Institutions and Economies
Vol. 15, No. 3, July 2023, pp. 59-80 https://doi.org/10.22452/IJIE.vol15no3.3

A Five-Factor Asset Pricing Model of Shariah Compliant Firms in the United States

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Abstract: *Shariah compliant firms operating in an environment with little to no access to a robust Islamic capital market (such as in the United States (US) stock market) will exhibit a consistent bias towards certain corporate financial behaviour. Does this bias subsequently lead to a skewed asset pricing behaviour? To answer this question, this paper investigates the asset pricing behaviour of multiple samples of Shariah compliant firms listed in the US as compared to an overall conventional sample by employing the Fama & French Five-Factor Model. By applying contemporary Shariah stock screening methodology on a sample of all stocks listed in the NYSE, NASDAQ and the IEX from January 2000 to December 2019, this paper shows that asset pricing behaviour differs not only between Shariah compliant and conventional samples, but also amongst Shariah compliant samples themselves. Ultimately, this paper shows that when deriving the appropriate expected return for Shariah compliant portfolios in the US, there are evidence to suggest that the Fama & French Five-Factor model is more suitable compared to the traditional Capital Asset Pricing Model (CAPM) since the additional risk premiums show consistent significance across groups of Shariah compliant firms.*

Keywords: Asset Pricing; Equity Premium; Equity Pricing; NASDAQ; NYSE; Risk
JEL Classification: G12, G11, G32

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1. Introduction

Critical in the field of finance is the study of the variation of returns of different assets and what factors may explain these variations. A plethora of models, from the initial Capital Asset Pricing Model (CAPM) of Sharpe (1964), Lintner (1965) and Mossin (1966) to the Five-Factor Model of Fama and French (2015), has been used to explain the variations of average excess returns of stocks, usually in the familiar NYSE-AMEX-NASDAQ universe of the United States (US) public stocks.

Sukor and Abdul Halim (2022) however, showed that this familiar universe, when subjected through the contemporary Shariah Stock Screening methodology, becomes a universe that is very much skewed to a certain set of firm-specific characteristics, which may significantly alter its fundamental asset pricing behaviour. Interestingly, the issue of considerably different asset pricing behaviour of samples of Shariah compliant (SC) firms ought to be further investigated since interested Shariah conscious investors are, by definition, limited in their operations to only within the boundaries of the universe of SC firms.

Therefore, the relevant factors that go into the exhaustive explanation of variations of average excess returns of samples of SC firms are of utmost importance. This is because, a complete explanation entails accurate expected returns and/or discount rates. Accurate discount rates are important for samples of SC firms since this could lead to precise weighted costs of capital (WACC) for firms and consequently correct net present value (NPV) calculations for projects, as well as the proper gauging of the performance of mutual funds, all of which should be relevant to investors of SC firms.

Consequently, this paper attempts at bridging this knowledge gap by explaining the variation of average excess returns of samples of SC firms in the US from January 2000 to December 2019 using exclusively Fama and French (2015)'s Five-Factor Model.[1] To the best of our knowledge, studies on the asset pricing behaviours of SC firms are usually limited to the gulf countries (Derigs & Marzban, 2009) or in Malaysia, where these countries are considered to have robust[2] Islamic financial equity and debt markets. Asset pricing studies into SC firms who operate in an environment that does not have access to robust Islamic financial markets may yield interesting results to say the least.[3]

The paper focuses on US firm data for the following reason: previous literature (Sukor & Abdul Halim, 2022) has suggested that when SC firms are based in a market with little to no access to an Islamic capital market, i.e. they cannot or will not or do not care to issue Sukuks (Shariah compliant debt), then their corporate financial behaviour will be biased and skewed towards a certain trend (e.g they tend to be bigger, more profitable etc.). If so, would SC firms in the US, which represent such a market, have an altered asset pricing behaviour given their skewed corporate financial behaviour? Subsequently, what sort of asset pricing behaviour can we expect from SC firms in the US? Also, would they be different from the conventional US firm?

Recent literatures, such as Merdad et al. (2015), have attempted to answer these questions. They applied the Three-Factor model to SC firms, but they focused mostly on isolating the "Islamic Factor" rather than testing the former on SC firms. They also based their study in Saudi Arabia, where the studied firms have ample access to a liquid Islamic market. This paper contributes to the current body of literature by applying the Five-Factor model to SC firms in a stock market where the studied firms do not have access to a liquid Islamic capital market (i.e the US stock market), and therefore may experience skewed asset pricing behaviour compared to the conventional firm as a result of the biased corporate financial behaviour, as reported by Sukor & Abdul Halim (2022). The key objective of this paper is to investigate the asset pricing behaviour of multiple samples of SC firms listed in the US, each with varying definitions of Shariah compliancy, from January 2000 to December 2019 using the Fama & French Five-Factor Model. Additionally, the asset pricing behaviour of an overall conventional sample is then compared to the SC sample.

This paper is organised as follows. Section 2 examines the prior literature. Section 3 discusses the data and methodology used in the study. Section 4 illustrates the Five-Factor regression outputs and its implications. Finally, Section 5 concludes with some policy implications.

2. Literature Review

Asset pricing studies are amongst the widest and deeply studied areas of research in the fields of finance. The focus of this paper is to investigate which factors are most important in the asset pricing behaviour of samples of SC firms in the US instead of testing which asset pricing models or factor premiums are generally more robust *per se*. An excellent literature survey of asset pricing studies can be found in Goyal (2012), Subrahmanyam (2010) and Fama and French (2004).

Beginning with Sharpe (1964), Lintner (1965) and Mossin (1966) who each separately developed the CAPM, posits that the required rate of return for an individual stock is a function of its correlation with the market portfolio (and not its firm specific risks since investors only hold the market portfolio and not individual assets) plus the risk-free rate. Papers, such as Banz (1981), marked the beginning of a plethora of papers that show inconsistencies between real-world empirical data and the theoretical predictions of the CAPM.

Subrahmanyam (2010) then suggested categorising the many factors that are studied in asset pricing studies. However, Fama and French (2015) used the Dividend Discount model (see also Miller & Modigliani, 1961) to add profitability (proxied by the portfolio RMW, robust minus weak) and investments (proxied by the portfolio CMA, conservative minus aggressive) to the Three-Factor Model of Fama and French (1993), thus leading to the Five-Factor Model. They show that the Five-Factor Model explains 71% to 94% of the variation of average excess returns for the various sorted portfolios, with only the variation of average excess returns of small and profitable firms that invests a lot still having room for further factor premium addition.

Since the crux of this paper stems from the possible skewness in firm characteristics because of the Shariah debt screening ratio, as discussed in Sukor and Abdul Halim (2022), this paper focuses more on firm characteristics as possible factor premiums in explaining the asset pricing behaviour of samples of SC firms analogous to Fama and French (1993; 2015). This does not imply a disagreement with previous literature that approached the issue of asset pricing from alternative angles, such as Chen et al (1986) who investigated the issue from a more macroeconomic perspective. Instead, it will be interesting for future research to investigate the role of less discussed factor premiums, such as liquidity (Amihud & Mendelson, 1986), investors over extrapolation (Lakonishok et al,1994) and even the momentum premium (Jagadeesh & Titman, 1993), in explaining average excess returns of samples of SC firms in the US.

As mentioned earlier, this paper focuses more on investigating what factor premium(s) explain the variation of average excess returns of samples of SC firm rather than testing the efficacy of various asset pricing models by and of itself. In other words, this paper focuses on the sample, rather than the methodology or factor premiums. Therefore, this paper is in parallel with studies that focus more on different samples, such as Chan et al. (1991) who studied the asset pricing behaviour of Japanese stocks and Capaul et al. (1993) for European stocks and Fama and French (1998) in 12 non-US major markets.

This paper is somewhat like the study by Merdad et al. (2015). The difference between this paper and that study are: First, Merdad et al. (2015) isolates the Islamic risk factor by adding a dummy variable that takes the value of 1 if the firm is SC, and 0 if it is not, while this paper does not focus on isolating the Islamic risk factor. This paper begins with investigation on the appropriateness of the Five-Factor model in explaining the variation of average returns. If the Five-Factor model is found to be insufficient in explaining the variation of average returns of samples of SC firms should other risk factors (such as the Islamic risk factors, amongst other risk factors, such as momentum and liquidity premiums) be considered in the model to explain the variation of average returns of SC samples. Second, Merdad et al. (2015) conducted their analysis within the Saudi Stock Exchange, whose firms have access to a robust Islamic capital market. Therefore, the higher average investment cut-off rate and the subsequent skewness towards firm-specific characteristics (as discussed in Sukor & Abdul Halim, 2022) do not come into play in their study. This paper, however, conducts an asset pricing study in a context whereby the studied firms do not have access to a liquid Islamic capital market, which may ultimately alter the asset pricing behaviour. Finally, Merdad et al. (2015) conducted their study using the Fama and French Three-Factor model, whereas this paper utilises the more recent Fama and French Five-Factor Model.

3. Data and Methodology

All stocks listed in the NYSE, NASDAQ and the IEX,[4] hereby known as the All-Stocks (AS) sample, are the overall asset universe that the various samples of SC firms will be compared against. The AS sample consists of 6,874 firms for the study duration from January 2000 to December 2019 for 240 months.

A Shariah stock screening procedure is employed that closely mimics the S&PDJI Islamic Indices 2019 screening standards on the AS sample. The resulting three samples of SC firms utilised in this paper are identical to the three samples of SC firms found in Sukor and Abdul Halim (2022). The outcome is a total of four samples, which are, the AS sample, the Qualitative sample, the MV sample and finally, the TA sample.[5] The last three samples are labelled as the Shariah compliant samples since these three samples have undergone some degree of Shariah stock screening. The Qualitative sample has undergone only qualitative screenings, whilst the MV and TA samples have undergone both the qualitative and quantitative screenings (with the MV and TA samples using 12-months trailing total market capitalisation and total assets respectively as their denominator in the Shariah quantitative screening). In contrast, the AS sample has not undergone any Shariah stock screening procedure. References to SC samples later in the paper refer explicitly to the Qualitative, MV and TA samples.

On the issue of sorting the firms within each sample into different groups, according to Fama and French (2015), the 2x2 sorts have optimal performance over other more complex sorts. Due to its simplicity, this paper shall use the 2x2 sorts to isolate the marginal effects of factor premiums on the average excess returns of sorted portfolios. Any 2x2 sort begins by sorting firms into two opposite groups using medians. Fama and French (2015) utilise the NYSE medians when sorting their sample into the 2x2 sorts. They explain the use of NYSE medians, even though their sample (and the samples of this study) includes firms not just from the NYSE, but also NASDAQ and AMEX, since using the overall sample median would result in most firms being classified as small. This is due to the proliferation of small stocks in the NASDAQ. Using the overall sample median would subsequently lead to the ensuing analysis being overly tilted towards small firms.

Our own empirical data, however, suggests that due to the reduced number of firms in the MV and TA samples (from initially almost 7000 firms in the AS sample to approximately 1500 to 1300 firms for the MV and TA sample) as well as the fact that firms in the MV and TA samples experience skewed firm characteristics as a result of the Shariah debt screening explained and illustrated in Sukor and Abdul Halim (2022), NYSE medians become unsuitable in these 2x2 sorts samples'. Instead, using medians generated from the MV and TA samples themselves should generate true midpoints with which to sort into the diametric portfolios and subsequently be constructed into the risk factors.

Going forward, the following has compromise has been taken. The AS and Qualitative samples shall utilise NYSE medians for their 2x2 sorts, whilst the MV and TA samples shall use their own individual medians to sort their 2x2 portfolios.[6] Ultimately, the interaction of the 2x2 sets of sorts produce 12 portfolios[7] for each of the four samples. Equipped with the 12 portfolios, the iconic Fama and French (2015)'s factor premium variables are SMB (small-minus-big, or size premium), HML (high-minus-low, or value premium), RMW (robust-minus-weak, or profitability premium) and CMA (conservative-minus-aggressive or investment premium). Table 1 illustrates the construction of these risk premium variables.

Table 1: Construction of the Size, Value Profitability, and Investment Factors

Sort	Breakpoint	Factors and their components
2x2 sorts	Size: NYSE Median	SMB = (SH+SL+SR+SW+SC+SA)/6 - (BH+BL+BR+BW+BC+BA)/6
	B/M ratio: NYSE Median	HML = [(SH-SL) + (BH-BL)]/2
	Profitability: NYSE Median	RMW = [(SR-SW) + (BR-BW)]/2
	Investment: NYSE Median	CMA = [(SC-SA) + (BC-BA)]/2

Having constructed the risk factors in Table 1, they are employed mainly as independent variables. The correlation coefficients between the risk factors and the 12 portfolios are reported in Tables 2 and 3, whilst Table 4 shows the descriptive statistics of the market premium and the risk factors of all four samples. Although correlations do not reflect the fundamental characteristics of the different samples, some interesting trends still emerge. For example, for all four samples, when the correlation coefficient of CMA vis-à-vis the 12 portfolios are significant, they are always negative. On the other hand, RMW exhibits the exact opposite; when it is significant, it is always positive. Consistently significant correlation coefficients of the market premium in all four samples are observed.

Table 4 shows that all risk factors in all four samples are significantly different than zero, since they all show t-statistics higher than 2.5. The table shows that all the MV sample's risk factors, except for CMA, have substantially higher standard deviations when compared to all other samples. CMA is highest in the AS sample, but lowest in the qualitative sample. This suggests that in terms of direction, the AS and TA samples show similar directions in mean for their risk factors. On the other hand, the MV sample's

Table 2: Correlation Coefficients for the AS and Qualitative Samples

AS Sample						**Qualitative Sample**					
	(Rm-Rf)	SMB	HML	RMW	CMA		(Rm-Rf)	SMB	HML	RMW	CMA
(Rm-Rf)	1					(Rm-Rf)	1				
SMB	0.098	1				SMB	0.179	1			
HML	0.238	0.971***	1			HML	-0.189	-0.920***	1		
RMW	0.121	0.995***	0.987***	1		RMW	0.411	0.778***	-0.890***	1	
CMA	0.241	-0.182	0.031	-0.089	1	CMA	-0.422	0.299	-0.195	-0.129	1
BA	0.997***	0.034	0.173	0.057	0.242	BA	0.999***	0.153	-0.157	0.384	-0.439
BC	0.998***	0.036	0.176	0.059	0.247	BC	0.999***	0.157	-0.162	0.386	-0.426
BH	0.998***	0.036	0.176	0.059	0.244	BH	0.999***	0.152	-0.155	0.386	-0.442
BL	0.996***	0.026	0.167	0.050	0.257	BL	1.000***	0.155	-0.164	0.387	-0.422
BR	0.998***	0.035	0.175	0.059	0.245	BR	0.999***	0.153	-0.158	0.385	-0.431
BW	0.997***	0.033	0.172	0.056	0.242	BW	0.999***	0.158	-0.162	0.387	-0.437
SA	0.687***	0.479*	0.449*	0.437	-0.486*	SA	0.999***	0.165	-0.165	0.388	-0.428
SC	0.942***	0.336	0.497*	0.376	0.392	SC	0.999***	0.179	-0.173	0.387	-0.400
SH	0.841***	0.599**	0.722***	0.629**	0.241	SH	0.999***	0.166	-0.165	0.388	-0.426
SL	0.996***	0.135	0.283	0.164	0.297	SL	0.986***	0.330	-0.339	0.539*	-0.387
SR	0.596**	0.854***	0.916***	0.869***	0.046	SR	0.995***	0.269	-0.275	0.487*	-0.404
SW	0.997***	0.036	0.176	0.058	0.247	SW	0.998***	0.172	-0.163	0.377	-0.405

Notes: Correlations between the market returns (Rm-Rf), the risk factors previously defined and the 12 portfolios formed by using 2x2 sorts as per Fama and French (2015). *, **, *** denotes 10%, 5% and 1% significance level, respectively.

Table 3: Correlation Coefficients for the MV and TA Samples

MV Sample						**TA Sample**					
	(Rm-Rf)	SMB	HML	RMW	CMA		(Rm-Rf)	SMB	HML	RMW	CMA
(Rm-Rf)	1					(Rm-Rf)	1				
SMB	-0.000	1				SMB	0.069	1			
HML	0.072	-0.102	1			HML	0.073	-0.232	1		
RMW	0.048	-0.097	-0.514*	1		RMW	0.236	-0.155	-0.231	1	
CMA	-0.206	0.504*	-0.553*	-0.023	1	CMA	-0.446*	0.306	-0.600**	-0.281	1
BA	0.998***	-0.011	0.067	0.055	-0.206	BA	0.999***	0.053	0.083	0.231	-0.451*
BC	0.998***	0.001	0.052	0.057	-0.191	BC	0.998***	0.073	0.037	0.229	-0.406
BH	0.997***	-0.007	0.124	0.016	-0.227	BH	0.986***	0.036	0.218	0.178	-0.491*
BL	0.998***	-0.008	0.056	0.061	-0.199	BL	0.999***	0.060	0.062	0.236	-0.435
BR	0.998***	-0.011	0.057	0.066	-0.202	BR	0.999***	0.060	0.066	0.238	-0.436
BW	0.998***	-0.001	0.083	0.024	-0.204	BW	0.997***	0.049	0.095	0.187	-0.450*
SA	0.998***	0.040	0.069	0.043	-0.189	SA	0.997***	0.124	0.081	0.210	-0.437
SC	0.996***	0.058	0.054	0.040	-0.150	SC	0.994***	0.150	0.054	0.187	-0.377
SH	0.997***	0.032	0.113	0.024	-0.211	SH	0.996***	0.109	0.112	0.205	-0.460*
SL	0.997***	0.047	0.046	0.049	-0.166	SL	0.996***	0.137	0.061	0.202	-0.401
SR	0.997***	0.048	0.056	0.063	-0.179	SR	0.998***	0.113	0.070	0.245	-0.439
SW	0.997***	0.045	0.069	0.029	-0.176	SW	0.995***	0.145	0.073	0.173	-0.401

Notes: Correlations between the market returns (Rm-Rf), the risk factors previously defined and the 12 portfolios formed by using 2x2 sorts as per Fama and French (2015). *, **, *** denotes 10%, 5% and 1% significance level, respectively.

Table 4: Descriptive Statistics

AS Sample	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**MV Sample**	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**
Mean	-0.001	0.086	0.003	-0.055	0.184	Mean	-0.001	0.134	-0.111	0.148	-0.130
Median	0.000	0.003	0.001	0.005	-0.000	Median	0.000	0.007	-0.010	0.008	-0.013
Standard Deviation	0.054	1.254	0.017	0.924	2.834	Standard Deviation	0.054	1.712	1.343	2.137	1.668
Minimum	-0.165	-0.073	-0.042	-14.188	-0.0707	Minimum	-0.165	-0.115	-20.487	-1.582	-25.540
Maximum	0.203	19.263	0.047	0.106	43.534	Maximum	0.2033	26.223	0.108	32.777	0.549
N	240	240	240	240	240	N	240	240	240	240	240
t-stat	-7.888	32.240	68.954	-28.003	30.683	t-stat	-7.888	36.816	-39.012	32.642	-36.758
Qualitative Sample	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**TA Sample**	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**
Mean	-0.001	0.144	-0.107	0.080	-0.118	Mean	-0.001	0.077	0.072	-0.053	-0.085
Median	0.000	0.009	-0.012	0.009	-0.010	Median	0.000	0.006	-0.009	0.010	-0.011
Standard Deviation	0.054	1.213	1.622	1.115	0.931	Standard Deviation	0.054	1.104	1.196	0.979	1.127
Minimum	-0.165	-0.094	-18.426	-5.325	-9.823	Minimum	-0.165	-0.096	-0.124	-15.017	-17.315
Maximum	0.203	13.775	10.078	13.162	0.041	Maximum	0.203	16.959	18.358	0.164	0.0960
N	240	240	240	240	240	N	240	240	240	240	240
t-stat	-7.888	55.975	-31.084	33.682	-59.621	t-stat	-7.888	32.979	28.257	-25.689	-35.679

Note: For monthly returns of the market premium and the various risk factors in percentage.

risk factor follows more closely with the QL sample's risk factors. All these differences suggest that the behaviour of the risk factors differs considerably between different samples. Would these differences lead to different asset pricing behaviours for firms amongst our samples? This question is taken up in the Five-Factor asset pricing model regressions slope coefficients and t-values of the four samples in Tables 5 and 6 respectively.

4. Results and Discussion

Tables 5 and 6 report the Five-Factor regression slope coefficients and t-values using average excess returns of the portfolios of sorted firms in the four samples respectively. Tables 5 and 6 are firstly divided into four parts, each part representing one of each of the four samples, beginning with the AS sample, the Qualitative sample, the MV sample and finally the TA sample. The columns BA until SW represent the 12 portfolios from the previous 2x2 sort, whilst the numbers depict the slope coefficients of the Five-Factor independent variables ($\beta_1 - \beta_5$) including the intercept (β_0) in Table 5 and represent t-values for each independent variable in Table 6.

Fama and French (2015) suggested that if an asset pricing model completely explains the average expected returns in a sample, then the model's intercept in a time series regression in the sample should be indistinguishable from zero. Tables 5 and 6 show that only the AS and TA samples exhibit non-significant coefficients of their intercept for most of their portfolios. The AS sample show significant intercepts only for the BH, BL, SH, and SL samples, whilst the TA sample only shows significant intercepts for the BR and SW samples (BL, BA and SW also show significant intercepts but only at 10% significance level).

On the other hand, the Qualitative and MV samples exhibit consistently significant intercepts in at least 8 out of the 12 portfolios in each sample (10 portfolios for the MV sample if 10% significance are considered). This suggests that there remain portions of the variation of average returns in most portfolios of these two samples that are still unexplained by the factor premiums in the Five-Factor model. Since the objective of this paper is only to observe any difference in asset pricing behaviours between the AS sample and the SC samples, the identification of these missing factor premiums is beyond the scope of this paper. It does, however, suggest that future SC firm asset pricing and factor identification research should focus more on SC

Table 5: Five-Factor Regression Slope Coefficients

		BH	BL	BR	BW	BC	BA	SH	SL	SR	SW	SC	SA
AS Sample	β_1	-0.01	0.00	0.88	0.86	0.84	0.90	0.05	0.05	0.83	0.85	0.88	0.82
	β_2	-0.12	-0.21	-0.46	-0.60	-0.74	-0.41	0.15	0.23	0.61	0.76	1.02	0.70
	β_3	0.46	-0.52	-0.08	-0.12	-0.02	-0.04	0.49	-0.52	-0.04	-0.00	-0.13	-0.12
	β_4	-0.04	-0.05	0.19	-0.76	-0.16	-0.30	-0.02	-0.01	0.34	-0.71	-0.43	-0.29
	β_5	0.04	0.08	0.26	0.01	0.27	0.08	-0.07	-0.11	-0.16	0.08	1.40	-0.41
	β_0	-0.02	-0.02	0.00	0.00	0.00	0.00	-0.02	-0.02	0.00	0.00	0.00	0.00
Qualitative Sample	β_1	0.9	0.92	0.9	0.98	0.92	0.94	0.95	0.93	0.96	0.88	0.93	0.91
	β_2	0.07	-0.08	-0.12	0.13	0.06	-0.16	1.03	1.18	1.05	0.80	0.80	1.02
	β_3	0.01	-0.01	-0.00	-0.02	-0.00	-0.01	1.05	-0.93	-0.10	-0.08	0.01	0.01
	β_4	0.00	-0.00	0.02	-0.05	-0.02	0.02	0.15	0.15	0.96	-0.97	-0.15	-0.18
	β_5	0.10	-0.07	-0.12	0.16	0.09	-0.17	-0.30	-0.13	0.29	0.01	0.94	-0.81
	β_0	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.01	-0.00	0.00	0.00	-0.00
MV Sample	β_1	0.83	0.82	0.79	1.01	0.85	0.84	0.84	0.84	1.00	0.78	0.83	0.82
	β_2	0.06	-0.09	-0.07	0.10	-0.01	-0.09	0.87	1.03	1.08	0.92	0.06	-0.09
	β_3	0.04	-0.13	-0.08	-0.03	-0.07	-0.10	0.66	-1.17	0.03	-0.01	0.04	-0.13
	β_4	-0.01	0.02	0.01	-0.01	0.01	0.01	-0.13	-0.16	1.21	-0.76	-0.01	0.02
	β_5	0.02	0.03	0.01	0.11	0.06	0.01	0.21	0.20	0.08	-0.02	0.02	0.03
	β_0	-0.01	-0.00	-0.00	-0.01	-0.01	-0.00	-0.00	-0.00	-0.01	-0.00	-0.01	-0.00
TA sample	β_1	0.81	0.80	0.80	0.86	0.79	0.85	0.81	0.81	0.86	0.80	0.85	0.79
	β_2	-0.06	-0.07	-0.05	-0.11	-0.12	-0.05	0.94	0.95	0.88	0.93	0.95	0.89
	β_3	0.35	-0.16	0.01	-0.12	0.04	-0.11	0.69	-0.80	-0.02	0.11	-0.06	0.09
	β_4	-0.12	-0.24	-0.05	-0.76	-0.45	-0.07	-0.44	-0.32	0.49	-0.80	-0.11	-0.49
	β_5	0.42	-0.03	0.01	0.44	0.33	-0.10	-0.08	0.36	0.43	-0.01	0.97	-0.60
	β_0	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	0.00

Note: To explain average returns on firms sorted by, firstly size, and subsequently by investment or book-to-market ratio or profitability:

$R_t - Rf_t = \beta_0 + \beta_1 (\text{Rm} - \text{Rf})_t + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \beta_4 \text{RMW}_t + \beta_5 \text{CMA}_t$

Table 6: Five-Factor Regression *t*-values

		BH	BL	BR	BW	BC	BA	SH	SL	SR	SW	SC	SA
AS Sample	β_1	-0.37	-0.2	-10.13	-9.63	-8.94	-10.32	-2.44	-1.68	-8.96	-9.66	-10.55	-9.71
	β_2	3.34	-5.96	-3.96	-5.07	-6.37	-3.48	-3.84	-5.43	-5.05	-6.9	-8.38	-6.37
	β_3	-8.4	-9.72	-0.63	-0.87	-0.17	-0.26	-8.77	-9.52	-0.26	-0.02	-0.78	-0.87
	β_4	-0.94	-0.87	-1.66	-6.31	-1.64	-2.04	-0.40	-0.29	-2.73	-6.81	-2.33	-2.69
	β_5	-1.85	-3.43	-4.13	-0.24	-4.65	-1.19	-3.27	-4.80	-2.71	-1.39	-17.98	-7.06
	β_0	-14.43	-16.45	-0.71	-0.3	0	0	-15.71	-17.96	-0.3	-0.76	-1.41	-0.17
	Adjusted R^2	0.235	0.387	0.680	0.717	0.697	0.660	0.286	0.324	0.551	1.000	1.000	0.604
Qualitative Sample	β_1	13.56	17.25	16.91	14.43	15.58	15.87	16.63	13.78	14.45	15.92	15.71	15.90
	β_2	1.68	-2.91	-4.60	3.16	1.77	-4.94	31.58	28.95	28.62	26.04	23.08	33.49
	β_3	0.81	-1.77	-0.08	-1.29	-1.08	-2.50	49.67	-143.20	-19.48	4.65	2.87	6.12
	β_4	0.05	-0.07	2.85	2.31	-2.10	1.81	4.54	11.60	95.34	36.03	-18.67	-25.80
	β_5	2.24	-2.34	-4.00	3.62	2.40	-4.50	-7.99	-2.79	6.96	0.15	24.14	-23.90
	β_0	-3.53	-0.30	-0.48	-2.99	-3.17	2.05	-3.98	-6.64	-0.46	2.37	3.44	-1.61
	Adjusted R^2	0.858	0.931	0.926	0.908	0.919	0.900	1.000	1.000	1.000	0.999	0.952	1.000
MV Sample	β_1	8.67	9.02	8.85	8.62	8.64	8.87	9.07	8.66	8.63	8.81	8.79	8.54
	β_2	1.16	-1.72	-1.38	1.29	-0.1	-1.65	16.38	18.36	14.71	18.03	16.9	17.12
	β_3	1.08	-2.99	-2.07	-0.51	-1.5	-2.36	14.63	-25.61	0.5	-0.31	1.11	1.58
	β_4	-1.12	1.82	1.77	-1.06	0.55	1.69	-15.21	-18.97	93.25	-102.77	-7.56	-7.79
	β_5	1.5	1.64	0.84	3.77	2.64	0.59	9.51	12.49	2.86	-1.18	56.2	-47.07
	β_0	-3.98	-1.92	-2.42	-3.38	-4.02	-0.55	-0.34	-2.37	-3.53	-2.47	-1.93	-5.06
	Adjusted R^2	0.764	0.756	0.773	0.722	0.727	0.750	0.879	1.000	1.000	0.989	0.942	1.000
TA sample	β_1	7.95	8.94	8.70	8.97	8.47	8.65	9.04	8.15	8.83	8.50	8.63	8.54
	β_2	-1.06	-1.63	-1.13	-1.92	-2.22	-1.08	19.81	17.46	15.62	19.49	18.65	16.90
	β_3	4.14	-2.72	0.13	-1.38	0.55	-1.55	10.43	-10.11	-0.20	1.75	-0.85	1.16
	β_4	-2.10	-5.98	-1.04	-13.00	-8.31	-1.33	-9.04	-6.37	8.45	-17.22	-2.46	-9.96
	β_5	3.12	-0.29	0.06	3.39	2.79	-0.95	-0.90	2.87	3.32	-0.08	9.71	-4.83
	β_0	-0.08	-1.88	-2.58	1.03	0.88	-1.73	-1.51	-0.08	1.08	-2.26	-1.95	0.83
	Adjusted R^2	0.768	0.803	0.784	0.860	0.803	0.775	1.000	0.893	0.852	1.000	0.904	1.000

Note: To explain average returns on firms sorted by, firstly size, and subsequently by investment or book-to-market ratio or profitability.

firms that are only qualitatively screened, as well as those that utilise total market capitalisation as the denominator in their quantitative screenings.

Interestingly, portfolios with non-significant intercepts differ for each sample (BL and BR for the Qualitative sample whilst BA and SH for the MV sample) suggesting that the non-significance is not due to a systematic factor (i.e the significance is caused by unique properties endemic within each sample).

The significance of the market premium is noted in all the models across all samples where the market premium, β_1, is consistently significant. Only the BH and BL portfolio in the AS sample show insignificant slopes. Additionally, the slope coefficient for the market premium for all portfolios within the SC samples ranges narrowly from 0.78 to 1, indicating that all portfolios within the three SC samples are very sensitive to systematic risks. This implies that portfolio diversification is of the utmost importance for investors of SC firms since the market premium will consistently contribute to higher expected returns for SC firms no matter how they are sorted. Conversely, portfolios within the AS sample have slope coefficients for the market premium that are considerably smaller, ranging widely from 0.05 to 0.9, thus inferring that the market premium may not be a critical factor for *all* portfolios within the AS sample, this is especially true for firms sorted into high and low B/M ratio.

Moving to the size premium, the AS and Qualitative samples are found to exhibit consistently significant size premiums for all portfolios. More interestingly, for the AS sample, a complete reversal in the directions of the coefficients is observed when one moves from big portfolios to small portfolios (negative coefficients for portfolios with big firms and positive coefficients for portfolios with small firms). This implies that the size premium reduces expected returns for firms above the NYSE median whilst increasing the expected returns for firms below the NYSE median, thus capturing the essence of the size premium and making it consistent with contemporary asset pricing theories and the findings of Fama and French (2015) as well as other literature.

Although the Qualitative sample initially shows consistently significant size premiums, the directions of which are only consistent with theory and past literature for small portfolios. Big portfolios display a mix of positive and negative coefficients.

For the MV and TA samples, only small portfolios show statistically significant size premiums. Big portfolios either show no significance or weak significant and negative slope coefficients (see portfolio BL for both the MV and TA samples; only the TA sample shows a 5% significance for the slope coefficient for BC). This finding is compelling because Sukor and Abdul Halim (2022) show that the MV and TA samples consistently have an average size premium that is larger than the AS sample, which means that the MV and TA samples should have significantly more observations involving larger firms. This in turn indicates that most big portfolios showing insignificant size premium should not be the result of lack of observations.

The size premium for small portfolios within the two SC samples, however, show persistent positive slope coefficients that are consistent with past findings. It can thus be inferred that investors of SC firms are consistently rewarded with higher expected returns when they include smaller-than-average firms into their portfolios. For big portfolios, on the other hand, the tendency towards insignificant size premiums mean that investors of SC firms are not penalised for holding larger-than-average firms in their portfolios. In short, the combination of strongly significant size premiums for small portfolios but overall insignificant size premiums for big portfolios suggests that generally, size premium is indeed a legitimate risk factor for samples of SC firms. Only that for big portfolios, the hypothesised negative slope coefficients are so miniscule that they are not statistically significant. The last finding is in direct contrast to the consistently significant size premiums across all portfolios in the AS sample, which suggests that investors in the AS sample are penalised for holding larger-than-average firms in their portfolios whilst they are rewarded only when they held smaller-than-average firms in their portfolios.

Investors of SC firms in the US should instead pursue a size-oriented strategy since holding smaller-than-average firms in their portfolios will reward them with higher expected returns. However, holding larger-than-average firms should not cause them to have lower expected returns keeping in mind that larger firms tend to have better corporate governance frameworks and their stocks are more liquid among many other perks. These benefits are enjoyed without any statistically significant loss of expected returns for the investor, on average.

Next, is the results on value premium. The AS sample exhibits significant value premiums only in 4 out of 12 models, all of which involve big and small portfolios sorted into high and low B/M ratios. Interestingly, these portfolios switch directions when one moves from sorts of high to low B/M ratios. For example, the BH portfolio shows a slope coefficient of 0.46 for its value premium, but the BL portfolio's (BH's opposite B/M ratio sort) slope coefficient is -0.52, which implies that the value premium rewards higher expected returns to investors who hold stocks with higher-than-average B/M ratio whilst decreasing expected returns to investors who hold stocks with lower-than-average B/M ratio. This is consistent with asset pricing theories as well as the findings of Fama and French (2015).

Surprisingly, the Qualitative sample shows significant value premiums in 7 out of 12 (8 if BL is counted although it is only significant at 10% significance level) models, whilst the MV and TA samples only show 5 and 4 significant value premiums out of 12 models at 5% significance level respectively. This suggests that the firms in the Qualitative sample are more sensitive towards the value premium compared to the MV, TA and AS samples. The reduced number of significant value premiums in three out of four of the samples corroborates the findings of Fama and French (2015) where they suggested the redundancy of HML as a variable to explain average excess returns. Additionally, all the SC samples exhibit a switch in directions for the slope coefficients of the value premium from positive to negative when one moves from sorts of high to low B/M ratios, as observed in the AS sample previously.

From the perspectives of investors of SC firms, if the distribution of investors is equal, then both conventional investors as well as investors of SC firms generally should not consider the value premium to be a critical determinant of their expected returns. However, for Shariah conscious investors who subscribe to a Shariah stock screening methodology that applies only qualitative screening, the value premium does play a critical role in the explanation of their expected returns.

Now we turn to the results on the profitability premium (RMW in Tables 5 and 6). The AS sample exhibits significant profitability premium in 8 out 12 portfolios at a weak 10% significance level. On the other hand, for the same significance level, the Qualitative, MV and TA samples all demonstrate significant profitability premiums in 11, 9 and 10 portfolios respectively. This shows the profitability premium plays a slightly more important role in the SC samples compared to the AS sample. Additionally, all four samples exhibit a reversal in direction of slope coefficients when one moves from portfolios of robust sort (positive) to portfolios of weak sort (negative), like the reversal seen in the value premium discussed above. Having more portfolios exhibiting significant profitability premiums compared to the AS sample implies that investors of SC firms should consider the profitability premium as one of the critical factors in deciding the correct level of expected returns from their portfolios.

Finally, the investment premium (CMA in Tables 5 and 6) is significant at a minimum of 10% significance level in 9 out of 12 portfolios in the AS sample. Meanwhile, for the same minimum significance level, the Qualitative, MV and TA samples exhibit significance in 11, 8 and 7 portfolios. This implies that for the MV and TA samples, the investment premium plays a slightly lesser role as compared to the AS sample. The Qualitative sample, on the other hand, indicates that the investment premium plays a more dominant role. In general, the investment premium in all four samples also demonstrate the same reversal of direction of slope coefficients when one observes portfolios of conservative sort (positive) to portfolios of aggressive sort (negative), as seen in the value and profitability premiums. However, the portfolios of SC and SA in the MV samples are the only portfolios sorted into conservative and aggressive portfolios that failed to demonstrate reversals in coefficient directions.

It can thus be said that the investment premium still plays an important role in explaining the expected returns of SC firms, albeit slightly lesser than the AS sample. This is because, even for the TA sample with the fewest portfolios with significant investment premium (7), more than half of its portfolios rely on the investment premium as a partial proxy for systematic risks. On the other hand, investors of SC firms who subscribe to only qualitative screening would find that the investment premium plays a dominant role in explaining their expected returns.

5. Conclusion and Policy Implications

The Five-Factor regressions provide the following conclusion. The risk-factor premiums between the AS samples (representing conventional investors) and the Qualitative, MV and TA samples (representing investors of SC firms) are not equal. The AS and TA samples demonstrate four or lesser significant intercepts, suggesting that the variation of average excess returns are almost completely explained by the Five-Factor model. The Qualitative and MV samples demonstrate 8 and 10 significant intercepts respectively, which imply that the Five-Factor model fails to completely explain the variation of average excess returns in most portfolios within these two samples. Identification of these missing factor premiums in future studies should therefore focus within these two samples.

In all samples as well as in almost all portfolios within them, market premium shows an overwhelming level of significance. However, the SC samples are particularly sensitive to the market premium, with slope coefficients ranging from 0.78 to 1, signalling an all-round need for portfolio diversification strategies for investors of SC firms. Alternatively, the AS sample does not have a significant market premium in all its portfolio, where its slope coefficient ranges widely from 0.05 to 0.9 suggesting that some portfolios in the AS sample could consider the market premium to be of minimal impact.

Size premiums are significant explanators of average excess returns for all portfolios in the AS and Qualitative samples. The MV and TA samples exhibit significant size premiums for small portfolios only, with big portfolios' average excess returns being independent of size premiums. Investors of SC firms therefore have an advantage from the size premium, either to include smaller stocks in their portfolio and enjoy higher long run average expected returns or include larger stocks in their portfolio and enjoy the perks of investing in large and established firms (such as better corporate governance and liquidity) with almost no statistically significant reduction in long run average expected returns.

Value premiums play a minor role in determining average excess returns for portfolios in the AS, MV and TA samples. However, value premiums are a consistent determinant of average excess returns for portfolios in the Qualitative samples. This indicates that the underlying risk factors of portfolios within the universe of SC significantly change when quantitative screenings are applied.

Profitability premiums remain a critical factor in explaining average returns in all four samples, however, the SC samples exhibit a slightly more significant role for profitability premium compared to the AS sample. Except for the Qualitative sample that exhibited its average excess return, the profitability premium is significant in almost all its portfolios. In any case, the profitability premium is a crucial factor premium in samples of SC firms and therefore should not be ignored by investors of SC firms.

Quite the opposite of the profitability premium, the investment premium played a lesser role in explaining the average returns of samples of SC firms vis-à-vis the AS sample, except for the Qualitative sample. The Qualitative sample showed significant investment premiums for nearly all its portfolio, reflecting its dominance in that sample. However, investors of SC firms should still consider the investment premium when approximating their long run average expected returns since the investment premium is still significant in most portfolios in the MV and TA samples.

The findings suggest various policy implications. Namely, the consistently insignificant SMB in big portfolios for MV and TA samples entail the following practical applications. The size premium has no significant negative impact on the expected returns of portfolios of large firms in the samples of SC firms despite the Five-Factor model being a suitable fit. On the other hand, the size premium rewards investors with significantly higher returns when they include small firms into their portfolios. Therefore, when investors who subscribe to the universe of SC firms include large firms (i.e those firms whose size is higher than the sample median) in their portfolios, they are not penalised with lower returns. Keep in mind that larger firms tend to have better governance and reporting standards, and not to mention higher liquidity of their public equities. In contrast, the investors who subscribe to the conventional sample, are rewarded with significantly higher returns when they include small firms in their portfolios but are also penalised with significantly lower returns when they include big firms in their portfolios.

Additionally, this paper also contributes to event studies, whereby it suggests that the Fama and French (2015) Five-Factor Model is a good fit, and therefore, an appropriate benchmark model to arrive at normal returns for samples of SC firms in the US that uses total assets as the denominator of their quantitative screenings. On the other hand, samples of SC firms that utilise total market capitalisation (or only qualitative screenings) may need to include more factor premiums to the Five-Factor Model for it to be a good fit and an appropriate benchmark model.

Finally, the findings should contribute to a more accurate estimation of the WACC for SC firms, which is arguably of utmost importance since this could lead to more precise NPV calculations for projects, as well as the proper gauging of the return performance of individual SC stocks or as part of a mutual fund, all of which should be relevant to investors of SC firms. Critically, the discovery of the correct required returns (also known as the costs of equity in the context of calculating the WACC) for equity as part of the WACC (given the firm's appropriate risk factors) through either the full Five-Factor model or only partially, remains the crux of the findings.

Notes

1 This is mainly for the sake of brevity. This paper will not be focusing on other asset pricing models, such as Momentum (Jagadeesh & Titman,1993) or macroeconomic variables (Chen et al., 1986). These alternative models may be significant but shall remain an opportunity for future research.

2 Robust here means a liquid stock and Sukuk market, whereby the SC firm can issue new shares or sukuks at the appropriate price or profit rate relatively quickly.

3 Take the example of the debt ratio screen. A firm who operates in an environment with a liquid Islamic debt market, can relatively easily convert all their long-term conventional debt into long-term Islamic debt (also known as sukuks) and keep their Shariah-compliancy status. However, a firm operating in the US may not enjoy such liquidity, and therefore a trade-off appears between keeping their Shariah-compliancy status or taking a higher level of debt. This may ultimately lead to an altered asset pricing behaviour.

4 Fama and French (2015) use the traditional NYSE-AMEX-NASDAQ universe. This study replaces the AMEX with the IEX since the AMEX has already been absorbed into the NYSE.

5 For a more in-depth theoretical discussion and illustration of the stylised facts regarding firm-characteristics of stocks within these samples, see Sukor and Abdul Halim (2022).

6 The robustness check suggest that this compromise does not alter the main findings significantly.

7 The 12 portfolios are BH, BL, SH, SL, BA, BC, SA, SC, BR, BW, SR, SW. The first letter describes the size sort (big, B or small, S). The second letter describes the second sort on B/M ratio (High, H or Low, L) or investment (aggressive, A or conservative, C) or profitability (Robust, R or Weak, W).

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