



**Capital Structure Dynamics of Shariah-Compliant vs Non-Compliant Firms: Evidence from Pakistan**

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### **Structured Abstract**

**Purpose:** *This study aims to compare capital structure determinants' effect on the leverage levels of Shariah-compliant and non-compliant firms in Pakistan. We also estimate and compare the capital structure adjustment speed for both firm types.*

**Design/methodology/approach:** *Based on the Karachi Meezan Index (KMI) screening criterion, a balanced panel of 117 Shariah-compliant and 68 non-compliant firms listed on the Pakistan Stock Exchange from 2008 to 2018 was constituted. The study employed the Generalized Method of Moments to identify the significant determinants of capital structure and estimate the speed of adjustment. In addition, the F-test was used to check whether the effect of the determinants on the leverage is same for Shariah and non-Shariah-compliant firms.*

**Findings:** *We found that different determinants affect both firm types' leverage levels (book and market) differently. We also found that the adjustment speed of Shariah-compliant firms toward their target leverage ratio is slower than their non-compliant peers. Lastly, significant variation was observed in the results under different screening criteria.*

**Research limitations/implications:** *This study fills the literature gap by providing a comprehensive comparison of the capital structure decisions of the Shariah and non-Shariah compliant firms. Because the study is limited to Pakistan, generalizability would be an issue.*

**Practical implications:** *The study will guide the management of Shariah and non-Shariah compliant firms about which factors are reliably important in choosing their capital structure. The findings also call for bringing harmony in the different Shariah screening criteria being in practice.*

**Originality/value:** *This is the first comparative study that identifies the significant capital structure determinants for Shariah and non-compliant firms and investigates their effect on the leverage of both firm types. By testing joint hypotheses of same relationship, it seeks to determine if, due to Shariah restrictions, the capital structure determinants of Shariah-compliant firms are similar to non-compliant firms or they exhibit different behavior. We also repeat our analysis using other prominent screening criteria to assess the consistency of our results.*

**Keywords:** *Capital Structure, speed of adjustment, Shariah-compliant, non-compliant, Pakistan*

## 1.0 Introduction

Capital structure refers to the combination of a firm's financing sources, mainly debt and equity. It is among the most critical financial decisions that affect firm value and therefore, researchers have been striving hard to suggest to the firms how they should formulate their capital structure. As a result, choosing an optimal debt-to-equity ratio has been a matter of extensive debate for the last few decades. However, despite the extensive research on the issue of capital structure, there is no comprehensive and practical solution to this problem, and the understanding of this issue is still inconclusive (Haron, 2014).

The available theories and literature seek to explain the capital structure choice of conventional firms. However, the Islamic finance sector has gained the attention of researchers (e.g., Alnori and Alqahtani, 2019; Farooq and Tbeur, 2013; Naz *et al.*, 2017) due to its remarkable growth in the last few years.<sup>[1]</sup> Similarly, to attract the investments of religiously motivated investors, more and more firms are becoming Shariah-compliant (SC). Due to the increasing importance and weightage of the Islamic finance sector, global index providers have established separate indices for SC firms. Such as Dow Jones Islamic Market World Index (DJIMI), Standard & Poor's (S&P)-500 Shariah Index, and Financial Times Stock Exchange (FTSE) Global Islamic Index.

SC firms operate under Shariah guidelines<sup>[2]</sup>, which restrict incurring interest-bearing debt beyond a certain threshold. However, with the limited debt financing, does the Shariah compliance also make the capital structure determinants different from the non-compliant (NC) firms?

Researchers, though limited in number, have investigated the issue and concluded that Shariah compliance does affect firms' capital structure decisions (Alnori and Alqahtani, 2019; Akinsomi *et al.*, 2015; Katper, Madun and Katper, 2021; Sukor, Halim, and Bacha, 2018; Yildirim, Masih, and Bacha, 2018). However, little consensus exists on the determinants of capital structure and the applicability of relevant theories for SC and NC firms. For example, Hassan, Shafi and Mohamed (2012) found support for the Pecking order theory (POT) and the Trade-off Theory (TOT) for SC and NC firms in Malaysia. Similarly, Sukor, Halim, and Bacha (2018) found support for the TOT, POT, and Market Timing Hypothesis, which varies with the compliance status. Hussain *et al.*, (2020) also find support for the market timing hypothesis and argue that Malaysian SC firms rely more on equity financing than the NC firms in times of overpriced equity. Akinsomi *et al.* (2015) found support for the POT for the Shariah and non-Shariah compliant real estate firms in the GCC

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3 countries. Alnori and Alqahtani (2019) found mixed support for the TOT and POT in the Saudi  
4 Arabian SC and NC firms. Yildirim, Masih, and Ismath (2018) found that the POT better explains  
5 the book, and the TOT explains the market leverage of both firm types. In a sector-wise  
6 comparative study, Katper, Madun and Katper (2021) could not find conclusive evidence for the  
7 applicability of the capital structure theories on SC and NC firms in Pakistan.  
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12 Previous literature suggests that determinants of SC firms vary with sector-specific and country-  
13 specific factors. Also, past studies have employed static methodology, thus ignoring the dynamism  
14 of capital structure. Moreover, limited studies examine the capital structure decisions of SC firms  
15 in Pakistan despite being an important Islamic finance market<sup>[3]</sup> (Katper *et al.*, 2017; Katper,  
16 Madun and Katper, 2021; Naz *et al.*, 2017; Rashid, Johari and Izadi, 2020). In short, a  
17 comprehensive comparative analysis that explains the differences in the capital structure  
18 determinants, speed of adjustment, and the applicability of the existing capital structure theories  
19 on SC and NC firms is missing.  
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24 Motivated by the reasons above, this study comparatively analyzes the effect of the most relevant  
25 capital structure determinants on the leverage (book and market) of SC and NC non-financial  
26 firms. We employ a dynamic framework and estimate the SOA for both firm types to confirm the  
27 existence of an optimal debt ratio and the speed of adjustment. Furthermore, we test which existing  
28 theories best explain the capital structure decisions of SC and NC firms in Pakistan. According to  
29 the results, significant differences were observed in the determinants of capital structure across  
30 both firm types and leverage measures. The results of the F test revealed that the same determinants  
31 have a different effect on the leverage of both firm types. In addition, SC firms were found to have  
32 a slower adjustment speed towards the target debt ratio than NC firms. Lastly, no single theory  
33 could explain the results conclusively.  
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38 The rest of the paper is organized as follows: Section 2 discusses the theoretical background and  
39 relevant literature, section 3 explains the methodology, section 4 provides the results and  
40 discussion, and section 5 includes the conclusion and policy recommendations of the study.  
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## 43 44 45 **2.0 Theoretical Background and Hypotheses Development**

### 46 47 *2.1 Theoretical Background*

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50 The pioneering irrelevance theory of Modigliani and Miller (1958; 1963) set the basis for the  
51 popular Trade-off Theory (TOT) that has gained much attention from academia to date. This theory  
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3 considers the costs and benefits of debt and states that firms can enjoy tax benefits if they opt for  
4 debt financing. Kraus and Litzenberger (1973) argue that the composition of a firm's capital  
5 structure should be based on the tax benefits from debt financing and its relative bankruptcy cost.  
6 More specifically, the optimal capital structure lies where the marginal benefits from debt  
7 financing equal its marginal cost.  
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12 Another version of the TOT is the dynamic TOT theory which is based on the Dynamic Trade-Off  
13 model by Fischer, Heinkel, and Zechner (1989). It states that firms have a target capital structure  
14 ratio; however, several factors in the market cause firms to deviate from their target capital  
15 structure. Firms then consistently try to rebalance their capital structure to reach their target capital  
16 structure. The speed at which these firms adjust to their desired optimal capital structure depends  
17 on the magnitude of the adjustment.  
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24 On the other hand, based on the information asymmetry notion, the Pecking Order Theory (POT)  
25 asserts that firms follow a pecking order in asset financing. They prefer to use internal sources of  
26 finance over external, and if external financing is chosen, debt is preferred over equity financing  
27 (Myers, 1984; Myers and Majluf, 1984). Firms prefer internal financing as it does not require  
28 providing information to the external investors compared to external financing, which requires  
29 revealing information regarding firms' operations, profitability, and financial position to potential  
30 investors and creditors.  
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37 Jensen and Meckling (1976) presented the theory of agency conflict, highlighting two types of  
38 conflicts: between owners and the managers and between owners and creditors. The agency theory  
39 predicts that these conflicts affect the choice of a firm's financing sources. Similarly, the Market  
40 Timing theory considers the market timing while choosing a source of financing but ignores the  
41 cost of financing. It states that firms will choose to issue debt if stock prices are low and more  
42 inclined to issue equity otherwise (Baker and Wurgler, 2002).  
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48 In the next section, we critically evaluate the literature on capital structure determinants for SC  
49 and NC firms and develop our hypotheses in light of the relevant capital structure theories.  
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### 51 *2.2.1 Profitability*

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54 The POT suggests that firms with higher profits are in a better position to use internal funds to  
55 finance their growth than the debt due to asymmetric information costs (Myer, 1984). Studies such  
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as Ahmad and Azhar (2015), Ali (2011), and Chen (2004) accord with the POT and report a negative relationship between profitability and leverage. On the contrary, Rajan and Zingales (1995) reported that profitable firms have sufficient funds to repay their debts, reducing their bankruptcy cost. Therefore, the TOT suggests that firms with more profits find the debt tax shield more valuable and use more debt to finance their assets to get maximum advantage in tax. Consistent with the information asymmetry view of the POT, we hypothesize a negative relationship between profitability and leverage.

### 2.2.2 Size

According to Rashid and Mehmood (2017), larger firms have a better understanding of the market, have a better reputation in the debt markets, and are less likely to go bankrupt. Therefore, the TOT suggests that larger firms employ more debt because they have more negotiating power, resulting in reduced debt costs. Studies by Hussain *et al.* (2020), Unsal and Hassan (2020), and Yildirim, Masih and Bacha (2018) confirm the notion of the TOT and report a positive relationship between size and leverage. On the contrary, the POT states that larger firms are inclined more towards equity financing because firm size acts as a proxy for information asymmetry between insiders and outside investors (Rajan and Zingales, 1995). Therefore, the cost of adverse selection for larger firms reduces as these firms provide more information than smaller firms when issuing new equity. Hence, according to the POT, a negative relationship exists between firm size and leverage level. With respect to the TOT and previous studies, we expect a positive relationship between firm size and leverage.

### 2.2.3 Tangibility

Tangibility is the nature of assets that the investors use for valuation while investing in a firm and can be used as collateral, thus making debt financing less costly. As a result, tangible assets have a lower expected financial distress cost than intangible assets. Therefore, the TOT predicts a positive relationship between tangibility and leverage (Frank and Goyal, 2009). Several research studies have confirmed the notion of the TOT (Alnori and Alqahtani, 2019; Chen, 2004; Yildirim, Masih, and Bacha, 2018). On the contrary, Frank and Goyal (2009) argue that because tangibility reduces information asymmetry between potential investors and managers, the cost of issuing equity falls, resulting in lower debt levels. Therefore, the POT predicts a negative relationship

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3 between tangibility and leverage. With respect to the collateral nature of fixed assets, we  
4 hypothesize a positive relationship between tangibility and leverage.  
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#### 7 2.2.4 *Earnings Volatility*

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9 Earnings volatility is used as a proxy to measure business risk and is an essential determinant of  
10 leverage because it determines the probability of financial distress. Consistent with the TOT,  
11 Banerjee *et al.* (1999) argue that firms with more volatile earnings find it hard to make interest and  
12 principal payments. Therefore, such firms should use less leverage to prevent possible bankruptcy.  
13 Empirical studies by Booth *et al.* (2001) and Rashid, Johari and Izadi (2020) confirm the TOT  
14 notion. On the contrary, the POT argues that more volatility might signal more asymmetric  
15 information to the investors, which will lead to a higher cost of equity and hence, a tendency  
16 toward leverage financing (Frank and Goyal, 2003). Consistent with the TOT and previous  
17 research, we expect a negative relationship between earnings volatility and leverage.  
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#### 25 2.2.5 *Growth Opportunities*

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27 According to Myers (1977), firms with high growth opportunities will have lower debt levels  
28 because managers of high-growth firms have a greater incentive to under-invest. Therefore, agency  
29 problems between managers or shareholders and creditors increase for such firms. Hence, the TOT  
30 predicts a negative relationship for growth opportunities. This is supported by the findings of  
31 Alnori & Alqahtani (2019) and Ozkan (2001), among others. On the contrary, the POT suggests  
32 that growth opportunities positively affect firms' leverage levels because internal funds will be  
33 insufficient to finance the growth. Therefore, these firms will opt for debt financing (Frank and  
34 Goyal, 2009). With respect to the TOT and agency problem, we hypothesize a negative  
35 relationship between growth opportunities and leverage.  
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#### 44 2.2.6 *Liquidity*

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46 According to the POT, liquidity is a primary internal financing source; hence, firms with more  
47 liquid assets will prefer to use their internal funds rather than funds from new debt or equity  
48 (Ahmad and Azhar, 2015). Haron and Ibrahim (2012), Ozkan (2001), and Rashid, Johari and Izadi  
49 (2020) support the POT and report a negative effect of liquidity on leverage. However, the TOT  
50 suggests that firms having more liquid assets would incur more debt, thus enabling them to pay  
51 off their current liabilities when they mature (Rajan and Zingales, 1995). It implies a positive  
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relationship between liquidity and leverage. Consistent with the POT and past literature, we expect a negative relationship between liquidity and leverage.

### 2.2.7 *Non-Debt Tax Shield (NDTS)*

DeAngelo and Masulis (1980) argue that firms with more NDTS will issue less debt because it serves as a substitute for the tax benefits arising from the debt. Therefore, the TOT predicts a negative relationship between NDTS and leverage. In the extant literature, most studies support this view and report a negative relationship between NDTS and leverage (Alnori and Alqahtani, 2019; Haron and Ibrahim, 2012; Ozkan, 2001; Shah and Khan, 2007). However, Rahim *et al.* (2020) and Sahudin *et al.* (2019), among others, report a positive relationship and argue that NDTS does not substitute for a debt tax shield. With respect to the TOT and past literature, we hypothesize a negative relationship between NDTS and leverage.

### 2.2.8 *GDP Growth*

The economic condition, measured by GDP growth, plays a significant role in shaping firm capital structure decisions. Firms intend to expand when the economy grows to increase their turnover and make more profits. Eventually, firms are less inclined to use debt because of higher profits and rely on internal funds (Yildirim, Masih, and Bacha, 2018). Thus, the POT predicts a negative relationship between GDP growth and leverage levels. Empirical studies of Frank and Goyal (2003), Haron *et al.* (2013), and Haron and Ibrahim (2012) are consistent with the POT notion. On the contrary, the TOT postulates a positive relationship between GDP growth and leverage because firms employ more debt in times of economic expansion to receive tax benefits. Following the previous literature and the POT, we expect a negative relationship between GDP growth and leverage.

## 2.3 *Joint Hypotheses*

The expected effect of different determinants on the leverage has been discussed in the light of relevant theories in section 2.2 and the hypotheses to be tested were drawn. However, we also test several joint hypotheses to highlight the differences in the capital structure determinants of SC and NC firms, which is the study's main purpose. In this regard, a joint hypothesis is tested for all variables, similar to the one that follows.

H<sub>2</sub>: The effect of profitability on leverage is different for SC and NC firms.

### 3.0 Methodology

#### 3.1 Data and Sample

The present study uses data from 2008 to 2018 collected from DataStream, WorldScope, and the Balance Sheet Analysis published by the State Bank of Pakistan. All the non-financial firms listed on Pakistan Stock Exchange for the entire period are taken as a sample. Those firms that did not remain listed throughout the sample period, firms with negative equity, and firms with incomplete data were excluded from the sample. The final sample constitutes a balanced panel of 185 firms from fourteen industries, of which 117 are SC and 68 are NC. The sample firms were classified as SC and NC by using the screening criteria of the KMI-30 index. We have winsorized all the variables at 1% and 99% to restrict the effect of outliers.

#### 3.2 Variables Measurement and Model Specification

The dependent variables in this study are book leverage (which best reflects managerial actions) and market leverage (a market-based measure). The independent variables are profitability, size, tangibility, earnings volatility, growth opportunities, liquidity, non-debt tax shield, and GDP growth rate. The definitions and measurements are provided in Table I.

*[Table I: Variables Definition, Symbols, and Measurement]*

As this study highlights the differences in the capital structure determinants of SC and NC firms, we estimate the following models for both firm types separately.

$$Blev_{in} = \alpha + \beta_1 Prof_{in} + \beta_2 Size_{in} + \beta_3 Tang_{in} + \beta_4 EV_{in} + \beta_5 GO_{in} + \beta_6 Liq_{in} + \beta_7 NDTS_{in} + \beta_8 GDPG_{in} + \varepsilon_{in} \dots (1)$$

$$Mlev_{in} = \alpha + \beta_1 Prof_{in} + \beta_2 Size_{in} + \beta_3 Tang_{in} + \beta_4 EV_{in} + \beta_5 GO_{in} + \beta_6 Liq_{in} + \beta_7 NDTS_{in} + \beta_8 GDPG_{in} + \varepsilon_{in} \dots (2)$$

Where  $Blev_{in}$  and  $Mlev_{in}$  are the dependent variables and refer to book and market leverage, respectively. While  $Prof_{in}$ ,  $Size_{in}$ ,  $Tang_{in}$ ,  $EV_{in}$ ,  $GO_{in}$ ,  $Liq_{in}$ ,  $NDTS_{in}$ , and  $GDPG_{in}$  are the explanatory variables.

#### 3.3 Estimation of Speed of Adjustment

According to the TOT, there exists an optimal capital structure for firms. If there are no transaction costs and market imperfections, the firms' observed capital structure equals its target or optimal

capital structure. Nevertheless, due to transaction costs, firms deviate from their optimal capital structure and then frequently adjust their capital structure back to the optimal one and try to make it as close to the optimal one as possible. Following is the dynamic partial adjustment model as previously used by Alnori and Alqahtani (2019) and Haron *et al.* (2013).

$$CS_{i,t} - CS_{i,t-1} = \lambda_{i,t}(TCS *_{i,t} - CS_{i,t-1})$$

Where  $CS_{i,t}$  is the observed capital structure of firm  $i$  at time  $t$ ,  $CS_{i,t-1}$  is the observed capital structure of firm  $i$  at time  $t-1$ ,  $\lambda_{i,t}$  represents the annual adjustment speed. If there are no transaction costs, firms will always be at their optimal capital structure, making  $\lambda = 1$ . However, this is not the case in reality. Transaction costs and frictions in the market allow firms to adjust their current capital structure towards the optimal structure partially. That is why this model is called the partial adjustment model. The value of  $\lambda$  will lie between 0 and 1; 0 means no adjustment while 1 means full adjustment in one period. If the model is adjusted according to the firm's actual leverage, it will get the following form:

$$CS_{i,t} = \lambda_{i,t}TCS *_{i,t} + (1 - \lambda_{i,t})CS_{i,t-1}$$

$TCS *_{i,t}$  represents the optimal/target capital structure estimated using the forecasted value by regressing all the explanatory variables against the current or observed capital structure. It will be calculated through the following model

$$TCS *_{i,t} = \beta_0 + \beta_1 X_{i,t-1} + \mu_{i,t} \dots \dots \dots (3)$$

$TCS *_{i,t}$  represents the target capital structure that firms try to achieve in one period.  $\beta_0$  is constant while  $\beta_1$  shows capital structure determinants parameters.  $X_{i,t}$  represents all capital structure determinants to be regressed against the  $TCS *$ , and  $\mu$  is the error term.

### 3.4 Generalized Method of Moments (GMM)

We use a dynamic model where the past capital structure decisions affect the present. Dynamic models usually suffer from endogeneity where reverse causality exists between exogenous and dependent variables. When endogeneity is present, the traditional models, such as OLS do not obtain efficient estimates. Therefore, we employ GMM (developed by Arellano and Bond, 1991) because it resolves the problems caused by reverse causality as well as simultaneity and omitted variable biases (Kebewar, 2012). In addition, the GMM estimator is designed for short panels,

large N and small T (Roodman, 2006), thus best suited to our case. Moreover, the estimator is robust to heteroskedasticity and serial correlation (Hansen, 1982).

### 3.5 Joint Hypotheses Test

Following Amin, Basem and Ul Haq (2019), we interact the Shariah (SH) and non-Shariah dummy (NS) with each independent variable and fit in our base models to test the second set of hypotheses as follows

$$Blev_{in} = \alpha + \beta_1 SHProf_{in} + \beta_2 NSProf_{in} + \beta_3 SHSize_{in} + \beta_4 NSSize_{in} + \beta_5 SHTang_{in} + \beta_6 NSTang_{in} + \beta_7 SHEV_{in} + \beta_8 NSEV_{in} + \beta_9 SHGO_{in} + \beta_{10} NSGO_{in} + \beta_{11} SHLiQ_{in} + \beta_{12} NSLiQ_{in} + \beta_{13} SHNDTS_{in} + \beta_{14} NSNDTS_{in} + \beta_{15} SHGDPG_{in} + \beta_{16} NSGDPG_{in} + \varepsilon_{in} \dots\dots\dots(4)$$

$$Mlev_{in} = \alpha + \beta_1 SHProf_{in} + \beta_2 NSProf_{in} + \beta_3 SHSize_{in} + \beta_4 NSSize_{in} + \beta_5 SHTang_{in} + \beta_6 NSTang_{in} + \beta_7 SHEV_{in} + \beta_8 NSEV_{in} + \beta_9 SHGO_{in} + \beta_{10} NSGO_{in} + \beta_{11} SHLiQ_{in} + \beta_{12} NSLiQ_{in} + \beta_{13} SHNDTS_{in} + \beta_{14} NSNDTS_{in} + \beta_{15} SHGDPG_{in} + \beta_{16} NSGDPG_{in} + \varepsilon_{in} \dots\dots\dots(5)$$

Then the F test is employed to test the null hypothesis of same coefficient of the independent variables for both firm types like  $\beta_1 = \beta_2$ ,  $\beta_3 = \beta_4$  and so on.

## 4.0 Empirical Results

### 4.1 Descriptive Statistics and Two-Sample t-test for Mean Comparison

Table II displays descriptive statistics for SC and NC firms and the two-sample t-test for the mean comparison of all the variables. The significant negative t-values for book and market leverage confirm that SC firms use substantially less leverage than NC firms due to their leverage restrictions.

*[Table II: Descriptive Statistics and Two Sample t-Test for Mean Comparison]*

The t-values of the explanatory variables further reveal that SC firms are more profitable, bigger in size, and have more liquidity than the NC firms. However, the former also have more volatile earnings than the latter. On the other hand, the NC firms have more tangible assets than the NC firms. The reason is that these firms are more levered, requiring more tangible assets to pledge as collateral. Lastly, the NDTS is not significantly different between the two firm types.

### 4.2 Correlation Matrix

The correlation matrices for SC and NC firms are reported in Table IIa and IIb, respectively. Results depict weak correlation among the variables, showing that the multicollinearity problem

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3 in our model is improbable. We found a high correlation between book and market leverage  
4 because both measures use almost the same definition.  
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8 *[Table III: Correlation Matrix]*  
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#### 10 4.3 *Diagnostic Tests*

11 We checked the data for serial correlation and heteroskedasticity using the Wooldridge and  
12 Modified Wald tests, respectively.<sup>[4]</sup> The results confirm the presence of serial correlation and  
13 heteroskedasticity in all our models. Furthermore, Dumitrescu and Hurlin (2012) Granger non-  
14 causality test <sup>[5]</sup> confirms the existence of reverse causality between most of the explanatory and  
15 dependent variables.  
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#### 20 4.4 *Results of the Main Model*

21 The results of the two-step system GMM are depicted in Table IV. For the models to be unbiased  
22 and valid that use GMM for estimation, some diagnostic criteria must be fulfilled. If the models  
23 suffer from second-order serial correlation and the instrumental variables correlate with the error  
24 term, the coefficient of the lagged dependent variable and the rest of the explanatory variables may  
25 be biased. First, there should be no second-order serial correlation, i.e., the value of AR(2) must  
26 be insignificant. Second, the number of instruments must not exceed the number of groups. Third,  
27 the null hypothesis of no correlation of the instruments with the error term must be accepted. For  
28 this purpose, the value of the Hansen test should be insignificant at 5% (Arellano and Bond, 1991).  
29 From Table IV, it can be observed that all three diagnostic tests are satisfied.  
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40 The results show that profitability significantly negatively affects both the book and market  
41 leverage across both firm types, thus proving our hypothesis. This is in line with the POT  
42 prediction, which states that more profitable firms are in a better position to finance their assets  
43 from internal funds rather than external to avoid the asymmetric information costs. Previous  
44 studies on SC firms (Ahmad and Azhar, 2015; Alnori and Alqahtani, 2019) and NC firms (Frank  
45 and Goyal, 2003; Shah and Khan, 2007) also report a negative relationship between profitability  
46 and leverage.  
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52 Consistent with our hypothesis, firm size was found to have a significant positive relationship with  
53 the leverage of NC firms for both leverage measures. The positive relationship conforms with the  
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TOT notion that larger firms, being less prone to bankruptcy, incur more debt to take benefit of the tax shield. The results are consistent with previous studies such as Frank and Goyal (2009) and Hussain *et al.* (2020). On the contrary, consistent with the findings of Ahmad *et al.* (2011), Haron and Ibrahim (2012), and Sahudin *et al.* (2019), we found a significant negative relationship for SC firms' book leverage. It conforms to the POT notion that larger firms generate more profits and are in a better position to use their internal funds for asset financing. Moreover, larger firms prefer to issue equity as these firms provide more information than smaller firms.

*[Table IV: Results of GMM]*

For tangibility, the results in Table IV exhibit a weak negative relationship with the leverage of SC firms, thus disproving our hypothesis. The finding aligns with the POT prediction that more tangible assets tend to have less information asymmetry and, thereby, a greater incentive to issue equity (Sheikh and Qureshi, 2017). Also, some authors explain the negative tangibility-leverage relationship with the matching principle where fixed assets are financed with long-term debt and current assets with short-term debt (Booth *et al.*, 2001; Onofrei *et al.*, 2015). The present study uses total book and market leverage; hence, we could not capture the specific effect of tangibility on short-term and long-term leverage which is the limitation of the study.

An important point raises here is that according to Shariah guidelines, the debt of SC firms must be asset-backed, i.e., the debt cannot exceed the amount of tangible assets (Haron and Ibrahim, 2012). The descriptive statistics in Table II show that the mean value of SC firms' book leverage is .162, while tangibility has a mean value of .414. Hence, these firms have ample tangible assets to pledge if they need more debt, thus not violating the Shariah principles.

On the contrary, we found a positive relationship between tangibility and book leverage of NC firms. This finding is consistent with our expectation and the TOT that firms with more tangible assets will find it easier to acquire debt as they will have enough assets to pledge. Our results are consistent with Chen (2004) and Frank and Goyal (2009). Earnings volatility was found to be positively related to the leverage of SC firms. This is consistent with earlier studies such as Booth *et al.* (2001), Haron and Ibrahim (2012), and Yildirim, Masih and Bacha (2018), thus confirming the POT prediction that more volatility may indicate more asymmetric information to investors, resulting in a higher cost of equity and a preference for leverage financing. Therefore, firms with more volatile earnings would use internal funds and debt financing if internal funds are

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3 insufficient. On the other hand, the relationship was found to be negative for NC firms. This  
4 finding approves our hypothesis based on the TOT notion that more volatile earnings affect the  
5 debt-paying ability of firms and may result in increased debt and bankruptcy costs. Our results  
6 align with the findings of Rashid, Johari and Izadi (2020) for Pakistan.  
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10 Growth opportunities showed a strong positive effect on leverage measures of both SC and NC  
11 firms. It implies that internal funds for growth firms will be insufficient to finance the growth, and  
12 eventually, they will opt for debt financing. This is based on the information asymmetry notion of  
13 the POT, where firms prefer to use internal funds and debt financing over equity financing if they  
14 choose external financing to avoid the cost of information asymmetry. Akinsomi et al. (2015) and  
15 Ali (2011) have also reported the same results. Liquidity was found to be negatively related to  
16 leverage across both firm types. Consistent with previous studies such as Rashid, Johari and Izadi  
17 (2020) and Sahudin et al. (2019), our result follows the prediction of the POT, where liquidity  
18 provides firms with more short-term resources to finance their operations and investments, thus  
19 relying less on external financing.  
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28 Contrary to our expectations, NDTs exhibits a positive relationship with the leverage of both firm  
29 types. The results oppose the TOT notion and hold that NDTs does not substitute for the debt tax  
30 shield. In addition, according to Bradley et al. (1984), NDTs could be considered a measure of the  
31 firm's asset "securability," with more securable assets resulting in a greater leverage ratio. The  
32 positive relationship was also reported by Alnori and Alqahtani (2019) and Katper, Madun and  
33 Katper (2021). Lastly, the GDP growth rate was significant in determining the capital structure of  
34 both firm types. For SC firms, we found a positive relationship consistent with the findings of  
35 Haron et al. (2013) and Rashid, Johari and Izadi (2020). This conforms to the TOT prediction that  
36 businesses try to expand to increase their revenues and issue more debt for asset financing to  
37 receive tax benefits when the economy is growing. On the other hand, the negative relationship of  
38 NC firms is in line with our expectations. It supports the notion of the TOT that firms use internal  
39 funds for assets financing in times of economic expansion because of higher profits, thus, less  
40 inclination toward debt financing (Frank and Goyal, 2003).  
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51 From Table IV, we observe that all the coefficients of lagged leverage are significant, thus  
52 confirming the existence of target leverage that SC and NC firms try to reach. According to the  
53 coefficients, the speed of adjustment towards the target leverage ratio for SC firms is 26.6% (1-  
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0.734) and 28.9% (1-0.711) for book and market leverage, respectively. It implies that SC firms take 3.7 years on average to adjust back to their target leverage ratio fully. On the other hand, the speed of adjustment for NC firms is 44.7% (1-0.553) and 41.3% (1-0.587) for book and market leverage, respectively. These firms take 2.23 years to reach their desired leverage ratio. Our findings reveal that NC firms adjust faster towards the optimal leverage ratio than SC firms. The reason is that SC firms face certain restrictions that increase their adjustment costs and limit access to debt markets. Also, Maroney, Wang and Hassan (2019) argue that faster SOA indicates greater importance of the trade-off between tax benefits and the financial distress costs.

The insignificance of some determinants for market leverage is due to the nature of the market leverage, which is mainly influenced by the share price movements and not by the management actions (Haron, 2014).

#### 4.5 Results of Joint Hypotheses Test

The results in Table V reveal that the coefficients of size, tangibility, and earnings volatility of SC firms are significantly different from those of NC firms for both leverage measures. Similarly, the coefficients of profitability, liquidity, and NDTs are significantly different for book leverage and the GDP growth for market leverage only. The only coefficient that is not different for both firm types is the growth opportunities. Hence, we reject our hypotheses of same relationship for all the variables except for the growth opportunities and conclude that the same determinants affect the leverage of both firm types differently.

*[Table V: Results of the Joint Hypotheses Test]*

#### 4.6 Results Using the Criteria of KMI, DJIMI, FTSE, and S&P

Different Shariah indices have their own Shariah screening standards. These Shariah Indices use different measurements for the same screening ratio. Table VI shows the screening criteria of DJIMI, FTSE, and S&P. Given this lack of consensus in screening methodologies, we also estimated our results based on these screening criteria to check whether they affect our results.<sup>[6]</sup>

*[Table VI: Financial Screening Criteria of DJIMI, FTSE, and S&P Shariah Indices]*

We found that while few variables are unchanged, others' relationships with leverage have significantly changed. According to the results, profitability is the only variable that is unchanged

with respect to the direction and significance. Growth opportunities lost its significance only for the book leverage of SC firms under DJIMI. The size and market leverage relationship became significant under DJIMI, while the coefficient became positive under S&P for SC firms. Similarly, the coefficient sign of tangibility changed for both leverage measures and firm types under DJIMI, while the relationship lost its significance under S&P, except for the book leverage of SC firms. The relationship for earnings volatility is significant for book leverage only while insignificant for market leverage for both firm types under DJIMI. In addition, the coefficient sign changed for the market leverage of SC firms under S&P. Growth opportunities remained almost unchanged, except that it lost its significance for the book leverage of SC firms under DJIMI. For liquidity, the direction of the relationship changed for the market leverage of both firm types under DJIMI and S&P. Moreover, the relationship became significant for the market leverage of SC firms while it lost its significance for the market leverage of NC firms under the DJIMI criterion. The relationship between NDTs and market leverage of NC firms became significant under DJIMI and S&P. Surprisingly, the relationship between GDP growth and both leverage measures for NC firms lost its significance under DJIMI and S&P. For SC firms, the relationship got significant for market leverage under DJIMI and S&P while its direction changed under S&P.

#### 4.7 Findings and Implications

We investigated the effect of different determinants on the leverage of SC and NC non-financial firms in Pakistan and estimated the adjustment speed for both firm types. It was observed that Shariah compliance not only limits firms' leverage but also affects how they choose their capital structure. The findings reveal that profitability, growth opportunities, and NDTs, determine SC firms' leverage (whether book or market). However, size, liquidity, and GDP growth determine only the book leverage while earnings volatility determines the market leverage of SC firms. For NC firms, profitability, size, earnings volatility, growth opportunities, liquidity, and GDP growth were found to be reliable in determining the leverage. However, the tangibility and NDTs were only relevant for determining the book leverage. Lastly, it was confirmed that both firm types have a target debt ratio; however, they are under-adjusted and consistently adjust to that ratio. In addition, NC firms adjust faster to the target or optimal ratio than the SC firms. This is consistent with the dynamic version of the TOT that the capital structure decision is not static and rather dynamic. Moreover, we found that the same determinants affect the capital structure of both firm

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3 types differently except for growth opportunities. It was further observed that the results vary based  
4 on the leverage measures used. Moreover, consistent with previous literature, this study does not  
5 find any single theory that conclusively explains firms' capital structure decisions in Pakistan. We  
6 find that both the POT and TOT are applicable in Pakistan, with more dominance of the POT for  
7 SC and the TOT for NC firms.  
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12 The study has certain implications for the literature, management of firms, and the governing  
13 bodies of the country's corporate sector. This study contributes to the existing literature on the  
14 comparative analysis of the capital structure decisions of SC and NC firms. The findings will  
15 enlighten the management of both firm types on which factors to consider while choosing their  
16 capital structure and how the different determinants affect it. Furthermore, SC firms in Pakistan  
17 are far below the allowed limit of 37% debt, as evident from the mean values of book leverage and  
18 market leverage in Table II. The reason may be that SC firms in Pakistan do not have proper  
19 Islamic alternatives to conventional debt. As a result, they rely more on internal financing.  
20 Therefore, legislation is needed by the governing bodies in the country to make it easier and readily  
21 available for SC firms to acquire non-interest-bearing alternatives of debt financing at a low cost.  
22 Lastly, due to the observed variations in the results under different screening criteria, a dire need  
23 arises to harmonize the different screening standards globally and at the country level.  
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### 33 34 **5.0 Conclusion**

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36 The core objective of our study is to investigate and compare the effect of critical variables on the  
37 capital structure decisions of SC and NC firms in Pakistan. In addition, the study also investigates  
38 the speed of adjustment for both SC and NC firms. The dependent variables are book and market  
39 leverage, while the independent variables are profitability, size, tangibility, earnings volatility,  
40 growth opportunities, liquidity, non-debt tax shield, and GDP growth. Results of the GMM reveal  
41 that the independent variables exhibit different effects on the different leverage measures (Book  
42 and Market leverage) of SC and NC firms. The results showed a uniform negative relationship for  
43 profitability and a positive association for growth opportunities across both firm types and leverage  
44 measures. The size was negatively related to SC firms' book leverage while positively to both  
45 leverage measures of NC firms. Similarly, a negative relationship was found between tangibility  
46 and leverage for both firm types. Earnings volatility showed a positive association for SC firms  
47 and a negative one for NC firms. Liquidity proved to be negatively related to the leverage across  
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both firm types. The NDTs exhibited a positive relationship with the leverage of SC and NC firms. GDP growth is positively related to the leverage of SC firms while it is negative for NC firms. The results of the F-test for joint hypotheses confirmed that the same determinants affect the book and market leverage of SC and NC firms differently except for growth opportunities. Moreover, SC firms were found to have a slower adjustment speed toward their target capital structure than NC firms. Lastly, we observed significant variations in the results under different screening criteria.

This study is based in Pakistan, which limits the generalizability of the findings. Therefore, it is recommended that further comparative studies should be conducted that use a larger sample of countries and some sector-specific and country-specific determinants to get more generalizable and detailed results. **Moreover, the analysis may be repeated by using the short-term and long-term book and market leverage to get more precise results.**

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#### 43 Footnotes

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46 [1] According to Reuters Islamic Finance Development Report 2018, the Islamic economy's market size was \$2,107  
47 Billion in 2018 and is expected to grow to \$3,007 Billion in 2023. Similarly, Islamic finance assets have been  
48 consistently increasing from \$1,746 billion in 2012 to \$2,438 billion in 2017, with a 6% compound annual growth  
49 rate during this period. Further, these assets were estimated to have reached to \$2.88 trillion in 2019 (State of the  
50 Global Islamic Economy Report 2021).

51 [2] The Shariah screening criteria include: (1) The core business must be "Halaal" and not be the one that violates any  
52 of Shariah principles, such as financial services including interest, weapon production, alcohol, pornography, pork,  
53 and gambling. (2) Interest-bearing debt financing should not exceed 37% of total financing. (3) Interest-bearing  
54 investment should not exceed 33%. (4) The ratio of non-compliant income should not exceed 5%  
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3 [3] Pakistan is the fourth most developed Islamic finance (Reuters Islamic Finance Development Report 2018).  
4 Consumer spending in the country on Halal relevant sectors was estimated at \$120 billion in 2019, the 6th highest  
5 globally (State of the Global Islamic Economy Report 2021). The country is a Muslim majority country, and the  
6 individual investors dominate the stock market, most of whom prefer to invest in SC stocks. According to the re-  
7 composition list of KSE Meezan-30 index 2021, more than 60% of companies are SC. Also, the stock market has won  
8 the best Islamic stock exchange award by Global Islamic Finance Awards (GIFA) for 2021.

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10 [4] The results are shown in Appendix A

11 [5] The results are shown in Appendix B due to space limitations

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13 [6] We do not report the results due to space limitations. However, can be provided on request  
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**Table I** Variables Definition, Symbols, and Measurement

Variables	Symbol	Measurement
<b>Dependent</b>		
Book Leverage	BLev	Book Debt/Total Assets (Where Book Debt = Total Assets – Book Equity)
Market Leverage	MLev	Book Debt/Book Debt +Mkt Capitalization
<b>Independent</b>		
Profitability	EBITDA	EBITDA / Total Assets
Size	Size	Natural Logarithm of Total Assets
Tangibility	Tang	Net Fixed Assets / Total Assets
Earnings Volatility	EV	Standard Deviation of EBIT / Total Assets over the last three years
Growth opportunities	GO	% Change in sales from the previous year
Liquidity	Liq	Current Assets/Current Liabilities
Non-Debt tax shield	NDTS	Non-cash expenses/Total assets
GDP growth	GDPG	% Change in GDP from the previous year

**Table II** Descriptive Statistics and Two Sample t-Test for Mean Comparison

Variable	Shariah-Compliant		t-test	p-value	Non-Compliant	
	Mean	Std. D.			Mean	Std. D.
Blev	.162	.154	-44.596	0.000	.467	.142
Mlev	.249	.257	-34.226	0.000	.628	.229
Prof	.162	.117	9.140	0.000	.114	.081
Size	29.038	68.626	2.840	0.002	13.962	24.173
Tang	.414	.229	-10.062	0.000	.502	.163
EV	1.04	2.604	4.808	0.000	.425	.751
GO	.139	.31	1.075	0.2827	.156	.312
Liq	1.963	1.447	7.614	0.000	1.052	.367
NDTS	.031	.019	-0.184	0.854	.035	.016
GDPG	3.919	1.458			3.919	1.458

**Table IIIa** Correlation matrix for SC firms

Variables	Blev	Mlev	Prof	Size	Tang	EV	GO	Liq	NDTS	GDPG
Blev	1.000									
Mlev	0.805	1.000								
Prof	-0.198	-0.327	1.000							
Size	-0.035	-0.027	0.019	1.000						
Tang	0.318	0.371	-0.156	-0.100	1.000					
EV	-0.073	-0.038	0.064	0.535	-0.095	1.000				
GO	-0.018	-0.015	-0.005	-0.045	-0.039	0.018	1.000			
Liq	-0.175	-0.167	0.004	-0.101	-0.165	0.005	-0.001	1.000		
NDTS	-0.018	-0.026	0.679	-0.034	0.012	-0.004	-0.008	-0.021	1.000	
GDPG	-0.098	-0.168	0.005	0.194	-0.067	0.070	0.034	0.040	0.010	1.000

**Table IIIb** Correlation matrix for NC firms

Variables	Blev	Mlev	Prof	Size	Tang	EV	GO	Liq	NDTS	GDPG
Blev	1.000									
Mlev	0.545	1.000								
Prof	-0.269	-0.292	1.000							
Size	0.136	0.029	0.107	1.000						
Tang	0.092	0.105	-0.009	0.203	1.000					
EV	-0.079	-0.110	0.131	0.401	0.039	1.000				
GO	-0.005	-0.006	0.130	-0.002	0.063	-0.015	1.000			
Liq	-0.296	-0.181	0.147	-0.027	-0.303	0.110	-0.016	1.000		
NDTS	-0.129	-0.147	0.346	-0.171	0.326	-0.037	0.008	-0.101	1.000	
GDPG	-0.041	-0.250	-0.180	0.217	-0.040	0.098	-0.207	0.012	-0.083	1.000

**Table IV** Results of GMM

VARIABLES	SC	NC	SC	NC
	Book Leverage	Book Leverage	Market Leverage	Market Leverage
L.Blev/L.Blev	.734*** (.034)	.553*** (.019)	.711*** (.039)	.587*** (.02)
Prof	-.281*** (.052)	-.362*** (.078)	-.953*** (.104)	-.47*** (.046)
Size	-.005* (.003)	.012*** (.002)	0.000 (.005)	.031*** (.005)
Tang	-.043* (.022)	.058*** (.015)	-.054* (.028)	.016 (.043)
EV	.002 (.002)	-.015*** (.004)	.005** (.002)	-.067*** (.01)
GO	.036*** (.009)	.047*** (.011)	.21*** (.029)	.22*** (.012)
Liq	-.017* (.01)	-.09*** (.02)	-.008 (.014)	-.053** (.02)
NDTS	.369* (.216)	.855*** (.209)	1.573*** (.317)	.235 (.321)
GDPG	.005*** (.002)	-.005*** (.002)	.005 (.003)	-.01*** (.002)
_cons	.177*** (.066)	.176*** (.04)	.155 (.114)	-.091 (.06)
Observations	1170	680	1170	680
AR(2) p-value	.376	.676	.140	.684
Hansen p-value	.262	.310	.122	.387
No. of Groups	117	68	117	68
No. of Instruments	60	60	60	60

This table exhibits the results of the Two-Step System GMM. The dependent variables are book and market leverage while the independent variables are profitability, size, tangibility, earnings volatility, growth opportunities, liquidity, Non-Debt tax shield, and GDP growth. AR(2) represents the second-order serial correlation while Hansen refers to the test for overidentifying restrictions. No. of groups and number of instruments have been shown in the last rows. \*, \*\*, and \*\*\* show the significance level at 10%, 5%, and 1% respectively. Robust standard errors are in parenthesis.

**Table VI: Results of the Joint Hypotheses Test**

Hypothesis	Book Leverage	Market Leverage
The effect of Profitability on leverage is same for SC and NC firms	5.62**	1.32
The effect of size on leverage is same for SC and NC firms	182.79***	111.20***
The effect of tangibility on leverage is same for SC and NC firms	11.09***	6.92***
The effect of earnings volatility on leverage is same for SC and NC firms	9.58***	19.85***
The effect of growth opportunities on leverage is same for SC and NC firms	1.56	1.49
The effect of liquidity on leverage is same for SC and NC firms	17.77***	.05
The effect of NDTs on leverage is same for SC and NC firms	3.38*	2.45
The effect of GDP growth on leverage is same for SC and NC firms	1.56	16.15***

Note: \*, \*\* and \*\*\* show significance at the 90, 95 and 99% levels, respectively.

**Table V** Financial Screening Criteria of DJIMI, FTSE, and S&P Shariah Indices

Ratios	Measurement	DJIMI	FTSE	S&P
Debt Ratio	Total debt/trailing 24-months avg market capitalization	<33%		
	Total Debt/Total Assets		<33%	
	Total Debt/36 Months avg market capitalization			<33%
Liquidity Ratios	Accounts Receivable/24 months avg market capitalization	<33%		
	Accounts Receivable + Cash/Total Assets		<33%	
	Accounts Receivable/36 months avg market capitalization			<49%
	Cash + Interest-Bearing Securities/24 months avg market capitalization	<33%		
	Cash + Interest-Bearing securities/Total Assets		<33%	
	Cash + Interest-Bearing securities/36 months avg market capitalization			<33%

**Appendix A. Results of Autocorrelation and Heteroskedasticity Tests**

Tests	Shariah-compliant		Non-compliant	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage
Wooldridge Test	124.348	139.717	124.348	139.717
P-value	0.000	0.000	0.000	0.000
Modified Wald Test	18079.01	9355.58	2237.55	2259.51
P-value	0.000	0.000	0.000	0.000

$H_{01}$ : No first-order autocorrelation in the data

$H_{02}$ : Data is homoscedastic

**Appendix B. Dumitrescu & Hurlin (2012) Granger non-causality test results**

Hypothesis	W-bar	Z-bar	p-value (Z-bar)	Yes/No
Prof does Granger-cause Blev	2.0075	6.9435	0.0000	Yes
Blev does Granger-cause Prof	2.0549	7.2707	0.0000	Yes
Size does Granger-cause Blev	2.9271	12.4311	0.0000	Yes
Blev does Granger-cause Size	3.2271	15.3492	0.0000	Yes
Tang does Granger-cause Blev	2.6614	11.4504	0.0000	Yes
Blev does Granger-cause Tang	3.3054	15.8886	0.0000	Yes
EV does Granger-cause Blev	1.6466	4.4563	0.0000	Yes
Blev does Granger-cause EV	1.5574	3.8416	0.0001	Yes
GO does Granger-cause Blev	1.6181	4.2602	0.0000	Yes
Blev does Granger-cause GO	2.6274	11.2162	0.0000	Yes
Liq does Granger-cause Blev	1.5574	3.8416	0.0000	Yes
Blev does Granger-cause Liq	1.6181	4.2602	0.0000	Yes
NDTS does Granger-cause Blev	2.5432	10.6355	0.0000	Yes
Blev does Granger-cause NDTS	3.6199	18.0564	0.0000	Yes
GDPG does Granger-cause Blev	3.1813	15.0336	0.0000	Yes
Blev does Granger-cause GDPG	1.9048	6.2362	0.0000	Yes
Prof does Granger-cause Mlev	1.8305	4.8426	0.0000	Yes
Mlev does Granger-cause Prof	2.5829	9.2299	0.0000	Yes
Size does Granger-cause Mlev	1.7347	4.2839	0.0000	Yes
Mlev does Granger-cause Size	3.1563	12.5732	0.0000	Yes
Tang does Granger-cause Mlev	2.2691	7.3999	0.0000	Yes
Mlev does Granger-cause Tang	3.7765	16.1895	0.0000	Yes
EV does Granger-cause Mlev	2.4272	8.3222	0.0000	Yes
Mlev does Granger-cause EV	1.7306	4.2599	0.0000	Yes
GO does Granger-cause Mlev	2.2054	7.0287	0.0000	Yes
Mlev does Granger-cause GO	1.5950	3.4691	0.0050	Yes
Liq does Granger-cause Mlev	2.4136	8.2429	0.0000	Yes
Mlev does Granger-cause Liq	3.2018	12.8386	0.0000	Yes
NDTS does Granger-cause Mlev	1.9044	5.2737	0.0000	Yes
Mlev does Granger-cause NDTS	2.8908	11.0253	0.0000	Yes
GDPG does Granger-cause Mlev	1.8949	5.2183	0.0000	Yes
Mlev does Granger-cause GDPG	1.1855	1.0819	0.2793	No