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ACCOUNTING FUNDAMENTALS AND VARIATIONS OF STOCK PRICE: METHODOLOGICAL REFINEMENT WITH RECURSIVE SIMULTANEOUS MODEL*

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ABSTRACT

This study investigates association between accounting fundamentals and variations of stock prices using recursive simultaneous equation model. The accounting fundamentals consist of earnings yield, book value, profitability, growth opportunities and discount rate. The prior single relationships model has been investigated by Chen and Zhang (2007), Sumiyana (2011) and Sumiyana et al. (2010). They assume that all accounting fundamentals associate direct-linearly to the stock returns. This study assembles that all accounting fundamentals should associate recursively. This study reconstructs the model and found that only the first two factors could influence stock returns directly, while the three remaining factors should relate precedently to the earnings yield and book value.

This study suggests that new reconstructed relationships among accounting fundamentals could decompose association degree between them and the movements of stock prices. Finally, this study concludes that this methodological refinement would improve the ability of predicting stock prices and reduce stock price deviations. It implies that accounting fundamentals actually have higher value relevance in the new recursive simultaneous equation model than that in single equation model. It also entails that relationship decompositions revitalize the integration of the adaptation and the recursion theories.

***Keywords**: earnings yield, book value, profitability, growth opportunities, discount rate, accounting fundamentals, recursive simultaneous model*

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INTRODUCTION

The association between accounting fundamentals and stock price variations are explained by recursion theory (Sterling, 1968) and adaptation theory (Wright, 1967). The difference between those theories mainly lies in the factors determining the variation of stock price or return. Recursion theory explains that accounting fundamentals, mainly book value and accounting earnings serve as determinant of the variation. Meanwhile, adaptation theory describes that assets investment scalability used for company operation and production determine the variation. Both theories explain stock price movement directly and linearly utilizing a single equation model.

This study explores the weakness of single equation model (Chen & Zhang, 2007, Sumiyana *et al*., 2010, and Sumiyana, 2011) and also recursion and adaptation theories formulations in explaining the association between accounting fundamentals and variations of stock price. Furthermore, this study mitigates the form of association from this single equation model into recursive simultaneous equation model. As by product of this mitigation process, this study revitalizes the view that adaptation theory and recursion theory need to be integrated when explaining stock price or return variation. Such integration would increase comprehensiveness and accuracy of the association level. Stock price variations are not only explainable by book value and accounting earnings, but also by operating assets used to generate accounting earnings. Likewise, the relationships of all accounting fundamentals are simultaneously gradually.

The mitigation of association model and integration of both theories become very important because of the following reasons. First, some prior research evidences show that weak single equation relationship between earnings and stock price variability (Chen and Zhang, 2007). Second, some research use a single linear association between accounting fundamentals and stock price variability although they have induced future related cash flow reflected by equity value as a function of scalability and profitability (Ohlson, 1995, Feltham & Ohlson, 1995, 1996, Zhang, 2003, Chen & Zhang, 2007, Sumiyana, *et al*., 2010, and Sumiyana, 2011). This study decomposes the single equation model into recursive simultaneous equation model to explain the influence among accounting fundamentals. Then, this association is eventually directed toward the stock price. In other words, this study would identify causality relationship within the associations. Third, the integration process of adaptation theory and recursion theory enables to recognize causality relationship among accounting fundamentals, and between accounting fundamentals and variations of stock prices. Similarly, this study explains stock price variations incrementally. In other words, both theories are synergized to reduce the errors of stock price variations.

This study assumes to following statements. *First*, investors consider accounting information comprehensively. It means that investors use accounting fundamentals for business decision makings. *Second*, investors comprehend the firm's prospects based not only on equity capital and its growth, but also on assets as stimuli of increasing firm's equity value. This refers to adaptation theory (Wright, 1967). *Third*, efficiency-form of stock markets is comparable. Stock price variability at all stock markets acts in the same market-wide regime behavior and depends solemnly on earnings and book value (Ho & Sequeira, 2007). *Fourth*, cost of equity capital represents opportunity cost for each firm. It describes that every fund was managed in order to maximize assets usability. This refers to that management always behaves rationally.

The main objective of this research is to investigate the association between accounting fundamentals and variations of stock prices using recursive simultaneous equation model. Such investigation is necessary because the association was originally studied under single equation model in previous researches. In other hands, this study investigates the causality relationship between accounting fundamentals and variations of stock price. During this examination, this study revitalizes the integration of adaptation and recursion theories. This integration also means that the association among accounting fundamentals and the relationship between accounting fundamentals and variations of stock price could be explained in more details.

This study contributes to accounting literature by providing more comprehensive and realistic return model. The advantages are explained as follows. First, this model is more comprehensive due to its stage simultaneous coverage. The comprehensiveness refers to the inclusion of assets scalability to generate future cash flow with recursive simultaneous equation model. Therefore, this model is expected to be closer to economic reality. Second, this new recursive simultaneous model grants more comprehensive and accurate predictor of future cash flow to estimate potential future earnings (Liu, *et al.*, 2001). Staging accounting information into recursive simultaneous equation model could improve model accuracy, as long as they are aligned to increase value relevance. Last, this study offers considerable contribution by decomposing association degree of return model.

This study is beneficial to investors, managements, and researchers. From investor's point of view, this study offers more accurate, realistic structure and comprehensive parameter to predict future cash flow (FASB, SFAC No. 1, 1978). This is related to the recursive simultaneous model of inter relationship among fundamental accounting data and its change and then impacts to the stock price. Accounting information becomes more useful when presented in financial statements (FASB, SFAC No. 5, para. 24, 1984). From management's point of view, this study gives more incentive for managements to manage more rationally their future investments. Because it is not single relationship model or based on stage association model, invested capital assets contributes by the use of firm equity value. From researchers' point of view, this study becomes a trigger to further studies, especially to develop new models to achieve higher degree of association.

The remaining manuscript is organized as follows. Section 2 describes the development of theoretical return model and hypothesis for each model. Section 3 illustrates empirical research design and research methods. Section 4 discusses the results of empirical examinations. And section 5 depicts research conclusions, limitations and consequences for further studies.

LITERATURE REVIEW, MODEL AND HYPOTHESIS DEVELOPMENT

Recursion Theory: Earnings Yield and Book value

Recursion theory (Sterling, 1968), which was developed based on classical concept, associates earnings and book value with stock market value or return similar to Ohlson (1995). This model formulates that firm equity value comes from book value and expected value of future residual earnings. Ohlson's (1995) clean surplus theory indicates linear information dynamic between book value and expected residual earnings with stock price. This model was used by Lundholm (1995), Lo & Lys (2000), and Myers (1999).

Lo & Lys (2000) offer new hypothetical concepts that firm equity value is a function of discounted future earnings and dividend. Dechow, *et al*. (1999) evaluate capital rate of return based on residual earnings, while Frankel & Lee (1999) add investors expectation of minimum profitability. Beaver (1999), Hand (2001), and Myers (1999) confirm that firm market value is a function of book value and earnings, in accordance with concept of Ohlson (1995). Burgstahler &

Dichev (1997) add concept of assets book value and liabilities to explain firm market value better. Liu & Thomas (2000), and Liu, *et al*. (2001) add multiple factors into clean surplus model, either earnings dis-aggregation or other book value and earnings related measures.

Collins, *et al*. (1997), Lev & Zarowin (1999), and Francis & Schipper (1999) outline that value relevance between book value and earnings with stock market value or return may be preserved. Abarbanell & Bushee (1997), Bradshaw, *et al*. (2006), Cohen & Lys (2006), Weiss, *et al*. (2008), and Penmann (1998) specifically state that more accounting information result in better degree of association. Both studies in earnings quality improve degree of association. Collins, *et al*. (1999) argue similarly and confirm the association between book value and earnings with stock market value by eliminating losing firms. Chen & Zhang (2007) modify their model in order to increase degree of association by adding external environment factors which may multiply degree of association.

Adaptation Theory: Invested Capital and Investment Scalability

Burgstahler & Dichev (1977) clearly state that equity value is not only determined by previous earnings, but also by the change in intrinsic value of assets. Investors have different insight, which is by observing future potential earnings. It was firm's invested capital when its resources are modifiable for other utilizations. Furthermore, the other utilizations may generate future potential earnings. Wright (1967) argues that adaptation value derives from the role of financial information in balance sheet. The role primarily comes from assets.

Francis & Schipper (1999) have abandoned Ohlson's linear information dynamics by adding assets and debts into return model. This addition has begun the measurement of assets scalability in either long or short-run. Abarbanell & Bushee (1997) modify return model by adding fundamental signals and its changes consist of inventories, account receivables, capital expenditure, gross profit, and taxes. These fundamental signals represent investment scalability from assets in the statement of financial position. Bradshaw, *et al*. (2006) modify Ohlson's return model by inducing the magnitude of financing obtained from debts. This change in debts is comparable to the change in assets utilized to generate earnings. Cohen & Lys (2006) improve model by Bradshaw, *et al*. (2006) by inducing not only the change in debts but also the change in short-run investment scalability that is the change in inventories. Many researcher consider, long-run and short-run investment scalability. Meanwhile, Weiss, *et al*. (2008) emphasize on short-run investment scalability, those are the changes in inventories and account receivables to improve degree of association.

Change in Growth Opportunities

Growth opportunities are included into return model according to Ohlson (1995). This model complies to clean surplus theory, with premises as follows. (i) Stock market value is based on discounted dividend in which investors take neutral position against risks. (ii) accounting income is pre-deterministic value. (iii) In addition, future earnings are stochastic. Future earnings can be calculated by previous consecutive earnings. However, investors may have different respond against minimum or maximum profitability. Therefore, growth opportunities affect earnings or future potential earnings.

Liu, *et al*. (2001), Aboody, *et al*. (2002), and Frankel & Lee (1998) mention that firm intrinsic value is determined by growth and future potential growth. Current growth drives the movement of future residual earnings, while future growth lessens return model errors by improving association degree of return model. Lev & Thiagarajan (1993), Abarbanell & Bushee (1997), and Weiss, *et al*. (2008) indicate that changes in inventory, gross profit, sales, account receivables and the others improve future potential growth of earnings. Growth also improves firm equity value. The study concluded that stock market value is adjustable to that firm's growth. Danielson & Dowdell (2001) confirm that growing firm has better operation efficiency shown by ratio between stock price and book value greater than one. However, investors do not perceive stock return of growing firm higher than those of diminishing firm.

Chen & Zhang (2007), Sumiyana *et al*. (2010), and Sumiyana (2011) conclude that firm equity value depends on growth opportunities. Growth opportunities are a function of scaled investment and affects future potential growth. The inducement of growth opportunities argues that earnings elements alone are not sufficient to explain. The explanation becomes more comprehensive when external environment, industry, and interest rate are included in determining earnings and future earnings.

Change in Discount Rate

Change in discount rate concept is based on model of Ohlson (1995) simplification. This model assumes that investors take neutral position against fixed risks and interest rate. The simplification is modified by Feltham & Ohlson (1995; 1996), and Baginski & Wahlen (2000) by inducing interest rate because it affects short-term and long-term earnings power. Change in interest rate also affects investor's perception about earning power, because interest rate provides certainty of future earnings.

Burgstahler & Dichev (1997) indicate that firm equity value can be increased according to adaptation theory by modifying interest rate, for instance obtaining alternative investment with lower interest rate. Aboody, Hughes & Liu (2002), Frankel & Lee (1998), Zhang (2000), Chen & Zhang (2007), Sumiyana *et al*. (2010), and Sumiyana (2011) argue that earnings growth is determined by interest rate. Interest rate serves as adjustment factor for firm operation, by selecting favorable interest rate to make efficient operation.

Recursive Simultaneous Model

The model in this study is explained as follows. Classical concept depicts that stock return is associated with earnings yield and book value (Feltham & Ohlson, 1995), while from adaptation theory we can derive invested capital and investment scalability to explain stock return. All those relationship can be drawn schematically as in the Figure 1. Such condition is applicable to recursive simultaneous model (Gudjarati, 2003). The model will control the bias and inconsistency problem.

Research Model and Hypothesis Development

The objective of this study is to transform single equation model to recursive simultaneous equation model. Therefore, the research model change the association structure between accounting fundamentals and stock returns. The original model showed that all cash flow factors are associated directly and linearly to the variations of stock price is changed into recursive and simultaneous form of examination. Transformed model is shown in the Figure 1 as follow.

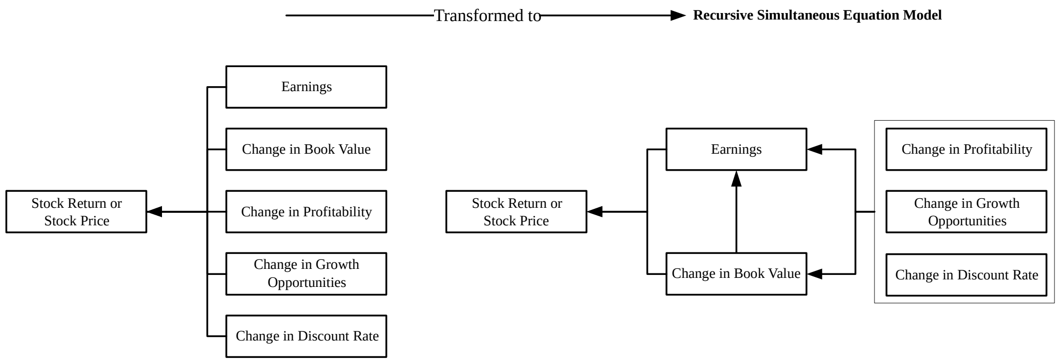

Figure 1 Model Transformation

Earnings Yield Earnings yields (X_t) show the value generated from beginning year invested assets or equities. Earnings yield is deflated by the opening value of current equity capital which generates current earnings. The increase in earnings yields will increase stock return and vice versa. The increase of stock price is caused by investors' expectation to obtain future dividend. It be concluded that earnings yield associates with stock price positively (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Bao & Bao, 1989; Burgstahler & Dichev, 1997; Collins, *et al.*, 1999; Collins, *et al.*, 1987; Cohen & Lys, 2006; Liu & Thomas, 2000; Liu, *et al.*, 2001; Weiss, Naik and Tsai, 2008; Chen & Zhang, 2007; Ohlson, 1995; Feltham & Ohlson, 1995; Feltham & Ohlson, 1996; Bradshaw, *et al.*, 2006; Abarbanell & Bushee, 1997; Lev & Thiagarajan, 1993; Penman, 1998; Francis & Schipper, 1999; Danielson & Dowdell, 2001; Aboody, *et al.*, 2001; Easton & Harris, 1991; and Warfield & Wild, 1992). Therefore, the alternative hypothesis is stated as follows.

H_{A1}: Earnings yield associates positively with stock return.

Change in Equity Capital The change in equity capital (ΔB_t) is the first center of firm value measurement. It is measured by the change in current equity value divided by beginning value of current equity. The change in equity value increases because of the increase in earnings, then reflected in the following book value and stock return. In other words, the change of stock return is in accordance with the change of earnings after denominated by opening value of current capital. It means that change in equity capital associates positively with stock return (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Bao & Bao, 1989; Burgstahler & Dichev, 1997; Collins, *et al.*, 1999; Collins, *et al.*, 1987; Cohen & Lys, 2006; Liu & Thomas, 2000; Liu, *et al.*, 2001; Weiss, *et al.*, 2008; Chen & Zhang, 2007; Ohlson, 1995; Feltham & Ohlson, 1995; Feltham & Ohlson, 1996; Bradshaw, *et al.*, 2006; Abarbanell & Bushee, 1997; Lev & Thiagarajan, 1993; Penman, 1998; Francis & Schipper, 1999; Danielson & Dowdell, 2001; Aboody, *et al.*, 2001; Easton & Harris, 1991; and Warfield & Wild, 1992). It is summarized as alternative hypothesis as follows.

$H_{A2.A}$: Change in firms' book value associates positively with stock return.

$H_{A2.B}$: Change in firms' book value associates positively with earnings yields.

Change in Profitability The change in profitability (Δq_t) is the third center of firm value measurement. Change in profitability is perceived by investors as expected future dividend. Accordingly, an increase in profititablity is expected to rise future dividend. Such reaction is reflected in future stock price increase. On the other side, increase in profitability is caused by the increase in earnings yield. Those earnings subsequently increase book value.

Thus, change in profitability increase as stock return, earning yield, and book value do (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Bao & Bao, 1989; Burgstahler & Dichev, 1997; Collins, *et al*., 1999; Collins, *et al*., 1987; Cohen & Lys, 2006; Liu & Thomas, 2000; Liu, *et al*., 2001; Weiss, *et al*., 2008; Chen & Zhang, 2007; Ohlson, 1995; Feltham & Ohlson, 1995; Feltham & Ohlson, 1996; Bradshaw, *et al*., 2006; Abarbanell & Bushee, 1997; Lev & Thiagarajan, 1993; Penman, 1998; Francis & Schipper, 1999; Danielson & Dowdell, 2001; Aboody, *et al*., 2001; Easton & Harris, 1991; and Warfield & Wild, 1992). It is summarized as alternative hypothesis as follows.

$H_{A3.A}$: Change in profitability associates positively with stock return.

$H_{A3.B}$: Change in profitability associates positively with earnings yield.

$H_{A3.C}$: Change in profitability associates positively with book value.

Change in Growth Opportunities Firm's equity value depends on change in growth opportunities (Δg_t). Stock return depends on whether a firm grows or not. If a firm grow, it increases its earnings, equity value and then simultaneously stock return. This growth concept is supported by growth adjustment process using book value and intrinsic value. Because of a growing firm is able to generate earnings from its invested assets, it indicates that assets should have grown in different type of investment than in firms' equity value. Growth opportunities after being adjusted by relative comparison between book value and intrinsic value associates positively with stock return (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Bao & Bao, 1989; Weiss, *et al*., 2008; Ohlson, 1995; Abarbanell & Bushee, 1997; Lev & Thiagarajan, 1993; Danielson & Dowdell, 2001; and Aboody, *et al*., 2001). The alternative hypothesis is stated as follows.

$H_{A4.A}$: Change in growth opportunities associates positively with stock return.

$H_{A4.B}$: Change in growth opportunities associates positively with earnings yield.

$H_{A4.C}$: Change in growth opportunities associates positively with book value.

Change in Discount Rate Discount rate shows future cash flow valued by cost of capital. The change in discount rate (Δr_t) affects future cash flow showed in the earnings and book value, then modifies stock return in turn. The higher discount rate, the lower future cash flow and vice versa. It means that change in discount rate associate negatively with stock price variations (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Burgstahler & Dichev, 1997; Liu, *et al*., 2001; Chen & Zhang, 2007; Feltham & Ohlson, 1995; Feltham & Ohlson, 1996; Danielson & Dowdell, 2001; and Easton & Harris, 1991). It is summarized in the following hypothesis statement.

$H_{A5.A}$: Change in discount rate associates negatively with stock return.

$H_{A5.B}$: Change in discount rate associates negatively with earnings yield.

$H_{A5.C}$: Change in discount rate associates negatively with book value.

RESEARCH METHOD

Population and Sample

This study use data sample from Sumiyana *et al*. (2010) and Sumiyana (2011). This study covers observation targets of all Asia-Pacific and US companies. It denies cultural and stock market efficiency problem with concept of market-wide regime shifting behavior approach (David, 1997; Veronesi, 1999; Conrad, *et al*., 2002; and Ho & Sequeira, 2007). It indicates that the movement of return association must be the same for each stock market and only relies on accounting information. It states that within the same certain classification, stock market movement as a respond to accounting information should be equal.

Sampling Methods

This study uses purposive sampling, the sample is obtained under certain criteria. The criteria (Sumiyana, *et al*., 2010 and Sumiyana, 2011) are as follows. First, firms are in manufacture and trading sectors, eliminating financial and banking sectors. This study eliminates financial and banking sectors because they are tightly regulated. Second, opening and closing equity book value must be positive ($B_{it-1}>0$; $B_{it}>0$). Firms with negative equity book value tend to go bankrupt. Third, firm stocks are traded actively. Sleeping stocks would disturb conclusion validity.

Variables Measurement and Examination

Variables definition and measurement conducted as follows. R_{it} is annual stock return for firm *i* during period *t*, measured since the first day of opening year period *t-1* until one day after financial statement publication or, if any, earnings announcement period *t*; x_{it} is earnings firm *i* during period *t*, calculated by earnings acquired by common stock holders during period *t* (X_{it}) divided by equity market value during opening of 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 firm *i* during period *t*, deflated by equity book value during opening of current period and profitability calculated using formula:

$$q_{it}=X_{it}/b_{it-1};\quad \Delta\hat{b}_{it} = [\frac{(B_{it} - B_{it-1})}{B_{it-1}}](\frac{1 - B_{it-1}}{V_{it-1}})$$

is equity capital or proportional change in equity book value for firm *i* during period *t*, adjusted by one minus ratio book value and market value during current period. This adjustment is needed to balance accounting book value and market value;

$$\Delta\hat{g}_{it} = (g_{it} - g_{it-1})B_{it-1}/V_{it-1}$$

is change in growth opportunities firm *i* during period *t*;

$$\Delta\hat{r}_{it} = (r_{it} - r_{it-1})B_{it-1}/V_{it-1}$$

is change in discount rate during period *t*; $\alpha, \beta, \gamma, \delta, \omega$ and φ are regression coefficient; and e_{it} is residual.

The original model uses model of Chen and Zhang (2007), Sumiyana *et al*. (2010), and Sumiyana (2011) that is a single equation model. It uses linear regression examination based on model (1). The second examination is recursive on simultaneous equation model (1), (2) and (3). This second examination composes three recursive equations that should be conducted simultaneously as follows.

$$R_{it} = \alpha + \beta X_{it} + \delta\Delta\hat{b}_{it} + \gamma\Delta\hat{q}_{it} + \omega\Delta\hat{g}_{it} + \varphi\Delta\hat{r}_{it} + e_{it} \quad (1)$$

$$X_{it} = \alpha + \delta\Delta\hat{b}_{it} + \gamma\Delta\hat{q}_{it} + \omega\Delta\hat{g}_{it} + \varphi\Delta\hat{r}_{it} + e_{it} \quad (2)$$

$$\Delta\hat{b}_{it} = \alpha + \beta X_{it} + \gamma\Delta\hat{q}_{it} + \omega\Delta\hat{g}_{it} + \text{y} \; \varphi\Delta\hat{r}_{it} + e_{it} \quad (3)$$

Constrained with :

$Cov.\ \{(e_{it}(1)); (e_{it}(2))\} \neq Cov\ \{(e_{it}(1)); (e_{it}(3))\} \neq Cov\ \{(e_{it}(2)); (e_{it}(3))\} \neq 0$

We reexamine the recursive simultaneous equation model with inducing investment scalability (Sumiyana, *et al*., 2010). This reexamination splits profitability into short-run and long-run invested asset scalabilities. $\Delta sr_{it} = (sr_{it} - sr_{it-1})B_{it-1}/V_{it-1}$ is the change in short-run profitability firm *i* during period *t*, deflated by equity book value during opening of current period and profitability. While, $\Delta lr_{it} = (lr_{it} - lr_{it-1})B_{it-1}/V_{it-1}$ is the change in long-run profitability. This third examination also composes three recursive equations that should be conducted simultaneously as follows.

$$R_{it} = \alpha + \beta X_{it} + \delta \Delta \hat{b}_{it} + \gamma \Delta sr_{it} + \pi \Delta lr_{it} + \omega \Delta \hat{g}_{it} + \varphi \Delta \hat{r}_{it} + e_{it} \quad (4)$$

$$X_{it} = \alpha + \delta \Delta \hat{b}_{it} + \gamma \Delta sr_{it} + \pi \Delta lr_{it} + \omega \Delta \hat{g}_{it} + \varphi \Delta \hat{r}_{it} + e_{it} \quad (5)$$

$$\Delta \hat{b}_{it} = \alpha + \beta X_{it} + \gamma \Delta sr_{it} + \pi \Delta lr_{it} + \omega \Delta \hat{g}_{it} + \varphi \Delta \hat{r}_{it} + e_{it} \quad (6)$$

Constrained with :

Cov. $\{(e_{it}(4)); (e_{it}(5))\} \neq Cov \{(e_{it}(4)); (e_{it}(6))\} \neq Cov \{(e_{it}(5)); (e_{it}(6))\} \neq 0$

Simultaneous model requires that each residual derived from each linear model should not have the same covariance values with each other. As Gujarati (2003) states that recursive simultaneous model must control its residual errors and its residual covariance between one regression and others to prevent bias. Furthermore, linearity examination is conducted for each model and simultaneous equations. The reason is that all models are linear regression and require freedom of normality, heteroscedasticity, and multicollinearity.

Sensitivity Examination

Sensitivity examination for the recursive simultaneous equation is performed by sample arrangement into various partitions. Partitioning criteria are ratio between equity book value and stock market value. This examination is aimed to show model consistency within various market levels. Consistency is also expected to be shown at various market changes. Our return model examines consistency against systematic risks, and not yet against idiosyncratic risks. The examination is carried out by splitting sample into quintiles according to ratio of book value and market value.

ANALYSIS, DISCUSSION AND FINDINGS

This section describes data analysis, discussion and research findings. It starts with descriptive statistics, analysis, discussion and ends with research findings. Descriptive statistics initiate this analysis.

Descriptive Statistics

Final sample has fulfilled all required criteria. This study acquires sample data as much as 6,132 (25.45%) from all population of 24,095 (100.00%). The population comes from all stock market in Asia, Australia and United States of America. The sample data period is 2009. A number of data must be excluded. The number and reason are as follows. First, 8,939 (37.10%) are due to stock price or stock return data incompleteness. Second, 661 (2.74%) are caused by earnings data unavailability. Third, 8,038 (33.36%) are due to expected earnings and growth are not presented. Fourth, 167 (0.69%) are caused by negative earnings. Fifth, 120 (0.50%) are due to extreme data exclusion. Last, 38 (0.16%) are caused by abnormal return that cannot be calculated using model of Fama and French (1992, 1993, and 1995). This study cannot obtain firms with negative earnings and book value, because their stock price data is incomplete. Therefore, the criteria which exclude firms having negative earnings and book value are automatically accomplished. The acquired data and the exclusion are presented in Table 1 as follows.

The result of descriptive statistics is shown in Table 2. It can be inferred as follows. Return for one year period (R_{i1}) is 0.8463. then, it degrades during the following periods, for return (R_{i4}) becomes 0.0528. The decrease occurs in all level of percentile 25 (from 0.1667 to -0.2450) and percentile 75 (from 1.2500 to 0.2186). It indicates that firm market value in longer period becomes closer to its intrinsic value. With this proximity, fundamental accounting information is expected to be reflected in firm market value.

Table 1 Sample Data

No	Note	Decrease		Sample	
		Number	%	Number	%
1	Population targets			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%		

Note: Number of valid observation for each country is Indonesia: 59; Malaysia: 326; Australia: 318; China: 976; Hongkong: 67; India: 171; Japan: 1.025; South Korea: 782; New Zealand: 50; Filipina: 38; Singapore: 193; Taiwan: 355; Thailand: 191; and US: 1.578. Mortal country during analysis is Sri Lanka: 3, and mortal countries before initial analysis are Pakistan, Bangladesh and Vietnam.

Table 2 Descriptive Statistics

No.	Variable	Min.	Max.	Mean	Median	Std. Deviation	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

Notes: Number of observation (N): 6.132. R_{it}: stock return for firm *i* during period *1 (1 year), 2 (1 year 3 months), 3 (1 year 6 months), and 4 (1 year 9 months);* x_{it}: earnings for firm *i* during period *t;* Δb_{it}: change of book value for firm *i* during period *t;* Δq_{it}: change of profitability for firm *i* during period *t;* Δsr_{it}: change of short-run assets scalability for firm *i* during period *t*; Δlr_{it}: change of long-run assets scalability for firm *i* during period *t*; Δg_{it}: change of growth opportunities for firm *i* during period *t;* Δr_{it}: change of discount rate during period *t;* PB_{it}: ratio between stock market value and book value for firm *i* during period *t*; V_{it}: market value of stock firm *i* during period *t*; B_{it}: book value for firm *i* during period *t*.

Since earnings data used in this study are earnings after tax (X_{it}), it requires firms with profit. Therefore, the minimum value is 0.0000. Mean value is 0.2092, median value is 0.0968, and standard deviation is 0.9104. The median value is in the left side of mean. It shows that there are some firms having enormous earnings. However, this condition is not a problem since its standard deviation is less than one. The return data indicates similar tendency. Therefore, the correlation between both variables is possible. The other variables, change of earnings power (Δq_{it}) and change of growth opportunities (Δg_{it}) also show similar tendency as earnings. Meanwhile, change of discount rate shows inversed tendency. Such phenomena are expected.

Recursive Simultaneous Equation Analysis

Recursive simultaneous equation constructs three main factors –earnings power, growth opportunities and discount rate– which associate consecutively with earnings, book value, and stock return. Then, four main factors; –book value, earnings power, growth opportunities and discount rate– which associate passing through earnings and stock return. Finally, five main factors –earnings yield, book value, earnings power, growth opportunities and discount rate– which associate with stock return. They are earnings yield (x_{it}), change in firm book value (Δb_{it}), change in earnings power (Δq_{it}), change in growth opportunities (Δg_{it}), and change in discount rate (Δr_{it}). The result analysis is presented in Table 3 as follows.

The result shows that earnings (x_{it}), firm book value (Δb_{it}), and growth opportunities (Δg_{it}) are consistently above 1% confirmed that they associate with stock return for various return specifications (R_{i1} until R_{i4}). They are with t-value (sig.) consecutively 6.785 (1%), 4.770 (1%) and 7.055 (1%) in the R_{t1} type and others type of R_t. It means that $H_{A.1}$, $H_{A.2A}$, and $H_{A.4A}$ are supported. This study is failed to confirm the association between earnings power (Δq_{it}) with stock return, unlike Chen and Zhang (2007) who confirm it consistently. Meanwhile, change in discount rate (Δr_{it}) is not confirmed. It could be concluded that $H_{A.3A}$ and $H_{A.5A}$ is not supported. Degree of association shows F-value of 35.5187 and significant at level 1%. This basic model has return type R^2 of 2.82% for R_{i1}, and lower for the others. Its *adj*-R^2 value is 2.74%. Meanwhile, the first recursive equation has earnings type R^2 of 58.2% for x_{it}, and its *adj*-R^2 value is also 58.2%. The second recursive equation has R^2 of 14.3% for change in book value (Δb_{it}) and its *adj*-R^2 value is also 14.3%.

The basic model or the first examination is still able to conclude the association between accounting information and stock return; it is not flexible enough or rigid because the two variables above were not confirmed. Therefore, this result gives sufficient reason for further stage of decomposed examination using recursive equation. Table 1 decomposes earning power (Δq_{it}) in this relationship with stock return. This study successfully proves that power and growth opportunities associate against earnings yields with t-value (sig.) as 48.470 (1%) and 26.266 (1%). It implies that earnings power and growth opportunities then associates with stock return. It means that $H_{A.3B}$ and $H_{A.4B}$ are supported. Even though, this study is still weak because it could not evidence the association between earning power and stocks' book value. In other words, $H_{A.3C}$ is not supported. Furthermore, $H_{A.5B}$ and $H_{A.5C}$ are also not supported.

This study conducts reexamination by factoring in the investment scalability. It results an analysis that are not different in comparison with results in the first examination. The results are presented in Table 4. It only adds a supported hypothesis that in the first examination is not supported. Earnings power or profitability that is in this second examination of factoring in the short-run investment scalability is supported or $H_{A.3B}$ is supported with t-value (sig.) as 1.651 (10%).

Table 3 Recursive Simultaneous Equation Analysis – Basic Model

Pred. Sign		?	+	+	+	+	-			
R_{i1}	=	0.810 +	0.145 X_{it} +	0.045 Δb_{it} +	0.000 Δq_{it} +	0.077 Δg_{it} +	0.037 Δr_{it}	+ e_{it} ……(1)	**R^2:** 0.028	**F-Value:** 35.519 ***
t-value		61.353 ***	6.785 ***	4.770 ***	0.023	7.055 ***	3.958		**Adj-R^2:** 0.027	
R_{i2}	=	0.445 +	0.052 X_{it} +	0.028 Δb_{it} +	0.007 Δq_{it} +	0.044 Δg_{it} +	0.016 Δr_{it}	+ e_{it} ……(1)	**R^2:** 0.011	**F-Value:** 13.513 ***
t-value		44.494 ***	3.194 ***	3.882 ***	1.040	5.299 ***	2.239		**Adj-R^2:** 0.010	
R_{i3}	=	0.155 +	0.020 X_{it} +	0.019 Δb_{it} +	0.008 Δq_{it} +	0.025 Δg_{it} +	0.000 Δr_{it}	+ e_{it} ……(1)	**R^2:** 0.005	**F-Value:** 6.041 ***
t-value		19.540 ***	1.576	3.381 ***	1.558	3.762 ***	-0.007		**Adj-R^2:** 0.004	
R_{i4}	=	0.042 +	0.040 X_{it} +	0.026 Δb_{it} +	0.002 Δq_{it} +	0.025 Δg_{it} +	0.002 Δr_{it}	+ e_{it} ……(1)	**R^2:** 0.009	**F-Value:** 10.915 ***
t-value		6.080 ***	3.552 ***	5.201 ***	0.412	4.342 ***	0.343		**Adj-R^2:** 0.008	
X_{it}	=		0.149 +	-0.241 Δb_{it} +	0.221 Δq_{it} +	0.162 Δg_{it} +	0.039 Δr_{it}	+ e_{it} ……(2)	**R^2:** 0.582	**F-Value:** 2,134.869 ***
t-value			19.453 ***	-51.103	48.470 ***	26.266 ***	6.955		**Adj-R^2:** 0.582	
Δb_{it}	=			0.008 +	-0.250 Δq_{it} +	-0.383 Δg_{it} +	0.041 Δr_{it}	+ e_{it} ……(3)	**R^2:** 0.143	**F-Value:** 341.088 ***
t-value				0.400	-20.982	-23.959	2.713		**Adj-R^2:** 0.143	

Constrained with ($x\ 10^{16}$):

Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$4.797 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$-3.369 \neq 0$	…….{b}	
Cov. $\{(e_{it}(2)); (e_{it}(3))\}$ =	$-1.658 \neq 0$	…….{c}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$1.197 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$-0.851 \neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$0.500 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$-1.738 \neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$-0.054 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$-1.249 \neq 0$	…….{b}	

Notes: Number of observation (N): 6,132. R_{it}: stock return for firm *i* during period *1 (1 year), 2 (1 year 3 months), 3 (1 year 6 months), and 4 (1 year 9 months)*; x_{it}: earnings for firm *i* during period *t*; Δb_{it}: change in book value for firm *i* during period *t*; Δq_{it}: change in earnings power for firm *i* during period *t*; Δg_{it}: change in growth opportunities for firm *i* during period *t*; Δr_{it}: change in discount rate for firm *i* during period *t*. *** significant at level 1%, ** significant at level 5%, * significant at level 10%. This model passed to the constraints of recursive simultaneous equation model. It is showed in the cell of "constrained with ($x\ 10^{16}$)" that all covariance values are not equal to null and their value also are not equal each others.

Table 4 Recursive Simultaneous Equation Analysis – Factoring in the Investment Scalability

Pred. Sign		?	+	+	+	+	+	-			
R_{i1}	=	0.808 +	0.145 X_{it} +	0.046 Δb_{it} +	0.003 Δsr_{it} +	0.004 Δlr_{it} +	0.083 Δg_{it} +	0.037 Δr_{it}	+ e_{it} …… (1)	**R^2:** 0.030	**F-Value:** 31.360 ***
t-value		61.470 ***	7.955 ***	4.918 ***	2.666 ***	1.764 *	7.524 ***	4.012		**Adj-R^2:** 0.029	
R_{i2}	=	0.443 +	0.060 X_{it} +	0.029 Δb_{it} +	0.001 Δsr_{it} +	-0.001 Δlr_{it} +	0.046 Δg_{it} +	0.016 Δr_{it}	+ e_{it} …… (1)	**R^2:** 0.011	**F-Value:** 11.617 ***
t-value		44.504 ***	4.360 ***	4.028 ***	1.745 *	-0.415	5.494 ***	2.207		**Adj-R^2:** 0.010	
R_{i3}	=	0.153 +	0.030 X_{it} +	0.020 Δb_{it} +	0.001 Δsr_{it} +	-0.001 Δlr_{it} +	0.025 Δg_{it} +	0.000 Δr_{it}	+ e_{it} …… (1)	**R^2:** 0.005	**F-Value:** 5.032 ***
t-value		19.441 ***	2.787 ***	3.541 ***	1.137	-1.070	3.752 ***	-0.079		**Adj-R^2:** 0.004	
R_{i4}	=	0.042 +	0.042 X_{it} +	0.026 Δb_{it} +	0.001 Δsr_{it} +	-0.002 Δlr_{it} +	0.027 Δg_{it} +	0.002 Δr_{it}	+ e_{it} …… (1)	**R^2:** 0.009	**F-Value:** 9.786 ***
t-value		6.058 ***	4.394 ***	5.235 ***	1.316	-1.608	4.680 ***	0.318		**Adj-R^2:** 0.009	
X_{it}	=		0.160 +	-0.300 Δb_{it} +	0.001 Δsr_{it} +	-0.001 Δlr_{it} +	0.142 Δg_{it} +	0.039 Δr_{it}	+ e_{it} …… (2)	**R^2:** 0.422	**F-Value:** 895.802 ***
t-value			17.823 ***	-55.901	1.651 *	-0.560	18.796 ***	6.004		**Adj-R^2:** 0.422	
Δb_{it}	=			-0.001 +	-0.006 Δsr_{it} +	-0.011 Δlr_{it} +	-0.391 Δg_{it} +	0.042 Δr_{it}	+ e_{it} …… (3)	**R^2:** 0.085	**F-Value:** 141.441 ***
t-value				-0.041	-3.125	-3.191	-22.602	2.694		**Adj-R^2:** 0.084	

Constrained with (x 10^{16}):

Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$5.592 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$-3.961 \neq 0$	…….{e}	
Cov. $\{(e_{it}(5)); (e_{it}(6))\}$ =	$-6.953 \neq 0$	…….{f}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$0.519 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$-0.586 \neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$0.525 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$-1.178 \neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$0.278 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$-1.511 \neq 0$	…….{e}	

Notes: Number of observation (N): 6,132. R_{it}: stock return for firm *i* during period *1 (1 year), 2 (1 year 3 months), 3 (1 year 6 months), and 4 (1 year 9 months)*; x_{it}: earnings for firm *i* during period *t*; Δb_{it}: change in book value for firm *i* during period *t*; Δsr_{it}: change of short-run assets scalability for firm *i* during period *t*; Δlr_{it}: change of long-run assets scalability for firm *i* during period *t*; Δg_{it}: change in growth opportunities for firm *i* during period *t*; Δr_{it}: change in discount rate for firm *i* during period *t*. *** significant at level 1%, ** significant at level 5%, * significant at level 10%. This model passed to the constraints of recursive simultaneous equation model. It is showed in the cell of "constrained with (*x* 10^{16})" that all covariance values are not equal to null and their value also are not equal each others.

Nevertheless, this examination is not able to support $H_{A.3C}$, $H_{A.4C}$, and $H_{A.5C}$. The second examination or the factoring in the investment scalability model has return type R^2 of 3.0% for R_{i1}, and lower for the others. Its *adj*-R^2 value is 2.9%. Meanwhile, the first recursive equation has earnings type R^2 of 42.2% for x_{it}, and its *adj*-R^2 value is also 42.2%. The second recursive equation has R^2 of 8.5% for change in book value (Δb_{it}) and its *adj*-R^2 value is also 8.4%.

Sensitivity Examination Results

This study analysis both prior two examinations based on the quartile of PB ratio. Table 5 –panel A– indicates that hypothesis H_{A1}, H_{A2A}, H_{A3A}, and H_{A5A} associated positively with return are supported. This is shown in low PB level for all return types with significance level of 1%, except for R_{i2} return type whose significance level of 5%. In the Panel B, C and D, it is also shown in low-medium, medium-high and high PB levels for R_{i1} and R_{i4} return types with significance level of, consecutively, 5% and 10%. Meanwhile, H_{A3A}, and H_{A5A} are not supported consistently as the first examination previously. In the low PB level – Panel A, growth opportunities associates positively with earnings yield and earnings power associates positively with book value with t-value (sig.) consecutively as 6.128 (1%) and 3.520 (1%). It means that H_{A3C} and H_{A4B} are supported.

In the low-medium PB level – Panel B, growth opportunities associates positively with earnings yield and book value with t-value (sig.) consecutively as 3.091 (1%) and 4.544 (1%). In addition, earnings power also associates with earnings yield with t-value (sig.) as 25.062 (1%). It means that H_{A3B}, H_{A4B}, and H_{A4C} are supported. Table 5 – Panel C gives additional results as a Table 5 – Panel B. It also concluded that H_{A3B}, H_{A4B}, and H_{A4C} are supported. While Table 5 – Panel D documents less additional support to the all hypotheses. It only supports to the H_{A4B}.

Table 5 Recursive Simultaneous Equation Analysis – P/B Partition

Panel A: Low P/B

Pred. Sign		?	+	+	+	+	-						
R_{i1}	=	0.936 +	3.335 X_{it} +	0.043 Δb_{it} +	0.000 Δq_{it} +	-0.730 Δg_{it} +	-0.874 Δr_{it} +	e_{it}	…… (1)	**R^2:**	0.184	**F-Value:**	68.881 ***
t-value		30.616 ***	15.868 ***	2.856 ***	-0.001	-11.286	-6.505 ***			**Adj-R^2:**	0.182		
R_{i2}	=	0.791 +	0.589 X_{it} +	0.033 Δb_{it} +	-0.013 Δq_{it} +	-0.049 Δg_{it} +	-0.521 Δr_{it} +	e_{it}	…… (1)	**R^2:**	0.030	**F-Value:**	9.315 ***
t-value		28.759 ***	3.115 ***	2.437 **	-0.901	-0.851	-4.305 ***			**Adj-R^2:**	0.026		
R_{i3}	=	0.464 +	0.341 X_{it} +	0.021 Δb_{it} +	-0.002 Δq_{it} +	-0.002 Δg_{it} +	-0.466 Δr_{it} +	e_{it}	…… (1)	**R^2:**	0.029	**F-Value:**	9.014 ***
t-value		20.664 ***	2.210 **	1.895 *	-0.168	-0.043	-4.722 ***			**Adj-R^2:**	0.026		
R_{i4}	=	0.207 +	0.488 X_{it} +	0.021 Δb_{it} +	0.005 Δq_{it} +	-0.069 Δg_{it} +	-0.268 Δr_{it} +	e_{it}	…… (1)	**R^2:**	0.026	**F-Value:**	8.263 ***
t-value		10.698 ***	3.677 ***	2.205 **	0.482	-1.701	-3.160 ***			**Adj-R^2:**	0.023		
X_{it}	=		0.079 +	-0.002 Δb_{it} +	-0.002 Δq_{it} +	0.284 Δg_{it} +	0.057 Δr_{it} +	e_{it}	…… (2)	**R^2:**	0.890	**F-Value:**	3,098.040 ***
t-value			25.404 ***	-1.036	-1.221	94.991 ***	3.520			**Adj-R^2:**	0.890		
Δb_{it}	=			0.096 +	0.168 Δq_{it} +	-0.438 Δg_{it} +	-0.098 Δr_{it} +	e_{it}	…… (3)	**R^2:**	0.087	**F-Value:**	48.679 ***
t-value				2.212 **	6.128 ***	-10.917	-0.432			**Adj-R^2:**	0.085		

Constrained with ($x\ 10^{16}$):

Cov. $\{(e_{it}(1)); (e_{it}(2))\} =$	-9.398 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\} =$	8.408 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(2)); (e_{it}(3))\} =$	-3.373 $\neq 0$	…….{c}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\} =$	-2.183 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\} =$	2.738 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\} =$	-1.048 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\} =$	0.136 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\} =$	-1.283 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\} =$	0.676 $\neq 0$	…….{b}	

Additional notes: Number of observation (N): 1,531.

Panel B: Low-Medium P/B

Pred. Sign		?	+	+	+	+	-						
R_{i1}	=	0.837 +	0.145 X_{it} +	0.051 Δb_{it} +	0.010 Δq_{it} +	0.727 Δg_{it} +	-0.026 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.063	**F-Value:**	20.696 ***
t-value		26.644 ***	2.052 **	1.067	0.341	9.355 ***	-0.548			**Adj-R^2:**	0.060		
R_{i2}	=	0.401 +	0.128 X_{it} +	0.074 Δb_{it} +	0.010 Δq_{it} +	0.566 Δg_{it} +	-0.032 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.080	**F-Value:**	26.537 ***
t-value		18.563 ***	2.631 ***	2.244 **	0.511	10.583 ***	-0.999			**Adj-R^2:**	0.077		
R_{i3}	=	0.158 +	0.099 X_{it} +	0.069 Δb_{it} +	0.012 Δq_{it} +	0.301 Δg_{it} +	-0.076 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.049	**F-Value:**	15.617 ***
t-value		9.172 ***	2.549 ***	2.645 ***	0.769	7.054 ***	-2.960 ***			**Adj-R^2:**	0.046		
R_{i4}	=	0.063 +	0.127 X_{it} +	0.080 Δb_{it} +	0.002 Δq_{it} +	0.266 Δg_{it} +	-0.053 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.048	**F-Value:**	15.541 ***
t-value		3.989 ***	3.595 ***	3.332 ***	0.119	6.835 ***	-2.279 **			**Adj-R^2:**	0.045		
X_{it}	=		0.161 +	-0.585 Δb_{it} +	0.220 Δq_{it} +	0.087 Δg_{it} +	0.035 Δr_{it} +	e_{it}	……(2)	**R^2:**	0.892	**F-Value:**	3,150.104 ***
t-value			15.213 ***	-67.101	25.602 ***	3.091 ***	2.099			**Adj-R^2:**	0.892		
Δb_{it}	=			-0.015 +	-0.629 Δq_{it} +	0.371 Δg_{it} +	-0.040 Δr_{it} +	e_{it}	……(3)	**R^2:**	0.421	**F-Value:**	371.386 ***
t-value				-0.484	-32.508	4.544 ***	-0.813			**Adj-R^2:**	0.420		

Constrained with ($\times 10^{16}$):

Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	-1.649 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	-2.332 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(2)); (e_{it}(3))\}$ =	9.352 $\neq 0$	…….{c}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	-3.531 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	-2.888 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	-1.737 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	-0.916 $\neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	-3.135 $\neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	-1.523 $\neq 0$	…….{b}	

Additional notes: Number of observation (N): 1,534.

Panel C: Medium-High P/B

Pred. Sign		?	+	+	+	+	-				
R_{i1}	=	0.428 +	0.940 X_{it} +	-0.023 Δb_{it} +	0.006 Δq_{it} +	0.558 Δg_{it} +	0.051 Δr_{it} +	e_{it}	……(1)	**R^2:** 0.240	**F-Value:** 96.480 ***
t-value		18.864 ***	15.357 ***	-1.207	0.292	10.975 ***	3.004			**Adj-R^2:** 0.237	
R_{i2}	=	0.158 +	0.498 X_{it} +	-0.016 Δb_{it} +	0.019 Δq_{it} +	0.274 Δg_{it} +	0.000 Δr_{it} +	e_{it}	……(1)	**R^2:** 0.147	**F-Value:** 52.621 ***
t-value		9.835 ***	11.467 ***	-1.166	1.406	7.587 ***	-0.027			**Adj-R^2:** 0.144	
R_{i3}	=	-0.060 +	0.297 X_{it} +	0.010 Δb_{it} +	0.013 Δq_{it} +	0.125 Δg_{it} +	-0.031 Δr_{it} +	e_{it}	……(1)	**R^2:** 0.093	**F-Value:** 31.515 ***
t-value		-5.109 ***	9.336 ***	0.981	1.283	4.728 ***	-3.488 ***			**Adj-R^2:** 0.091	
R_{i4}	=	-0.096 +	0.261 X_{it} +	0.028 Δb_{it} +	0.010 Δq_{it} +	0.123 Δg_{it} +	-0.023 Δr_{it} +	e_{it}	……(1)	**R^2:** 0.074	**F-Value:** 24.272 ***
t-value		-8.069 ***	8.116 ***	2.781 ***	1.014	4.606 ***	-2.589 ***			**Adj-R^2:** 0.071	
X_{it}	=		0.163 +	-0.066 Δb_{it} +	0.083 Δq_{it} +	0.161 Δg_{it} +	0.016 Δr_{it} +	e_{it}	……(2)	**R^2:** 0.141	**F-Value:** 62.779 ***
t-value			19.159 ***	-8.568	10.653 ***	7.708 ***	2.209			**Adj-R^2:** 0.139	
Δb_{it}	=			-0.011 +	-0.067 Δq_{it} +	-0.013 Δg_{it} +	0.007 Δr_{it} +	e_{it}	……(3)	**R^2:** 0.004	**F-Value:** 2.277 *
t-value				-0.407	-2.588	-0.183	0.283			**Adj-R^2:** 0.002	

Constrained with ($x\ 10^{16}$):

$Cov.\ \{(e_{it}(1));\ (e_{it}(2))\} =$	$2.836 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
$Cov.\ \{(e_{it}(1));\ (e_{it}(3))\} =$	$-0.163 \neq 0$	…….{b}	
$Cov.\ \{(e_{it}(2));\ (e_{it}(3))\} =$	$4.192 \neq 0$	…….{c}	
$Cov.\ \{(e_{it}(1));\ (e_{it}(2))\} =$	$-0.404 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
$Cov.\ \{(e_{it}(1));\ (e_{it}(3))\} =$	$-2.425 \neq 0$	…….{b}	
$Cov.\ \{(e_{it}(1));\ (e_{it}(2))\} =$	$-0.223 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
$Cov.\ \{(e_{it}(1));\ (e_{it}(3))\} =$	$-1.513 \neq 0$	…….{b}	
$Cov.\ \{(e_{it}(1));\ (e_{it}(2))\} =$	$0.191 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
$Cov.\ \{(e_{it}(1));\ (e_{it}(3))\} =$	$-0.713 \neq 0$	…….{b}	

Additional notes: Number of observation (N): 1,534.

Panel D: High P/B

Pred. Sign		?	+	+	+	+	-						
R_{i1}	=	0.470 +	0.109 X_{it}+	0.013 Δb_{it} +	-0.005 Δq_{it} +	0.043 Δg_{it} +	0.023 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.064	**F-Value:**	20.902 ***
t-value		24.346 ***	4.382 ***	1.253	-0.507	4.054 ***	2.951			**Adj-R^2:**	0.061		
R_{i2}	=	0.171 +	0.035 X_{it}+	0.004 Δb_{it} +	0.006 Δq_{it} +	0.029 Δg_{it} +	0.009 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.033	**F-Value:**	10.267 ***
t-value		12.590 ***	1.998 **	0.560	0.793	3.845 ***	1.714			**Adj-R^2:**	0.029		
R_{i3}	=	-0.106 +	0.010 X_{it}+	-0.005 Δb_{it} +	0.000 Δq_{it} +	0.012 Δg_{it} +	-0.002 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.015	**F-Value:**	4.634 ***
t-value		-11.110 ***	0.835	-1.012	0.080	2.385 **	-0.415			**Adj-R^2:**	0.012		
R_{i4}	=	-0.153 +	0.025 X_{it}+	0.005 Δb_{it} +	-0.008 Δq_{it} +	0.015 Δg_{it} +	0.001 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.021	**F-Value:**	6.476 ***
t-value		-16.906 ***	2.162 **	1.005	-1.727	3.033 ***	0.351			**Adj-R^2:**	0.018		
X_{it}	=		0.171 +	0.251 Δb_{it} +	-0.223 Δq_{it} +	0.196 Δg_{it} +	0.046 Δr_{it} +	e_{it}	……(2)	**R^2:**	0.670	**F-Value:**	775.065 ***
t-value			8.829 ***	29.496 ***	-23.818	20.325 ***	5.765			**Adj-R^2:**	0.669		
Δb_{it}	=			-0.132 +	-0.319 Δq_{it} +	-0.450 Δg_{it} +	0.044 Δr_{it} +	e_{it}	……(3)	**R^2:**	0.256	**F-Value:**	175.574 ***
t-value				-2.505	-14.681	-19.028	2.053			**Adj-R^2:**	0.255		

Constrained with ($x\ 10^{16}$):

Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$-3.625 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$7.495 \neq 0$	…….{b}	
Cov. $\{(e_{it}(2)); (e_{it}(3))\}$ =	$-10.758 \neq 0$	…….{c}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$1.189 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$-1.118 \neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$0.264 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$0.532 \neq 0$	…….{b}	
Cov. $\{(e_{it}(1)); (e_{it}(2))\}$ =	$0.510 \neq 0$	…….{a}	$\{a\} \neq \{b\} \neq \{c\} \neq 0$
Cov. $\{(e_{it}(1)); (e_{it}(3))\}$ =	$1.809 \neq 0$	…….{b}	

Additional notes: Number of observation (N): 1,533.

The second sensitivity examination was conducted by using factoring in the investment scalability in to P/B partition. Consistent with previous examinations, Table 6 – Panel A shows results that earnings yields and book value associate positively with variations of stock price with t-value (sig.) as 15.868 (1%) and 2.856 (1%). In this section, we find a new supported hypothesis that discount rate associate negatively with movements of stock price with t-value (sig.) as -6.505 (1%). It means that H_{A1A}, H_{A2A}, and H_{A5A} are supported. Examination using sample partition based on low-medium PB and medium-high PB levels shows that hypothesis H_{A5A} which states that discount rate associates negatively with stock price is supported, either in panel B and C.

The first recursive simultaneous model in Table 5 – Panel A shows that earnings yield relates only to growth opportunities with R^2 of 89.0% and higher than the others. Its *adj-*R^2 value is also 89.0%. The book value is shown to associate with earnings power with R^2 of 8.7%. Its *adj-*R^2 value is also 8.5%. However, this association has higher degree of association in low-medium P/B and high P/B with R^2 and *adj-*R^2 value, consecutively, 42.1% and 42.0% for low-medium P/B, and 25.6% and 25.5% for high P/B.

Table 6 – Panel A also shows results that growth opportunities associates positively with earnings yield with t-value (sig.) as 94.991 (1%). We find that H_{A4B} is supported. In addition, earnings power associates positively with earnings yield with t-value (sig.) as 6.218 (1%). It could be concluded that H_{A3C} is supported. In the Panel B, we find that growth opportunities associate positively with book value with t-value (sig.) as 5.858 (1%). We find that H_{A4C} is supported. Furthermore, long-run investment scalability associates with book value with t-value (sig.) as 1.861 (10%) that supports to the hypothesis H_{A3C}. Table 6 – Panel C and D did not document additional results as Table 6 – Panel A and B.

The second sensitivity examination as presented in Table 6 – Panel A shows that earnings yield relates to long run scalability and growth opportunities with R^2 of 89.1% and higher than the others. Its *adj-*R^2 value is also 89.0%. The book value is shown to relate with other factors insignificantly, except for low-medium P/B (Panel B). It shows significant association with long run scalability and growth opportunities with R^2 and *adj-*R^2 value, consecutively, 2.5% and 2.2%.

This study summarizes all supported hypotheses in the Table 7 as follows. We find that all hypotheses are supported in at least once, except for hypotheses H_{A5B} and H_{A5C}. They are the hypotheses of the association between discount rate and earnings yield, and discount rate and book value. However, the association between discount rate and variations of stock return is dominantly supported in the single equation model. It means that discount rate explains the stock price variability un-recursively.

Table 6 Recursive Simultaneous Equation Analysis – Factoring in the Scalability – P/B Partition

Panel A: Low P/B

Pred. Sign	?	+	+	+	+	+	-			
R_{i1} =	0.934 +	3.354 X_{it} +	0.043 Δb_{it} +	0.000 Δsr_{it} +	-0.015 Δlr_{it} +	-0.713 Δg_{it} +	-0.870 Δr_{it} +	e_{it} ……(1)	**R^2:** 0.185	**F-Value:** 57.739 ***
t-value	30.574 ***	15.934 ***	2.905 ***	-0.135	-1.350	-10.971	-6.506 ***		**Adj-R^2:** 0.182	
R_{i2} =	0.790 +	0.610 X_{it} +	0.031 Δb_{it} +	-0.001 Δsr_{it} +	-0.013 Δlr_{it} +	-0.045 Δg_{it} +	-0.506 Δr_{it} +	e_{it} ……(1)	**R^2:** 0.030	**F-Value:** 7.988 ***
t-value	28.732 ***	3.221 ***	2.337 **	-0.668	-1.309	-0.766	-4.204 ***		**Adj-R^2:** 0.027	
R_{i3} =	0.464 +	0.355 X_{it} +	0.021 Δb_{it} +	0.001 Δsr_{it} +	-0.009 Δlr_{it} +	0.008 Δg_{it} +	-0.463 Δr_{it} +	e_{it} ……(1)	**R^2:** 0.030	**F-Value:** 7.767 ***
t-value	20.640 ***	2.292 **	1.906 *	0.436	-1.164	0.168	-4.707 ***		**Adj-R^2:** 0.026	
R_{i4} =	0.206 +	0.486 X_{it} +	0.022 Δb_{it} +	0.000 Δsr_{it} +	0.000 Δlr_{it} +	-0.066 Δg_{it} +	-0.273 Δr_{it} +	e_{it} ……(1)	**R^2:** 0.026	**F-Value:** 6.861 ***
t-value	10.684 ***	3.655 ***	2.307 **	0.340	0.019	-1.605	-3.222 ***		**Adj-R^2:** 0.022	
X_{it} =		0.079 +	-0.002 Δb_{it} +	0.000 Δsr_{it} +	0.003 Δlr_{it} +	0.278 Δg_{it} +	0.058 Δr_{it} +	e_{it} ……(2)	**R^2:** 0.891	**F-Value:** 2,486.568 ***
t-value		25.523 ***	-1.265	-0.202	2.608 ***	80.597 ***	3.595		**Adj-R^2:** 0.890	
Δb_{it} =			0.083 +	0.000 Δsr_{it} +	0.006 Δlr_{it} +	-0.369 Δg_{it} +	-0.242 Δr_{it} +	e_{it} ……(3)	**R^2:** 0.065	**F-Value:** 26.491 ***
t-value			1.885 *	-0.163	0.334	-7.735	-1.060		**Adj-R^2:** 0.062	

Constrained with ($x\ 10^{16}$):

$Cov.\ \{(e_{it}(4)); (e_{it}(5))\} =$	$-8.807 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
$Cov.\ \{(e_{it}(4)); (e_{it}(6))\} =$	$7.856 \neq 0$	…….{e}	
$Cov.\ \{(e_{it}(5)); (e_{it}(6))\} =$	$-3.116 \neq 0$	…….{f}	
$Cov.\ \{(e_{it}(4)); (e_{it}(5))\} =$	$-2.227 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
$Cov.\ \{(e_{it}(4)); (e_{it}(6))\} =$	$1.954 \neq 0$	…….{e}	
$Cov.\ \{(e_{it}(4)); (e_{it}(5))\} =$	$-0.852 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
$Cov.\ \{(e_{it}(4)); (e_{it}(6))\} =$	$0.256 \neq 0$	…….{e}	
$Cov.\ \{(e_{it}(4)); (e_{it}(5))\} =$	$-1.320 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
$Cov.\ \{(e_{it}(4)); (e_{it}(6))\} =$	$0.114 \neq 0$	…….{e}	

Additional notes: Number of observation (N): 1,531.

Panel B: Low-Medium P/B

Pred. Sign		?	+	+	+	+	+	-						
R_{i1}	=	0.830 +	0.163 X_{it} +	0.058 Δb_{it} +	0.008 Δsr_{it} +	0.007 Δlr_{it} +	0.717 Δg_{it} +	-0.027 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.065	**F-Value:**	17.629 ***
t-value		26.736 ***	2.730 ***	1.224	1.234	0.900	9.207 ***	-0.573			**Adj-R^2:**	0.061		
R_{i2}	=	0.398 +	0.137 X_{it} +	0.075 Δb_{it} +	0.009 Δsr_{it} +	-0.003 Δlr_{it} +	0.556 Δg_{it} +	-0.033 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.082	**F-Value:**	22.812 ***
t-value		18.639 ***	3.336 ***	2.315 **	1.990 **	-0.479	10.378 ***	-1.044			**Adj-R^2:**	0.079		
R_{i3}	=	0.155 +	0.115 X_{it} +	0.073 Δb_{it} +	0.001 Δsr_{it} +	0.000 Δlr_{it} +	0.298 Δg_{it} +	-0.078 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.048	**F-Value:**	12.928 ***
t-value		9.115 ***	3.502 ***	2.836 ***	0.381	-0.056	6.968 ***	-3.033 ***			**Adj-R^2:**	0.045		
R_{i4}	=	0.064 +	0.125 X_{it} +	0.078 Δb_{it} +	0.001 Δsr_{it} +	-0.004 Δlr_{it} +	0.265 Δg_{it} +	-0.054 Δr_{it} +	e_{it}	……(1)	**R^2:**	0.049	**F-Value:**	13.166 ***
t-value		4.094 ***	4.194 ***	3.304 ***	0.348	-1.080	6.790 ***	-2.300 **			**Adj-R^2:**	0.045		
X_{it}	=		0.171 +	-0.726 Δb_{it} +	0.003 Δsr_{it} +	-0.016 Δlr_{it} +	0.087 Δg_{it} +	0.007 Δr_{it} +	e_{it}	……(2)	**R^2:**	0.848	**F-Value:**	1,703.955 ***
t-value			13.595 ***	-91.098	1.151	-4.904	2.593 ***	0.344			**Adj-R^2:**	0.847		
Δb_{it}	=			-0.063 +	-0.011 Δsr_{it} +	0.020 Δlr_{it} +	0.621 Δg_{it} +	0.068 Δr_{it} +	e_{it}	……(3)	**R^2:**	0.025	**F-Value:**	9.770 ***
t-value				-1.565	-1.247	1.861 *	5.858 ***	1.066			**Adj-R^2:**	0.022		

Constrained with (x 10^{16}):

Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	-2.847 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-1.570 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(5)); (e_{it}(6))\}$ =	4.567 $\neq 0$	…….{f}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	-4.184 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-1.265 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	-2.179 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-0.319 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	-3.432 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-0.899 $\neq 0$	…….{e}	

Additional notes: Number of observation (N): 1,534.

Panel C: Medium-High P/B

Pred. Sign	?	+	+	+	+	+	-			
R_{i1} =	0.426 +	0.940 X_{it} +	-0.022 Δb_{it} +	-0.004 Δsr_{it} +	0.007 Δlr_{it} +	0.550 Δg_{it} +	0.051 Δr_{it} +	e_{it} …… (1)	**R^2:** 0.245	**F-Value:** 82.537 ***
t-value	18.910 ***	15.950 ***	-1.149	-1.171	2.928 ***	10.754 ***	3.001		**Adj-R^2:** 0.242	
R_{i2} =	0.156 +	0.513 X_{it} +	-0.015 Δb_{it} +	0.000 Δsr_{it} +	0.004 Δlr_{it} +	0.259 Δg_{it} +	-0.001 Δr_{it} +	e_{it} ……. (1)	**R^2:** 0.150	**F-Value:** 44.820 ***
t-value	9.741 ***	12.243 ***	-1.122	-0.125	2.657 ***	7.132 ***	-0.088		**Adj-R^2:** 0.146	
R_{i3} =	-0.061 +	0.309 X_{it} +	0.010 Δb_{it} +	0.001 Δsr_{it} +	0.000 Δlr_{it} +	0.119 Δg_{it} +	-0.031 Δr_{it} +	e_{it} ……. (1)	**R^2:** 0.093	**F-Value:** 26.002 ***
t-value	-5.209 ***	10.032 ***	0.972	0.560	0.077	4.459 ***	-3.543 ***		**Adj-R^2:** 0.089	
R_{i4} =	-0.097 +	0.270 X_{it} +	0.027 Δb_{it} +	0.001 Δsr_{it} +	-0.001 Δlr_{it} +	0.119 Δg_{it} +	-0.023 Δr_{it} +	e_{it} ……. (1)	**R^2:** 0.073	**F-Value:** 20.169 ***
t-value	-8.150 ***	8.711 ***	2.760 ***	0.680	-0.551	4.415 ***	-2.632 ***		**Adj-R^2:** 0.070	
X_{it} =		0.167 +	-0.071 Δb_{it} +	-0.003 Δsr_{it} +	0.000 Δlr_{it} +	0.150 Δg_{it} +	0.013 Δr_{it} +	e_{it} …… (2)	**R^2:** 0.079	**F-Value:** 26.247 ***
t-value		19.016 ***	-8.938	-1.679	0.326	6.879 ***	1.828		**Adj-R^2:** 0.076	
Δb_{it} =			-0.015 +	0.003 Δsr_{it} +	-0.003 Δlr_{it} +	0.001 Δg_{it} +	0.008 Δr_{it} +	e_{it} …… (3)	**R^2:** 0.001	**F-Value:** 0.291
t-value			-0.518	0.490	-0.881	0.011	0.361		**Adj-R^2:** -0.002	

Constrained with (x 10^{16}):

Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	2.209 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-2.937 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(5)); (e_{it}(6))\}$ =	5.450 $\neq 0$	…….{f}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	0.185 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-2.627 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	0.148 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-1.202 $\neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	0.281 $\neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	-0.876 $\neq 0$	…….{e}	

Additional notes: Number of observation (N): 1,534.

Panel D: High P/B

Pred. Sign		?	+	+	+	+	+	-					
R_{i1}	=	0.465 +	0.098 X_{it} +	0.015 Δb_{it} +	0.005 Δsr_{it} +	-0.003 Δlr_{it} +	0.064 Δg_{it} +	0.023 Δr_{it}	+ e_{it}	…… (1)	**R^2:** 0.078	**F-Value:**	21.440 ***
t-value		24.287 ***	4.984 ***	1.374	4.566 ***	-1.397	6.272 ***	3.023			**Adj-R^2:** 0.074		
R_{i2}	=	0.167 +	0.042 X_{it} +	0.004 Δb_{it} +	0.003 Δsr_{it} +	-0.005 Δlr_{it} +	0.038 Δg_{it} +	0.009 Δr_{it}	+ e_{it}	…… (1)	**R^2:** 0.050	**F-Value:**	13.425 ***
t-value		12.411 ***	3.007 ***	0.583	4.087 ***	-3.463	5.259 ***	1.628			**Adj-R^2:** 0.046		
R_{i3}	=	-0.107 +	0.010 X_{it} +	-0.006 Δb_{it} +	0.001 Δsr_{it} +	-0.003 Δlr_{it} +	0.017 Δg_{it} +	-0.002 Δr_{it}	+ e_{it}	…… (1)	**R^2:** 0.024	**F-Value:**	6.266 ***
t-value		-11.303 ***	1.049	-1.101	2.391 **	-2.898	3.390 ***	-0.475			**Adj-R^2:** 0.020		
R_{i4}	=	-0.152 +	0.013 X_{it} +	0.004 +	0.001 Δsr_{it} +	-0.003 Δlr_{it} +	0.023 Δg_{it} +	0.002 Δr_{it}	+ e_{it}	…… (1)	**R^2:** 0.028	**F-Value:**	7.220 ***
t-value		-16.939 ***	1.357	0.763	2.141 **	-3.008	4.807 ***	0.416			**Adj-R^2:** 0.024		
X_{it}	=		0.204 +	-0.319 Δb_{it} +	0.002 Δsr_{it} +	0.001 Δlr_{it} +	0.132 Δg_{it} +	0.051 Δr_{it}	+ e_{it}	…… (2)	**R^2:** 0.483	**F-Value:**	284.891 ***
t-value			8.397 ***	-28.671	1.452	0.370	10.335 ***	5.171			**Adj-R^2:** 0.481		
Δb_{it}	=			-0.178 +	-0.013 Δsr_{it} +	-0.027 Δlr_{it} +	-0.447 Δg_{it} +	0.039 Δr_{it}	+ e_{it}	…… (3)	**R^2:** 0.169	**F-Value:**	77.778 ***
t-value				-3.185	-3.905	-4.167	-16.487	1.703			**Adj-R^2:** 0.167		

Constrained with ($\times 10^{16}$):

Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$-4.044 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$6.683 \neq 0$	…….{e}	
Cov. $\{(e_{it}(5)); (e_{it}(6))\}$ =	$-14.577 \neq 0$	…….{f}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$0.422 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$0.416 \neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$0.196 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$1.248 \neq 0$	…….{e}	
Cov. $\{(e_{it}(4)); (e_{it}(5))\}$ =	$1.152 \neq 0$	…….{d}	$\{d\} \neq \{e\} \neq \{f\} \neq 0$
Cov. $\{(e_{it}(4)); (e_{it}(6))\}$ =	$2.097 \neq 0$	…….{e}	

Additional notes: Number of observation (N): 1,533.

Table 7 Summary of Examination Analysis

	H_{A1}	H_{A2A}	H_{A2B}	H_{A3A}	H_{A3B}	H_{A3C}	H_{A4A}	H_{A4B}	H_{A4C}	H_{A5A}	H_{A5B}	H_{A5C}
The First Examination	√	√			√		√	√				
The Second Examination: Factoring in the Investment Scalability	√	√		√	√		√	√				
Sensitivity Examinations:												
The First Examination												
Panel A (Low PB Level)	√	√				√		√		√		
Panel B (Low-Medium PB Level)	√	√			√		√	√	√	√		
Panel C (Medium-High PB Level)	√	√			√		√	√				
Panel D (High PB Level)	√	√	√				√	√				
The Second Examination: Factoring in the Investment Scalability												
Panel A (Low PB Level)	√	√			√		√	√		√		
Panel B (Low-Medium PB Level)	√	√		√	√		√	√	√	√		
Panel C (Medium-High PB Level)	√	√		√			√	√		√		
Panel D (High PB Level)	√			√			√	√				

Discussion

All examinations show that association and its direction between accounting fundamentals and stock price movements as hypothesized are supported. This section describes each variables interpretation and concludes in research finding.

Earnings Yields Earnings yield associates positively with firm market value. This study supports classical concept (Ohlson, 1995), along with its derivatives studies Lo & Lys (2000), Francis & Schipper (1999), Meyers (1999), Bradshaw, *et al*. (2006), Cohen & Lys (2006), Bradshaw & Sloan (2002), Bhattacharya, *et al*. (2003), Collins, *et al*. (1997), Givoly & Hayn (2000), Kolev, *et al*. (2008), and Weiss, *et al*. (2008). Eventhough Ohlson (1995) has some weakness that earnings are disturbance when measuring firm market price, this study concludes that earnings is still as a related-cash flow factor of firm value. Therefore, this study suggests that earnings are indicator of value added within accounting matters, and are absolutely reflected in firm's market value.

The reflection of earnings in stock price variations implies that earnings are fundamental signal (Ohlson, 1995; Feltham & Ohlson, 1995, 1996). This study suggests that this fundamental signal comes from the nature of earnings which serve as denominator of firm performance. Earnings as denominator of firm performance trigger stock price movements and it can be viewed as potential factor. The users of financial statements absorb this factor as a related-cash flow factor of firm value. This study supports the concept of recursion theory (Sterling, 1968) which states that firm value can be identified from firm book value and earnings. Their values are manifested in stock price movements. Finally, this study concludes that book value and accounting earnings associates with stock price variations.

Change in Book Value This study confirms the association between book value and stock return and between book value and earnings yield. It could decompose direct association between book value and stock price into two association indirect-recursively. They associate simultaneously between book value and stock return and between book value and earnings yield. This study supports to both recursion theory (Sterling, 1968) and the adaptation theory (Wright, 1967) that firm's book value associates with stock return passing through earnings. Furthermore, this study supports Ohlson (1995) and Lundholm (1995) who conclude that book value determine firm market value. In addition, Lo & Lys (2000) imply that firm equity value is a function of discounted future earnings and dividend. Dechow, *et al*. (1999) re-evaluate capital rate of return based on residual earnings. Beaver (1999), Hand (2001), and Myers (1999) support that book value, earnings and their association as evaluator of firm market value. This study suggests that book value improve association degree of return model.

This study suggests that change in book value is the second center of firm market equity measurement. Hence, change in equity capital equals to sinergy of earnings yield and book value. Consequently, book value will increase along with both earnings and equity capital, and next to stock return (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; Bao & Bao, 1989; Burgstahler & Dichev, 1997; Collins, *et al*., 1999; Collins, *et al*., 1987; Cohen & Lys, 2006; Liu & Thomas, 2000; Liu, *et al*., 2001; Weiss, *et al*., 2008; Chen & Zhang, 2007; Ohlson, 1995; Feltham & Ohlson, 1995; Feltham & Ohlson, 1996; Bradshaw, *et al*., 2006; and Abarbanell & Bushee, 1997).

Investment Scalability and Its Change The analysis shows that investment scalability, including after factoring into short and long-run investment scalability, is associated with return by influencing earnings yield and book value precendently (Bao & Bao, 1989; Cohen & Lys, 2006; Weiss, *et al*., 2008; Bradshaw, *et al*., 2006; Abarbanell & Bushee, 1997; Francis & Schipper, 1999). The increase of short-run and long-run investment refers to the increase of earnings power, meaning the increase of firm's equity value. Therefore, investment scalability associates with stock price variability directly and indirectly through earnings variability.

Analysis and inferences from previous studies show that this study supports adaptation theory (Wright, 1967). Supporting to all hypotheses indicates that firm assets are modifiable to generate future earnings and then earnings determine book value. Both earnings and book value subsequently affect stock price variability. This study concludes that the role of financial position information, it is not only equity capital which may also become a determinant of stock price variability, especially the role of assets and liabilities.

Change in Growth Opportunities This study verifies that firm equity completely depends on growth opportunities. Growth opportunities itself is a scalable function of firm assets exploitation and affects future growth opportunities (Chen & Zhang, 2007). Growth opportunities are included into return model because of its ability to drive earnings. It means that this study supports to the adaptation theory (Wright, 1967). Therefore, the inducement of growth opportunities into return model is expected to improve its degree of association. Conclusively, this study confirms the precedent association between growth opportunities with earnings, book value and stock price movements. This study infers that higher efficiency enhances productivity and increases both accounting earnings and stockholders' wealth (Rao & Litzenberger, 1971; Litzenberger & Rao, 1972; and Bao & Bao, 1972). This study supports the concept of Miller and Modigliani (1961) which suggest that growing firms are firms having positive capital rate of return for each invested asset.

This study posits that firm intrinsic value is determined by current growth. Current growth improves future residual earnings (Liu, *et al*., 2001; Aboody, *et al*., 2002; and Frankel & Lee, 1998). Growth opportunities associate with stock price movements because it improves future both earnings and book value. It also increases firm equity (Lev & Thiagarajan, 1993; Abarbanell & Bushee, 1997; and Weiss, *et al*., 2008). Accordingly, this study suggests that stock price responds to growth opportunities.

Change in Discount Rate Although this study only confirm to the association between discount rate and variations of stock prices, it implies that interest rate has multiplier effects. When interest rate falls, firm could potentially increase its earnings. The available methods are procuring additional liabilities or new capital to reduce weighted interest rate (Rao & Litzenberger, 1971; and Litzenberger & Rao, 1972). Therefore, this study supports that firm equity is determined by favorable discount rate to grow assets, earnings, and equity book value (Danielson & Dowdell, 2001; and Liu, *et al*., 2001).

Our main analysis fails to show significant result in the association between discount rate and earnings and book value. However, our initial indication states that firm equity can be increased by value adaptation concept. Equity value can be increased by adapting alternative resources with lower interest rate. It will improve resources productivity (Burgstahler & Dichev, 1997). Meanwhile, Aboody, *et al*. (2002), Frankel & Lee (1998), Zhang (2000), and Chen & Zhang (2007) argue that one factor which affects earnings growth is pure interest rate.

Model This study performed two recursive simultaneous model examinations and reexamined model sensitivity using PB levels. This study is able to offer better decomposition of return association degree compared to previous study model (Chen & Zhang, 2007, Sumiyana *et al*., 2010, and Sumiyana, 2011).

Thus, this study can enhance real formulation of return model in comparison with previous study. It also means that this model developed by this study could clearly explain all these association directly in the single equation model and recursively in the simultaneous equation model. In other words, this study has confirmed the inter-relationship among accounting fundamentals and the association of accounting fundamentals with stock price or return variations.

Research Findings

Based on all analysis, this research concludes some findings described as follows. First, this study could decompose all association between accounting fundamentals and stock return into inter-relationship among them. All fundamental accounting information associate with stock price movements is verified directly and indirectly by means of earnings and book values. Three main factors, earnings yield, change in book value, change in earnings power and change in growth opportunities associate positive-recursively with stock price variability. The change in discount rate associates negative-directly with stock price variations.

Second, this study confirm effective association results when accounting fundamentals associate with stock price movements recursively. Furthermore, their associated direction is confirmed either directly or in recursive manner. We find that book value passing through earnings associate to variations of stock price. Furthermore, growth opportunities, earnings power, and investment scalability do so. In addition, they by the use of book value and earnings associate with stock return. It could be inferred that their association revitalizes adaptation theory. They also associate with stock return directly in a single equation, and so support recursion theory. Finally, this study supports that both adaptation and recursive theories could explain the movements of stock price in synergetic ways. The integration of both theories results in a return model which is closer to reality and more logically comprehended.

Implications and Consequences

The assets management becomes the main duty and responsibility for company management. Assets management has paradigm that assets in statement of financial position is an investment project that must positively contribute to the firm. More spesifically, management must optimalize the firm net operating assets and net financing assets. Our research findings imply that when the both factors have been optimalized, the firm value increase is an automated process through earnings and then concluded in book value. Consequently, the ones that must become management's concern are initial factors, namely profitability, growth, and discount rate. As an external factor, discount rate is relatively uncontrollable, so it can be excluded. The ending factor, that is book value, is merely logical and automatic consequence from initial factors.

The book value is associated with stock value under nearly "identical" formula, so that their association is almost literal. Therefore, the management should make both factors out of their concern. Their concern must be turned into area that make component become more exact, that is assets. More spesifically, management must handle the assets investment scalability, assets growth, and cost of capital employed to finance the scalability and swift growth.

Investors must recomprehend their logical framework to comply with management's way. Their prime concerns must look over the initial factors too, and do not take into account to the book value and market value. Furthermore, they must scrutinize forward looking pertaining profitability, growth and discount rate. As external party, investors may do their transaction when pure interest rate is at favorable level, unlike company management that almost cannot control the rate.

CONCLUSION AND LIMITATIONS

Conclusions

This study documents analysis result in conclusions as follows. Earnings yields, book value, earning power, investment scalability and growth opportunities associate positively with firm market value. These associations are verified and we conclude that they determine stock price variations directly. This study also confirms that book value, earnings power, investment scalability and growth opportunities associate by the use of earning with stock return. Furthermore, earnings power, investment scalability and growth opportunities associate by way of book value with variations of stock price. It means that all of accounting fundamentals associate positively and recursive-simultaneously with stock price variability.

Change in discount rate associates negatively with stock return. This study finds only in the single equation model. It be concluded that discount rate only relate to stock return directly or not recursive simultaneously with stock price movements. It would be weaknesses of this study. However, this study offers better associative power when explaining return model using recursive simultaneous equation in comparison with single equation model. This study is succeeded to provide better associative power when examining the association between accounting information and stock price variations.

This study documents consistent findings especially shown in PB ratio partition. Even, in this PB ratio examinations could find more evidences clearly, especially in the result of recursive simultaneous equation model. All findings conclude that this research supports the association between accounting fundamentals and stock price movement recursive-simultaneously. It means that this study revitalizes the adaptation theory. All of accounting fundamentals associate directly and recursive-simultaneously with stock price variability. Finally, this study concludes that decomposed model does not only support the adaptation theory but also synergizes both theories that are the adaptation theory and the recursion theory. Finally, this study suggests that integration of both theories results in a return model which is closer to reality and more logically comprehended.

Limitations

The analysis results of association model between accounting information and stock return provide valid empirical evidence. Careful comprehension is necessary because research design is not flawless. The limitations are explained as follows. The first is survivorship bias when examining hypotheses. From all 24,095 firm-years, this study only uses 6,132 (25.45%) because the rest is not analyzable. Second, this study uses three sampling criteria. This study cannot find firms with negative book value and negative earnings. Such firms are needed as control group. Therefore, this study is unable to procure robustness examination for such firms. Nevertheless, it could be denied by the fact that lower PB ratio tends to occur in firms having bad earnings quality.

Third, the sample combination from weak to semi-strong markets may cause bias. Though, it is deniable by market-wide regime concept, but the differences in economy, regulations, trading mechanisms, and cultural are ignored in this study. Factually, such factors affect return model. Fourth, statements of financial position usually are presented under conservatism which tends to understate assets. This ex-ante conservatism may influence return model. This study did not put such conservatism into considerations. Last, further research concerning the association between accounting fundamentals and stock price variations should be more focused on forward looking inducement especially in profitability, growth, and discount rate factors.

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