CHAPTER 2

LITERATURE REVIEW

CONCEPTUAL AND THEORETICAL BACKGROUND

Earnings forecasting has become an interesting topic since investors and financial intermediaries focus on earnings as a primary indicator of value. The management also needs an accuracy forecast of earnings to help them better decide the business plans. Early studies dated back to pioneering work on market efficiency by Little (1962) in which the random nature of corporate earnings changes was first demonstrated. This helped stimulate series of works involving the application of the concept of the random walk. In search for the appropriate forecasting models has started back in the late 1970's with the time-series model which use only the lagged variables of earnings itself. Later on, more complicated models have been developed, for example, expanding the information set to explain earnings changes, or disaggregate variables to better justified the properties of earnings.

Brown (1993) surveys all researches about earnings forecasting since the early 1960s and organizes its development into four groups: (i) time series properties of earnings; (ii) expanding the information sets to financial data; (iii) earnings response coefficient; and (iv) analysts' earnings forecast. The development of forecasting models has been continued, recently, Chan, Karceski and Lakonishok (2003) (CKL hereafter) investigate the level and persistence of growth in earnings and using some ad-hoc variables to forecast earnings but find only inappreciable results.

However, there is one approach that arise from the economic theory that Stigler (1963) points out that, under competition, the rate of return on investment tends to be equal in all industries. This argument suggests that in a competitive environment profitability will tend to be mean reverting both within and across industries. Mean reverting has been applied to many models even the time-series one (Brook and Buckmaster (1976), Salamon and Smith (1977), and Beaver and Morse (1978)). Yet, the interesting result came from the cross-sectional study of Fama and French (2000) which report that in a simple partial-adjustment model the estimated ratio of mean reversion in profitability is about 38 % per year in their US sample. Mean reversion

in profitability implies the changes in profitability and earnings can be predicted by the mean reversion in profitability to some extent.

2.1 LITERATURE RELATED TO PREDICTABILITY OF EARNINGS AND PROFITABILITY IN FOREIGN COUNTRIES

2.1.1) Time-series Properties of Earnings

One of the first branches in earnings forecasting is the research in time series properties of earnings. Earlier studies, such as Little (1962) and Little and Rayner (1966), find that earnings growth followed a random "higgledy piggledy" path using a small sample of UK firms. It was confirmed later by the time series studies such as Beaver (1970) and Ball and Watts (1972) using the U.S. data. Later on, the quarterly earnings time-series models have been proposed by groups of researchers using different Box-Jenkins (1970) ARIMA model which uses (pdq)*(PDQ) notation (the first term is the ordinary component while the second term is the seasonal component). The Foster (1977) model is the (100)*(010) model plus a constant. It is a first-order autoregressive model, determined after seasonally differencing the time-series of quarterly earnings. The Griffin (1977) and Watts (1975) model is the (011)*(011) model which has both its ordinary and seasonal components are moving average processes after taking first differences. The Brown-Rozeff (1979) suggest the (100)*(011) model which adopt the first term from the Foster model and the seasonal term from the Griffin and Watts model.

These three ARIMA models formed the core of the quarterly earnings time-series model literature. Many studies have examined which model generates the most accurate quarterly earnings forecast. Benston and Watts (1978) provide evidence in favor of the Foster model, Lorek (1979) argue on behalf of the Griffin and Watts model, Collins and Hopwood (1980) and Bathke and Lorek (1984) present the evidence that support the Brown and Rozeff model. For over a decade, no other quarterly ARIMA model to be introduced was found to be more accurate, on average, than these three models.

Although it was commonly believed in that period that annual earnings follow a random walk model, some researchers argued that annual earnings with extreme year to year changes were better described by a mean-reverting model (Brooks and Buckmaster (1976), Salamon and Smith (1977), and Beaver and Morse (1978)).

Kendall and Zarowin (1990), and Ramakrishnan and Thomas (1992) show that annual earnings are well-described by a first-order autoregressive process in earnings levels. These studies suggest that the rejection of the random walk model is not confined to only extreme earnings changes.

2.1.2) Using Financial Statement Information

Time-series studies, which use only past earnings, always suffer from the lack of sufficiently long history for most firms. Hence, some researchers argued that it can be beaten by expanding the information set to explain earnings changes.

Hopwood et al. (1982) present that the three ARIMA quarterly earnings time-series models can be used to improve the predictive accuracy of the annual earnings number by use it to forecast each quarter and then summed to be the annual earnings, instead of extrapolate the past annual earnings to forecast the current annual earnings.

Ou and Penman (1989a, b), Ou (1990), Lev and Thiagarajan (1993), and Penman (1992b) show that financial statement data can be used to predict future earnings. Ou and Penman (1989a, b) perform a financial statement analysis that combines a large set of financial statement items, approximately 70, into one summary measure which indicates the direction of one-year-ahead earnings changes. It appears that this fundamental measure captures equity values that are not reflected in stock prices. This measure is an indicator of the direction of future earnings. In contrast to fundamental analysis which extracts value measures from financial statements and compares them to prices to identify mispriced stocks, their trading strategies involve cross-sectional comparisons of the value measure, rather than comparisons with prices. It is quite possible that, given market inefficiency, some high (low) values of "the measure" are associated with overpricing (underpricing).

Lev and Thiagarajan (1993) candidate those fundamental data differently by using ratios in which analysts actually use in practice. For example, increase in inventories, disproportionate (to sales) increase in accounts receivable, decrease in capital expenditures, or increase in selling and administrative expense – these have been view negatively to future earnings by financial analysts. They also use the macrovariables such as GNP and inflation rate to help create the fundamental score (financial data + macroeconomic data) which found to be able to capture the transitory component of earnings. The fundamental signals are thus associated in the expected

direction with future earnings changes, and as such reflect the persistence of earnings. The macroeconomic variables have been applied to the model yet again in the paper of Hussian (1998). The paper examines the predictive ability of models which adjust random walk forecasts of corporate earnings, to incorporate past changes in economic lead indicators. The results suggest that changes in the broad money supply measure M4 contain predictive ability, beyond equivalent changes in other lead indicators or an individual firm's earnings. When forecasts from the broad-money model are compared with forecasts generated by financial analysts a size effect is evident: the superiority of analysts' forecasts is apparent much earlier for large firms than for small firms. This result is consistent with studies suggesting a size related differential in the collection and dissemination of information by market participants.

Ohlson (1995) and Feltham and Ohlson (1995) serve as an analytical device to organize thinking about forecasting and analyzing financial statements for forecasting. Their models are the statement of how book value and forecasted earnings relate to forecasted dividends and thus to value. The ratio analysis in these papers follows from recognition of standard accounting relations that determine how components of the financial statements relate to earnings and book values.

Garrod and Rees (1999) examine the explanatory and predictive power of fundamentals; equity, net income, dividend, and price, for future earnings in three European countries. The results provided strong support that there are positive relations between future earnings growth and those fundamentals information. Moreover, the model can correctly predict the direction of the earnings changes in almost 60 percent of cases.

Nissim and Penman (2001) argue that papers such as Lipe (1986), Ou(1990),Ou and Penman (1989), Lev and Thiagarajan (1993) and Fairfield, Sweeney and Yohn (1996),etc., which examine the role of particular financial statement components and ratios in forecasting, have been conducted without much structure. Interesting, robust empirical correlations have been documented, but the research has not produced a convincing financial statement analysis for equity valuation. Indeed the standard textbook schemes for analyzing statements, such as the DuPont scheme, rarely appear in the research. Thus, Nissim and Penman (2001) attempt to produce a structural approach to financial statement analysis for equity valuation, which also provides a way of organizing the analysis task. The structural approach contrasts to the purely empirical approach in Ou and Penman (1989). That paper identified ratios that predicted earnings

changes in the data; no thought was given to the identification.

Fairfield and Yohn (2001) find that disaggregating the change in return on net operating assets into the change in asset turnover and change in profit margin provides more information about future profitability. Besides, change in asset turnover correlates positively with the change in profitability one year ahead while there is no correlation in the change in profit margin. Penman and Zhang (2002) discover that a structured financial statement analysis helps forecast the next –period return on net operating assets(RNOA) as well as explain cross-sectional variations in P/E ratios.

The works of CKL(2003) conduct a comprehensive investigation of the level and persistence of earnings growth. Their evidence suggests that there is no persistence in growth rates. They also gather a group of related-variables in the forecasting attempt, but find only inappreciable predictive power from them.

Lately, Zhang (2004) compares the accuracy of models to forecast EPS and found that the neural network approach improves forecast accuracy, whether for the univariate or multivariate models. However, the improved forecasting accuracy is more pronounced when a collection of fundamental accounting variables are included. The evidence further indicates that the fundamental signals possess incremental value with respect to future quarterly EPS forecasts, but the incremental value of the fundamental information can only be achieved in a nonlinear manner.

2.1.3) Mean Reversion Concept

As Brooks and Buckmaster (1976) discover that income tends to revert to previous levels in the period subsequent to a substantial deviation from an operationally defined norm and also, given Ball and Watts (1972) definition of income smoothing, the evidence seems to provide a contradiction to their inference that management cannot be successful in efforts to smooth income, more researchers apply this concept to generate the earnings prediction model.

Freeman et al. (1982) show that when expanding the information set beyond the firm's past annual earnings to include its book rate of return, the result is more accurate than the random walk with drift model. The explanations are two empirical results which together would make this alternative hypothesis more descriptive: (i) book rates-of-return follows a mean reverting process and (ii) changes in rates-of-return correlate strongly with changes in earnings. Hence, current

book rate-of-return provides a basis for predicting future earnings changes.

Fama and French (2000) suggest that cross-sectional studies of changes in profitability or earnings regressed on lagged changes and other variables have the advantage of drawing on large samples of firms with minimal survival requirements in tests of predictability. These tests have the advantage of providing statistical power without being weakened by survivor bias. One drawback of previous reported work in this area is that the standard errors of the regression slopes in these cross-section tests are not adjusted for the correlation of regression residuals across firms. The underlying assumption is that there is no correlation across firms in current changes in the dependent variables earnings or profitability driven by common macroeconomic or industry shocks beyond those picked up by lagged predictor variables. There is also predictable variation in earnings. They suggest that much of what is predictable about earnings is due to mean reversion in profitability.

Although the use of industry benchmarks is widespread in practice, the majority of academic research on the mean reversion of profitability measures implicitly assumes an economy-wide benchmark by pooling over the entire cross-section of firms [e.g., the papers stated above]. While this notion is applicable to total profitability measures such as return-on-net-operating assets (RNOA), there is good reason to believe that the various components of RNOA identified by DuPont analysis will not revert to economy-wide levels. Industries have unique operating structures that cause ratios to cluster by industry membership. For example, to compare the sales/assets ratio of a firm in the airline industry with that of a consulting business would be futile because of clear industry differences. White, Sondhi, and Fried (1998) as well as Nissim and Penman (2001) show that the industry medians of profit margin (PM) and asset turnover (ATO) tend to have a strong negative correlation, implying that most industries achieve similar levels of RNOA through different combinations of PM and ATO. Thus, though RNOA may revert to some economy-wide level, PM and ATO may be more likely to revert to industry levels.

2.1.4) Earnings response coefficient

The earnings response coefficient is "the coefficient relating the surprise in accounting earnings to abnormal stock returns. The ERC directly links earnings forecasting research to capital markets research because the definition of earnings surprise is conditional upon an earnings expectations model. ERC studies often require a proxy for the earnings persistence factor, which relates changes in expected future earnings to current earnings surprise, because, in

theory, the valuation implication of ERC is positively related to its degree of permanence.

Collins and Kothari (1989) predict and document evidence that the earnings response coefficient (the unexpected earnings changes) is a function of riskless interest rates and the riskiness, growth and/or persistence of earnings where the ERC increases in growth and/or persistence and decreases in interest rates and risk. The earnings response coefficient also varies cross-sectionally with the holding period return interval. They also demonstrate empirically that the earnings/returns relation varies with firm size, where size is a proxy for information environment differences. Differences in information environment affect the extent to which price changes anticipate earnings changes. Moreover, by including the factors noted above, the empirical specification of the earnings/returns relation is significantly improved.

Linkages to capital markets also include the studies of forecasting surprise with abnormal return, post-earnings announcement drift and earnings growth expectation. Kothari (2001) mentions five reasons for the motivation for research into earnings behavior. The first reason is that the valuation models always use either directly or indirectly earnings forecasts. Second, the correlation between information in financial statements with returns on securities uses a model of expected earnings to isolate the surprise component of earnings from the anticipated component. Future returns, which are measured over the announcement period or the association study period, should be un-correlated with future returns in efficient capital markets. The third reason is to test the efficient market hypothesis.

2.1.5) Analysts' Earning Forecast

Many researches argue that the analysts' earnings forecasting advantage relative to time-series models is partly attributable to their private information acquisition activities, which may enable them to better distinguish between permanent, transitory and price-irrelevant earnings shocks. Moreover, it seems that, normally, analysts do possess a positive bias; the optimistic bias is greater when firms employing them are underwriters or investment bankers of the companies whose earnings they forecast.

Harris(1999) explicitly evaluates analysts' long-term growth forecasts and finds that analysts' long-term growth forecasts are highly inaccurate, overly optimistic, and inefficient, that the majority of the forecasting error is random, leaving little room for fixing. Sommers(2001) confirms the findings in Brown, Foster and Noreen (1985) and shows evidence supporting the

notion of +2 EPS forecasts and long-term growth forecasts provide important input to investors' decision making on top of one-period-ahead earnings forecasts. Abarbanell and Bushee (1997) tested the explanatory power of the fundamental accounting variables with respect to changes in future EPS changes. They found strong associations between individual fundamental signals (i.e., the fundamental accounting variables provide information that act to "signal" forecasters of possible future events) and future EPS changes. Thus, specific financial data can be useful in explaining security returns and predicting EPS. Subsequent research has shown that investment strategies based on the yearly fundamental analysis information does earn significant abnormal returns.

Recently, Guenther, Shane and Weber (2004) develop a technique to infer the accuracy of analysts' forecasts of different components of earnings when databases contain forecasts of only bottom line (or limited component) earnings forecasts and find that larger changes in all three components—sales, operating profit percentage, and effective tax rates— are associated with larger contemporaneous forecast errors, but that the change in operating profit percentage appears to be the most difficult to forecast. This difficulty in forecasting changes in the operating profit percentage appears to be concentrated in those observations in which net income decreases from the prior year.

In summary, despite the problems analysts' long-term forecasts have, they are important inputs to investors' decision-making. This renders the exercise to understand the properties of and to improve upon analysts' long-term forecasts a meaningful endeavor. Brown (1993) concludes that there are numerous ways to improve analysts' earnings forecasts, such as by pooling them with time-series model forecasts, stock prices, or financial statement data.

2.2 LITERATURE RELATED TO PREDICTABILITY OF EARNINGS AND PROFITABILITY IN THAILAND

Mostly, researches in Thailand focus on prediction of stock returns and earnings have been studied as the indicator of it. Nuchanat Kulkattimas (2000) investigates whether the earnings surprise can be a good indication of stock returns. The results reveal that there is no evidence found on the relationship between the earnings surprise and the stock return. She states three reasons supporting the result: (i) there is too much interval between the forecast and the announcement date so the information is not u, to date. (ii) longer forecast age has the

disadvantage of incorporating more noise or variation in prices unrelated to the information in earnings surprise, and (iii) information about realized earnings may leak prior to the announcement date via inside traders. She also tests relationship of other factors and finds that firm size has a strong inverse relationship. Finally, she tests for the accuracy and the only variable having the significant result is the positive relationship of the forecasting error and the profit-making firm since analyst always put more conservative into the estimation of loss-making firm.

Theeraya Awatchanakan (2001) studies whether the stock returns of certain sectors can predict overall stock market return. The results indicate that, through the period 1992-2000, the sectors that have the predictability power to the market returns are consumer products(+), capital goods(-), textile and trade (-), and finance and bank(+) while before crisis, the sectors that have the predictability power are food(+), media(-), infrastructure(-), and real estate and construction(+).

However, earnings or profitability prediction has been examined by Amorn Sumthaweekul (1999) which attempt to find the relation between changes in dividend and changes in future profitability but discover only the relation linking to current profitability, not future. These results have been argued by Sudaporn Sirikanant (2002) who examines the relationship between dividend and future earnings of the firms by using dividend changes to indicate potential for future profitability. The dependent variable is changes in profitability as percentages of book value of common equity while the explanatory variables are rate of changes in dividend payout and ROE. Before crisis, the results show that there is a positive relation between future profitability and rate of changes in dividend payout but a negative relation to ROE. These imply that the management might have the outlook for future profitability and signal it publicly through dividend payout. The negative relation to ROE can be explain in the sense that the company might be during the investment period which the return on investment will bounce back next year, or the management will put more effort to improve the profitability to reduce the agency problem. Mean reverting of ROE is one of the reasons as well. Yet, when regressing on the after-crisis period, only a negative relation to ROE remained significant. She argued that the economic status may not be stable enough for the management to make a precise expectation of the profitability, or the company might still have a loss in retain earnings wherefore they will not be able to pay dividend. When adding the direction of the change in dividend to the before crisis model, only the positive change has the significant relation to the future profitability, a positive

relation. She also found that only the small firms that the dividend payout has the information on future profitability.

Newly, Khwunjai Wichaiyut (2003) develops the models for prediction of property development business rehabilitation and test for predictability of the models. This research used multivariate discriminant analysis (MDA) and logistic regression analysis (LRA) for selecting the financial information relevant to the type of property development business classified as non-rehabilitated property development business and rehabilitated property development business. The research results indicate that the financial information relevant to the rehabilitation of property development business include return on assets, retained earnings to total assets ratio, total assets turnover and default ratio. The overall classification accuracy of the MDA model is 95.95% and the overall classification accuracy of the LRA model is 97.69%. The results suggest that both MDA model and LRA model have increasing prediction accuracy when the rehabilitated year is approaching.