

Validity of Fama-French Three Factor Model for Diversified Financial Companies Listed on the Colombo Stock Exchange

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Abstract

This study aims to test the validity of the Fama and French Three-Factor Model (FF3FM) in explaining the cross-sectional variation in stock returns of the diversified financial companies listed on the Colombo Stock Exchange (CSE). It adopted the Fama and French (1992) approach to construct the portfolios. Accordingly, six portfolios were constructed using a 2x3 annual sorting procedure based on market capitalization and book to market equity ratio. The sample period spans for five years, from April 2014 to March 2019 and the sample is included 37 diversified financial companies listed on the CSE. The data analysis is based on both descriptive statistics and inferential statistics which are derived on correlation analysis and multiple regression analysis. The results indicate that FF3FM performs well in explaining cross-sectional variation in stock returns. All three factors of the model - market risk premium, size premium, and value premium exhibit significant relations with excess portfolio returns. The study also finds that market risk premium is the most prominent factor of the model, while the other two factors share equal explanatory power. The results further confirm that FF3FM outperforms Capital Assets Pricing Model (CAPM) in explaining cross-sectional variation in stock returns. The study supports the prediction of Fama French (1992) that high BE/ME ratio portfolios outperform the portfolios with low BE/ME ratios. Considering these findings, it is recommended that, in addition to stock beta, size and value information should be made available to stock investors for conducting better assessment of uncertainties associated with investment returns.

Key Words: Diversified Financial Companies, Fama and French Three Factor Model, Market Risk Premium, Size Premium, Value Premium

1. Introduction

In general, investors expect to achieve the most appropriate trade-off between risk and returns to improve the financial investment results. Ideally, the most optimal portfolio is the one that generates the highest returns at the lowest risk level. Since the risks and returns are expected to be positively related, reaching such an optimal trading position is dilemmatic for most investors (Brigham & Houston, 2015). One of the most popular empirical models used to resolve this risk-return

dilemma is the CAPM which was originally developed by Sharp (1964) and Linter (1965). The main implication of CAPM is the linear relationship between expected return and systematic risk and it measures systematic risk based on beta (β). Early empirical studies such as Sharp (1964), Linter (1965), and Fama and MacBeth (1973) provide evidences that support the linear relationship between expected return and systematic risk. However, several empirical studies, after the 1980s, such as Reinganum (1981), Breeden and

Litzenberger (1989), and Fama and French (1992) found evidence that Beta (β) has very little explanatory power in explaining the returns.

To enhance the explanatory power of CAPM, Fama and French (1992) introduced FF3FM which incorporates size and value effects of stocks to the existing CAPM model. Accordingly, the model assumes that the cross-sectional variation of stock return can be explained by three factors, i.e. market risk premium, size premium and value premium. Fama and French (1992) used SMB (stands for “Small minus Big”) and HML (stands for “High minus Low”) for measuring the size premium and value premium respectively. SMB represents excess return from investing in stocks with relatively small market capitalization, while HML represents premium offered to investors for investing in companies with high book-to-market equity (B/E) value.

This study aims to test the validity of FF3FM for the Sri Lankan stock market, the Colombo Stock Exchange (CSE). The key motivation of this study is the fact that the CSE has become a highly volatile stock market over the past few decades with the economic and political instability of the country. Consequently, investors experienced large fluctuations in stock prices. Hence, there should be means to comprehensively take into account such systematic risk when making stock investment decisions. Since the CSE currently publishes only the market beta for such systematic risk assessment, the investors tend to merely rely on it when making their investment decisions. However, recent empirical evidence in the Sri Lankan context reveals that CAPM has lesser explanatory

power in predicting cross-sectional variations of stock returns than FF3FM (Randeniya and Wijerathna, 2012; Riyath and Nimal, 2016; Abeysekera and Nimal, 2017). Accordingly, by testing the validity of FF3FM model, this study attempts to further emphasize the significance of SMB and HML factors in the systematic risk assessment.

The findings of this work contribute in the following ways. First, with the support of prior evidence, the results emphasize the significance of SMB and HML factors in the systematic risk assessment of stocks, which can consequently stress the CSE the fact that the investors are better off by making them available information about these factors. Second, the findings of this study motivate the investors to apply SMB and HML factors to give better consideration for the systematic risk in their stock investment decisions.

The remainder of the paper is organized as follow. Section 2 reviews the literature about the evolution of asset pricing models, particularly, the FF3FM in both global and Sri Lankan contexts. While discussing about the data in Section 3, Section 4 presents the methodology employed in this study, which involves conceptualization, operationalization of variables, and data analysis procedure. The empirical results are reported in Section 5. Then, Section 6 concludes the paper with the empirical implications.

2. Literature Review

2.1. Evolution of Asset Pricing Models

The evolution of asset pricing theories was started along with the mean-variance portfolio theory introduced by Markowitz (1952). He argued that investors would tend to avoid risks

and investing in diversified portfolios will help them to enjoy optimal returns. Based on Markowitz's arguments, Sharp (1964), Linter (1965), and Mossin (1966) developed the first asset pricing theory that was later called the CAPM. The theory assumes that the rate of returns on a financial asset has a linear relationship with the asset market beta. Since its introduction, researchers, such as Black, Jensen, and Scholes (1972), Fama and Macbeth (1973) and Merton (1973) attempted to examine the validity of CAPM in predicting the rate of returns on assets. As a result of that many new forms of CAPM, were emerged, such as zero-beta CAPM and multi-risk factor CAPM.

Then, an important contribution to assets pricing theories Ross (1976) introduced Arbitrage Pricing Theory (APT). The theory argues that stock return is not influenced only by the market risk but other factors will also affect the return such as firm specified factors and macroeconomic factors. Therefore APT initiated the motivation to incorporate new factors into CAPM in addition to the market risk factor. Meanwhile, empirical studies such as Reinganum (1981), Breeden and Litzenberger (1989) also resulted in negative evidence about the validity of the market risk factor in predicting returns. As a reaction to these arguments, Fama and French (1992) introduced a new extended form of CAPM namely FF3FM.

2.2. Fama French Three Factors in Global Context

The testing of Fama and French Three Factors (FF3F) was started in 1981 when Banz (1981) investigated the relationship between firm size and expected return. In addition, Rosenberg,

Reid, and Lanstein (1985) found that book-to-market equity (BE/ME) also has the power to explain the variations in stock return. Afterward, Fama and French (1992) developed the FF3FM by incorporating these factors into the CAPM and tested the validity of three factors, all together, in NYSE. The study revealed that firm size and BE/ME explain most of the variation in the United States (US) stock returns. Again, Fama and French (1993) analyzed the explanatory power of the factors with the help of 25 stock portfolios from July 1963 to December 1991 based on size and book-to-market equity in NYSE and found that the cross-section of average returns on the US stocks can be explained by the market risk factor, a size factor, and a value factor.

The FF3FM was originally developed based on the NYSE data and its applicability was only restricted to the US context until Fama and French (1998) tested the model for several international markets. The study used data from NYSE, American Stock Exchange (AMEX), and NASDAQ Stock Market. The study ensured the validity of the model in these markets. However, the major limitation of Fama and French (1998) was the domination of a small number of large firms (Djajadikerta & Nartea, 2005). In response, to eliminate the domination of the small number of large firms, Griffin and Lemmon (2002) conducted a study using data from 1521 companies in Japan, 1234 in the United Kingdom, and 631 in Canada from January 1981 to December 1995. The study found that the FF3FM is well performed in these countries. Following the above observations, FF3FM has become one of the key asset pricing models in the global context and attracted the interest of many

researchers. As a result, FF3FM has been tested on, almost, every stock market in the world.

2.3. Fama French Three Factors in Sri Lankan Context

In Sri Lankan context, a very little evidence has been published on FF3FM and the results of these publications have been inconclusive at best. Samarakoon (1997) was the first study that investigated the FF3Fs in the Sri Lankan context. However, it found evidence against the FF3FM and therefore concluded that the firm size and BE/ME have no relations with stock returns. Later, the study conducted by Randeniya and Wijerathna (2012) applied FF3FM for two-time phases, namely the period during the civil war in Sri Lanka (before May 2009) and the period after the conclusion of the war in the CSE. The results of the study show the validity of market beta, firm size, and firm value in the CSE. Hence, contrary to these findings of Samarakoon (1997), it confirmed that the FF3FM is best suited for the Sri Lankan context in explaining the cross-sectional variations in stock returns for the period January 2000 and December 2010. The findings also supported the prediction of Fama and French's (1992) that "small-cap- high-value" portfolios will outperform relative "high-cap-small-value" portfolios.

Afterwards, the study conducted by Thilakarathne and Jayasinghe (2014) also added some inconsistent evidence towards the explanatory power of the FF3Fs. The main aim of the study was to test the validity of the market beta in explaining expected returns of stocks listed in the CSE. The results of the study revealed that while the market beta is a

significant variable in explaining the average stock returns, the firm size has a weak positive relationship with average stock returns. Thus, it criticized the explanatory power of the firm size as a factor representing FF3Fs. However, Riyath and Nimal (2016) found that the FF3FM is a better model in predicting the cross-sectional variations of stock returns of the listed companies in the CSE when time-series regressions are employed. The study aimed to investigate the suitability of various asset pricing models in explaining cross-sectional variation of stock returns in the CSE. It suggested that incorporation of firm size and firm value to the CAPM will explain the cross-sectional variation in stock returns more accurately than a single factor model. Similarly, Abeysekera and Nimal (2017) also documented that the FF3Fs are more efficient in explaining the cross-sectional variations in stock returns in Sri Lanka. The aim of the study was not to test the FF3FM but Carhart's (1997) Four Factor Model (C4FM). However, results individually indicated the explanatory power of FF3FM in addition to the fourth factor. The findings of the study suggested that firm size and firm value should be taken into consideration when evaluating portfolio performance. The results also in line with the Fama and French's (1992)'s prediction of "small-cap- high-value" portfolios will outperform "high-cap-small-value" in the market.

3. Data

The sample period covers from April 2014 to March 2019, which consists of a total of 60 months. The sample of the study is the stocks of the diversified financial companies listed on the CSE. The diversified financial service

sector is a specific category of the Global Industry Classification Standard (GICS) that is used by the financial community. It consists of a collection of companies that offer a wide range of financial products and services including commercial lending, asset management, credit card services, insurance services, student loan facilities, etc.

The data set includes monthly closing prices of stocks, number of shares outstanding and monthly All Share Price Index (ASPI), which are available in the Data Library (CD ROM) published by the CSE. Consistent with the previous studies, newly listed companies and de-listed companies during the sample period are dropped from the sample to maintain consistency across the study period. Accordingly, the final data set includes a total of 37 stocks with 2,220 monthly price observations. In addition, the book values of

the stocks are obtained from the respective company's annual reports. The three-month Treasury bill rate, which is used as the proxy for risk-free rate are obtained from the Central Bank of Sri Lanka's website.

4. Research Methodology

4.1. Conceptualization

Fama and French (1992) used market return, size factor based on market capitalization, and value factor based on book-to-market value to explain the cross-sectional variation of stock returns. Hence, the research variables of the study include excess returns of portfolios, market return, size factor and value factor. The market risk premium, SMB and HML are the proxies used to represent the market return, size factor and value factor respectively. Figure 1 depicts these conceptual relations between these research variables.

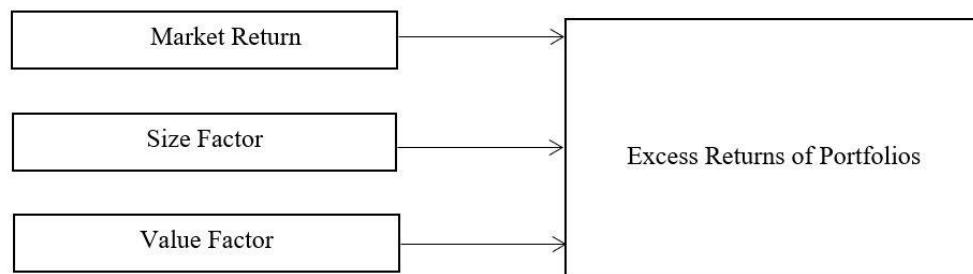


Figure 1: Conceptual Framework

Source: Fama and French (1992)

Consistent with Fama and French (1992), Fama and French (1993) and Fama French (1998), it can be predicted that market return, size factor and value factor relate to excess returns of portfolios, which are hypothesized below.

H1 : There is a relation between market risk premium and excess returns of portfolios.

H2 : There is a relation between SMB and excess returns of portfolios.

H3 : There is a relation between HML and excess returns of portfolios.

4.2. Operationalization of Variables

The FF3FM is specified by the equation (1) (Fama and French, 1992).

$$RP_t - RF_t = a + b [RM_t - RF_t] + sSMB_t + hHML_t + e_t \dots \dots \dots (1)$$

Where:

- RP_t : Return on the test portfolios
- RM_t : Market return
- RF_t : Risk-free rate
- SMB_t : Return on the size factor
- HML_t : Return on the value factor
- a : Abnormal mean return of portfolio
- b, s, h : Market, size and value factor exposure of portfolio
- e_t : Mean-zero assets- specific return of portfolio

These variables of the equation (1) are operationalized as follows.

• Market Return

The ASPI is used as a proxy for market return, which is calculated monthly as per the equation (2).

$$RM = \left(\frac{ASPI_t}{ASPI_{t-1}} \right) - 1 \dots \dots \dots (2)$$

Where:

- RM : Market return
- $ASPI_t$: ASPI at month t
- $ASPI_{t-1}$: ASPI at month t-1

• Stock Return

Stock return is the difference between the current month's price and the previous month's stock price relative to the previous month's stock price, as computed by the equation (3).

$$R = \left(\frac{P_t}{P_{t-1}} \right) - 1 \dots \dots \dots (3)$$

Where:

- R : Stock return
- P_t : Stock price at month t

P_{t-1} : Stock price at month t-1

• Firm Size

This study uses market capitalization (multiplication of the number of shares outstanding by market price of stock) as a proxy for firm size. Stocks are ranked on their market capitalization, which are then partitioned into big stocks (B) and small stocks (S) based on the median market capitalization. The stocks that are located above the median value are classified as "big stocks (B)", whereas those located below the median value are classified as "small stocks (S)" (Achola & Muriu, 2016).

• Book-to-Market Equity Ratio

The book-to-market equity ratio (BE/ME) is obtained by dividing the book value by the market value of the stock. The book value is total equity minus preferred stock, while the market value is the number of outstanding shares multiplied by the stock price. The BE/ME ratios are then ordered from the highest to the lowest value. The upper 30% is classified as "high (H)", the middle 40% as "medium (M)", and the bottom 30% as "low (L)" (Chandra, 2015).

Afterwards, six non-overlapping portfolios are constructed at the end of each year with the intersection of the size and book-to-market groups, as shown by Figure 2. The stock composition of the portfolios remains the same from April of year t to March of year $t+1$. Based on these six portfolios, values of SMB and HML factors are estimated, as discussed below, monthly from April of year t to March of year $t+1$. This SMB and HML factor estimation procedure is repeated for each month from April 2015 to March 2019.

		Book-to-Market Equity		
		High (H)	Medium (M)	Low (L)
Size	Small (S)	Small Size and High Value (S/H)	Small Size and Medium Value (S/M)	Small Size and Low Value (S/L)
	Big (B)	Big Size and High Value (B/H)	Big Size and Medium Value (B/M)	Big Size and Low Value (B/L)

Figure 2: Construction of Portfolios
Source: Fama and French (1992) and Chandra (2015)

• High minus Low (HML)

HML is the proxy measure of the value factor. It is the difference between the average return of two portfolios with high BE/ME (S/H and B/H) and the average return of two portfolios with low BE/ME (S/L and B/L), as obtained by equation (5).

$$HML = \frac{1}{2}(S/H + B/H) - \frac{1}{2}(S/L + B/L) \dots \dots \dots (5)$$

4.3. Data Analysis

Consistent with many previous studies such as Fama and Macbeth (1973), Nimal (2006), Gregory, and Nimal and Fernando (2013), the “Multiple Regression Framework” is used in this study to estimate coefficients of risk factors. In addition, this study applies a special data analysis and presentation approach

adopted by Karp and Vuuren (2017) which runs the regression for each portfolio individually and is presented separately to enhance the validity of the results and discussions. The regression analysis is also performed to both CAPM and FF3FM separately to compare the explanatory power of the models. Further, the performances of individual portfolios are evaluated by looking at the intercept values of the regression analysis. Moreover, the correlation analysis is used to test the correlation between FF3F during the study period.

5. Results and Discussion

5.1. Statistical Description of the Portfolios

Table 1 shows the number of stocks in each of the six portfolios constructed to generate FF3F over the period from April 2014 to March 2019.

Table 1: Number of Stocks in the Six Portfolios Formed by the Intersection of Size and Value Factors

Year	B/H	B/M	B/L	S/H	S/M	S/L	Total
2014/2015	1	9	9	10	6	2	37
2015/2016	2	8	9	9	7	2	37
2016/2017	1	8	10	10	7	1	37
2017/2018	1	8	10	10	7	1	37
2018/2019	1	9	9	10	6	2	37

It appears from Table 1 that the small size stocks are concentrated in the portfolios with higher BE/ME ratio, while big size stocks are concentrated in the portfolios with lower BE/ME ratio. This indicates that the small stocks are distressed since their low earnings-

generating capability in the future. On the contrary, the big capitalized stocks give a sign of high earning capability in the future. These results are in line with Srimarksuk (2007) and Ajlouni and Khasawneh (2017).

Table 2: Descriptive Statistics of the Six Portfolios' Excess Return

Descriptive Statistics	B/H	B/M	B/L	S/H	S/M	S/L	Average
Mean	0.54	-0.02	-0.53	0.28	0.60	-0.40	0.08
Standard Deviation %	2.67	1.77	1.70	1.72	1.95	6.11	2.65
Skewness	0.45	1.49	1.26	-0.32	1.70	-0.11	0.75
Kurtosis	-3.07	2.19	2.78	-0.54	3.38	1.59	1.05
High	3.46	2.90	2.25	2.36	3.91	8.02	3.82
Low	-2.12	-1.39	-2.40	-2.09	-1.17	-9.07	-3.04

Table 2 summarizes the descriptive statistics of the six portfolios' excess returns. Accordingly, the average excess return across the six portfolios during the sample period was 0.08. Fama and French (1992) predict that portfolios with small size and high BE/ME (S/H) stocks have the highest excess return. However, the results of the present study do not confirm this prediction as the highest excess return appears to be in the portfolio with small size and medium BE/ME (S/M).

In general, higher standard deviations of the portfolios are associated with higher average excess returns. Contrary to this argument, this study finds that the portfolio with small size and low BE/ME (S/L) is

associated with the highest standard deviation of excess returns (6.11%), which could be due to high volatility of stocks of low-capitalized diversified financial companies. Further, Table 2 highlights that excess returns of the portfolios are approximately normally distributed, as reflected by the average skewness value between 0.5 and 1 (moderately symmetrical) and average kurtosis value closed to one.

5.2. Statistical Description of Explanatory Variables

Table 3 shows the descriptive statistics of the explanatory variables of the FF3FM, namely market risk premium, HML, and SMB, as given by the equation (1).

Table 3: Descriptive Statistics of Explanatory Variables

Descriptive Statistics	Market Risk Premium	HML	SMB
Mean	-0.007	0.005	0.004
Standard Deviation	0.001	0.014	0.005

Kurtosis	0.932	4.735	4.718
Skewness	0.374	-0.576	0.085

Accordingly, HML has the highest average excess return and standard deviation, followed by SML and market risk premium. The average excess returns for HML and SMB are 0.5% and 0.4% respectively. The HML's high positive value over the study period indicates that portfolios with high BE/ME were outperforming the portfolios with low BE/ME, which supports the prediction of Fama and French (1992). Further, the same as the data distribution of portfolio excess returns, the distribution of explanatory

variables also moderately symmetrical, as reflected by the skewness values in between -1 and +1 and the kurtosis values of around 4.

5.3. Correlation of Excess Portfolio Returns

Table 4 reports the correlation matrix of the excess returns of the six portfolios. According, it seems that excess returns of many portfolios are strong as well as positively correlated with each other. Further, comparatively the portfolios with the same size asset also resulted in a higher correlation.

Table 4: Correlation Matrix of Excess Portfolio Return

	B/H	B/M	B/L	S/H	S/M	S/L
B/H	1					
B/M	0.64	1				
B/L	0.60	0.70	1			
S/H	-0.45	0.21	0.33	1		
S/M	0.64	0.97	0.77	0.17	1	
S/L	0.58	0.21	0.08	-0.24	0.02	1

5.4. Correlations of Three-Factors

Table 5 shows the correlation coefficients between the explanatory variables. Accordingly, SMB and market risk premium are negatively correlated ($\rho = -0.264$). Hence, it is expected that the variation in SMB has a negative impact on the market beta estimation, which however is not consistent with the positive correlation found by Fama and French (1993). On the other hand, consistent with Fama and French (1993), the correlation between HML and SMB is negative ($\rho = -0.11$). Further, there is a positive correlation between HML and market risk premium ($\rho = 0.458$).

Table 5: Correlation Matrix of FF3F

	Risk Premium	HML	SMB
Risk Premium	1		
HML	0.458	1	
SMB	-0.264	-0.110	1

5.5. Regression Results of CAPM

To test the effectiveness of FF3FM over CAPM, the study tests cross-sectional

variations of returns explained by market beta alone, as reflected by CAPM. Table 6 reports the regression results of the CAPM for each of the six portfolios.

Table 6: Regression Results of CAPM

Portfolio	Market Risk Premium		Standard Error	Adjusted R^2
	Coefficients	P-value		
B/H	2.177	0.000	0.194	67.90%
B/M	0.576	0.000	0.162	60.83%
B/L	0.431	0.043	0.209	5.24%
S/H	1.372	0.013	0.536	8.58%
S/M	1.276	0.000	0.265	27.29%
S/L	-0.287	0.619	0.574	-1.29%

It appears that CAPM performs pretty well in predicting the cross-sectional variance of stock returns of B/H, B/M, and S/M as evidenced by high adjusted R^2 values ranging from 27.29% to 67.9%. This indicates that CAPM performs better for big group stocks relative to small group stocks. In addition, the positively significant coefficients at 5% level

of significance for all the portfolios, except SL, reveal a strong co-movement of return between portfolios and the market. Overall, the findings support the validity of CAPM for diversified financial companies listed on CSE, as argued by Sharpe (1964), Linter (1965), and Limmack and Ward (1990).

5.6. Regression Results of Initial FF3FM

Table 7 summarizes the results of regression analysis performed individually for the six portfolios constructed to test the validity of the FF3FM. Accordingly, it seems that FF3FM performs relatively well for the diversified financial companies when compared with CAPM, as evidenced by relatively high adjusted R^2 ranging from 20% to 84% across the portfolios. These results are in line with the

findings of Barber and Lyon (1997) and Jackson and Patterson (2003) who documented that FF3FM performs well for financial sector companies. In addition, it is worth noting that coefficient estimates for the market risk premium for all six portfolios are positively significant at 5% level of significance, which made it to be the most prominent factor in FF3FM.

Table 6: Initial Regression Results of FF3FM

Portfolios	Market Risk Premium		SMB		HML		Adjusted R^2
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	
B/H	0.896	0.000	-0.096	0.261	0.131	0.024	70.26%
B/M	0.649	0.000	0.074	0.318	-0.016	0.746	60.83%
B/L	0.483	0.033	-0.256	0.004	-0.122	0.038	20.94%
S/H	0.544	0.044	0.954	0.000	0.862	0.000	83.43%
S/M	0.526	0.000	0.455	0.000	0.015	0.833	43.53%

S/L	0.957	0.000	0.714	0.000	-0.885	0.000	80.79%
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Further, the coefficient estimates of the size effect, as given by SMB, are significant at 5% level of significance for all the portfolios except for B/H and B/M, which implies that SMB loses its explanatory power for high-grouped stocks. Contrary to these results, Karp and Vuuren (2017) find that SMB is the most prominent factor of FF3FM in explaining the cross-sectional variations of returns of all portfolios. The coefficient estimates of the value effect, as given by HML, are also significant at 5% level of significance for all the portfolios except for B/M and S/M,

implying that the predictability power of HML is considerably low for the portfolios constructed with the medium-valued assets having a medium level of BE/ME. However, Karp and Vuuren (2017) document that the predictability of HML is low for S/L and S/M.

5.7. Removal of Insignificant Variables and Disjoint Tests

In addition to the initial regression test, the regression test was re-run by removing the insignificant variables, the results of which are summarized in Table 8.

Table 8: Regression Results after Removing Insignificant Variables of FF3FM

Portfolio	Market Risk Premium		SMB		HML		Adjusted R ²
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	
BH	0.955	0.000	-	-	0.130	0.025	70.11%
BM	0.576	0.000	-	-	-	-	60.83%
BL	0.483	0.033	-0.256	0.004	-0.122	0.038	20.94%
SH	0.544	0.044	0.954	0.000	0.862	0.000	83.43%
SM	0.752	0.000	0.455	0.000	-	-	44.48%
SL	0.957	0.000	0.714	0.000	-0.885	0.000	80.79%

As shown in Table 8, the removal of insignificant variables has caused adjusted R² to fall slightly, ranging from 20% to 83%. Higher values appear in the portfolio with small assets and high BE/ME ratio (S/H) and the portfolio with small assets and low BE/ME (S/L). The model can be considered to be stable since the coefficients and their significance remain unchanged after removal of insignificant variables. Similar to the

regression results of the initial FF3FM, market risk premium remains as the most prominent factor for all the portfolios.

Then, following the disjoint test procedure suggested by Karp and Vuuren (2017), two additional regressions were run to find which factor of HML and SMB contributes more in explaining cross-sectional variations in stock returns. Tables 9 and 10 present the results of the disjoint tests.

Table 9: Regression Results of Market Risk Premium with HML

Portfolio	Market Risk Premium		HML		Adjusted R ²
	Coefficient	P-value	Coefficient	P-value	

BH	0.955	0.000	0.130	0.025	70.11%
BM	0.602	0.000	-0.015	0.756	62.15%
BL	0.642	0.007	-0.124	0.048	10.04%
SH	-0.112	0.797	0.871	0.000	53.28%
SM	0.843	0.000	0.019	0.816	26.08%
SL	0.801	0.017	-0.874	0.000	42.03%

Table 10: Regression Results of Market Risk Premium with SMB

Portfolio	Market Risk Premium		SMB		Adjusted R ²
	Coefficient	P-value	Coefficient	P-value	
BH	0.920	0.000	-0.093	0.291	67.98%
BM	0.621	0.000	0.074	0.316	61.44%
BL	0.274	0.184	-0.258	0.005	16.10%
SH	0.922	0.000	0.770	0.000	38.38%
SM	0.552	0.000	0.455	0.000	44.48%
SL	0.441	0.359	0.997	0.000	34.96%

companies as the differences between the two models for B/H and B/M are considerably low.

From the results presented in Tables 9 and 10, it is found that the results are almost similar when the explanatory variables SMB and HML are tested individually, which imply that both factors have equal explanatory power. The adjusted R^2 values of both regressions are almost similar, which range from 10% to 70%. However, when compared to SMB, HML has high explanatory power for B/H, B/M, S/H, S/L with the adjusted R^2 values of 70.11%, 62.15%, 53.28%, and 42.03% respectively. Accordingly, consistent with Fama French (1992), it seems that BE/ME ratio is a more powerful predictor than firm size.

5.8. Comparison between the CAPM and FF3FM

The results presented in Table 11 reveal that FF3FM outperforms CAPM in explaining cross-sectional variations in stock returns of the diversified financial companies since adjusted R^2 values of FF3FM are higher than those of CAPM. However, CAPM appears to be suitable for the big-size diversified financial

Table 11: Comparison between CAPM and FF3FM Models

Portfolio	Adjusted R ²		
	CAPM	FF3FM	Difference
B/H	67.90%	70.26%	2.36%
B/M	60.83%	60.83%	0.00%
B/L	5.24%	20.94%	15.70%
S/H	8.58%	83.43%	74.85%
S/M	27.29%	43.53%	16.25%
S/L	-1.29%	80.79%	82.08%

5.9. Portfolio Performance Evaluation

As suggested by Karp and Vuuren (2017), the performance of the portfolios is evaluated based on the values of the intercept (Jensen's Alpha), which are presented in Table 12. Accordingly, the intercept estimates of all six portfolios are insignificant at 5 % level of significance, which support the fact that FF3FM captures a significant portion of the cross-sectional variation in stock returns.

Table 12: Intercepts Estimates of FF3FM

Portfolio	Intercepts		As the investors are exposed to high risk when investing in stock markets, especially in frontier and emerging stock markets due to market-wide factors such as economic instability and political uncertainty, there should be means to comprehensively take into account such systematic risk when making stock investment decisions. According to the findings of the study, FF3FM appears to be a valid mechanism for explaining the cross-sectional variations in stock returns. Accordingly, this study arrived at various implications with favorable evidence towards the suitability of FF3FM for the diversified financial companies listed on the CSE. First, the results of the study documented the validity of FF3FM for various portfolios constructed with various attributes (size and value). This encourages all types of investors from large-scale industrial investors to small-scale household investors to invest in the stocks of the diversified financial companies at low risk. Second, it is clear from the study that marker risk, firm size and firm value influence stock return differently. Therefore, portfolios should be evaluated with the most influential method that has the highest explanatory power. Accordingly, this study recommended that, in addition to stock beta, size and value information should be made available to stock investors for conducting better assessment of uncertainties associated with investment returns so that they would be able to mitigate risk exposure by a considerable level.
	Coefficient	P-value	
B/H	0.010	0.090	
B/M	0.010	0.051	
B/L	0.000	0.939	
S/H	-0.002	0.754	
S/M	0.014	0.065	
S/L	0.009	0.294	

5.10. Hypothesis Testing

The study intends to test three hypotheses, as given in section 4.1. The results of the study accept H1 since the coefficient estimates of market risk premium, as presented in Tables 7 and 8, are significant for all the six portfolios at 5% level of significance. Hence, there is a significant relation between market risk premium and excess returns of portfolios constructed for diversified financial companies listed on the CSE. In addition, with respect to H2, the findings presented in Tables 7 and 8 reveal coefficient estimates of SMB are significant for B/L, S/H, S/M and S/L portfolios at 5% level of significance. Thus, it appears that the results support H2 mostly for the small-size stocks. Accordingly, it can be deemed that there is a relation between size premium and excess return for the small-size stocks of the diversified financial companies listed on the CSE. Further, in relation to HML, the results show that the coefficient estimates of HML are significant at 5% level of significance for B/H, B/L, S/H and S/L portfolios. Hence, H3 is supported only for the portfolios with high and low BE/ME. Thus, there is a relation between value premium and excess return for high and low value stocks of the diversified financial companies listed on the CSE.

6. Conclusion

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