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Relation between Accounting Choices, Book Values and Stock Prices

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Abstract

This study examines the relationship between stock prices and accounting figures, primarily the book value of equity and earnings, as well as the market perception of accounting choices implemented by companies. Market event studies from late sixties have initiated numerous of researches, and the majority of contemporary results were consistent with strong belief in the market efficiency theory. The book value of equity and earnings have been proved to have the highest explanatory power of future stock prices. Other accounting-related issues, like inventory methods or accounting for business combination, were proven to have reliable impact on the stock prices. Moreover, the cash flow implications triggered by the accounting change are not an indispensable condition to influence the stock price level. Although a great body of research has treated the relationship between accounting choices and stock prices, a clear-cut mechanism is not well specified. The evidence is inconsistent, and the consequences of accounting change are difficult to measure. However, the accounting figures included in financial statements remain the most important measure of the companies' performance. Due to the economic and technical progress, which considerably modified the structure of companies and the environment in which they operate, further studies are advisable in order to maintain the reliability of accounting figures on significant level.

Key Words

equity book value, earnings, accounting choice, stock price, the market efficiency theory

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1. Introduction

Unquestionably the accounting plays significant role in the economy, but the recent history showed that this role is even larger. Large accounting scandals, which resulted in the biggest bankruptcies ever, have raised many questions about the reliability of accountings figures. The purpose of my work is to show relationships between accounting figures, mainly book value of equity and earnings, with the stock prices, as well as I explore the consequences of the accounting choices. Moreover, my work responds to the most important questions in the post-Enron age: Can investors trust the accounting numbers again? How strongly the accounting figures are correlated with the market? And finally, how well does the accounting carry out its main task - supplying the creditors and investors in credible data?

It is worth to cite the definition of the accounting choices, as their ramification to stock prices consist important part of this work. Among variety of definition, I choose - for the purpose of that study - definition by Fields, Lys, Vincent (2001) which state that:

> "An accounting choice is any decision whose primary purpose is to influence (either in form or substance) the output of the accounting system in a particular way, including not only financial statements published in accordance with GAAP, but also tax returns and regulatory filings"

According to the cited definition inventory methods and structure of leasing are examples of accounting choices that influence company's financial statement. Real options with direct impact on earnings, for example a decision about expanding production or reducing cost of goods sold by lowering fixed costs and R&D expenditures, are also included. Determinants and impact of accounting numbers on stock markets have interested many academician. Primarily they focused on the role of earnings, but later they turned their attention to valuation models, which involved the book value of the equity. The theoretical framework was created by Ohlson (1995), and recently due to increasing focus on value creation, the residual measures become important indicators of the firm performance (Fields, Lys, Vincent, 2001)

The major contribution of my work to the existing literature is providing a comprehensive outlook over the consequences of the accounting choices to stock prices. My study focuses on the empirical results and their consequences to soundness of the economy. The remainder of the paper is organized as follows: Section 2 summarizes the early research into relationship among share prices and accounting rules, Section 3 focuses on the role of book values and earnings on stock pricing, Section 4 deals with the earnings manipulation phenomenon, Section 5 concentrates on other accounting related issues associated with stock prices, such as cash flow-related variables, discount rate, inventory measures, adoption of accounting-based compensation plans, accounting restatements, accounting for business combination and voluntary changes in accounting methods. Section 6 centers on basic limitations of accounting information, and Section 7 reviews a case study of accounting change with its consequences on the capital market.

2. Early Researches into Relationship Between Accounting Choices and Stock Prices

The questions about the relationship between accounting choices and the stock prices were raised much earlier than in 1960-1970, but first critical studies were conducted during that period. It is worth noting that all results from the early studies were related with the market efficiency theory and its possible violations.

2.1 Market Event Studies during the Late Sixties and Early Seventies

Studies conducted in the late sixties analyzed in details the connection between accounting methods and stock prices. For example two articles by Myers (1967, 1969) published in *Financial Analyst Journal* showed how financial reports can vary among accelerated and straightway depreciation. In the same journal Grabor (1969) pointed to "the illusionary earnings growth" generated by lax accounting methods. Copeland and Wojdak (1969) researched 169 mergers that occurred during one year period in 1967. They found out that 29 acquired companies had ballooned their earning using accounting manipulation. Those results were consistent with general trend, stating that investors were not able to interpret properly the accounting changes, and companies could freely influence the stock prices by accounting manipulation. The breakthrough was made by Roll and Kaplan (1973), which proved that accounting changes affect only the financial statement for shareholders, without any real effect on taxes or cash position of the company. According to the efficient market hypothesis, investors should be able to recognize earnings generated by accounting modifications and thus prevent the company from influencing the stock price only via implementing those changes. However, the assumption about market efficiency remains arguable.

2.2 Work by Roll and Kaplan

Kaplan and Roll (1973) selected three groups of companies. First one has switched to the full flow-through of investment accounting, which directly increased earnings on the financial statement. The essentials of the full-flow method are reductions of current taxes, instead of provisions for deferred taxes, which then can be reported as part of the current income. The second group have maintained the more conservative productive-life method, and reported the investment credit over their assets' productive lives. The third group included firms, which switched from the accelerated to straight-line depreciation method. Kaplan and Roll obtain the data from first earning announcement in the fiscal year, in which the accounting change was implemented. Next step, they followed the stock price movements after the date of announcement. In order to eliminate a bias caused by other factors that

simultaneously affected the stock prices, the authors used the rate-of-return models, which allowed to mitigate an influence of interest rate and the general economic condition. Cross-sectional averaging over a sample of heterogeneous firms helped to extenuate the effects which affected only particular company or groups of companies. To obtain relative measure of accounting change, Kaplan and Roll summed up abnormal returns starting 30 weeks prior the announcement and after averaging and subtracting other effects, such as interest rate, finally obtained the “cumulative average abnormal returns”. According to the authors, the profitability of earning manipulation is very doubtful. Generally speaking, stock prices can go up around the date of higher earnings announcement caused by accounting change, but that is only a temporary effect. Adjustment to the fair market price follows subsequently with quarterly reports. Additionally, companies which had manipulated their level of earnings, performed worse than the average. The conclusion is, that the accounting changes, such as the straight-line depreciation and the full flow-through reporting an investment credit, do not influence the stock prices in the longer run.

2.3 Related Studies

Consistent with Kaplan and Roll's result were market event studies conducted by Dopuch, Gonedes (1974) and Leftwich (1981), which documented that accounting changes are not associated with stock prices movements, as long as those changes do not generate real economic consequences, such as cash flow increase. Additionally, it has been assumed, that investors are sophisticated, and they know all available accounting rules for the particular transaction. They are able to identify costs and benefits associated with possible changes in the accounting rules. The new information results in real economic consequences, only if the costs or benefits for a particular firm influence its cash flows. Examples of such information are changes in asset/liability management strategies, changes in the probability of costly regulatory intervention and reclassification of the securities portfolio.

Research by Ball and Brown (1968) documented strong positive reaction of prices on earnings surprise. Beaver (1989) observed the stock prices between earnings announcements, and he found high predictive power of the earnings announcement from earlier share price changes. Interesting were results on interim earnings by Foster (1979). Foster concluded that interim earnings are helpful in explaining small reaction to annual earnings, when data is already available. Market reaction is strong to interim earnings, but relatively weak to annual report, once the data have been introduced. Those results were consistent with Chambers and Penman (1984), which examined the market reaction to the timing of new information. Generally, the market anticipates bad news later on, so the positive response was noticed only in case of early disclosure. In another review, Lev (1989) found that earnings have very low explanatory power in the estimation of future share prices, and he questioned the practical value of reported earnings. According to Lev (1989), the bias introduced by accounting rules was responsible for low operational function of financial statements, and he advocated further research towards standardization of accounting variables instead of focusing on their content.

A great body of research focused on the relationship among stock prices and cash flows. According to Beaver and Dukes (1972), the future cash flows are main factors in determining the share prices. But they proved that investors' reaction to the earnings included in the income statement is stronger. One

among possible explanations could be the fact that cash flows distinguish greater dispersion, so the earnings exposes the underlying trends more visibly. In later research Beaver and Duke (1973) studied the potential managers' ability to manipulate the market through changes in the accounting policies. They concluded that market cannot be fooled by smart managers, as long as different effects on earnings are canceled out, and P/E ratio remain unaffected. Those results were invalid, when inventory valuation procedures have been modified, e.g. LIFO had effect of reducing tax liabilities, and depressing reported profits.

3. The Role of Book Value of Equity and Earnings in Stock Valuation

The equity book value and earnings were recognized for the most powerful accounting variables explaining future stock prices. The residual income model with its later modification by Ohlson (1995) has outlined a new direction for further studies, and become a framework for many academicians. Although the original model had been significantly modified, the book value of equity and earnings remain a key variables. This chapter analyses the residual income models with their empirical results, as well as focuses on subsequent studies basing on traditional models.

3.1 Residual Income Model

The implementation of accounting figures such as book value of equity and abnormal earnings to dividend discount model was an essential idea for creating the residual income model. The model was built by Preinrech (1938), Edwards and Bell (1961) and Peasnell 1982, which concluded that company's value can be expressed as a function of its book value of equity and future earnings. The basic concept is presented in the formula:

$$P_0 = y_0 + \sum_{t=1}^{\infty} \frac{E_0[x_t^d]}{(1+r)^t} \qquad (1)$$

According to the residual income model, the share prices or economic value of equity are equal to current book value of equity plus the present value of all residual income or abnormal earnings. In this formula y_0 denotes current equity book value, X_t^d - abnormal earnings, E_0 - expected value on abnormal earnings at the time 0, and *r* represents the cost of equity.

It is worth to mention that the model does not require discounting the accounting variables to maintain clean surplus relation (change in cash basis owners' equity plus net cash distributions to equity, or change in cash plus net cash distributions to equity). Only values of the future earnings have to be adjusted in that manner. Normal earnings can be omitted, because they do not add value. Value adding variables are abnormal earnings or residuals. The key feature of the model is its autonomy from a particular set of accounting procedures. The model generally holds, regardless of the accounting policies applied in assets' valuation and periodic incomes. As long as the clean surplus relation holds, the total economic value of equity remains unchanged, apart from the modification in accounting policies that are likely to influence the book value and the residual income component. The book value of equity changes only with income fluctuations and net capital investments as well as with withdrawals (dividends) by the owners. But if we assume, that book value remain stable regardless of the accounting policies, the value during the particular time intervals will be a function of the applied measure rules. Conservative accounting rules tend to understate the book value of assets, and in consequence result in relative higher level of future earnings and residual incomes.

The time horizon for the residual income model was set as infinity, but it may be well applied in shorter terms (Bernard 1995). The clean surplus accounting offsets completely the bias between current earnings, book values and future residual earnings in undefined period. In shorter terms the problem over accounting bias on the future residual earnings becomes more complicated. In order to mitigate that issue, Ohlson and Feltham (1995) modified original residual income model and created their own called the Ohlson model.

3.2 Ohlson Model

Residual income model defined a strong theoretical link between the share prices and accounting variables in consistency with traditional dividend discount model. The main difficulty was an estimation of future earnings over infinite time horizon. That strong assumption seems to be very unlikely, because high abnormal earnings attract the competition and usually reduce earnings to normal level in longer run. In order to make the model more operational, the assumption of the infinite period had to be relaxed.

Ohlson (1995) treated abnormally high earnings as a temporary phenomenon, and he employed constant persistence parameters into the residual income model. The persistence parameters remain constant within the range from zero to one, so the abnormal earnings gradually decline over the time. Ohlson concluded that residual income model can be depicted as a linear function of the current book value, current abnormal earnings and other value relevant information as follows:

$$P_t = y_t + \alpha_1 X_t^a + \alpha_2 v_t \qquad (2)$$

P_t represents the share price or market value of equity, y_t denotes current book value, α_1 - coefficient on abnormal earning, X_t^d - abnormal earnings, α_2 - coefficient on other value-relevant information, and

finally v_t, which stands for other value-relevant information. Moreover, after implementing additional coefficients k, φ and dividends d, the Ohlson model can be seen as weighted average of book values and earnings models, adjusted for dividends and other relevant information as follows: (see Appendix B).

$$P_t = (1-k)y_t + k(\varphi x_t - d_t) + \alpha_2 v_t \qquad (3)$$

The Ohlson's framework, like any other economic models, is not free from restriction. The model refers only to particular companies and ignores universal aspects. The variables defined as "the other value relevant information" were not well identified, therefore testing them in the model is very intricate.

3.3 Empirical Evidence on Residual Income Models

The value of the model can be attributed to its precision in explaining variations of stock prices. The question about the model's accuracy was raised by many researches (e.g. Frankel and Lee 1998, Joos and Lang 1994). In general, the study design was divided into three groups; the first group focused on the explanatory power of the models under different sets of accounting rules and direct correlation among stock price movements, book values and earnings; the second group confers about the influence of relevant information other than book value and earnings, and third part considered any other factors, which were omitted in the previous groups. The results from the most influential studies are presented below.

3.3.1 Book Value of Equity, Earnings and Accounting Rules

Even though the process toward standardization of accounting rules is progressive, the differences across countries are significant and their effects on financial statements can vary considerably. With consideration of the diversity among accounting systems, Frankel and Lee (1998) studied the connection between accounting data and share prices in 20 countries, such as Japan, Thailand and Australia from an eight years period. Mainly, they used the basic residual income model, reported book earnings and consensus earnings forecasts in order to estimate share prices for each company. The estimated values of stocks were incorporated into the model with current book value and current earnings as explanatory variable. The results showed surprisingly high explanatory power of the model. The highest figure was 88% in USA, and 72% for the rest of the countries combined. Also the share prices estimated on consensus forecasts revealed strong predictive power in all 20 countries, stronger even than the predictions based on current earnings and book values. Moreover, the stable coefficient over estimated values suggests several consistencies between accounting practices and stock prices. The consensus earnings forecasts are assumed to have the highest explanatory power, even though the

discount rates used in the models were adjusted to the particular country. Furthermore, those results suggest, that the discounted residual income model can be very helpful in mitigation the international accounting differences. The main conclusion is that the variety of accounting regimes do not affect the value estimates in the model. In addition, they found indication of superior returns from trading strategies based on the estimate of value from the residual earnings model.

The numbers from Germany, United Kingdom and Norway were used in another event study performed by King and Langli (1998). King and Langli selected those three countries, as a result of relatively high differences in degree of conservatism of the accounting regimes and deviations from the clean surplus relation among them. The authors estimated three models, the first one researched into relation among share prices, equity book value and current earnings. Next two models explored the correlation between those accounting variables with share prices separately. They concluded that book values and earnings were strongly linked with the stock prices, and explanatory power of those two variables combined was 70 per cent in United Kingdom, 60 per cent in Norway and 40 per cent in Germany. Those differences were consistent with different accounting rules. King and Langli (1998) revealed that incremental and relative explanatory power of book value and earnings diverge both over time and among the countries. For Norway the incremental explanatory power of book values and EPS remained stable over time, while for Germany those two variables were negatively correlated with stock prices. For the UK the incremental explanatory power of books value increased, while power of EPS remained unchanged. The books value explained more earnings in Germany and Norway, but less earnings in the United Kingdom. However, the result did not show any relationship between differences in accounting conservatism and clean surplus relation embedded in variety accounting systems. Variables other than book value of equity and earnings add little incremental values to the existing model.

Bernard (1993) examined a large set of American companies, and he obtained 55 per cent figure explaining the stock price movement by book values. That number is increased to 64 per cent, if the current return on capital is added. Bernard (1994) found also that return on common equity is mean reversion, which means that companies with relatively high current ROE presumably will have low ROE over time.

The sample data from 1982 – 1990 period from France, Germany and United Kingdom was the foundation for Joos and Lang's (1994) market event study. They primarily underlined effects of the implementation the accounting related directives in the European Union members. The explanatory power of the book value and earnings combined ranged from 20 to 38 per cent in Germany, from 48 to 78 per cent in France, and from 14 to 42 per cent in the UK. Due to the relatively short time intervals, the pattern of changes over time remains ambiguous.

Harris et al. (1994) compared the explanatory power of residual income models between Germany and USA using the simple regression of one variable. The difference in value relevance was very small, but coefficients (multiples) on book value and on earnings were greater in Germany. Value relevance of accounting data can be enhanced through consolidation, and in Germany the explanatory power of model rises with restatements of earnings to adjust for transitory elements. Furthermore, the contrast sharpens over time.

3.3.2 Other Value Relevance Variables

A regression model by Green, Stark and Thomas (1996) derived from the original Ohlson model, was used to evaluate R&D expenditures. However, the authors incorporated the market-to-book premium (share price less equity book value) as independent variable, and current residual income as main explanatory variable. Then, they added current expenditures on R&D as second explanatory variable, which can be considered as the other value relevance variable. The market risk, measured as variances, and variables such as current advertising expenditures, market share and capital structure were included into the model as control variables. The result explicitly pointed to a strong relation between residual income and explanatory power of market-to-book premium, but evidence on R&D expenditures was confusing. The other value relevance variables, namely the control variables, demonstrated almost no effects on explanatory power of the model. The control variables were likely to influence only interference tests.

Ohlson (1995) framework has been widely implemented in many studies, but very rarely variables such dividend and other value relevant data were incorporated into the model. Hand and Landsman (1998) based on the data from US companies, and additionally introduced dividends and net capital contribution into the general model. The model modified by the authors explained about 80 per cent of share price movements. They found also, that if the value of other relevant information is set to 0, like in most empirical cases, the coefficient of dividends is likely to be positive, what is inconsistent with the theory. But if realized earnings are considered as proxies for expected earnings and other variables, they influence future residual income according to Ohlson, and the sign of coefficient earnings is contrary to the theory as well. Hand and Landsman concluded, that the original assumption does not process the data perfectly, and the positive relationship with dividends is only a consequence of usefulness of dividends in predicting future residual income. According to the above explanation, they proved that greater dividends are associated with higher future residual incomes, especially in case of companies with current net losses.

3.4 Subsequent Market-Based Researches

According to relevant literature, a decline in the relevance of book value of equity, earnings and other data included in financial statements was a consequence of changes in the economy. Collins et al. (1997) examined the information from 41-year time period (1953-1993) from American companies, and the result pointed to a decline in explanatory power of the earnings. But the ability of book value of equity to explain stock price movements significantly increased during that period, so the total explanatory power of the model generally raised. The authors documented that decline in the explanatory power of earnings was the result of an increase in the incidence of one-time items, reported losses together with sizing down companies, as well as an increase of the proportion of firms with high intensity of intangible assets in the sample.

Financial health of firms and its connection with book values and earnings in the explanatory power of the model was tested by Barth, Beaver, Landsman (1998). Bond ratings and two sample data from USA

were a relative measure of the financial condition. The estimated regression model linked directly the market value with book value of equity. The data were divided into two groups, the first one contained companies that subsequently filed a bankruptcy, and the second one included those with sounding financial condition. The outcome confirmed the assumption that the relative explanatory power of book value of equity increase, and explanatory power of earnings decrease, when the financial health of the firm deteriorate. The authors proved also the hypothesis, that the explanatory power of book value and earnings is related within industries, and this is a direct outcome of the importance of intangible assets. For example pharmaceutical industries depend strongly on the intangible assets, so the explanatory power of earnings was significantly higher. However, in the industries such as financial services, where intangible assets play a minor role, the book values had higher explanatory power than earnings.

Further research by Dechow, Hutton and Sloan (1999) inquired into dynamic linear links of expected residual income with currently available information. The authors estimated several regression models with alternative values of persistence parameters using the data from USA. The explanatory power of the Ohlson model ranged from 40 to 60 per cent what means that the model reasonably cover the empirical numbers. But the authors concluded, that their findings improved the basic model only marginally. According to them, investors will tend to overweigh the information in earnings estimates, or under weigh the data in current accounting variables. However, the authors emphasized a huge role of the Ohlson's model as an unified framework for subsequent empirical studies.

3.5 General Conclusion

The residual income models were a direct response to imperfections of the dividend discount model. Main difficulty of the traditional model was the estimation of future dividends for the remaining life of company. The problem was significantly enhanced in case of fast-growing firms with high retention rates. The residual income models predicted the share price movements without cumbersome dividend estimation, and therefore an importance of accounting variable gradually raised.

The early studies focused mainly on the explanatory power of the earnings, but over time also equity book value gained in significance. Although the main concept is based on abnormal earnings and residual incomes instead of dividends, it still required estimations over infinite period. That obstacle was overcame by Ohlson (1995), who modified the basic model by relating the residual income with auto-regressive process, so only the current data were required.

Market event studies conducted in Europe (Joos and Lang, 1994 ; King and Langli's ,1998), North American (Bernard, 1994; Collins et al., 1997) and Asia (King, Graham, 2000) indicated, that book value and residual earnings are positively and strongly related to current stock prices. Although the relationship between the explanatory power and accounting differences was proved, the pattern is still not revealed. However, the strong conservative accounting seems to be less value relevant.

Researches based on Ohlson's framework provided evidence, that the book value of equity and earnings combined have much higher explanatory power that each of those variables separately. Different

accounting regimes seemed to influence the explanatory power as well as other value relevant information, but the empirical results were ambiguous. Also the evolution of residual income consistent with the linear dynamic process has been questioned. However, Ohlson built a solid base for subsequent studies and created opportunities for exploring an empirical fit of current variables, other than earnings and book value of equity.

3.6 Valuation Model as Convex Function of Earnings and Book Value of Equity

The linearity of the current book value of equity and current abnormal earnings was important contribution of Ohlson (1995) to the original residual income model. However, the researchers which have followed the Ohlson's line began to question the linearity of the model. The representative of the new trend was Zhang (1999) who implemented the convex function of book value of equity and earnings to the model.

3.6.1 The Model by Zhang

Zhang (1999) reexamined the role of earnings and book value of equity in order to focus on the cross-sectional differences in features of the valuation function. Zhang based on Ohlson (1995), and Feltham and Ohlson (1995; 1996), but he questioned the linearity of function of earnings and book value. His hypothesis was consistent with previous studies by Burgstahler and Dichev (1997), which proved the valuation function to be convex. Similarly, Hayn (1995) and Collins et al. (1999) documented, that valuation effect of earnings is asymmetric between positive and negative earnings. Additionally, Collins et al. (1999) concluded, that level of earnings is associated with explaining equity by the relative and incremental importance of earnings versus book value. The primary contribution of Zhang (1999) was an incorporation of capital investment decisions into the model originally created by Ohlson (1995) and Feltham and Ohlson (1995; 1996) in order to reconcile the empirical results from latest studies.

In contrary to the original model, Zhang documented that accounting information played a crucial role in the investment decisions. He rejected the assumption of an predetermined stochastic process as characteristics of the investment decision. The equity value was derived from accounting variables such as historical cost valuation, the clean-surplus relation, and conservative (therefore biased) depreciation policy. The equity value was assumed to be convex in both earnings and book value, particularly for low efficiency firms and for high efficiency firms with growth opportunities. In case of stable firms, the equity value was the linear function of earnings, and then the book value had lower explanatory power. Accounting regimes, such as conservatism, were likely to understate true values of assets, and generally increased the valuation impact of the book value of equity.

3.6.2 Contribution to Existing Literature

The Zhang's model of emphasized the importance of the accounting data in taking the investment decisions. From the accounting point of view, the equity value was a value of continuing the present methods of operations plus the value of the option to expand or contract the scale of operations. The book value and earnings were considered as the most important accounting factors, and additionally, the equity value with endogenous investment was predicted to be convex in earnings and book value of equity.

The stock price was expected to rise with earnings under any given book value. On the contrary, when the earnings were given, the book value was supposed to increase with the stock price in case of low-efficiency firms. The stock prices of steady-state firms were likely to be insensitive to book value and decreasing in growth-firm. Options to expand or contract the operating scale prompted the valuation function in earning and book value to be convex. The reduction of stock prices to a linear function of earnings was acceptable only in case of steady-state firms.

Explaining the equity through the book value and earnings was associated with operating efficiency and growth potential. In contrary to the steady state firms, the book value had higher explanatory power than earnings in low-efficiency firms. Combined earnings and book values showed high explanatory power of equity value, and the usefulness of the book value have been increasing with growth potential of firms. Moreover, Zhang created the theoretical model, which explains a negative relation between the market value of equity and negative earnings.

Although Zhang's model requires additional empirical analysis, the evidence was generally consistent with its predictions. The basic innovation of the model was a division of the companies into different groups, according to the operating efficiency and growth scale, and the regression equation was adjusted for each group. The accounting conservatism was likely to increase the valuation impact based on the book value, but the impact based on earnings varied on investment scale. Zhang created the framework, which was very useful in areas such as earnings response studies, studies exploring the changing role of accounting data for valuation, and researches inquiring into an impact of accounting practice on the valuation.

3.7 Theory of Accrual Anomaly

Another critical study was conducted by Sloan (1996). He argued, that investors are able to earn abnormal profits of 10,4 per cent per annum by purchasing firms with low accruals and selling short firms with high accruals. Sloan (1996) documented, that abnormal returns are a consequence of naivety of investors, which "fixate" on earnings and overweigh the accrual component of current earnings during future earnings forecast. The accruals tend to revert due to the subsequent earnings announcement and abnormal earnings are direct outcomes of the price adjustment. Additionally, Sloan (1996) concluded that different features of accruals and cash flow components are subjected to accounting measurement.

In order to understand the Sloan's theory properly, a clear definition of accruals needs to be quoted. Sloan (1996) defined accruals as “the change in non-cash working capital less depreciation expense”. Despite that definition refers strictly to the previous studies, and corresponds with operating accruals used in the FASB’s Statement of Financial Accounting Standard Number 95 ‘‘Statement of Cash Flows’’, it omits some important relations. The accruals and deferrals, which are connected with non-current operating assets and liabilities, as well as non-cash financial assets and liabilities were not included in the above definition. The accruals simple represent differences between accrual earnings and cash earnings and can be obtain by formula:

$$\begin{aligned} \textit{Accruals} &= \textit{Accrual Earnings - Cash Earning} \\ &= \textit{Change in Non Cash Assets - Change in Liabilities} \end{aligned}$$

Accruals earnings are derived from:

$$\begin{aligned} \textit{Accrual Earnings} &= \textit{Change in Owners' Equity + Net Cash Distributions to Equity} \\ &= \textit{Change in Net Assets + Net Cash Distributions to Equity} \\ &= \textit{Change in Assets – Change in Liabilities + Net Cash Distributions to Equity} \end{aligned}$$

The Sloan's (1996) work inquired if the share prices reflect the information about future earnings, which is included in the accrual and cash flow component of current earnings. The relative magnitude of cash- and earning components were proven to influence the persistence of earnings performance. The accrual component of earnings showed less persistence than the cash flow component of earnings, and this difference was a consequence of the greater subjectivity of accruals. The stock prices reacted accordingly to investors' perception of those two components, and the outcome were inconsistent with semi-strong form of efficient market hypothesis, but the finding did not necessarily implicate investors' irrationality and the existence of free profit opportunities.

However, the Sloan's strategy has some limitations in the form of the potential price pressure effect. Historical stock trades observations do not confirm the hypothesis, that any amount of stocks can be traded at the same price. The author concluded, that the obtained result may be an evidence of normal return, which can be earned by investors through the active investment strategy and the financial statement analysis.

3.8 Modern Theory of Accrual Reliability and Earnings Persistence

Further research in the earnings accrual and cash flow component were continued by Sloan with cooperation with Richardson, Soliman, Tuna (2005), and the new study added several features to the existing literature. The authors modified the basic definition of accruals by incorporating accruals

related to non-current operating assets and liabilities, as well as accruals on financial assets and financial liabilities. Due to variety of different transaction issues, the new comprehensive definition is considered as the accruals accounting's representative.

$$Total\ Accruals = \frac{[Net\ Income - (Net\ Dividends\ and\ Distribution\ to\ Equity\ Holders + increase\ in\ the\ Cash\ Balance)]}{Average\ Total\ Assets}$$

Additionally Richardson, Soliman, Tuna and Sloan (RSTS thereafter) documented significant costs from recognizing less reliable information in the financial statements. The lower earning persistence was associated with less reliable accruals, so therefore investors did not anticipate this trend in a full range, and that directly contributed to stock mispricing. The stock mispricing related to the accruals proved to be larger than it originally assumed in Sloan (1996). Additionally, the definition of accruals was widened, but the new elements showed particularly low reliability.

RSTS proved, that less reliable accruals generated costs in form of lower earnings persistence and related mispricing. Their result was consistent with Watts (2003), who concluded that recent changes in GAAP towards including less reliable data can be very costly. When less reliable information was implied, the measurement error in accruals can be treated as an independent random variable accordingly to RSTS's result. Conservatism, or other accounting convention, combined with strategic managerial reaction caused the measurement error to behave in nonrandom manner. That problem could be enlarged by the underestimation of costs and effects.

The distinction between earnings and free cash flows was crucial in evaluation of the firm performance. According to the basic definition, the free cash flow equals the earnings adjusted by adding back amortization and depreciation, subtracting changes in working capital and capital expenditures. It is worth noting, that the formula of the operating accruals components developed by RSTS was very similar. The accruals, which were classified by the authors as lest reliable, corresponded closely with an earnings adjustment towards the free cash flow value. In that manner, the free cash flow can be considered as combination of actual cash flows plus the relatively reliable financing accruals.

The modern model of accruals is not free from several restrictions. The authors omitted tests of other economic explanation for differential persistence coefficients on the cash flow and accrual components of earnings. It is probable, that the economic factors can cause earnings to be less persistent in growth firm, although the accrual component of the earnings seems to respond with sales growth changes. Another limitation results from an assumption, that the measurement error in the accruals is considered as independent random variable. However, the measurement error can be subjected to strategic managerial manipulation of earnings and the accounting convention. The measurement error in cash flow was treated as the second-importance variable, but recent studies proved, that the cash flows are prone to managerial manipulation as well.

Sloan initiated a great number of subsequent studies on the accrual anomaly. His successors documented even larger returns, which in consequence questioned the market efficiency. Kraft, Leone and Wasley (2005) focus on the look-ahead bias in the accrual anomaly. They based on previous studies, which inquired into an evolution of accruals, as well as trading strategy associated with the accruals (e.g. Collins and Hribar 2000). Returns from implementing that strategy were doubtful,

because they required a presence of next-year accruals, and that was not knowable at the time of modeling the portfolio. Furthermore, a selection of companies without the future accruals was likely to be nonrandom due to the occurrence of the bankruptcy. The sample of firms listed on NYSE/AMEX returned to accruals of 4,2 per cent including the bias, or 1,8 per cent without. In comparison, the same sample with annual buy-and-hold size-adjusted returns to the lowest accrual deciles returned 13,0 per cent with the bias but only 1.4 per cent without it.

4. Stock Prices and Earnings Manipulation

Accounting methods can be applied by executives with substantial degree of freedom, and it is commonly referred as earnings management. But the borderline between the earnings management and earnings manipulation is blurred, and consequences for the stock prices are significant.

4.1 Earnings Management

The broad activities included in the earnings management definition target primarily the level of earnings. Boosted earnings can directly influence stock prices and raise capital at the lowest cost, but those activities do not necessarily benefit investors. According to Bebchuk, Fried and Walker (2002), inflating profits for option exercises shifts value from current shareholders toward managers. In contrast, boosting the profits or the stock prices, and using those overstated stocks in an acquisition of other firms, benefits current investors through transferring wealth from future stakeholders. Those findings are consistent with theory of the optimal incentive contracts of Bolton, Scheinkman, and Xiong (2003) and the view of stock-financed mergers in Shleifer and Vishny (2003).

Managers are likely to choose income-increasing accruals, especially when earnings before discretionary accruals fall below the lower bound in bonus plans (Gaver, et al. 1995), or in order to smooth incomes. Mergers activities and large scale compensation contracts are conducive to manipulate earnings as well.

4.2 How Earnings Can be Manipulated?

Manipulated earnings can be describes as:

> "Earnings, which provide a poor or deceptive guide to future earnings and cash flows due to an intentional intervention by management"
>
> Baruch Lev (2003), *Journal of Economic Perspectives Vol.17*

Earnings can be manipulated mainly in two ways; through accounting- or real means. Manipulation through accounting means can be further divided into GAAP-consistent or GAAP-violating. The accounting means does not have physical effects on cash flows and any other firm's activities, and can be easily done by one stroke of pen. A simple example is recording expenses as capital expenditures, which are an asset position in the balance sheet, and that directly boost earnings by the same amount under unchanged cash flows. In contrast, the real means require real changes and causes real consequences. Bartov (1993) proved, that the timing of assets sales affect reported earnings, and Dechov and Sloan (1991) documented, that decreasing the level of R&D expenditures can raise current earnings.

Regarding to the Sloan's theory of accruals, accounts receivable are the most common category of the accruals used in the earnings manipulation. The accounts receivable consist of subjective estimation of outstanding accounts, so techniques such as trade loading and premature revenue recognition are very easy to apply (Dechow, Sloan and Sweeney, 1996). Also inventory measures can significantly distort reported earnings due to high degree of subjectivity in cost flow assumption and allocation. For example under LIFO, when production level is very high, the allocation of fixed costs to inventory influence financial statements substantially. More detailed studies in effects of the inventory measures are presented in the further part of my study.

Rangan (1995) and Shivakumur (1996) found evidence, that managers' incentives to inflate earnings rise before an equity offering, because the overstated earnings allow to obtain external funds at lower cost. Furthermore, Shivakumur (1996) concluded, that those incentives remain even after the equity offering, due to possibility of litigation, if managers fail to fill promised forecasts. The authors documented, that aggressive earnings management is more probable two quarters before, quarter of, and three quarters following the seasoned equity offering. The degree in information asymmetry played crucial role, and it was proved that higher asymmetry was associated with the earnings manipulation.

4.3 Earnings Manipulation Phenomenon

Although the earnings manipulations are very common, detection and prosecution still remain a big challenge. Even though evidence showed, that firms which were more likely to manipulate earnings, experienced lower earnings in the future (Beneish and Nichols, 2003), the executives are still able to mislead investors. The managers often use incorrect estimations of provision and reserves during

earnings computation, or simply exploit the loopholes in accounting systems to make investors expect abnormal future earnings. The manipulation of earnings has considerable economic consequences, and attempts to reduce its scale remain fruitless as long as the incentives are not eliminated.

5. Other Accounting Related Issues Associated with Stock Prices

The book value of equity and earnings were documented to have the largest impact on future stock prices, but further studies showed that stock prices can be explain also by cash flow-related variables. Additionally, the market were proven to react to changes in accounting systems, like change of inventory methods or even an adoption of compensation plan. Although the explanatory power considerably varies, the accounting-related factors improved the awareness of stock prices behavior.

5.1 Cash Flow-Related Variables

Earnings yields, capital investments, changes in profitability and growth opportunities were identified by Chen and Zhang (2006) as the cash-flows factors with the highest explanatory power of future returns. The earning yield is a variable, which generates value and thus represents a part of current-period earnings. Changes in profitability reflect modifications in an operating efficiency, defined as the value generation per unit of capital. It affects directly expected future cash flows. The future cash flows depend on the scale of operations, and the capital investments are factors, which influence current operations. The authors based their work on the real-options-based valuation model of Zhang (2000), which generally assumed, that firm value is derived from the value of assets plus growth opportunities (see e.g., Miller and Modigliani, 1961). According to Zhang (2000), the equity value was a function of earnings capitalization from current assets, and the value of real options, e.g. option for abandonment or growth. Furthermore, the author concluded, that changes in stock prices are strictly related with changes in expectations about the firm's scale and profitability in future periods.

5.1.1 Information Associated with Profitability

The theoretical and empirical results of model created by Chen and Zhang (2006) enhanced an understanding, how accounting choices can influence the level of stock prices. The authors identified the effects of cash-flow related factors on future earnings as positive correlations. Since the value of

earnings yields constitute the part of stock return, earnings yield are strong and positive correlated with expected future earnings. Coefficient on changes in profitability was documented to be positive for each level of profitability. The profitability was primary factor in value generation, so change in the profitability was central to stock returns. Value generation was affected by changes in the profitability through invested capital.

The information associated with the profitability was proven to have greater importance in explaining price movements than any other cash flow-related factors. Those findings are consistent with previous theory of the second-moment behavior of stock returns.

5.1.2 Information Associated with Scale

Capital investments and changes in growth opportunities are factors of the cash flow-related variables associated with scale. Chen and Zhang (2006) defined the capital investment as a proportional change in invested equity capital. The change in the capital base, on which value is generated, affect directly returns. The authors documented, that increase in the capital base due to incremental capital investments result in a raise of the expectations about the amount of future value generation, and that leverages on increase in equity value. However, the incremental capital investments reduce the dividends as well, so the coefficient on capital investment was an average of that two opposed effects. Nevertheless, it is assumed that the capital investments are positively correlated with stock prices, because firms usually accept investment projects with positive NPV.

The growth opportunities, defined as the extent to which the operating scale can potentially grow, are important factor in the value creating process. Other things being equal, the increase in growth opportunity results in higher level of return. Firms, with higher profitability are more sensitive to changes in growth opportunities.

5.2 Discount Rate

The great importance of discount rate is a consequence of its effect on the future cash flows pricing. Present value of future cash flow fall with any raise of the discount rate, and lower present value leverages on lower level of expected earnings. This change is of particular interest to investors, because dividend is a function of cash flows/earnings. Ceterus paribus, the discount rate is negatively correlated with stock prices. The negative correlation of discount rate with returns is consistent with the original theory of Net Present Value. The change in interest rate can be a consequence of change in demand for financial capital/money, the result of monetary policy targeting inflation, and government's fiscal policy aiming economic stimulation (Salvary 2003).

5.3 Inventory Measures

Binding accounting regulations allow for choices between inventory methods, such as FIFO and LIFO. Prior literature review documented, that the FIFO method is likely to increase reported earnings. In contrast, the LIFO is widely used for tax purposes, because it reduces the present value of taxes. It is worth noting, that both methods have direct cash flows implications.

5.3.1 LIFO

The firms incurring raising inventory costs are likely to switch to LIFO, which generates incremental cash flow due to tax savings. In the presence of tax related implications and conflicting firm's goals, the choice of the LIFO is not prevalent. However, the stock price reaction to the LIFO adoption is not always positive, even with an incremental cash flow assumption.

Tse (1990) made an attempt to create a theoretical model, which would explain contradictory results observed since 1970. He analyzed market reactions in the announcement period to incomes, which were generated by liquidation the assets under LIFO. Moreover, the assets liquidation was assumed to be strategic and planned by management. The model by Tse (1990) had very low explanatory power, and did not link empirical results with the theory.

Consequent study by Hand (1993) in FIFO/LIFO effects on stock price movement did not contribute much to the existing literature. Hand's (1993) results were used in subsequent review by Kang (1993), who remodeled the LIFO adoption decision. The author concluded, that if investors are rational, the market should not react to switch/no switch decision, because companies which chose LIFO must incur lower switching costs than tax savings. Kang (1993) did not find a positive relation between abnormal returns and scale of LIFO tax relief for the LIFO adoption, and moreover - his model predicted even lower share prices under that inventory measure comparing with prices in non-inflationary environment due to LIFO adoption costs.

Jennings, et al. (1996) were inquiring into the LIFO effects on income statements and the balance sheets. The authors documented, that the income statements and balance sheets prepared under the LIFO were stronger associated with the equity value than non-LIFO methods.

Hand (1995) re-examined the relation between LIFO and stock prices, and he explored into three anomalies: (1) firms, which voluntary adopt LIFO in 1974 incur negative mean excess stock returns at the first annual earnings announcement, (2) negative returns were also a consequence of early public disclosure of LIFO adoption, (3) LIFO earnings were constantly overestimated by Standard & Poor analysts, as well as earnings reduction under LIFO were underestimated. Hand (1995) proved the first and third anomalies to be untrue, investors were able to process S&P forecast properly. However, the second anomaly remained unexplained. The author deducted, that the excess of stock return is a function of sophisticated and unsophisticated responses to information on LIFO adopters, and therefore the results were ambiguous.

Contrasting results of prior studies suggest that market reaction to the LIFO adoption is very complex and not fully captured by the theoretical models. That can be a consequence of discretionary nature of the LIFO adoption (Lanen and Thomson, 1988), or above average earnings growth, which is likely to occur after switching to the LIFO (Ricks, 1982) and (Pincus and Wasley, 1994). Ball (1972) and Jennings et al. (1996) pointed out, that under LIFO firms are able to reduce inventory profit taxation, but they may not be able to hand over higher inventory costs to their customers. However, it is generally accepted, that the LIFO adoption is positively correlated with stock prices, and higher tax benefits implicate higher correlation (Pincus 1997).

5.3.2 FIFO

The first-in first-out method can lower inventory costs on the income statement, so earnings before taxes are higher than under the LIFO. Higher earnings induce higher tax levels, what generally decrease the net income. Since the FIFO affects inventory prices, it results in changes of current assets and other balance sheet measures. Therefore, the share prices can vary in accordance with the firm's performance variables.

Gul (2007) documented a strong link between the free cash flows theory and the inventory methods. Non-value maximizing managers with free cash flows are more likely to adopt the earnings increasing FIFO, because it leverages on their higher compensation. In that case, the managers do not act in investors' interest, and that can lead to potential conflicts. For example, a debt is widely used in mitigating the agency problem and the free cash flow issues, because managers of firms with high level of free cash flow and debt have lower incentives for the FIFO adoption.

5.4 Changes in Net Operating Assets

The relationship between future stock prices and changes in net operating assets were documented by Sloan (1996), who concluded that recent annual changes in non-cash working capital were negatively correlated with future accounting rates of return and future stock returns. Fairfield, Whisenant and Yohn (2003) and Richardson, Sloan, Soliman and Tuna (2005) proved, that Sloan's result can be extended to the most recent annual changes in net operating assets.

The level of net operating assets was recognized by Hirshleifer, Hou, Teoh and Zhang (HHTZ thereafter) as the powerful predictor of future earnings and stock prices. According to the authors, the net operating assets comprise all cumulative differences among the free cash flows and operating incomes (see Appendix C). The latest annual change in the net operating assets reflects only a small fraction of those differences, so the value of net operating assets provide more comprehensive outlook. HHTZ concluded, that the stock returns measure is simpler, when it is derived from the current balance sheet. In their research they estimated several regressions, and deflated the level of net operating assets

by lagged total assets. Further empirical research into the obtained net operating measure confirmed its high explanatory power on stock returns. Furthermore, the level deflated by the lagged level is equal to the change in net operating assets. The results obtained by HHTZ were slightly different from the prior researches. The magnitude of differences in prediction of the stock prices depends mostly on research designs and samples period, so each study should be explored carefully.

The net operating assets measure can be described by linear function of the one-period change in NOA - variable used in previous research, the lagged level of cash deflated by lagged assets, and the lagged level of operating liabilities deflated by lagged assets. Richardson, Sloan and Tuna (RST thereafter) concluded, that explanatory power of above measure could be enhanced by incorporating additional variables, but the cumulative past differences between earnings and cash flows are not the case. Models created by HHTZ (2004), and RST (2006) did not fully explain that issue.

RST explored correlations between the lagged changes in net operating assets and the future stock returns. They proved, that past changes in net operating asset have low impact on predicted stock returns. That result was inconsistent with prior study of HHTZ, and the authors concluded that future stock returns cannot be explained by the cumulative past changes in net operating assets.

5.5 Adoption of Accounting-Based Compensation Plan

Accounting-based compensation plans are also called for accounting performance plans, and they are commonly used for managers' remuneration. Companies divide the compensation plans to three groups: (1) straight salary, (2) stock options, and (3) bonuses. The stock options and bonuses help mitigate the agency problems. It is assumed, that companies adopt the performance plans due to inclusive character of choices in other types of contracts and signaling issues (Brooks, May, Mishra 2001).

The review by Lacker (1983), and Rich, Larson (1984) documented, that most of the performance plans targeted primarily an earnings per share growth. Subsequent research by Talmor and Wallace (1999) on the compensation contracts, proved that despite over half of them consisted bonus clauses and stock options, the performance plans were used in less than half cases.

The long term accounting-based compensation plan is usually designed for three to six year period. On the beginning of award period, each manager is granted a maximum number of performance units, which later can be received. The executive remuneration equals the number of units earned at the end of award period times the fixed predetermined dollar value per unit. The numbers of performance units are granted according to achieved accounting targets. Slightly different from the performance units are performance-share plans. Instead of fixed numbers of units, the amount of the performance units in share plans are adjusted to achieved goals, so the total compensation is a function of earned shares and their value at the end of the award period.

5.5.1 Why Companies Choose Performance Plans?

Raviv (1985) linked the adoption of accounting-based compensation plans with signaling the future improvement of firms' performance. He concluded, that investors anticipate managers to design contracts in way, which benefit them personally, so linking the managers' compensation with firm performance is a credible signal indicating inside information on improvements in future performance. Although, under the signaling theory the compensation plans have no alignment function of interest among investors and managers, the stock prices reaction is positive.

Another explanation is closely related with an alignment of managers' interest with investor expectations. The theory is likely to be true, following poor performance period of the firm. The performance plans, explained by the incentive-alignment, are used to mitigate the agency problem between shareholders and managers. It is worth noting, that performance plans are direct responses to agency problems and they remain an effective tool in reducing such issues.

The influential studies by Lanen and Larcker (1992) on determinants of performance plans adoption showed, that those plans were a response to changes in the external environment and internal strategies (e.g. electric utilities). Firms with lower investment opportunities, and those under restructure, were presumed to accepted performance plans as well (Gaver, 1994, Brozovski and Sopariwala, 1995). However, existing share plans were not fully replaced by new performance plans, so the incentive-alignment problems could not be recognize as a driving force behind the adoption.

5.5.2 Implication for Stock Prices and Empirical Results

General results of the studies inquiring into relationship between performance plans and stock prices pointed to positive market reaction after the adoption announcement. Lacker (1983) explored data from 21 firms, and he documented an improved stock performance, as well as an increase in capital expenditures associated with the performance plans adoption. The result of Gaver and Battistel (1992) study was quite surprising. The authors examined large sample, and they observed no significant stock prices reaction during first two days period after the SEC approved detailed performance plan. The significant market reaction was noticed only after those two days period, up to the day of the general shareholders meeting. Gaver and Battistel (1992) associated their results with disclosure of other information, since the sample of non-adopting firms yielded similar outcome. However, Kumar and Sopariwala (1992) basing on 62 companies from Fortune 500, documented strong positive correlation among stock prices and the adoption of performance plans around the mailing day of proxy statement.

Although the performance plans adoptions have been proved to have positive impact on stock performance, the results on accounting returns were mixed. According to review by Kumar and Sopariwala (1992), the performance plans increased growth rates in earnings per share and return on equity. Improved profit margins due to performance plan lead to lower cost of goods sold, and reduced inventory-related costs, and that suggest better cost management (Ferris, Kumar, Sant, and Sopariwala,

1998). However, the value of total assets and total assets turnover did not increase significantly, which negated the assumption of long-term growth in sales and improvement of asset management. That result was confirmed by Enis (1993), who did not find any improvement of performance after the plans adoption. Subsequent research by Askren, Bannister and Pavlik (1994) also did not show any links between the performance plan adoptions and the accounting earnings.

Another study by Jarrel and Dorkey (1992) included a broad sample of 576 companies listed on American and New York Exchanges, and covered the 1963 – 1990 period. The authors explored the correlation among stock returns and the accounting-based performance measures, such as earnings per share, return on equity, return on assets, cash flow per share, and sales growth. Empirical results documented strong, positive and statistically significant relation to gross and net-of-market stock returns of each firms. Additionally, the correlation was stronger for the firms with a value-weighted market index. Jarrel and Dorkey (1992) found significantly positive relation with firm stock returns and each of the accounting-based performance measures, but earning per share before extraordinary events had the highest explanatory power. The accounting measures were proved to be strongly associated with the firm-specific component of stock returns, but relatively low correlated with the value-weighted market index, even though individual firm returns were significantly related to the market.

The study by Brooks, May, Mishra (2001) on the post adoption performance documented significant improvement for adopting firms, and the authors explained all their finding by the signaling theory. The incentive-alignment model was inconsistent with empirical research on earning per share growth and operating returns, so the authors concluded, that the positive market reaction was primarily a result of the credible signal of future performance.

5.6 Accounting Restatements, their types and causes

The research by Callen, Livnat, Segal (2002) focused on the restatement of financial statements in five situations involving changes in accounting principle, such as: (1) change the LIFO inventory measures to another method, (2) changes in the accounting method for long-term construction-type contracts, (3) changes to- or from the full-cost method of accounting in the extractive industries, (4) issuance of financial statements by a closely related company for the first time in order to obtain additional equity capital, to effect a business combination, or to register securities, (5) the new accounting announcement recommends, that a change in accounting principle must be treated retroactively. Additionally, under Accounting Principle Board 1977, paragraph 13, public companies are required to restate financial statements which contain “errors [resulting] from mathematical mistakes, mistakes in application of accounting principles, or oversight or misuse of facts that existed at the time the financial statements were prepared”.

Changes in accounting rules, which result in the restatements of financial statements, are less likely to be a symptom of the earnings management. Most of those changes were legitimate requirements to disclose changing circumstances that influence the firm’s performance. Broad studies by Schipper (1989), Healy and Whalen (1999), Dechow and Skinner (2000) and Parfet (2000) proved, that even if the changes in accounting principles were associated with the earnings management, that strategy was

not necessarily well-aimed, since capital markets were informed about the future firm's performance. However, the changes in accounting principles due to deliberate errors that intended to mislead investors, were documented to have significant negative implications on the future firm's prospects in comparison with the prior performance. According to the evidence explored by the authors, the accounting restatement associated with the managerial opportunistic behavior were divided into restatements related to changes of accounting principles and those related to accounting errors.

5.6.1 Market Reaction and Prevalence of Restatements

Wu (2002) explored 1,068 cases from the period 1977 – 2000 and he documented sharply rising trend in number of earnings restatements. In late 1970s and early 1980s the number of restatements were characterized by single digit number, but comparing to the latest research, that number skyrocketed to nearly 300 per year (Bryan, Low, 2003). Almost half of restatements were made by hi-tech firms, and over 90 per cent revised earnings downward. Wu (2002) suggested that lower earnings were intercepted by investors as surprise, the stock prices from the day before through the day of the announcement fell on average by 11,2 per cent. Nevertheless, the return on stock prices was negative at 4 - 5 per cent during the month prior announcement, so the earning restatement was not total surprise. The stock prices continued to decrease slowly even after the announcement.

Wu (2002) related a great number of accounting restatements with the manipulation. Enron, WorldCom, Xerox, Tyco and Global Crossing achieved an disgraceful fame, after fraudulent practices had been uncovered by external auditors. The scale of the accounting restatements were so large, that the stock prices fell to few cents in case of Enron within couple of days. Large number of restatements since 1998 was connected with SEC activities against the earnings manipulations, and bursting the high-tech bubble. However, not every accounting restatements reflects frauds and earnings manipulation, and that results implicate more complex problems than merely technical accounting issues (Lev 2002).

Callen, Livnat, Segal (2002) documented strong negative market reaction to the average error restatement, and that outcome was consistent with the prior studies. Nevertheless, the market reaction to announcements arising out of the changes in accounting principle was not significantly different from zero. The income increasing announcements, both for modification in accounting principles or correcting accounting errors, resulted in statistically insignificant market reaction. The authors found strong and negative market reaction to the income-decreasing error announcements, but in case of the same announcement resulted from the changes in accounting principle, the reaction was statistically insignificant. The possible explanation for the strong negative reaction was related to negative future cash flows and weak accounting systems that could indicate the opportunistic managerial behavior.

The income-increasing restatements due to errors probably prompted negative market reaction because of a failure in the accounting system. The restatement error just offset, but did not completely outweigh the potential positive future cash flow implications of the income-increasing restatements. The opportunistic managerial behavior issue was excluded, because the income was not significantly higher comparing to the previous period.

Note, that the market did not penalize companies, which influenced the level of incomes through the change in accounting methods, albeit incentives toward opportunistic behavior by managers had been enhanced. Nevertheless, the effects were offset by upward revisions prognosis on future cash flow, and the weaknesses in the accounting system did not play a key role.

5.7 Accounting for Business Combinations

Purchase and pooling of interests are two competing methods of accounting for business combinations. According to the purchase method, the acquiring firm (parent) is obliged to recognize, and eventually expense, a difference between fair values paid for acquired firm (target), and book value of the target's net assets. In the literature that difference is called the accounting acquisition premium (AAP), and it usually constitutes a great proportion of the amounts paid for the target, and AAP can substantially reduce combined entity's future net income. Book values, rather than the purchase price, increase the risk of overpayment in transactions, because managers are not held fully accountable in the reports for the price paid for target, and that directly leverages on higher investors' skepticism. The purchase regime allows for recording substantial goodwill, and due to increased depreciation and amortization charges, set higher earnings target in order to justify paid premium.

On the contrary, under the pooling of interest method the target's net assets can be recorded by the parent at the book values. The AAP is omitted, and if all variables remain unchanged, the future net income after the pooling transaction are usually higher than the net income reported after purchased accounting. Due to laxer reporting requirements and lower transparency of paid prices, the managers are likely to choose the pooling method, if they engage in negative NPV acquisitions.

5.7.1 Does Business Accounting Combination Make a Difference?

The strictly rational view suggests, that the accounting for business combination should not affect stock prices. However, McGoldrick (1997) and Vincent (1997) found evidence suggesting, that reduction in the net income by AAP under purchase method can destroy a firm value, but subsequent studies have not provided convincing and clear results. For example Martínez-Jerez (2007) documented that markets reward the purchase transactions over pooling transactions. The author suggested, that stricter reporting requirements and increased accountability for the acquisition price under the purchase method, will reduce managers' incentives towards value-destroying acquisitions. In the same research, Martínez-Jerez (2007) found significant and negative market reaction to the announcement of pooling transactions, and confirmed investors' common believe about higher risk of ex-ante value-destruction under pooling method. Additionally, the author linked stronger negative reaction with weaker corporate governance institutions.

Contrasting result was documented by Davis (1990), who noted significant differences in returns between companies using purchase and pooling methods before a merger announcement. Davis compared abnormal returns of tax-free purchase and the pooling transactions during the weeks centered on the merger and merger-announcement dates, and - contrary to common view- he found strong positive marker reactions for the purchasing companies. The author attributed those discrepancies to differential market reactions and assessments of mergers. In spite of contrasting results, fundamental variations in accounting have been proved to have statistically significant impact on stock prices (Hopkins,1996; Hirst and Hopkins, 1998)

5.8 Voluntary Changes in Accounting Methods

The voluntary accounting changes can be explained by two contrary motives. The common justification offered by managers is supplying the market with more accurate measure of the firm's investments and operating environment. In contrast, the skeptics argue that managerial discretion can lead to earnings manipulation in order to influence contractual agreements or equity valuation (Fields, Lys, and Vincent 2001). Management is allowed to choose among acceptable accounting rules, and previous studies by Holthausen and Leftwich 1983; Healy and Palepu (1993) showed, that the managerial discretion over the accounting methods enables to convey more value-relevant information to the market. However, the voluntary accounting changes (VAC thereafter) can distort investors' assessment of firms' performance and financial reporting consistency.

5.8.1 The Effects on Stock Prices

Most voluntary accounting changes do not have direct impact on cash flows, such changes only reflect the same information in alternative method, so in efficient markets any trading strategy based on VAC should not generate abnormal profits. However, it is questionable if the markets are fully efficient, and in some cases strategies closely associated with VAC can be successfully used by investors. For example, Dharan and Lev (1993) found evidence on relationship between the income-increasing VAC and future negative firm performance. The authors documented, that the income-decreasing accounting change companies reported significantly higher stock returns than the income-increasing accounting change companies over the four-year period prior the voluntary accounting change. Those findings were inconsistent with earlier research on the VAC by Kaplan and Roll (1973), which assumed that markets are able to interpret consequences of the VAC correctly in accordance with the market efficiency theory.

Linck, Lopez, Rees (2006) extended the previous studies by employing recent methodological advances to measure long-run abnormal equity performance. The authors related the outcome to the Sloan's (1996) accruals anomaly. Xie (2001) concluded, that discretionary accruals are a driving force of the Sloan's (1996) accruals anomaly, and in that context VAC are treated as publicly disclosed discretionary accruals. Linck, Lopez and Rees (2006) used buy-and-hold methodology based on

Dharan and Lev (1993), and they documented statistically significant positive abnormal returns from investing long in the income-decreasing VAC companies, and short in income-increasing VAC firms. However, the abnormal returns diminished under the calendar time portfolio approach, so the buy-and-hold abnormal returns cannot be consider as robust indicator of the future earnings. Additionally, the authors showed that any of abnormal profits from the VAC-based investment strategies were subsumed by the accruals anomaly, and the accrual-based strategy held even after the effects of VAC vanished. The voluntary accounting changes were proven to smooth earnings for the income-increasing VACs, and enhance negative earnings for the income-decreasing VACs. Those findings suggested, that motivation for VAC are rather short-termed, and even if managers are successful in influencing the stock prices, in the longer run stock prices revert back to their fundamental values.

Evidence from prior studies suggest, that managers implement current accounting choices to favorably affect subsequent period earnings, hoping that investors will not adjust future earnings for the effect of the accounting change. In a case study by Palepu (1987), a company implemented an accounting change believing that reported income would be adjusted in the year of change. Difficulties with tracing the effects of implemented change during following year made management believe that future reported income would not be adjusted. However, some academicians conclude, that effects of earning management prevent investors from adjustments in subsequent years (e.g. Shipper 1989). The contrary theory states, that investors “forget” the past accounting change and do not adjust for its effect on current earnings.

5.8.2 Bias in Methodology

The studies into relationship between the voluntary accounting methods and stock prices yielded mixed results. Kothari (2001) suggested that methodologies used for examining long-run stock-price performance after the VAC introduction could be severely biased. For example, Mitchell and Stafford (2000) found, that long-run buy-and-hold abnormal returns (BHAR) employed in the previous research suffered from cross-sectional dependence in the abnormal returns, and therefore t-statistics were significantly inflated. The calendar-time approach offered by Mitchell and Stafford (2000) and Fama (1998) used recent methodological innovations to examine the long-run stock price performance of companies that introduced VAC, what helps mitigate biased-methodology issues.

6. Limitation of Accounting Data

As it is noted in Salvary (2006):

> "Security returns, a function of stock market movements, are seen as the real phenomenon; and accounting earnings because of measurement error is seen as a means, but a rather poor means, to predict stock returns. It is this separation or view of the stock market as being the correct value of claims, independent of accounting information, that leads to the questioning of the relevance of accrual accounting (Beaver, 1981); (Beaver and Demski 1979).

It is assumed, that "the market is a perfect measuring system which serves as a corrective device for an ill-designed measurement system [financial accounting; in which case] . . . the role of financial accounting is to mimic the capital market expectation of future earnings . . . [returns]" (Salvary 1989), so the accounting numbers can be directly linked with stock prices. Unfortunately, the problem is much more complex. The market efficiency – fundamentals of above theory - remain arguable, and the stock price movements in short term are closely associated with expected earnings, so meeting the forecast gives the managers great incentives towards the earnings manipulation.

6.1 Lack of Isomorphism

Shubik and Whitman (1971) noticed, that the stock markets investing in the short run display closer relation to psychology rather than to underlying corporate facts. The lack of isomorphism between financial accounting numbers and capital market values were the primary reason for the irrelevance of the traditional financial accounting information. (Salvary 1998) Those discrepancies were dominated by two fallacies: (1) fallacy of division, and (2) fallacy of composition. The fallacy of division states, that the valuation of a firm's net assets is based on the aggregate value of the firm's shares. Contrasting, in the fallacy of composition the value of the firm's net assets is a basis for the valuation, or should coincide with the aggregate value of firm's shares. However, in reality the share prices based primarily upon investors' expectation of the future earnings, an assessed riskiness of company's operation and prevailed interest rate.

6.2 The New Economy

The investor expectations tend to be overly-optimistic, the recent over-optimism was especially prevalent during 1998 - 2000 period, when the investors commonly bought shares of companies that had never earned a profit, and even in some cases, never generated revenues. Being more specific, Colvin (2000) wrote in his article "America Online is worth more than GM Ford, and the entire

American Steel industry combined… AOL's stock price makes sense only if you think the company can increase its annual EVA (economic value added) by an amount equal to the highest EVA ever achieved in American business and increase it by that amount every year forever." On the day of publishing Colvin's article, the AOL stock prices exceeded $80, and Price/Earnings ratio skyrocketed to value of $180. The above situation is closely related with a phenomenon, called "the new economy". In the new economy tangible assets play minor role in balance sheets, so the traditional valuation methods based on historic earnings are no longer appropriate. The phrase "new economy" is widely used in case of growing and emergent sectors, mainly telecommunications, media and technology.

6.3 Limited Investors Attention

The earnings-related information is prevalently misprocessed by the investors. The evidence of stock returns predictability associated with earnings, accruals, and cash flows pointed to over-reaction or under reaction to various earnings-related data. Hirshleifer and Teoh (2006) created a model, which studied stock market reactions to the earnings-related information, based upon limited investor attention. The authors concluded, that investors tend to under react to earnings surprises, mainly because they do not process the latest earnings news properly. The future stock returns are positively predicted by cash flows, and negatively by accruals. The cash flows are considered to have higher explanatory power of the future stock prices, high accruals are usually linked with overvaluation, and high cash flows- with undervaluation. However, the model does not predict whether the cash flow or the accruals effects on the future earnings will completely subsume the other.

The model by Hirshleifer and Teoh provides a rich set of new empirical implications**.** In the case when some of investors neglect the earnings, while others attend to the earnings but neglect the accruals, prices of the stock were predicted to under react to the earnings, but over react to the accruals relative to the cash flow. As a consequence, the model assume stronger under reaction to the cash flow than to the earnings. Additionally, if investors pay enough attention to the earnings-related information, the reaction to the accruals will be significantly enhanced. It is worth noting, that lower quality of the accruals as an earnings forecast, e.g. due to the earnings management, is likely to strengthen the accrual anomaly, but it has mixed results on the cash flow anomaly. The ratio of the cash flow effect to the accruals effect is higher than the ratio of the variances (variance of accruals over variance of cash flow). Stronger correlation between cash flows and accruals is assumed to weaken the accruals anomaly.

Another important issue considers shifts in investors attentions towards- or from company's events. Such distracting event can be, e.g. an earnings announcement by other firm, which intensifies both post-earnings announcement drift and the cash flow anomaly, but implications for the accruals anomaly are less unambiguous. The association between the drift and the accruals effects is consistent with well-known phenomenon called for investor 'naiveté', and such insights can be captured within an equilibrium model.

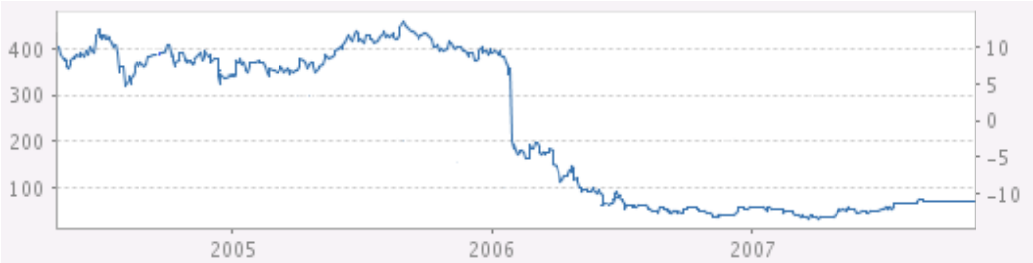
7. Does Accounting Choice Really Matter? – Case study of iSoft

Not surprisingly first connotation with question about the accounting significance concerns Enron – the company which bankrupted in 2001 after fraudulent accounting practices have been revealed. However, the accounting choices made in Enron were unambiguously inconsistent with binding rules, the level of earnings was manipulated, and the accounting figures did not reflect company's real economic condition. For that reason the case of Enron are not taken into consideration, because this study explores the consequences of accounting choices which are fully recognizable by accounting standards. The case study presented below seems to be a better example, although iSoft was also involved in an accounting scandal. However, illegal accounting practices have come to daylight after a disclosure of accounting change, and that only enhanced the market reaction.

The case study of iSoft shows, how powerful can be accounting choices in their consequences, and how strongly they are correlated with stock prices behavior. iSoft is a multinational corporation operating in over 8,000 organisations in 27 countries. The headquarter is located in Manchaster, England. The core business is supplying the software applications for helathcare sectors, and the company is a key contractor in the UK National Health Service's computer program modernization. The iSoft's systems connect over 30,000 general practice doctors with 300 hospitals, and transfer health information to the patients.

The problems began in April 2006, when the company announced, that forecasts overstated the profit by £25 million. Due to criticism over pre-booking sales (they were recognized before payments had arrived), the company decided to revise its revenue policy. Under the previous policy iSoft recognized revenues over the full-life of contracts. Now, under the new method the revenues will only be booked after they are collected. The new accounting policy was dictated by the group's increasing dependence on larger contracts, which typically extend the period of time between the supply of software licenses and the application of the software by the customers. Soon after the UK government watchdog – Financial Services Authorities – confirmed a formal investigation into possible accounting irregularities for the years 2004 – 2005.

As it is seen from the graph, the company market value decreased sharply soon after the accounting change announcement. The share price fell from 400p. at the beginning of 2006, and 461p. in August 2005 to 51p. in June 2007. The sudden 39 per cent's drop was a direct market reaction to 68 per cent's profit reduction by accounting change.



The recommendations on iSoft shares were withdraw by broker companies like Morgan Stanley. Analysts blame the management for the lack of visibility, and predicted many months to rebuild a confidence in the company. The situation was exacerbated by accusation of delays, which have plagued plans to transfer the records of nearly 50 million NHS patients to the new electronic system.

The response from iSoft, in which spokesman did not give a clear answer about the scope of possible irregularities and delayed full-year result, caused further speculations, and did not prevent the stock prices from falling. The optimism from 2004 - when the company won the £300 million contract with NHS – completely vanished, and the analysts speculated over a possible replacement of iSoft by a American rival. Moreover, the change in accounting policy put the company in technical breach of some banking covenants, and put the group into negotiations with its banks, which include Lloyds TSB, Royal Bank of Scotland, HSBC and Barclays. The delay in publishing the full-result caused a real threat of stocks trading suspension, and in August 2006 the share prices hit a new record-breaking level - 42p. per share.

It is worth noting, that Deloitte was embroiled in the iSoft scandal, after it emerged that the accounting company worked for iSoft in the period under the FSA's investigation. An internal investigation confirmed that some revenues booked in the 2003-20004 and 2004-2005 financial years were booked incorrectly according to the applied policy.

The case of iSoft showed how essential are accounting choices for the stock prices valuation. The change in accounting policy, which modified the revenue recognition, wiped out over 90 per cent firm's market value, and triggered an acquisition by IBA Health Group Company – an Australian competitor - in October 2007.

8. Conclusion

Beginning from late sixties, the numerous studies have focused on the association between the accounting choices and future stock prices. Early research yielded mixed results, but foundations for further studies were grounded by Kaplan and Roll (1973), which proved that accounting changes affect only the financial statement for shareholders, without any effect on taxes or cash position of the company.

Earnings and book value of equity are considered to have the highest explanatory power of the stock prices, so it is not surprising that the greatest body of research focus on those two variables. The residual incomes model defined a strong theoretical link between the share prices and accounting variables in consistency with traditional dividend discount model, but the most influential studies were conducted by Ohlson and Feltham (1995). The Ohlson's approach relaxed the strong assumption about estimations of future earnings over the infinite time horizon, and makes the model more operational.

Market event studies conducted in Europe, USA and Asia confirmed a strong positive correlation of book value of equity and residual earnings with current stock prices, but the differences in accounting regimes did not explain the pattern of changes. However, the book value of equity and earnings combined showed much higher explanatory power that each of those variables separately, and different accounting regimes seemed to influence the explanatory power as well with other value relevant information. Although the residual income model had many restriction, and the predicted results were ambiguous, it build a solid base for the further research and created opportunities for exploring an empirical fit of current variables, other than earnings and book value of equity.

The importance of the accounting data in taking the investments decision were stressed by Zhang (1999) who reexamined the role of earnings and book value of equity. In the Zhang's model the equity value was derived from variables such as historical cost valuation, the clean-surplus relation and conservative depreciation policy. The equity value was assume to be convex in both earnings and book value, particularly for low efficiency firms and for high efficiency firms with growth opportunities. Accounting regimes, like conservatism, were assumed to increase a valuation impact of book value, but impact on earnings varied on investment scale. For example, Sloan (1996) documented, that investors are able to earn abnormal profits of 10,4 per cent per annum by purchasing firms with low accruals and selling short firms with high accruals. Moreover, different features of accruals and cash flow components were proved to be sensitive to different accounting measurements. Although Sloan's theory of accrual anomaly had significant limitation in form of potential price pressure effect, it laid an important milestone for the further research.

Another group of variables with high predicting power of future returns are cash-flows factors, such as earnings yields, capital investments, changes in profitability and growth opportunities. Equity value is a function of earnings capitalization from current assets and value of real options, therefore changes in stock prices are strictly related with changes in expectations about firm’s scale and profitability in future periods. The cash flow-related variables are positively correlated with future returns, and these factors are basically divided into two groups: information associated with probability and information associated with scale. The information associated with profitability was proven to have greater importance in explaining the price movements than any other cash flow-related factors, and profitability constituted central factor in stock returns. Capital investments and changes in growth opportunities were identified as the cash flow-related variables associated with scale. The capital investment considered as proportional change in invested equity capital, and growth opportunities defined as the extent to which the operating scale can potentially grow, were proven to be positively correlated with the stock prices.

Accounting regulations allow for discretion over the inventory methods, e.g. FIFO/LIFO. FIFO is likely to increase reported earnings, and LIFO, in contrary, is widely used for tax purposes, because it reduces present value of taxes. Both methods have direct cash flows implications. LIFO adoption is generally associated with positive correlation with stock prices, and degree of correlation depends on tax benefits. FIFO affects inventory prices, and it results in change of current assets and other balance sheet measures. Nevertheless, the effect on stock prices can vary due to firm performance variables.

The relationship between future stock prices and changes in net operating assets were already documented by Sloan (1996), who concluded that recent annual changes in non-cash working capital were negatively correlated with future stock returns. Subsequent research extended Sloan's result, and identified net operating assets as a powerful predictor of future earnings and stock prices.

Another accounting-related issues, like adoption of accounting-based compensation plans, is generally related to positive market reaction. The motives for performance plans are basically associated with signaling theory and alignment of managers' interest with investor expectations. Companies working in changeable external environments and requiring adjustment in internal strategies are more likely to adopt the performance plans. However, the improved stock performance after plans adoption does not necessarily implicate higher accounting returns.

Managerial discretion over accounting methods can significantly affect the stock prices. Companies using the pooling method of accounting for business combinations enjoy high share price premiums over firms using the purchase method, even though the cash flows remain on the same level. Although the numerous studies yielded mixed results, choices in accounting for business combination have reliable impact on stock prices. Management is allowed to choose among acceptable accounting rules, and latitude in selection of particular method is defined as voluntary accounting change. Despite that the most voluntary accounting changes do not have direct impact on cash flows, the evidence points to relationship between income-increasing VAC and future negative firm performance. In contrary, companies with income-decreasing accounting changes reported significantly higher stock returns. Those results put into questions the efficiency of markets, as well as majority of previous studies based on the market efficiency theory.

Managers' discretion over the accounting choices can take several forms: managers may maximize earnings in a given period, avoid losses, smooth earnings over time, or avoid earnings declines. But the aim for all those activities remains the same – influencing the stock prices. The mechanism is still not well defined, the numerous of studies yield contradictory results, but the inefficiency of the market remains the key issue. The violations of the markets efficiency can take form of the investor irrationality, manager signaling, and contractual motivations such as managers activities avoiding debt covenants violations, and therefore maximizing the firm value. Moreover, even in case when accounting change implicate direct cash flows effects; like under the FIFO/LIFO methods, the market reaction is affected by other factors, so defining a clear-cut mechanism remains very difficult (Fields et al., 2001). However, I do not want leave an impression, that we have no knowledge in the subject. The fully recognition of the pattern is restricted by strong limitation, such as lack of the consistent evidence, broad application of accounting methods, and finally the interference of other factors. Moreover, the motives for accounting choices diverge significantly among particular companies. The structure of the companies has been considerably modified, non-tangible assets gained in importance, so the majority of prior studies have lost their validity. The further research under the new conditions is crucial for better understanding the pattern of correlations

Nevertheless, the accounting figures remain the basic source of information about company's performance for investors. Although the reliability of financial accounting has been recently strongly undermined, accounting figures give the most accurate outlook over the company's condition. But can we investors still trust those figures having in minds the cases of Enron, WordCom or Tyco? I think we can, or even we have to, since there is no better alternatives. But we must also learn the lesson taught by all those scandal, process the information correctly, and do not get fooled by smart managers. Comforting is fact, that case of Enron did not question the creditability of accounting system in general, but only pointed to the weaknesses of controlling procedures. Those procedures were significantly modified, and the future will show if the changes went in right direction.

Appendices

The models presented in this section constitute the framework for my study. The rest of the models are their modifications in a various range.

A. The Residual Income Model – simplification

P_0 - share price/economic value of equity
y - equity book value
X_t^a - abnormal earnings
r - cost of equity
d - dividend including all transaction with owner such as new issues and repurchased of shares
E_0 - expected value on the variable concerned, conditional of the information at the time 0

Abnormal earnings X_t^d can be defined as normal earnings x minus cost of the equity capital: (Pirie and Smith 2005)

$$X_t^a \equiv x_t - ry_{t-1} \tag{4}$$

Maintaining the clean surplus relation requires that accounting earnings incorporate changes in equity book value, but exclude transactions with the owners:

$$X_t^a \equiv y_{t-1} + x_t - d_t \tag{5}$$

According to equation (3) and (4) dividends can be defined as follows:

$$d_t = X_t^a + (1+r)y_{t-1} - y_t \tag{6}$$

With an assumption of the market efficiency and the constant discount rate, the equation (6) can be implemented into the traditional dividend discount model, so current stock price is expressed by accounting figures:

$$P_0 = \sum_{t=1}^{\infty} \frac{E_0\,[X_t^a + (1+r)y_{t-1} - y_t]}{(1+r)^t} \tag{7}$$

The formula (7) can be simplified, if we assumed that $E_0[y_t]/(1+r)^t \to 0$ as $t \to \infty$

$$P_0 = \sum_{t=1}^{\infty} \frac{E_0[x_t^a]}{(1+r)^t} \quad (8)$$

The model define the current share price as the current book value of the equity plus the present value of all future residual incomes or abnormal earnings.

B. Ohlson Model – Modification of Basic Residual Income Model

ω, v - constant persistence parameters
γ - information, other than current abnormal earnings
$\varepsilon_1, \varepsilon_2$ - random disturbance terms with constant variance and zero mean
R_f - one plus risk free rate
α_1 - coefficient on abnormal earnings
α_2 - coefficient on other information

In contrast to the basic residual income model, the abnormal earnings are assumed to decline over time. This was captured by regressing the following dynamic process:

$$X_{t+1}^d = \omega X_t^a + v_t + \varepsilon_{1t+1} \quad (9)$$

$$v_{t+1} = \gamma v_t + \varepsilon_{2t+1} \quad (10)$$

With an assumption of the risk neutrality, the coefficients are defined as: $\alpha_1 = \omega/R_f - \omega$ and $\alpha_2 = R_f/(R_f - \omega)(R_f - \gamma)$, so the relation between current book value, current earnings and other relevant information can be expressed as an linear combination:

$$P_t = y_t + \alpha_1 X_t^d + \alpha_2 v_t \quad (11)$$

After implementing the coefficients k and φ the model can be viewed as a weighted average of a book value and an earnings model, additionally adjusted for dividends and other relevant information:

$$P_t = (1-k)y_t + k(\varphi x_t - d_t) + \alpha_2 v_t \quad (12)$$

In this case the coefficients are expressed as $k = R_f - 1 \quad \alpha_1 = R_f - 1 \quad \omega/R_f - \omega$ and $\varphi = R_f/(R_f - 1)$.

C. Net Operating Assets – formula by Richardson, Sloan, Soliman and Tuna (2006)

A_{t-1} - total assets at time t-1
OA = Operating Assets
OL = Operating Liabilities
A_{t-1} = Total Assets
Cash = Cash and Short-Term Investments

The formula for the net operating assets by Hirshleifer, Hou, Teoh and Zhang (2004)

$$NOA_t = OA - OL = A - Cash - AL \tag{13}$$

This can be rewritten in following way:

$$NOA = \frac{NOA_t}{A_{t-1}} \tag{14}$$

The lagged NOA are subtracted, and then the same time the offsetting lagged NOA are added back to maintain HHTZ's measure.

$$\frac{NOA_t}{A_{t-1}} = \frac{NOA_t - NOA_{t-1}}{A_{t-1}} + \frac{NOA_{t-1}}{A_{t-1}} \tag{15}$$

Lagged NOA can be decomposed into lagged total assets, lagged operating liabilities and lagged cash.

$$\frac{NOA_t - NOA_{t-1}}{A_{t-1}} + \frac{A_{t-1}}{A_{t-1}} - \frac{OL_{t-1}}{A_{t-1}} - \frac{Cash_{t-1}}{A_{t-1}} \tag{16}$$

Due to decomposing each variables by lagged NOA, the lagged assets variable reduces to a constant equal to one. So changes in total assets before the period t-1 are not taken into consideration.

$$\frac{NOA_t - NOA_{t-1}}{A_{t-1}} + 1 - \frac{OL_{t-1}}{A_{t-1}} - \frac{Cash_{t-1}}{A_{t-1}} \qquad (17)$$

D. iSoft - Basic Accounting Figures

IFRS	IFRS	IFRS	UK GAAP	UK GAAP	
	2007	2006	2005	2004	2003
	£m	£m	£m	£m	£m
Results					
Revenue	**175.2**	201.7	186.1	94.8	51.3
Operating profit/(loss)					
Normalized operating profit/(loss)*	**6.6**	13.3	7.2	(15.0)	(14.6)
Normalized (loss)/profit before tax*	**(1.1)**	7.7	(0.9)	(17.7)	(16.7)
(Loss)/profit from operations	**(14.3)**	(338.1)	8.5	(34.2)	(19.2)
Key statistics					
(Loss)/earnings per share (pence)	**(3.8)**	(165.1)	2.6	(17.1)	(12.6)
Underlying (loss)/earnings per share (pence)	**2.89**	(13.3)	2.6	(8.1)	(12.0)
Net funds/(debt)	**(67.9)**	(41.8)	(1.6)	(64.7)	(39.6)
Cash (used in)/generated by operations	**(39.3)**	1.9	92.4	35.9	23.5
Average number of employees	**3,107**	3,224	2,546	1,338	580

* stated before goodwill amortization, goodwill impairment and exceptional items

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