

3

'Earnings Forecasting Research: An Overview and Critique

Erik Peek

Research Memorandum 1997-44

August 1997



Earnings Forecasting Research: An Overview and Critique



Erik Peek

Department of Accounting
Faculty of Economics and Econometrics
Vrije Universiteit Amsterdam
email: epeek@econ.vu.nl

July 1997

Paper presented at the 20th Annual Congress of the European Accounting Association, Graz, Austria, April 23-25, 1997

Earnings Forecasting Research: An Overview and Critique

Abstract

Past research has extensively addressed the influence of accounting information on stock prices. However, results of this branch of capital market based research have been inconclusive, partly due to methodological deficiencies. Focusing on differential groups of market participants, such as financial analysts forecasting earnings, might contribute to our understanding of the functioning of capital markets and the role of accounting information. In this paper an overview and critique of the earnings forecasting literature is presented. For the purpose of offering some insight into the present state of the earnings forecasting research and detecting the remaining deficiencies in our understanding of financial analysts a classification is made, Studies are divided into process-oriented studies and results-oriented studies. Studying individual forecasting *processes* is necessary, since earnings forecasts at the aggregate level are found to be distorted by inefficient individual information processing. However, process-oriented studies do not cover all aspects of the earnings forecasting process. For that reason, judgmental forecasting and decision making literature is drawn into the discussion to provide some directions for future research.

1. Introduction

This paper reviews the accounting research on financial analysts' earnings forecasting. Financial analysts are important intermediaries in capital markets between disclosure and usage of financial information. Our understanding of the functioning of capital markets and the role of accounting information may therefore be improved by focusing on these interpreters of fundamental information. This paper provides a non-exhaustive summary of achievements, limitations and remaining deficiencies of earnings forecasting research.

In the 1960s a paradigm shift in accounting research could be observed. Positive accounting research, aimed at explaining and predicting accounting phenomena, gained popularity at the expense of normative prescriptive accounting research. As explanation and prediction in positive accounting research both need an underlying theory, usually economics or behavioral sciences, in one branch of positive accounting, financial economic theory forms the basis of analyzing practices in capital markets. This stream of research, known as market based accounting research, brought forth studies on the relation between stock prices and accounting information, initiated by Ball and Brown (1968) to determine the 'usefulness' of reported earnings. In their reasoning unexpected earnings should be associated with stock price changes in order to be informative to financial market participants. Implicit assumption is that a stock price movement indicates information usefulness. The reported information content of published earnings in these studies seems to be disappointing, bearing in mind that earnings are an important focus of financial analysts and investors (Lev 1989). One reason may be that many earnings disclosures are preceded by public disclosures of related information, which consequently causes financial analysts to anticipate earnings changes.

Next to this, more recent studies address methodological misspecifications (e.g. Lev 1989). In the Ball and Brown study and most following studies (e.g., Ali and Pope 1995; Bernard and Stober 1989) the amount of unexpected earnings equals the difference between realized earnings and a time-series based earnings forecast. Underlying notion of early earnings forecasting research is that if financial analysts' earnings forecasts outperform time-series based earnings forecasts, preference should be given to the former as a market expectations proxy. Thus, much research has concentrated on earnings forecasts as a proxy for capital market expectations since the 1980s (see Brown 1993).

In course of time more researchers have begun to focus on the earnings forecasting process itself, simply motivated by the importance of financial analysts as users of financial statement information and as intermediaries between capital suppliers and companies. In this context financial analysts represent the group to whom financial reporting is and should be addressed (Schipper 1991). Although most studies still make use of aggregated market data, the individual analyst is the focus of analysis and more behavioral aspects are emphasized in this branch of the earnings forecasting research. One may conclude that in course of time a subservient role of earnings forecasting research has given way to a more central role. In the

1980s this development ran parallel to a more general change process in (behavioral) judgment and decision making research. Behavioral studies shifted from a descriptive to an explanatory approach and understanding imperfections in human decision making gained a more prominent position (see Ashton and Ashton 1995).

The historical setting in which both aforementioned roles of forecasting research have been discussed does not preclude that most research studies on financial analysts' earnings forecasts have been led and are still led by one of these two motives (Schipper 1991), i.e., improving earnings forecasts as a proxy for market expectations or gaining insight into the earnings forecasting process and results'. In addition a third motive may stem from the unsatisfactory results of information content studies (e.g., Lev 1989) and the awareness that stock prices are less suitable in indicating information usefulness. First, some studies find evidence of a delayed stock price reaction to the disclosure of financial information (e.g., Stober 1992). Second, some researchers suggest that stock price changes are partly internally generated. Apart from some investors incorporating released accounting information into stock prices, market participants show characteristics of noise traders, selecting stocks on the basis of simplistic rules. This may result in chaotic price movements and distortions of the assumed linear effects of exogenous shocks (see Etheridge and Sriram 1993). For instance, Hand (1990) establishes that stock price reactions subsequent to accounting changes are dependent on whether the marginal investors setting prices can be characterized as unsophisticated or sophisticated. Intuitively, earnings are forecasted by fundamental information analysts and earnings forecasts are therefore more suitable in information content studies than stock prices.

In this paper a review of the earnings forecasting literature is presented, without the intention to summarize all relevant literature, but merely to offer some insight into the present state of the research. Earlier papers addressing developments in earnings forecasting research have focused on earnings forecast properties and market expectations proxies (Givoly and Lakonishok 1984; Brown 1993; Williams 1995). This paper provides a broader perspective, mainly by examining the earnings forecasting process. The remainder of this paper is organized as follows. The next section segregates research on financial analysts' earnings forecasts into process studies and result studies, partly consistent with some former classifications (Brennan 1991; Maines 1995). Sections 3 and 4 attend to the present state of the research that falls within these categories. A summary and conclusions are presented in the final section.

2. Classification of analysts' earnings forecasting research

Classification of earnings forecasting studies may be essential for a thorough understanding. Herein categories partly correspond with those of Brennan (1991) and Maines (1995). Brennan divides the research flowed from the study of Ball and Brown into two

groups, namely market reaction studies and valuation studies. Market reaction studies are directed at the determination of the effect of new accounting information on capital market phenomena measured within a short time-period. Valuation studies relate share prices to disclosed accounting information. Although not generally applicable, Brennan connects the term level of stock prices to valuation studies and the term short-term changes in stock prices to market reaction studies to stress the differences between both groups. Thus, in market reaction studies the dynamics of the capital markets are the focus of attention, whereas in valuation studies static market characteristics are.

An alternative classification can be obtained from Maines (1995), who reviews a wide variety of judgment and decision making research in financial accounting. Whereas in Brennan's classification studies from both categories view the incorporation of public information in stock prices as a black-box process, Maines explicitly differentiates between studies aimed at determining the relation between input and output of decision processes and studies aimed at explaining this relation, i.e. analyzing the black box. These studies can be specified as input studies and process-output studies respectively.

In this paper a division into two groups will be made, that is, process-oriented studies and results-oriented studies. Some aspects of Brennan's distinction between static and dynamic market characteristics may be found in this classification. Process studies can be defined as studies aimed at the determination of the dynamics of financial analysts' decision making when forecasting earnings. Result studies attend to the properties of the resulting earnings forecasts. Moreover, in many respects this classification corresponds with that of Maines. Above all, the black-box approach may be retained in the result studies, while process studies are directed at unraveling the presumably complex forecasting process of financial analysts. However, in most studies under examination the input of analysts' earnings forecasting is considered to be given or varied in order to analyze the influence on forecasting processes and results. For that reason more appropriate appellations seem to be process-oriented studies and result-oriented studies.

In section 3 and 4 result studies and process studies are subdivided into three categories. In an abstract model of reality people undertake three roles to generate and process a flow of financial information, i.e. disclosure, analysis and information use roles (cf. Richardson and Gibbins 1991). Consequently, in examining the analysis role, including earnings forecasting, three different subjects should be the focus of attention, since all roles are subject to environmental influences, e.g. competition in product and capital markets, and market participants who are active in one of these areas continuously interact. That is, process-oriented and results-oriented studies may address the analysis role itself, environmental factors and interactions between roles. These three subjects lay the foundation for three subcategories, respectively earnings forecasting process or results, interactions of disclosure of accounting information and earnings forecasting, and the analysts' environment, encompassing both

environmental influences and the remaining interactions between roles. Figure 2 presents a schematic overview of research topics addressed, consistent with the above classification.

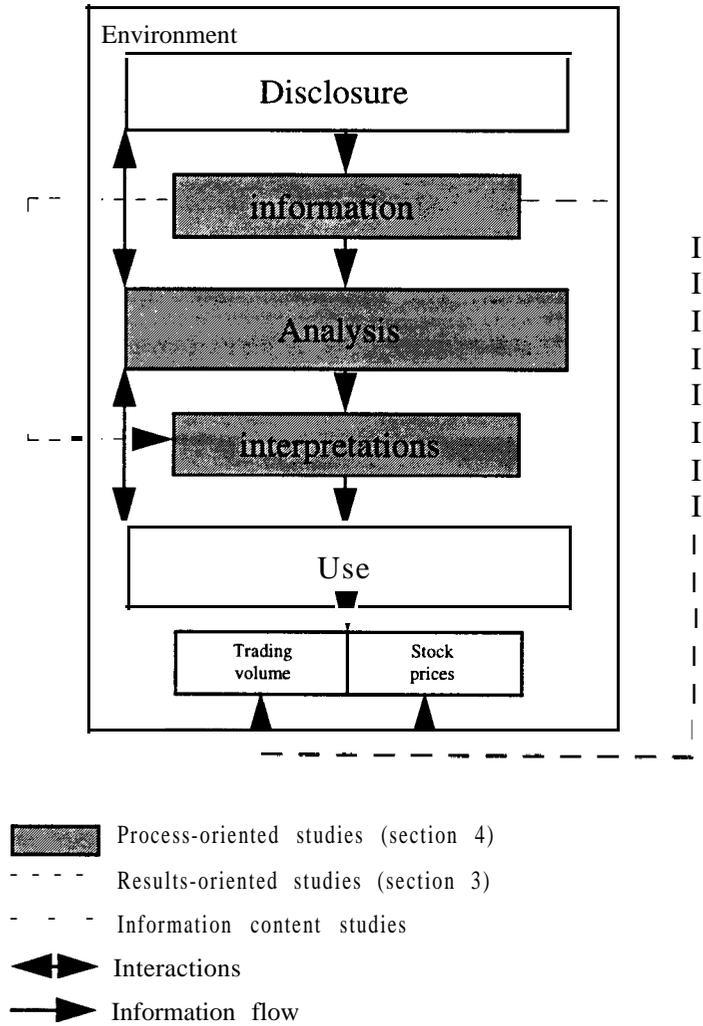


Figure 1

In conclusion may be noticed that while a pure distinction between valuation studies and market reaction studies seemed to be impossible (Brennan 1991), process studies and result studies are not purely distinct either. Therefore, the discussion of the literature dealing with result-oriented studies inevitably contains elements of process-oriented studies and vice versa. Although intuitively processes should precede output, in the next section results-oriented studies are dealt with, previous to the discussion of earnings forecasting process-oriented research, mainly because many subjects of attention in process-research stem from imperfections found in results-oriented research.

	Analysis role - Forecasting properties	Accounting information	Environmental influences and interactions between roles
Results-oriented studies (section 3)	subsection 3.1 Relative and absolute performance of earnings forecasting models	subsection 3.2 The incorporation into earnings forecasts of: <ul style="list-style-type: none"> · historical information on earnings, cash flows and accruals; · dividend; · financial statement information; · accounting changes. 	subsection 3.3 <ul style="list-style-type: none"> • The incorporation into earnings forecasts of stock prices and management forecasts; · The influence of earnings forecasts on capital market activity; • The influence of firm, industry and macro-economic variables on earnings forecasts; · Financial analysts' incentives.
Process-oriented studies (section 4)	subsection 4.1 <ul style="list-style-type: none"> · Providing a general framework of financial analysts' earnings forecasting process (identification of forecasting protocols); · Identification of stages in the financial analysts' earnings forecasting process. 	subsection 4.2 <ul style="list-style-type: none"> · Usage and usefulness of accounting information in the earnings forecasting process; · Accounting information usage in differential stages of the earnings forecasting process. 	subsection 4.3 <ul style="list-style-type: none"> • The influence of ability, knowledge, environment and motivation on the forecasting process; • Learning and feedback; · The effect of the dynamics of the environment.

Figure 2

3. Results-oriented studies

Results-oriented studies are directed at the characteristics of financial analysts' forecasts and the relationship between input and output of the forecasting process. Considering their share of the most influential accounting articles (4 out of 26), these studies play an important role in accounting research (Brown 1996). In this section results-oriented studies are subdivided into studies aimed at the empirically established properties of earnings forecasts, studies that address the importance of accounting information and studies that address environmental influences.

3.1 Earnings forecasts properties

Relative performance of forecasting models

Usage of earnings forecasts as a proxy for market expectations has stimulated many to compare financial analysts' earnings forecasts properties to properties of alternative earnings forecasts. Additionally, in the light of information economics studying the relative performance of alternative earnings forecasting mechanisms may be useful in determining the reasonable degree of effort financial analysts should expend to predict earnings. Moreover, these studies resemble or may even be seen as a branch of the lens model research, in which individuals' judgments are modeled and the accuracy of these is compared to the outcomes of

linear statistical models (see Maines 1995), providing some insight into the information cue usage of financial analysts.

Most commonly four different forecasting models are examined:

1. *time-series-based models*;
2. *security price-based models*;
3. *financial analysts models*;
4. *financial statement-based models*.

Time-series models are based on the existence of permanent components in earnings, resulting in serial correlation. Security prices have predictive ability because of the argument that price changes anticipate earnings changes (Kothari and Sloan 1992). Stock prices reflect market expectations of a company's future profitability, whereas through conventions underlying used accounting principles reported earnings mirror these expectations in future periods. Thus, earnings suffer from a lack of timeliness (e.g., Collins *et al.* 1994; Lev 1995), which is most evident in fast changing industries, where companies' valuable investments in intangibles, such as R&D, depress earnings and book values (e.g., Amir and Lev 1996).

According to Elgers and Murray (1992) accuracy of financial analysts' earnings forecasts does not significantly differ from accuracy of security price-based forecasts. However, due to the usage of distinct elements of available information both models provide complementary sources of information. Brown *et al.* (1987a) conclude that analysts' earnings forecasts outperform time series based forecasts and that the higher predictive ability of financial analysts is due to the existence of two different advantages analysts have over time-series models:

1. *contemporaneous advantage*;
2. *timing advantage*.

A contemporaneous advantage exists because of financial analysts' superiority in processing all available information. The difference between the initiation date of time-series models and the initiation date of financial analysts models causes a timing advantage. Financial analysts are able to make use of information published after the initiation date of time-series models, since forecasts are made some time after the earnings release date.

In completion Brown *et al.* (1987b) expand the contemporaneous advantage by ascribing the forecasting advantage to the characteristics of the information upon which analysts base their forecasts. The information usefulness may be related to the quantity, precision and correlation of available data. In some way this explanation corresponds with two reasons for the superiority of statistical models suggested in some studies on judgment and decision making: decision makers may be subject to suboptimal choice of information and imperfect combining of information (see Maines 1995).

A forecasting model not extensively discussed in the earnings forecasting literature is a financial statement-based model. Ou and Penman (1989) find evidence that financial

statement information has the ability to predict future earnings and that a trading strategy based on financial statement information can be profitable. Profitability of market transactions purely dependent on historical information implies that stock prices do not yet impound all available information. Investors' ignorance of some financial statement information might be accompanied with financial analysts' ignorance, in which case financial statement-based forecasts can be incrementally informative beyond the information reflected in financial analysts' forecasts. Stober (1992) documents a marginal superiority of financial analysts' earnings forecasts over financial statement-based forecasts in predicting the signs of **one-year-ahead** changes in earnings per share. He also finds both models to contain incremental information, most evidently when predictions disagree.

The superiority of financial analysts' earnings forecasts does not hold for every possible contingency. Determining factors that influence competitive advantages of financial analysts is of substantial importance, since it helps explain forecast accuracy and it aids researchers in selecting control variables in research designs that employ samples with cross-sectional variance on certain firm characteristics (Branson *et al.* 1995).

In some studies the time-series models examined provide competitive forecasts for smaller firms (e.g., Brown *et al.* 1987b; Elgers and Murray 1992; Branson *et al.* 1995), whereas Kross *et al.* (1990) find contrasting evidence that firm size has no significant effect. Based on these ambiguous conclusions firm size cannot be accepted unequivocally as an influential factor. However, more factors than firm size alone have been studied and agreed on to have a significant effect on the analysts' advantage. Among these factors are historical variability of earnings, the amount of press coverage (Kross *et al.* 1990) and prior forecast dispersion (Brown *et al.* 1987b). Factors that have been found to be of no influence are: subperiods under examination, forecast horizon, forecast error definition, conditioning fiscal quarter and statistical test upon which inferences are drawn (Brown *et al.* 1987a). Further environmental influences will be discussed in subsection 3.3.

Although results from these studies provide some indications of analysts' forecast accuracy and environmental influences, it should be noted that most of these are motivated by the need for an improved market expectations proxy. Time-series models are subjectively chosen and tested jointly with analysts' forecasts. Therefore, it is impossible to draw inferences from these studies without considering the effect of (the choice for) a benchmark model. Other studies discussed in the remainder of this paper allow for less conditional conclusions on characteristics of analysts' earnings forecasts.

Absolute performance of forecasting models

Instead of examining analysts' earnings forecast errors in combination with alternative forecasting models' performances, some have searched for trends or consistencies in statistical properties of analysts' forecasts. On average earnings forecasts errors would be expected to

tend to zero, but analysts' forecasts have been empirically found to be positively biased (Brown 1993)². Whether this optimism reflected in forecasts is intentional or unintentional could be subject of discussion between supporters of the Efficient Market Hypothesis and behavioral researchers. Francis and Philbrick (1993) attribute a positive bias in earnings forecasts to the analyst-management relation. The management of a followed company is found to be an important source of information for financial analysts in predicting earnings. Analysts are anxious to accept the consequences of unfavorable forecasts imposed by the management of a firm and therefore eager to produce overly optimistic reports.

The findings of Francis and Philbrick can be employed to demonstrate that rationality of analysts does not always coincide with semi-efficient earnings forecasting. In the described situation alternative incentives may cause financial analysts' rational actions to result in a decrease in forecast accuracy. However, analysts' behavior might still be explained by the Efficient Market Hypothesis when costs of gathering, processing and reporting information are taken into consideration (cf. Jensen 1978). These transaction costs, i.e. discounted future costs of a distorted relation with the management of a company, may outweigh the benefits of increased forecast accuracy and allow for deliberately ignoring relevant, though costly information. Such an 'information perspective' partly contradicts Brown's (1993) conclusion that "...a finding that analysts ignore publicly available information is unsatisfactory to capital markets researchers who advocate semi-strong form market efficiency, but it is satisfactory to behavioral researchers who maintain that people consistently overweight some cues and underweight others..." and in a measure brings some empirical evidence on earnings forecast properties into agreement with capital market based research assumptions.

A second, more obvious explanation for a positive bias in earnings forecasts is the existence of a direct relation between the management of a *followed* company and the management of a *following* company. Investment bankers involved in forecasting earnings will force their analysts to cultivate relations with clients and on this behalf to act optimistically. Studies that make notice of this possibility are those of Lin and McNichols (1993) and Dugar and Nathan (1995). Additionally, Dugar and Nathan empirically prove that private information exchanges between financial analysts faced with these incentives and the management of an investment bank's client suffice to produce forecasts that are as accurate as those of non-investment banker analysts.

Both explanations bear on conscious actions of financial analysts and the biases at issue may therefore be called *reporting biases* (see, Francis and Philbrick 1993). Alternative explanations relate to *processing biases*. If forecast errors are associated with unanticipated macro-economic information that is negatively affecting many firms, then on average financial analysts may overstate earnings (O'Brien 1988). Moreover, financial analysts have been found to underreact to earnings information (e.g., Mendenhall 1991; Abarbanell and Bernard 1992).

Consequently, they produce overly optimistic forecasts for firms with recent negative earnings. A discussion of the underreaction anomaly will follow in subsection 3.2.

3.2 Earnings forecasts and accounting

Based on the assumption that financial analysts predict earnings in a semi-efficient manner, all available relevant information should be impounded in analysts' forecasts. In the preceding subsection financial analysts' earnings forecasts were found to outpredict time-series based forecasts and financial statement-based forecasts. This superiority of financial analysts models does not imply that financial analysts make use of the information conveyed by alternative models. As mentioned before usage of distinct elements of available information may lead to complementary predictive ability (see Conroy and Harris 1987; Elgers and Murray 1992). Many authors have studied the degree of incorporation of accounting information in earnings forecasts, mostly focusing on historical earnings information. The accuracy of investment analysts' earnings forecasts depend on this degree of incorporation in case forecasts errors are correlated with relevant information components. However, conclusions on irrationality of investment analysts should be made with caution, because ignoring relevant information could stem from rational thinking (e.g., Francis and Philbrick 1993). Next to this Brown (1993) argues that since much research employs consensus data instead of individual data, results of consensus analyses may be distorted by individual forecasts made before the publication date of the presumably under- or overweighted information.

Studies on the usage of prior accounting information include Abarbanell and Bernard (1992), and Mendenhall (1991). Both present evidence that on average analysts underreact to publicly available earnings information, whereas Maines and Hand (1996) attempt to put these results into perspective by analyzing individuals.

Mendenhall investigates whether financial analysts systematically underestimate the persistence of earnings forecast errors and whether investors understand the meaning of subsequent earnings forecast revisions. The correlation found between consecutive earnings forecast errors implies that financial analysts do not fully incorporate the information conveyed in earnings announcements, resulting in not fully rational forecasts revisions. Under-reactions seem to be higher for more recent quarterly earnings (Abarbanell and Bernard 1992). In spite of this lack of rationality investors make use of forecast revisions in re-evaluating the persistence of past earnings surprises. Abarbanell and Bernard conclude that the underreaction of analysts to earnings information only partially explains anomalous behavior of investors resulting in a post earnings-announcement drift³.

Tests of the universality of the documented underreaction have been executed by Ali *et al.* (1992), and Maines and Hand (1996). On average Ali *et al.* find a positive correlation between subsequent annual earnings forecasts. However, analysts' misperceptions of earnings time-series information are larger for firms with highly permanent earnings. Maines and Hand make

use of an experimental approach to individually analyze forecasts of M.B.A. students. They conclude that the correctness of individuals' earnings forecasts depends on the value of the autoregressive component of a Brown-Rozeff time-series^{4,5}. The documented imperfections in financial analysts' incorporation of earnings time-series information in earnings forecasts implies that time-series of earnings possess incremental information over analysts' earnings forecasts. Ali *et al.* therefore find improved earnings forecasts after adjusting analysts' forecast for time-series information.

The findings of Mendenhall (1991) and Abarbanell and Bernard, consistent with analysts' underreaction to recent earnings information, are at variance with behavioral concepts of market participants' actions. Kahneman and Tversky (1973) establish that individuals' forecasting is subject to myopia, that is, individuals make too extreme predictions when those predictions are solely based on recent data. Elaborating on these basics of human predictions DeBondt and Thaler (1990) provide evidence that financial analysts' professional activities display comparable irrationalities. Financial analysts seem to overreact to recently published earnings information, which is in complete disagreement with the conclusions of Abarbanell and Bernard, and Mendenhall. In defense of their results Abarbanell and Bernard prove that DeBondt and Thaler's empirically found overreaction does not denote an extreme reaction of analysts to recent earnings, since particularly prior poor performing firms are subject to overly optimistic forecasts. Overall, this question is still open to debate.

Research on the information content of published earnings as initiated by Ball and Brown (1968) has reached a stage where non-earnings information and non-financial information are related to stock prices in order to determine their incremental contribution to price movements beyond earnings. A linkage can be made between the information content literature and the earnings forecasting research. If non-earnings information is significantly associated with stock market returns, it could imply that both financial analysts and investors make use of this information in forecasting future profitability or that price reactions are preceded by financial analysts' interpretations.

Some studies (Rayburn 1986; Wilson 1987; Ali and Pope 1995) indicate that dividing earnings into its two basic components, cash flow and accruals, generates new information, since investors value these components differently. However, opposing ideas exist (Bernard and Stober 1989; Board and Day 1989) and inferring from these studies conclusions on the information content of cash flows over earnings still seems to be premature. Moses (1991) links these studies to the earnings forecasting research. Residuals of a regression of unexpected earnings and earnings forecast revisions are found to be related to unexpected cash flow measures. Moses concludes that decomposition of earnings into working capital from operations and non-current accruals is the most informative to financial analysts.

The informative function of reported earnings and cash flows basically rests on the assumption that historical earnings and cash flow information signals future cash flows. In this light dividends are also mentioned as a 'signaling mechanism' and therefore useful in forecasting earnings. Sant and Cowan (1994) present evidence that dividend omissions lead to increased return variance and increased earnings forecasts dispersion. Their results suggest that both investors and financial analysts are harmed by the absence of management's dividend signals. In sum, earnings, cash flows and dividends have been found to have information content for and to be used by financial analysts. Moreover, findings that financial statement information incrementally explains future earnings (Stober 1992) mean that besides from earnings and cash flow information analysts do not fully benefit from the information reflected in financial statements either.

One question remains unanswered. Interesting topic for further research is the role of accruals in forecasting earnings and more specifically the role of discretionary accruals. In any case accruals are related to earnings in future periods because of corrections for accrual forecast errors (Dechow *et al.* 1995) and future reversals. Again, information content beyond that triggered by accrual forecast errors and reversals should stem from the usage of accruals as a signal by the management of a company about future cash flows.

Dechow (1994) shows that accruals enhance the information content of cash flows. She mentions two generally accepted explanations. First, accruals help overcome timing and matching problems in cash flows. Expenditures may have a positive effect on future performance, while they negatively influence present cash flows. Matching these negative amounts with future revenues mitigates timing and matching problems and decreases variance of earnings, but reduces timeliness of published earnings as well (e.g., Collins *et al.* 1994). The influence of matching is therefore rather ambigü. Second, accruals are dependent on management's discretionary choices. Discretion can be employed as a signaling mechanism. As far as management does not use its discretion over accruals opportunistically to mislead stakeholders, signals in accruals on future profitability may improve earnings' informative function.

According to Dechow the net effect of accruals on the information content of earnings is an empirical question. Subramanyam (1996) examines the pricing of discretionary accruals. In his opinion a positive net effect of discretionary accruals should indicate that investors set value on these earnings components. Conclusion is that the capital market prices both discretionary and non-discretionary accruals. Accruals seem to contribute to the mitigation of timing and matching problems and the effectiveness of management's signaling.

While a lack of research on the effect of discretionary accruals on earnings forecasts in general exists, some studies deal with the influence of specific discretionary items. Amongst others Biddle and Ricks (1988) and Elliot and Philbrick (1990) investigate whether financial analysts are misled by the usage of accounting changes. Accounting changes may have their

influence on accounting income, whereas 'true' economic income should be invariable. Therefore, revisions of financial analysts' earnings forecasts should not exceed the amount of future earnings change that could normally be expected consequent the adoption of new accounting methods. Biddle and Ricks restrict their analysis to a sample of firms adopting LIFO-valuation and conclude that financial analysts systematically overestimate future earnings of the firms concerned due to fixation on current earnings changes. More generally, Elliot and Philbrick document a decrease in financial analysts' forecasting accuracy in years with accounting changes, manifesting itself most evidently in mandatory change years. Examination of the effect of accounting changes on dispersion in forecasts results in mutually more consistent conclusions for voluntary and mandatory changes. Overall, in the absence of prior disclosure financial analysts seem to be less able to correctly predict earnings.

In their discussion on accounting changes and earnings forecasts Elliot and Philbrick compare forecast errors in change years to forecast errors in non-change years and suppose that "...expectations about the association of forecast revisions and the income effects of accounting changes are conditional on the association between forecast errors and accounting changes." With that they merely test to what extent financial analysts are able or willing to process all technicalities of accounting changes. However, accounting changes subject to management discretion may be informative about changes in management's future earnings expectations (see, e.g., Hughes and Schwartz (1988) on the LIFO/FIFO choice) and consequently cause an increase in future forecast errors when they are not fully accounted for. Recognition of these two possible effects is of substantial importance, so that an interesting extension of the Elliot and Philbrick study would be to examine the effect of accounting changes on analysts' forecast errors in years following the change year. The need of allowing for more than one effect should apply to both voluntary and mandatory accounting changes. While discretion in voluntary changes seems obvious, mandatory changes are subject to some discretion as well. Balsam *et al.* (1995) document a discretionary use of the flexibility in the timing of adoption⁶.

3.3 Earnings forecasts and the analysts' environment

In section 2 it was assumed that the roles within the production, analysis and use of financial information are subject to environmental influences. Moreover, individuals fulfilling these roles participate in the creation of the environment of individuals fulfilling alternative roles. The following discussion of the interdependencies of earnings forecasts and the financial analysts' environment will concern some factors that directly stem from market participants which are taking on an information use role. However, the influence of the disclosure role, of which accounting information disclosure has been discussed in the preceding subsection, remains largely beyond the scope of the definition of environmental

factors used in this subsection and the discussion is limited to the influence of management earnings forecasts⁷.

Interactions between disclosure, analysis and use

The recognition and understanding of earnings forecasts properties is important since financial analysts are amongst the most relevant users of financial accounting information, but above all since financial analysts intermediate between demand and supply of capital. Accuracy and rationality of earnings forecasts may have its effect on the perceptions of other market participants. Therefore, some research is directed at analyzing and comprehending the relation between analysts' forecasts and investors' reactions. In conformity with earnings-price research the information content of earnings forecasts can be determined on the basis of stock price changes. Naturally correlation between earnings forecast revisions and stock price changes exists since both analysts' and investors' actions rest on conformable elements of available information. Thus, causality between revisions and price changes should be investigated during a short period centered on the forecast announcement date. Revisions of financial analysts' earnings forecasts are related to changes in stock prices during the forecast announcement period, indicating forecast usefulness (Lys and Sohn 1990). Even when earnings forecasts are preceded by forecasts of other financial analysts within less than three days they provide new information to investors, that is, revisions are associated with market returns. Investors expect analysts to act independently and have a need for confirmatory information.

A different effect of earnings forecasts on capital market activity is that of forecast dispersion on trading volume. Trading volume may depend on both forecast dispersion and mean forecast revision. Correlation between forecast revisions and trading volume is a direct consequence of the previously mentioned informative properties of earnings forecasts. Theoretically, through differing interpretations by market participants earnings forecast revisions may even lead to changes in trading volume in absence of substantial price changes. Using mean forecast revisions as a control variable Ajinkya *et al.* (1991) provide empirical evidence that financial analysts' forecast dispersion and trading volume of common shares outstanding are positively associated. Thus, forecast dispersion has an incremental effect on trading volume, possibly since it might proxy for differing beliefs about a firm's future stock returns. In completion Barron (1995) proves that abnormal trading volume is caused by both heterogeneous earnings expectations and differential belief revisions that may even result in homogeneity*.

Lys and Sohn (1990) conclude their discussion with a most fundamental question. If earnings forecasts are informative and disclosure evokes investors' trading, why do financial analysts publicly disclose this information rather than employ it to their own advantage. Market efficiency requires that financial analysts are indemnified for their loss of profit.

Possibly, since financial analysts may be one of many devices to monitor whether the management of a firm breaches contractual agreements (Ball and Foster 1982), agency theory may shed some light on this problem. Owing to financial analysts' economies of scale reductions in monitoring costs may occur (see Leland and Pyle 1977) and increase the value of a firm (see, e.g., Moyer *et al.* 1989; Chung and Jo 1996). A complete answer to this question desires a theory that describes and explains financial analysts' disclosing behavior, which remains an avenue of future research.

Stock prices have been regularly studied as possibly important sources of information to financial analysts. As indicated in subsection 3.1, the finding of Kothari and Sloan (1992) that stock price changes anticipate earnings changes implies that information about future earnings is conveyed in stock prices. Questionable is whether financial analysts actually process stock price information, since intuitively stock price changes should follow earnings forecast revisions, particularly if profitability of predicting earnings is conditional upon market reactions. Therefore, an appealing explanation for a positive correlation between stock price changes and consequent forecast revisions is that unexpected price changes act as incentives for analysts to obtain supplementary information (Brown *et al.* 1985). A second possibility is that stock prices help analysts interpret publicly available information.

Most studies on the incorporation of stock price information are not motivated by the desire to determine analysts' rationality, but simply by the need to improve consensus earnings forecasts as a market expectations proxy by means of corrections for stock price changes (e.g., Abarbanell 1991; Elgers and Murray 1992; Elgers and Lo 1994). Abarbanell examines the association of earnings forecast errors and stock price changes. Starting-point of his analysis is a model that closely corresponds with that of Brown *et al.* (1985), i.e., stock prices combine informed and uninformed traders' beliefs about future earnings and consequently produce a noisy signal altering the beliefs of uninformed traders and stimulating them to obtain new information. The documented correlation between prices and errors involves imperfections in financial analysts' stock price information processing. Important in this respect is the conclusion of Elgers and Murray (1992) that security-price based forecasts provide a complementary source of information. Otherwise, correlation between price changes and consequent forecast revisions might be due to the fact that revisions only confirm information in prices, particularly since results of consensus analysis may be distorted by individual forecasts made before the date of the stock price change (Brown 1993, see subsection 3.1).

The relevance of stock price information to financial analysts shows that important environmental factors are readily available interpretations of public information. Comparable are management earnings forecasts, which have been found to be informative to financial analysts (Hassell *et al.* 1988). The advantage that management earnings forecasts have over information conveyed in stock prices is that through management forecasts private information may be signaled to investors and analysts. The usefulness of a management's

earnings expectations disclosure depends on both relevance and believability of its forecasts. The latter is embodied by the ability and incentive of the management to forecast accurately (see, e.g., Williams 1996). However, informal contacts between analysts and managers as previously mentioned by Francis and Philbrick (1993) might reduce the informational asymmetry and with that lower the usefulness of management earnings forecasts. In this respect results of information content studies will be distorted, since conditional on their relation with managers, analysts set different values on publicly available prospective management information, i.e. management earnings forecasts. Another distortion results from the voluntary nature of publication of management earnings forecasts, which causes examined companies to be self-selected (Bartley and Cameron 1991).

Despite these two difficulties in determining the usefulness of management earnings forecasts, some factors have been found to generally influence analysts' reactions to such disclosures. First, financial analysts' forecast revisions are expected to depend on the reputation of a management, which is partly based on past forecasting records. Williams (1996) finds consensus analysts' reactions to be positively related to past management's forecast accuracy relative to analysts' forecast accuracy. Thus, prior management forecast usefulness indicates believability. Second, capital markets' price reactions or the underlying information sets appear to be used by analysts to determine the credibility of management earnings forecasts (Baginski and Hassell 1990). Third, Williams (1996) provides some additional influential factors, such as the content and timing of management earnings forecasts. Financial analysts perceive management forecasts representing bad news to be more believable than good news forecasts and analysts' responses are larger in the fourth quarter of a company's fiscal year (Baginski and Hassell 1990).

The environment

The remainder of this section will address the environmental influences on the financial analysts' earnings forecasts, which are not created by a disclosure or an information use role. Two facets of the environment can be distinguished: the information environment *which* the analyst analyses and the forecasting environment *in which* the analyst operates. The environment of an analyzed firm is mainly determined by firm, industry or macro-economic characteristics. Cross-sectional variances in characteristics, however, have not been extensively examined. Most research has restricted itself to an explicit discussion of the distortion of cross-sectional studies by variance in firm-specific factors, particularly firm-size. Consequently, Brown (1993) mentions this research area as a direction for future studies. Studies that engage in the determination of influential factors, mainly stem from the testing of relative forecasting advantages of financial analysts over earnings time-series (see subsection 3.1). In such case environmental variables may proxy for attributes of these advantages.

Findings on the association of firm size with analysts' earnings forecast accuracy diverge. For example, Brown *et al.* (1987b) show that the difference between accuracy in financial analysts' earnings forecasts and accuracy in earnings time-series forecasts increases with firm size, whereas Kross *et al.* (1990) claim that no relation exists. Other influential firm characteristics have been presented by Kross *et al.* as well. First, they provide empirical evidence that variability of past earnings is related to the financial analysts' relative forecasting advantage and argue that increasing variability diminishes the forecast accuracy of earnings time-series and consequently induces the financial analyst to gather alternative information. Confirmation of these results is offered by the study of Branson *et al.* (1995). Second, the level of press coverage is found to be associated with the amount of available information that is valuable to financial analysts and increases forecast accuracy.

Kross *et al.* indicate that in their sample firm size has no significant effect on the financial analysts' advantage over earnings time-series predictions. As it appears from the results, both variables are highly correlated and some doubts may be raised about whether the level of press coverage does not simply proxy for firm size. Actually, both might proxy for the same characteristic of a firm's information environment, that is the dimensionality of the information set (Brown *et al.* 1987b). However, the conclusions of Kross *et al.* (1990) hold after controlling for firm size and after explicit consideration of cross-correlation. Finally, Branson *et al.* (1995) report a significant negative relation between firm size and the analyst forecast advantage. It should be noted however that this study is restricted to a small-size sample and that analysts forecasts are found to improve as firm size increases. Results are distorted by the fact that the ARIMA time-series forecasts improvement is faster, which emphasizes that studies on analysts' forecast advantage jointly test analysts forecasts and time-series-based forecasts.

As well as the followed firm's environment, characteristics of the forecasting environment in which the analysts operate are important influential factors of financial analysts' earnings forecasts. First, a distinction can be made between sell-side analysts and buy-side analysts. Most generally, sell-side analysts are employed at investment or brokerage firms, distributing their forecasts externally, whereas buy-side analysts forecast to advise their employer, i.e. banks, pension funds and insurance companies. Both types are subject to dissimilar incentives. As previously noted, as investment or brokerage firms participate in the underwriting of a firm's stock, a conflict of interest may arise. Managers may pressure analysts under their supervision to produce positive recommendations (Lin and McNichols 1993) and with that indirectly force them to report overly optimistic earnings forecasts. Confirmation of these results is offered by Conroy and Harris (1995), who examined Japanese financial analysts' earnings forecasts.

Secondly, while differences between buy-side analysts and sell-side analysts determine some statistical properties of forecast errors, the level of competition between individual sell-

side analysts, resulting from conformity, may influence financial analysts' earnings forecasts as well. Cross-sectional differences in analysts' forecast accuracy have been found to be small or non-significant (O'Brien 1990; Butler and Lang 1991). Lys and Soo (1995) theorize that based on the presumption that sell-side analysts' rewards are associated with brokerage firms' commissions on trading, analysts will be inclined to follow companies with increasing trading volume. Financial analysts already in these markets have an incentive to increase the forecast accuracy to reduce new market entries. Consequently, trading volume is related to both analyst following and forecast accuracy. Comparatively, decreasing earnings predictability and availability of information will lead to decreasing forecast profitability, lower competition and less accurate earnings forecasts.

4. Process-oriented studies

In section 2 some differences between process and result studies were presented. At the risk of oversimplification, in this section process studies will be characterized as studies that add one dimension to the input-output relation, i.e., financial analysts' time-consuming actions in fulfilling their forecasting tasks. In order to analyze financial analysts' forecasting actions, process studies are largely directed at the individual level rather than at the aggregate level. The commonly used premise of capital market efficiency has kept researchers from studying individual behavior of market participants, since individual irrationalities were assumed to be of transitory nature and expected to disappear at the aggregate level. However, as followed from the preceding section, result studies demonstrate that aggregate analysts' behavior displays some non-efficient information processing, thus indicating two possibilities: individual irregularities persist at the aggregate or aggregate behavior is subject to new biases (see Berg *et al.* 1995). Persistence of individual actions justifies explicit attention for process-oriented studies in this section.

4.1 The earnings forecasting process

Unraveling the forecasting process requires the identification of forecasting protocols. Essentially, process studies are directed at financial analysts' actions and typical characteristics of these actions. However, this subsection starts with a brief discussion and extension of the literature providing a general framework of decision making and gradually moves on to financial analysts' forecasting processes. In contrast to the process-tracing studies, studies on general frameworks do not aim to describe actual decision making processes, but merely provide 'as if-theories in order to predict individuals' decisions (see Ashton 1982). In the earnings forecasting literature little attention has been paid to financial analysts' earnings forecasting processes. In this subsection some indications for future research will be presented, starting from judgmental forecasting literature and taking into account some recent developments in the earnings forecasting research'.

A general framework of financial analysts' earnings forecasting

In studying decision making of accounting information users Ashton (1982) discusses two paradigms of human information processing, i.e., the lens paradigm and the subjectively expected utility paradigm. **Lens** model research aims at modeling individuals' judgments by determining the relationship between information cues and estimates or predictions of an environmental event. Resulting regressions are compared with linear models of actual events, in order to find out whether individuals properly weigh the importance of available data. Several studies have used the lens model to examine accounting decision making and forecasting. Examples are studies on bankruptcy prediction and the assessment of individuals' functional fixation with respect to accounting numbers. Moreover, many studies discussed in section 3 may be seen as a branch of the lens model research". The subjectively expected utility model describes individuals' choices in worlds with uncertainty. Individuals are assumed to maximize utility given the outcomes of possible actions and the subjective probabilities of events.

Although the lens paradigm and the subjectively expected utility paradigm provide useful frameworks for investigating human information processing, they do not contribute to our understanding of the forecasting or decision making **process**, since both paradigms are normative, black-box approaches. Normative, since outcomes of human judgment are compared with the outcomes of optimal models to determine how well, instead of how, people reason (see Hogarth 1993). Einhorn and Hogarth (1981) pose that "...to consider human judgment as suboptimal without discussion of the limitations of optimal models is naive." They sum up some of these limitations, amongst which are the conditional nature of optimality and the rejection of decision makers' pursuit of multiple goals.

Nevertheless, individually testing the axioms that underlie the subjectively expected utility model, such as transitivity, comparability, dominance, irrelevance and independence, offers some insight into the decision making process. Assumptions of rationality and detected biases and heuristics in human decision making and forecasting are the starting-point of further process analyses. Biases can be defined as individuals' systematic violations of underlying premises, which result from the use of simple judgmental decision making rules, i.e., heuristics". Moser (1989) empirically examines two heuristics which may cause biases in investors' predictions of a company's future profitability. First, investors are found to be subject to an output interference heuristic, which means that previously retrieved information from memory inhibits retrieval of further information. Second, the availability heuristic implies that investors' estimates of the likelihood of the occurrence of an event depend on the ease with which investors retrieve from memory the occurrence of similar events or plausible explanations¹².

In summary, the judgment and decision making literature provides some conditions for the development of a model of financial analysts' forecasting processes:

1. *Adaptation*. Decision makers are forced and have been found to be relatively adaptive to circumstantial factors of the decision making task, since the complexity of the tasks extends beyond the cognitive capabilities of decision makers (see Hogarth 1993). Furthermore, optimality of decisions is highly conditional on characteristics of the task environment (Einhorn and Hogarth 1981);

2. *Cognitive limitations*. Decision makers are subject to bounded rationality, replacing optimality goals with levels of aspiration, maximizing with satisfying (Simon 1982);

3. *Goal multiplicity*. Decision makers may be striving for the satisfaction of more than one goal (Einhorn and Hogarth 1981), possibly dividing the initial task into several sub-tasks.

Thus, in order to fully comprehend the existence of irrationalities and inefficiencies that resulted from earnings forecasting studies and most likely from lens model studies and subjectively expected utility studies, it is necessary to develop process-oriented models that to a larger extent correspond with cognitive processes of financial analysts.

In the act of modeling earnings forecasting one may consider task-specific characteristics which can be seen as an exploration of the adaptive nature of analysts' decision making processes. A characteristic that distinguishes earnings forecasting from many other decision making processes is the availability of presumably correlated historical earnings data. Intuitively, these data are an important information source to financial analysts when forecasting earnings, simply by detecting trends in earnings time-series. If these data were the only available source of information, financial analysts would be expected to produce earnings forecasts by means of statistical or judgmental time-series extrapolation. Essentially, earnings forecasting can be seen as judgmental time-series forecasting and judgmental forecasting literature may provide some directions for the development of a process-oriented model. The set of publicly available information, however, consists of both historical (earnings) data and contextual data. While analysts extrapolate consistencies from historical data, they may attempt to assess the variability of earnings, such as one-time events and structural changes (Bunn and Wright 1991), through interpretations of the present context.

Starting from the distinction between trend assessment and variability assessment, it would be the financial analysts' earnings forecasting task to efficiently weigh the outcomes of both assessments. To some extent the recognition of differential assessments matches the information search strategies employed by financial analysts, which have been documented by Biggs (1984), i.e., historical strategies and predictive strategies. Whereas predictive strategies include the identification of future values, historical strategies solely focus on past performance evaluation.

Differentiating between the assessment of trends and the assessment of variability is a starting point for the identification of forecasting processes and might contribute to our understanding of irregularities in financial analysts' forecasting. Out of all fairness it should be noted that, as appeared from studies discussed in section 3, outcomes of statistical time-series models and analysts' earnings forecasts provide complementary information (e.g., Mendenhall 1991; Abarbanell and Bernard 1992; Elgers and Murray 1992). Next to this, it was established that individuals judgmental time-series forecasting is subject to heuristics (Maines and Hand 1996). These studies indicate that analysts are not able or willing to properly process earnings trends into their earnings forecasts, which underlines the normative orientation of the aforementioned assumptions.

In departure from the assumptions of rationality both assessments may introduce differential heuristics and biases. Analysts' forecasting processes can exhibit these heuristics simultaneously (see Moser 1989; Peters 1993), however, heuristics and biases are possibly mediated through interactions of trend and variability assessment. The availability of contextual information may decrease analysts' need for and use of simplistic rules. Moreover, some authors mention that the availability of historical accounting information is expected to reduce the influence of heuristics on individuals' judgments (Moser 1989; Lawrence and O'Connor 1992; Peters 1993).

The recognition of a distinction between both assessments is to a large extent related to studies on increased forecasting accuracy by averaging various methods (e.g., Conroy and Harris 1987; Bunn and Wright 1991; Lawrence and O'Connor 1992; Webby and O'Connor 1996). Inferences drawn from this literature offer some helpful insights. First, as in much earnings forecasting research, in these studies judgmental and statistical forecasts have been found to be moderately correlated and of varying importance in changing environments. Contrary to the lens model and the subjectively expected utility model, subdividing financial analysts' forecasting task complies with the condition that optimal predictions are conditional on environmental assumptions, i.e., whether forecasts are produced in a stable or changing environment (see, e.g., Einhorn and Hogarth 1981). The effort expended to both forecasting tasks may be dependent on the characteristics of the underlying information set, which will be further discussed in subsection 4.3.

Second, human judgments have been found to benefit from increased experience, knowledge of contextual data and motivation. Hunton and McEwen (1996) build on upon the latter two factors and empirically examine the influence of motivational factors and information search strategy on earnings forecasts (see subsection 4.2). Third, judgmental forecasting studies show that judgmental methods are most accurate in highly informative environments. However, in these situations combination of statistical and judgmental methods is also most effective. Individuals seem to make insufficient use of the available contextual information, possibly referring to the existence of an information overload.

In sum, in creating a general framework and conceptualizing the earnings forecasting process one may seek refuge in the readily available research on judgmental forecasting. This branch of research provides insights into conditions in which human judgment seems indispensable and individuals' ability to extrapolate trends and to assess the impact of trend distortions.

Stages in the financial analysts' earnings forecasting process

The earnings forecasting process can be subdivided into differential stages. Identification of the distinct characteristics of these stages may be of use in understanding the irregularities in (the outcomes of) analysts' earnings forecasting, since it unravels the complex forecasting process and provides for more convenient, less complex fractions for further study. Moreover, partitioning decision making processes allows for the recognition and analysis of multiple goals or criteria, since in every phase of the process differential goals may be pursued. For example, sell-side analysts may attempt to process all available information in order to produce accurate earnings forecasts, however, they aim to report over-optimistic forecasts. Studies on differential stages of the forecasting process are scarce. Thus, literature on decision making processes is drawn into the discussion.

The decision making process can be disaggregated into four stages, intelligence, design, choice and review (Simon 1977)¹³. In its most abstract form, this division of the decision making process naturally applies to the analysts' forecasting process and inferences drawn may be extrapolated to accounting research. The concept of multi-stage decision making and forecasting implies that examinations of decisions are expanded. Studying predecisional behavior stems from the recognition of improbabilities in well-structured, linear decision problems, as commonly investigated in result studies. Generally, financial analysts face tasks of ill-defined, complex nature. Information cues needed at forecasting earnings are not directly available or not fully reliable, which causes an extension of the impact of financial analysts' judgments to stages preceding the actual decision.

One must be aware that divisions of the forecasting process into differential stages are merely simplifications of real-world situations with a normative orientation. Characteristics of financial analysts' actions are dichotomized. The premise that these actions are distinct and take place sequentially may not be generalizable to all individual decision making processes. During the evaluation of information analysts may have the need for additional information cues. Next to this, complementary phases may be of substantial importance. For instance, preceding this process, the analyst may conceptualize the decision making situation and possible incentives. Moreover, the detection of reporting biases in result studies emphasizes the importance of studying post-decisional behavior.

The analyst's decision making process may be influenced by uncertainty of possible outcomes, incomplete information and restrictions imposed by the limitations of his information processing capacity. This concept of bounded rationality (Simon 1982) suggests that financial analysts may go through the differential stages of the decision making process somewhat arbitrarily or routinely affecting the sequence of and emphasis placed on these stages. The routinely nature of analysts' actions is likely to be reinforced, since earnings forecasting appears to be a continuous process.

In further analyzing the decision making process, Bouwman *et al.* (1987) dissect the investment screening decision, using protocol analysis on financial experts. Basically, as implied by the bounded rationality concept of Simon (1982), financial analysts' actions within these decision making processes are guided by the restrictions of time and cognitive capabilities. In searching and evaluating information cues, analysts are forced to be selective because of the time limits. Next to this, Bouwman *et al.* indicate that cognitive limitations of individuals ask for the availability of information processing mechanisms¹⁴. Overall, because of the large complexity of the decision making problem, financial analysts need to plan activities and subdivide the investment screening task into smaller sub-tasks, each with its own goal. This corresponds with characteristics of financial analysts examined by Biggs (1984), which indicate that information search of financial analysts appears to be a highly structured process, probably resulting from the expertise of financial analysts.

The investment screening protocols of financial analysts give some indications of the decision making process. However, it appears from the study of Bouwman *et al.* that financial analysts judging investments tend to search for unusual items allowing them quick rejections of the investments. Intuitively, some of the conclusions drawn from the observed screening behavior are not applicable to the earnings forecasting process, since earnings forecasting is not an accept-reject decision.

Notwithstanding the validity of this argument, the Bouwman *et al.* study provides several helpful insights. Based on the differential goals pursued the investment screening process can be divided into four stages, i.e., familiarizing, exploring, scanning and reasoning. As described by Bouwman *et al.* (1994), "...the first three activities . . . all involve the search for, and the acquisition of information. The differences among these activities are the objectives of the information search and the level of intensity." Reasoning represents the analysts' analysis of information and judgment making.

Biggs (1984) stresses the importance of examining predecisional behavior and analyses verbal protocols of financial analysts acquiring information. The author identifies two information search strategies, i.e., a historical strategy and a predictive strategy. Financial analysts employing a historical strategy focus on the search for and evaluation of historical information. Predictive strategies combine the historical strategy with activities directed at

assessing future values. With respect to the previously mentioned assessment of trends and variability in (future) earnings, the historical strategy appears to be essentially trend-driven.

In summary, a non-exhaustive list of topics for further research on earnings forecasting processes has been given. First, studies may be directed at whether and how financial analysts properly assess trends as well as variability in (future) earnings. Second, assuming that both assessments are present in some form, identification of the sequence, interactions and relative importance of both may provide evidence on the role of judgment in the forecasting process. Third, research is necessary on the evolution of forecasting rules, the adaptation to changing environmental factors and the role of learning and feedback, which will be further discussed in subsection 4.3. Fourth, further identification of stages in the earnings forecasting process provides for more convenient parts for further study and may allow for the recognition of multiple (contradictory) goals.

4.2 *The earnings forecasting process and accounting*

Starting from the preceding discussion of the earnings forecasting process, studying the effect of accounting information on financial analysts' actions may be restricted to the following items. First, the conceptual framework provided raises the question of whether accounting information is useful in forecasting earnings by signaling both trends in and variability of (future) earnings. Second, the role of accounting information in differential stages of the earnings forecasting process may vary.

This subsection starts with the discussion of the role of accounting information in differential stages of the forecasting process and the strategies employed by financial analysts in their search for information. Basically, the examination of financial analysts' accounting information usage may follow two approaches. First, analysts may be asked to state their preferences for certain types of information, most likely by means of questionnaires (e.g., Arnold and Moizer 1984) or interviews (e.g., Day 1986; **Bence** *et al.* 1995). Secondly, studies may be directed at descriptions of financial analysts' actual behavior, either reflected in analysts' company reports (e.g., Govindarajan- 1980; Previts *et al.* 1994) and verbal protocols (e.g., Day 1986; Bouwman *et al.* 1987) or directly observed (e.g., Gniewosz 1990).

Bouwman *et al.* (1987; 1994) conclude that the use of financial information is largely restricted to the familiarizing stage of the investment screening process. In searching for arguments to quickly reject possible investments and consequently facilitating the investment evaluation task, financial analysts focus on accounting information and more specifically income statement information. During the familiarizing, exploring and scanning stages the usage of (GAAP-based) accounting information constitutes an average of 58 percent of total information usage. Non-GAAP information gains a more prominent role in the reasoning

stage of the investment screening process. Bouwman *et al.* (1994) conclude that accounting information, particularly performance information, remains relevant to financial analysts' decision making. Moreover, financial analysts' frequently requested additional information predominantly consists of detailed segment information and prospective information.

Much of these results match the results of survey studies and content studies. As protocol studies, content studies suffer from the fact that financial analysts do not fully disclose all information processed in the act of evaluating companies (whereas financial analysts' stated preferences include ignored information). Nevertheless, Govindarajan (1980) and Previts *et al.* (1994) have examined information usage in financial analysts' company reports. Previts *et al.* find an emphasis of sell-side analysts' reports on performance information. Financial analysts subjectively refine or adjust available information, i.e., they assess segment information, core earnings, earnings variability and earnings momentum. Non-financial information also plays a substantial role in analysts' company evaluation. Govindarajan scrutinizes financial analysts' reports to find out whether in their act of evaluating performance information analysts place their emphasis on earnings or cash flow information. Earnings information is found to be of significantly more importance.

In examining the use of accounting information and the forecasting process Day (1986) assesses the differential values attached to information cues by financial analysts. Overall, financial analysts concede that the financial report is useful, though its role may be restricted to providing confirmation or background data. Annual reports have a use for reviewing prior forecast accuracy, assessing a company's past performance and determinants of present financial results, confirming known information and stimulating the identification of questions (see Gniewosz 1990). Applying cluster analysis to analysts' stated preferences provides for a classification of information sources. In doing so, Bence *et al.* (1995) establish that on average financial analysts favor routinely received (short-term) information, amongst which are interim statements and the annual reports and accounts.

Overall, analysts have been found to make use of accounting information, particularly concentrating on performance information. Although ample studies provide detailed insight into the preferences and information usage of financial analysts, relatively few studies focus on earnings forecasting. As indicated by Day (1986), the relative importance of accounting information detected in these studies may therefore be limited as far as the financial analysts' earnings forecasting process is concerned. Nevertheless, accounting data seem to provide substantial confirmatory or background information that is possibly affecting earnings forecasts. Such purposes of accounting information would imply that the use of this information is confined to particular stages of the forecasting process. In conclusion, the management of the company itself has been found to be an important additional information source (see, e.g., Gniewosz 1990; Bence *et al.* 1995).

It appears from the foregoing discussion that the role of accounting information is likely to be dependent on the stage of the forecasting process. Next to this, differential characteristics of the financial analyst may affect the relative importance of information sources as well. Accounting information usage varies from individual to individual. Financial analysts employing historical strategies focus their attention on past performance data, in contrast to analysts employing predictive strategies (Biggs 1984). The latter make use of additional information of a prospective nature, which probably causes 'historians' to be relatively more accounting information oriented.

Bouwman *et al.* (1987) identify two dimensions of information search behavior. First, analysts search for information in either a directed fashion, scanning for specific items, or a sequential fashion. Secondly, active searchers often change search objectives, whereas methodical searchers focus on one objective until achievement of that objective. The effect of search behaviors on the relative importance of accounting information is not clear, however, Hunton and McEwen (1996) establish that analysts employing the directive/active search strategy exhibit higher forecasting accuracy.

Both Day (1986) and Bence *et al.* (1995) indicate that the values attached to differential information sources may be associated with the characteristics of the company. Hence, the forecasting task may turn out to be an important determinant of the financial analysts' preferences for and usage of information. In this respect, the relative importance of trend assessment and variability assessment comprising the earnings forecasting process may be associated with the usefulness of accounting information.

Obviously, accounting information is most useful in providing the historical figures from which the financial analyst could extrapolate trends. Recent studies on the information content of accounting data have indicated that the dynamics of the environment in which a company operates to some measure influence the usefulness of accounting information (e.g. Amir and Lev 1996). This might imply that to the extent that judgment on earnings variability is more prominent in the financial analysts' forecasting task, accounting information becomes less important. Further research on the implications of the characteristics of the forecasting task on the usefulness of accounting information is necessary. More specifically, accounting researchers should focus on the influence of the dynamics of the environment, especially since, as mentioned in subsection 4.1, judgmental forecasting processes gain importance in changing environments.

In this respect an essential question for accounting research is whether the assessment of trends in accounting information is part of analysts' efficient information processing or merely a mechanism used heuristically by financial analysts who are guided by restrictions of time and cognitive capabilities. Heuristic use of trend assessment may imply that financial analysts' forecasting rules are invariant to task characteristics and may ultimately result in inaccurate earnings forecasts in dynamic environments.

Dynamics of the forecasting environment include accounting changes. Financial analysts may interpret accounting data routinely without considering underlying accounting processes. Such irrationalities, commonly known as functional fixation (see, e.g., Ashton 1976; Chang and Birnberg 1977), may decrease the effectiveness of the financial analysts' forecasting process, since analysts fail to assess 'true' values of reported data. Both Ashton (1976) and Chang and Birnberg (1977) posit that the use of the psychological concept of functional fixation in accounting research on accounting changes is essentially wrong. Since functional fixation denotes the fixation on the function of objects, functional fixation in accounting settings should refer to fixation on the function of accounting changes. The assessment of trends versus variability provides for a distinction between two possible variants of functional fixation. First, financial analysts may be functionally fixated on reported earnings and consequently not able to assess 'true' correlations between historical earnings. Secondly, they may be functionally fixated on accounting procedures, i.e., accounting changes are not properly recognized as signaling devices (e.g. Hughes and Schwartz 1988). The latter variant corresponds to a larger extent with the psychological interpretation of functional fixation.

4.3 ***The earnings forecasting process and the forecasting environment***

In the judgment and decision making literature the following determinants of decision performance have been identified (see Libby and Luft 1993): ability, knowledge, environment and motivation. The assumption that decision performance is a function of these factors implies that, as stated by Peters (1993), "...since decision making behavior is a function of task characteristics, decision maker characteristics and the interaction among these characteristics, accounting decision making theories should include both decision maker characteristics and their interactions if they are to predict effectively human behavior on accounting tasks."¹⁵ For example, knowledge of the decision maker is particularly task-specific. The effect of knowledge on forecasting accuracy is therefore strongly dependent on the impact of knowledge differences on cognitive forecasting processes (cf. Libby and Luft 1993).

Financial analysts' characteristics are thus comprised of ability, knowledge and motivation. Ability relates to the task-invariant information processing capabilities of the decision maker, whereas knowledge interacts with task characteristics. Libby and Luft (1993) provide a model of the associations of ability, experience and knowledge. In their view, both knowledge and ability affect decision performance, however, knowledge is an intermediate variable determined by the decision maker's ability and experience, i.e., familiarity with the task. For example, some authors have posited that experienced financial analysts prefer directive/active search strategies which result in higher accuracy (see Bouwman *et al.* 1987; Hunton and McEwen 1996).

Motivational factors affecting forecasting performance have been previously discussed in section 3. It appeared that financial analysts are subject to incentives to be positively biased.

Motivational effects of underwriting positions or the desire to cultivate future relations with the management of a company have been experimentally confirmed by **Hunton and McEwen** (1996). Additionally, in a questionnaire survey **Williams et al.** (1996) establish that buy-side and sell-side analysts' dissimilar incentives cause significant differences in information cues used to revise earnings forecasts.

Hogarth (1993) states that in order to understand decision making one should rather focus on understanding the decision making task than on understanding the decision maker, since the complexity of the former surpasses the cognitive capabilities of decision makers. Apart from the aforementioned factors of knowledge and motivation, the environment forms an important determinant of the forecasting task. Illustrative are the differences between countries that affect the accuracy of financial analysts' earnings forecasts. **Capstaff et al.** (1996) posit that amongst other factors characteristics of national accounting disclosure, consolidation and taxation practices may influence the properties of financial analysts' earnings forecasts. The information content and timeliness of accounting disclosures has been found to vary between countries (see **Alford et al.** 1993). Moreover, developments of financial markets have reached differential stages, through which the forecasting environments may be determined by the overall experience of financial analysts.

Another factor generally mentioned is the volatility of reported earnings. Overall, high volatility is expected to decrease predictability of earnings. Management's earnings smoothing reduces variability in reported earnings, enhancing the accuracy of financial analysts' earnings forecasts. Furthermore, financial analysts' judgment is expected to be relatively more important in settings with high earnings variability, through which the forecasting advantage of financial analysts over time-series models increases (see **Kross et al.** 1990). Generally, the dynamics of the forecasting environment are prominent determinants of earnings predictability.

Kang et al. (1994) examine whether the forecasting process of financial analysts is adaptive, that is, whether the earnings forecasting rules are changed in concordance with changes in characteristics of contextual information. They establish that forecast rules are inconsistent over different forecast horizons, but those inconsistencies are independent of changes in information. Suggested alternative explanations are the influence of financial analysts' incentives and the interaction between judgmental biases, and/or statistical forecasting techniques. Further research on the environmental influences on the usage of and interactions between the time-series and contextual forecasting processes is necessary.

In conclusion it should be noted that since earnings forecasting can be defined as a continuous process, financial analysts' forecasting errors may provide feedback that is utilized in rearranging the process. In studying the forecasting processes of financial analysts learning opportunities should be included, mainly because of two reasons. First, if analysts are found to

learn from performance feedback, then inferences drawn about financial analysts may be based on non-stationary characteristics. Secondly, since many authors pose that understanding behavior precedes improving behavior, studies should be directed at whether improvement of financial analysts' behavior is essentially possible.

5. Concluding remarks

In this paper earnings forecasting research has been subject of discussion. A distinction has been made between studies focusing on the **results** of financial analysts' earnings forecasting and studies addressing the earnings forecasting **process**. Earnings forecasting research contributes to our understanding of the functioning of capital markets. Furthermore, examining earnings forecasts is guided by three differential submotives, i.e.: forecasts at the aggregate level may proxy for market earnings expectations; financial analysts play an important role in capital markets; studying earnings forecasts may facilitate establishing the information content of accounting data.

Contingent on certain circumstantial factors financial analysts' forecasting accuracy appears to surpass the accuracy of alternative models, of which time-series based models, security price based models and financial statement based models have been discussed herein. However, financial analysts exhibit some irregularities in their behavior which persist at the aggregate level. First, analysts' forecasts have been found to be positively biased owing to reporting biases and processing biases. The latter stem from irrational actions or cognitive limitations whereas reporting biases have been attributed to analysts' incentives. Secondly, alternative forecasting models provide complementary information to financial analysts which indicates that analysts underreact to publicly available information cues.

Persistence of irregularities justifies the explicit attention for individual analysts in process-oriented studies. Process studies provide both 'as if'-theories directed at the creation of a general framework of forecasting and process-tracing models that subdivide the forecasting process into differential stages. It has been posited that general frameworks of earnings forecasting should satisfy certain conditions in order to encompass all characteristics of the earnings forecasting process. At least three of these have been discussed herein, that is: interactions between the characteristics of the forecasting task and financial analysts; analysts' cognitive limitations; the existence of goal multiplicity. Furthermore, in exploring the adaptive nature of financial analysts' decision making processes one should distinguish between the assessment of (earnings) trends and the assessment of (earnings) variability.

Results-oriented studies generally indicate that accounting information, of which earnings, cash flow, accruals, dividends and financial statement data have been discussed, is informative to and used by financial analysts. Usefulness of accounting information has been confirmed by several process studies. Overall, financial analysts appear to have preference for performance information which is predominantly utilized in the early stages of the forecasting process.

Forecasting performance is associated with the analysts' ability, knowledge and motivation, and environmental factors, which indicates that decision maker characteristics, task characteristics and interactions of both characteristics are of substantial importance. Process studies may be aimed at analyzing these factors, since abstraction from complex accounting settings is necessary to gain understanding of interactions between task characteristics and decision maker characteristics.

However, studying forecasting processes has a minor drawback. In essence, earnings forecasts merely denote a quantitative representation of financial analysts' opinions. This quantification allows for extensive statistical analyses. In a measure process studies do not focus on process outcomes, consequently neglecting the benefits of earnings forecasts' quantitative properties. Future earnings forecasting research should therefore be largely directed at studying the statistical properties of earnings forecasts. Process studies should focus on providing a general framework, insight into task-specific and decision maker-specific influences and on generating hypotheses.

In this paper some specific indications for further research have been given. First, future result studies may be directed at further exploration of the informative function of accruals or accounting changes and may search for influential factors in the analysts' environment. More specifically, firm, industry and macro-economic characteristics are under-exposed in the studies under examination. Second, process studies may proceed to provide conceptual frameworks for results-oriented research. Distinct examinations of the assessment of trends and the assessment of variability may facilitate conceptualizations of the earnings forecasting process. Again, the influence of task characteristics on analysts' earnings forecasting should be part of further investigations.

Though to a large extent the contents of this paper have been of descriptive nature, in the introduction it has been stated that earnings forecasting research may contribute to our understanding of the functioning of capital markets and the role of accounting information. At this point it can be concluded that presumably since the majority of earnings forecasting studies has been guided by the need for a market expectations proxy, the present contribution of earnings forecasting research appears to be limited. Hence, three changes may be recommendable. First, it may be worthwhile to further expand our attention to studies on the technicalities of earnings forecasting, i.e., the forecasting process. Second, in order to explain behavior of capital market participants research should focus on both earnings forecasts and interactions of forecasting and usage of forecasted information (e.g., Abarbanell and Bernard 1992). Third, since many researchers are no longer merely interested in earnings forecasts as an input to capital market based research, a theoretical framework on financial analysts' earnings forecasting should be developed. Additionally, explanations for analysts' disclosing behavior may be included.

Notes

¹ An overview of the research on market expectations of earnings models is provided by Williams (1995).

² Butler and Lang (1991) provide evidence that financial analysts persist over time in their optimism or pessimism.

³ The post earnings-announcement drift can be defined as a correctional drift of stock prices after the underreaction of investors to the public announcement of earnings.

⁴ In order to preserve the clarity of this discussion characteristics of time-series models will not be further explored. For a discussion of these models, see Williams (1995).

⁵ Although Maines and Hand stress the advantage of studying individuals that are unbiased and unexposed to other non-earnings information, one must take into account the likely condition that non-professional analysts are less skillful in interpreting earnings time-series than professional analysts (e.g., see Abarbanell and Bernard 1992).

⁶ In the view of Balsam et al. this flexibility is provided by the FASB to reduce its political costs.

⁷ However, Lang and Lundholm (1996) provide evidence that in general a firms' discretionary disclosure policy is related to financial analysts' earnings forecast accuracy. More informative disclosure policies lead to increased accuracy.

⁸ Worth mentioning is the experimental study of Hirst et al. (1995) on differential investor reactions due to characteristics of the analyst and the report. Unfavorable reports originating from investment-banking analysts have a stronger negative influence on investors' beliefs about a firm's future performance than identical reports originating from non-investment-banking analysts. According to Hirst et al. this behavior is the result of the influence of two factors on financial analysts' evaluation. These factors are the investors' ex ante expectation of the analysts' report and whether or not the report is in concordance with ex ante expectations. On average investors expect the financial analysts' report to be favorable, particularly because of the previously mentioned incentives to produce overly optimistic earnings forecasts.

⁹ In this paper the terms financial analysts' decision **making** process and financial analysts' **forecasting** process are used interchangeably.

¹⁰ For example, paramount of lens model research is the comparison of two multiple regression equations, event $Y_e = b_{1e} X_1 + b_{2e} X_2 + \dots + b_{ke} X_k$ and estimated event $Y_s = b_{1s} X_1 + b_{2s} X_2 + \dots + b_{ks} X_k$, where X_i are informational cues, whereas many earnings forecasting studies examine the multiple regression equation of forecast error $FE = Y_s - Y_e = (b_{1s} - b_{1e}) X_1 + (b_{2s} - b_{2e}) X_2 + \dots + (b_{ks} - b_{ke}) X_k$.

¹¹ Three well-known heuristics, the representativeness heuristic, the availability heuristic and the anchoring and adjustment heuristic have been described by Tversky and Kahneman (1974).

¹² Heuristic and bias approaches arouse some controversy. Although some studies provide evidence that violations of axioms persist beyond laboratory conditions (Hogarth 1993), the usefulness of experimentally detected heuristics in explaining characteristics of the reasonably complex earnings forecasting process may be limited. Hence, many authors support the view that heuristic and bias approaches in judgment and decision making research are subject to a trade-off between internal and external validity. Followers of the heuristic and biases approach may seek refuge in the argument that human information processing exists at and may be studied at different levels of abstraction (see Peters 1993).

¹³ Intelligence consists of the information search activities of the decision maker. Design bears on the evaluation of available information cues and the formulation of alternatives. These stages precede the choice-stage in which the decision maker forms his judgment on the alternatives and implements chosen actions.

¹⁴ In the study of Bouwman et al. financial analysts have been found to employ several mechanisms, directed at the relief of cognitive and time restrictions. They make use of mental checklists and theme-driven reasoning. Moreover, analysts simplify the screening task, since they recognize templates of typical companies, which provide them with standards, typical problem hypotheses and evaluations.

¹⁵ In essence, the existence of interactions would prevent purely distinct discussions of forecasting processes and environmental influences. However, since forecasting processes and the importance of accounting information, as part of the forecasting environment, have been discussed in previous sections, the remainder of this section will deal with some financial analyst characteristics and the remaining environmental influences in order to maintain the clarity of this discussion.

References

- Abarbanell, J.S., Do analysts' earnings forecasts incorporate information in prior stock price changes?, *Journal of Accounting and Economics* 14, 199 1, pp. 147- 165
- Abarbanell, J.S. and V.L. Bernard, Tests of analysts' overreaction/underreaction to earnings information as an explanation for anomalous stock price behavior, *Journal of Finance* 47, 1992, pp.1 181-1207
- Ajinkya, B.B., R.K. Atiase and M.J. Gift, Volume of trading and the dispersion in financial analysts' earnings forecasts, *The Accounting Review* 66, 1991, pp.389-401
- Alford, A., J. Jones, R. Leftwich and M. Zmijewski, The relative informativeness of accounting disclosures in different countries, *Journal of Accounting Research* 3 1, supplement, 1993, pp. 183-223
- Ali, A., A. Klein and J. Rosenfeld, Analysts' use of information about permanent and transitory earnings components in forecasting annual EPS, *The Accounting Review* 67, 1992, pp.183-198
- Ali, A. and P.F. Pope, The incremental information content of earnings, fund flows and cash flow: The UK evidence, *Journal of Business Finance and Accounting* 22, 1995, pp. 19-34
- Amir, E. and B. Lev, Value-relevance of non-financial information: The wireless communications industry, *Journal of Accounting and Economics* 22, 1996, pp.3-30
- Ashton, R.H., Cognitive changes induced by accounting changes: Experimental evidence on the functional fixation hypothesis, *Journal of Accounting Research* 14, supplement, 1976, pp.1-17
- Ashton, R.H., *Human information processing in accounting*, Studies in Accounting Research, no. 17, 1982
- Ashton, R.H. and A.H. Ashton, Perspectives on judgment and decision making research, In: *Judgment and decision making research in accounting and auditing*, Cambridge University Press, 1995
- Arnold, J. and P. Moizer, A survey of the methods used by UK investment analysts to appraise investments in ordinary shares, *Accounting and Business Research* 14, 1984, pp. 195-207
- Baginski, S.P. and J.M. Hassell, The market interpretation of management earnings forecasts as a predictor of subsequent financial analyst forecast revision, *The Accounting Review* 65, 1990, pp.175-190
- Ball, R. and P. Brown, An empirical evaluation of accounting income numbers, *Journal of Accounting Research* 6, 1968, pp.159-178
- Ball, R. and G. Foster, Corporate financial reporting: A methodological review of empirical research, *Journal of Accounting Research* 20, supplement, 1982, pp. 16 1-234
- Balsam, S., I.-M. Haw and S.B. Lilien, Mandated accounting changes and managerial discretion, *Journal of Accounting and Economics* 20, 1995, pp.3-29
- Barron, O.E., Trading volume and belief revisions that differ among individual analysts, *The Accounting Review* 70, 1995, pp.581-597
- Bartley, J.W. and A.B. Cameron, Long-run earnings forecasts by managers and financial analysts, *Journal of Business Finance and Accounting* 18, 199 1, pp.2 1-4 1
- Bence, D., K. Hapeshi, R. Hussey, Examining investment information sources for sophisticated investors using cluster analysis, *Accounting and Business Research* 26, 1995, pp. 19-26
- Berg, J., J. Dickhaut and K. McCabe, The individual versus the aggregate, In: *Judgment and decision making research in accounting and auditing*, Cambridge University Press, 1995
- Bernard, V.L. and T.S. Stober, The nature and the amount of information reflected in cash flow and accruals, *The Accounting Review* 64, 1989, pp.624-652

- Biddle, G.C. and W.E. Ricks, Analyst forecast errors and stock price behavior near the earnings announcement dates of LIFO adopters, *Journal of Accounting Research* **26**, 1988, pp.169-194
- Biggs, S.F., Financial analysts' information search in the assessment of corporate earnings power, *Accounting, Organizations and Society* **9**, 1984, pp.3 13-323
- Board, J.L.G. and J.F.S. Day, The information content of cash flow figures, *Accounting and Business Research* **20**, 1989, pp.3- 11
- Bouwman, M.J., P.A. Frishkoff and P. Frishkoff, How do financial analysts make decisions? A Process model of the investment screening decision, *Accounting, Organizations and Society* **12**, 1987, pp. 1-29
- Bouwman, M.J., P.A. Frishkoff and P. Frishkoff, The relevance of GAAP-Based information: A case study exploring some uses and limitations, *Accounting Horizons* **9**, 1995, pp.22-47
- Branson, B.C., K.S. Lorek and D.P. Pagach, Evidence on the superiority of analysts' quarterly earnings forecasts for small capitalization firms, *Decision Sciences* **26**, 1995, pp.243-263
- Brennan, M.J., A perspective on accounting and stock prices, *The Accounting Review* **66**, 1991, pp.67-79
- Brown, L.D., Earnings forecasting research: its implications for capital markets research, *International Journal of Forecasting* **9**, 1993, pp.295-320
- Brown, L.D., Influential accounting articles, individuals, Ph.D. granting institutions and faculties: A citational analysis, *Accounting, Organizations and Society* **21**, 1996, pp.723-754
- Brown, L.D., R.L. Hagerman, P.A. Griffin and M.E. Zmijewski, Security analyst superiority relative to univariate time-series models in forecasting quarterly earnings, *Journal of Accounting and Economics* **9**, 1987a, pp.6 1-87
- Brown, L.D., G.D. Richardson and S.J. Schwager, An information interpretation of financial analyst superiority in forecasting earnings, *Journal of Accounting Research* **25**, 1987b, pp.49-67
- Brown, P., G. Foster and E. Noreen, *Security analyst multi-year earnings forecasts and the capital market*, Studies in Accounting Research, no.21, 1985
- Butler, K.C. and L.H.P. Lang, The forecast accuracy of individual analysts: Evidence of systematic optimism and pessimism, *Journal of Accounting Research* **29**, 1991, pp. 150- 156
- Bunn, D. and G. Wright, Interaction of judgemental and statistical forecasting methods: Issues and analysis, *Management Science* **37**, 1991, pp.501-518
- Capstaff, J., K. Paudyal and W. Rees, A comparative analysis of earnings forecasts in Europe, Working Paper, University of Glasgow, 1996
- Chang, D.L. and J.G.Bimberg, Functional fixity in accounting research: Perspective and new data, *Journal of Accounting Research* **15**, 1977, pp.300-312
- Chung, K.H. and H. Jo, The impact of security analysts' monitoring and marketing functions on the market value of firms, *Journal of Financial and Quantitative Analysis* **31**, 1996, pp.493-512
- Collins, D.W., S.P. Kothari, J. Shanken and R.G. Sloan, Lack of timeliness and noise as explanations for the low contemporaneous return-earnings association, *Journal of Accounting and Economics* **18**, 1994, pp.289-324
- Conroy, R.M. and R.S. Harris, Consensus forecasts of corporate earnings: analysts' forecasts and time-series methods, *Management Science* **33**, 1987, pp.725-738
- Conroy, R.M. and R.S. Harris, Analysts' earnings forecasts in Japan: Accuracy and sell-side optimism, *Pacific-Basin Finance Journal* **3**, 1995, pp.393-408
- Day, J.F.S., The use of annual reports by UK investment analysts, *Accounting and Business Research* **16**, 1986, pp.295-307

- DeBondt, W.F.M. and R.H. Thaler, Do security analysts overreact?, *American Economic Review* 80, 1990, pp.52-57
- Dechow, P.M.**, Accounting earnings and cash flows as measures of firm performance. The role of accounting accruals, *Journal of Accounting and Economics* 18, 1994, pp.3-42
- Dechow, P.M., S.P. Kothari and R.L. Watts, The correlation structure of earnings, cash flows and accruals, Working Paper, University of Rochester, 1995
- Dugar, A. and S. Nathan, The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations, *Contemporary Accounting Research* 12, 1995, pp.131-160
- Einhorn, H.J. and R.M. Hogarth, Behavioral decision theory: Processes of judgment and choice, *Journal of Accounting Research* 19, 1981, pp. 1-31
- Elgers, P.T. and D. Murray, The relative and complementary performance of analyst and security-price-based measures of expected earnings, *Journal of Accounting and Economics* 15, 1992, pp.303-316
- Elgers, P.T. and M.H. Lo, Reductions in analysts' annual earnings forecast errors using information in prior earnings and security returns, *Journal of Accounting Research* 32, 1994, pp.290-303
- Elliot, J.A. and D.R. Philbrick, Accounting changes and earnings predictability, *The Accounting Review* 65, 1990, pp. 157- 174
- Etheridge, H.L. and R.S. Sriram, Chaos theory and nonlinear dynamics: An emerging theory with implications for accounting research, *Journal of Accounting Literature* 12, 1993, pp.67- 100
- Francis, J. and D. Philbrick, Analysts' decision as products of a multi-task environment, *Journal of Accounting Research* 3 1, 1993, pp.2 16-230
- Givoly, D. and J. Lakonishok, Properties of analysts' forecasts of earnings: A review and analysis of the research, *Journal of Accounting Literature* 3, 1984, pp.1 17-152
- Gniewosz, G., The share investment decision process and information use: An exploratory case study, *Accounting and Business Research* 20, 1990, pp.223-230
- Govindarajan, V., The objectives of financial statements: An empirical study of the use of cash flow and earnings by security analysts, *Accounting, Organizations and Society* 4, 1980, pp.383-392
- Hand, J.R.M., A test of the extended functional fixation hypothesis, *The Accounting Review* 65, 1990, pp.740-763
- Hassel, J.M., R.H.Jennings and D. Lasser, Management earnings forecasts: Their usefulness as a source of firm-specific information to security analysts, *Journal of Financial Research* 11, 1988, pp.303-320
- Hirst, D.E., L. Koonce and P.J. Simko, Investor reactions to financial analysts' research reports, *Journal of Accounting Research* 33, 1995, pp.335-351
- Hogarth, R.M.**, Accounting for decisions and decisions for accounting, *Accounting, Organizations and Society* 18, 1993, pp.407-424
- Hughes, P.J. and E.S. Schwartz, The LIFO/FIFO choice: An asymmetric information approach, *Journal of Accounting Research* 26, 1988, pp.4 1-58
- Hunton, J. and R. A. McEwen**, Examining the relative contributions of search strategy versus motivation effects and the use of accounting information on forecasts of earnings: An experimental assessment of professional financial analysts, Working Paper, University of South Florida and Virginia Commonwealth University, 1996
- Jensen, M.C., Some anomalous evidence regarding market efficiency, *Journal of Financial Economics* 6, 1978, pp.95-101

- Kahneman, D. and A. Tversky, On the psychology of prediction, *Psychological Review* 80, 1973, pp.237-251
- Kang, S.-H., J. O'Brien and S. Sivaramakrishnan, Analysts' interim earnings forecasts: Evidence on the forecasting process, *Journal of Accounting Research* 32, 1994, pp.103-112
- Kross, W., B. Ro and D. Schroeder, Earnings expectations: the analysts' information advantage, *The Accounting Review* 65, 1990, pp.461-476
- Kothari, S.P. and R.G. Sloan, Information in prices about future earnings: implications for earnings response coefficients, *Journal of Accounting and Economics* 15, 1992, pp.143-171
- Lang, M.H. and R.J. Lundholm, Corporate disclosure policy and analyst behavior, *The Accounting Review* 71, 1996, pp.467-492
- Lawrence, M. and M. O'Connor, Exploring judgemental forecasting, *International Journal of Forecasting* 8, 1992, pp. 15-26
- Leland, H.E. and D.H. Pyle, Informational asymmetries, financial structure and financial intermediation, *The Journal of Finance* 32, 1977, pp.371-387
- Lev, B., On the usefulness of earnings and earnings research. Lessons and directions from two decades of empirical research, *Journal of Accounting Research* 27, supplement, 1989, pp.153-192
- Lev, B., The boundaries of financial reporting and how to extend them, Working Paper, University of California at Berkeley, 1995
- Libby, R. and J. Luft, Determinants of judgment performance in accounting settings: ability, knowledge, motivation and environment, *Accounting, Organizations and Society* 18, 1993, pp.425-450
- Lin, H. and M. McNichols, Underwriting relationships and analysts' research reports, Working Paper, Stanford University, 1993
- Lys, T. and S. Sohn, The association between revisions of financial analysts' earnings forecasts and security-price changes, *Journal of Accounting and Economics* 13, 1990, pp.341-363
- Lys, T. and L.G. Soo, Analysts' forecast precision as a response to competition, *Journal of Accounting, Auditing and Finance* 10, 1995, pp.751-765
- Maines, L.A., Judgment and decision-making research in financial accounting: A review and analysis, In: *Judgment and decision-making research in accounting and auditing*, Cambridge University Press, 1995
- Maines, L.A. and J.R.M. Hand, Individuals' perceptions and misperceptions of time series properties of quarterly earnings, *The Accounting Review* 71, 1996, pp.317-336
- Mendenhall, R.R., Evidence on the possible underweighting of earnings related information, *Journal of Accounting Research* 29, 1991, pp. 170-179
- Moyer, R.C., R.E. Chatfield and P.M. Sisneros, Security analyst monitoring activity: Agency costs and information demands, *Journal of Financial and Quantitative Analysis* 24, 1989, pp.503-512
- Moser, D.V., The effects of output interference, availability, and accounting information on investors' predictive judgments, *The Accounting Review* 64, 1989, pp.433-448
- Moses, O.D., Cash flow signals and analysts' earnings forecast revisions, *Journal of Business Finance and Accounting* 18, 1991, pp.807-832
- Ou, J.A. and S.H. Penman, Financial statement analysis and the prediction of stock returns, *Journal of Accounting and Economics* 11, 1989, pp.295-329
- O'Brien, Analysts' forecasts as earnings expectations, *Journal of Accounting and Economics* 10, 1988, pp.53-83
- O'Brien, P., Forecast accuracy of individual analysts in nine industries, *Journal of Accounting Research* 28, 1990, pp.286-304

- Peters, J.M., Decision making, cognitive science and accounting: An overview of the intersection, *Accounting, Organizations and Society* 18, 1993, pp.383-405
- Previts, G.J., R.J. Bricker, T.R. Robinson and S.J. Young, A content analysis of sell-side financial analyst company reports, *Accounting Horizons* 8, 1994, pp.5570
- Rayburn, J., The association of operating cash flow and accruals with security returns, *Journal of Accounting Research* 24, supplement, 1986, pp. 112-133
- Richardson, A.J. and M. Gibbins, Behavioral research on the production and use of financial information, In: *Accounting research in the 1980s and its future relevance*, The Canadian Certified Accountants' Research Foundation, 199 1
- Sant, R. and A.R. Cowan, Do dividends signal earnings? The case of omitted dividends, *Journal of Banking and Finance* 18, 1994, pp. 1113-1 133
- Schipper, K., Commentary on analysts' forecasts, *Accounting Horizons* 5, 1991, pp.105-121
- Simon, H.A., *The New Science of Management Decision*, Prentice-Hall, Englewood Cliffs NJ, 1977
- Simon, H.A., *Models of Bounded Rationality: Behavioral Economics and Business Organization*, The MIT Press, Cambridge MA, 1982
- Stober, T.L., Summary financial statement measures and analysts' forecasts of earnings, *Journal of Accounting and Economics* 15, 1992, pp.347-372
- Subramanyam, K.R., The pricing of discretionary accruals, *Journal of Accounting and Economics* 22, 1996, pp.249-28 1
- Tversky, A. and D. Kahneman, Judgment under uncertainty: heuristics and biases, *Science* 185, 1974, pp.1124-1131
- Webby, R. and M. O'Connor, Judgemental and statistical time series forecasting: A review of the literature, *International Journal of Forecasting* 12, 1996, pp.9 1- 118
- Williams, P.A., The search for a better market expectation of earnings model, *Journal of Accounting Literature* 14, 1995, pp.140-168
- Williams, P.A., The relation between a prior earnings forecast by management and analyst response to a current management forecast, *The Accounting Review* 71, 1996, pp. 103- 113
- Williams, P.A., G.D. Moyes and K. Park, Factors affecting earnings forecast revisions for the buy-side and sell-side analyst, *Accounting Horizons* 10, 1996, pp. 112- 12 1
- Wilson, P.G., The incremental information content of the accrual and funds components of earnings after controlling for earnings, *The Accounting Review* 62, 1987, pp.293-322