

## CHAPTER IV :FINDINGS

### 4.1 Introduction

This chapter provides the results for each of the outlined models used in this research. It also addresses the research objectives and correlates the findings to the respective objectives.

### 4.2 ARCH Effects Test Results

The presence of ARCH effects is explored for FTSE Bursa Malaysia, the Shariah-compliant portfolio as well as the conventional portfolio. The results are highlighted below.

#### 4.2.1 FTSE BURSA Malaysia ARCH effect test result

**Table 4.1:** ARCH Effect Test For FTSE Bursa Malaysia

No	MARKET	F-statistic	R-squared (R <sup>2</sup> )	Prob. Chi-Square $\chi^2(K)$	R <sup>2</sup> > $\chi^2(K)$ : Reject H <sub>0</sub>
1	FTSE BURSA Malaysia	5.286	5.27	0.022	5.26

The presence of ARCH effects for FTSE Bursa Malaysia is computed. The F-static value is 5.286 and 5.27 is the observed R-squared value. The probability value (0.022) is significant at 95% confidence level, therefore there is presence of ARCH effects. This consequently permits the computation of downside beta for FTSE Bursa Malaysia using GARCH (1,1).

#### 4.2.2 Shariah-Compliant Portfolio ARCH Effect Test Results

Table 4.2 below highlights the ARCH effects for the Shariah compliant portfolio.

**Table 4.2:** ARCH Effect Test For Shariah-Compliant Portfolio

No.	<i>F</i> -statistic	<i>R</i> -squared ( $R^2$ )	Prob. Chi-Square $\chi^2(K)$	$R^2 > \chi^2(K)$ : Reject $H_0$	No.	<i>F</i> -statistic	<i>R</i> -squared ( $R^2$ )	Prob. Chi-Square $\chi^2(K)$	$R^2 > \chi^2(K)$ : Reject $H_0$
1	20593.39	1167.90	0.00	1167.90	26	204.25	175.55	0.00	175.55
2	19256.93	1163.33	0.00	1163.33	27	181.65	158.61	0.00	158.61
3	57387.33	1211.90	0.00	1211.90	28	39.85	38.67	0.00	38.67
4	3.30	3.30	0.07	3.23	29	11.02	10.94	0.00	10.94
5	64.98	61.83	0.00	61.83	30	251.86	209.53	0.00	209.53
6	30.61	29.92	0.00	29.92	31	43.00	41.62	0.00	41.62
7	46.32	44.72	0.00	44.72	32	22.83	22.45	0.00	22.45
8	9.44	9.38	0.00	9.38	33	14.55	14.41	0.00	14.41
9	5.18	5.16	0.02	5.14	34	7.44	7.41	0.01	7.40
10	50.95	49.01	0.00	49.01	35	17.37	17.16	0.00	17.16
11	5.10	5.09	0.02	5.06	36	16.10	15.92	0.00	15.92
12	152.56	136.00	0.00	136.00	37	19.37	19.10	0.00	19.10
13	79.57	74.87	0.00	74.87	38	17966.43	1157.44	0.00	1157.44
14	27.86	27.29	0.00	27.29	39	0.01	0.01	0.90	-0.89
15	265.49	218.87	0.00	218.87	40	154.12	137.24	0.00	137.24
16	40.75	39.51	0.00	39.51	41	3.71	3.70	0.05	3.65
17	3.81	3.81	0.05	3.75	42	1.44	1.44	0.23	1.21
18	0.70	0.70	0.40	0.30	43	3.54	3.53	0.06	3.47
19	24.07	23.65	0.00	23.65	44	16.58	16.38	0.00	16.38
20	6.11	6.09	0.01	6.08	45	5.12	5.11	0.02	5.08
21	26.49	25.97	0.00	25.97	46	72.26	68.37	0.00	68.37
22	120.46	109.93	0.00	109.93	47	237.55	199.55	0.00	199.55
23	301.74	242.89	0.00	242.89	48	24.45	24.01	0.00	24.01
24	1.21	1.21	0.27	0.94	49	24.45	24.01	0.00	24.01
25	36.91	35.90	0.00	35.90	50	60.19	57.49	0.00	57.49

The probability values for Shariah-compliant portfolios are significant at different levels except for three (3) stocks. Therefore, the null hypothesis is rejected for the vast majority of returns. With the rejection of the null hypothesis, the series demonstrates the presence of ARCH effects. Consequently, this allows for the modelling of downside beta using the GARCH (1,1) method.

### 4.2.3 Conventional Portfolio ARCH Effect Test Results

Table 4.3 below highlights the ARCH effects for the conventional portfolio.

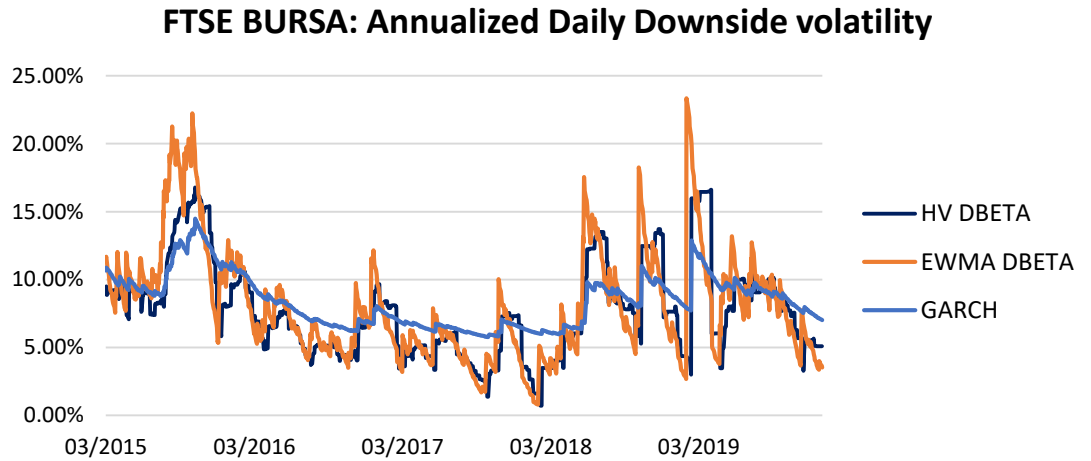
**Table 4.3:** ARCH Effect Test For Conventional Portfolio

No.	F-statistic	R-squared (R <sup>2</sup> )	Prob. Chi-Square $\chi^2(K)$	R <sup>2</sup> > $\chi^2(K)$ : Reject H <sub>0</sub>	No.	F-statistic	R-squared (R <sup>2</sup> )	Prob. Chi-Square $\chi^2(K)$	R <sup>2</sup> > $\chi^2(K)$ : Reject H <sub>0</sub>
1	30.46	29.78	0.00	29.78	26	12.89	12.77	0.00	12.77
2	21.50	21.17	0.00	21.17	27	374.90	288.06	0.00	288.06
3	0.00	0.00	0.97	-0.96	28	43.68	42.26	0.00	42.26
4	48.70	46.93	0.00	46.93	29	0.00	0.00	0.99	-0.99
5	34.64	33.75	0.00	33.75	30	82.35	77.33	0.00	77.33
6	17.53	17.31	0.00	17.31	31	12.78	12.67	0.00	12.67
7	20.39	20.09	0.00	20.09	32	4.26	4.26	0.04	4.22
8	0.45	0.45	0.50	-0.06	33	17.88	17.65	0.00	17.65
9	18.39	18.15	0.00	18.15	34	53.27	51.15	0.00	51.15
10	80.11	75.35	0.00	75.35	35	11.01	10.93	0.00	10.93
11	2.09	2.09	0.15	1.94	36	3.04	3.04	0.08	2.96
12	6.07	6.05	0.01	6.04	37	230.65	194.66	0.00	194.66
13	47.53	45.84	0.00	45.84	38	6.11	6.09	0.01	6.08
14	6.39	6.37	0.01	6.35	39	50.43	48.53	0.00	48.53
15	258.49	214.10	0.00	214.10	40	40.25	39.04	0.00	39.04
16	19.48	19.21	0.00	19.21	41	56.09	53.74	0.00	53.74
17	7.15	7.12	0.01	7.11	42	0.00	0.00	0.95	-0.94
18	136.29	122.95	0.00	122.95	43	6.57	6.55	0.01	6.53
19	0.33	0.33	0.56	-0.23	44	5.70	5.68	0.02	5.67
20	305.68	245.43	0.00	245.43	45	27.02	26.49	0.00	26.49
21	73.60	69.57	0.00	69.57	46	82.56	77.51	0.00	77.51
22	101.33	93.80	0.00	93.80	47	18.95	18.69	0.00	18.69
23	239.61	201.00	0.00	201.00	48	75.97	71.69	0.00	71.69
24	6.82	6.79	0.01	6.78	49	24.10	23.67	0.00	23.67
25	103.21	95.40	0.00	95.40	50	69.30	65.73	0.00	65.73

Similarly, the probability values for conventional portfolio is significant at different levels except for six (6) stocks. Therefore, the null hypothesis is rejected for the vast majority of returns. With the rejection of the null hypothesis, the series demonstrates the presence of ARCH effects. Consequently, this allows for the modelling of downside beta using the GARCH (1,1) method.

### 4.3 Objective 1: Modelling FTSE Bursa Malaysia Downside Beta

The market downside beta (FTSE Bursa) is modeled using HV, EWMA and GARCH (1,1) methods. The graph below outlines the downside beta of FTSE Bursa Malaysia.



**Figure 4.1:** Downside Beta For FTSE Bursa Malaysia From 2015-2020

The modelling of the FTSE Bursa Malaysia downside beta using the historical volatility model, the EWMA and the GARCH (1,1) models shows similar trends as captured in figure 4.1. As such, the results indicate a good fit between the models. All models show similar trend movements throughout the observation period. The table below highlights the average annual downside beta for all the models.

**Table 4.4:** Yearly-Downside Beta For FTSE Bursa Malaysia

<i>YEAR</i>	<i>Average of HV DBETA</i>	<i>Average of EWMA DBETA</i>	<i>Average of GARCH</i>
<i>2015</i>	0.1087	0.1250	0.1090
<i>2016</i>	0.0641	0.0712	0.0790
<i>2017</i>	0.0517	0.0515	0.0654
<i>2018</i>	0.0784	0.0801	0.0808
<i>2019</i>	0.0860	0.0850	0.0915
<i>AVERAGE</i>	<b>0.0766</b>	<b>0.0810</b>	<b>0.0843</b>

The data shows that GARCH (1,1) has the highest average downside beta. Furthermore, the highest downside beta was in 2015. This could be attributed to a high debt ratio, demotivating investors from active participation in reviving the economy (CEIC, 2021). There was a decline in downside beta for the following two years. In addition, 2017 recorded the least downside beta score. In 2018, there was an increase compared to the previous year. This incremental trend also appeared to be the case for the year 2019.

#### **4.4 Objective 2: Comparing Downside Beta**

Tables 4.5 and 4.6 captures the descriptive statistics of the downside stock returns. The average mean for the 5-year period is given for each company. Also, the maximum cut off return is at zero for all the companies while the average minimum values is variant dependent on the company's downside return. Further descriptive elements are captured such as the kurtosis, Jarque-Bera and the probability values for all company returns. The probability shows data results captured are significant within a 99% confidence level for both portfolios.

#### **Descriptive Summary for Downside Shariah-Compliant Returns**

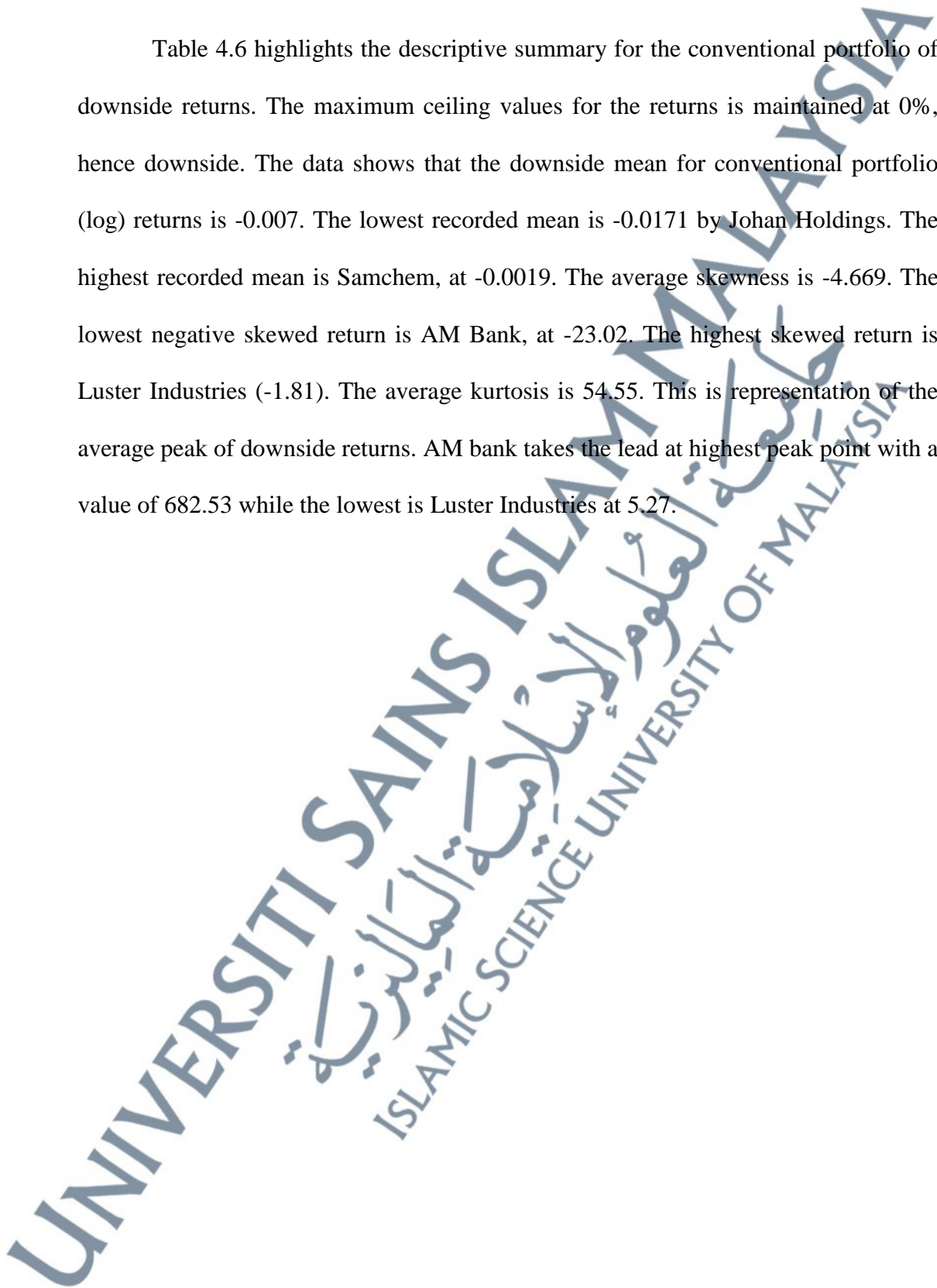
Table 4.5 shows that the mean for the downside Shariah-compliant portfolio (log) stock returns is -0.007. The maximum ceiling values for the returns is maintained at 0%, hence downside. The lowest recorded average mean is -0.0128 by Goodway Integrated. The highest recorded average mean is Nestle, at -0.0019. The average negative skewness is -4.36. The lowest negative skewed return is Sime Darby Bhd, at -15.28. The highest skewed return is Emico, standing at -2.28. The average kurtosis is 43.15. This is representation of the average peak of downside returns. Sime Darby takes the lead at highest peak point with a value of 373.4 while the lowest is Borneo at 9.68.

**Table 4.5:** Descriptive Summary For Shariah-Compliant Downside Returns

	<i>Mean</i>	<i>Min</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>Jarque-Bera</i>	<i>Probability&lt;0.05</i>
<i>Adventa</i>	-0.94%	-0.20	-3.35	16.86	12214.21	0.000
<i>Ancom</i>	-0.83%	-0.29	-6.20	93.79	433106.5	0.000
<i>Apm Automotive</i>	-0.41%	-0.07	-3.12	15.70	10316.05	0.000
<i>Astino</i>	-0.70%	-0.09	-2.45	10.65	4252.904	0.000
<i>Bimb Hlds</i>	-0.41%	-0.07	-2.86	16.00	10413.2	0.000
<i>Borneo Oil</i>	-1.15%	-0.13	-2.65	9.68	3755.461	0.000
<i>Cb Ind Product Holding</i>	-0.51%	-0.09	-3.14	18.54	14485.49	0.000
<i>Cocoaland Hlds</i>	-0.50%	-0.17	-5.10	58.19	162498.1	0.000
<i>Complete Logistic Services</i>	-0.73%	-0.14	-3.28	18.10	13986.99	0.000
<i>Dutch Lady</i>	-0.21%	-0.08	-6.02	61.05	181293.5	0.000
<i>Emico</i>	-1.09%	-0.15	-2.28	9.75	3423.89	0.000
<i>Fiamma Hlds</i>	-0.57%	-0.09	-2.73	12.80	6496.213	0.000
<i>Goodway Integrated</i>	-1.28%	-0.28	-3.56	24.02	25406.32	0.000
<i>Ijm Corp</i>	-0.64%	-0.15	-4.50	35.54	58797.05	0.000
<i>Ioicorp</i>	-0.38%	-0.14	-5.82	72.58	256732.8	0.000
<i>Ivory Properties</i>	-0.87%	-0.13	-2.96	15.94	10440.2	0.000
<i>Kl Kepong</i>	-0.24%	-0.07	-4.43	34.56	55420.27	0.000
<i>Kretam Prop</i>	-0.71%	-0.41	-12.25	251.68	3220917	0.000
<i>Matrix Concepts</i>	-0.37%	-0.05	-2.74	12.52	6224.247	0.000
<i>Mesb</i>	-1.07%	-0.27	-3.50	21.36	19916.94	0.000
<i>Misc</i>	-0.79%	-0.18	-3.10	15.49	10026.78	0.000
<i>Mesiniaga</i>	-0.40%	-0.14	-5.95	69.74	237096.1	0.000
<i>Nestle</i>	-0.19%	-0.11	-9.67	147.11	1090505	0.000
<i>Notion</i>	-0.92%	-0.32	-6.08	81.97	329264.9	0.000
<i>Ntpm</i>	-0.56%	-0.13	-3.60	25.32	28372.33	0.000
<i>Pansar</i>	-1.25%	-0.33	-3.62	25.35	28456.22	0.000
<i>Pantec</i>	-0.59%	-0.13	-3.91	27.13	33173.48	0.000
<i>Petra Energy</i>	-0.61%	-0.10	-2.87	16.13	10590.11	0.000
<i>Pan Malaysia Hlds</i>	-0.60%	-0.07	-2.47	10.63	4260.767	0.000
<i>Public Packages</i>	-1.03%	-0.24	-4.07	29.51	39680.94	0.000
<i>Sapind</i>	-0.69%	-0.12	-2.84	15.97	10339.8	0.000
<i>Sarawak Consolidated</i>	-0.55%	-0.16	-4.31	29.56	40227.17	0.000
<i>Sbccorp</i>	-0.94%	-0.23	-3.85	23.66	25072.24	0.000
<i>Scanwolf Corp</i>	-0.62%	-0.19	-4.71	37.77	66927.99	0.000
<i>Scgm</i>	-1.09%	-0.34	-4.30	35.24	57434.53	0.000
<i>Shh Resources</i>	-0.65%	-0.21	-5.58	63.92	197875.7	0.000
<i>Sig Gases</i>	-0.68%	-0.15	-3.44	19.28	16110.03	0.000
<i>Sig Int</i>	-0.82%	-0.14	-3.25	18.55	14654.25	0.000
<i>Sime Darby Bhd</i>	-0.83%	-0.17	-3.85	27.49	33990.71	0.000
<i>Slp Resources</i>	-0.47%	-0.35	-15.28	373.04	7111363	0.000
<i>Spritzer</i>	-0.68%	-0.12	-3.19	16.80	11925.81	0.000
<i>Success Transformer</i>	-0.41%	-0.09	-3.39	19.26	16020.29	0.000
<i>Superlon Hldgs</i>	-0.74%	-0.17	-4.44	33.01	50511.63	0.000
<i>Taann</i>	-0.79%	-0.20	-4.56	40.10	75271.86	0.000
<i>Tasek</i>	-0.57%	-0.12	-3.14	19.59	16233.85	0.000
<i>Teo Seng Capital</i>	-0.36%	-0.08	-3.98	23.17	24249.57	0.000
<i>Time Dotcom</i>	-0.76%	-0.12	-3.34	18.15	14142.2	0.000
<i>Tong Herr Resources</i>	-0.46%	-0.14	-5.78	58.16	163819.6	0.000
<i>Tsh Resources</i>	-0.55%	-0.16	-4.50	36.33	61493.09	0.000
<i>Pestech</i>	-0.49%	-0.08	-2.66	12.92	6537.773	0.000
<b>AVERAGE</b>	<b>-0.007</b>	<b>-0.16</b>	<b>-4.36</b>	<b>43.15</b>		

### **Descriptive Summary for Downside Conventional returns**

Table 4.6 highlights the descriptive summary for the conventional portfolio of downside returns. The maximum ceiling values for the returns is maintained at 0%, hence downside. The data shows that the downside mean for conventional portfolio (log) returns is -0.007. The lowest recorded mean is -0.0171 by Johan Holdings. The highest recorded mean is Samchem, at -0.0019. The average skewness is -4.669. The lowest negative skewed return is AM Bank, at -23.02. The highest skewed return is Luster Industries (-1.81). The average kurtosis is 54.55. This is representation of the average peak of downside returns. AM bank takes the lead at highest peak point with a value of 682.53 while the lowest is Luster Industries at 5.27.



**Table 4.6: Descriptive Summary For Conventional Downside Returns**

	<i>Mean</i>	<i>Min</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>J-Bera</i>	<i>Probability</i>
<i>Abmb</i>	-0.53%	-0.11	-3.07	18.53	14382.95	0.000
<i>Aeon Credit Services</i>	-0.37%	-0.05	-2.92	14.10	8121.579	0.000
<i>Am Bank</i>	-0.35%	-0.46	-23.02	682.53	23928495	0.000
<i>British Ame Toba</i>	-0.58%	-0.13	-4.15	26.78	32702.6	0.000
<i>Berjaya Asset</i>	-0.63%	-0.11	-2.58	16.09	10208.76	0.000
<i>Berjaya Corp</i>	-0.35%	-0.06	-3.19	15.48	10130.73	0.000
<i>Brem Holdings</i>	-0.70%	-0.12	-3.63	23.47	24336.64	0.000
<i>Bumi Armada</i>	-1.09%	-0.41	-7.75	97.81	476037.2	0.000
<i>Carlsberg Brew</i>	-0.37%	-0.08	-3.83	25.80	29837.59	0.000
<i>Cimb Grp Bhd</i>	-0.47%	-0.14	-4.65	44.99	95404.13	0.000
<i>Dolomite Corp</i>	-1.22%	-0.20	-2.88	12.74	6607.463	0.000
<i>Eco World Dev</i>	-1.24%	-0.29	-3.72	22.60	22672.65	0.000
<i>Luster Industries</i>	-0.65%	-0.10	-2.68	14.04	7766.173	0.000
<i>Eksons Corporations</i>	-0.60%	-0.18	-4.18	33.76	52401.45	0.000
<i>Facb Industries</i>	-0.33%	-0.13	-5.84	80.09	313608.7	0.000
<i>Warisan</i>	-0.47%	-0.13	-3.69	27.14	32879.14	0.000
<i>Genting Bhd</i>	-0.58%	-0.08	-2.61	13.75	7371.887	0.000
<i>Elk-Desa Resources</i>	-0.27%	-0.10	-5.96	55.61	150090.5	0.000
<i>Hap Seng Consolidated Bhd</i>	-0.55%	-0.36	-13.15	287.55	4212431	0.000
<i>Maa Group</i>	-0.27%	-0.05	-3.18	16.07	10895.76	0.000
<i>Hexza Corpn</i>	-0.68%	-0.17	-4.37	35.78	59382.25	0.000
<i>Hong Leong Bank</i>	-0.36%	-0.11	-4.90	51.43	125959.8	0.000
<i>Igb Reit</i>	-0.52%	-0.12	-3.31	19.29	15941.1	0.000
<i>Ijm Plantations</i>	-1.45%	-0.28	-2.61	15.20	9080.658	0.000
<i>Johan Holdings</i>	-1.71%	-0.29	-2.75	12.55	6266.478	0.000
<i>K-Star Sports</i>	-0.52%	-0.32	-9.38	161.98	1321827	0.000
<i>Hume Ind</i>	-1.11%	-0.21	-3.07	16.06	10745.45	0.000
<i>Lien Hoe Corp</i>	-0.83%	-0.11	-2.32	9.48	3279.776	0.000
<i>Leader Stl Hldg</i>	-1.30%	-0.13	-1.81	5.27	940.2774	0.000
<i>Maybank Bhd</i>	-0.55%	-0.36	-12.73	256.01	3335538	0.000
<i>Metrod Hld</i>	-1.08%	-0.15	-2.66	11.71	5369.984	0.000
<i>Majuperak Hldgs</i>	-0.27%	-0.04	-3.40	17.99	13966.04	0.000
<i>Pavilion Real Estate</i>	-0.22%	-0.13	-6.03	45.78	101905	0.000
<i>Public Bank Bhd</i>	-0.58%	-0.12	-3.23	24.97	27044.76	0.000
<i>Pentamaster Corp</i>	-0.48%	-0.13	-4.45	41.21	79397.36	0.000
<i>Plb Engineering</i>	-0.64%	-0.16	-4.00	26.54	31892.84	0.000
<i>Lbi Cap</i>	-0.84%	-0.22	-4.09	37.41	64520.59	0.000
<i>Rhbank</i>	-0.44%	-0.13	-4.49	26.14	31772.31	0.000
<i>Samchem</i>	-0.19%	-0.04	-3.95	22.72	23283.58	0.000
<i>Southern Steel</i>	-0.47%	-0.23	-10.06	183.70	1705233	0.000
<i>Tasco Berhad</i>	-0.77%	-0.14	-3.23	17.49	12984.78	0.000
<i>Tan Chong Motor</i>	-0.90%	-0.22	-3.85	31.57	45176.64	0.000
<i>Tdm Berhad</i>	-0.52%	-0.08	-2.78	13.52	7310.189	0.000
<i>Teck Guan P'dana</i>	-0.59%	-0.09	-2.53	10.65	4331.738	0.000
<i>Texchem Res'rces</i>	-0.85%	-0.12	-2.78	13.92	7737.961	0.000
<i>Digistar</i>	-0.85%	-0.20	-3.65	23.14	23666.49	0.000
<i>Yung Kong Galvan</i>	-0.62%	-0.13	-3.49	19.13	15933.08	0.000
<i>Ytl Corporation</i>	-0.37%	-0.10	-4.48	23.98	26844.79	0.000
<i>Mphb Capital</i>	-0.59%	-0.14	-3.86	30.60	42370.78	0.000
<i>Pensonic Holdgs</i>	-1.30%	-0.30	-3.67	27.08	32672.74	0.000
<b>AVERAGE</b>	<b>-0.007</b>	<b>-0.16</b>	<b>-4.67</b>	<b>54.56</b>		

#### 4.4.1 Downside Beta using HV, EWMA and GARCH (1,1)

**Table 4.7:** Downside Beta of Sharia-Compliant Portfolio

1-25 companies	HV	EWMA	GARCH (1,1)	25-50 companies	HV	EWMA	GARCH (1,1)
Adventa	0.3146	0.3247	0.3504	Pansar	0.1823	0.1906	0.2014
Ancom	0.2165	0.2363	0.2901	Pantec	0.1550	0.1704	0.1679
Apm Automotive	0.1310	0.1366	0.1469	Petra Energy	0.2756	0.2964	0.3320
Astino	0.1825	0.1995	0.1908	Pan Malaysia Hldgs	0.3759	0.3958	0.4267
Bimb Hlds	0.1083	0.1175	0.1181	Public Packages	0.1800	0.1961	0.1900
Borneo Oil	0.3611	0.3819	0.4138	Sapind	0.2152	0.2151	0.2319
Cb Ind Product Hd.	0.1319	0.1446	0.1470	Sarawak Con.	0.3321	0.3381	0.3714
Cocoland Hlds	0.1481	0.1566	0.1777	Sbccorp	0.1895	0.2005	0.2345
Complete Logistic	0.2160	0.2281	0.2325	Scanwolf Corp	0.3587	0.3700	0.4225
Dutch Lady	0.0699	0.0723	0.0976	Scgm	0.1781	0.1913	0.2649
Emico	0.2861	0.3124	0.3020	Shh Resources	0.2173	0.2252	0.2388
Fiamma Hlds	0.1659	0.1763	0.1746	Sig Gases	0.2215	0.2388	0.2578
Goodway Integrated	0.3750	0.3976	0.4078	Sig Int	0.2153	0.2349	0.2436
Ijm Corp	0.1686	0.1849	0.2141	Sime Darby Bhd	0.1476	0.1541	0.2584
Ioicorp	0.1093	0.1168	0.1353	Slp Resources	0.2050	0.2150	0.2304
Ivory Properties	0.2227	0.2454	0.2489	Spritzer	0.1312	0.1366	0.1404
Kl Kepong	0.0729	0.0763	0.0896	Success Transformer	0.2298	0.2397	0.2487
Kretam Prop	0.2014	0.2154	0.3608	Superlon Hldgs	0.2160	0.2331	0.2700
Matrix Concepts	0.1015	0.1097	0.1112	Taann	0.1486	0.1625	0.1680
Mesb	0.3587	0.3698	0.4071	Tasek	0.1140	0.1185	0.1431
Misc	0.1149	0.1220	0.1390	Teo Seng Capital	0.2070	0.2233	0.2285
Mesiniaga	0.2729	0.2785	0.2837	Time Dotcom	0.1435	0.1487	0.2238
Nestle	0.0645	0.0659	0.0965	Tong Herr Resources	0.1656	0.1741	0.1921
Notion	0.2425	0.2636	0.3357	Tsh Resources	0.1292	0.1411	0.1422
Ntpm	0.1522	0.1640	0.1740	Pestech	0.1503	0.1664	0.1669

The table above highlights the results for downside beta of Shariah-compliant stocks and the market using HV, EWMA and GARCH (1,1) models.

**Table 4.8:** Shariah-Compliant And FTSE Bursa Malaysia Downside Beta

<i>AVG Shariah-compliant stock beta</i>	<i>0.1975</i>	<i>0.2095</i>	<i>0.2328</i>
<b>FTSE BURSA MALAYSIA</b>	<b>0.0766</b>	<b>0.0810</b>	<b>0.0843</b>

The results show a slight steady increase in downside beta estimates as the methods become more rigid. The GARCH model gives a total annualized average beta of 23% for Shariah-compliant stocks based on the GARCH (1,1) estimates. The result indicates that both the market and the portfolio recorded higher values for downside

deviations as the parameters become tighter. The downside beta for conventional stocks is also highlighted below:

**Table 4.9:** Downside Beta of Conventional Portfolio

<i>1-25 companies</i>	<i>HV</i>	<i>EWMA</i>	<i>GARCH (1,1)</i>	<i>25-50 companies</i>	<i>HV</i>	<i>EWMA</i>	<i>GARCH (1,1)</i>
<i>Abmb</i>	0.1418	0.1539	0.1558	K-Star Sports	0.5730	0.5919	0.3667
<i>Aeon Credit Services</i>	0.1052	0.1118	0.1092	Hume Ind	0.1790	0.1948	0.2395
<i>Am Bank</i>	0.1210	0.1247	0.3003	Lien Hoe Corp	0.2319	0.2493	0.4075
<i>British Ame Toba</i>	0.1813	0.1982	0.2376	Leader Stl Hldg	0.3505	0.3650	0.4504
<i>Berjaya Asset</i>	0.1997	0.2051	0.1737	Maybank Bhd	0.0735	0.0786	0.3457
<i>Berjaya Corp</i>	0.1631	0.1796	0.1270	Metrod Hld	0.1317	0.1249	0.0886
<i>Brem Holdings</i>	0.1059	0.1105	0.2011	Majuperak Hldgs	0.3275	0.3462	0.1680
<i>Bumi Armada</i>	0.3040	0.3258	0.6327	Pavilion Real Estate	0.1316	0.1406	0.1498
<i>Carlsberg Brew</i>	0.1056	0.1122	0.1189	Public Bank Bhd	0.0574	0.0598	0.1584
<i>Cimb Grp Bhd</i>	0.1315	0.1397	0.1519	Pentamaster Corp	0.2193	0.2386	0.2373
<i>Dolomite Corp</i>	0.4192	0.4336	0.4107	Plb Engineering	0.2133	0.2067	0.2549
<i>Eco World Dev</i>	0.1532	0.1716	0.4613	Lbi Cap	0.1924	0.1942	0.2342
<i>Luster Industries</i>	0.4042	0.4250	0.1653	Rhbank	0.1393	0.1472	0.0700
<i>Eksons Corporations</i>	0.1930	0.2000	0.2084	Samchem	0.2248	0.2410	0.2088
<i>Facb Industries</i>	0.1451	0.1510	0.1134	Southern Steel	0.2419	0.2616	0.2443
<i>Warisan</i>	0.1921	0.1842	0.1590	Tasco Berhad	0.1657	0.1782	0.2463
<i>Genting Bhd</i>	0.1357	0.1534	0.1484	Tan Chong Motor	0.1364	0.1486	0.1482
<i>Elk-Desa Resources</i>	0.1018	0.1066	0.1155	Tdm Berhad	0.2109	0.2340	0.1838
<i>Hap Seng Consolidated Bhd</i>	0.0872	0.0875	0.2809	Teck Guan P'dana	0.2755	0.2850	0.2405
<i>Maa Group</i>	0.1791	0.1859	0.0898	Texchem Res'rces	0.1993	0.2077	0.3062
<i>Hexza Corpn</i>	0.1724	0.1791	0.2171	Digistar	0.3765	0.3982	0.2177
<i>Hong Leong Bank</i>	0.0797	0.0843	0.1146	Yung Kong Galvan	0.3596	0.3862	0.2142
<i>Igb Reit</i>	0.1049	0.1118	0.1758	Ytl Corporation	0.1487	0.1647	0.1764
<i>Ijm Plantations</i>	0.1606	0.1680	0.4159	Mphb Capital	0.1370	0.1538	0.3990
<i>Johan Holdings</i>	0.3883	0.4231	0.2390	Pensonic Holdgs	0.2103	0.2175	0.6009

The results for the conventional stocks also show an increase in downside beta estimates as the method becomes more robust. The average downside beta score for conventional stocks is 23.76% based on the GARCH (1,1) estimates. The table below captures the downside scores of the conventional stocks and the market for the study period.

**Table 4.10:** Conventional And FTSE Bursa Malaysia Downside Beta

<i>Total</i>	<i>0.1972</i>	<i>0.2083</i>	<i>0.2376</i>
<i>FTSE BURSA MALAYSIA</i>	<i>0.0766</i>	<i>0.0810</i>	<i>0.0843</i>

#### 4.4.2 GARCH (1,1) Results

The GARCH (1,1) downside beta values are given below. It is categorized into two groups. Group 1 contains the list of downside beta values for all the 50 Shariah-compliant stocks using the GARCH (1,1) method. Group 2 contains the list of downside beta values for all the 50 conventional stocks using the GARCH (1,1) method.

**Table 4.11:** Downside Beta Values For Both Portfolios

Shariah-Compliant Companies		Conventional Companies	
Companies (1-25)	Companies (25-50)	Companies (1-25)	Companies (25-50)
0.3504	0.4267	0.1558	0.3667
0.2901	0.2014	0.1092	0.2395
0.1469	0.1679	0.3003	0.4075
0.1908	0.1669	0.2376	0.4504
0.1181	0.3320	0.1737	0.3457
0.4138	0.1900	0.1270	0.0886
0.1470	0.2319	0.2011	0.1680
0.1777	0.3714	0.6327	0.1498
0.2325	0.2345	0.1189	0.1584
0.0976	0.4225	0.1519	0.2373
0.3020	0.2649	0.4107	0.2549
0.1746	0.2388	0.4613	0.2342
0.4078	0.2578	0.1653	0.0700
0.2141	0.2436	0.2084	0.2088
0.1353	0.2584	0.1134	0.2443
0.2489	0.2304	0.1590	0.2463
0.0896	0.1404	0.1484	0.1482
0.3608	0.2487	0.1155	0.1838
0.1112	0.2700	0.2809	0.2405
0.4071	0.1680	0.0898	0.3062
0.2837	0.1431	0.2171	0.2177
0.1390	0.2285	0.1146	0.2142
0.0965	0.2238	0.1758	0.1764
0.3357	0.1921	0.4159	0.3990
0.1740	0.1422	0.2390	0.6009

The t-test was computed to establish whether the downside beta values, using the GARCH (1,1) method, will yield statistically difference among the two portfolios.

This was done using a confidence interval of 95%. The p-value (0.83) is greater than

the level of significance (0.05), therefore, the null hypothesis is not rejected. As a result, there is no statistically significant difference in downside beta values between Shariah-compliant stocks and their conventional counterparts. The table below highlights the result.

**Table 4.12:** T-Test For Downside Beta Using GARCH (1,1) Results

<i>t-Test: Two-Sample Assuming Unequal Variances</i>	<i>SCS</i>	<i>CS</i>
<i>Mean</i>	0.2328	0.2376
<i>Variance</i>	0.0087	0.0159
<i>Observations</i>	50	50
<i>Hypothesized Mean Difference</i>	0	
<i>df</i>	90	
<i>t Stat</i>	-0.2166	
<i>P(T&lt;=t) one-tail</i>	0.4145	
<i>t Critical one-tail</i>	1.6620	
<i>P(T&lt;=t) two-tail</i>	0.8290	
<i>t Critical two-tail</i>	1.9867	

The mean downside beta values for the 5-year period is 23.28% and 23.76% for Shariah-compliant portfolio and conventional portfolio respectively. However, the difference in mean values are statistically not significant, therefore suggesting that the downside measures of Shariah-compliant portfolio is not significantly better than its conventional counterpart. Therefore, with downside beta as primary selection criteria, investors will not be penalised in preferring a conventional stock over its contemporary Shariah-compliant stock, irrespective of the slightly higher beta of 0.238 as opposed to 0.233. The number of observations for each of the portfolios is 50 and the degrees of freedom is 90.

#### **4.4.3 Portfolio Explanatory Power On FTSE BURSA Malaysia**

The explanatory power of both Sharia-compliant stocks and conventional stocks toward modelling the downside market beta is put to test. The regression (see appendix) shows Shariah-compliant portfolio and conventional portfolio registering an R-squared

value of 7.5% respectively. Based on this metric, it is evident that Shariah compliant stocks have a higher impact over their conventional counterparts in explaining the market downside beta. However, the direction of impact contribution (positive or negative) is dependent on the interested time period and the performance of the interested asset class.

### Sharia-Compliant Portfolio

The combined effects of the portfolio on explaining the variations of the downside market beta is done using GARCH analysis. There was normal convergence achieved after 171 iterations with an R-squared value of 0.08. The portfolio stocks (log returns) represent the independent variables while the FTSE Bursa downside stock (log returns) is used as the dependent variable. The mirroring of FTSE Bursa downside beta reveals that Shariah-compliant portfolio registers a lower ARCH term, and higher GARCH and long run variance when compared to conventional portfolio in Malaysia. Table 4.13 highlight the result of the Sharia-compliant stocks that are significant in predicting the downside beta of the market returns.

**Table 4.13:** Shariah-Compliant Portfolio Modelling of FTSE Bursa Malaysia

<i>SCS</i>	<i>BORNEO OIL</i>	<i>CB IND</i>	<i>IJM CORP</i>	<i>KL KEPONG</i>	<i>MISC</i>	<i>SHH RES.</i>	<i>SIME DARBY</i>	<i>SPRITZER</i>	<i>SUPERLON</i>	<i>TONG HERR RES.</i>
<i>Coeff.</i>	0.010 (0.034)	0.074 (0.000)	0.029 (0.006)	0.110 (0.000)	0.054 (0.002)	0.019 (0.042)	0.033 (0.000)	0.043 (0.003)	0.018 (0.049)	0.042 (0.000)
<i>Std. Err</i>	0.005	0.012	0.010	0.023	0.017	0.010	0.006	0.015	0.009	0.009

Table 4.13 highlights stocks that statistically significant at 95% confidence interval in explaining the downside beta for FTSE Bursa. Furthermore, the coefficients of the constant term, GARCH term and the ARCH term are all positive and statistically significant at 1% confidence interval.

The conditional variance equation is given by:

$$\hat{h}_t = 0.0000063 + 0.18\hat{u}_{t-1}^2 + 0.60\hat{h}_{t-1} \quad (3.28)$$

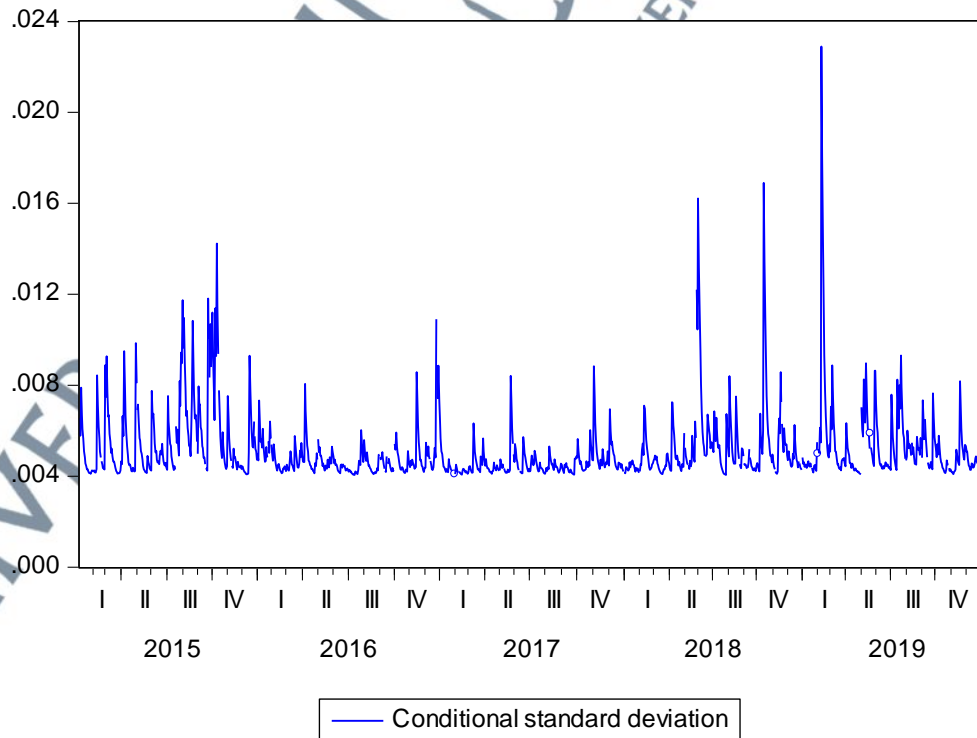
Where

$b_1 = 0.18$  : ARCH parameter,

$\theta_1 = 0.60$  : GARCH parameter.

The stability of the method requires both the values and the additive computations of  $b_1$  and  $\theta_1$  to be less than 1. This condition is met. Therefore, there is presence of time-varying conditional downside beta in the returns of the FTSE Bursa Malaysia stock as modelled by the Shariah-compliant stocks. If FTSE Bursa was only composed of Shariah-compliant stocks, the downside beta will follow the graph shown below.

The conditional standard deviation for downside beta of all Shariah-compliant stocks on the is captured below.



**Figure 4.2:** Shariah-Compliant Portfolio Modelling FTSE Bursa Malaysia

### Conventional Stocks

Similarly, the combined effects of the conventional stocks on explaining the variations of the downside market beta is done using GARCH (1,1) analysis. There was normal convergence achieved after 207 iterations with an R-squared value of 0.03. The conventional stocks (log returns) represent the independent variables while the FTSE Bursa downside stock log returns is used as the dependent variable. Also, the GARCH and long run variance terms for the conventional portfolio is less than the Shariah-compliant portfolio. Table 4.14 highlights the result of the Sharia-compliant stocks that are significant in predicting the downside beta of the market returns.

**Table 4.14:** Conventional Portfolio Modelling of FTSE Bursa Malaysia

<i>SCS</i>	<i>ABMB</i>	<i>CIMB</i>	<i>EKSONS</i>	<i>GENTING</i>	<i>HUME IND</i>	<i>MAA GROUP</i>	<i>MAY BANK</i>	<i>PENTA MASTER</i>	<i>PLB</i>	<i>YTL</i>
<i>Coeff.</i>	0.054 (0.000)	0.063 (0.000)	0.028 (0.000)	0.067 (0.000)	0.019 (0.034)	0.023 (0.002)	0.082 (0.003)	0.017 (0.052)	0.042 (0.000)	0.034 (0.000)
<i>Std. Err</i>	0.011	0.015	0.008	0.013	0.009	0.007	0.028	0.009	0.006	0.010

Table 4.14 highlights stocks that statistically significant at 95% confidence interval in explaining the downside beta for FTSE Bursa. Furthermore, the coefficients of the constant term, GARCH term and the ARCH term are all positive and statistically significant at 1% confidence level.

The conditional variance equation is given by:

$$\hat{h}_t = 0.0000048 + 0.48\hat{u}_{t-1}^2 + 0.52\hat{h}_{t-1} \quad (3.29)$$

Where

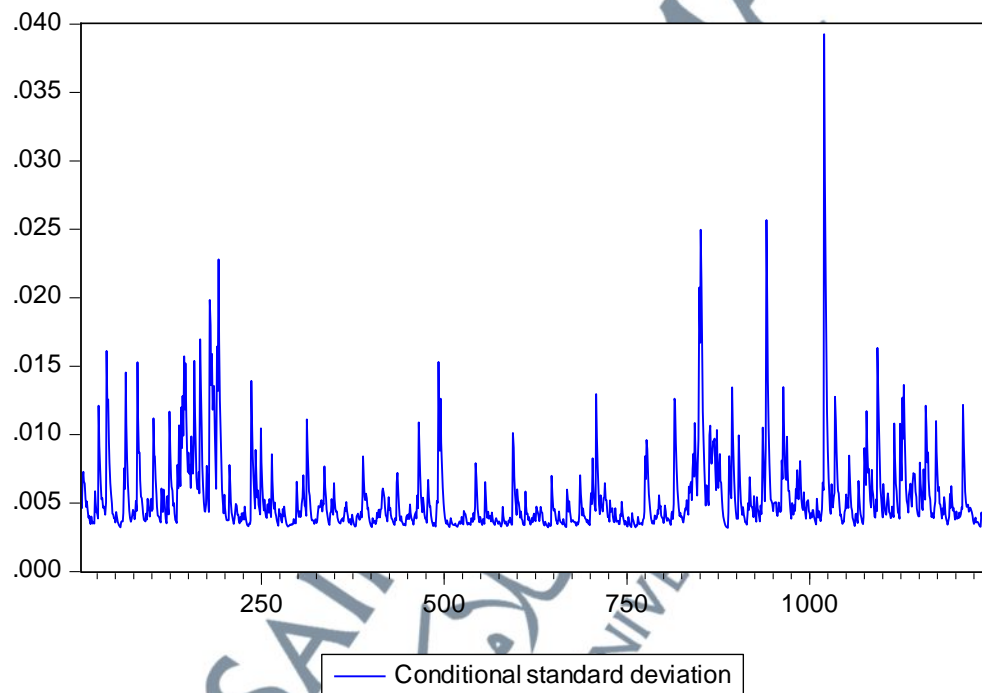
$b_1 = 0.48$  : ARCH parameter,

$\theta_1 = 0.52$  : GARCH parameter.

The stability of the method requires both the values and the additive computations of  $b_1$  and  $\theta_1$  to be less than 1. This condition is not met. This has the

tendency to offset the persistence of the volatility and results in explosive volatility predictions, and hence, results to poor forecasting. However, there is presence of time-varying conditional downside beta in the returns of the FTSE Bursa Malaysia stock as modelled by the conventional stocks.

If FTSE Bursa was only composed of conventional stocks, the downside beta will follow the graph shown below.



**Figure 4.3:** Conventional Portfolio Modelling FTSE Bursa Malaysia

#### 4.5 Objective 3: Sortino Ratio

The Sortino ratio for the two portfolios was done using the downside beta scores of the GARCH (1,1) model. The data is sorted into groups, where the first group (Group 1) is the list of the Shariah-compliant portfolio while the second group (Group 2) is the list of the conventional portfolio scores.

**Table 4.15: Sortino Ratio For Both Portfolios Using GARCH (1,1) Scores**

SHARIAH-COMPLIANT PORTFOLIO				CONVENTIONAL PORTFOLIO			
Group 1	Ratio	Group 1	Ratio	Group 2	Ratio	Group 2	Ratio
Adventa	0.02	Pansar	0.04	Abmb	-0.03	K-Star Sports	-0.02
Ancom	0.04	Pantec	0.01	Aeon Credit Services	0.09	Hume Ind	-0.07
Apm	-0.04	Petra	0.05	Am Bank	-0.02	Lien Hoe Corp	-0.01
Astino	0.02	Panmal	-0.05	British Ame Toba	-0.06	Leader Stil Hldg	0.00
Bimb	0.04	Pub Pack	0.05	Berjaya Asset	-0.02	Maybank Bhd	0.01
Borneo	-0.01	Sapind	-0.02	Berjaya Corp	-0.05	Metrod Hld	-0.05
Cb Ind	-0.03	Sarawak	0.09	Brem Holdings	-0.01	Majuperak Hldgs	0.02
Coco	0.07	Sbccorp	-0.01	Bumi Armada	-0.01	Pavilion Real Estate	0.03
Com Log	0.03	Scanwolf	0.01	Carlsberg Brew	0.11	Public Bank Bhd	0.02
Dutch	0.04	Scgm	0.03	Cimb Grp Bhd	0.01	Pentamaster Corp	0.20
Emico	0.03	Shh Res	-0.01	Dolomite Corp	-0.03	Plb Engineering	0.02
Fiamma	0.01	Sig Gases	0.07	Eco World Dev	-0.02	Lbi Cap	-0.01
Goodway	0.01	Sig Int	-0.01	Luster Industries	0.00	Rhbank	-0.01
Ijm	0.00	Sime Darby	0.00	Eksons Corporations	-0.04	Samchem	0.07
Ioi	0.01	Slp Resour	0.07	Facb Industries	0.04	Southern Steel	-0.02
Ivory	-0.02	Spritzer	0.02	Warisan	-0.04	Tasco Berhad	0.00
Kl	0.04	Success Trans	0.07	Genting Bhd	-0.03	Tan Chong Motor	-0.07
Kretam	0.01	Superlon	0.08	Elk-Desa Resources	0.02	Tdm Berhad	-0.04
Matrix	0.05	Taann	0.01	Hap.Seng Consolidated	0.04	Teck Guan P'dana	0.02
Mesb	0.01	Tasek	-0.07	Maa Group	0.08	Texchem Res'rces	-0.03
Misc	0.02	Teo_Seng	0.04	Hexza Corpn	0.02	Digistar	-0.10
Mesiniaga	0.02	Time.Com	0.05	Hong Leong Bank	0.04	Yung Kong Galvan	-0.05
Nestle	0.13	Tong	0.02	Igb Reit	0.04	Ytl Corporation	-0.02
Notion	0.05	Tsh Resources	-0.01	Ijm Plantations	-0.01	Mphb Capital	-0.02
Ntpm	0.01	Pestec	0.06	Johan Holdings	-0.05	Pensonic Holdgs	0.00
<b>Shariah-compliant stock Average</b>			<b>0.023</b>	<b>Conventional stock Average</b>			<b>-0.001</b>

A t-test was done to ascertain whether there is statistical difference in the Sortino ratio values between Shariah-compliant stocks and conventional stocks. From table 4.16, the results of the t-test (at 95% confidence interval) indicates a p-value of 0.008. This probability value is less than the level of significance (0.05) and therefore, the null hypothesis is rejected. Consequently, the findings conclude that there is statistical difference in downside beta to return performance of Shariah-compliant stocks over their conventional counterparts and vice versa. The table 4.16 highlights the result.

**Table 4.16: T-Test For Sortino Ratio Using GARCH (1,1) Results**

<i>t-Test: Two-Sample Assuming Unequal Variances</i>	SCS	CS
<i>Mean</i>	0.023116	-0.00112
<i>Variance</i>	0.001414	0.002558
<i>Observations</i>	50	50
<i>Hypothesized Mean Difference</i>	0	
<i>df</i>	90	
<i>t Stat</i>	2.71886	
<i>P(T&lt;=t) one-tail</i>	0.00393	
<i>t Critical one-tail</i>	1.661961	
<i>P(T&lt;=t) two-tail</i>	0.00786	
<i>t Critical two-tail</i>	1.986675	

The mean Sortino ratio for the 5-year period is 0.023 and -0.001 for the Shariah-compliant portfolio and conventional portfolio respectively. The number of observations for each of the portfolios is 50 and there are 90 degrees of freedom. Also, the results of the Sortino ratio using the GARCH (1,1) method indicates significant difference in the mean values of Sharia-compliant stocks against conventional stocks. As a result, investors will bear more reward investing in Shariah-compliant businesses as opposed to conventional ones. This is in line with the EWMA beta scores, as evidenced in the robustness test below. There are different opinions which indicate the superiority of conventional stocks over Sharia-compliant stocks in yielding better returns such as Rana & Akhter (2015), while Tükenmez, Saka & Kizgin (2019) and Trabelsi et al. (2020) proposes that both portfolios are equally rewarding. However, Alam & Ansari (2020) approves of the findings that highlights the supremacy of Shariah-compliant stock over its conventional counterpart.

#### 4.6 Robustness Test

The robustness test is done using the market downside beta as a benchmark for the two separate portfolios. The computation of downside beta is done as highlighted by equation 3.21 for both Shariah-compliant stocks and conventional Stocks.

**Table 4.17: Market Downside-Beta Scores For Both Portfolios**

SHARIAH-COMPLIANT PORTFOLIO				CONVENTIONAL PORTFOLIO			
Group 1	DBeta	Group 1	DBeta	Group 2	DBeta	Group 2	DBeta
Adventa	0.02	Pansar	0.13	Abmb	0.18	K-Star Sports	0.01
Ancom	0.12	Pantec	0.15	Aeon Credit Services	0.10	Hume Ind	0.04
Apm	0.03	Petra	0.12	Am Bank	0.02	Lien Hoe Corp	0.22
Astino	0.13	Panmal	-0.05	British Ame Toba	0.14	Leader Stl Hldg	0.11
Bimb	0.11	Pub Pack	0.16	Berjaya Asset	0.10	Maybank Bhd	0.20
Borneo	0.32	Sapind	0.19	Berjaya Corp	0.09	Metrod Hld	0.13
Cb Ind	0.10	Sarawak	0.01	Brem Holdings	0.07	Majuperak Hldgs	0.19
Coco	0.15	Sbccorp	0.17	Bumi Armada	0.10	Pavilion Real Estate	0.12
Com Log	0.00	Scanwolf	0.37	Carlsberg Brew	0.16	Public Bank Bhd	0.14
Dutch	-0.01	Scgm	0.09	Cimb Grp Bhd	0.31	Pentamaster Corp	0.37
Emico	0.20	Shh Res	0.37	Dolomite Corp	-0.08	Plb Engineering	0.03
Fiamma	0.12	Sig Gases	0.03	Eco World Dev	0.27	Lbi Cap	0.03
Goodway	0.25	Sig Int	0.32	Luster Industries	0.24	Rhbank	0.17
Ijm	0.10	Sime Darby	0.31	Eksons Corporations	0.08	Samchem	0.19
Ioi	0.14	Slp Resour	0.22	Facb Industries	0.18	Southern Steel	0.15
Ivory	0.03	Spritzer	0.17	Warisan	0.14	Tasco Berhad	0.05
Kl	0.14	Success Trans	0.10	Genting Bhd	0.31	Tan Chong Motor	0.15
Kretam	0.30	Superlon	0.31	Elk-Desa Resources	0.01	Tdm Berhad	0.23
Matrix	0.13	Taann	0.08	Hap Seng Con. Bhd	0.09	Teck Guan P'dana	-0.01
Mesb	0.01	Tasek	-0.05	Maa Group	0.10	Texchem Res'rces	0.10
Misc	0.15	Teo_Seng	0.25	Hexza Corpn	0.20	Digistar	-0.21
Mesiniaga	0.04	Time.Com	0.12	Hong Leong Bank	0.12	Yung Kong Galvan	0.19
Nestle	0.01	Tong	0.29	Igb Reit	0.09	Ytl Corporation	0.14
Notion	0.06	Tsh Resources	0.14	Ijm Plantations	0.01	Mphb Capital	0.19
Ntpm	0.32	Pestec	0.02	Johan Holdings	0.11	Pensonic Holdgs	0.27
<b>Shariah-compliant stock Average</b>			<b>0.14</b>	<b>Conventional stock Average</b>			<b>0.13</b>

The downside beta values captured in table 4.17 was computed using the downside movements of Bursa Malaysia as the market index and benchmark upon which the covariance of all other stocks were matched, against its variance equation 3.21. Shariah-compliant companies recorded a slightly higher downside beta value (0.14) over their conventional counterparts (0.13).

A t-test is done to inform on the statistical significance of the difference in mean values amongst the two portfolios. The hypothesis proposes that there is no statistical difference in the mean downside beta value between Shariah-compliant stocks and conventional stocks. The t-test is done using a confidence interval of 95%. The p-value (0.53) is greater than the level of significance (0.05), therefore, the null hypothesis is not rejected. As a result, there is no statistically significant difference in downside beta

between Shariah-compliant stocks and conventional stocks. The table below highlights the result.

**Table 4.18:** T-Test For Downside Beta Using Market Downside Beta Values

<i>t-Test: Two-Sample Assuming Equal Variances</i>		
	<b>SCS</b>	<b>CS</b>
<b>Mean</b>	0.1398	0.1268
<b>Variance</b>	0.012414	0.010402
<b>Observations</b>	50	50
<b>Pooled Variance</b>	0.011408	
<b>Hypothesized Mean Difference</b>	0	
<b>df</b>	98	
<b>t Stat</b>	0.608567	
<b>P(T&lt;=t) one-tail</b>	0.27211	
<b>t Critical one-tail</b>	1.660551	
<b>P(T&lt;=t) two-tail</b>	0.54422	
<b>t Critical two-tail</b>	1.984467	

The Sortino ratio was calculated through data from the EWMA downside beta method. The data is sorted into groups, where the first group (Group 1) is the list of the Shariah-compliant portfolio while the second group (Group 2) is the list of the conventional portfolio scores.

**Table 4.19: Sortino Ratio For Both Portfolios Using The EWMA Scores**

SHARIAH-COMPLIANT PORTFOLIO				CONVENTIONAL PORTFOLIO			
Group 1	Ratio	Group 1	Ratio	Group 2	Ratio	Group 2	Ratio
Adventa	0.02	Pansar	0.08	Abmb	-0.03	K-Star Sports	-0.01
Ancom	0.04	Pantec	0.01	Aeon Credit Services	0.09	Hume Ind	-0.09
Apm	-0.05	Petra	0.03	Am Bank	-0.04	Lien Hoe Corp	-0.01
Astino	0.02	Panmal	-0.02	British Ame Toba	-0.08	Leader Stl Hldg	0.00
Bimb	0.04	Pub Pack	0.09	Berjaya Asset	-0.02	Maybank Bhd	0.04
Borneo	-0.01	Sapind	-0.02	Berjaya Corp	-0.03	Metrod Hld	-0.03
Cb Ind	-0.03	Sarawak	0.06	Brem Holdings	-0.01	Majuperak Hldgs	0.01
Coco	0.08	Sbccorp	-0.02	Bumi Armada	-0.03	Pavilion Real Estate	0.03
Com Log	0.03	Scanwolf	0.01	Carlsberg Brew	0.12	Public Bank Bhd	0.05
Dutch	0.05	Scgm	0.07	Cimb Grp Bhd	0.01	Pentamaster Corp	0.20
Emico	0.03	Shh Res	-0.01	Dolomite Corp	-0.03	Plb Engineering	0.02
Fiamma	0.01	Sig Gases	0.07	Eco World Dev	-0.06	Lbi Cap	-0.02
Goodway	0.01	Sig Int	-0.01	Luster Industries	0.00	Rhbank	-0.01
Ijm	0.00	Sime Darby	0.01	Eksons Corporations	-0.04	Samchem	0.06
Ioi	0.02	Slp Resour	0.08	Facb Industries	0.03	Southern Steel	-0.02
Ivory	-0.02	Spritzer	0.03	Warisan	-0.03	Tasco Berhad	0.00
Kl	0.04	Success Trans	0.04	Genting Bhd	-0.03	Tan Chong Motor	-0.07
Kretam	0.02	Superlon	0.09	Elk-Desa Resources	0.02	Tdm Berhad	-0.03
Matrix	0.05	Taann	0.02	Hap.Seng Consolidated	0.14	Teck Guan P'dana	0.02
Mesb	0.01	Tasek	-0.10	Maa Group	0.04	Texchem Res'rces	-0.04
Misc	0.05	Teo_Seng	0.03	Hexza Corpn	0.02	Digistar	-0.05
Mesiniaga	0.01	Time.Com	0.07	Hong Leong Bank	0.06	Yung Kong Galvan	-0.03
Nestle	0.19	Tong	0.02	Igb Reit	0.06	Ytl Corporation	-0.02
Notion	0.07	Tsh Resources	-0.01	Ijm Plantations	-0.02	Mphb Capital	-0.06
Ntpm	0.01	Pestec	0.05	Johan Holdings	-0.03	Pensonic Holdgs	-0.01
<b>Shariah-compliant stock Average</b>			<b>0.027</b>	<b>Conventional stock Average</b>			<b>0.001</b>

The result from table 4.19 shows that Sharia-compliant stocks records a higher Sortino ratio over their conventional counterparts by the use of Sortino ratio. Furthermore, by use of t-test, it is realized that the difference in scores is statistically significant at 95% confidence level.

**Table 4.20: T-Test For Sortino Ratio Using EWMA Results**

<i>t-Test: Two-Sample Assuming Equal Variances</i>	<b>SCS</b>	<b>CS</b>
<b>Mean</b>	0.027206	0.000729
<b>Variance</b>	0.002011	0.002969
<b>Observations</b>	50	50
<b>Pooled Variance</b>	0.00249	
<b>Hypothesized Mean Difference</b>	0	
<b>df</b>	98	
<b>t Stat</b>	2.653026	
<b>P(T&lt;=t) one-tail</b>	0.004654	
<b>t Critical one-tail</b>	1.660551	
<b>P(T&lt;=t) two-tail</b>	0.009307	
<b>t Critical two-tail</b>	1.984467	

The t-test iterated over the scores of each company's Sortino ratio score to establish any fundamental difference in mean values among the two portfolios. The findings in this research is in line with Alam & Ansari (2020), suggesting that investors are better off investing in Shariah-compliant portfolio over their conventional counterpart. The performance findings using GARCH (1,1) downside beta values are collaborated by the robustness test which conclusively proves that investors concerned with performance will show preference in Shariah-compliant portfolio over its conventional counterparts, as analysed by the HV, EWMA and GARCH (1,1) methods for the selected Malaysian firms.

#### **4.7 Conclusion**

This chapter reexamined the objectives and implemented the appropriate models to sought both downside beta and beta to return performance of the two portfolios. Essentially, the findings of the research were expounded.