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ACCOUNTING FUNDAMENTALS AND THE VARIATION OF STOCK PRICE

Factoring in the Investment Scalability*

Sumiyana
Zaki Baridwan
Slamet Sugiri
Jogiyanto Hartono M.

All of authors are from Faculty of Economics and Business, Universitas Gadjah Mada

This study develops a new return model with respect to accounting fundamentals. The new return model is based on Chen and Zhang (2007). This study takes into account the investment scalability information. Specifically, this study splits the scale of firm's operations into short-run and long-run investment scalabilities. We document that five accounting fundamentals explain the variation of annual stock return. The factors, comprised book value, earnings yield, short-run and long-run investment scalabilities, and growth opportunities, co-associate positively with stock price. The remaining factor, which is the pure interest rate, is negatively related to annual stock return. This study finds that inducing short-run and long-run investment scalabilities into the model could improve the

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degree of association. In other words, they have value relevance. Finally, this study suggests that basic trading strategies will improve if investors revert to the accounting fundamentals.

Keywords: accounting fundamentals; book value; earnings yield; growth opportunities; short-run and long-run investment scalabilities; trading strategy; value relevance

JEL Classification*:* M41 (*accounting*); G12 (*assets pricing; interest rate);* G14 (*information and market efficiency*); G15 (*international financial markets*)

Introduction

Chen and Zhang (2007) present the latest return model that relates the fundamental firm value to the variation in stock price. They also provide theoretical and empirical evidence that stock return is a function of accounting variables, namely earnings yield, equity capital, the change in profitability, growth opportunities, and discount rate. Chen and Zhang (2007) argue that firm value embraces information on potential future assets and growth opportunities. This argument is supported by Miller and Modigliani (1961). In a simple explanation, both studies infer that stock price is a function of future assets or capital scalability.[1] Earnings could be determined by the adaptation concept when the firm's invested resources are modifiable to generate future earnings (Wright 1967).

The association between stock return and fundamental firm value has been examined by Burgstahler and Dichev (1997) and Collins et al. (1999). They suggest that earnings yield has a concave-nonlinear association, thereby not purely linear. Other studies show otherwise, an inverse relationship of earnings and book value of equity to stock price or return (Jan and Ou 1995, and Collins et al. 1999). The inconsistent relationship between stock price and accounting fundamentals has been overviewed by Lev (1989), Lo and Lys (2000), and Kothari (2001). Those researchers argue that this inconsistency is due to: (1) a weak relationship between earnings and stock price variability, marked by R^2 less than 10 percent (Chen and Zhang 2007), and (2) a linear correlation between accounting information and future related cash flows, with equity value as a function of scalability and profitability (Ohlson 1995; Feltham and Ohlson 1995, 1996; Zhang 2003; and Chen and Zhang 2007).

[1] Scalability is actually a firm's scale of operations. This study shortens it into scalability. It refers to the measure of increasing or decreasing scale of operations in a ratio or proportion. In this study, the ratio's denominator is the previous year's assets.

This study is mainly focused on designing a new return model and examining the model. Previous studies clearly show a positive association between accounting data and return based on four related cash flows, namely earnings yield, equity capital, profitability, and growth opportunities, and a negative relationship with the costs of debt and equity capital (Zhang 2003, and Chen and Zhang 2007). Since previous models have yet to comprehensively explain the role of equity capital, this recently designed model is aimed at enhancing the identification of initial factors causing the equity capital scalability to rise, whether it is short-run or long-run investment scalability according to financial management concepts (Smith 1973).

Hatsopoulus (1986) supports the investment scalability argument, suggesting that the strength of firm productivity is associated with earnings and stock price. Drucker (1986) also concludes that production scalability affects not only the earnings power but also the firm's market value. Other empirical studies have confirmed the followings: (1) the positive association between assets productivity and equity value (Kaplan 1983), (2) the efficient productivity shown by low-cost assets usage to increase the firm's equity (Dogramaci 1981; Kendrick 1984), (3) the cheap-resource inputs to ensure future growth of the firm (Kendrick 1984), (4) the enhancement of firm productivity to improve the firm's equity value and stockholder wealth (Bao and Bao 1989), and (5) the non-earnings numbers as an additional predictive value, which is called the valuation link (Ou 1990).

This complementary analysis relies on the following reasons. *First*, the limitation of Ohlson's (1995) model (Feltham and Ohlson 1995, 1996). This weakness lies in its assumptions that: (i) future earnings could be determined using consecutive previous earnings and (ii) earnings could be pre-determined stochastically. *Second*, earnings is a noise when measuring economic earnings and equity value (Kolev et al. 2008; Collins et al. 1997; Givoly and Hayn 2000; and Bradshaw and Sloan 2002). *Third*, high value is relevant when eliminating earnings (Bradshaw and Sloan 2002; and Bhattacharya et al. 2003). Therefore, this study provides complementary measurement of earnings. Additionally, this study is focused on the adaptation theory in which assets on the statement of financial position are a determinant of equity value (Burgstahler and Dichev 1977).

Our main research objective is to design a new return model. It also examines the degree of association in this model. Not only does this new return model associate stock return with four cash-flow-related factors, namely earnings (Easton and Harris 1991; Burgstahler and Dichev 1997; Collins et al. 1999), equity capital (Jan and Ou 1995, and Collins et al. 1999), profitability and growth opportunities (Ohlson 1995; Feltham and Ohlson 1995, 1996; Zhang 2003, and Chen and Zhang 2007), and discount rate (Zhang

2003, and Chen and Zhang 2007), but it also investigates further by factoring in the short-run and long-run investment scalabilities. This study examines the new theoretical return model using empirical data. Furthermore, robustness checks are conducted to confirm the consistency between the new model and its predecessors, including the association between each construct and stock return.

This study benefits both investors and managers. From the investor's point of view, this study provides more comprehensive, realistic, and accurate parameters for predicting potential future cash flows since the new model extracts more information than do currently available models. From the manager's point of view, this study gives incentives to managers to disclose more information publicly as mandated by SFAC No. 5, paragraph 24 (FASB 1984). Finally, the new return model can lead investors and management to assess comprehensively the information conveyed in financial statements.

This study contributes to accounting literature by providing more complete and realistic return model. This study has advantages compared with the models of Easton and Harris (1991), Liu and Thomas (2000), Zhang (2003), Copeland et al. (2004), Chen and Zhang (2007), and Weiss et al. (2008), explained as follows. *First*, this model is more comprehensive due to its broader coverage, specifically the inclusion of assets scalability to generate future cash flows.

Second, by including scalability, this model is expected to be closer to the economic reality as firms should reasonably choose future investment projects that will contribute positive net cash inflow. Cash inflow magnifies earnings and its variability. The second advantage is labeled as the earnings capitalization model by Ohlson (1995), who explains that earnings and its variability are affected by current projects.

Third, the new return model creates a more comprehensive and accurate predictor of future cash flows to estimate potential future earnings by extracting multiple relevant information (Liu et al. 2001). Multiple information could improve model accuracy as long as it is aligned with increasing value relevance. Eventually, this study offers considerable contribution by improving the degree of association of return model as it is more comprehensive, realistic, and accurate. This contribution is reflected by higher R^2 and *adj-*R^2 than the previous models.

This study assumes that, *firstly*, the association between accounting fundamentals and stock price variability is linear. Accounting information is positively proportional to earnings yield, invested equity capital, profitability, and growth opportunities, and is negatively proportional to discount rate. *Secondly*, investors pay attention to accounting information comprehensively, meaning that investors use accounting fundamentals for business decision-making. *Thirdly*, investors comprehend a firm's prospect based not only on equity capital and its growth, but also on

assets as the stimulus for increasing the firm's equity value. This refers to the adaptation theory (Wright 1967). *Fourthly*, the efficiency form of stock market is comparable. Stock price variability on all stock markets acts in the same market-wide regime behavior, and depends solemnly on earnings and book value (Ho and Sequeira 2007). *Fifthly*, cost of equity capital represents the opportunity cost for each firm. It suggests that every fund is managed in order to maximize assets usability and that management always behaves rationally.

Literature Review, Models and Hypotheses Development

Earnings Yield and Stock Value

Ohlson (1995) reveals that firm equity comes from book value and future residual value. Firm value can be calculated from current, potential discount rate which is unrelated to current accounting net capital economic assets. If a firm creates new wealth value from invested assets, the new wealth value is concluded in the firm's net equity capital. Hence, this net value is reflected in the firm's stock price.

Ohlson's (1995) model suggests linear information dynamics of book value and expected residual value in association with stock price. This model was then followed by a myriad of further studies. Lo and Lys (2000), and Myers (1999) implemented the linear information dynamics model for the first time, which is afterwards renowned as the clean surplus theory. This theory argues that year-end stock price is the result of beginning-of-the-year stock price added by current earnings and subtracted by current dividends paid. Meanwhile, Lundholm (1995) finds that the firm's market value is the sum of invested equity capital and its future residual earnings discounted by the cost of invested capital.

Other research has consistently utilized Ohlson's (1995) model without criticizing the stock value and earnings within the model. Feltham and Ohlson (1995; 1996) emphasize that the association between stock value and earnings is asymptotic. This relation may be affected by other information and accounting conservatism in depreciation. Burgstahler and Dichev (1997) used the same model, and introduced the book values of assets and debt to better explain firm value. Liu and Thomas (2000) and Liu et al. (2001) added multiple factors, both earnings disaggregating and other measures related to book value and earnings, into the clean surplus model.

Collins et al. (1997), Lev and Zarowin (1999), and Francis and Schipper (1999) figure out the association validity that the value relevance between book value and earnings and stock market value could be maintained. Abarbanell and Bushee (1997) and Penmann (1998) specifically suggest that accounting information signals can improve the degree of association. Both studies contend that earn-

ings quality improves return association. Collins et al. (1999) declare similar conclusion, and enhance the association by eliminating firms with negative earnings.

Prior to Ohlson's (1995) model, research in the past had associated book value and earnings with the firm's market value. Rao and Litzenberger (1971) and Litzenberger and Rao (1972) provide evidence that the firm's market value is a function of book value and earnings although the relation might be adjusted by the functions of debt and productivity growth. Bao and Bao (1989) specifically indicate that equity is not only affected by earnings, but also by expected earnings, standard deviation of earnings, and earnings growth.

Investment Scalability

The first limitation of Ohlson's (1995) model lies in its assumptions. Continued by Feltham and Ohlson (1995; 1996), it still assumes that future earnings is determined by consecutive previous earnings. However, investors may have different insights by observing future potential earnings. Burgstahler and Dichev (1977) clearly reveal that equity value is not affected by previous earnings only, but could be determined by the adaptation theory,[2] which is the firm's invested capital when its resources are modifiable for other utilizations. Furthermore, the other utilizations may generate future potential earnings. This concept is based on Wright (1967), who argues that the adaptation value is derived from the role of financial information on the balance sheet, and the role primarily comes from assets.

The second limitation of Ohlson's model (Ohlson 1995; and Feltham and Ohlson 1995, 1996) lies in its earnings assumption. Earnings is assumed to be pre-determined stochastically. This concept is based on Sterling (1968), assuming that firms are in stationary condition. The concept basically postulates that a firm continues to operate based on its past strength and performance. In fact, the firm's strength and performance may change due to technology, merger and acquisition, takeover, liquidation, bankruptcy, restructuring, management turnover, and new invested capital.

Ohlson (1995; 2001) himself admitted to the limitations, citing that there was other information noted as a mysterious variable. This variable makes the stock markets fail to reflect book value, or lessens the information content. Further research has been attempting to replace the mysterious variable (e.g., Beaver 1999; Hand 2001), although both of those studies are merely an interpretative commentary or evaluative review of the Ohlson's model.

Later research has left Ohlson's concept and tried to complement it with

[2] Apart of the adaptation theory, another approach to determining firm equity value is the recursion theory. Using the recursion approach, equity value is a discounted future expected earnings under the assumption that the firm merely applies current business technology into the future.

other empirical models. Francis and Schipper (1999) have abandoned Ohlson's linear information dynamics by adding assets and debt into the return model. This addition has embarked on measuring assets scalability in either long or short run. Abarbanell and Bushee (1997) modified the return model by adding fundamental signals, and their changes consist of inventories, accounts receivable, capital expenditures, gross profit, and taxes. These fundamental signals represent investment scalability from assets on the statement of financial position.

Bradshaw et al. (2006) modified Ohlson's return model by inducing the magnitude of financing obtained from debt. This change in debt is comparable to the change in assets utilized to generate earnings. Cohen and Lys (2006) improved the model by Bradshaw et al. (2006) by inducing not only the change in debt but also the change in short-run investment scalability, which is the change in inventories. Heretofore, long-run and short-run investment scalabilities have been put into consideration. Meanwhile, Weiss et al. (2008) emphasize the short-run investment scalability, which are the changes in inventories and accounts receivable to improve the degree of association.

Before Ohlson's (1995) model, short-run and long-run investment scalabilities had been associated with equity value. Bao and Bao (1989) construct production capacities measured by the economic value added, which are the changes in inventories and direct labor costs to measure short-term productivity and fixed assets depreciation to measure long-term capacity.

Accounting earnings as a noise when measuring economic earnings and equity was introduced by Kolev, Marquadt and McVay (2008), Collins et al. (1997), Givoly and Hayn (2000), and Bradshaw and Sloan (2002). An investor adjusts his or her focus to earnings not based on the generally accepted accounting principles, but instead on the measurement of core potential earnings. Compelling results from the studies of Bradshaw and Sloan (2002) and Bhattacharya et al. (2003) indicate that earnings is eliminated to improve the value relevance of their return models.

Previous research verifies that: (1) there are limitations to the model of Ohlson (1995), Feltham and Ohlson (1995; 1996), (2) earnings is a disturbance when measuring economic earnings and equity (Kolev et al. 2008; Collins et al. 1997; Givoly and Hayn 2000; and Bradshaw and Sloan 2002), and (3) there is high value relevance by eliminating earnings (Bradshaw and Sloan 2002; and Bhattacharya et al. 2003). Based on the literature discussed above, this study constructs complementary measurement for earnings by inducing short-run and long-run investment scalabilities. Furthermore, this research is focused on the adaptation theory in which assets are the determinant of firm value (Burgstahler and Dichev 1977).

Changes in Growth Opportunities

Ohlson's (1995) model maintains the clean surplus theory which relates accounting information to the following premises: (1) stock market value is based on discounted future dividends in which investors have a neutral position against risk, (2) accounting information is sufficient to calculate clean surplus, and (3) future earnings is stochastic, pre-determined by consecutive previous earnings. However, investors may respond differently to minimum or maximum profitability. Hence, growth factors, as have been included by other research, may affect earnings.

Rao and Litzenberger (1971), Litzenberger and Rao (1972), and Bao and Bao (1972) conclude that growth and its change increase firm competitiveness. Consequently, the higher the efficiency, the higher the productivity and accordingly the higher the stockholder and country wealth. Rao and Litzenberger (1971) and Litzenberger and Rao (1972) specifically disclose that growth opportunities are directly associated with long-run prospect within one industry. Those studies are based on Miller and Modigliani (1961), concluding that growing firm is a firm that has a positive rate of return for each invested capital. It also means that every invested resource has a lower cost of capital than that within the industry.

Liu et al. (2001), Aboody et al. (2002), and Frankel and Lee (1998) show a perspective that a firm's intrinsic value is determined by growth and future potential growth. Current growth drives the increase in potential future earnings, whereas future potential growth reduces the model's residual error to improve the degree of model association. Lev and Thiagarajan (1993), Abarbanell and Bushee (1997), and Weiss et al. (2008) suggest that the growth in inventories, gross profit, sales, accounts receivable, etc. improves future earnings growth. Moreover, their research concludes that market value adapts to all the growth factors. Danielson and Dowdell (2001) examined growing firms, and find that they have better financial performance than do other firms. Their study also shows that the P/B ratio of growing firms is greater than that of other companies.

Chen and Zhang (2007) find evidence that firm value completely depends on growth opportunities. The growth opportunities per se are the function of assets operation scale, and affect the potential to grow continuously. The inclusion of growth opportunities is based on the perspective that earnings and book value are not sufficient to explain stock price movement. Therefore, the analysis on current and future earnings could be enhanced when external environment, industry, and interest rate are taken into account.

Changes in Discount Rate

Ohlson's (1995) model assumes that investors take a neutral position against fixed risk and interest rate. This simplification was modified by Feltham and Ohlson (1995; 1996), and Baginski

and Wahlen (2000). Their modifications lie in the fact that interest rate can change the firm's future earnings power. Related to investor's perception, interest rate movement may change the investor's belief in the firm's earnings power since future earnings can be referred to as a set of discount rates giving better certainty of future earnings.

Rao and Litzenberger (1971), and Litzenberger and Rao (1972) imply that equity value depends on the discount rate of future potential earnings. In turn, this discount rate hinges on pure interest rate, and then affects the efficiency of the firm's scale of operations and finally earnings. Danielson and Dowdell (2001), and Lie et al. (2001) find that firm equity is highly affected by expected discount rate to grow assets and book value. Interest rate has a multiplier effect. If the interest rate relative to current assets and capital is higher than the pure interest rate, the firm can generate more earnings. An alternative interpretation is that the increase in debt or new invested capital could relatively decrease the cost of capital.

Burgstahler and Dichev (1997) suggest that a firm's equity value is increased by the adaptation theory. This value may increase by attaining cheaper alternative sources, such as exploring alternative resources with lower interest rate to improve the firm's productivity. Aboody et al. (2002), Frankel and Lee (1998), Zhang (2003) and Chen and Zhang (2007) argue that earnings growth is determined by interest rate. It serves as an adjustment factor to the firm's scale of operations. In other words, external environment factors may affect earnings growth, such as the external interest rate selected by management to make the operations efficient.

A Model of Equity Value

A model of equity value relates accounting information with the prospect of future cash flows. This approach was employed by Ohlson (1995), and Feltham and Ohlson (1995; 1996). The model is based on the firm's scale of operations (scalability) and profitability. Scalability and profitability are a function of current condition and future potential cash flows. Thus, earnings plays a major role due to its ability to show the firm's tendency to expand operations or to abandon operations. Equity value model is a process of measuring equity investment to expand or to cease operations (Burgstahler and Dichev 1997). Zhang (2003) developed the equity value model that simplified the probability of firm's going concern or firm's abandoning operations.

Zhang (2003) and Chen and Zhang (2007) symbolize the equity value financed on date t (end period t) with V_t. Next, X_t represents earnings during period t. B_t is the book value of firm equity. $E_t(X_{t+1})$ is expected future earnings, k is earnings capitalization factor, P is the probability of abandonment option, C is the probability of continuation option, q_t X_t/B_{t-1} is profitability – based on ROE, during period t. Mean-

$$V_t = kE_t(X_{t+1}) + B_t.P(q_t) + B_t.g_t.C(q_t) \quad \ldots\ldots(1)$$

while, g_t is earnings growth opportunities. Chen and Zhang (2007) formulate equity value as follows.

Model (1) formulates that equity value (V_t) is associated with expected future earnings from invested assets $(E_t(X_{t+1}))$, earnings capitalization factor (k), the probability of abandonment option $(P(q_t))$, and the probability of continuation option $(C(q_t))$. This model indicates that equity value is equal to the continuation of current operations (q_t) added by firm growth opportunities, either positive or negative (g_t).

Based on the model by Chen and Zhang (2007), this study expands their model by complementing and transforming it into a detailed form. This transformation is supported by Ou (1990) who implies that non-earnings accounting value can be used as current and future earnings predictors. Non-earnings information may give an additional predictive value reflected in stock price. Therefore, this study adds the non-earnings values as predictors.

The transformation is based on the rationale that $q_t \equiv X_t/B_{t-1}$ may be specified by sr_t and lr_t. Short-run investment scalability is $sr_t = (Asr_t - Lsr_t)/(Asr_{t-1}-Lsr_{t-1})$, where A is assets and L is liabilities; and long-run investment scalability is $lr_t = (Alr_t - Llr_t)/(Alr_{t-1}-Llr_{t-1})$. The transformation results in a complete formula expressed in Model (2) as follows.

$$V_t = kE_t(X_{t+1}) + B_t(P(sr_t) + P(lr_t)) + B_t.g_t(C(sr_t) + C(lr_t)) \quad \ldots\ldots(2)$$

By transforming q_t into sr_t and lr_t, this study develops a logical framework as follows. Parameter q_t as earnings is capital inflow to the firm from its operating activities. Thus, Model (1) is based on the capital cash flows. It is formulated in this study that earnings is measured by assets, symbolized as sr_t and lr_t. In order to synchronize with the flow form, this study transforms the stock form into the flow form by measuring the changes, namely by $(Asr_t - Lsr_t)$ and $(Alr_t - Llr_t)$, and then normalizes them on the basis of prior period $(Asr_{t-1} - Lsr_{t-1})$ and $(Alr_{t-1} - Llr_{t-1})$. Secondly, Zhang (2003) posits that earnings increases due to the firm's expansion. This study formulates that the increase in earnings is not only caused by the firm's expansion, but also by the scalability of their productive assets. Assets refer to all resources managed to generate earnings. Therefore, the net difference between assets and liabilities could be used to measure the firm's earnings power. Additionally, the transformation of q_t into sr_t and lr_t is based on Rao and Litzenberger (1971), suggesting that the book values of assets and liabilities could increase or decrease the potential future earnings (Smith 1973).

The next step is Model (2) simplification. Earnings growth usually follows the random walk, meaning that

earnings growth depends on previous year's observed earnings. With $q_{t+1} = q_t + e_{t+1}$, with e_{t+1} being the mean-error close to zero, then $E_t(X_{t+1}) = E_t(B_t q_{t+1}) = B_t q_t$, and with $k = 1/r_t$. Assets growth used to generate earnings follows the same pattern as does earnings growth. Transformation of q_t into sr_t and lr_t results in the following equation.

$$E_t(X_{t+1}) = E_t(B_t q_{t+1}) = B_t q_t = B_t((sr_t) + (lr_t)) \quad \text{.....(3)}$$

Substituting Equation (3) into Model (2) results in Equation (4) below.

$$V_t = B_t\left[\left(\frac{(sr_t) + (lr_t)}{r_t}\right) + P(sr_t) + P(lr_t) + g_t(C(sr_t) + C(lr_t))\right] \quad \text{.....(4)}$$

According to Equation (4), an addition of one unit of assets or one unit of invested capital into the firm's equity (v) could increase with a certain magnitude current equity value. Its formulation in Equation (5) is as follows.

$$V_t = B_t v\left[\left(\frac{(sr_t) + (lr_t)}{r_t}\right) + P(sr_t) + P(lr_t) + g_t(C(sr_t) + C(lr_t))\right] \quad \text{.....(5)}$$

A Model of Stock Return

To develop a return model, this study considers the equity value model, which assumes that the change in equity value starts from date *t-1* to *t*, notated as ΔV_t. To construe Equation (6), the change in firm value is equal to the change in book value of equity as a function of four cash-flow-related factors ($\Delta B_t v(sr_{t-1}, lr_{t-1}, g_{t-1}, r_{t-1})$) and the book value multiplied by the changes in all four factors (Δsr_t, Δlr_t, Δg_t, and Δr_t). Subsequently, return formulation is shown by the following Equation 6.

$$\Delta v_t \approx \Delta B_t\, v(sr_{t-1}, lr_{t-1}, g_{t-1}, r_{t-1}) + B_t\,[v_1\Delta(sr_t) + v_2\Delta(lr_t) + C((sr_t) + C(lr_t))\,\Delta) + v_3\Delta r_t] \quad \text{.....(6)}$$

To show the change in each related factor, the differential equation is developed as follows. $v_1 \equiv \frac{dv}{d(sr_{t-1})}$, $v_2 \equiv \frac{dv}{d(lr_{t-1})}$, and $v_3 \equiv \frac{dv}{dr_{t-1}}$, with $\frac{dv}{dg_{t-1}} = C\left((sr_{t-1}) + (lr_{t-1})\right)$.

If the firm pays dividend D_t during period t, the net contribution for current return (R_t) is as follows.

$$R_t \equiv \frac{DV_t + D_t}{} \quad \text{.....(7)}$$

$$R_t = v\left[\frac{\Delta B_t}{V_{t-1}}\right] + v_1\left[\frac{B_{t-1}}{V_{t-1}}\Delta sr_t\right] + v_2\left[\frac{B_{t-1}}{V_{t-1}}\Delta lr_t\right] + (C(Sr_t) + C(lr_t))\left[\frac{B_{t-1}}{V_{t-1}}\Delta g_t\right] + v_3\left[\frac{B_{t-1}}{V_{t-1}}\Delta r_t\right] + \frac{D_t}{V_{t-1}} \quad \text{.....(8)}$$

Substituting Equation (7) into Equation (6), an equation to calculate stock return during current period (R_t) is as follows.

Because of $v\left[\frac{\Delta B_t}{V_{t-1}}\right] = \frac{\Delta B_t}{B_{t-1}}$,

substituting it into Equation (9) will obtain Equation (9) as follows.

$$R_t = \frac{\Delta B_t}{V_{t-1}} + v_1\left[\frac{B_{t-1}}{V_{t-1}}\Delta sr_t\right] + (C(Sr_t) + C(lr_t))\left[\frac{B_{t-1}}{V_{t-1}}\Delta g_t\right] + v_3\left[\frac{B_{t-1}}{V_{t-1}}\Delta r_t\right] + \frac{D_t}{V_{t-1}} \quad \text{.....(9)}$$

Assuming that book value growth is equal to earnings during current period subtracted by dividend during current period, or referred to as the clean surplus relation, then $\Delta B_t = X_t - D_t$. This equation is reversed into $D_t = X_t - \Delta B_t$. If this equation is substituted into Equation (10), it results in the following equation.

$$R_t = v\left[\frac{X_t}{V_{t-1}}\right] + v_1\left[\frac{B_{t-1}}{V_{t-1}}\Delta sr_t\right] + v_2\left[\frac{B_{t-1}}{V_{t-1}}\Delta lr_t\right] + \left[\left(1-\frac{B_t}{V_{t-1}}\right)\frac{\Delta B_{t-1}}{B_{t-1}}\right] + (C(sr_t)) + C(lr_t))\left[\frac{B_{t-1}}{V_{t-1}}\Delta g_t\right] + v_3\left[\frac{B_{t-1}}{V_{t-1}}\Delta r_t\right] \quad \text{.....(10)}$$

Equation (10) shows that stock return is a function of the following factors: (1) earnings yield (X_t/V_{t-1}), (2) the change in earnings from short-run invested assets (Δsr_t), (3) the change in earnings from long-run invested assets (Δlr_t), (4) the change in book equity value ($\Delta B_t/B_{t-1}$), (5) the change in growth opportunities (Δg_t), and (5) the change in discount rate (Δr_t).

Hypotheses Development

Earnings Yield

Earnings yield (X_t) shows an additional value generated since the beginning of invested capital (henceforth,

current earnings). Earnings yield is deflated by beginning-of-the-year firm's equity value used to generate current earnings. Based on Model (11), if earnings yield increases, stock return will increase, and vice versa (Rao and Litzenberger 1971; Litzenberger and Rao 1972; Bao and Bao 1989; Burgstahler and Dichev 1997; Collins et al. 1999; Collins et al. 1987; Cohen and Lys 2006; Liu and Thomas 2000; Liu et al. 2001; Weiss et al. 2008; Chen and Zhang 2007; Ohlson 1995; Feltham and Ohlson 1995; Feltham and Ohlson 1996; Bradshaw et al. 2006; Abarbanell and Bushee 1997; Lev and Thiagarajan 1993; Penman 1998; Francis and Schipper 1999; Danielson and Dowdell 2001; Aboody et al. 2001; Easton and Harris 1991; and Warfield and Wild 1992).

The association between earnings yield (X_t/V_{t-1}) and stock return (R_t) is always positive. Because $\frac{dR_t}{dX_t} = \frac{1}{V_{t-1}}$, and $1/V_{t-1}$ is always greater than zero, then dR_t/dX_t is always positive. Therefore, our hypothesis is stated as follows.

H_{A1}: Earnings yield is positively related to stock return

Short-run and Long-run Investments

Short-run investment (Δsr_t) and long-run investment (Δlr_t) are assets invested by the firm to generate future earnings. According to the model, short-run and long-run investments could generate future earnings when short-run and long-run assets values are greater than the cost of capital. Accordingly, the increases in short-run and long-run assets will improve the firm's ability to generate future earnings as well as the firm's book value (Bao and Bao 1989; Cohen and Lys 2006; Weiss et al. 2008; Bradshaw et al. 2006; Abarbanell and Bushee 1997; Abarbanell and Bushee 1997; Francis and Schipper 1999). On the other hand, the increases in short-run and long-run assets will decrease the cost of equity capital since they decrease the ability to pay dividends. Because (B_{t-1}/V_{t-1}) is expected to be greater than one, short-run assets are positively linked with stock return.

The differential equation is

$$\frac{dR_t}{d(\Delta)sr_t} = v_1\left[\frac{B_{t-1}}{V_{t-1}}\right] + C\left[\frac{B_{t-1}}{V_{t-1}}\Delta g_t\right].$$

Because in the beginning B_{t-1}/V_{t-1} is always greater than zero, v_1 is always positive. When positive B_{t-1}/V_{t-1} affects positive Δg_t, then dR_t/dsr_t must be greater than zero. Using a similar method, long-run assets are also positively associated with dR_t/dlr_t. Hence, it is hypothesized that:

H_{A2}: The change in short-run invested assets is positively related to stock return

H_{A3}: The change in long-run invested assets is positively related to stock return

Changes in Book Value

The change in book value is the thrust of firm's equity value measurement. It is measured by $\Delta B_t/B_{t-1}$ which is current earnings divided by beginning book value. In other words, $\Delta B_t/B_{t-1}=v[\Delta B_t/V_{t-1}]$ implies that the increase in earnings is proportional to the growth of market value, and also with the change in stock return. Consequently, the change in stock return is proportional after considering the beginning market value (V_{t-1}). Therefore, v is expected to be positive and greater than zero (Rao and Litzenberger 1971; Litzenberger and Rao 1972; Bao and Bao 1989; Burgstahler and Dichev 1997; Collins et al. 1999; Collins et al. 1987; Cohen and Lys 2006; Liu and Thomas 2000; Liu et al. 2001; Weiss et al. 2008; Chen and Zhang 2007; Ohlson 1995; Feltham and Ohlson 1995; Feltham and Ohlson 1996; Bradshaw et al. 2006; Abarbanell and Bushee 1997; Lev and Thiagarajan 1993; Penman 1998; Francis and Schipper 1999; Danielson and Dowdell 2001; Aboody et al. 2001; Easton and Harris 1991; and Warfield and Wild 1992).

With $\frac{dR_t}{d\Delta B_t}=\left(1-\frac{B_{t-1}}{V_{t-1}}\right)\frac{1}{B_{t-1}}$:

$=\frac{B_{t-1}}{B_{t-1}}-\frac{1}{V_{t-1}B_{t-1}}$, and B_{t-1}/B_{t-1} was greater than $1/(V_{t-1}B_{t-1})$, then dR_t/dB_t is always positive and greater than zero. This association is stated in the following hypothesis.

H_{A4}: *The change in book value is positively associated with stock return*

Changes in Growth Opportunities

The firm's book value depends on the change in growth opportunities (Δg_t). In other words, stock return depends on whether or not the firm grows. A firm is called an option to grow if it can increase its book value and, in turn, increase its stock price. Similarly, a firm is called an option to expand when it could generate future earnings from its assets. The growth concept is also inspired by the firm's ability to generate future earnings from multiplied short-run and long-run assets ($C((sr_t)+(lr_t))$). It infers that assets growth may be different from the growth of book value. Therefore, growth opportunities (Δg_t), after being adjusted by B_{t-1}/V_{t-1} and considering the multiplier effect of $C((sr_t)+(lr_t))$, are conjectured to have a positive relation with stock price variation (Rao and Litzenberger 1971; Litzenberger and Rao 1972; Bao and Bao 1989; Weiss et al. 2008; Ohlson 1995; Abarbanell and Bushee 1997; Lev and Thiagarajan 1993; Danielson and Dowdell 2001; and Aboody et al. 2001).

The change in book value, which increases proportionally with the growth of beginning short-run and long-run invested assets, supports this positive association. With $\frac{dR_t}{dg_t}=C(sr_t)+C(lr_t)\left[\frac{B_{t-1}}{V_{t-1}}\right]$, when B_{t-1}/V_{t-1} is greater

than zero and $C(sr_t)$ and $C(lr_t)$ are greater than zero, then $\frac{dR_t}{dg_t}$ is greater than zero. The hypothesis is stated as follows.

H_{A5}: *The change in growth opportunities is positively associated with stock return*

Changes in Discount Rate

Discount rate could generate potential future cash flows priced by the cost of book value. Indeed, discount rate (Δr_t) affects future cash flows. It also affects book value and, in turn, stock return. The greater the discount rate, the lower the future cash flows are, and vice versa (Rao and Litzenberger 1971; Litzenberger and Rao 1972; Burgstahler and Dichev 1997; Liu et al. 2001; Chen and Zhang 2007; Feltham and Ohlson 1995; Feltham and Ohlson 1996; Danielson and Dowdell 2001; and Easton and Harris 1991).

With $\frac{dR_t}{d\Delta r_t} = v_3 \frac{B_{t-1}}{V_{t-1}}$, when B_{t-1}/V_{t-1} is greater than zero, and v_3 is one unit investment, because $r_t = \frac{1}{k}$, then $\frac{V_{t-1}}{B_{t-1}}$ becomes smaller than zero.

Hence, our next hypothesis is as follows.

H_{A6}: *The change in discount rate is negatively associated with stock return*

Research Methods

Data

All cash-flow-related factors determining the return model in this research (earnings yield, expected earnings yield, short-run investment assets and expected short-run investment assets, long-run investment assets and expected long-run investment assets, the change in capital, and the change in growth opportunities and the change in expected growth opportunities) are gathered from financial statements. Data on expected values and financial statements prospectuses can be found in the notes to financial statements. All data are obtained from OSIRIS database. The change in discount rate data are obtained from the central bank's website of each country, even though the financial statements of each firm also contain long-term liabilities or obligation interest rate. Pure interest rate is proxied by the long-term obligation interest rate enacted by the central bank in each country. This study, then, extracts stock price and return for each firm from the stock markets in every country directly.

This study's observation embraces all Asia-Pacific countries and the U.S., along with their stock markets and central banks. This study employs data during 2002-2009, excluding 2003 and 2008 because of financial crisis on all stock markets. However, these years are still included to be the base year for calculating the expected value compared to previous years.

This study is expected to overcome the cultural problem and the inefficiency of stock markets based on market-wide regime shifting behavior approach (David 1997; Veronesi 1999; Conrad et al. 2002; and Ho and Sequeira 2007). This approach indicates that the movement of stock price or return model should be equivalent for all stock markets since it is based on accounting information. It is also conjectured that within certain classifications, the response of stock price movement against accounting information should be the same. Therefore, the cultural and the efficient stock market problems are eliminated when the market efficiency level is applied within the return model.

Sampling Method

This study uses the purposive sampling where a set of sample are chosen under criteria suited for research objectives. The criteria are as follows. *Firstly*, sample is comprised of manufacturing and trading firms. *Secondly*, it eliminates firms with negative book values at the beginning and the end ($B_{it-1}<0$; $B_{it}<0$). This exclusion is based on the logical reasoning that firms with negative book values tend to abandon operations owing to their short-run and long-run capacities. In other words, those firms are inclined to go broke. *Thirdly,* sample consists of firms whose stocks are traded actively. Sleeping stocks are excluded as they can compromise this research's validity. This study also selects sample with liquidity (*LQ-n*) according to each stock market.

Variables Measurement and Examination

This study is aimed at improving Chen and Zhang's (2007) model. Therefore, this research is carried out through the following stages. *Firstly*, we examine Chen and Zhang's (2007) model. *Secondly*, this study examines a new model using Equation (11). *Thirdly*, this study compares the results of examinations (1) and (2).

The first examination is linear regression as follows.

$$R_{it} = \alpha + \beta x_{it} + \gamma \Delta \hat{q}_{it} + \delta \Delta \hat{b}_{it} + \omega \Delta \hat{g}_{it} + \varphi \Delta \hat{r}_{it} + e_{it} \quad \text{.....(11)}$$

with R_{it} is annual stock return for firm *i* during period *t*, measured in one year, one year and three months, one year and six months, and one year and nine months. The calculation begins from the first day of the beginning year to the end of the month during period *t*; x_{it} is earnings generated by firm *i* during period *t*, calculated by earnings acquired by common stockholders during period *t* (X_{it}) divided by the opening market value of equity in current period (V_{it-1}); $\Delta \hat{q}_{it} = (q_{it} - q_{it-1}) B_{it-1} / V_{it-1}$ is the change in profitability of firm *i* during period *t*, deflated by the opening book value of equity in current period. Profitability is calculated using the formula $q_{it} = X_{it} / b_{it-1}$; $\Delta \hat{b}_{it} = [(B_{it} - B_{it-1}) / B_{it-1}](1 - B_{it-1} / V_{it-1})$ is book equity capital or the proportional change in equity book value for firm *i* during period *t*, adjusted by one minus the

opening book to market equity ratio in current period; $\Delta\hat{g}_{it} = (g_{it} - g_{it-1})$. B_{it-1}/V_{it-1} is the change in growth is the change in growth opportunities for firm *i* during period *t*; $\Delta\hat{r}_{it} = (r_{it} - r_{it-1})$. B_{it-1}/V_{it-1} is the change in discount rate during *t*; *a, b, g, d, w* and *j* are regression coefficients; and e_{it} is residual.

The model used in examination (2) comparable to the examination of Chen and Zhang (2007) in Equation (12) is as follows.

$$R_{it} = \alpha + \beta x_{it} + \gamma \Delta sr_{it} + \delta \Delta lr_{it} + \theta \Delta p_{it} + \omega \Delta g_{it} + \varphi \Delta r_{it} + e_{it} \quad \text{.....(12)}$$

with additional explanations for model (12) are: (1) $sr_{it} = (Asr_{it} - Lsr_{it})$ is current assets minus current liabilities, $\Delta sr_{it} = (sr_{it} - sr_{it-1}) / sr_{it-1}(B_{it-1}/V_{it-1})$ is the change in sr_{it} adjusted by the opening book to market equity ratio in current period; (2) $lr_{it} = (Alr_{it} - Llr_{it})$ is fixed assets subtracted by long-term liabilities, $\Delta lr_{it} = (lr_{it} - lr_{it-1}) / lr_{it-1}$ (B_{it-1}/V_{it-1}) is the change in lr_{it} adjusted by the opening book to market equity ratio in current period; (3) $\Delta p_{it} = \Delta B_{it}/B_{it-1}(1-B_{it}/V_{it-1})$ is the change in profitability measured by the change in book value of equity and adjusted by one minus the opening book to market equity ratio in current period; (4) $\Delta\hat{g}_{it} = (C(sr_{it}) + C(lr_{it}))$ $(g_{it} - g_{it-1})B_{it-1}/V_{it-1}$ is the change in growth opportunities for firm *i* during period *t* measured by considering the multiplier effect of growth opportunities against short-run and long-run invested assets. It is then adjusted by the opening book to market equity ratio in current period; other variables are identical.

It should be noted that R_{it} in regression model (13) represents various return periods, namely one year, one year and three months, one year and six months, and one year and nine months. This study applies multiple periods because by inducing investment scalability, current short-run and long-run assets are considered to be utilized to generate current and future earnings. Therefore, different return periods refer to current return (R_{it}) and potential future return ($R_{i,t+1}$). Nevertheless, it is still notated as R_{it}.

The First Sensitivity Analysis

Chen and Zhang (2007) examined their model sensitivity by categorizing profitability and growth opportunities into three groups: low group (L), medium group (M), and high group (H). The proposed consideration is that the coefficients on *H* group should be greater than those on *M* and *L* groups, and greater than zero ($g_H > g_M > 0$, and $w_H > w_M > 0$). Model used by Chen and Zhang (2007) is as follows.

$$R_{it} = \alpha + \beta x_{it} + \gamma \Delta\hat{q}_{it} + \gamma M \Delta\hat{q}_{it} + \gamma_H H \Delta\hat{q}_{it} + \delta \Delta\hat{b}_{it} + \omega \Delta\hat{g}_{it} + \omega_M M \Delta\hat{g}_{it} + \omega_H H \Delta\hat{g}_{it} + \varphi \Delta\hat{r}_{it} + e_{it} \quad \text{.....(13)}$$

with *M* and *H* represent groups with profitability and growth opportunities greater than the lower group.

This study develops the classification of profitability and growth opportunities using four categories: lower group (L), lower-medium group (LM), medium-high group (MH), and high group (H). This examination expects the following results: $l_H > l_{MH} > l_{LM} > 0$, $c_H > c_{MH} > c_{LM} > 0$, $f_H > f_{MH} > f_{LM} > 0$, and $p_H > p_{MH} > p_{LM} > 0$. This study also performs the model's linearity tests since linear regression requires that the model be free from normality, heteroscedasticity, and multicolinearity problems. Gujarati (2003) suggests that a linear regression model be free from unbiased errors.

The Second Sensitivity Examination

This study performs sensitivity examinations for Models (12) and (13) by splitting the sample into various partitions. The partitioning criterion is the ratio between book value and market value of stock (P/B ratio). The sensitivity examination aims to show the return model consistency under various market levels. Moreover, model sensitivity may be achieved in different market chances. It is performed by splitting the sample into quintiles based on P/B ratio.

Analysis, Discussion, and Findings

Descriptive Statistics

This study acquires 6,132 sample firm-years (25.45%) from available initial sample of 24,095 firm-years (100%) from all stock markets in Asia, Australia and the U.S. during 2009. Before 2009, predicted data are unavailable in the OSIRIS database. The number of data excluded with the reasons are as follows. First, stock price or return data incomplete, 8,939 (37.10%). Second, earnings data unavailable, 661 (2.74%). Third, no expected earnings and growth opportunities, 8,038 (33.36%). Fourth, firms with negative earnings, 167 (0.69%). Fifth, extreme values of earnings and expected earnings, 120 (0.50%). Finally, inability to calculate abnormal returns based on Fama and French (1992, 1993, and 1995), 38 (0.16%).

Data excluded due to all six factors above are 17,963 firm-years (74.55%). The most common exclusion is due to stock price incomplete and earnings data unavailable, which add up to 70.46%. The final sample has fulfilled all required criteria. For instance, this study is unable to acquire data on firms with negative book values because such firms do not have complete data on stock market prices. The complete data are presented in Table 1.

Table 1. **Sample Data**

No.	Note	Decrease		Sample	
		Number	%	Number	%
1	Population			24,095	100.00
2	Stock price data incomplete	8,939	37.10	15,156	62.90
3	Earnings data unavailable	661	2.74	14,495	60.16
4	Expected data unavailable	8,038	33.36	6,457	26.80
5	Lossing company exclusion	167	0.69	6,290	26.11
6	Extreme value exclusion	120	0.50	6,170	25.61
7	Inability to calculate abnormal return	38	0.16	6,132	25.45
	Total	17,963	74.55		

Table 2. **Descriptive Statistics**

No.	Var.	Min.	Max.	Mean	Median	Std. Dev.	Perc.-25	Perc.-75
1	R_{i1}	-0.9954	9.8966	0.8463	0.5880	0.9999	0.1667	1.2500
2	R_{i2}	-0.9964	8.0000	0.4600	0.2419	0.7506	-0.0151	0.7500
3	R_{i3}	-0.9966	9.0000	0.1627	0.0327	0.5932	-0.1981	0.3689
4	R_{i4}	-0.9939	6.6310	0.0528	-0.0356	0.5175	-0.2450	0.2186
5	X_{it}	0.0000	46.2025	0.2092	0.0968	0.9104	0.0532	0.1959
6	Δq_{it}	-55.1125	58.8148	0.0571	0.0071	1.7100	-0.0313	0.0772
7	Δb_{it}	-54.3503	33.3750	-0.0873	0.0011	1.7231	-0.0608	0.0553
8	Δg_{it}	-10.6073	54.4328	0.1977	0.0683	1.2737	0.0056	0.1976
9	Δr_{it}	-29.9957	28.9790	-0.1362	-0.0737	1.3559	-0.4694	0.0301
10	Δsr_{it}	-506.3845	202.6165	0.0336	0.0907	11.8351	-0.1125	0.4198
11	Δlr_{it}	-250.0161	289.1262	0.2959	0.0609	6.3004	-0.0368	0.2572
12	Δp_{it}	-54.3503	33.3750	-0.0873	0.0011	1.7231	-0.0608	0.0553
13	PB_{it}	0.0026	70.4000	1.0362	0.6831	2.4254	0.3594	1.2095
14	V_{it}	0.0100	6,843.3600	39.3251	3.6300	248.8796	1.1600	16.3400
15	B_{it}	0.0200	4,601.1500	29.8525	2.7450	189.1163	0.5400	10.6200
16	AR_{i1}	-2.6632	8.9513	0.0000	-0.2030	0.9306	-0.5655	0.3361
17	AR_{i2}	-2.3542	7.1236	0.0000	-0.1283	0.6854	-0.4069	0.2438
18	AR_{i3}	-1.8951	8.5445	0.0000	-0.0862	0.5433	-0.3150	0.1953
19	AR_{i4}	-1.3450	6.2174	0.0000	-0.0818	0.4939	-0.2785	0.1558

This study performs data analysis to investigate initial data tendency. The descriptive statistics are presented in Table 2. Return for one year period (R_{i1}) is 0.8463, which then decreases over time and plunges to 0.0528 for R_{i4}. The decreases occur in all levels within 25th percentile (from 0.1667 to -0.2450) and 75th percentile (from 1.2500 to 0.2186). These findings indicate that market value in the longer period is closer to real firm's intrinsic value. With this tendency, the firm's fundamental value calculated using accounting information is expected to be reflected in the firm's market value.

Focusing on earnings after taxes (x_{it}), this study only employs profit firms. Earnings' minimum value is 0.0000, with mean 0.2092, median 0.0968, and standard deviation 0.9104. The median lies on the left from its mean, signaling that some firms have extremely great earnings, and so the mean is pushed upward. However, it is not a problem as the standard deviation is less than one. The aligned movement between return and earnings shows that they are likely to be related. The change in earnings power (Δq_{it}), the change in growth opportunities (Δg_{it}), and long-run assets scalability (Δlr_{it}) show relatively the same pattern as the variation of earnings. Meanwhile, the change in discount rate (Δr_{it}), the change in short-run assets scalability (Δsr_{it}), and the change in profitability (Δp_{it}) show otherwise. However, the change in discount rate is not expected to be aligned. Nevertheless, the change in short-run scalability and the change in profitability with such movement may reduce the degree of association of the return model.

Firm's book value (B_{it}), market to book value ratio (PB_{it}), and stock price (V_{it}) are always positive because, according to the criteria, this study excludes firms with negative earnings after taxes and negative book values. Even after the elimination of extreme values, B_{it} and V_{it} still have large maximum values, especially for the data from developing countries where stock market values usually move away from their book values. Book value (B_{it}) data with mean of 29.8525 and median of 2.7450 resemble the pattern of stock market value. The pattern does not harm the relation, and the pattern of firm's intrinsic value (V_{it}) is reflected in stock market value at the end of accounting period.

Abnormal return calculation is based on the model by Fama and French (1992; 1993 and 1995). Results show means of 0.0000 for AR_{i1}, AR_{i2}, AR_{i3}, and AR_{i4}, indicating that the estimation is proven valid mathematically. Standard deviation of abnormal return becomes smaller throughout the analysis period, from 0.9306 (AR_{i1}) to 0.4939 (AR_{i4}). Therefore, it can be concluded that abnormal return moves proportionally with the firm's market value, which closely reflects the fundamental value derived from accounting information. Abnormal return movement is in accord with return and earnings (x_{it}) movements, earnings power (Δq_{it}), the change in growth opportunities (Δg_{it}), long-run assets scalability (Δlr_{it}), and

all expected values. In addition, this study could achieve a higher degree of association.

Analysis of Chen and Zhang's (2003) Model

This study, at the first analysis, examines Chen and Zhang's (2003) model, which is the basic model (Model 12). The basic model constructs five cash-flow-related factors associated with return: (1) earnings yield (x_{it}), (2) the change in firm's book value (Δb_{it}), (3) the change in earnings power (Δq_{it}), (4) the change in growth opportunities (Δg_{it}), and (5) the change in discount rate (Δr_{it}). The results of the first analysis are presented in Table 3.

The analysis of Chen and Zhang's (2003) model has yet to examine this study's hypotheses. Rather, it is conducted as an initial investigation of the five cash-flow-related factors associated with stock return. The results show that three variables, i.e., earnings yield (x_{it}), firm's book value (Δb_{it}), and growth opportunities (Δg_{it}), are significantly (at 1% level) related to various specifications of return (R_{i1} to R_{i4}). However, this study is unable to find evidence on the relation between earnings power (Δq_{it}) and stock return which Chen and Zhang (2003) has proven consistently. Meanwhile, the result for the change in pure interest rate (Δr_{it}), as in Chen and Zhang's (2003) model, is also insignificant. Consequently, this study concludes that the basic model is adequately substantiated, except for earnings power. However, the basic model analysis shows a sufficient degree of association with F-value of 35.5187, which is significant at 1 percent level. The basic model has R^2 of 2.82 percent for R_{i1}, and lower for other types of return. The degree of association with the adjusted level is not significantly different, with *adj-*R^2 of 2.74 percent.

The results of the initial investigation are interesting. The rejection of earnings power (Δq_{it}) behooves us to change the basic model. The results of the basic model analysis imply that the relation between accounting information and stock return is not flexible enough with respect to the forms of stock market efficiency, economic uncertainty, and the reflection of firm's fundamental value pertaining to debt or capital concentration. The results need to transform the basic model into a new model which is more detailed and able to explain the change in earnings power. Furthermore, the transformation does not consider the change in pure interest rate (Δr_{it}), which is actually serves as a lift for the change in earnings power. The change in pure interest rate has been proven inconsistently by previous studies. This study conjectures that the change in pure interest rate should be more reflected when it is specified into short-run or long-run earnings powers.

Table 3. **The Results of Basic Model Analysis**

Var(s)		R_{i1}			R_{i2}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	0.8096	61.3526	0.0000 ***	0.4447	44.4938	0.0000 ***
X_{it}	+	0.1452	6.7848	0.0000 ***	0.0518	3.1938	0.0014 ***
Δq_{it}	+	0.0002	0.0228	0.9818	0.0071	1.0400	0.2984
Δb_{it}	+	0.0450	4.7703	0.0000 ***	0.0277	3.8822	0.0001 ***
Δg_{it}	+	0.0770	7.0549	0.0000 ***	0.0438	5.2991	0.0000 ***
Δr_{it}	-	0.0370	3.9584	0.0001	0.0158	2.2393	0.0252
F-value			35.5187	0.0000 ***		13.5133	0.0000 ***
R^2			2.82%			1.09%	
Adj-R^2			2.74%			1.01%	

Var(s)		R_{i3}			R_{i4}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	0.1548	19.5395	0.0000 ***	0.0419	6.0803	0.0000 ***
X_{it}	+	0.0203	1.5765	0.1150	0.0397	3.5517	0.0004 ***
Δq_{it}	+	0.0084	1.5582	0.1192	0.0019	0.4119	0.6805
Δb_{it}	+	0.0191	3.3806	0.0007 ***	0.0256	5.2008	0.0000 ***
Δg_{it}	+	0.0246	3.7618	0.0002 ***	0.0248	4.3416	0.0000 ***
Δr_{it}	-	0.0000	-0.0070	0.9944	0.0017	0.3432	0.7315
F-value			6.0406	0.0000 ***		10.9147	0.0000 ***
R^2			0.49%			0.88%	
Adj-R^2			0.41%			0.80%	

Notes: Number of observation (N): 6,132. R_{it}: stock return, firm *i* during period *1* (a year), 2 (a year and three months), 3 (a year and six months), and 4 (a year and nine months); x_{it}: earnings, firm *i* during period *t*; Δq_{it}: change of profitability, firm *i* during period *t*; Δb_{it}: change of book value, firm *i* during period *t*; Δg_{it}: change of growth opportunities, firm *i* during period *t*; Δr_{it}: change of discount rate, firm *i* during period t; *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Linearity test for this model 12 shows that: (1) With Kolmogorov-Smirnov test shows t-value 9.036 and p-value 0.000, and Jarque and Berra shows t-value 15,202.42 and chi-square 0.000, it means that the residuals are not distributed normally. However, normality test is ignorable for large data sample that is 6,132. It tends to follow a central limit theorem (Gudjarati 2003). (2) Glejser's test for heteroscedasticity shows that all variables have significance above 0.05, with t-value (sig.) x_{it} amount to 0.013 (0.989); Δq_{it} amount to -0.014 (0.989); Δb_{it} amount to -0.007 (0.994); Δg_{it} amount to -0.073 (0.942); and Δr_{it} amount to 0.010 (0.992). The test shows that the data is free from heteroscedasticity problem. (3) Multicolinearity test shows that all variables have VIF about one which means that there is no colinearity among variables, VIF value for each variable is, x_{it} amount to 2.394; Δq_{it} amount to 1.483; Δb_{it} amount to 1.664; Δg_{it} amount to 1.218; and Δr_{it} amount to 1.010.

Analysis of Investment Scalability Model

The second analysis transforms the basic model analysis, in which we include the change in earnings power (Δq_{it}) into a model using the change in short-run earnings power (Δsr_{it}) and long-run earnings power (Δlr_{it}). This model is also called the short-run and long-run investment scalability inducing model (Model 13). The model specifies the earnings power into more detailed forms to investigate their associations with the variation of stock price. Table 4 presents the analysis results.

The results of Model 12 show that earnings yield (x_{it}), the change in book value (Δb_{it}), the change in short-run earnings power (Dsr_{it}), the change in long-run earnings power (Δlr_{it}), the change in growth opportunities (Δg_{it}), and the change in discount rate (Δr_{it}) are associated with stock price movement. Consequently, H_{A1}, H_{A4}, and H_{A5} are confirmed at 1 percent level for return models $R_{i1} - R_{i4}$. H_{A4} is partially supported at 10 percent level only for R_{i1} return type with t-value of 1.7644. H_{A3} is supported for R_{i1} return type as well as for R_{i2} with t-value of 1.7466, which is significant at 10 percent level. The results of Model 13 examination show an adequate degree of association with F-value of 31.3601, which is significant at 1 percent level. The model has R^2 of 2.98 percent for R_{i1} type, and lower for other return types. The model has *adj-*R^2 of 2.89 percent.

The analysis results show that Model 13 is able to explain the relation between the change in earnings power (Δq_{it}) and stock return variation after specifying it into more detailed forms, i.e., short-run (Δsr_{it}) and long-run (Δlr_{it}) investment scalabilities. H_{A2} and H_{A3} are confirmed for both R_{i1} and R_{i2} return types. H_{A2} is also supported for R_{i2} return type. The findings suggest that the effect of earnings power on the aggregate value is actually weak. Therefore, splitting the earnings power into more detailed forms is necessary. Therefore, its association with the variation of stock return becomes more comprehensible. Model 13 is better than the basic model in its degree of association with *adj-*R^2 of 2.89 percent, which is better than that of the basic model (2.74%).

Table 4. **The Results of Investment Scalability Model Analysis**

Var(s)		R_{i1}			R_{i2}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	0.8075	61.4695	0.0000 ***	0.4430	44.5037	0.0000 ***
X_{it}	+	0.1447	7.9547	0.0000 ***	0.0601	4.3603	0.0000 ***
Δsr_{it}	+	0.0030	2.6663	0.0077 ***	0.0015	1.7446	0.0811 *
Δlr_{it}	+	0.0035	1.7644	0.0777 *	-0.0006	-0.4149	0.6782
Δp_{it}	+	0.0461	4.9185	0.0000 ***	0.0286	4.0283	0.0001 ***
Δg_{it}	+	0.0833	7.5241	0.0000 ***	0.0461	5.4937	0.0000 ***
Δr_{it}	-	0.0374	4.0118	0.0001	0.0156	2.2068	0.0274
F-value		31.3601	0.0000	***	11.6169	0.0000	***
R^2		2.98%			1.13%		
Adj-R^2		2.89%			1.03%		
Var(s)		R_{i3}			R_{i4}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	0.1535	19.4414	0.0000 ***	0.0416	6.0579	0.0000 ***
X_{it}	+	0.0305	2.7868	0.0053 ***	0.0418	4.3937	0.0000 ***
Δsr_{it}	+	0.0008	1.1375	0.2554	0.0008	1.3158	0.1883
Δlr_{it}	+	-0.0013	-1.0701	0.2846	-0.0017	-1.6076	0.1080
Δp_{it}	+	0.0200	3.5407	0.0004 ***	0.0257	5.2351	0.0000 ***
Δg_{it}	+	0.0250	3.7516	0.0002 ***	0.0271	4.6801	0.0000 ***
Δr_{it}	-	-0.0004	-0.0790	0.9370	0.0016	0.3181	0.7504
F-value		5.0317	0.0000	***	9.7857	0.0000	***
R^2		0.49%			0.95%		
Adj-R^2		0.39%			0.85%		

Notes: Number of observation (N): 6,132. R_{it}: stock return, firm *i* during period *1* (a year), 2 (a year and three months), 3 (a year and six months), and 4 (a year and nine months); x_{it}: earnings, firm *i* during period *t*; Δsr_{it}: change of short-run assets scalability, firm *i* during period *t*; Δlr_{it}: change of long-run assets scalability, firm *i* during period *t*; Δp_{it}: change of profitability, firm *i* during period *t*; Δg_{it}: change of growth opportunities, firm *i* during period *t*; Δr_{it}: change of discount rate, firm *i* during period t; *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Linearity test for this model 13 shows that: (1) With Kolmogorov-Smirnov test shows t-value 9.035 and p-value 0.000, and Jarque and Berra shows t-value 15,202.42 and chi-square 0.000, it means that the residuals are not distributed normally. However, normality test is ignorable for large data sample that is 6,132. It tends to follow central limit theorem (Gudjarati 2003). (2) Glejser's test for heteroscedasticity shows that all variables have significance above 0.05, with t-value (sig.) x_{it} amount to 0.045 (0.964); Δsr_{it} amount to -0.045 (0.964); Δlr_{it} amount to -0.035 (0.972); Δp_{it} amount to 0.000 (0.990); Δg_{it} amount to -0.067 (0.946); and Δr_{it} amount to 0.000 (0.990). The test shows that the data is free from heteroscedasticity problem. (3) Multicolinearity test shows that all variables have VIF about one which means that there is no colinearity among variables, VIF value for each variable is, x_{it} amount to 1.731; Δsr_{it} amount to 1.086; Δlr_{it} amount to 1.014; Δp_{it} amount to 1.650; Δg_{it} amount to 1.257; and Δr_{it} amount to 1.008.

Sensitivity Analysis 1: Categorical Arrangement

Subsequently, this study analyzes the model based on categorical differentiation. This analysis serves to find a more favorable degree of association. Model 14 should have a higher goodness of fit when, after differentiation, it has a higher degree of association and is still consistent with the main variables. The results of categorical arrangement for the basic model are presented in Table 5.

This analysis purports to identify the incremental explanatory power. Moreover, the categorical arrangement serves to identify the initial sensitivity such that hypotheses examination is supported in accordance with the theory. The categorical arrangement for Model 14 exhibits that there are positive differences (greater than zero) for the changes in earnings power and growth opportunities. H_{A1}-H_{A5} are accordingly supported, as are Model 13 above. In details, the change in earnings power for high group ($H\Delta q_{it}$) has a greater degree of association with t-value of 16.2990, which is significant at 1 percent level, compared to that of medium group ($H\Delta q_{it}$). Similar results are applicable to growth opportunities. Model 14 shows a better degree of association with R^2 of 12.34 percent and *adj*-R^2 of 12.21 percent for R_{i1} return type. Accordingly, Model 14 has been able to better explain the association power relative to the basic model. Therefore, the ratio between market value and book value serves well within the next analysis.

Sensitivity Analysis 2: P/B Partitioning

This study organizes the sample based on P/B ratio arrangement into five partitions (quintiles). This quintile arrangement functions to examine the model sensitivity not merely predicated on firm's information strength, but instead based on market strength that draws investors' attention. Such arrangement also serves to examine investor rationality, which is less likely to act within stock mispricing. The results of the second sensitivity analysis are presented in Appendix 1.

Appendix 1 proves that earnings yield (x_{it}), the change in book value (Δb_{it}), and the change in growth opportunities (Δg_{it}) are related to the variation of stock price in various return types and for all P/B levels. Hence, hypotheses H_{A1}, H_{A4} and H_{A5} are substantiated consistently in comparison with previous examinations. Hypothesis H_{A2} is supported for R_{i1} – R_{i3} return types and high level of P/B with the degree of association of 1 percent, and for R_{i4} return type and high and medium-high levels of *P/B* with the degree of association of 5 percent. Hypothesis H_{A3} is supported for R_{i1} return type and medium-high level of *P/B* with 10 percent significance level.

The change in pure interest rate (Δr_{it}) in the P/B partition-based model is negatively linked to stock price movement. The supports are shown for low level of P/B and R_{i1} - R_{i4} return types at 1 percent significance level, for low to medium-high levels of P/B and R_{i2} –

Table 5. **The Results of Categorical Arrangement for Basic Model Analysis**

Var(s)		R_{i1}			R_{i2}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	0.6058	18.7617	0.0000 ***	0.1114	4.5000	0.0000 ***
X_{it}	+	0.1219	5.9680	0.0000 ***	0.0521	3.3264	0.0009 ***
Δq_{it}	+	-0.0188	-2.1794	0.0293	-0.0114	-1.7297	0.0837
$M\Delta q_{it}$	$H>M>0$	0.0174	0.5442	0.5863	0.2069	8.4532	0.0000 ***
$H\Delta q_{it}$	$H>M>0$	0.4895	16.2990	0.0000 ***	0.3980	17.2896	0.0000 ***
Δb_{it}	+	0.0363	4.0447	0.0001 ***	0.0217	3.1501	0.0016 ***
Δg_{it}	+	0.0453	4.2684	0.0000 ***	0.0175	2.1477	0.0318 **
$M\Delta g_{it}$	$H>M>0$	-0.1477	-4.1981	0.0000	0.0547	2.0283	0.0426 **
$H\Delta g_{it}$	$H>M>0$	0.1975	5.5108	0.0000 ***	0.2392	8.7095	0.0000 ***
Δr_{it}	-	0.0493	5.5458	0.0000	0.0248	3.6413	0.0003
F-value		95.7330	0.0000	***	63.9787	0.0000	***
R^2		12.34%			8.60%		
Adj-R^2		12.21%			8.46%		

Var(s)		R_{i3}			R_{i4}		
	Pred.	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
α	?	-0.1311	-6.6248	0.0000 ***	-0.1726	-9.8938	0.0000 ***
X_{it}	+	0.0297	2.3692	0.0179 **	0.0454	4.1175	0.0000 ***
Δq_{it}	+	-0.0071	-1.3465	0.1782	-0.0074	-1.5931	0.1112
$M\Delta q_{it}$	$H>M>0$	0.2334	11.9242	0.0000 ***	0.1219	7.0670	0.0000 ***
$H\Delta q_{it}$	$H>M>0$	0.3096	16.8177	0.0000 ***	0.1824	11.2394	0.0000 ***
Δb_{it}	+	0.0161	2.9241	0.0035 ***	0.0230	4.7548	0.0000 ***
Δg_{it}	+	0.0105	1.6150	0.1064	0.0119	2.0831	0.0373 **
$M\Delta g_{it}$	$H>M>0$	0.0978	4.5328	0.0000 ***	0.1105	5.8089	0.0000 ***
$H\Delta g_{it}$	$H>M>0$	0.1315	5.9864	0.0000 ***	0.1505	7.7714	0.0000 ***
Δr_{it}	-	0.0050	0.9099	0.3629	0.0055	1.1422	0.2534
F-value		46.4409	0.0000	***	31.9229	0.0000	***
R^2		6.39%			4.48%		
Adj-R^2		6.25%			4.34%		

Notes: Number of observation (N): 6,132. R_{it}: stock return, firm *i* during period *1* (a year), 2 (a year and three months), 3 (a year and six months), and 4 (a year and nine months); x_{it}: earnings, firm *i* during period *t*; Δq_{it}: change of profitability, firm *i* during period *t* (in basic model notated as Δp_{it}); Δb_{it}: change of book value, firm *i* during period *t*; Δg_{it}: change of growth opportunities, firm *i* during period *t*; Δr_{it}: change of discount rate, firm *i* during period t; *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Categorical arrangement of profitability and growth opportunities with conditions, consecutively, $g_H > g_M > 0$, and $w_H > w_M > 0$ serves to examine the association degree related to profitability and growth opportunities characteristics.

R_{i4} return types at 1 percent significance level, and for R_{i4} return type and medium-high level of P/B with the degree of significance of 5 percent. Therefore, this study concludes that H_{A6} is supported, which indicates that the change in pure interest rate is able to elevate earnings and investment scalability, leading to higher firm value.

P/B partition-based model shows that R^2 increases to 38.60 percent, and $Adj\text{-}R^2$ to 38.30 percent for R_{i1} return type. Thus, the partition model even has a better explanatory power than does the basic model. Furthermore, the ratio of market value to book value works out well to improve the model's degree of association.

Discussion

Overall, our analysis provides evidence that six cash-flow-related factors of accounting information are related to stock price variability with directions as hypothesized. This study interprets the accounting information variables one by one, and suggests some research findings.

Earnings Yields

Earnings yield is positively related to firm value. The results of this study support the classical concept (Ohlson 1995), along with the derivative studies by Lo and Lys (2000), Francis and Schipper (1999), Meyers (1999), Bradshaw et al. (2006), Cohen and Lys (2006), Bradshaw and Sloan (2002), Bhattacharya et al. (2003), Collins et al. (1997), Givoly and Hayn (2000), Kolev, Marquadt and McVay (2008), and Weiss et al. (2008). Even though Ohlson (1995) has a flaw where earnings is a noisy when measuring market equity value, this study concludes that earnings is the primary determinant of the firm's market value. Therefore, this study denotes that earnings is the measures of value added in accounting. Furthermore, its measurability is always reflected in the market value.

Corresponding with the evidence of earnings being reflected in stock price variability, this study shows that earnings is the fundamental signal (Ohlson 1995; Feltham and Ohlson 1995, 1996). This study comprehends that the fundamental signal is digested from its characteristics which serve as a lift for firm performance. Earnings serves as a lift for operation performance as well as for stock price variability. Earnings is perceived by financial users as the primary determinant of the firm's equity value. In other words, this study supports the concept of recursion theory (Sterling 1968), suggesting that firm value is identified from book value and earnings. Consequently, we suggest that the variation of stock price fully reflects book value and earnings. Finally, this study concludes that the association between accounting earnings and stock price is undeniable.

Investment Scalability and Its Change

Short-run and long-run investment scalabilities can be used as the predictors of market value. The analysis

shows that investment scalability is associated with return. Hence, this study concludes that short-run and long-run assets act as an earnings power. Consequently, an increase in assets basically means an increase in the firm's equity (Bao and Bao 1989; Cohen and Lys 2006; Weiss et al. 2008; Bradshaw et al. 2006; Abarbanell and Bushee 1997; Abarbanell and Bushee 1997; Francis and Schipper 1999). This study supports the notion that short-run and long-run investments are the earnings power and return when they are financed with a low cost of capital. The rationale is that the increases in short-run and long-run investments lead to the enhancement of future earnings power, which then improves the firm's equity value. Moreover, the increases in short-run and long-run investments will decrease the cost of capital, such that the firm's ability to pay dividends will decline. Therefore, investment scalability is associated with stock price variability directly through dividends or indirectly through earnings variability.

This study supports the old concept that book value and earnings are closely related to the firm's market value. Rao and Litzenberger (1971), and Litzenberger and Rao (1972) formulate that firm value is a function of book value and earnings, but still adjustable to the function of debt and change in growth opportunities. Analysis and inferences from previous studies show that our study confirms the adaptation theory (Wright 1967). All supported hypotheses indicate that firm assets are modifiable to generate future potential earnings. This study concludes that it is the role of information on financial position—especially the roles of assets and liabilities, but not equity capital—that may become a determinant of stock price variability.

Book Value and Its Change

This study confirms the relationship between book value and stock return. This study supports Ohlson (1995) and Lundholm (1995), concluding that book value determines the firm's market value. Moreover, Lo and Lys (2000) propose a concept that firm value is a function of all discounted future earnings and dividends. Dechow, Hutton, and Sloan (1999) reformulate the return model, which was still based on earnings. Beaver (1999), Hand (2001), and Myers (1999) verify that book value and earnings serve as the evaluators of market value without ignoring the Ohlsons' concept. Within the same logical and reasoning, this study infers that accounting information on book value improves the degree of association of the return model.

This study implies that the change in book value is the primary measure for the firm's equity value. The change in book value is identical with current earnings measurement. Therefore, the change in book value is in accord with the growth of equity capital, and hence in accord with the change in stock return (Rao and Litzenberger 1971; Litzenberger and Rao 1972; Bao and Bao 1989; Burgstahler and Dichev 1997; Collins et al. 1999; Collins et al. 1987; Cohen and Lys 2006; Liu and

Thomas 2000; Liu et al. 2001; Weiss et al. 2008; Chen and Zhang 2007; Ohlson 1995; Feltham and Ohlson 1995; Feltham and Ohlson 1996; Bradshaw et al. 2006; and Abarbanell and Bushee 1997).

Growth Opportunities

This study supports Rao and Litzenberger (1971), Litzenberger and Rao (1972), and Bao and Bao (1972) that growth opportunities increase firm competitiveness. Consequently, the higher the efficiency, the higher the productivity is. Miller and Modigliani (1961) suggest that growing firms always have a positive rate of return for each invested asset, meaning that every invested resource has a lower cost of capital than that of other firms in the industry.

This study posits that firm value is determined by growth and future potential growth opportunities (Liu et al. 2001; Aboody et al. 2002; and Frankel and Lee 1998). Current growth drives the increase in future earnings, while future potential growth reduces the model's error to improve the association degree of the return model. Lev and Thiagarajan (1993), Abarbanell and Bushee (1997), and Weiss et al. (2008) conclude that the growth of inventories, gross profit, sales, accounts receivable, etc. improves future earnings growth. Simultaneously, this research concludes that market value adapts to the growth of those factors.

Changes in Discount Rate

This study documents that the change in discount rate is negatively associated with annual stock return. From the beginning, this study has conjectured that firm value can be increased by the adaptation concept. The equity value could be increased by adapting alternative resources through the lower interest rate. Consequently, the invested resources managed by the firm would be more productive (Burgstahler and Dichev 1997). Aboody et al. (2002), Frankel and Lee (1998), Zhang (2003) and Chen and Zhang (2007) argue that earnings growth is determined by several factors, and one of them is interest rate. In conclusion, earnings growth is positively associated with stock price variability.

This study's perspective is that interest rate plays a role of multiplier effect. When interest rate decreases, a firm may generate more earnings since the firm acquires more liabilities or new invested capital such that the firm's weighted interest rate will decline (Rao and Litzenberger 1971; and Litzenberger and Rao 1972). Therefore, this study infers that the firm's equity value is highly determined by the expected discount rate (Danielson and Dowdell 2001; and Liu et al. 2001).

Model

This study conducts five model examinations with two sensitivity tests. The results of investment scalability analysis show that Model 13 has *adj-R^2* of 2 percent-3 percent, which is higher than that of Model 12 (2%). This study shows that the newly designed model has a better degree of association, and could explain the return association by 1 percent increase. Next, this study examines the models by categorical arrangement based on P/B ratio. The analysis results demonstrate that *adj-R^2* is within the range of 6 percent-11 percent. These findings indicate that when sample is differentiated categorically into sub-samples, the degree of association of the return model increases. It is also noted that the incremental explanatory power is around 9 percent compared to that of the basic model. The analysis based on P/B ratio partition confirms that the model shows a high degree of association with *adj-R^2* of approximately 5 percent-38 percent, which is approximately 10 percent-20 percent higher than those of the two previous analyses. Up to this stage, this study is able to show a better degree of association of the return model. Thus, this model is more comprehensive, realistic, and accurate.

Research Findings

The results of overall analysis confirm the theory, and provide some empirical evidence. *First*, all accounting fundamentals, as suggested by theory, are confirmed to be related with stock price variability. All cash-flow-related variables, i.e., earnings yield, short-run and long-run investment scalabilities, book value, and growth opportunities are positively associated with stock price variability. Meanwhile, the change in discount rate or pure interest rate has a negative relation with stock price variability. *Second*, the change in earnings power in a single measure is found to weakly explain stock price variability. Until recently, some empirical evidence measures the earnings power as a single unit. This study splits this measure into short-run and long-run investment scalabilities, and finds that both measures are positively associated with annual stock return. The examination using P/B ratio partition shows consistent results for sub-samples with low to medium-high P/B ratio.

Third, this study could synergize the adaptation theory (Wright 1967) with the recursion theory (Sterling 1968). Earnings has explained stock price variability for half a century, showing that the recursion theory is still valid. On the other hand, the finding on short-run and long-run investment scalabilities implies that the adaptation theory is also prevalent. This study combines both theories into one model, and finds that both theories indeed hold, and even the model has a better degree of association. The recursion theory that relies on earnings and book value as shown in Ohlson's model (Ohlson 1995; Feltham and Ohlson 1995; 1996) is called the orthodox paradigm. This

forty-year-old paradigm can be revised by complementing it with an older paradigm, which is the adaptation theory. Therefore, this study comprehends that both theories are complementary, not mutually exclusive.

Invested resource capital could be used to generate either current potential or future earnings. It is the agent's liabilities to elaborate on the usage and linkage of invested assets. The agent (management) should disclose information on their activities or projects that create wealth for investors. A firm is also required to disclose information on the increase or the decrease of its liabilities. Rational investors should not only harness information related to earnings and book value, but also on the characteristics of the firm's investment scalability on the financial statements. The detailed assets show that investors could utilize them to perceive earnings powers.

Fourth, this study fruitfully verifies the relation between accounting fundamentals and the variation of stock price, and attains a higher degree of association than that of previous study (Chen and Zhang 2003). The previous study recorded a highest score of *adj-*R^2 of approximately 20 percent, which came from sub-sample partition. This study achieves a higher result using the sub-samples, which is in the range of 7 percent-38 percent for P/B ratio partition. *Fifth*, we find and confirm that accounting fundamentals are related to stock price variability in cross-sectional stock return. This study substantiates the strong association between accounting fundamentals and stock price variability. Besides, this study suggests that not only should earnings be disclosed immediately to investors, but invested assets also need to be informed to the public. The timeliness and comprehensiveness of the firm's disclosure to the capital markets could reduce the anomaly of stock price variability. Such a policy is expected to repress firm value deviation.

Sixth, confirming the association between the six cash-flow-related factors and stock price variability, this study pinpoints that investors' trading strategy should revert to accounting fundamentals, and that they could rely on them. This perspective complies with current tendency of stock trading strategy in the midst of stock market fluctuation and economic uncertainty. This study concludes that accounting fundamentals, i.e., assets, book value, earnings, etc., are the main factors that explain firm value or return.

Conclusion and Limitations

Conclusion

This study summarizes the analysis results in the following conclusion. Earnings yield and book value are positively associated with firm value. Short-run and long-run investment scalabilities may serve as the prime determinants of stock price variability, indicating that short-term and long-term assets are capitalized on to generate potential future earnings. Growth opportunities are also associated with the variation of

stock price. In other words, stock price adjusts to growth opportunities. The change in discount rate is negatively related to annual stock return, which stems from the use of cheap alternative resources or lower interest rates. All examination results confirm the hypothesized directions. In addition, the sensitivity test based on P/B ratio shows similar results. This study delivers a better degree of return association. Although this particular finding is comparable with that of previous study, which shows a low degree of relation, this study contributes an incremental explanatory power.

The association between accounting fundamentals and the variation of stock price categorized by P/B ratio is confirmed as suggested by theory. Specifically, high and medium-high P/B ratios could explain stock price variability better than does lower P/B ratio. Within the theoretical level, this study finds empirical evidence of the synergy between the adaptation theory and the recursion theory. Therefore, investors should not merely use information related to earnings and book value, but they should analyze the characteristics of investment scalability or invested resources.

This study documents a higher degree of association between stock price variability and accounting fundamentals than do previous studies. The relation has more significant results in the sub-sample partition, especially with P/B ratio. Overall, the findings lead to conclusion that the relation of accounting information to stock price variability is statistically confirmed. In addition, this study suggests that investors' trading strategy revert to accounting fundamentals.

Limitations

This study has some limitations as follows. *First*, it uses a large data sample so that its *Adj-R^2* is low due to the law of large data sample. *Second*, this study has a survivorship bias in its sample. Of all 24,095 firm-years, this study only uses 6,132 (25.45%) because the remainders are unanalyzable. *Third*, this study does not employ firms with negative book values and negative earnings after taxes, as it uses purposive sampling criteria. Future researchers should consider employing them as the control group. Because of their unavailability, this study fails to conduct robustness checks for this group. *Fourth*, there is a bias due to the blending of all stock markets, from semi-strong to weak forms of efficiency. Although this limitation is deniable by the market-wide regime concept, this study ignores the characteristics of economies, regulations, trading mechanisms, and cultures across countries. In fact, those factors may affect the return model.

Fifth, this study uses earnings after taxes, and so it disregards earnings quality, which may affect the return model. Nevertheless, this issue is not influential as the sample tends to show a low P/B ratio. This means that the sample usually has good earnings quality. *Sixth*, this study does not consider conservatism in the published financial

reports where assets are frequently disclosed lower than their real figures. This ex-ante conservatism may affect the return model. Also, this study does not consider the conservatism level. *Seventh*, investment scalability measurement is weak since it only consists of current assets, fixed assets, short-term liabilities, and long-term liabilities. This study ignores the possibility that there may be some reserves or construction in progress operating immediately.

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APPENDIX 1

The Results of Inducing the Change in Investment Scalability Analysis

			R_{i1}			R_{i2}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
Low PB	α	?	0.9262	26.3673	0.0000 ***	0.8079	25.2705	0.0000 ***
	X_{it}	+	3.6746	15.2294	0.0000 ***	0.8236	3.7505	0.0002 ***
	Δsr_{it}	+	0.0002	0.0892	0.9289	-0.0006	-0.3446	0.7305
	Δlr_{it}	+	-0.0306	-2.0497	0.0406	-0.0198	-1.4573	0.1453
	Δp_{it}	+	0.0414	2.6972	0.0071 ***	0.0293	2.1012	0.0358 **
	Δg_{it}	+	-0.7296	-9.9661	0.0000	-0.0601	-0.9018	0.3673
	Δr_{it}	-	-1.9473	-9.4720	0.0000 ***	-1.2520	-6.6911	0.0000 ***
	F-value			56.8679	0.0000 ***		11.7171	0.0000 ***
	R^2			21.86%			5.45%	
	Adj-R^2			21.47%			4.98%	

			R_{i1}			R_{i2}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
Low PB	α	?	0.4863	18.5310	0.0000 ***	0.2146	9.5104	0.0000 ***
	X_{it}	+	0.5175	2.8714	0.0042 ***	0.6577	4.2440	0.0000 ***
	Δsr_{it}	+	0.0008	0.5967	0.5509	0.0008	0.7097	0.4780
	Δlr_{it}	+	-0.0187	-1.6717	0.0948	-0.0176	-1.8374	0.0664
	Δp_{it}	+	0.0175	1.5289	0.1265	0.0136	1.3792	0.1681
	Δg_{it}	+	-0.0061	-0.1121	0.9107	-0.0756	-1.6071	0.1083
	Δr_{it}	-	-0.8871	-5.7763	0.0000 ***	-0.5965	-4.5176	0.0000 ***
	F-value		9.2309	0.0000	***	8.2587	0.0000	***
	R^2		4.34%			3.90%		
	Adj-R^2		3.87%			3.43%		

Continued from APPENDIX 1

PB			R_{i1}				R_{i2}			
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**		**Coef.**	**t-value**	**Sig.**	
Low - Medium	α	?	0.9273	27.1602	0.0000	***	0.4944	20.1531	0.0000	***
	X_{it}	+	0.1362	2.2081	0.0274	**	0.1212	2.7338	0.0064	***
	Δsr_{it}	+	-0.0055	-1.0154	0.3101		-0.0022	-0.5594	0.5760	
	Δlr_{it}	+	0.0041	0.4881	0.6256		-0.0046	-0.7620	0.4462	
	Δp_{it}	+	0.0517	1.0571	0.2907		0.0740	2.1054	0.0355	**
	Δg_{it}	+	0.7051	8.4779	0.0000	***	0.4950	8.2823	0.0000	***
	Δr_{it}	-	-0.0479	-0.7671	0.4432		-0.0464	-1.0332	0.3017	
	F-value		13.7341	0.0000	***		13.7660	0.0000	***	
	R^2		6.33%				6.35%			
	Adj-R^2		5.87%				5.88%			

PB			R_{i1}				R_{i2}			
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**		**Coef.**	**t-value**	**Sig.**	
Low - Medium	α	?	0.2299	11.6663	0.0000	***	0.0922	5.1260	0.0000	***
	X_{it}	+	0.1147	3.2218	0.0013	***	0.1810	5.5703	0.0000	***
	Δsr_{it}	+	-0.0035	-1.1290	0.2591		-0.0053	-1.8672	0.0621	
	Δlr_{it}	+	0.0000	-0.0072	0.9942		0.0010	0.2176	0.8278	
	Δp_{it}	+	0.0808	2.8596	0.0043	***	0.1315	5.1021	0.0000	***
	Δg_{it}	+	0.2773	5.7771	0.0000	***	0.2252	5.1386	0.0000	***
	Δr_{it}	-	-0.0938	-2.6034	0.0093	***	-0.0638	-1.9401	0.0526	*
	F-value		9.3563	0.0000	***		11.4706	0.0000	***	
	R^2		4.40%				5.34%			
	Adj-R^2		3.93%				4.88%			

Continued from APPENDIX 1

PB			R_{i1}			R_{i2}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
Medium - Medium	α	?	0.5106	17.1578	0.0000 ***	0.1834	8.9008	0.0000 ***
	X_{it}	+	1.0372	13.2985	0.0000 ***	0.5999	11.1093	0.0000 ***
	Δsr_{it}	+	0.0072	1.1376	0.2555	0.0062	1.4053	0.1602
	Δlr_{it}	+	0.0060	0.7466	0.4554	-0.0123	-2.2334	0.0257
	Δp_{it}	+	-0.0226	-1.0891	0.2763	-0.0227	-1.5800	0.1144
	Δg_{it}	+	0.8992	10.0492	0.0000 ***	0.7072	11.4168	0.0000 ***
	Δr_{it}	-	0.0213	0.7259	0.4680	-0.0118	-0.5816	0.5609
	F-value		44.6507	0.0000	***	40.0357	0.0000	***
	R^2		18.01%			16.45%		
	Adj-R^2		17.60%			16.04%		

PB			R_{i1}			R_{i2}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
Medium - Medium	α	?	-0.0236	-1.5134	0.1304	-0.0716	-4.9097	0.0000 ***
	X_{it}	+	0.3527	8.6174	0.0000 ***	0.3531	9.2338	0.0000 ***
	Δsr_{it}	+	0.0040	1.1825	0.2372	0.0064	2.0561	0.0400 **
	Δlr_{it}	+	-0.0046	-1.0887	0.2765	-0.0077	-1.9811	0.0478
	Δp_{it}	+	0.0052	0.4738	0.6357	0.0219	2.1477	0.0319 **
	Δg_{it}	+	0.3908	8.3219	0.0000 ***	0.3735	8.5146	0.0000 ***
	Δr_{it}	-	-0.0421	-2.7392	0.0062 ***	-0.0364	-2.5338	0.0114 **
	F-value		23.7174	0.0000	***	26.9835	0.0000	***
	R^2		10.45%			11.72%		
	Adj-R^2		10.01%			11.28%		

Continued from APPENDIX 1

PB			R_{i1}				R_{i2}			
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**		**Coef.**	**t-value**	**Sig.**	
Medium - High	α	?	0.2714	11.2791	0.0000	***	0.0796	4.6595	0.0000	***
	X_{it}	+	1.6294	21.2164	0.0000	***	0.9001	16.5045	0.0000	***
	Δsr_{it}	+	0.0010	0.4065	0.6844		-0.0005	-0.2814	0.7784	
	Δlr_{it}	+	0.0030	1.7680	0.0773	*	0.0017	1.4319	0.1524	
	Δp_{it}	+	0.0258	1.9758	0.0484	**	0.0126	1.3570	0.1750	
	Δg_{it}	+	0.2448	4.8097	0.0000	***	0.0825	2.2821	0.0227	**
	Δr_{it}	-	0.0279	1.8392	0.0661		-0.0082	-0.7566	0.4494	
	F-value		127.7231	0.0000	***		70.0659	0.0000	***	
	R^2		38.60%				25.64%			
	Adj-R^2		38.30%				25.28%			

PB			R_{i1}				R_{i2}			
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**		**Coef.**	**t-value**	**Sig.**	
Medium - High	α	?	-0.1066	-8.0359	0.0000	***	-0.1325	-10.0345	0.0000	***
	X_{it}	+	0.5053	11.9339	0.0000	***	0.3746	8.8874	0.0000	***
	Δsr_{it}	+	0.0008	0.5618	0.5744		0.0010	0.7710	0.4409	
	Δlr_{it}	+	-0.0008	-0.8013	0.4231		-0.0010	-1.1049	0.2694	
	Δp_{it}	+	-0.0059	-0.8180	0.4135		0.0035	0.4878	0.6258	
	Δg_{it}	+	-0.0192	-0.6838	0.4942		0.0195	0.6972	0.4858	
	Δr_{it}	-	-0.0331	-3.9548	0.0001	***	-0.0208	-2.4959	0.0127	**
	F-value		34.7146	0.0000	***		20.1725	0.0000	***	
	R^2		14.59%				9.03%			
	Adj-R^2		14.17%				8.58%			

Continued from APPENDIX 1

			R_{i1}			R_{i2}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
PB High	α	?	0.4335	21.6449	0.0000 ***	0.1444	9.8993	0.0000 ***
	X_{it}	+	0.0938	4.1453	0.0000 ***	0.0403	2.4450	0.0146 **
	Δsr_{it}	+	0.0053	4.5853	0.0000 ***	0.0039	4.6269	0.0000 ***
	Δlr_{it}	+	0.0047	1.4485	0.1477	-0.0026	-1.1144	0.2653
	Δp_{it}	+	0.0359	2.2089	0.0274 **	0.0173	1.4596	0.1447
	Δg_{it}	+	0.0688	6.8601	0.0000 ***	0.0430	5.8899	0.0000 ***
	Δr_{it}	-	0.0247	3.2440	0.0012	0.0110	1.9782	0.0481
	F-value		19.6192	0.0000	***	11.3087	0.0000	***
	R^2		8.81%			5.27%		
	Adj-R^2		8.36%			4.81%		

			R_{i3}			R_{i4}		
	Coef.	**Pred.**	**Coef.**	**t-value**	**Sig.**	**Coef.**	**t-value**	**Sig.**
PB High	α	?	-0.1275	-12.4631	0.0000 ***	-0.1729	-17.6318	0.0000 ***
	X_{it}	+	0.0259	2.2394	0.0253 **	0.0243	2.1922	0.0286 **
	Δsr_{it}	+	0.0019	3.1430	0.0017 ***	0.0014	2.3871	0.0171 **
	Δlr_{it}	+	-0.0007	-0.4333	0.6649	-0.0019	-1.1925	0.2333
	Δp_{it}	+	0.0162	1.9544	0.0509 *	0.0186	2.3316	0.0199 **
	Δg_{it}	+	0.0237	4.6342	0.0000 ***	0.0269	5.4863	0.0000 ***
	Δr_{it}	-	-0.0013	-0.3272	0.7435	0.0019	0.5116	0.6090
	F-value		5.7043	0.0000	***	7.1771	0.0000	***
	R^2		2.73%			3.41%		
	Adj-R^2		2.25%			2.94%		

***Additional Notes**:* Number of observation (N) for Low PB: 1,227, Low-Medium PB: 1,226, Medium-Medium PB: 1,227, Medium-High PB: 1,226, High PB: 1,226. The limits of each PB: Low PB < 0.3065; Low-Medium PB < 0.5462; Medium-Medium PB < 0.8505; Medium-High PB < 1.3687, High PB > 1.3687.