CROSS-SECTION EXPECTED RETURN OF STOCKS:

NEW EVIDENCE FROM THE VIETNAMESE STOCK MARKET

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Abstract

Previous academic papers suggested that over 300 factors have been found to explain the cross-section expected return. Moreover, findings from empirical studies also indicated that multi factor asset-pricing models such as the Fama-French three-factor model are not consistent in the context of Vietnam. This paper is conducted to examine potential factors which can explain the cross-section expected return of the Vietnamese stocks using a combination of DuPont analysis and Residual Income Valuation. With the data of 284 non-financial listed companies in Ho Chi Minh Stock Exchange during the period 2008-2014, findings from this study indicate that the *return on equity* and the *change in return on equity* are informative to cross-section stock returns. In addition, findings also present evidence to confirm that the level of *capital turnover* and *financial cost ratio*, together with *the change in capital* and *the change in financial cost ratio* contain incremental explanatory powers in explaining returns.

Keywords: DuPont analysis; Multi factors; Asset pricing model

JEL Code: M4

1. Introduction

Estimating a return on equity is an extremely complicated task. Although researchers and practitioners have been looking for factors to contribute in explaining the relationship between risk and return for decades, there is no consensus so far. On the basis of the theories from Markowitz (1952) and Tobin (1958), the first ever capital asset pricing model (CAPM), Sharpe-Lintner CAPM proposed by Sharpe (1964) and Lintner (1965), plays a key role in finance literature in which a capital asset can be priced. The CAPM theory gains a lot of researcher's attention worldwide. This leads to another well-known name for CAPM, the single factor Asset Pricing model. Almost immediately since the introduction of the model in 1964 - 1965, this theory has been testing for its implications by empiricists. While some of the typical results advocate the validity of CAPM (Fama & MacBeth, 1973; Jensen, Black, & Scholes, 1972), others offer their critiques (Basu, 1977, 1983; Bhandari, 1988).

The studies of Fama and French (1992) and Fama and French (1993) later suggest an alternative model for CAPM, called the Fama-French three-factor model (FF3F) by adding size and book-to-market ratio to the original model of CAPM. The works of Fama and French lead to one common view that is one of the most intense debates in the finance history and have been attracting a lot of scholar's attention within two recent decades. There are hundreds of quantitative studies conducted worldwide in various time-periods and contexts in order to criticize or to improve the model. Nevertheless, the jury is still out on that question (Gaunt, 2004; O'Brien, Brailsford, & Gaunt, 2010). Many studies concluded that the new added factors in the FF3F are insignificant or do not have the expected sign. Moreover, the quantitative results from the Fama-French three-factor model are usually considered as "data mining" since there is no robust theoretical framework relating to this model (Kogan & Tian, 2013; Wang & Wu, 2011).

In addition, in October 2013, the Nobel Prize in Economics Science had been awarded to Professor Eugene Fama for his works on market efficiency and out-performance. Recently, Professor Fama and his companion, Professor French, have introduced a new model, named the Fama-French five-factor, with the view to better explain the return on equity in the US Stock Market (Fama & French, 2015). This five-factor model is an augmented version of the three-factor model by adding profitability factor (Novy-Marx, 2013) and investment tendency factor (Aharoni, Grundy, & Zeng, 2013).

A fundamental question challenged academia, policymakers, and practitioners is that whether the single factor CAPM is still alive for the purpose of estimating the expected equity return. An answer to this question is far from completeness. It is noted that more and more explanatory factors (more than 300 factors as at December 2014) have been found in the rapid development of literature. For example, Harvey, Liu, and Zhu (2014) reported that 315 factors have been identified in the top ranked journals and high quality working papers. In a similar manner, Green, Hand, and Zhang (2013) identify 330 factors which have been utilized for the same purpose of explaining an expected return on equity.

In Vietnam, the mixed results of the applications of the Fama-French three-factor model are achieved (Phan & Ha, 2012; Phong & Hoang, 2012; Truong & Duong, 2014; Vuong & Ho, 2008). The recent studies of Vo and Mai (2014a) and Vo and Mai (2014b) conclude that the findings from multi factor asset pricing model are not consistent in the context of Vietnam and these authors called for a great caution in relation to the applications of the model in the policy setting environment in Vietnam. Even though various studies have been attempted in the context of Vietnam, no study has been conducted to provide an answer to the question, if new factors added by Fama and French are unable to explain an expected return in Vietnam, which factor, supported from both theories and empirical studies, is likely to do so. This study is to provide an answer to fill in the gap.

2. Literature review

2.1. Empirical evidences on the asset pricing models

Almost immediately since introduction in 1964 – 1965 by Sharpe (1964) and Lintner (1965), CAPM theory has been testing for its implication by empiricists. Among number of empirical tests, the works of Fama and MacBeth (1973) and Jensen et al. (1972) were the first studies which support the validity of CAPM theory. According to what is indicated from CAPM, the market beta is the unique factor that matters the variations in expected return across stocks, other variables should add nothing into explanatory power. Moreover, there should be a linear relationship between these two variables, expected stock return and market beta. By investigating both the cross sectional and times series approaches, Jensen et al. (1972) proved that the intercepts from those regression of expected return on market return are equal to zero. Starting from another aspect, Fama and MacBeth (1973) added two new explanatory variables into the regression equation. The first variable was the square of market beta with the objective to consider whether the related relationship is linear or not. The second variable was the variance of residual resulted from regressing return on market. The reason behinds the residual variance is that: if there are any other stock characteristics that could explain the return, they appear in the residual. However, none of these two variables is useful.

The earliest study gives a different signal from CAPM was conducted by Basu (1977). In this work, he discovered that there was a difference in return related to earning/price ratio (E/P). Those stocks with high E/P could generate a significant higher return than stocks with low E/P. The critiques continue to investigate deeply the CAPM. In a later study, Basu (1983) found stocks with low market capitalization, on average, have higher return compared to the high market capitalization stocks. Another problem with CAPM was found by Rosenberg, Reid, and Lanstein (1985). They provided evidence that the stocks with high book-to-market ratio created a notably higher return than stocks with low book-to-market ratio. Bhandari (1988) was against CAPM theory by proving that stocks with higher leverage tent to have average returns.

The work of Fama and French (1992), after publishing, acted an especially important role since it covered all the studies had been done during two decades related to asset pricing models and put them together into one formula. In specific, they examined size, book-to-market, leverage, E/P and market beta again. These two authors came to the conclusion that: (1) the effect of E/P on average return is reflected completely by Size and book-to-market factors; (2) the book-to-market ratio captures the role of leverage. With these interesting findings, Fama and French (1992) completed their model, the FF3F model. Moreover, Fama and French (1993) expanded their work with more testing variables and different method and found an even more supported information for their previous findings in 1992. Although it gave some interesting results, a large number of scholars disagreed with this theory because it was not built upon any theoretical basis. The SMB and HML factor are considered as self-financing portfolios due to its formation. Black (1993) believed that the Fama-French' findings were a lucky result because there were hundreds of people search for stock returns explanatory variables every day. In addition, more important, the FF3F model had to deal with the view that the data mining or data snooping may be a core cause of what Fama French found (MacKinlay, 1995).

The work of Fama and French in 1992 leaded to one of the most intense argument in the finance history. In October 2013, the Nobel Prize in Economics Science has awarded to Professor Eugene Fama for his contribution in term of Asset pricing model. The FF3F has been attracting a lot of scholar's attention within two recent decades. There have been hundreds of quantitative studies conducted worldwide in various time periods and contexts in order to criticize or to improve the model. Nevertheless, the jury is still out on that question (Gaunt, 2004; O'Brien et al., 2010). There are many studies conclude that the new added factors in the FF3F are insignificant or do not have the expected sign. Moreover, the quantitative results from the FF3F are usually considered as "data mining" and there is no robust theoretical framework relating to this model (Kogan & Tian, 2013; Wang & Wu, 2011). Although the later model is not as common as the FF3F, the C4F model receives the same critiques for the added 12-month momentum factor.

In the rapid development of literature that attempts to identify new return predictive signals, more and more factors have been found. For example, Subrahmanyam (2010) found 50 factors; McLean and Pontiff (2014) identified 82 signals; Green et al. (2013) established 330 firm-specific signals. In particular, Harvey et al. (2014) reported 315 factors and classify them into common and individual risk type as follows:

Table 1. Factor classification

Risk type		Description	Number of factors found
Common	Financial	Proxy for aggregate financial market movement, including market portfolio returns, volatility, squared market returns, etc.	46
	Macro	Proxy for movement in macroeconomic fundamentals, including consumption, investment, inflation, etc.	40
	Microstructure	Proxy for aggregate movements in market microstructure or financial market frictions, including liquidity, transaction costs, etc.	11
	Behavioral	Proxy for aggregate movements in investor behavior, sentiment or behavior-driven systematic mispricing	3
	Accounting	Proxy for aggregate movement in firm-level accounting variables, including payout yield, cash flow, etc.	8
	Other	Proxy for aggregate movements that do not fall into the above categories, including momentum, investors' beliefs, etc.	5
Individual	Financial	Proxy for firm-level idiosyncratic financial risks, including volatility, extreme returns, etc.	61
	Microstructure	Proxy for firm-level financial market frictions, including short sale restrictions, transaction costs, etc.	28
	Behavioral	Proxy for firm-level behavioral biases, including analyst dispersion, media coverage, etc.	3
	Accounting	Proxy for firm-level accounting variables, including PE ratio, debt to equity ratio, etc.	87
	Other	Proxy for firm-level variables that do not fall into the above categories, including political campaign contributions, ranking-related firm intangibles, etc.	24
Total			**315**

Source: Harvey et al. (2014)

In the context of mixed and ambiguous FF3F and C4F results, Graham and Harvey (2001) conducted an very interesting survey on 392 United State CFO (Chief Financial Officer) about how their firm calculate the cost of equity capital. The result showed that 73.5% of them use the original CAPM. Brounen, De Jong, and Koedijk (2004) carried out a similar study with 313 European's CFO and 43% claimed that they rely on CAPM. In term of practical applications, according to Mckenzie and Partington (2014), regulators in Australia, Germany, New Zealand, USA, Canada and UK are still currently basing their decisions primarily on the CAPM framework (see Appendix 1 for details). Recently, Professor Fama and his companion, Professor French, have just introduced a new model named Fama-French five-factor with the objective to explain the return on equity on USA Stock Market (Fama & French, 2015). This FF5F model is an augmented version of FF3F model by adding profitability factor (Novy-Marx, 2013) and investment tendency factor (Aharoni et al., 2013).

In Vietnam, there are also some studies with the objective to test the validity of multi factor model in general. However, the results are still mixing. Typically, Vuong and Ho (2008) were the first to investigate the issue. At that time, the market was not developed well. Aiming at the stocks that listed over 3 years in the Ho Chi Minh Stock Exchange (HOSE), the sample included just 28 stocks from 01/2005 to 26/03/2008. By using OLS, these authors concluded that besides the objective impact of the market, the expected rate of return of stocks was affected by firm-specific characteristics such as SMB factor with positive effect and HML factor with negative effect. The results also indicated that among three factors, the market risk premium played an important role. They suggested one possible explanation for this fact was that investors in HOSE were interested in firm-specific factors at a lesser extent that the market tendency.

Phan and Ha (2012) examined the stocks in HOSE during 2009 – 2011 period. With 749 firm-year observations, they suggested that the FF3F model was more explanatory than CAPM. Moreover, based on the adjusted R^2 indicator from OLS regression, the C4F model explained the variation in stock returns better than FF3F model. In addition, they found positive effects of both SMB and HML factor on expected return. Phong and Hoang (2012) explained it is essential to discover more risk factors related to expected return in Vietnam stock market. In their study, stocks listed over 2 years and non-stop trading in both Ho Chi Minh Stock Exchange (HOSE) and Ha Noi Stock Exchange (HNX) from 2007 to 2011 were utilized. Then, these stocks were divided into 6 groups: 2 groups based on size factor and 3 groups based on book-to-market factor. The OLS regression results, however, were not expected. While the SMB factor kept the positive effect on expected return, the effect of HML was not significant at some portfolios, i.e. the B/M and B/H.

As the mentioned objective to test the validity of FF3F model in HOSE, Truong and Duong (2014) used the non-financial stocks in 2006-2012 period. In this study, a GARCH (1, 1) were applied besides the OLS method. The results showed that all the three factors had the significantly positive effect on expected return. Nonetheless, when considering at 6 portfolios, the outcomes were quite complex. The SMB factor kept its expected sign at most portfolios except one with big size and high book-to-market ratio. The HML factor was significant at all portfolios. More interesting, the effect of HML variable was larger with higher book-to-market ratio.

Vo and Mai (2014a) studied the issue with the sample of 281 listed companies in HOSE in the year 2007-2013. Employing the two-stage cross-sectional regression and five different portfolio construction methods, these authors reached following conclusions: (1) different ways to construct portfolio leaded to different results, both in value and in the significance of the coefficients; (2) the market beta was the best pricing factor of FF3F model; (3) the HML factor seemed to explain the average stock return better than SMB. In addition, Vo and Mai (2014a) recommended researchers, companies, and investors to be more cautious about confirming values obtained with the FF3F model.

The presence of FF5F model attracts the special attention of scholars and policy makers. In this context, Vo and Mai (2014b) conducted an pioneering study in applying this model into Vietnam market. Using the sample of 281 listed companies in the 2007-2013 periods, the results suggested that beta has the correct expected sign and statistically significance. Moreover, for the two traditional factors in the three-factor model, while the Value factor had a strong explanatory ability for the stock returns, the Size factor did not. For the two new added factors, the Profitability factor could explain the stock return; however, the Investment factor showed an unexpected sign.

2.2. The DuPont analysis

The DuPont analysis model was built up by engineer Donaldson Brown in 1918, when he was working for DuPont Co-operation. At that time, Donaldson Brown was assigned to consider and understand the financial performance of General Motors, a car manufacturer company that DuPont was going to acquire. He found that when multiplying the two common ratios, the total asset turnover and net profit margin, yields a new ratio that is the return on total asset (ROA). The interesting finding that ROA was affected by a profitability indicator (*net* *profit margin*) and a efficiency indicator (*total asset turnover*) made DuPont method become widely used in financial analysis in large cooperation in America.

Generally, DuPont model decomposes the profitability ratio into traditionally operational management ratios to explain and analyze the firm' return improvement ability. In the origin version, DuPont model uses the ROA as follows:

$$ROA = \frac{Net\ income}{Total\ assets} = \frac{Net\ income}{Sale} x \frac{Sale}{Total\ assets}$$
$$= Profit\ margin\ x\ Asset\ turnover$$

As a result, maximizing ROA is a common objective of companies. By realizing both profitability and efficiency measure influence ROA, better strategies on plan development and decision control are applied. This origin DuPont model kept an important role in financial analysis until 1970s.

According to Gitman (2000), the widely accepted objective of financial management changed time to time. Maximizing the wealth of equity owners becomes the most important goal of a company. Therefore, a more appropriate return ratio, the return on equity (ROE), replaced ROA in DuPont model. This leaded to the first adjustment from the origin DuPont model. In specific, ROE is decomposed as:

$$ROE = \frac{Net\ income}{Total\ equity} = \frac{Net\ income}{Sale} x \frac{Sale}{Total\ assets} x \frac{Total\ assets}{Total\ equity}$$
$$= Profit\ margin \text{ x } Asset\ turnover \text{ x } Leverage$$

As such, the *leverage* is the third concern of financial managers besides the two-used ratio in the origin version, the *profit margin* and *asset turnover*. Thus, to improve the operation efficiency, or to improve ROE, firms have various choices on the basis of combining these three components.

Over time, there are some other adjustments to the origin DuPont model to achieve the most appropriate model with financial analysis needs. Typically, Nissim and Penman (2001) developed an adjusted version of the DuPont model to eliminate the effect of financial leverage and other factors that firm's manager cannot control. In specific, these authors re-arranged ROE algebraically and converted it into the return on net operating assets ratio (RNOA) as follows formula:

$$ROE = RNOA + [FLEVxSPREAD]$$

where:

- RNOA is the return on net operating assets,
- FLEV is the financial leverage,
- SPREAD is the difference between return of the firm's operations and borrowing costs.

Recently, Hawawini and Viallet (2010) introduced another adjusted DuPont model in which the ROE is decomposed into five different components as follows:

$$ROE = \frac{EAT}{Owners'\ Equity} = \frac{EBIT}{Sales} x \frac{Sales}{IC} x \frac{EBT}{EBIT} x \frac{IC}{Owners'\ Equity} x \frac{EAT}{EBT}$$

where:

- ROE is the return on equity,
- EAT is the earnings after tax,
- EBT is the earnings before tax,
- EBIT is the earnings before interest and tax, and
- IC is the invested capital.

From this formula, ROE is affected by five components: (1) *operating profit margin* (EBIT/Sales); (2) *capital turnover* (Sales/Invested capital); (3) *financial cost ratio* (EBT/EBIT); (4) *financial structure ratio* (Invested capital/Equity); and *tax-effect ratio* (EAT/EBT). Each ratio captures different effects on firm's profitability in general and ROE in particular. The first two ratios, *operating profit margin* and *capital turnover*, reflect the influence of the investing and operating decisions of the firm. The effect of the firm's financing policy is captured by the third, *financial cost ratio*, and the fourth ratios, *financial structure ratio*. The last ratio explains the effect of corporate taxation.

In order to valuing a stock or a company, there are many different approaches. The familiar Dividend Discount Model (DDM), proposed by Gordon (1959), expresses the stock price as a function of net present value of expected future dividend. Stemming from the assumption of clean-surplus accounting, the Residual Income Valuation (RIV) describes the stock prices in terms of accounting numbers in an algebraically equivalent model with DDM. This model is sometimes known as Edwards-Bell-Ohlson (EBO) valuation equation due to its origins in Edwards and Bell (1965) and Ohlson (1995). Accordingly, the stock price can be expressed as following accounting information:

$$P_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i}$$

where:

- P_t is the current stock price,
- B_t is the book value at time t,
- E_t is expectation based on information available at time t,
- ROE_{t+i} is the return on book equity for period t+1,
- r_e is the cost of equity capital.

The important role of ROE in the performance of valuation models and residual income model was emphasized by Ohlson (1995). Combining this residual income valuation approach and DuPont analysis, Soliman (2008) pointed out that DuPont components are used in evaluating the prospects of the firm by market participants. More specific, he concluded that the there was a positive relationship between stock returns and *changes in asset turnover*. This finding leaded to a fact that *changes in asset turnover* is considered as one of return predictive signal in 315 signals reported by Harvey et al. (2014). A similar research framework was conducted by Chang, Chichernea, and HassabElnaby (2014) in the US health care industry. However, in these studies, the authors used the adjusted version of DuPont model of Nissim and Penman (2001) in which RNOA is utilized and decomposed into *profit margin* and *asset turnover*. Then, these components are added into the regression model to examine the effect on stock returns.

3. Data and research methodology

As stated in the DuPont analysis above, ROE is equal to the product of five following ratios:

$$ROE = \frac{EAT}{Owners'Equity} = \frac{EAT}{EBT} x \frac{EBT}{EBIT} x \frac{EBIT}{Sales} x \frac{Sales}{IC} x \frac{IC}{Owners'Equity}$$

This study follows the idea of Soliman (2008) and Chang et al. (2014) to employ the Residual Income Valuation approach to map the effect of ROE and its components on stock returns. As such, the stock returns are used as dependent variable in the regression model. As reviewed above, while the level of DuPont components has no predictive value, the change in these components contains more explanatory power. In addition, Ohlson (1995) suggests that ROE should be an important factor in valuation model. The change in return indicator is also included in the regression model to check the incremental impact on stock returns (Chang et al., 2014; Soliman, 2008). Therefore, two following models are considered:

$$R_{it} = \beta_o + \beta_1 ROE_{it} + \beta_2 \Delta ROE_{it} + \beta_3 OPM_{it} + \beta_4 CT_{it} + \beta_5 FCR_{it} + \beta_6 FSR_{it} + \beta_7 TER_{it} + \beta_8 \Delta OPM_{it} + \beta_9 \Delta CT_{it} + \beta_{10} \Delta FCR_{it} + \beta_{11} \Delta FSR_{it} + \beta_{12} \Delta TER_{it} + \varepsilon_t \quad (1)$$

$$R_{i,t+1} = \beta_o + \beta_1 ROE_{it} + \beta_2 \Delta ROE_{it} + \beta_3 OPM_{it} + \beta_4 CT_{it} + \beta_5 FCR_{it} + \beta_6 FSR_{it} + \beta_7 TER_{it} + \beta_8 \Delta OPM_{it} + \beta_9 \Delta CT_{it} + \beta_{10} \Delta FCR_{it} + \beta_{11} \Delta FSR_{it} + \beta_{12} \Delta TER_{it} + \varepsilon_{t+1} \quad (2)$$

The model (1) attempts to examine the statistical relationship between information contained in the DuPont components and the equity returns (Soliman, 2008). The significance of the result will represent the fact that these DuPont components demonstrate some underlying events that are revealed in the stock price besides play the forecasting future profitability role.

The model (2) is constructed to investigate whether investors understand the time-series properties of returns fully. This hypothesis is based on the fact that sometimes investors do not recognize the future implication of current earnings or returns, then a trading strategy could take this advantage and earn some abnormal returns.

To estimate these models, this study will employ the Feasible Generalized Least Squares (FGLS) estimation to control for the existence of heteroskedasticity and auto-correlation diagnostics. According to Gujarati and Porter (2011), in the presence of Heteroskedasticity, the usual OLS estimators are no longer the best linear unbiased estimators, they are only a linear unbiased estimators since the variance of coefficients are not minimum. As a result, the *t-test* and *F-test* are not reliable, leads to the false conclusion of rejecting the null hypothesis. Similarly, the Autocorrelation causes the *t-statistics* value become larger than it should be. As such, the significance of estimated coefficients might be not concluded precisely.

Variables definitions and measurements are summarized in Table 2.

Table 2. Variables definitions and measurements

Variable	Definition	Measurement	Unit
R_{it}	*Stock returns*	Compounded average monthly raw return over the 12 months beginning in the first month of the fiscal year and ending at the end of the fiscal year t	Percent
$R_{i,t+1}$	*Future stock returns*	Compounded average monthly raw return beginning four months after the end of the fiscal year t and ending at the end of the fiscal year t + 1	Percent
ROE_{it}	*Return on equity*	$\frac{\text{Earnings after tax}}{\text{Owners' Equity}}$	Percent
ΔROE_{it}	*Change in return on equity*	$ROE_{it}-ROE_{it-1}$	Percent
OPM_{it}	*Operating profit margin*	$\frac{\text{Earnings before interest and tax}}{\text{Sales}}$	Percent
CT_{it}	*Capital turnover*	$\frac{\text{Sales}}{\text{Invested Capital}}$	Percent
FCR_{it}	*Financial cost ratio*	$\frac{\text{Earnings before tax}}{\text{Earnings before interest and tax}}$	Percent
FSR_{it}	*Financial structure ratio*	$\frac{\text{Invested Capital}}{\text{Owners' Equity}}$	Percent
TER_{it}	*Tax-effect ratio*	$\frac{\text{Earnings after tax}}{\text{Earnings before tax}}$	Percent
ΔOPM_{it}	*Change in operating profit margin*	$OPM_{it}-OPM_{it-1}$	Percent
ΔCT_{it}	*Change in capital turnover*	$CT_{it}-CT_{it-1}$	Percent
ΔFCR_{it}	*Change in financial cost ratio*	$FCR_{it}-FCR_{it-1}$	Percent
ΔFSR_{it}	*Change in financial structure ratio*	$FSR_{it}-FSR_{it-1}$	Percent
ΔTER_{it}	*Change in tax-effect ratio*	$TER_{it}-TER_{it-1}$	Percent

All the current 284 non-financial listed companies in Ho Chi Minh Stock Exchange are utilized to find the explanatory factors of expected returns for Vietnam market. The number of companies for each industry is summarized in Table 3.

Table 3. List of industry and related information in Vietnam

Industry	Number of companies	Market capitalization (bil. VND)	Sale (bil. VND)	Operating profit (bil. VND)	Total asset (bil. VND)	Total liabilities (bil. VND)	Cash (bil. VND)
Accommodation and Food services	3	212.0	108.5	-25.9	190.7	203.5	5.5
Agriculture Production	10	1,884.6	1,094.2	227.0	6,090.3	3,354.4	353.4
Arts, Entertainment, and Recreation	2	697.6	234.1	32.95	814.2	177	80.1
Construction and Real Estate	68	2,352.2	1,352.5	167.4	4,745.0	2,954.5	290.4
Information and technology	5	504.8	1,072.3	67.7	1,201.9	693.3	70.8
Manufacturing	99	3,801.5	3,148.4	376.2	3,429.4	1,846.4	324.3
Mining, Quarrying, and Oil and Gas Extraction	15	1,015.2	1,370.6	200.9	2,230.2	1,050.3	235.7
Transportation and Warehousing	26	1,175.5	1,037.5	107.8	1,692.7	818.6	215.1
Utilities	20	5,703.0	5,011.8	1,014.7	5,095.3	1,730.7	1,246.7
Wholesale Trade and Retail Trade	36	1,430.0	4,674.2	170.9	2,075.0	1,236.0	231.4
Total	**284**						

Note: Information about market capitalization, sale, operating profit, total asset, total liabilities and cash are calculated as average of all companies in the same industry.

4. Results

First, the variables data of 284 listed companies in Ho Chi Minh Stock Exchange from 2008 to 2014 are summarized in Table 4.

Table 4. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dependent variables					
R_t	1403	0.3050	0.8022	-0.7658	3.7255
R_{t+1}	1354	0.2776	1.0017	-0.7739	5.8678
Independent variables					
ROE_t	1403	0.1163	0.1274	-0.3782	0.4635
ΔROE_t	1403	-0.0157	0.1126	-0.4088	0.4130
OPM_t	1403	0.1587	0.1980	-0.3427	1.0866
CT_t	1403	0.7397	0.3858	-0.5642	2.2398
FCR_t	1403	2.0495	2.3839	0.0514	15.1739
FSR_t	1403	1.4321	0.9335	0.0948	4.9838
TER_t	1402	0.8167	0.1406	0.1654	1.1518
ΔOPM_t	1403	-0.0159	0.1834	-1.0356	0.7262
ΔCT_t	1403	-0.0488	1.1463	-5.3285	5.0309
ΔFCR_t	1403	-0.0203	0.5601	-2.7055	2.6586
ΔFSR_t	1403	0.0221	0.4555	-1.5120	1.7684
ΔTER_t	1400	-0.0004	0.1758	-0.6974	0.8469

Note: Definition and unit of variables are presented in Table 2.

Table 4 provides some basic information of variables key in this study. First, these numbers reveal that this is an unbalanced panel data and there are a few missing observations within. Generally, there are approximately over 1400 firm-year observations. In addition, the variation of these variables is substantial since the stand deviation is equal or even larger than the mean value. The min and max value also indicate a wide benchmark of variables.

Table 5 represents information to test whether the multicollinearity problem exist in the independent variables. The table includes the correlation matrix and Variance Inflating factor (VIF). The results suggest that there is no considerable collinearity among the independent variables. The maximum correlation value is 0.42 between ROE_t and OPM_t, which is quite low. In addition, the VIF figures solidify the fact that the multicollinearity is likely not a significant problem in this study.

Table 5. The correlation matrix and Variance Inflating Factor among variables

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	VIF
(1)	**R_t**	1.00													-
(2)	**ROE_t**	0.25	1.00												1.69
(3)	**$\triangle ROE_t$**	0.34	0.40	1.00											1.79
(4)	**OPM_t**	0.11	0.42	0.22	1.00										1.76
(5)	**CT_t**	0.00	0.13	0.02	-0.28	1.00									1.30
(6)	**FCR_t**	0.14	0.16	-0.11	0.03	0.04	1.00								2.34
(7)	**FSR_t**	-0.06	-0.18	-0.07	-0.27	-0.04	-0.37	1.00							1.54
(8)	**TER_t**	0.05	-0.03	-0.03	0.02	-0.05	0.16	-0.02	1.00						1.51
(9)	**$\triangle OPM_t$**	0.25	0.27	0.58	0.37	0.01	-0.14	-0.02	-0.04	1.00					1.81
(10)	**$\triangle CT_t$**	-0.06	-0.01	0.02	-0.04	0.21	0.05	-0.03	0.04	-0.07	1.00				1.19
(11)	**$\triangle FCR_t$**	0.11	-0.13	-0.19	-0.13	0.01	0.60	-0.01	0.11	-0.28	0.07	1.00			2.04
(12)	**$\triangle FSR_t$**	-0.06	-0.11	-0.19	-0.06	-0.05	-0.02	0.26	0.00	-0.06	-0.30	-0.09	1.00		1.30
(13)	**$\triangle TER_t$**	0.03	-0.09	-0.08	-0.05	-0.03	0.09	0.03	0.56	-0.11	0.01	0.18	0.00	1.00	1.51

Next, the problem of Heteroskedasticity (HET) and Autocorrelation (AR) will be concern. According to Gujarati and Porter (2011), in the presence of Heteroskedasticity, the usual OLS estimators are no longer the best linear unbiased estimators, they are only a linear unbiased estimators since the variance of coefficients are not minimum. As a result, the *t-test* and *F-test* are not reliable, leads to the false conclusion of rejecting the null hypothesis. Similarly, the Autocorrelation causes the *t-statistics* value become larger than it should be. As such, the significance of estimated coefficients might be wrongly concluded. Both two following model are considered:

Model (1):

$$R_{it} = \beta_o + \beta_1 ROE_{it} + \beta_2 \Delta ROE_{it} + \beta_3 OPM_{it} + \beta_4 CT_{it} + \beta_5 FCR_{it} + \beta_6 FSR_{it} + \beta_7 TER_{it} + \beta_8 \Delta OPM_{it} + \beta_9 \Delta CT_{it} + \beta_{10} \Delta FCR_{it} + \beta_{11} \Delta FSR_{it} + \beta_{12} \Delta TER_{it} + \varepsilon_t$$

Model (2):

$$R_{i,t+1} = \beta_o + \beta_1 ROE_{it} + \beta_2 \Delta ROE_{it} + \beta_3 OPM_{it} + \beta_4 CT_{it} + \beta_5 FCR_{it} + \beta_6 FSR_{it} + \beta_7 TER_{it} + \beta_8 \Delta OPM_{it} + \beta_9 \Delta CT_{it} + \beta_{10} \Delta FCR_{it} + \beta_{11} \Delta FSR_{it} + \beta_{12} \Delta TER_{it} + \varepsilon_{t+1}$$

The results from Table 6 indicate that there are existences of HET and AR in both models. In order to deal with these problems, Wooldridge (2012) and Cameron and Trivedi (2009) suggest a useful method to cover them, which is the FGLS regression.

Table 6. Heteroskedasticity and Autocorrelation test

	Modified Wald test			**Wooldridge test**		
	Chi-squared	P-value	Presence of HET	Chi-squared	P-value	Presence of AR
Model 1	1.4e+06	0.0000	✔	14.056	0.0002	✔
Model 2	2.0e+07	0.0000	✔	4.137	0.0430	✔

Table 7 represents the estimations results of Model (1) and Model (2) using the FGLS regression to investigate the effect on stock returns. Specifically, model (1) determines if ROE and its change, △ROE, are useful in explaining the variation across stock returns; and the ROE components that are decomposed by DuPont analysis are incrementally useful.

Table 7. Regression results

	Model (1) **Dependent variable: R_t**			Model (2) **Dependent variable: R_{t+1}**		
	(a)	(b)	(c)	(d)	(e)	(f)
ROE_t	0.5714***	0.4184***	0.8724***	0.5261***	0.3376**	0.3045**
△ROE_t	2.0913***	2.3439***	1.8914***	2.4781***	2.5413***	2.5762***
OPM_t		-0.0679	-0.2095***		0.0532	0.0355
CT_t		**-0.0161*** **	**-0.0143*** **		**-0.0020**	**0.0127** **
FCR_t		**0.2721*** **	**0.1200** **		**0.3822*** **	**0.3169*** **
FSR_t		0.0545***	0.0104		0.0426*	0.0253
TER_t		0.0817	-0.0958		0.0213	0.1411
△OPM_t			0.8263***			0.2100
△CT_t			**-0.0502*** **			**-0.0911*** **
△FCR_t			**0.2698*** **			**0.1201** **
△FSR_t			-0.0456			0.0672
△TER_t			0.3732***			0.1044
Constant	0.2389***	-0.0461	0.2961***	0.1866***	-0.1682	-0.1534

*Note: Coefficients followed by *, ** and *** are significant at 10%, 5% and 1%, respectively. The Feasible Generalized Least Squares are applied due to the existence of Heteroskedasticity and Autocorrelation. For each of model (1) and (2), three estimations are conducted. The first includes only ROE and its change. The second adds the level of five DuPont components. The third estimation adds both the level and change of five DuPont components.*

The Residual Income Valuation theory suggests that ROE has a strong relation with stock returns, the regression results from Column (a) advocates the theory by the statistical positive significance of ROE coefficient. Moreover, the coefficient of △ROE is positive and significant at 1%, indicates that the change in ROE is informative about stock returns besides the value of ROE.

When ROE components decomposed from DuPont analysis are added, the ROE and △ROE keep their statistically significance. In addition, result of Column (b) shows that some of the level of these DuPont components does have additional power in describing the returns such as *capital turnover* (CT), *financial cost ratio* (FCR) and *financial structure ratio* (FSR). In particular, while the correlation between *capital turnover* and returns is negative, the two others, *financial cost ratio* and *financial structure ratio*, are positive. The level of *operating profit margin* and *tax-effect ratio* do not contribute any additional information.

Regression model in Column (c) introduces full independent variables, which includes changes in DuPont components. The significances of ROE, △ROE, level of *capital turnover* and *financial cost ratio* are remained. Moreover, most of changes in DuPont components indicate the incremental explanatory power in explaining returns except the *change in financial structure ratio*. Specifically, the coefficients of $\triangle OPM_t$, $\triangle FCR_t$ and $\triangle TER_t$ are positively significant. They suggest a positive relationship between these changes and stock returns. The coefficient of $\boldsymbol{\triangle CT_t}$ is negative and significant at 1%.

Overall, the results of Model (1) in Table 4.12 advocate the view that both the value and change in DuPont components are incremental sources of explanatory power. Particularly, relative to the stable effect of ROE and its change, the level of *capital turnover* and *financial cost ratio* seem to explain the stock returns better than the others do with a negative relation of the former and positive relation of the latter. Furthermore, four in five changes of DuPont components suggest a high correspondence with stock returns, except the *change in financial structure ratio*.

On the other hand, model (2) examines the effect of these factors on the future returns. The same procedure is repeated as in model (1) through three estimations in turn in Column (d), (e) and (f) but the stock returns in one year ahead excluded the first four months are used as the dependent variable. Since the average time of auditing process is about four months, this test could reveal the predictive power of accounting information related to future returns. Again, the statistical significance of ROE and △ROE are unchanged through different estimations. This implies ROE and its change not only are able to explain the variation in stock returns, but also contain some predictive information for future returns. More important, it looks like investors understand fully the future predictive power of the level of *financial cost ratio* together with the *change in capital turnover* and *financial cost ratio* since the correspondence between these variables and future abnormal stock returns are statistically significant.

5. Conclusions

It has been more than 50 years since the first ever capital asset pricing model (CAPM), the Sharpe-Lintner CAPM, was developed by Sharpe (1964) and Lintner (1965). As soon as this CAPM was introduced, intense debates among academics, policymakers and the others emerged. Since the introduction of the model, many theoretical models and hundreds of empirical papers have been conducted. The findings from all these attempts are unfortunately mixed with supports and critiques for the original model, the Sharpe-Lintner CAPM. A fundamental question whether the single factor CAPM is still valid for the purpose of estimating the expected equity return is still a challenging issue for academia, policymakers, and practitioners. However, it is widely accepted and observed from current practices over the last 50 years or so that the Sharpe-Lintner CAPM has still been in use. Recent theoretical and empirical evidence suggests that CAPM is still widely applied all around the world, especially by practitioners, firm's managers and policymakers (Brounen et al., 2004; Graham & Harvey, 2001; Mckenzie & Partington, 2014).

Among more than 300 different factors which have been attempted worldwide to explain an expected return, this study is an attempt to find a group of factors that can explain the stock returns in Vietnam. Using a combination of DuPont analysis and Residual Income Valuation, together with the data of 284 non-financial listed companies in Ho Chi Minh Stock Exchange, the results suggest that the *return on equity* and the *change in return on equity* are informative to stock returns. Moreover, the level of *capital turnover* and *financial cost ratio,* together with *the change in capital* and *the change in financial cost ratio* contain incremental explanatory powers in explaining returns.

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