The Influence of Profitability in CAPM on Stock Portfolio's Expected Excess Return LQ45 Indonesia Stock Exchange

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Abstract

The growth of capital market in Indonesia has become one of the indicators of economic progress. Capital market becomes attractive to investors when it produces a high return. Return is the results obtained from the investment, which may be a return that has occurred and has been expected to occur (estimated return). The model that is widely used to estimate return securities is the CAPM. CAPM has been developed into three-factor CAPM (Fama-French Pricing Model) by Fama and French . The objective of this research is to find the influence of another factor beside size and book-to-market equity as Fama-French mentioned previously.

Using financial data for the period 2005 to 2011, which obtained from LQ45 Indonesia Stock Exchange's website, researcher found that company's profitability has a significant value when added to CAPM. In this research Fama-French methodology was used to construct the new equation. Using quantitative method and multiple-regression, the result indicates that the new independent variable has a significant value and the equation has high adjusted R-squared for Indonesia Stock Exchange LQ45 index for the period 2005 to 2011.

***Keywords**: Capital market, CAPM, Three-Factor Pricing Model, LQ45 Index, Profitability Ratio.*

INTRODUCTION

To raise funds the companies can issue shares to the capital market. On the other hand people can take advantage of the capital markets for long-term investments or seek short-term profits. Gain on securities or capital investment is usually expressed as a percentage called the return. The investors are usually very concerned about news and events that affect the stock price changes to get short-term gains. Event study is an empirical analysis of the behavior of stock prices around a certain event.

Efficiency in efficient market hypothesis theory is defined as an expression of speed and perfection of capital markets which include the relevant information into the stock price, and abnormal return cannot be obtained in the long run by using investment strategies based on historical share prices or other historical data. Abnormal return is behavior of stock prices that provide stock return exceeds the expected return based on the risk (Jones, 2007: 330).

The gap I found for this research is: some studies have shown that there is no significant abnormal return in the Indonesia Stock Exchange, but there are also a number of other studies proving contrary. Since systematically nonzero abnormal security returns that persist after a particular type of event are inconsistent with market efficiency (Kothari & Warner, 2006), this research was conducted to examine what variables cause stocks experiencing abnormal return in Indonesia Stock Exchange using Three-Factor Pricing Model plus new independent variable.

Since the equation introduced by Fama and French in 1993 the Three Factor Pricing Model [TFPM] has been used, discussed, and modified by many researchers around the world. Many researchers test it in many countries outside United States, like Andre and L'Her [2012] from Canada, Liu [2006] from England, Moerman [2005] from Netherland, Connor and Sehgal [2001] from India, Phong and Hoang [2012] from Vietnam, Kubota and Takahara [2010] from Japan, and also several researchers from Indonesia.

Kubota and Takahara [2010] add one independent variable to TFPM called IML, stand for Illiquid Minus Liquid, that prove to be significant. The similar research by Dash and Mahakud [2012] from India also add one independent variable to TFPM called LQF, stand for Liquidity Factor, which proven to be significant too.

Sasongko and Wulandari [2006] found that profitability has a significant effect on stock price in Indonesia.

Based on that previous research, this research add a new independent variable to TFPM called PML, stand for Profitable Minus Less-profitable.

2. DISCUSSION AND HYPOTHESIS

Abnormal returns that occur continuously at a particular event are contrary to the theory of Efficient Market Hypothesis theory. That gap between the real conditions in Indonesia capital market with a grand theory underlying the establishment of the stock market is the problem identification in this research. The reason is: based on the Efficient Market Hypothesis theory, abnormal returns cannot be obtained in the long run by using investment strategies based on historical share prices or other historical data. In Indonesia Stock Exchange LQ45, abnormal returns that occurred are allegedly due to several variables that affect estimates of investors to return a certain number of shares. The anticipated return expected by investors over some future holding period is defined as expected excess return (Jones, 2007).

The problem in this study focuses on quantitative variables suspected to affect stocks in the Indonesia Stock Exchange LQ45 using Three Factor Pricing plus Profitability Model.

Hypothesis 1: Market risk premium (Rmt-Rft) has a significant influence on expected excess return (Rpt-Rft).

Hypothesis 2: The difference between the return on the portfolio of "small" stocks and "big" stocks (SMBpt) has a significant influence on expected excess return (Rpt-Rft).

Hypothesis 3: The difference between the return on the portfolio of "high" and "low" book-to market stocks (HMLpt) has a significant influence on expected excess return (Rpt-Rft).

Hypothesis 4: The difference between the return on the portfolio of "profitable" stocks and "less profitable" stocks (PMLpt) has a significant influence on expected excess return (Rpt-Rft).

3. PROCEDURES FOR COLLECTING DATA

3.1. Data

Rm-Rf, SMB, HML, and PML are examined from:

Indonesia Stock Exchange historical data from 2005-2011 period, which financial statement data for that period was taken from JKSE historical price-Yahoo! Finance.

3-month SBI rate (SBI: Sertifikat Bank Indonesia) from Banks Sentral Republik Indonesia's website, to determine risk-free rate return.

Market Equity (ME) which is stock price times a number of outstanding stock.

Book to Market ratio is book equity divided by market equity. The final sample includes 140 data from 20 companies in 7 years' period. The companies that are incorporated into observation are companies that consistently appears in the list of LQ45 from December 2005 until December 2011. Book Equity (BE) which is computed as the book value of stockholders' equity plus balance sheet deferred taxes minus the book value of preferred stock, negative Book Equity is excluded from the sample (see L'Her et al, 2004).

3.2. Construction of model

3.2.1. Three Factor Pricing plus Profitability Model

Three factor pricing model (TFPM) created by Fama and French in 1993 to estimate the abnormal return of the portfolio that they form (Jogiyanto, 2010). According to the TFPM, stocks excess return are equal to:

$$Rpt - Rft = ap + bp\,(Rmt - Rft) + sp\,SMBpt + hp\,HMLpt + ept$$

Based on Kubota and Takahara [2010], who add one independent variable to TFPM and based on the previous research by Sasongko and Wulandari [2006] this research add a new independent variable to TFPM called PML, stand for Profitable Minus Less-profitable:

Rpt – Rft = ap + bp (Rmt – Rft) + sp SMBpt + hp HMLpt + pp PMLpt + ept
Where

- Rpt is the equal or value-weighted return for calendar year t for the portfolio of event firms that experienced the event within the previous t year.
- Rft is the risk-free rate,
- Rmt is the market return,
- SMBpt is the difference between the return on the portfolio of "small" stocks and "big" stocks;
- HMLpt is the difference between the return on the portfolio of "high" and "low" book-to market stocks;
- PMLpt is the difference between the return on the portfolio of "profitable" stocks and "less profitable" stocks.
- ap is the average monthly abnormal return on the portfolio of event firms over the T-year post-event period,
- bp, sp, and hp, are sensitivities (betas) of the event portfolio to the three factors.
- pp is sensitivity (beta) of the event portfolio to the fourth factor.

Based on Fama and French (1993) and L'her et al (2004), I use two rankings to calculate a 50% breakpoint for size, and 30% and 70% breakpoints for book-to-market. The stocks are subsequently sorted into two size groups and three book-to-market groups based on these breakpoints. The stocks above 50% size breakpoint are designated B (for Big) and the remaining 50% are designated S (for Small). The stocks above the 70% book-to-market breakpoint are designated H (for H) and the firms below the 30% book-to-market breakpoint are designated L (for low). As the intersection of book-to-market and size, eight value-weighted portfolios are from: S/H, B/H, S/L, B/L, S/P, B/P, S/L, B/L.

SMB is the equally-weighted average of the returns on the small stock portfolios minus the returns on big stock portfolios:

SMB = [(S/H-B/H)+(S/L-B/L)+(S/P-B/P)+(S/L-B/L)]/4

HML is equally-weighted average of the returns on the high stock portfolios minus the returns on the low stock portfolios:

HML = [(S/H+B/H) - (S/L+B/L)]/2

Classification for the profitability factor (PML) based on profitability ratios for each share, in this research I use ROI, ROE, NPM, and EPS. When the ratios higher than industry ratios I classify it as “profitable”, and when the ratios lower than industry ratios I classify it as “less profitable”.

PML is equally-weighted average of the returns on the profitable stock portfolios minus the returns on the less profitable stock portfolios: PML = [(B/P-B/L) + (S/P-S/L)]/2

Using data from December 2005 to December 2011, I derive the time-series of the market risk premium, size, book-to-market, and profitability, as described in the next sections.

3.3. Portfolio Formation

3.3.1. Portfolio Formation for Dependent Variable.

I use excess returns on 9 portfolios, As Fama and French did in their research in 1992, formed on Size and BE/ME to determine portfolios SMB and HML capture common factors in stock returns related to size and book-to-market equity. I construct 9 portfolios from the intersection of the size and BE/ME terciles and calculate value-weighted yearly returns on the portfolios from 2005 to 2011. The excess returns on these 9 portfolios for 2005 to 2011 are the dependent variables for stocks in the time-series regressions.

There are nine portfolios for each year:

Portfolio A, small size and low BE/ME

Portfolio B, small size and middle BE/ME

Portfolio C, small size and high BE/ME

Portfolio D, medium size and low BE/ME

Portfolio E, medium size and middle BE/ME

Portfolio F, medium size and high BE/ME

Portfolio G, big size and low BE/ME

Portfolio H, big size and middle BE/ME

Portfolio I, big size and high BE/ME

2005

		BE/ME tercile		
		Low	**Middle**	**High**
Size tercile	**Small**	0.50070	0.09959	0.75086
	Medium	0.48032	0.31779	(0.97634)
	Big	(0.09617)	0.10448	0.04801

2006

		BE/ME tercile		
		Low	**Middle**	**High**
Size tercile	**Small**	0.85941	0.52908	0.91454
	Medium	0.27260	0.43251	0.60909
	Big	0.40016	0.42635	0.52471

2007

		BE/ME tercile		
		Low	**Middle**	**High**
Size tercile	**Small**	1.00636	0.62948	1.74022
	Medium	0.91326	(0.09234)	0.32313
	Big	1.96170	0.26868	0.33803

2008

		BE/ME tercile		
		Low	**Middle**	**High**
Size tercile	**Small**	(0.75083)	(1.06791)	(1.89271)
	Medium	(0.99219)	(1.06510)	(1.65745)
	Big	0.08521	(0.70175)	(1.65700)

2009

		BE/ME tercile		
		Low	**Middle**	**High**
Size tercile	**Small**	0.92292	0.82788	0.62285
	Medium	0.92230	0.85530	0.20051
	Big	0.748046	1.04735	0.56354

2010

Size tercile	BE/ME tercile: Low	Middle	High
Small	0.11952	0.24646	(0.19153)
Medium	0.11851	0.29889	0.25754
Big	0.35540	0.08177	0.35387

2011

Size tercile	BE/ME tercile: Low	Middle	High
Small	(0.19201)	(0.00002)	(0.17340)
Medium	(0.25418)	(0.18136)	(0.03620)
Big	0.27671	0.07203	(0.03610)

3.3.2. Portfolio Formation for Independent Variables.

Using equations above the results for independent variables from 2005 until 2011 are:

2005

B/H	B/L	S/H	S/L	B/L	B/P
0.0879	0.1158	-0.2062	0.484	0.0803	0.182
S/D	**S/U**	**B/D**	**B/U**	**S/L**	**S/P**
-1.1613	0.7201	-0.0654	0.488	-0.4876	0.539

SMB= -0.03412
HML= -0.35916
PML= 0.56385

2006

B/H	B/L	S/H	S/L	B/L	B/P
0.5528	0.5475	0.91454	0.2466	0.4594	0.5661
S/D	**S/U**	**B/D**	**B/U**	**S/L**	**S/P**
0.1864	0.9778	0.20598	0.7391	0.2327	0.9008

SMB= 0.0422
HML= 0.3367
PML= 0.3874

2007

B/H	B/L	S/H	S/L	B/L	B/P
0.3306	1.3976	1.74022	0.9565	0.3335	0.4837
S/D	S/U	B/D	B/U	S/L	S/P
0.3845	1.4558	0.1829	1.9617	0.7315	1.5757

SMB= 0.6146
HML= -0.142
PML= 0.4972

2008

B/H	B/L	S/H	S/L	B/L	B/P
-1.6575	0.08521	-1.8927	-0.751	0.3847	-0.837
S/D	S/U	B/D	B/U	S/L	S/P
-2.1854	-0.5095	-1.7817	-0.008	-1.9037	-0.927

SMB= -0.8626
HML= -1.4423
PML= -0.1225

2009

B/H	B/L	S/H	S/L	B/L	B/P
0.5635	0.7801	0.46578	0.9229	0.7116	0.8199
S/D	S/U	B/D	B/U	S/L	S/P
0.228	1.1276	0.4321	1.1133	0.631	0.8296

SMB= -0.006
HML= -0.337
PML= 0.1535

2010

B/H	B/L	S/H	S/L	B/L	B/P
0.3539	0.3476	-0.121	0.1195	0.2444	0.2517
S/D	S/U	B/D	B/U	S/L	S/P
-0.171	0.3666	-0.21	0.4488	-0.039	0.2417

SMB= -0.249
HML= -0.117
PML= 0.1439

2011

B/H	B/L	S/H	S/L	B/L	B/P
0.3713	-0.0198	-0.1734	-0.192	-0.156	0.0807
S/D	S/U	B/D	B/U	S/L	S/P
-0.332	0.2192	-0.3144	0.2253	-0.068	-0.269

SMB= -0.245
HML= 0.2049
PML= 0.018

4. RESULT

Table below shows the p-value that less than 10% for RmRf (market return minus risk-free rate) and RPML (the difference between the return on the portfolio of "profitable" stocks and "less profitable" stocks) indicates that these variables have a significant effect on the dependent variable (Rpt-Rft). This equation has high adjusted r-squared value, indicating this model is good enough to predict the future outcomes on the basis of other related information.

Dependent Variable: RJRF
Method: Panel EGLS (Cross-section random effects)
Date: 08/13/13 Time: 12:25
Sample: 2005 2011
Periods included: 7
Cross-sections included: 9
Total panel (balanced) observations: 63
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.151037	0.105571	-1.430675	0.1578
RMRF	1.275594	0.203088	6.280992	0.0000
RHML	-0.021250	0.150717	-0.140994	0.8884
RPML	0.450847	0.262162	1.719729	0.0907

Effects Specification	S.D.	Rho
Cross-section random	0.128730	0.0884
Idiosyncratic random	0.413315	0.9116

Weighted Statistics

R-squared	0.685847	Mean dependent var	0.074256
Adjusted R-squared	0.669873	S.D. dependent var	0.719350
S.E. of regression	0.413315	Sum squared resid	10.07891

5. CONCLUSION

The concluding points that can be drawn from the results of statistical tests for the model (TFPM+PML model) are as follows:

- Annual market risk premium (Rmt-Rft) has a significant influence on expected excess return (Rpt-Rft).

• The difference between the return on the portfolio of "small" stocks and "big" stocks (SMBpt) has an insignificant influence on expected excess return (Rpt-Rft).

• The difference between the return on the portfolio of "high" and "low" book-to market stocks (HMLpt) has a significant influence on expected excess return (Rpt-Rft).

• The difference between the return on the portfolio of "profitable" stocks and "less profitable" stocks (PMLpt) has a significant influence on expected excess return (Rpt-Rft).

The result indicates that Three Factor Pricing plus Profitability Model (TFPM+PML) is fit for Indonesia Stock Exchange LQ45 index in 2005-2011 periods. In that period the model has high adjusted r-squared. This indicates the model can be used to predict the future outcomes on the basis of other related information.

6. INTERNATIONAL AND MANAGERIAL IMPLICATIONS

International implications: Three Factor Pricing plus Profitability Model (TFPM+PML) can be applied in Indonesia, at least in the period 2005-2011 in LQ45.
In the future research the model can be tested in international stock market.

Managerial Implications: Three Factor Pricing plus Profitability Model (TFPM+PML) has a high adjusted R-squared; therefore, it can be used as a forecasting tool.

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Appendix

Autocorellation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.000	.000	-.069	.42072738	1.538

a. Predictors: (Constant), HML, RmRf, SMB, PML

b. Dependent Variable: RjRf

$d_{L.005}$= 1471 $d_{U.005}$ =1.731

The result lies between $d_{L.005}$ and $d_{U.005}$ that yield inconclusive results.

Appendix

Heteroscedasticity Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.310	.089		3.474	.001
	RmRf	-.280	.150	-.405	-1.869	.067
	RSMB	-0.24	.503	-.176	-0.476	.636
	RHML	-.232	.094	-.429	-2.475	.160
	RPML	-.033	.235	-.027	-.142	.888

a. Dependent Variable: abresid

All independent variables have a significance value greater than 0.05 so there are no heteroscedasticity.

Appendix

Multicollinearity

	RHML	RJRF	RMRF	RPML	RSMB
RHML	1	0.616618	0.763701	0.455604	0.630409
RJRF	0.616618	1	0.707008	0.536141	0.74614
RMRF	0.763701	0.707008	1	0.535308	0.773771
RPML	0.455604	0.536141	0.535308	1	0.700988
RSMB	0.630409	0.74614	0.773771	0.700988	1

All independent variables have value less than 0.8 indicating there are no multicollinearity.