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### The Financial Determinants of Corporate Cash Holdings: Does Sharia-Compliance Matter?

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#### ABSTRACT

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*This paper aims to investigate the financial determinants of corporate cash holdings of Sharia-compliant (SC) and Sharia non-compliant (SNC) firms. This study applies the autoregressive distributed lag (ARDL) approach for a sample of 178 Malaysian listed firms over the period 2008-2017. The results show that, in long-run and short-run, various cash holding determinants vary in sign and magnitude between SC and NSC firms. Moreover, we find that SC firms quickly adjust their level of cash holdings toward a target level than NSC firms. These results can be explained by the by the restrictions imposed by Sharia rules on firms to sustain their compliance status. Overall, the findings reveal that the trade-off, the pecking order and the free cash flow theories play an important role in explaining the determinants of cash holdings of both SC and NSC firms. This study concludes that SC firms possess certain financial characteristics that can affect their cash holding decision.*

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#### INTRODUCTION

How firms make decision for holding cash is one of the most important research topics in financial economics. The theoretical literature in finance offers three alternative theories to answer the above mentioned prevailing question namely the trade-off theory (Myers 1977), the pecking order theory (Myers and Majluf 1984) and the free-cash flow theory (Jensen, 1986). The trade-off theory states that firms set the optimal level of cash reserves by weighting the marginal costs and marginal benefits of holding cash. Under this theory, holding liquid assets is justified by two motives, namely the transaction cost motives and the precautionary motives.

Contrasting with this view, the pecking order theory considers that there is no optimal level of cash holdings. In order to minimize the costs associated with asymmetric information, firms have a preferred hierarchy for financing decisions. The highest preference is to use internal financing such as retained

earnings, before resorting to any form of external funding. The free-cash flow theory relies on managerial discretion to explain cash holding decision. Managers have an incentive to build up cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision. Since holding cash provides more flexibility, managers would rather retain cash than increase payouts to shareholders when the firm has poor investment opportunities. There is an extensive empirical research on the determinants of corporate cash holdings. The most of the previous existing studies have explored the issue for conventional firms only. However, when we review the literature for Sharia-compliant firms, we observe that researchers have not paid attention about which factors explain the decision of cash retention.

During the last two decades, the business community had witnessed a drastic growth of Islamic funds all over the world. Islamic finance has attracted a fair amount of attention from stock market participants. The financial market around the world experienced exceptional growth in Islamic finance. In Malaysia, Islamic finance has been witnessed with the robust growth. It is now the fastest growing segment in the global financial industry. Sharia-compliant securities have being the prominent products in Malaysian capital market. The average growth rate of Islamic Capital Market (ICM) in Malaysia is 13.6% per annum over the ten year period between 2000 and 2010. Haron and Ibrahim (2012) report that 80% of Malaysian publicly listed firms are Sharia-compliant.

According to the theory of Islamic finance, SC firms are subject to a variety of restrictions to maintain their compliance status. More specifically, these firms can access fewer financing channels in comparison with non Sharia-compliant firms, and hence are more constrained in their financing choices (Alnori and Alqahtani, 2019).

This study aims to examine the financial determinants of corporate cash holding of SC and SNC Malaysian firms by applying a newly developed autoregressive distributed lagged (ARDL) bound testing approach proposed by Pesaran et al. (2001). It contributes to the current literature in different ways. First, it provides further understanding of the determinants of cash holdings of firms identified as being SC compared to their non-compliant peers. Particularly, this research explores the implication of relevant Islamic principles on corporate cash holdings. We argue that financial constraints faced by SC firms are such that these firms are at a disadvantage relative to their SNC counterparts to access financial markets. In addition, SC firms are constrained to have low cash level to maintain their compliance status. Second, this study focuses on an emerging Malaysian economy where the regulatory and institutional constraints are different from other developed and emerging economies. In particular, a significant proportion of Malaysian firms adopt Islamic business principles as a core element of their articles of association. Third, this study analyses the determinants of corporate cash holding using ARDL method. The use of this method permits to identify the short-run and long-run relationships, as well as the elasticities of the relationship between cash holding and its main determinants. The reason for using this method is that the firm characteristics have a lagged effect on cash holding. For instance, the growth opportunities in future have an effect on today's cash holding. Moreover, the use of this method permits to consider the firm-specific heterogeneity. To the best of our knowledge, this is the first study that uses an ARDL approach to examine the determinants of corporate cash holding. Finally, the findings will contribute significantly to the body of knowledge as well as to practitioners and to firms that would like to operate under Islamic principles.

The remainder of this paper is organized as follows. The following section reviews theoretical and empirical literature. The sample and the methodology are discussed in the next section. The subsequent section analyses the empirical results and the final section presents the conclusion.

## **1. LITERATURE REVIEW AN HYPOTHESES DEVELOPMENT**

Assuming a world without market imperfections, holding large amounts of cash is irrelevant because companies can easily go to capital markets to finance their profitable investment projects at negligible transaction costs (Modigliani and Miller, 1958). By introducing market frictions, scholars developed several theories, which provide rational explanations for the determinant factors of firms' cash level. This resulted in three major theories, namely the trade-off theory, the pecking order theory, and the free cash

flow theory. To empirically test these theories, researchers analyze the impact of several firm characteristics (used as proxy variables) on the level of corporate cash.

## 1.1 The trade-off theory

The trade-off theory starts with the premise that a company should seek an optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash. The advantages of holding cash derive from the transaction cost motive and the precautionary motive (Bates et al., 2009). By holding cash, firms save transaction costs associated with converting a non-cash financial asset into cash and uses cash for payments. Furthermore, Firms hold cash to better cope with adverse shocks when they struggle to obtain funding from external sources (Chireka and Fakoya, 2017). Holding more cash, however, comes with a price as firms incur an opportunity cost of the capital due to the low return on liquid assets. Following prior studies (e.g. Opler et al., 1999; Ferreira and Vilela, 2004; Al-Najjar, 2013; Guizani, 2017), we have taken growth opportunities, asset tangibility, leverage, liquid assets, company size, cash flow, cash flow uncertainty and dividend payout as the possible determinants of corporate cash holding. We discuss the relevant literature for each of these variables below.

When linking the proxy variables to cash holding under the trade-off theory, we expect a positive impact of growth opportunities on cash level since the cost of incurring a cash shortage is higher for firms with larger investment opportunities (Guizani, 2017). Therefore, cash retention enables firms to undertake their profitable investments projects without raising outside funds at high transaction costs. Keeping more cash for firms with better investment opportunities is also justified by financial distress costs because the positive NPV of these investments disappears in case of bankruptcy (Ferreira and Vilela, 2004). The presence of tangible assets should lead to lower cash levels, as they can be sold in the case of a cash shortfall (Drobetz and Gruninger, 2007). Singh and Misra (2019) found that tangible assets are negatively associated with cash holding. Such relationship exerts to enhance the borrowing capacity to make such outlays and undercut the requirement of cash holding. In addition, higher firm leverage coincides with high problems of financial distress. For this reason, firms with higher leverage are expected to hold more cash. On the other hand, in line with the transaction cost motive, highly levered firms face high costs when investing in liquid assets and should hence hold less cash (Ferreira and Vilela, 2004).

For liquid assets, Ozkan and Ozkan (2004) and Al-Najjar (2013) propose a negative impact on cash reserves, because these assets can be seen as substitutes for cash holdings. Here the precaution motive states that it is better to hold non-cash liquid assets than cash (Singh and Misra, 2019). Also, in accordance with transaction cost motive, Bates et al. (2009) suggest that firms with sufficient liquid assets may not have to use the capital markets to raise funds when they have a shortage of cash. Firms can convert liquid assets to cash and in turn are less likely to hoard cash.

As large firms are often more diversified, increasing firm size is commonly associated with lower direct bankruptcy costs (Titman and Wessels, 1988). In addition, larger firms incur smaller cost of external financing owing to the economies of scale resulting from a substantial fixed cost component of security issuance costs. Consequently, larger firms are less likely to accumulate cash reserves. For cash flow uncertainty, the trade-off theory predicts a positive sign for its relation with cash holding. Since cash flow volatility induces higher liquidity constraints and more cash shortage, more volatile firms should hold more precautionary cash (Bates et al., 2009). As for cash flow, it provides a buffer when income from operations unexpectedly falls. The trade-off theory views cash flow as an alternative source of liquidity that can set managers free from the financial constraints that can otherwise be imposed by the capital markets (Chireka and Fakoya, 2017). Therefore, we expect a negative relation between cash flow and cash holdings. Finally, previous literature found that dividend is negatively associated with cash holding. To the extent that dividend-paying firms have more financial flexibility, they can raise funds at low cost by reducing its dividend payments. However, non-dividend paying firms have to use the capital markets to raise funds and bear transactions costs (Opler et al., 1999; Bates et al., 2009). Thus, it is expected that firms that pay dividends hold less cash than firms that do not pay dividends.

## 1.2 The pecking order theory

Contrary to the trade-off theory, no optimal level of cash exists in the pecking order approach, but instead, cash is used as a buffer between retained earnings and investment needs. Owing to asymmetric information between firms and capital markets, firms finance investments first with internal resources, then with safe debt and risky debt, and with equity as a last resort. Under the pecking order theory, firms with higher growth opportunities need higher cash level to cope with any shortfall in cash and limit company commitment in costly external financing (Guizani, 2017). Tangible assets are assumed to lower the degree of information asymmetry due to ease of valuation by outsiders. At the same time, capital expenditures create assets that can be used as collateral (Bates et al. 2009). Thus, they could increase debt capacity and reduce the demand for cash. In a similar vein, investment expenditure limits firms' capacity to invest in liquid asset reserves, and hence they hold less liquid assets (Opler et al., 1999). Regarding firm leverage, the pecking order theory assumes a negative impact on cash holding. In a financing hierarchy model, debt typically grows when investment exceeds retained earnings and falls when investment is less than retained earnings (Ferreira and Vilela, 2004; Drobetz and Gruninger, 2007). In addition, when firms have better access to the debt markets, they have less need to keep cash reserves. For firm size, the pecking order theory predicts a negative impact on cash holding. As large firms provide better information to outside investors, information asymmetries are lowered, which reduces the costs of external financing (Drobetz and Gruninger, 2007). Moreover, Ozkan and Ozkan (2004) argue that large firms are less likely to experience financial distress. Thus they hold less cash. Moreover, firms with more volatile cash flow hold more cash as increased cash flow volatility raises outsiders' investment uncertainty (Frank and Goyal, 2009). Therefore, due to increased information asymmetry, these firms suffer from more problems of adverse selection. Finally, as retained earnings constitute the favored form of financing under the pecking order model, firms with higher cash flow are expected to retain more cash reserves.

## 1.3 The free cash flow theory

The theory of free cash flow developed by Jensen (1986) suggests that excess cash holdings exacerbates the risk of the misappropriation of these funds that can be squandered on projects with negative net present value. Thus, firms with agency problems tend to accumulate cash even if they do not have good investment opportunities. Managers of these firms are reticent to return cash to shareholders; however, they are prone to invest in growth projects, even if the NPV of these projects is negative. Previous studies show that firms hold more cash when agency problems between insiders and outside shareholders are greater. Accordingly, it is likely that the relation between investment opportunity set and cash holdings will be negative. In light of the agency theory, an increasing debt derives firms to use the cash efficiently, because cash is used to the repayment of the principal and interest payments.

Debt imposes a certain level of discipline upon corporate executives since it reduces the resources under their control. In contrast, low leverage firms are less subject to monitoring, allowing for superior managerial discretion. Therefore, we expect that less levered firms hold more cash. Furthermore, agency costs increase with the size of the company as the latter becomes more difficult to control (Jensen and Meckling, 1976). Ferreira and Vilela (2004) argue that the larger the company size the larger the proportion of actual resources which is affected by any given managerial decision. Accordingly, we expect that managers of large firms have more discretionary power over the firm financial policies, leading to a greater amount of cash holdings.

Table 1 presents, separately for each of the three theories, the most common proxy variables and the direction of their hypothetical signs.

**Table 1.** Determinants of corporate cash holding

Variables	Trade-off theory	Pecking order theory	Free cash flow theory
Investment opportunity set	+	+	-
Asset tangibility	-	-	
Leverage	+	-	-
Liquid asset substitute	-		
Firm size	-	-	+
Cash flow uncertainty	+	+	
Cash flow	-	+	
Dividend payments	-		

## 2. DATA DESCRIPTION AND METHODOLOGY

### 2.1 Data Sources and Sample

For the purpose of our empirical investigation, we consider Sharia-compliant and Sharia non-compliant firms listed on Bursa Malaysia for which all data were available. We follow the classification adopted by the Malaysian Securities Commission's Sharia Advisory Council to distinguish between Sharia-compliant and Sharia non-compliant firms. The classification used consists of two screening processes. Firstly, the contribution of Sharia non-compliant activities (such as conventional banking and insurance, gambling, pork and pork-related activities) to the total revenue and profit before tax of the company should not exceed 5%. A 20-per cent benchmark is also applicable to the following activities: share trading; stock broking business; rental received from Sharia non-compliant activities; and other activities deemed non-compliant according to Sharia. The second screening process adopted by the Sharia Advisory Council consists of the following financial ratios:

- i. Cash over total assets: cash only includes cash placed in conventional accounts and instruments;
- ii. Debt over total assets Debt: only includes interest-bearing debt.

Each ratio, which is intended to measure *riba* and *riba-based* elements within a company's statements of financial position, must be less than 33 per cent. This study uses a 10 year period data from 2008 until 2017. The year 2007 serves to calculate some parameters that are variations. We collect firms' stock prices, returns, and firms' financial data, available in Thomson Reuters Datastream. Financial companies are excluded because they are normally considered separately due to differences in their businesses and regulatory environment. We also exclude firms with missing information. The final sample due to data availability for the entire period is 143 Sharia-compliant and 35 Sharia non-compliant firms.

### 2.2 Empirical Specifications and Estimation Methods

This study employs the Autoregressive Distributed Lag Model (ARDL) to capture both the short run and long-run impact of the model (Pesaran and Shin, 1997 and Pesaran et al., 2001). Because of its flexibility, this technique is used as an alternative to the usual cointegration tests (Engle and Granger, 1987; Johansen, 1991). In the ARDL model, the relation between the variables is tested regardless of whether the variables are I(0), I(1) or mutually integrated. The ARDL model is also an appropriate technique to small samples and which offers the possibility of jointly processing long-run dynamics and short-run adjustments. It involves the formatting of the error correction model or unrestricted error correction model (ECM). Following Pesaran and Shin (1997) and Pesaran et al. (2001), the empirical formulation of ARDL model for this study is specified as follows:

$$\begin{aligned}
\Delta Cash_{i,t} = & \alpha_0 + \sum_{j=1}^p \beta_1 \Delta Cash_{i,t-j} + \sum_{j=1}^{q1} \beta_2 \Delta Q_{i,t-j} + \sum_{j=1}^{q2} \beta_3 \Delta Tang_{i,t-j} + \sum_{j=1}^{q3} \beta_4 \Delta Lev_{i,t-j} \\
& + \sum_{j=1}^{q4} \beta_5 \Delta Liq_{i,t-j} + \sum_{j=1}^{q5} \beta_6 \Delta Size_{i,t-j} + \sum_{j=1}^{q6} \beta_7 \Delta CFvol_{i,t-j} + \sum_{j=1}^{q7} \beta_8 \Delta CF_{i,t-j} + \sum_{j=1}^{q8} \beta_9 \Delta Div_{i,t-j} \\
& + \pi_1 Cash_{i,t-1} + \pi_2 Q_{i,t} + \pi_3 Tang_{i,t} + \pi_4 Lev_{i,t} + \pi_5 Liq_{i,t} + \pi_6 Size_{i,t} + \pi_7 CFvol_{i,t} + \pi_8 CF_{i,t} \\
& + \pi_9 Div_{i,t} + \varepsilon_{i,t} \tag{1}
\end{aligned}$$

Where *Cash* is the cash ratio measured by cash and cash equivalents to total assets ratio; *Tang* is the asset tangibility measured by capital expenditures to total assets; *Lev* is the leverage ratio, measured by total debt to total assets; *Liq* is the liquid asset substitute measured by the net working capital; *Size* is the natural logarithm of total assets; *CFvol* is the standard deviation of firm cash flow; *CF* is the ratio of cash flow to total assets. The cash flow is assessed as earnings after interest, dividends and taxes plus depreciation. *Div* is the dividend payout ratio measured by dividend per share divided by earnings per share.  $\Delta$  is the first difference,  $p$  is the optimal lag length of the ARDL model and  $\varepsilon$  is the error term assumed to be independently and identically distributed.

The null hypothesis of no co-integration in the long-run relationship is defined as  $H_0: \pi_1 = \pi_2 = \pi_3 = \dots = \pi_9 = 0$ , against the alternative hypothesis  $H_1: \pi_1 \neq \pi_2 \neq \pi_3 \neq \dots \neq \pi_9 \neq 0$ . In the ARDL model, the null hypothesis of no cointegration between two variables is examined via the F-statistic (Pesaran et al. 2001). The estimated F-statistic is usually compared with the two critical values (upper-bound and lower-bound):

- If the F-statistic exceeds the upper-bound, then we reject the null hypothesis of no cointegration and we conclude that there is a long-run association between retained variables;
- If the F-statistic is lower than the lower-bound, then we do not reject the null hypothesis of no cointegration and we conclude that there is no long-run association between the retained variables;
- If the F-statistic is between the two limits, then we cannot conclude.

Once cointegration is established, the conditional long-run ARDL model can be estimated as:

$$\begin{aligned}
Cash_{i,t} = & \alpha_0 + \sum_{j=1}^p \beta_1 Cash_{i,t-j} + \sum_{j=1}^{q1} \beta_2 Q_{i,t-j} + \sum_{j=1}^{q2} \beta_3 Tang_{i,t-j} + \sum_{j=1}^{q3} \beta_4 Lev_{i,t-j} + \sum_{j=1}^{q4} \beta_5 Liq_{i,t-j} \\
& + \sum_{j=1}^{q5} \beta_6 Size_{i,t-j} + \sum_{j=1}^{q6} \beta_7 CFvol_{i,t-j} + \sum_{j=1}^{q7} \beta_8 CF_{i,t-j} + \sum_{j=1}^{q8} \beta_9 Div_{i,t-j} \\
& + \varepsilon_{i,t} \tag{2}
\end{aligned}$$

Finally, a dynamic error correction model (ECM) can be derived from the ARDL bounds test through a simple linear transformation. The short-run dynamic parameters by estimating an unrestricted ECM associated with the long-run estimates are specified as follows:

$$\begin{aligned}
\Delta Cash_{i,t} = & \alpha_0 + \sum_{j=1}^{p-1} \beta_1 \Delta Cash_{i,t-j} + \sum_{j=1}^{p-1} \beta_2 \Delta Q_{i,t-j} + \sum_{j=1}^{p-1} \beta_3 \Delta Tang_{i,t-j} + \sum_{j=1}^{p-1} \beta_4 \Delta Lev_{i,t-j} \\
& + \sum_{j=1}^{p-1} \beta_5 \Delta Liq_{i,t-j} + \sum_{j=1}^{p-1} \beta_6 \Delta Size_{i,t-j} + \sum_{j=1}^{p-1} \beta_7 \Delta CFvol_{i,t-j} + \sum_{j=1}^{p-1} \beta_8 \Delta CF_{i,t-j} + \sum_{j=1}^{p-1} \beta_9 \Delta Div_{i,t-j} \\
& + \varphi ECT_{i,t-1} + \varepsilon_{i,t} \tag{3}
\end{aligned}$$

Where  $ECT_{i,t-1}$  is the error correction term that indicates the speed of adjustment, that is to say, how quickly the cash holdings return to the long-run equilibrium.

### 3. RESULTS AND DISCUSSION

#### 3.1 Descriptive statistics

Table 2 provides the main summary statistics for the variables used in the empirical analyses. First, we present the descriptive statistics for the whole sample, and then we split the sample based on SC and SNC corporations. The results show that cash holdings for SC firms are significantly less than those for SNC firms. This may be due to the fact that SC firms restrict themselves from using cash to maintain their compliance status. Further, as highlighted by Table 2, SC firms have lower growth opportunities than their NCS peers. This may be attributed to the limited financing channels available to SC firms as indicated by the significantly low leverage. The slower growth of SC firms results in lower capital expenditures and size differences in favor of SNC firms, which enjoy a wider range of financing options. However, SC firms pay higher dividend compared to SNC firms, despite their lower growth.

**Table 2.** Descriptive statistics

	All firms				SC firms				SNC firms			
	Mean	St.dev	Min	Max	Mean	St.dev	Min	Max	Mean	St. dev	Min	Max
Cash	0.13	0.22	0.01	3.71	0.09	0.11	0.01	1.02	0.25	0.42	0.01	3.71
Q	1.52	1.05	0.25	7.54	1.46	1.03	0.25	7.54	1.63	1.15	0.50	6.19
Capex	0.58	0.20	0	0.97	0.56	0.20	0	0.97	0.64	0.20	0.06	0.94
Lev	0.18	0.17	0	1.10	0.14	0.16	0	1.10	0.26	0.18	0	0.62
Liq	0.08	0.16	-0.57	0.87	0.09	0.16	-0.57	0.87	0.04	0.15	-0.38	0.51
Size	9.33	0.71	7.73	11.53	9.27	0.70	7.73	11.53	9.42	0.78	8.08	11.00
CFvol	0.03	0.03	0.01	0.32	0.04	0.03	0.01	0.32	0.03	0.02	0.01	0.15
CF	0.04	0.07	-0.51	1.05	0.04	0.07	-0.31	1.05	0.02	0.07	-0.51	0.18
Div	0.41	0.35	0	1.45	0.44	0.35	0	1.45	0.32	0.37	0	1.11

#### 3.2 Regression analysis results

##### 3.2.1 Unit root tests

Before proceeding to the ARDL approach, we test the stationarity of the different series to ensure that none of the variables is integrated of higher order i.e. I(2) as it will violate the assumption of bound testing procedure. To ascertain the order of the integration, we perform the LLC test (Levin, Lin & Chu, 2002) and Pesaran test (Pesaran, 2003). Table 3 shows unit root test results for SC and SNC firms. As can be observed, for all variables, the null hypothesis of non-stationarity cannot be rejected, except the variables *Lev*, *CFvol* and *Div* for SC firms and *Tang*, *CFvol* and *Div* for SNC firms. Both the LLC and Pesaran test results reveal that *Cash*, *Q*, *Tang*, *Liq*, *Size* and *CF* are not stationary at level but stationary at first difference for SC firms. Concerning SNC firms, the results indicate that *Cash*, *Q*, *Lev*, *Liq*, *Size* and *CF* are not stationary at level but stationary at first difference.

**Table 3.** Unit-Root Test Results

Vbles	Sharia-compliant firms				Sharia non-compliant firms			
	LLC		Pesaran		LLC		Pesaran	
	Level	First Differ.	Level	First Differ.	Level	First Differ.	Level	First Differ.
Cash	1.176	-4.285***	0.315	-3.683***	4.523	-3.447***	2.358	-5.042***
Q	-0.687	-6.367***	-0.423	-4.526***	-0.302	-8.554***	-0.114	-3.747***
Tang	2.154	-3.956***	2.718	-7.589***	-6.553***	-30.452***	-4.125***	-11.745***
Lev	-4.027***	-21.234***	-5.201***	-17.653***	-1.902	-11.232***	-1.137	-8.477***
Liq	5.462	-6.325***	2.452	-8.635***	3.443	-7.358***	1.884	-5.058***
Size	1.956	-5.133***	0.684	-4.568***	5.136	-2.925***	2.552	-8.254***
CFvol	-2.305***	-11.542***	-5.845***	-20.521***	-4.551***	-22.083***	-3.683***	-19.035***
CF	1.845	-4.887***	0.526	-3.995***	6.884	-5.845***	4.632	-9.478***
Div	-3.712***	-15.623***	-5.456***	-27.84***	-6.215***	-18.932***	-4.956***	-25.412***

Δ denotes the first lag level. \*\*\*, \*\*, \* denote statistical significance at the 1, 5 and 10% levels.

### 3.2.2 Cointegration tests

This step consists of testing the existence of a possible cointegration relationship between cash holding and its main determinants. Pedroni (2004) is the first who proposed a cointegration test. Seven statistics were performed to establish cointegration test for panel data among which four statistics are based on the *within* dimension and three statistics are based on the *between* dimension. Pedroni (2004) showed that at a fixed threshold, a statistic greater than the tabulated critical value (1.65 at the 5% threshold) will lead to the rejection of the null hypothesis of no cointegration. The results reported in Table 4 show that all statistics are significant rejecting the null hypothesis of no cointegration. Therefore, we can conclude that there is a cointegration relationship between cash holding and its determinants.

**Table 4.** Pedroni Cointegration Test

	Sharia-compliant firms		Sharia non-compliant firms	
	Statistic	p-value	Statistic	p-value
Within dimension				
V-Panel	-6.08	0.00	-8.35	0.00
Rho-Panel	-7.21	0.00	-10.02	0.00
PP-Panel	-12.63	0.00	-15.31	0.00
ADF-Panel	-10.52	0.00	-12.63	0.00
Between dimension				
Rho-Group	-8.24	0.00	-10.22	0.00
PP-Group	-17.54	0.00	-18.98	0.00
ADF-Group	-14.83	0.00	-16.43	0.00

### 3.2.3 Long-run estimation results

The long-run elasticities among the predetermined, cointegrated variables are analyzed via the dynamic OLS (DOLS) technique as suggested by Stock and Watson (1993).

**Table 5.** Estimated long-run coefficients for CASH using the ARDL approach

	Sharia-compliant firms		Sharia non-compliant firms	
	Coefficient	Std. Error	Coefficient	Std. Error
Q	0.011**	(0.004)	-0.037*	(0.023)
Tang	-0.211***	(0.026)	-1.943***	(0.147)
Lev	-0.241***	(0.031)	-0.400**	(0.198)
Liq	-0.127***	(0.034)	-1.819***	(0.181)
Size	-0.014**	(0.007)	0.035	(0.047)
CFvol	0.287**	(0.120)	-0.537	(1.114)
CF	0.015*	(0.059)	-0.474**	(0.348)
Div	-0.018*	(0.013)	-0.097**	(0.062)
Intercept	0.091**	(0.065)	1.451***	(0.451)
Adj. R <sup>2</sup>	0.608		0.527	
F statistic	72.80***		23.09***	
N	1430		350	

\*\*\*, \*\*, \* denote statistical significance at the 1, 5 and 10% levels.

The estimated results confirm the existence of the long-run relationship between corporate cash holding and its main determinants for both firm groups. As highlighted in Table 5, the coefficients of the growth variable do show mix results for both SC and SNC firms. Consistent with the trade-off and pecking order theories predictions, we find a positive and significant impact of growth opportunities on cash retention for SC firms. According to the trade-off theory, growth firms accumulate more cash reserves because the opportunity cost of lost investment is larger for these firms. In addition, in a pecking order world, growth firms are characterized by a higher degree of information asymmetry leading to more costly



external financing. This implies that SC firms with better investment opportunities hold more cash because the inability to raise financing is more costly for these firms. This result can be explained by the restrictions imposed by Sharia rules on firms to sustain their compliance status. More specifically, these firms can access fewer financing channels in comparison with SNC firms and hence are more constrained in their financing choices (Alnori and Alqahtani, 2019). The positive relation supports the view that the cost of financial distress of high growth firms is relatively high, thus lead to an increase in cash retention. However, the results show that the growth opportunities are found to be highly significant and negatively related to cash holding in SNC firms. This implies that cash holdings in SNC firms are the outcome of agency conflicts. The negative relationship is consistent with the predictions of the free cash flow theory which posits that managers of firms with poor investment opportunities will hold more cash to ensure the availability of funds to invest in growth projects, eventually with negative NPV.

As for asset tangibility, we document a negative and highly significant coefficient for both SC and SNC firms. However, the magnitude of the asset tangibility effect is stronger in SNC firms. Every 1% increase in the asset tangibility will lead, on average, to a 0.211 % and 1.943% reduction in cash for SC and SNC firms, other things being equal. Overall, this negative relationship is consistent with the predictions of the trade-off and pecking order theories. This result supports the argument that tangible assets can be sold if a cash shortfall occurs and that firms with more collaterals encounter fewer problems issuing debt. The leverage coefficient exhibits a negative and significant result for both SC and SNC firms consistent with the pecking order and the free cash flow theories expectations. This negative relationship supports the previous arguments that debt can increase a firms' access to the capital market and also reduce agency cost which could arise for the free cash flow reason. Leverage also exerts a negative relationship with cash holding as it can be viewed as a substitute for holding cash. We also find a negative significant relationship between liquid assets and corporate cash holding for both SC and SNC firms, supporting the trade-off theory expectation. Firms that face cash shortages can easily convert their liquid assets into cash and thus they can avoid expensive capital market financing.

Firm size is one of those determinants that provide consistent results in its relationship to cash holding. While the results show a negative and significant coefficient for SC firms, a positive and insignificant relationship is found for SNC firms. The negative relationship between firm size and cash holding aligns with trade-off and pecking order arguments that large firms are more able to obtain external funds and, therefore, are less in need of holding cash. Due to the economies of scale enjoyed by large firms, they can lower their transaction costs incurred in external borrowing. This influences large firms rather to borrow than to hold the cash. However, small firms carry more cash as they do not have proper information asymmetry and also to avoid financial distress. This evidence does not support the free cash flow theory that states that managers of large firms are more likely to hoard cash reserves for discretionary purposes.

Regarding cash flow uncertainty, the results show a positive and significant coefficient for SC firms and a negative but insignificant coefficient for SNC firms. The positive effect of cash flow volatility on cash holding documented in SC firms is a sign of a precaution against adverse situations. Since cash shortages have adverse effects, firms can be forced to forfeit positive NPV investment opportunities. Therefore, companies experiencing high cash flow uncertainty will be driven by the precautionary motive to retain more cash. Similar to the growth variable, the sign and coefficient of cash flow show mix results for both SC and SNC firms. Owing to restrictions imposed by Sharia rules on firms to sustain their compliance status, SC firms face more constrained in their financing choices. Thus, they rely more on their internal funds for their financing needs. This supports the notion of the pecking order theory with the rationale that firms with good cash flows will use these internal funds to finance their projects, pay off their debt and accumulate cash reserves. As for SNC firms, the association between cash flow and cash holding is negative and significant in accordance with the prediction of the trade-off theory. Cash flows are viewed as an alternative source of liquidity to set managers free from financial constraints imposed by the capital markets. This leads SNC firms to use these cash flows in times of cash shortages, thus, reducing the need to hold cash.

As predicted by trade-off theory, dividend payout has a negative and significant impact on cash holding for both SC and SNC firms. This suggests that dividend-paying firms can trade-off the high costs of stocking cash by drawing down on dividend payments (Al-Najjar, 2013). In addition, according to the fi-

financial constraints' theory of Fazzari et al. (1988), firms that distribute dividends are more able to raise funds at lower costs when needed by reducing their dividend payments.

### 3.2.4 ECM Short Run Dynamic ARDL Estimation

After the investigation of the long-run relation of model specified, we further proceeded towards examining the short-run dynamic following the ECM-ARDL model. The short run estimated coefficients of Eq. (3) are reported in Table 6. The error correction term (ECT) represents the speed of adjustment towards the long-run equilibrium. It should be negative and statistically significant. The more negative and significant this speed of adjustment, the more rapidly firms adjust their cash holdings relative to their levels in  $(t - 1)$  and the less possible shocks are sustainable over time.

**Table 6.** Estimated short-run coefficients for  $\Delta CASH$  using the ARDL approach

	Sharia-compliant firms		Sharia non-compliant firms	
	Coefficient	Std. Error	Coefficient	Std. Error
$\Delta Cash$	0.142***	(0.039)	0.066*	(0.046)
$\Delta Q$	0.021**	(0.093)	-0.015*	(0.028)
$\Delta Tang$	-0.889***	(0.063)	-1.601***	(0.265)
$\Delta Lev$	-0.162**	(0.067)	-0.703*	(0.370)
$\Delta Liq$	-0.640***	(0.054)	-1.264***	(0.215)
$\Delta Size$	-0.149**	(0.061)	0.591**	(0.235)
$\Delta CFvol$	-0.018	(0.197)	1.368	(1.543)
$\Delta CFvol(-1)$	0.084**	(0.104)	0.173***	(0.421)
$\Delta CFvol(-2)$	0.023*	(0.043)	0.087**	(0.152)
$\Delta CF$	-0.115*	(0.061)	-0.909*	(0.733)
$\Delta Div$	-0.033**	(0.017)	-0.051*	(0.090)
$\Delta Div(-1)$	-0.017*	(0.024)	-0.031*	(0.014)
$ECT(-1)$	-0.354***	(0.073)	-0.217***	(0.053)
Intercept	-0.002	(0.003)	-0.018*	(0.012)
Adj. R <sup>2</sup>	0.528		0.463	
F statistic	62.53***		17.85***	
N	1430		350	

ARDL (1,0,1,0,1,1,0,3,0,2) is selected for SC firms while ARDL (1,1,0,0,0,1,1,3,1,2) is selected for SNC firms based on Schwarz criterion.. \*\*\*, \*\*, \* denote statistical significance at the 1, 5 and 10% levels.

The estimation results (Table 6) show that the estimated coefficients associated with the error correction term are negative and significant confirming the long-run equilibrium relationship between corporate cash holdings and its main determinants. The error correction term ECT is negative and statistically significant at the 1% level of significance for both SC and SNC firms. The coefficient of ECT is equal to (-0.345) for SC firms and (-0.217) for SNC firms. This implies that any prior period shock in the model is to be adjusted in the long-run equilibrium with speeds of 34.5% and 21.7% for SC and SNC firms respectively. With regard to the magnitude of the ECT coefficients, it is clear that SC firms quickly adjust their level of cash holdings toward a target level than SNC firms. The high adjustment speed of SC firms suggests that the cost of being off target is higher compared to SNC firms. However, the slow speed of adjustment of SNC firms seems consistent with their propensity to hold high levels of cash which is not permitted to SC firms. For instance, among the requirements for a firm to be Sharia-compliant is to have low cash (Dow Jones). As argued by Drobetz and Gruninger (2007), firms with slow adjustment towards their target cash ratio must hold higher cash reserves in order to avoid cash shortfalls that require costly adjustments. Additionally, in the short-run, asset tangibility, leverage, liquid assets, cash flow and dividend payout have negative and significant effects on both SC and SNC firms. The coefficients associated with  $\Delta CFvol(-1)$  and  $\Delta CFvol(-2)$  are positive and significant for both groups. However, we obtain mixed results for growth opportunities and firm size. The estimated coefficients reveal a positive relationship be-

tween growth opportunities and cash holding for SC firms. For firm size, we find a negative effect on cash reserves in SC firms. The reverse relationships are found in SNC firms.

## CONCLUSION

Given that the literature suffers from a tight focus on cash holdings of conventional firms and often ignores those of SC companies, this study contributes to the literature by moving beyond this boundary and extending the investigation for all prevalent company types in the context under investigation. Therefore, this empirical paper examines whether the most reliable corporate cash holding determinants are related to Sharia-compliance status. To establish the relationship between cash holding and its determinants, this study employs an autoregressive distributed lag (ARDL) econometric framework. It uses the DOLS method to explain the long-run dynamic of corporate cash holding of both SC and SNC firms. We have found results confirming the existence of a long-run relationship between corporate cash holding and its main determinants for both firm groups. However, various explanatory variables on the cash holding do exhibit different effects among SC and SNC firms. The results show that growth opportunities and cash flow differently affect cash holdings. Further, the magnitudes of the effects of capital expenditure and liquidity substitutes are significantly different among both groups. These results can be explained by the restrictions imposed on firms to sustain their compliance status.

Overall, the findings reveal that the trade-off, the pecking order and the free cash flow theories play an important role in explaining the determinants of cash holdings of both SC and SNC firms. The results also show that the short-run coefficient estimates obtained from the ECM version of ARDL model are altered by Sharia-compliance. We find that SC firms quickly adjust their level of cash holdings toward a target level than SNC firms. We argue that financial characteristics of SC firms are such that they have quick speed of adjustment than their SNC counterparts. Subject to the above caveats, we can draw some theoretical and managerial implications of this study. First, the study explores the role of Sharia in corporate cash holdings in terms of its influence on the costs of external funds and financial constraints. Consequently, scholars can draw on this research to further investigate the effect of Sharia on cash management, financing and investment decisions. Second, the study findings may be useful to investors, assisting them in making better informed decisions and aids other interested parties in gaining a better understanding of the role played by Sharia in corporate cash holdings. Third, the study findings may be also useful to managers to efficiently establish the level of cash holdings in order to maximize firm value.

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