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FAMA AND FRENCH FIVE- FACTOR STUDY OF STOCK MARKET IN INDONESIA

ABSTRACT

In general, contemporary finance theories agree that the Fama and French Five-Factor model provides a more comprehensive explanation for average stock returns compared to its predecessors. Previous research on the five-factor model in Indonesia has yielded inconclusive results, and none of the studies has attempted to compare the significance of the five factors over shorter and longer periods, or even within shorter periods. As a result, the researchers of this study endeavor to ascertain the importance of the five elements – the profitability (RMW), market, size (SMB), profitability (RMW), book-to-market (HML), and investment (CMA) factors – to an excess return on the portfolio over shorter and longer periods. The findings indicate that SMB and CMA factors exhibit statistically insignificant, significantly negative, and significantly positive correlations with excess portfolio return, respectively, over the three shorter periods and the longer period. A significant negative correlation is observed between the HML factor and excess portfolio return over the longer period, while the relationship is deemed insignificant over the three shorter periods. No significant relationship was found between the RMW factor and excess portfolio return over the (2005-2019) period and two (2010-2014, 2015-2019) periods, but one shorter period is significantly positive.

Keywords: Asset Pricing Theory, Excess Return, Fama and French Five-Factor Model

1. INTRODUCTION

Companies must at least meet the required rate of return of equity investors in order to get them to invest in the company in the stock market. The required rate of return of the investor connects the anticipated cash flows.to investors in the future to the present through the intrinsic value calculation (Hirst et al., 2008). How companies balance their cost of capital, which includes debt or equity, will affect the risk and cash flows of the companies which investors can use to derive market values from projected cash flows and discount to the present to compute the values of the business (DePamphilis, 2013). Therefore, in order for investors to know the justified rate of return they are seeking in a stock, several asset pricing theories were developed such as Markowitz in portfolio selection (Markowitz, 1952), Capital Asset Pricing Model or the CAPM (Sharpe, 1964), Fama and French three-factor model (Fama & French, 1992), and lastly, Fama and French five-factor model (Fama & French, 2014).

Related with the revolution of asset pricing theories, the Fama and French five-factor Model has been widely accepted to surpass the explanations of its predecessors regarding average stock returns.such as the CAPM (Sharpe, 1964), Arbitrage Pricing Theory (Ross, 1976) and Fama and French three-factor Model (Fama & French, 1992). Based on the Capital Asset Pricing Model (CAPM), asset return is determined solely by the market. However, due to the inconsistencies found in later findings, Fama and French (1992) inserted additional two more elements: the size and book-to-market factors and called the model the Fama and French Three-Factor model. While Fama and French (1995) suggested that the book-to-market and size factors must proxy for sensitivity to risk factors in returns to describe the differences in average stock returns. As their study shows that when considering the size and book-to-market factors, the movement of stock prices mirrors the behavior exhibited by earnings, which would then translate into stock returns.

Outside US markets, the pertinency of the five-factor model has been evaluated by many scholars around the world, including Fama and French (2017) themselves. The results have raised several important points to note. Foye (2017) studied the pertinency of the five-factor

model across 18 developing markets. The study established that both in Latin America and Eastern Europe, the five-factor model coherently surpassed the three-factor model. The inability to differentiate between investment premium and profitability in the Asian factors renders the five-factor model inadequate in describing equity returns in the region. Fama and French (2017) studied the pertinency of the five-factor model across 23 developed countries from four regions: Europe, Asia Pacific, Japan and North America.

According to the findings of their study, in both markets the five-factor model does not outperform the three-factor model when elucidating excess returns. Additionally, unlike the US market that found that HML factor is duplicative across both markets. Meanwhile, a study by Wijaya et al. (2017) shows that book-to-market factor proved to be insignificant in justification for surplus returns and that the five-factor model explains excess returns better than the three-factor model. These inconclusive results have motivated the researchers to make this study of their own.

The data used in this study is divided into two big segmentations: a longer period spanning from 2005 to 2019, and shorter periods spanning from 2005-2009, 2010-2014, 2015-2019. Five years of segmentation is used because a US-based non-profit private economic research organization, National Bureau of Economic Research (NBER), predicted that one business cycle lasts for 5 years (NBER, 1991). The reason for these segmentations is if those 5 factors are indeed associated with fundamental analysis, Varying lengths of time may result in variations in the significance level of those five factors because fundamental analysis forecasts stock returns in a different way for short-term and long-term (Hancock & Seng, 2012). The goal of this research to present an evidence-based conclusion on whether investment, profitability, market, book-to-market, and size factors significantly affect the excess stock returns in the longer (2005-2019) period and shorter (2005-2009, 2010-2014, 2015-2019) periods. The contributions are 1)to fill the gap in the knowledge universe in academia about whether each of the five-factors affects excess return on stock both in the shorter and longer periods, and how the implication of each of the five-factors differs for the shorter and longer periods, also within the shorter periods, 2) to give investment professionals an evidence-based understanding of how the five-factors affect excess stock returns in Indonesia both in the shorter and longer periods.

2. THEORITICAL FRAMEWORK

The evolution of asset pricing theories has a long history. Before the second half of twentieth century, economists and practitioners believed that the stock market is more of a “casino” than a “market”, and thus intuitions take precedence over scientific analysis in describing the return on stocks (Bier, 2019). However, this “casino” view was later challenged. Harry Markowitz (1952) pioneered the Modern Portfolio Theory, a theory that allows risk-averse investors to build portfolios that maximizes expected return based on a given level of market risk, by proposing that investments’ risks and returns be evaluated by how they affect the overall portfolio’s risk and return characteristics and not to be viewed on an individual basis.. Banz (1981) also found that there is a negative relationship between market capitalization and average return, something that the CAPM does not factor in for US stocks. Furthermore, Chan, Hamao and Lakonishok (1991) found that expected returns develops a direct relationship with book-to-market. Rosenberg, Reid and Lanstein (1985) also found the consistent result with the previous study that Book-to-Market produces dispersion in average returns. These and other studies that found relationships between variables other than beta and average stock returns proved the failure of CAPM as a single and comprehensive asset pricing theory because it turns out that beta is not the only source of priced risk. An alternative to CAPM was developed by Ross (1976) and is now known as the Arbitrage Pricing Theory (APT). Like CAPM, APT is based on the assumption of linear relationship between stock return and a risk factor, but APT allows numerous risk factors – as many as are relevant to the particular stock being examined. A non-arbitrage circumstance in the stock market is

utilized to come up with the risk factors and calculate betas for the risk factors. Besides that, other factors may be different from one stock to another because every stock can have specific variables that affect the return rate. Despite the theoretical elegance and flexibility, APT is not widely implemented in practical settings due to its failure to specify risk factors and the inherent complexity in identifying and estimating betas for individual stocks within a portfolio (Singal, 2019).

While the work of Markowitz generally focused on risk and returns on portfolios, Sharpe (1964) and Lintner (1965) eventually introduced a model that properly tried to explain individual stock returns. The model focused on the relationship between stock returns and systematic risk. Sharpe argued that investors should receive compensation commensurate with the risk they are assuming and the time value of money.. This model was later named the Capital Asset Pricing Model (CAPM). According to CAPM, asset return is established merely by the systemic risk, i.e., beta. While initial empirical tests proved the theory to be solid, later empirical findings pointed to the inconsistencies of the theory. One major criticism came from Basu (1977) who discovered an unexplained positive correlation of US shares between the earnings to price ratio (P/E ratio) and the average return. Banz (1981) also found a non-positive relationship between market capitalization and average return, something that the CAPM does not factor in.

In light of the difficulty in identifying risk factors in using the APT, Fama and French built a multifactor framework that does specify risk factors used. Besides addressing this problem, Fama and French (1992) also proved inconsistency of CAPM by pointing out that if beta and return were permitted to fluctuate independently of size the CAPM-suggested positive linear relationship would disappear. Their study yielded a three-factor asset pricing model (1992) that includes the market factor (excess market return), size factor (SMB), and book-to-market factor (HML). Subsequent studies have shown that the three-factor framework can effectively justify cross-sectional stock returns. Studies by Novy-Marx (2013), Titman, Wei, and Xie (2004) proved that the three-factor model is a substantial portion of the variability of mean returns associated with investment and profitability is overlooked by the model, rendering it an inadequate representation of expected returns. Stimulated by this evidence and based on the valuation theory, profitability and investment were added to the three-factor model and Fama and French (2014) called it as five-factor asset pricing framework. Fama and French (2014) test the performance of the five-factor model in predicting the expected return using stocks listed in America from NASDAQ, The American Stock Exchange (AMEX), and The New York Stock Exchange (NYSE).

2.1. Excess Return

Excess stock return is essentially the difference between the actual return on the stock and risk-free rate. The risk-free rate used is normally proxied by the return on the most recent short-term government treasury bill (Singal, 2019). Frequently, investors do not attain excess returns. Nonetheless, occasional market anomalies and stock price deviations from their intrinsic value have been observed.(Ying et al., 2019).

2.2. Market Factor

The market factor, which is the difference between the risk-free rate and the return on the market portfolio, measures the excess return on the market portfolio (RMRF). Similar to the risk-free rate utilized in the computation of excess return on a market portfolio, is also normally proxied by the return on the most recent short-term government bill (ycharts, n.d.). Sharpe (1964) and Lintner (1965) argued that the returns on stocks follow systematic risk and compensate investors for the risk they are taking as premium surpassing the risk-free rate of return they could have made. In the theory of finance, multifactor models are used to estimate

the sensitivity of security returns to specific factor i.e. beta. One of the factors in the multifactor model that is often used is the expected excess return on the market (Rm-Rf). Note that expected excess stock return is the product of the factor sensitivity(beta) and the risk factor which is the market portfolio's or market index's excess return.

2.3. Size (Small Minus Big) Factor

Generally, there are three approaches used to measure firm size: total sales, market capitalization, and total assets (Wibowo & Angela, 2020). Fama and French (1992, 2014) used market capitalization to measure the size factor. Therefore, the researchers would also use market capitalization to measure the SMB factor in this study. Market capitalization reflects the ownership of equity. The size (SMB) factor measures the difference between the returns on diversified portfolios of stocks of small companies i.e. those with small market capitalization and big companies i.e. those with large market capitalization. Banz (1981) discovered empirical evidence for the notion that size contributes to the understanding of how market βs compute average returns across sections, as elucidated in the Capital Asset Pricing Model (CAPM)Firms with small market equity or known as small size stocks are found to have very high returns while large stocks' returns are inadequately low considering their βs estimates. This finding contradicts those of Sharpe(1963), Lintner (1965), Black (1972). Fama and French (1992) found non-positive relation of size and average returns that is robust unlike market factor and average return relation which disappears when being tested on 1963-1990 period. These findings are consistent with Leledakis, Davidson, and Smith (2004) research on the United Kingdom stocks which further confirmed the size effect, average stock returns is consistently higher for small firms when measured by their market equity and non-market indicators or the true magnitude of the organization (number of employees, annual sales, book value of total asset, and book value of gross fixed assets).

2.4. Book-to-Market (High Minus Low) Factor

The book-to-market is calculated from market value of equity divided by the book value of equity. The book-to-market factor is often associated with the division of growth stock and value stock. Graham and Dod (1935) defined growth stocks as stocks that trade at a relative high price compared to their fundamentals and value stocks as stocks that exchange at a relatively low price compared to their fundamentals. Although there are numerous methods for categorizing stocks as growth or value stocks according to their price in relation to their underlying fundamentals, scholars predominantly rely on three ratios: price-to-book (P/B), price-to-earnings (P/E), price-to-cashflow (P/C) or the equivalence of these ratios which are earnings-to-price, book-to-market, cash flow-to-price (Rabbani & Muharam, 2018). Fama and French (1992, 2014) used book-to-market (HML) factor In order to quantify the disparity in returns of diversified portfolios consisting of growth stocks (low book-to-market ratio) and value stocks (high book-to-market ratio).

Many studies have found that stocks that are considered as value stocks outperform those considered as growth stocks. Francis (Nicholson, 1960) was the first to find stocks that have a low price-to-earnings ratio generate greater returns in comparison to ones that have a high price-to-earnings ratio. Later, this finding was confirmed through testing by Ball (1978) and Basu (1977). Fama and French (1992, 2014) used book-to-market to capture the effect of value factor on excess stock return. According to their research, book-to-market exchange rates and excess return are positively correlated.

2.5. Profitability (Robust Minus Weak) Factor

The two most common proxies to measure profitability are Return on equity (ROE) and Return on assets (ROA). Whereas ROA reflects how well a firm is able to use its investment

resources to generate profits, ROE reflects shareholders' return on their equity (Marandu & Sibindi, 2016). Fama and French (2014) used a different metric to measure profitability computed as revenues deducted by cost of sales, interest expense, and selling, general, and administrative expenses, scaled by book equity. They call it Operating Profitability (OP). It is important to note, however, that this variable is operating profitability without interest expense. The reason for using this metric, however, is not discussed in Fama and French's original study and it has never been discussed in any other studies examining the pertinency of Fama and French Five-Factor model. While the RMW factor computes the disparity in returns between diversified portfolios comprising stocks characterized by strong profitability.i.e. stocks with high Operating Profitability (OP) and efficiently profitable stocks i.e. those with low Operating Profitability (OP). Profitable firms, while having slightly higher valuation ratios, produce significantly higher returns than unprofitable firms. Profitability was further researched and confirmed by Akbas, Jiang, and Koch (2017) whose study shows that companies with upward profitability trends perform better than those with downward trends. Profitability trends give predictive incremental information about expected forthcoming profits and share returns. Fama and French (2014) used the profitability element in their test and found that it helps in predicting the returns with a positive correlation.

2.6. Investment (Conservative Minus Aggressive) Factor

Total asset growth is utilized as investment's proxy by Fama dan French (2014). This is different from the original valuation theory which measures investment as book equity growth. However, Fama and French (2014) stated that "We have replicated all tests using the growth of book equity, with results similar to those obtained with the growth of assets. The main difference is that sorts on asset growth produce slightly larger spreads in average returns" Perhaps the lagged growth of assets represents the infinite sum of anticipated future growth in book equity more accurately in the valuation equation than the lagged growth in book equity. The use of total asset growth as investment's proxy is consistent with the objective of measuring excess stock return because Cooper et al (2008) confirmed that asset growth is indeed one of the determining factors of return on a stock. The investment (CMA) factor, as used by Fama and French (2014), measures the disparity within diversified portfolios' return of conservative investment shares i.e. low asset growth and those with aggressive investment shares i.e. high asset growth. Aharoni, Grundy, and Zeng (2013) documented that firms that have high investment/asset growth tends to give low average returns. Fama and French (2014) employ total asset growth to calculate the level of company investment; this is different from the valuation theory, where the level of investment is measured by the book equity growth. Chen, Novy-Marx, and Zhang (2011) also states "asset growth is the most comprehensive measure, where investment equals the change in total assets ".

2.7. Hypotheses

H1: Investment, Profitability, Book-to-market, Size, Market factors significantly affect excess stock returns in Indonesian stock market for the period of 2005-2019 (longer period).

H2a: Investment, Profitability, Book-to-market, Size, Market factors significantly affect excess stock returns in Indonesian stock market for the period of 2005-2009 (shorter period).

H2b: Investment, Profitability, Book-to-market, Size, Market factors significantly affect excess stock returns in Indonesian stock market for the period of 2010-2014 (shorter period).

H2c: Investment, Profitability, Book-to-market, Size, Market factors significantly affect excess stock returns in Indonesian stock market for the period of 2015-2019 (shorter period).

3.Methodology

3.1 Sample

The population of this research is all publicly listed companies in the IDX composite from 2003-2019, and there are 712 companies included. In this research, the researchers utilize the non-probability sampling with purposive sampling as the sampling design. The set of parameters are: (1) Listed in the IDX composite from 2003- 2019 consecutively, (2) Excluding stocks from banking sector, (3) Excluding stocks with negative equity, (4) Selected companies require data of interest expense, operating income, and book value of equity for earlier year, (5) The companies required to have total asset data of years t-2 and t-1.

Table 1. Sample Descriptive

Parameters	Number of Companies
Companies whose listing date are available on Bloomberg and are listed consecutively in IDX composite from 2003-2019	235
(-) Companies from banking sector	19
(-) Companies with negative equity	47
(-) Companies with incomplete financial data	135
Total Companies	54

3.2 Measurement of Variables

Excess stock return is operationalized as follows:

Excess stock return = stock (portfolio) return – risk-free rate of return (1)

which stock portfolio return is computed as value-weighted return of the shares in portfolio. Value-weighted return is computed as weighted average-return where the weights are each stock's market capitalization in the portfolio

The market factor is operationalized as follows:

Excess market portfolio return = market portfolio return – risk-free rate of return (2)

The size (SMB) factor is operationalized as follows:

SMB = Return of small-market-cap firms – Return of large-market-cap firms (3)

where market capitalization = number of shares outstanding x stock market price

The SMB factor as computed as follows:

SMB = (SMB B/M + SMB OP + SMB Inv) / 3 (4)

The book-to-market (HLM) is operationalized as follows:

HML = Return on shares with high B/M – Return on shares with low B/M (5)

Book-to-market (B/M) = total equity / market capitalization (6)

In analyzing the book-to-market (HML) and size (SMB), the stocks are sorted into 2 portfolios: Big for those with market capitalization above the median value of all the stocks, and Small for those with market capitalization below the median value as in the table below:

Table 2. Book-to-Market (HML) and Size (SMB) Portfolio

		Book-to-Market (HML)		
		Low (L)	Neutral (N)	High (H)
Size (SMB)	Small (S)	SL	SN	SH
	Big (B)	BL	BN	BH

The size-book-to-market (SMB B/M) and book-to-market (B/M) factors are computed as

SMB B/M = (SH + SN + SL) / 3 – (BH + BN + BL) / 3 (7)

HML = (SH + BH) / 2 – (SL + BL) / 2 (8)

Before analyzing the data using multiple regression, there are four classic assumptions that researchers should pay heed to in regression analysis which are no multicollinearity (variance inflation factor (VIF), no autocorrelation (Durbin Watson test), homoscedasticity (Breush-Pagan test), and normality (Kolmogorov Smirnov test) (Lind et al., 2012).

The profitability (RMW) factor is operationalized as follows:

RMW = return on shares with sturdy profitability – return on shares with low profitability (9)

Operating profitability (OP) = (Revenue – Cost of Sales – Interest Expense – Selling, General, and Administrative Expense)/Total Equity (10)

In analyzing the size (SMB) and profitability (RMW) factors, the stocks are sorted into 2 portfolios: Big for those with market capitalization above the median value of all the stocks, and Small for those with market capitalization below the median value as in the table below:

Table 3. Size (SMB) and Profitability (RMW) Portfolios

		Profitability (RMW)		
		Weak (W)	Neutral (N)	Robust (R)
Size (SMB)	Small (S)	SW	SN	SR
	Big (B)	BW	BN	BR

The size-operating profitability (SMB OP) and profitability (RMW) factors are computed as follow:

SMB OP = (SR + SN + SW) / 3 – (BR + BN + BW) / 3 (11)

RMW = (SR + BR) / 2 – (SW + BW) / 2 (12)

Fama dan French (2014) used total asset growth as a proxy for investment. The investment (CMA) factor is operationalized as follows:

CMA = Return on conservative investment stocks – return on stocks with aggressive investment shares (13)

investment = (Total $Asset_{t-1}$ – Total $Asset_{t-2}$)/Total $Asset_{t-2}$ (14)

In analyzing the size (SMB) and investment (CMA) factors, the stocks are sorted into 2 portfolios: Conservative for those with market capitalization above the median value of all the stocks, and Small for those with market capitalization below the median value as in the table below:

Table 4. Size (SMB) and Investment (CMA) Portfolios

		Investment (CMA)		
		Conservative (C)	Neutral (N)	Aggressive (A)
Size (SMB)	Small (S)	SC	SN	SA
	Big (B)	BC	BN	BA

The size-investment (SMB Inv) and investment (CMA) factors are computed as follow:

SMB Inv = (SC + SN + SA) / 3 – (BC + BN + BA) / 3 (15)

CMA = (SC + BC) / 2 – (SA + BA) /2 (16)

Then, multiple regression model is formulated as below for each portfolio i and period j:

$$ESRet_{ij} = \alpha_0 + \alpha_1 EMRet_{ij} + \alpha_2 SMB_{ij} + \alpha_3 HML_{ij} + \alpha_4 RMW_{ij} + \alpha_5 CMA_{ij} + \varepsilon_i \quad (17)$$

Which $PERet_{ij}$ is Excess Stock Return for portfolio i and period j measured by (1), $EMRet_{ij}$ is Excess Market Return for portfolio i and period j measured by (2).

4.Results and Discussion

From the Table 5, we can see that during January 2005- December 2019, the constructed portfolio generated a positive 0.2% excess return each month with a standard deviation of excess return standing at 5.71%. The constructed portfolio performed worst in October 2008, where it generated an excess portfolio loss of 35.71% in a month, and performed best in April 2009, where it generated an excess portfolio return of 14.89% over a month.

Table 5. Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Excess Port Return	180	0.0021591	0.0571465	-0.3570936	0.1488884
Market Factor	180	0.0045368	0.0556945	-0.3286335	0.1913357
SMB	180	0.0061219	0.0525233	-0.1691479	0.2217417
HML	180	0.159035	0.098489	-0.1833278	0.6276675
RMW	180	0.0033886	0.0726798	-0.2450284	0.312743
CMA	180	-0.0010149	0.0530958	-0.1871153	0.1523395

There are four classical assumptions test that should be fulfilled to avoid biased or misleading results, and each test is applied to each portfolio that consists of the longer (2005-2019) period and shorter (2005-2009, 2010-2014, 2015-2019) periods. All portfolios have passed four classical assumptions test and could be continued to the multiple regression analysis.

Table 6. Regression Results

Variable	Period			
	2005-2019	2005-2009	2010-2014	2015-2019
Market Factor	0.9823***	0.9579***	0.9378***	1.1102***
SMB	-0.1431***	-0.1844***	-0.1038**	-0.1452**
HML	-0.0353**	-0.0047	-0.0193	-0.0298
RMW	0.0193	0.1281***	-0.0370	-0.0188
CMA	0.0210	-0.0421	-0.0226	0.0390
Constant	-0.0009	-0.0043**	-0.0043**	-0.0036
Adj R.Square	0.8935	0.9604	0.9016	0.7954
F-Test	0.00	0.00	0.00	0.00

*p-value<0.1; ** p-value<0.05; ***p-value<0.01

4.1 Market Factor towards Excess Portfolio Return

As can be seen from table 6, market factor across the four periods (2005-2019, 2005-2009, 2010-2014, 2015-2019) consistently proves to have a significant positive relationship with excess portfolio return. This is consistent with the results of the studies by Sharpe (1964), Lintner (1965) and Fama and French (1992, 2014) themselves. Given the broad stock market index presents a gauge of market sentiment (Kaplan & Kelly, 2019), this study proves that investors have been correct in watching the market return before forming expectation on the return of their portfolios.

4.2 SMB Factor towards Excess Portfolio Return

The outcome of the regression in this study displays a consistently significant non-positive relationship of SMB or size factor and excess portfolio return for both shorter (2005-2009, 2010-2014, 2015-2019) periods and the longer (2005-2009) period. This means this study shows that portfolios of small-cap shares underperform portfolios of large-cap shares. This finding is not aligned with Fama and French (1992, 2014)'s conclusion of positive significant relationship. The result is also inconsistent with other studies related to the return attributable to the size factor in Indonesia such as that of Junarsin (2014), and Wijaya et al. (2017), but is consistent with the study by Heriyandi (2017) and Wijaya et al. (2017). Given the fact that many past studies conclude that small-cap stocks outperform large-cap stocks in Indonesia, the researchers then checked whether this finding specifically happened to the constructed portfolio or if it is representative of the whole index by comparing the performance of MSCI Indonesia Large Cap (MXIDLC) Index and MSCI Indonesia Small Cap (MXIDSC) Index over the period of December 2009 – December 2019.

Over the period of December 2009 to December 2019, MSCI Indonesia Large Cap Index delivered a price return of 134.77% while MSCI Small Cap Index delivered a price return of -9.07% (Bloomberg, 2019) in line with the finding in this research that large-cap stocks outperform small-cap stocks. One rationale that may explain this is that foreign investors kept buying large-cap stocks over that period, and thus driving their prices upward. Hariyanto Wijaya (Prasidya, 2020) stated that foreign investors generally invest in Indonesian market through Exchange Traded Funds, causing stocks with large capitalization to rally. Therefore, the researchers believe that the negative SMB factor defined the Indonesian stock market during the period observed, and that it may continue to characterize the Indonesian stock market going forward.

4.3 HML Factor towards Excess Portfolio Return

This study produces 2 different results with regards to the relationship between excess portfolio return and HML factor: negatively significant relationship for the longer (2005- 2019) period , which means high book-to-market stocks' portfolios underperform of the low ones, and insignificant relationship for each of the shorter periods (2005-2009, 2010-2014, 2015-2019), which means portfolios of high book-to-market shares do not necessarily outperform or underperform portfolios of low ones. The significant negative relationship between HML and portfolio excess return over the period of 2005-2019 is inconsistent with Fama and French (2014)'s findings that when adding RMW and CMA factors the HML factor becomes redundant. Another study by Beneda (2002) also reveals that long-term performance (more than 14 years) of growth stock is higher than long-term performance of value stocks, which may explain why the longer period regression (2005-2019) used in this study points to a significant negative relationship between HML and excess portfolio return while each of the shorter period regressions (2005-2009, 2010-2014, 2015-2019) suggests insignificant relationship between the HML and excess portfolio return. It should be noted, however, that Fama and French (2014) used data over 606 months period, starting from July 1963 – December 2013, and still found a positive significant relationship between HML factor and portfolio excess return although the HML factor is also found to be redundant. Still, a study by Willim (2019) that uses Sharpe, Treynor, and Jensen indices to measure portfolio performance also concluded that returns on growth stocks are higher than returns on value stocks in Indonesian market. Still, a study by Willim (2019) that uses Sharpe, Treynor, and Jensen indices to measure portfolio performance also concluded that returns on growth stocks are higher than returns on value stocks in Indonesian market. To check which findings actually hold in the Indonesian stock market, the researchers compare the returns of MSCI Indonesia Growth (MXID000G) Index and MSCI Indonesia Value (MXID000V) Index as follows.

The MSCI Indonesia Value Index generated a price return of 90.73% while MSCI Indonesia Growth Index generated a return of 108.83% over the same period, in support the researchers' conclusion of significant negative relationship between HML and excess return in the longer period (2005-2019) and insignificant relationship between the two variables in the shorter periods (2005-2009, 2010-2014, 2015-2019). Therefore, one may conclude that growth stocks do outperform value stocks in longer term in the Indonesian market. One rationale that can explain this phenomenon is that most Indonesian investors may not know of the attractive valuation of value stocks due to the low financial literacy in Indonesia. Financial literacy in Indonesia stood at 38.03% in 2019 (OJK, 2020), relatively lower compared the US which is estimated to have a financial literacy of 57%. Hence, it should come as no surprise that some investors just follow others' call when they buy stocks without knowing any fundamental and technical analysis (Puspitasari, 2021). This may explain why value stocks' performance do not rise in Indonesia even in a long- term because people simply do not buy the stocks despite their attractive valuation because they do not know how to analyse the fundamentals of the stock.

4.4 RMW Factor towards Excess Portfolio Return

The outcome of regression shows that the RMW factor for the longer period and shorter periods to have insignificant explanatory power to stock excess return meaning that neither portfolios of robust or weak profitability stocks underperform or outperform each other with exception for the 2005-2009 period which indicates a significant positive relationship towards excess stock returns that means portfolios of sturdy profitability stocks do outperform portfolios of weak profitability stocks. In this case, the 2005-2009 period is aligned with the original Fama and French (2014) study which concluded a positive significant relationship, for companies that have high level of profitability will produce higher returns. Another study by Heriyandy (2017) also supports the non-negative significant relationship of profitability and portfolio excess return used in his study. The result of this study for the longer (2005-2019) period and two of the shorter (2010-2014 & 2015- 2019) periods which indicates insignificant relationship between RMW factor and excess portfolio return are consistent with other researches on Indonesian market, such as Ekaputra and Sutrisno (2020), and Munawaroh & Sunarsih (2020).

Interestingly, the period in which this study shows significant RMW factor towards portfolio stock return is during the previous global financial crisis of sub-prime mortgages. Stock markets were less efficient in incorporating company-specific information into stock prices during the crisis, indicating that companies' performance differ between non-crisis and crisis times (Lee et al., 2017). One rationale that we can suggests for why RMW factor is significant during the period of 2005-2009 is the change in institution and investors behaviour to be risk-averse and stay away from riskier investments (Alves & Francisco, 2015). The implication to this study's rationale is that stock market participants would have the opportunity to better evaluate their investments to companies that were financially sound.

4.5 CMA Factor towards Excess Portfolio Return

This study has produced results that are in the opposite of what Fama and French (2014) claimed in their study which documented companies with conservative investments are having higher return than companies with aggressive investment. The CMA factors, which are measured by the total asset growth in this case, do not significantly affect the excess portfolio returns in this study for both the shorter and longer periods from 2005-2019, 2005-2009, 2010- 2014 and 2014-2019 meaning that portfolios of conservative investment stocks neither underperform or outperform portfolios of aggressive investment stocks. Another research of Fama and French Five-Factor model (2014) that supports our result was conducted in the German market by Dirkx & Peter (2020) to test the profitability and investment premium, and their result shows that the investment factor relevance with regards to international asset pricing not liable for transfer to a specific country. However, in practice, this is not always the case since studies on the Indonesian market over the previous years have been inconclusive with regards to the CMA factor. One theory states that the negative relationship between investment and stock returns is due to investors doubt against managers' empire building that tend to maximize their own gains over shareholders. The implication of this theory to our study suggest that the insignificant effect of the CMA factor on excess portfolio returns is perhaps due to the fact that Indonesian market participants still believe that those companies with high investment still have high growth to offer. High asset growth in developing market may signal attractive potential return that it might bring, and this might be the rationale why most asset growth effect is insignificant in emerging markets.

5.Conclusion

The results show the excess portfolio return and market factor prove to have significant positive relationship for all the 3 shorter (2005-2009, 2010-2014, 2015-2019) periods and the longer (2005-2019) period, while it is a significant non-positive correlation between the SMB factor and excess portfolio return for all three shorter periods and the longer periods. The excess portfolio return and HML factor have a significant non-positive relationship for the longer period. However, the HML factor and excess portfolio return for the 3 shorter periods exhibit an insignificant relationship. The RMW factor in the longer period has an insignificant relationship with the excess portfolio return. While the relationship between the RMW factor and the excess portfolio return, nevertheless, is not uniform across the 3 shorter periods, as the 2 variables were proven to have a significant positive relationship during 2005-2009 while exhibiting insignificant relationships during the period of 2010-2014 and 2015-2019. Lastly, the relationship between the CMA factor and the excess portfolio return proves to be insignificant for the longer periods and all the 3 shorter periods.

Fama French 5threvision

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