The effects of foreign currency exposure and Sharī'ah-compliant status on financial hedging strategy

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Abstract

Purpose – Drawing upon underinvestment theory and clientele effect hypothesis, this paper aims to examine the effects of foreign currency (forex) exposure and Shari'ah-compliant status on firms' financial hedging strategy.

Design/methodology/approach – Based on data of 250 nonfinancial firms listed on Bursa Malaysia from 2010 to 2018 (2,250 firm-year observations), the authors test the impact of forex exposure based on a vector of foreign-denominated cash flows (FCF) indicators and firms' Sharīʿah-compliant status on two proxies of financial hedging decisions, namely, the ratio of the notional value of currency derivatives to total assets and a binomial measure of hedging status. The hedging decision models are estimated using panel logistic regression and system generalized method of moments.

Findings – The results indicate significant positive effects of the forex exposure indicators on firms' propensity to hedge. However, the impact of forex exposure is most prevalent via total FCF. The results also reveal significant positive effects of Sharīʿah-compliant status on firms' propensity to hedge but its negative impacts on the value of currency derivatives they use. The results suggest that Sharīʿah-compliant firms refrain from engaging in currency derivatives to avoid *riba'* and subsequently subdue the clientele effect. However, when the forex exposure reaches higher levels, engagement in currency derivatives becomes a matter of tentative necessity (dharurat).

Research limitations/implications – This study relies exclusively on the disclosure of foreign currency risk and management data in the annual reports of listed companies. Consequently, this limits the sample size to only those nonfinancial listed companies with complete data for the study period. Also, since

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none of the companies reports using Sharīʿah-compliant derivatives, the authors thus assume that they use derivative instruments that tolerate "riba."

Practical implications – Given the significance of forex exposure on hedging decisions, the accounting profession must strictly adopt FRS 7 and FRS 139 for all listed firms to avoid market scrutiny and sustain their clientele. The results also call for the Islamic market regulators to include mandatory disclosure of conventional currency derivatives in screening firms for clearly prohibited activities to help enhance the credibility of its Islamic financial market.

Originality/value – Due to difficulty accessing relevant cash flow data, the study is among the few studies that measure forex exposure using FCF and test more proxy indicators. This study is perhaps the first to examine the Shari'ah perspective on currency derivatives in corporate forex risk management.

Keywords Currency derivatives, Forex exposure, Financial hedging, Foreign cash flows, Shari'ah-compliant status, Shari'ah-compliant derivatives

Paper type Research paper

1. Introduction

Globalization, trade liberalization and technology advancement have created opportunities for firms to access markets that offer the most competitive products and services inputs and outputs worldwide. The World Trade Organization (WTO, 2020) reported that the world's trade had amounted to US$48.69tn in 2019, of which Asian countries contributed 33.37%. China and Japan were ahead of the game, with Malaysia and Association of the Southeast Asian Nations (ASEAN)-5 among the top 50 traders. The more advanced Singapore was placed 11th in the world rank while Thailand, Indonesia and the Philippines ranked 24th, 32nd and 38th, respectively. Ranked 31st, Malaysia has also benefited tremendously from the growth in international trade. In 2019, its international trade was worth 123.1% of its gross domestic product (GDP), which stood at US$358.6bn (World Bank, 2020).

The opportunities created from international trade come with various risks, including foreign currency (forex) exposure. Since international trade typically involves payments at a future date, the accounts receivable or the current cash realizable values of those future cash flows are dependent on the future spot foreign exchange (forex) rates. The unexpected changes in forex rates increase the uncertainties in the firms' expected cash flows. Forex exposure may seem trivial for companies in economies that conduct trading based on strong currencies such as USD, Euro and Yen. However, it can present a threat for companies in developing countries like Malaysia, which are more likely to settle their international trades on stronger currency with their trading partners, such as the USD. The need to convert to/from foreign currencies exposes their cash flows to the uncertainties (*gharar*) of the future forex rates. In a nutshell, sustaining global competitiveness would require the companies to manage their forex exposure effectively as it is considered the costliest corporate risk (Buyukkara *et al.*, 2019; Servaes *et al.*, 2009), especially for those trading in international markets and within Shari'ah perspective for those companies with Sharīʿah-compliant status (SHA).

Financial hedging is the most common strategy for managing forex exposure. Using derivatives such as forward, option and futures, companies can lock the future forex rate to convert foreign currencies. Theoretically, Froot *et al.* (1993) attributed the relationship between forex exposure and hedging to the underinvestment theory. The theory suggests that failure to hedge forex exposure would force companies to forego viable investment opportunities due to uncertainties in their expected cash flows, especially when external financing is costly. Undertaking a project would put them at risk of abandoning it if the prevailing forex rate depreciates the value of their future cash flows. This option is costly for the companies and detrimental to their credibility to secure future projects. Thus, not only can companies incur financial losses due to forex exposure, but they also risk losing positive

NPV projects. Since firm value depends on future cash flows from the current contractual transactions and positive NPV projects, managers would hedge their forex exposure to avoid jeopardizing their firm's value (Luo and Wang, 2018).

Empirically, there is voluminous evidence supporting the relationship between forex exposure variables and financial hedging. However, the proxies do not directly fit the definition of forex exposure, thus questioning the reliability of the results. Bartram *et al.* (2009) attributed the inapt in forex exposure measurement to the unavailability of relevant cash flow data. Our study sees an opportunity to address the gap in the literature using Malaysian firms, where data on foreign cash flows are currently available. In 2010, the Malaysian Accounting Standards Board (MASB) enforced two accounting standards, FRS 7 and FRS 139, on all firms listed on Bursa Malaysia (Chong *et al.*, 2014), requiring the disclosure of foreign currency exposure and risk management policy. Malaysia also presents a unique setting for examining corporate hedging strategies using currency derivatives since 73% of its listed companies are Sharīʿah-compliant. These companies must adhere to Shari'ah rules prohibiting *haraam* (impermissible) business activities related to forex transactions. Their investment and financing activities must be free from *riba*' or *usury* (interest or predatory premium), *gharar* (uncertainty) and *maysir* (gambling or speculation). On conventional currency derivatives, the hedging tools entail *riba'* due to violating three principles in currency transactions; *al-sarf* (on-the-spot), same rates and same currencies (Ahmad *et al.*, 2012; Oziev *et al.*, 2016; Selim, 2021). Sharīʿah-compliant companies would refrain from using conventional currency derivatives to avoid *riba'* and *gharar*. This argument is consistent with the clientele effect hypothesis (Miller and Modigliani, 1961), which implies deliberate breaches of the *Shariah* principles could jeopardize the companies' appeal to their investors and stakeholders.

This study contributes to the existing literature in three ways. First, it addresses the inapt in forex exposure measurement by introducing four indicators based on foreign-denominated cash flows (FCF) (total foreign cash flows [TFCF], net foreign cash flows [NFCF], their ratios to total assets [TFCF/TA and NFCF/TA]). The argument for not relying on sales or international trade is that it only represents one of the main sources of forex risk. Meanwhile, using total cash flows tends to overestimate forex risk. When transactions are settled in local currencies, these are locally denominated cash flows that will not be exposed to forex risks. Consistent with the forex exposure definition, the net realizable cash values of assets and liabilities denominated in foreign currencies are subject to changes in future forex rates. Second, it addresses the Shari'ah issues in conventional currency derivatives by examining the effect of SHA on the firms' currency hedging strategy. Third, it offers new evidence from an emerging market that operates a dual Islamic-conventional capital markets system concerning foreign currency exposure, SHA and financial hedging strategy. Since we suggest currency derivatives as the financial hedging strategy, thus it is imperative to consider how the *riba'* and *gharar* elements in the hedging instrument would alter the hedging strategy among Sharīʿah-compliant companies. In the paper, we argue that TFCF have the highest effect on firms' propensity to use financial hedging strategies in alleviating the impact of forex exposure. Similarly, Sharīʿah-compliant firms tend also to hedge only when the forex exposure reaches higher levels, a strategy of tentative necessity imposed on them by the forces of international currency exchanges.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature, Section 3 describes the methodology, Section 4 reports and discusses the results, and Section 5 concludes the paper and discusses the implications.

2. Literature review

2.1 Forex exposure, financial hedging and underinvestment theory

Forex exposure, also known as foreign currency risks, refers to the uncertainties in the firms' expected cash flows due to unexpected changes in forex rates. The risk is significant for companies dealing with international transactions invoiced in foreign currencies (Buyukkara *et al.*, 2019; Servaes *et al.*, 2009). Since international transactions are typically settled at a future date, the unpredictability of the prevailing future forex rates creates uncertainties in the realizable values of the firms' future cash flows. Explaining the need to manage forex exposure with the underinvestment theory, Froot *et al.* (1993) argue that with uncertain future cash flows, firms are bound to forego viable projects in anticipation of difficulties in committing to the projects' financing needs. Abandoning the project is an option of last resort because it forfeits firms' investment and damages their reputation and credibility. Since firm value is the present value of all future cash flows, forex exposure ultimately poses a threat to the firm's value (Luo and Wang, 2018). Therefore, companies need to engage in mitigating strategies to manage forex exposure risk effectively.

Theoretically, forex exposure can be managed via operational and financial hedging. Operational hedging involves diversifying operations in foreign countries, but this strategy can be costly unless the venture creates long-term potential. Financial hedging can be executed using various financial market instruments, including the money market and currency derivatives. This study focuses on financial hedging using currency derivatives, namely, forward, futures, options and swaps. Such derivative instruments allow firms to limit their losses. They will have ample time to mark the market before the exercise date and close the deal on either gain or loss in the derivative (future/forward) values. According to Geczy *et al.* (1997), capital market imperfections create incentives for firms to use derivative instruments. However, the ultimate decision to use derivatives depends on the level of firms' exposure to foreign currencies and the costs of managing the risk.

Many studies have established the relationship between financial hedging (currency derivatives) and forex exposure (Bhagawan and Lukose, 2017; Butt *et al.*, 2018; Vural-Yavas, 2016; Wahyudi *et al.*, 2019). However, the proxies used in these studies did not directly reflect forex exposure. For instance, many studies used foreign sales (FS) (Butt *et al.*, 2018; Vural-Yavas, 2016), which underestimates forex exposure because it disregard foreign currencies used in acquiring materials, other assets and services. It also failed to consider that it is increasingly common for companies to raise capital in foreign currencies. Bae *et al.* (2018) pointed out the importance of having a sound measurement for forex exposure and called for the need to differentiate between the expected and observed forex exposures (OFE). The latter exposure, i.e. OFE[1] – a function of profit margin, FS and expenses, caught the researchers' attention. Geczy *et al.* (1997) studied observed forex exposures (OFE) by estimating FS and expense ratios with the sector's import and export inputs, thus making it a nonfirm specific proxy. Furthermore, they used Jorion's (1990) two-factor model to estimate OFE based on the sensitivity of stock return to exchange rates of a selected (or a basket) of foreign currencies. However, since OFE is an ex post, it is less practical for risk management strategic decisions and can be discarded as a reliable indicator.

Instead, studies by Ameer (2010) and Wahyudi *et al.* (2019) offered proxies based on cash flows such as the volatility of operating cash flows because these proxies are closer representative of the meaning of forex exposure. However, these proxies also include cash flows denominated in local currencies that would not be exposed to unexpected changes in future forex rates because no conversion would be required.

From the literature we reviewed, only a few studies harnessed foreign cash flows to measure OFE. Bae *et al.* (2018) and Geczy *et al.* (1997) used the ratios of long- and short-term

foreign debts to total assets (TA) and the foreign income ratio. Geczy *et al.* (1997) found foreign debt to be significant, while the ratios of long-and short-term foreign debts are insignificant in explaining the frequency of currency swap versus forward. In contrast, Bae *et al.* (2018) found the net and total foreign debt ratios to be significant and positively related to the expected forex exposure and the notional value (NV) of currency derivatives. On the other hand, Bartram *et al.* (2009) used the foreign assets to TA ratio and found it to have a significant positive relationship to currency derivatives.

The findings of Bae *et al.* (2018), Bartram *et al.* (2009) and Geczy *et al.* (1997) motivate us to extend the literature by proposing FCF as the more direct measure for exploring forex exposure. This approach is possible following the adoption of FRS 7 (Financial Instruments: Disclosure) and FRS 139 (Financial Instruments: Recognition and Measurement), which requires Malaysian listed firms to disclose information on their foreign currency risk management. The disclosure includes the ringgit values of assets and liabilities denominated in foreign currencies, FS, currency derivatives and NVs at the date of the financial statements. Despite the availability of these data, no study has attempted to use FCF to investigate forex exposure. Although Chong *et al.* (2014) discussed the impact of MASB's requirement at length, they only associated the disclosure with changes in companies' assertive level, knowledge and skill and market risk and regulation. Therefore, we propose using five proxies associated with FCF to reflect better the extent of forex exposure and its impact on financial hedging strategy. Since prior studies have established a positive association between the extent of forex exposure and the tendency to use financial hedging, our first hypothesis is as follows:

H1(a, b, c, d and e). Higher forex exposure, proxied by five measures (total foreign cash flows [TFCF], net foreign cash flows [NFCF], their ratios to total assets [TFCF/TA and NFCF/TA] and foreign sales to total sales ratio [FS/TS]), increases a firm's tendency to use financial hedging strategy.

2.2 Shari'ah views on currency derivatives and *clientele* effect hypothesis

To be Sharīʿah-compliant, companies must adhere to the Shari'ah laws prohibiting *haraam* (impermissible) business activities, such as swine, liquor and their by-products. Their investment and financing activities must be free from all types of *riba'* or *usury* (interest or premium), *gharar* (uncertainty) and *maysir* (gambling or speculation). While currency hedging is an effective strategy to manage forex exposure, Sharīʿah-compliant companies are refrained from using conventional currency derivatives because it entails *riba'* and *gharar*. Shari'ah jurists and scholars rule conventional currency derivatives as violating the principle of *al-sarf* (on-the-spot) in currency transactions since it involves exchanging promised currencies at a future date. The instruments also breach the requirement of exchanging the same items (currencies) and forex rates in the transactions of *ribawi* items (Ahmad *et al.*, 2012; Selim, 2021). Muslim ibn Al-Hajjaj narrated that the Prophet (s.a.w) clarified the rules in *ribawi* item transactions:

> Gold for gold, silver for silver, wheat for wheat, barley for barley, dates for dates, and salt for salt (exchange of the same item)– like the same likes (in equal measure), and hand to hand (on-the-spot). Anyone who pays more or takes more has been involved in usury.' The recipient and giver are the same (guilty).

Shari'ah scholars use this hadith to rule fiat currency transactions based on the arguments that those *ribawi* items were currencies of the old ages. This opinion is consistent with the

fatwa (ruling) of the Organization of the Islamic Cooperation's Council of the Islamic Fiqh Academy (CIFA). In their 11th session held on 14–19 November 1998, CIFA issued the *fatwa* that:

> it is not permissible in Shari'ah to sell currencies by deferred sale, and it is not permissible, still to fix a date for exchanging them. This ruling is based on the Qur'an, Sunnah and *Ijma* (Islamic Fiqh Academy, 2000, p. 236).

In this study, we consider *riba'* associated with conventional currency derivatives to be severe and threaten the reputation and core of Sharīʿah-compliant investment[2]. In verses 278–279 of Al-Baqarah, Allah (s.w.t) gives a harsh warning to *riba'* sinners:

> O you who have believed, fear Allah and give up what remains [due to you] of interest, if you should be believers. And if you do not, then be informed of a war [against you] from Allah and His Messenger.

Shari'ah scholars classify *riba'* into *riba'* on credit and *riba' al-fadhl*. *Riba'* on credit is divided into; *riba' al-jahiliya,* which refers to the interest added as a reward for deferring repayment and *riba' an-nashiya*, which occurs when there is a delay in the transaction or payment by one or both parties. *Riba' al-fadhl* involves an exchange of the same item for more or less. In the context of currency derivatives, deferring the exchange gives rise to *riba' an-nashiya* (Oziev *et al.*, 2016), and exchanging at different rates and currencies results in *riba' al-fadhl* (Selim, 2021). Both issues call for appropriate attention to firms' strategy or decision in engaging in financial hedging without imperfect or unknown information (*gharar*). Given that *riba'* (*an-nashiya* and *al-fadhl*) is clearly rooted in conventional currency derivatives, we propose that Sharīʿah-compliant firms may influence the firms' decision to use currency derivatives as a financial hedging strategy.

Malaysia offers a unique setting for studying this issue because its financial market operates in a dual system of conventional and Shari'ah, with the latter governed by the Shari'ah Advisory Council (SAC). The SAC has set 5% as the maximum threshold before-tax profits contributed by prohibited business activities, specifically:

> conventional banking and lending, conventional insurance, gambling, liquor, and liquor-related activities, pork and pork-related activities, non-halal foods and beverages, Shari'ah non-compliant entertainment, tobacco, and tobacco-related activities, interest income from conventional accounts and instruments (including interest income awarded from a court judgment or arbitrator, and dividends from Shari'ah non-compliant investment), and other activities deemed non-compliant according to the Shari'ah principles as determined by the SAC.

As the benchmark in classifying the firm as Sharīʿah-compliant (Securities Commission Malaysia, 2020, p. 173)[3]. The SAC rules emphasize the prohibition of *riba'* by explicitly portraying it as interest charges and incomes from conventional financing and investment instruments but overlook other sources of *riba'*, including currency derivatives. Failure to consider currency derivatives as a source of *riba'* will affect investors' confidence in the SHA of the firms and consequently prompt them to displace their investments in such companies.

The clientele effect hypothesis of Miller and Modigliani (1961) suggests that firms consider investors' behavior when making dividend payment decisions, and this also applies in the case of SHA. Their failure to comply with the Shari'ah principles will prompt investors and Islamic financial industry critics to question the legitimacy of the *Shariah*-compliance claim and the alignment of their interests with those of the stakeholders. Hence, the clientele effect hypothesis suggests that companies must portend Muslim investors' behavior and reaction before compromising Islamic principles that make up their compliance status. However, to the best of our knowledge, most studies on the Islamic

perspectives of currency derivatives are still conceptual. No empirical studies test the effect of *Shariah* compliance on currency derivatives except for Abdul-Rahim *et al.* (2017). Their study involving 70 companies over the 2010–2014 period in Malaysia revealed that no companies disclosed hedging with Sharīʿah-compliant currency derivatives and SHA does not influence the firms' hedging practice. Consistent with Kok *et al.* (2014), the first finding explains the difficulty of gathering data to examine the application of Islamic currency derivatives for corporate hedging. The second finding indicates that these companies possibly engaged with *riba'* in their hedging decision, violating their *Shariah*-compliance status.

The results by Abdul-Rahim *et al.* (2017) did not fully capture the market environment in Malaysia and thus, require a reexamination. Since 2010, the central bank of Malaysia (Bank Negara Malaysia, BNM) has introduced *wa'd* (promise) – or Islamic derivatives, to cater for the needs of Sharīʿah-compliant companies when pursuing hedging for their forex exposure (Ahmad *et al.*, 2012). In addition, since then, more banks in Malaysia have offered Sharīʿah-compliant currency derivatives, including Bank Islam Malaysia, Bank Mualamat Malaysia, CIMB Islamic Bank, RHB Islamic Bank, Kuwait Finance House, Standard Chartered Saadiq Bank, Deutsche Bank and United Overseas Bank (Mohamad *et al.*, 2014). Thus, since the perception of *unIslamic* practice by companies in the form of currency derivatives usage could alter the clientele's behavior, we hypothesize that:

H2. Sharīʿah-compliant status reduces a firm's tendency to engage in currency derivatives for its hedging strategy.

Besides our two variables of interest, i.e. forex exposure and SHA, we also control for several variables found significant in explaining financial hedging. Firm size is expected to influence companies' decision to use currency derivatives because it represents the resources to execute the financial hedging and provides economies of scale (Bae *et al.*, 2018; Butt *et al.*, 2018). Consistent with the underinvestment theory, companies with high growth and financial constraints have stronger motivation to use currency derivatives to stabilize and secure their cash flows because access to external financing is limited and costly (Froot *et al.*, 1993). Finally, following Chong *et al.* (2014) and Martin *et al.* (2009), we include systematic risk (SR) since nondiversifiable risks can be mitigated only through hedging. Figure 1 depicts the conceptual framework of our study.

3. Data and methodology

3.1 Variable measurement

During the study period (2010–2018), between 903 and 1,017 companies were listed on the Bursa Malaysia, and 73% were classified as Sharīʿah-compliant. Our final sample contains 250 firms after excluding financial firms and nonfinancial companies with incomplete data. This sampling technique provides balanced panel data of 2,250 firm-year observations. The year 2010 is selected as the base for two reasons; the year when the BNM officially introduced *wa'd* as the first Islamic derivatives structure and the year when the MASB enforced the FRS 7 and FRS 139 standards for financial instrument disclosure (the equivalent of IFRS 7) and financial instruments recognition and measurement (the equivalent of IAS 39) on listed firms, respectively (Chong *et al.*, 2014). These accounting standards require firms to disclose their foreign currency risk management as notes to the accounts[4]. The November edition of the Sharīʿah-compliant companies list, published by the Securities Commission of Malaysia, is used to determine the companies' SHA. Market and accounting data are sourced from DataStream.

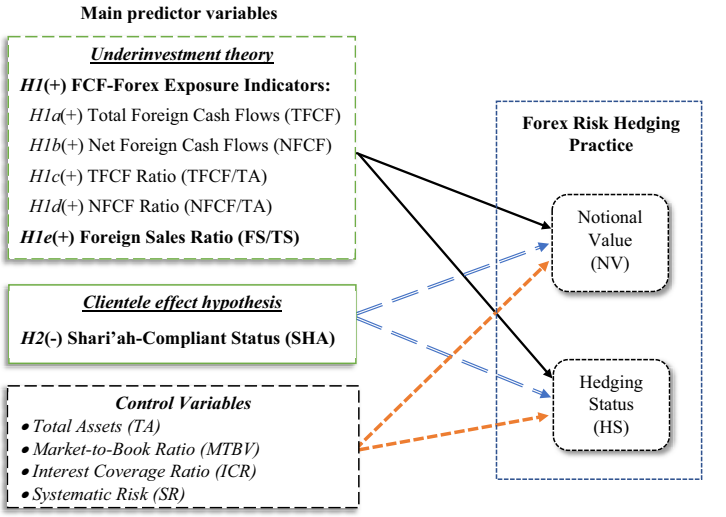

Figure 1.
Conceptual framework for forex exposure and Sharīʿah-compliant impact of hedging practice

Corporate hedging policy is represented by hedging status (HS), a binary variable that takes a value of "1" if the firm uses any currency derivatives and "0" otherwise. Following Luo and Wang (2018) and Vural-Yavas (2016), we use content analysis to determine if a firm uses currency derivatives. We search for the terms: "hedge," "hedging," "forward," "futures," "option," "swap" and "derivatives" in the narratives of items 31, 36 or 37 in the Notes to Financial Statements. The search terms "hedge" and "hedging" help verify some cases when the content analysis returns no hit, but the companies report the NV of currency derivatives. We also use the NV of the currency derivatives disclosed as the alternative to HS for robustness. While HS indicates whether or not the companies use financial hedging instruments, the NV represents the depth of currency derivatives used to hedge forex exposure (Bae *et al.*, 2018; Bhagawan and Lukose, 2017).

This study accentuates the role of forex exposure as the main driver for a firm's decision to engage in financial hedging. Taking advantage of the disclosure required by FRS 7 and 139, we introduced FCF as the more direct measure of forex exposure. We propose four FCF-based forex exposure indicators. The first two are TFCF, which is the sum of foreign short-term assets and liabilities and NFCF, which is the absolute difference between foreign current assets and liabilities. The other two indicators, which control firm size's effect on the value of foreign cash flows, are the TFCF/TA and NFCF/TA. Note that the NFCF ratio is similar to the foreign debt ratio used by Bae *et al.* (2018). We also use FS/TS to compare our results with previous studies.

3.2 Model specifications and estimation models

The role of forex exposure and SHA in influencing the two proxies for forex hedging policy are represented with equations (1) and (2) in panel form of firm i and time t:

$$HS_{i,t} = \alpha + \beta_1 FX_{i,t,j} + \beta_2 SHA_{i,t} + \beta_k \sum_{k=1}^{K} CV_{i,k} + \varepsilon_{it} \quad (1)$$

$$NV/TA_{i,t} = \alpha + \beta_1 FX_{i,t,j} + \beta_2 SHA_{i,t} + \beta_k \sum_{k=1}^{K} CV_{i,k} + \varepsilon_{it} \quad (2)$$

where β is the coefficient of the explanatory variable, and α and ε are the constant and error terms, respectively, FX_j is the firm forex exposure $j = 1, \ldots, 5$ of foreign cash flows and FS, CV_k is the k control variables; TA measures the firm size, market-to-book-value ratio (MTBV) measures growth opportunity, interest coverage ratio (ICR) proxies financial distress and SR measures the sensitivity of the company's stock to market condition (estimated over 36 monthly returns).

Since HS in equation (1) is a binary variable, the model is estimated using pooled ordinary least square logistic regression. Similar studies have used logistic regression either in cross-sectional or panel form (Butt *et al.*, 2018; Buyukkara *et al.*, 2019; Wahyudi *et al.*, 2019). The advantages of logistic regression are it uses maximum likelihood estimation to maximize the likelihood of an event, and it solves econometric issues such as normality, autocorrelation, homoscedasticity and endogeneity (Boateng and Abaye, 2019; Starkweather and Moske, 2011). The panel logistic regression representation of equation (1) is:

$$Ln\left(\frac{p}{1-p}\right)_{i,t} = \beta_0 + \beta_1 FX_{i,t,j} + \beta_2 SHA_{i,t} + \beta_k \sum_{k=1}^{K} CV_{i,k} + \eta_i + \varepsilon_{it} \quad (3)$$

where p is the probability that $HS = 1$ (i.e. the firm uses currency derivatives), β_0 is the constant and η is the firm-specific effect. The other variables are as defined in earlier equations. Interpretation of the coefficient (β) from logistic regression is more intuitive in the "odds ratio" (e^{β}) form. A one-unit change in X would make the event e^{β} as likely to occur.

For equation (2), in which hedging policy is represented by the ratio of currency derivatives notional value to total assets (NV/TA), we use the system generalized method of moments (GMM) model as shown in equation (4):

$$NV/TA_{i,t} = \alpha + \gamma NV/TA_{i,t-1} + \beta_1 FX_{i,t,j} + \beta_2 SHA_{i,t} + \beta_k \sum_{k=1}^{K} CV_{i,k} + \varepsilon_{it} \quad (4)$$

where NV/TA_{t-1} is the lagged dependent variable, and other variables are defined in earlier equations. GMM is considered the appropriate method since the firms' current hedging decision (NV/TA_{t-1}) should also cover previous commitments to deliver/receive foreign currencies, and thus NV/TA_{t-1}. The advantage of GMM is it effectively controls simultaneity bias if the dependent variable is endogenous (Saba *et al.*, 2021). System GMM offers more negligible sample bias and higher accuracy than the first difference GMM (Blundell and Bond, 1998). We use several diagnostic tests for logistic regression and GMM model to determine if the FCF-based forex exposure variables generate reliable hedging policy models.

4. Results and discussion

4.1 Descriptive analysis

Table 1 reports the descriptive statistics of the variables for all firms and sub-samples of Sharīʿah-compliant and Sharīʿah noncompliant firms. The results show that 22% of the 2,250 firm-year observations use currency derivatives, lower than 26% reported by

Table 1.
Descriptive statistics

Variables	All firms (N = 2,250)				Sharī'ah-compliant firms (N = 1,395)				Sharī'ah non-compliant firms (N = 855)			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Dependent												
HS	0.22	0.42	0	1.00	0.28	0.45	0	1.00	0.17	0.38	0	1.00
LnNV	3.66	0.90	0	22.18	4.61	7.49	0	22.18	2.80	6.23	0	20.57
Independent												
FS/TS	0.20	0.27	0	0.82	0.24	0.28	0	0.82	0.15	0.25	0	0.79
LnTFCF	12.23	7.93	0	23.89	13.28	7.64	0	23.89	11.57	7.90	0	22.76
TFCF/TA	0.09	0.18	0	0.36	0.11	0.17	0	0.15	0.07	0.21	0	0.36
LnNFCF	11.66	7.57	0	23.33	12.47	7.61	0	23.33	10.44	7.95	0	22.69
NFCF/TA	0.05	0.12	0	0.33	0.06	0.11	0	0.15	0.04	0.17	0	0.33
SHA	0.77	0.42	0	1.00	0.97	0.00	0	1.00	0.43	0.50	0	1.00
Control												
LnTA	20.09	1.57	13.86	25.28	20.23	1.50	16.28	24.97	19.90	1.63	13.86	25.28
MTBV	1.46	2.81	−1.63	38.89	1.31	1.02	−0.15	11.56	1.72	3.68	−1.63	38.89
ICR	10.66	21.76	−97.68	97.78	10.94	20.05	−97.68	97.22	10.20	23.95	−81.94	97.78
SR	1.05	0.91	−7.72	8.30	1.09	0.79	−2.73	4.29	1.00	1.03	−7.72	8.30

Notes: Definitions of variables are as follows: HS: hedging status, LnNV: natural log of currency derivative notional value, FS/TS: ratio of foreign sales to total sales, LnTFCF: natural log of total foreign cash flows, TFCF/TA: ratio of total foreign cash flows to total assets, LnNFCF: natural log of net foreign cash flows, NFCF/TA: ratio of net foreign cash flows to total assets, SHA: Sharī'ah-compliant status, LnTA: natural log of total assets, MTBV: ratio of market to book value of equity, ICR: interest coverage ratio and SR: systematic risk

Ameer (2010) in the same market. Interestingly, the HS and NV values indicate that currency derivatives are more common in Sharīʿah-compliant (28% and 4.16) than Sharīʿah noncompliant observations (17% and 28). All forex exposure proxies indicate that Sharīʿah-compliant firms experience greater forex exposure than Sharīʿah noncompliant firms. This finding provides an early indication that the companies use currency derivatives for hedging purposes rather than for speculation (Allayannis and Ofek, 2001; Geczy *et al.*, 1997) since there is reasonable evidence of forex exposure. Meanwhile, values of the control variable suggest that companies in both Sharīʿah-compliant and noncompliant subsamples have similar characteristics [5].

Table 2 presents the Pearson correlation coefficients between the independent variables to identify possible multicollinearity. The highest correlations are between TFCF and NFCF and their respective ratios (TFCF/TA and NFCF/TA). These findings suggest they are alternative measures of the same construct and, thus, will not be tested in the same model to avoid multicollinearity issues. Other correlations are below the 0.5 cutoff point, including between TFCF and FS and NFCF and FS, which are slightly higher than the cutoff point. The results suggest these FCF-based variables and FS measure different facets of forex exposure.

4.2 Testing alternative measures of forex exposure

Panel A of Table 3 presents the logistic regression results of equation (3) using the FS ratio and the four alternatives of FCF-based measures. All estimated models exhibit goodness-of-fit as the Hosmer–Lemeshow and Wald test consistently generate $p > 0.05$ and $p < 0.01$, respectively. The Likelihood ratio always shows $p < 0.01$, indicating the models significantly explain HS. However, only Models I (FS ratio), II (LnTFCF) and IV (LnNFCF) generate Pseudo-R^2 scores within the 0.20–0.40 range (Hu *et al.*, 2006) and pass the receiver operating characteristic (ROC) criterion of 0.80–0.90 area under the curve. These models (I, II and IV) meet all diagnostic tests, suggesting FS ratio, LnTFCF and LnNFCF are reliable indicators of forex exposure. Between the two FCF-based measures, LnTFCF exhibits relatively better properties than LnNFCF.

Following the results in Panel A, we run system GMM of equation (4) with only FS ratio, LnTFCF and LnNFCF to represent forex exposure. As shown in Panel B of Table 3, all three models pass the diagnostic tests for GMM. The number of instruments is consistently less than the number of groups. The lagged dependent variable [NV/TA(−1)] is significant, and its coefficients are always less than 1.0. The insignificant AR(2) confirms the absence of a

Variable	FS/TS	LnTFCF	TFCF/TA	LnNFCF	NFCF/TA	SHA	LnTA	MTBV	ICR
LnTFCF	0.513	1.000							
TFCF/TA	0.403	0.470	1.000						
LnNFCF	0.547	0.942	0.466	1.000					
NFCF/TA	0.312	0.354	0.888	0.390	1.000				
SHA	0.076	0.048	0.076	0.072	0.076	1.000			
LnTA	0.232	0.341	0.023	0.329	−0.041	−0.008	1.000		
MTBV	−0.069	0.077	−0.028	0.045	−0.054	−0.105	0.084	1.000	
ICR	0.028	0.046	0.015	0.058	0.027	0.038	0.088	0.218	1.000
SR	0.014	0.059	0.015	0.061	−0.001	0.037	0.087	−0.060	−0.006

Note: For definitions of variables, refer to Table 1

Table 2.
Pearson correlations

Table 3.
Results of logistic regression and system GMM with alternative forex exposure specifications

	Panel A. Logistic regressions					Panel B. System GMM			
Variables	Model I	Model II	Model III	Model IV	Model V	Variables	Model I	Model II	Model IV
FS Ratio	0.025 *** (0.002) 1.025					FS Ratio	0.00004*** (0.000)		
LnTFCF		0.197*** (0.017) 1.218				LnTFCF		0.00031*** (0.000)	
TFCF/TA			2.244*** (0.322) 9.435						
LnNFCF				0.173*** (0.015) 1.189		LnNFCF			0.00026*** (0.000)
NFCF/TA					3.013*** (0.556) 20.344	NFCF/TA			
						NV/TA(−1)	0.702*** (0.005)	0.677*** (0.006)	0.686*** (0.006)
Diagnostic tests:									
Hosmer–Lemeshow	0.120	0.312	0.158	0.279	0.154	No. of Instruments	95	95	95
AUC-ROC curve	0.8172	0.8236	0.7811	0.8159	0.7769	No. of Groups	250	250	250
Pseudo R^2	0.2275	0.2469	0.1877	0.2332	0.1805	AR2	0.769	0.771	0.770
Likelihood Ratio (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	Hansen test	0.671	0.821	0.717
						Diff-in-Hansen test	0.645	0.682	0.689
						Wald test	0.000	0.000	0.000

Notes: For definitions of variables, refer to Table 1. In all models, N = 2,250 firm-year observations. In Panel A, the dependent variable is a binary variable HS, and figures in each cell correspond to the coefficient value, standard errors in parenthesis and odds ratio. In Panel B, the dependent variable is the notional value ratio (NV/TA), and figures in each cell correspond to the coefficients and standard errors in parenthesis. All estimated models include Shari'ah and all control variables, but the results are not reported since they are consistent with Table 4. AUC-ROC denotes Area Under the Receiver Operating Characteristic Curve. Asterisks ***, ** and * indicate significant at 1, 5 and 10% levels, respectively

second-order serial correlation. The Hansen and Difference-in-Hansen tests of over-identifying restrictions are insignificant, supporting the validity of instruments. The AR(2) and Hansen tests indicate the consistency of GMM estimators. Between the two models: LnTFCF and LnNFCF, the results are again in favor of LnTFCF.

Table 3 shows that FCF-based forex exposures and FS ratios have the same effect on financial hedging in all models. FS significance (Model I) in both panels substantiate its use as one of the most common forex exposure proxies (Abdul-Rahim *et al.*, 2017; Butt *et al.*, 2018; Vural-Yavas, 2016). The results gathered so far lead to the following conclusions. First, FCF-based variables, particularly TFCF and NFCF, are reliable measures of forex exposure, as does the FS ratio. Second, TFCF consistently prevails as a better measure of forex exposure than the FS ratio in predicting financial hedging. Third, FCF-based measures and FS ratios are likely to measure different aspects of forex exposure since they are significant and only moderately correlated. We test this proposition by including FS in the models containing FCF-based forex measures: LnTFCF and LnNFCF.

4.3 The effects of forex exposure and Sharīʿah-compliant status on financial hedging strategy

Table 4 presents results for *H1* and *H2* using logistic regression (Panel A) and system GMM (Panel B). All models fulfil the respective diagnostic tests. The results show, as hypothesized, forex exposure measured by FS and FCF indicators significantly and positively explains the hedging policy in both HS and NV/TA models. The significant FS and FCF-based forex exposure in these models validate our proposition that companies consider the two factors independently when deciding on their hedging policy.

Between the two measures of FCF-forex exposure, total foreign cash flows (LnTFCF) consistently show better results than net foreign cash flows (LnNFCF). This finding provides additional support to forward LnTFCF as the best measure for forex exposure. In Panel A, the odds ratios associated with LnTFCF and LnNFCF suggest that a unit increase in TFCF and NFCF increases their tendency to use currency derivatives by 1.16 and 1.13 times, respectively. Meanwhile, with an odds ratio of 1.01, firms with higher FS are nearly as likely to engage in currency derivatives as those firms with lower FS. System GMM models consistently indicate that firms with higher FS and total and net FCF-forex exposure significantly increase their position in currency derivatives. Consistent with the logistic regression results, LnTFCF gives the strongest effect than LnNFCF and FS ratio.

The FS result is consistent with Allayannis and Ofek (2001), Ameer (2010), Butt *et al.* (2018) and Vural-Yavas (2016), whereas the result of the NFCF is similar to the foreign debt ratio in Bae *et al.* (2018). Nonetheless, our results show that TFCF have more substantial effects on currency derivatives, supporting the argument that firms tend to hedge their foreign assets and debts since both contribute to their exposure to unexpected future forex rates. Overall, these results provide strong support for *H1* and the underinvestment theory, as explained by Froot *et al.* (1993). In the presence of external forces (forex exposure), firms engage in forex hedging to mitigate the uncertainty in their cash flows. The results also corroborate with currency derivatives used for hedging instead of speculation (Allayannis and Ofek, 2001; Geczy *et al.*, 1997).

Table 4 also shows the results on SHA. In Panel A, SHA is consistently significant and positive, suggesting that Sharīʿah-compliant firms use currency derivatives for hedging. This result contradicts *H2* that Sharīʿah-compliant firms would refrain from engaging in currency derivatives to avoid *riba'* and subsequently subdue the clientele effect. In Panel B, SHA is negative as hypothesized but insignificant in influencing the NV of currency derivatives. It suggests that companies limit their currency derivatives usage because most

Panel A. Logistic regression				Panel B. System GMM		
Variables	E(Sign)	Model I	Model II	Variables	Model I	Model II
FS Ratio	+	0.015***	0.016***	Foreign Sales (FS)	0.00002***	0.00003***
		(0.002)	(0.002)		(0.00007)	(0.00001)
		1.015	*1.016*			
LnTFCF	+	0.152***		LnTFCF	0.00020***	
		(0.018)			(0.00005)	
		1.164				
LnnFCF			0.124***	LnNFCF		0.00012**
			(0.017)			(0.00005)
			1.132			
SHA	−	0.373**	0.362**	SHA	−0.00055	−0.00021
		(0.154)	(0.154)		(0.00060)	(0.00060)
		1.452	1.437			
Control						
LnTA	+	0.502***	0.528***	LnTA	−0.00016	−0.00021
		(0.044)	(0.04)		(0.00016)	(0.00015)
		1.652	1.696			
MTBV	+	0.065***	0.072***	MTBV	0.00013***	0.00013***
		(0.019)	(0.019)		(0.00004)	(0.000039)
		1.067	1.075			
ICR	−	0.003	0.002	ICR	0.00003***	0.00003***
		(0.003)	(0.003)		(0.00001)	(0.00001)
		1.003	1.002			
SR	+	−0.225***	−0.214***	SR	−0.00041***	−0.00035**
		(0.074)	(0.074)		(0.00015)	(0.00016)
		0.798	0.807			
				NV/TA (−1)	0.69980***	0.69951***
					(0.00434)	(0.00421)
Diagnostic tests						
Hosmer and Lemeshow		0.671	0.624	No of Instruments	112	112
Area under ROC curve		0.839	0.832	No of Groups	250	250
Pseudo R^2		0.265	0.253	AR2	0.763	0.765
Likelihood Ratio (p-value)		0.000	0.000	Hansen test	0.929	0.904
				Diff-in-Hansen test	0.898	0.912
				Wald test	0.000	0.000

Table 4.
Results of logistic regression and system GMM

Notes: For definitions of variables, refer to Table 1. In all models, N = 2,250 firm-year observations. In Panel A, the dependent variable is a binary variable HS, and figures in each cell correspond to the coefficient value, standard errors in parenthesis and odds ratio. In Panel B, the dependent variable is the notional value ratio (NV/TA), and figures in each cell correspond to the coefficients and standard errors in parenthesis. ROC stands for the receiver operating characteristic. Asterisks ***, ** and * indicate significant at 1, 5 and 10% levels, respectively

of them are Sharīʿah-compliant firms that prefer the long-established conventional derivatives (Mohamad *et al.*, 2014). While the results marginally support *H2*, the finding necessitates close attention by the Shari'ah authorities on the use of currency derivatives among Sharīʿah-compliant companies in Malaysia. As discussed earlier, the practice could compromise the trust of their Muslim shareholders and stakeholders, particularly those from foreign countries. Overseas investors mostly rely on the guidelines and principles of the CIFA, Islamic Financial Services Board (IFSB) and Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI). These Islamic advisory bodies are typically stricter in complying with the *Shariah* rules as a key strategy in maintaining good

confidence in Islamic investment. The result in Panel B is consistent with the prediction in terms of the sign, had it been significant. It tends to imply that Sharīʿah-compliant firms are being attentive in using currency derivatives by limiting their use to the necessity (*dharurat*) of hedging forex exposure.

To illustrate how Sharīʿah-compliant and noncompliant firms behave toward forex exposure, we plot Figure 2, which presents the marginal effect of the SHA on the firms' hedging policy, given the level of forex exposure. The marginal effect profiles show that

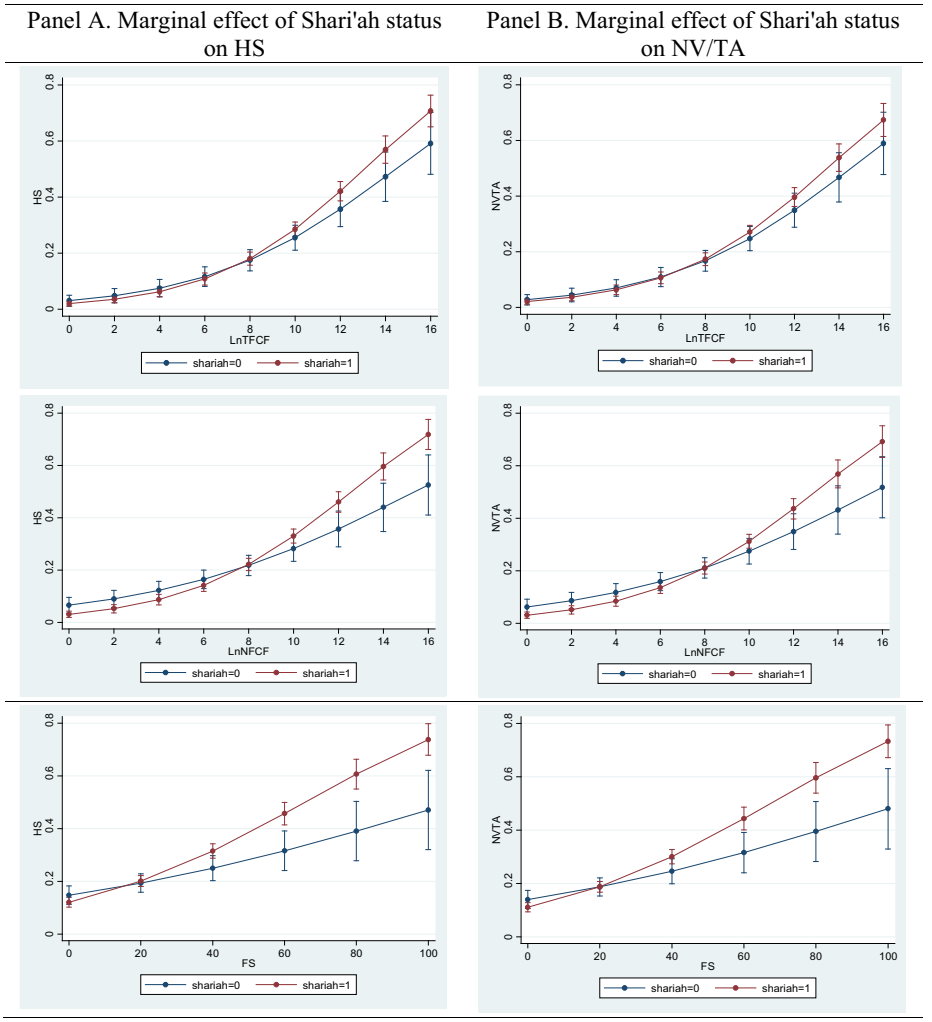

Figure 2.
Marginal effect of SHA on HS with forex exposure as basis

Notes: $N = 2{,}250$ firm-year observations. NV/TA is the ratio of the notional value of currency derivatives to total assets. FS is foreign sales ratio, TFCF is total foreign cash flows, NFCF is net foreign cash flows

Sharīʿah-compliant firms are consistently more responsive to both proxies of hedging policy than Sharīʿah noncompliant firms (dotted line). However, this notion is best represented by the behavior of the firms based on the total foreign cash flows (LnTFCF). Both groups of firms behave similarly to forex exposure until the level of exposure is considered high enough to be detrimental to the firms' cash flows, profitability and receivable value. Once forex exposure reaches that point, Sharīʿah-compliant firms respond more aggressively by using currency derivatives to manage their forex exposure. They tend to minimize their losses as the last resort dictated by extraordinary necessity (*dharurat*) that can be justified to their investors and stakeholders. In contrast, the lines representing FS and net foreign cash flows (LnNFCF) exhibit crossover points that suggest the firms behave differently depending on the levels of forex exposure. At lower levels of forex exposure, Sharīʿah noncompliant firms are more likely than Sharīʿah-compliant firms to engage in financial hedging. The reverse is true at a higher level of forex exposure. These observations are consistent regardless of hedging policy proxies.

The finding that Sharīʿah-compliant companies use conventional currency derivatives may suggest unwavering disregard of *riba'* in managing risks due to a lack of viable alternatives and lack of competency at the corporate governance level. Since this practice can compromise their SHA, we shed more explanations by interviewing top managers of three financial institutions (BNP Paribas, Kuwait Finance House and Malaysia Building Society Berhad). Interestingly, their responses corroborate Islamic bankers' opinions in Mohamad *et al.* (2014). Companies in Malaysia perceived Islamic derivatives to be less appealing because of the complexity associated with Arabic terms, lengthy procedures and more expensive than conventional derivatives (Saba *et al.*, 2021). Besides, there is no requirement for Sharīʿah-compliant firms to disclose whether or not the currency derivatives used are Sharīʿah-compliant. Kok *et al.* (2014). While Islamic derivatives have just begun their rapid development in Malaysia, challenges lie ahead in promoting Islamic derivative instruments (Sakti *et al.*, 2016). Islamic scholars have diverse opinions about the permissibility of Sharīʿah-compliant derivatives. Opponents of Sharīʿah-compliant derivatives view the products as *haraam* because they are superficial modifications of the conventional derivatives. The proponents agree that currency derivatives for hedging purposes are consistent with the Shari'ah prohibition of excessive risks (*gharar*). However, the limited capacity of the Islamic financial market and institutions to cater for the growing Islamic segment of the economy hinders the increasing demands for Islamically-compliant hedging instruments.

Finally, the results of the control variables in Table 4 are not always as theoretically predicted. Unlike previous studies (Bhagawan and Lukose, 2017; Butt *et al.*, 2018), we find the negative effect of size is more consistent with the behavior of Sharīʿah-compliant firms. While larger firms tend to use currency hedging, their SHA keeps their usage of currency derivatives for hedging purposes only. The significantly positive effect of MTBV is consistent with the underinvestment theory, which posits that growth opportunities increase the firms' tendency to use currency derivatives to stabilize cash flows. The ICR, the proxy for financial constrain or distress, gives contradicting results in that the healthier the firms, the greater the tendency to use currency derivatives. This finding implies a tendency to use currency derivatives for speculative purposes. However, SR results are perplexing as they contradict the expectation that currency derivatives are used to alleviate market risk. The results suggest that firms avoid using currency derivatives in volatile market conditions, possibly because it becomes more challenging for managers to predict movement in forex rates and hence, be held accountable for making an erroneous decision.

5. Conclusion

This paper examines the effect of FCF-based forex exposure and SHA on the hedging strategy of 250 nonfinancial listed firms in Malaysia between 2010 and 2018. The hedging strategy is measured with HS, which represents whether a company is a currency derivatives user or not and the ratio of currency derivatives NV/TA. These hedging strategy models are estimated using logistic panel regression and system GMM, respectively. The results consistently show that TFCF play a significant role in influencing the firm's hedging strategy. The results also reveal that Sharīʿah-compliant firms experiencing forex exposure would engage in currency derivatives as a matter of necessity, compared with Sharīʿah noncompliant firms.

Our findings substantially contribute to the existing literature related to direct forex exposure measurements based on complete data from 250 out of 875 nonfinancial companies listed on Bursa Malaysia during the study period. First, the findings support the MASB's decision to adopt FRS 7 and FRS 139, requiring listed firms to disclose their forex exposure and the strategies to mitigate the risks. Given the voluminous evidence on the direct impact of financial hedging on firm value, this finding strongly justifies imposing stricter rules on many listed companies that fail to disclose their foreign currency risk management. Specific measures are necessary to ensure the companies comply with the disclosure requirement. Second, the results regarding Sharīʿah-compliant companies using conventional currency derivatives warrant considerable attention to the existing Sharīʿah-compliant criteria, which appear to overlook the significance of *riba'* (*an-nashiya* and *al-fadhl*) rooted in these instruments. We call for Malaysia's Shari'ah regulatory bodies to be more explicit in prohibiting conventional currency derivatives and include them in the computation of the 5% maximum contribution of clearly prohibited activities. This move would help change the perception that the SAC is lenient and liberal toward Islamic financial policymaking, which is a setback for attracting Muslim investors from overseas. Sharīʿah-compliant companies will not deprive of the ability to manage their forex exposure because Sharīʿah-compliant currency derivatives are currently available. In addition, they need to be more diligent and transparent in reporting their foreign currency risk management.

The clientele effect hypothesis suggests that transparency would benefit companies seeking direct and portfolio investment from overseas Muslim investors. These investors typically follow the ruling of the Islamic finance regulatory bodies like the CIFA, IFSB and AAOIFI that prohibit conventional currency derivatives. In addition, Sharīʿah-compliant companies can also consider other strategies to manage forex exposure, including risk-sharing and operational diversifications. Finally, although this study offers some insights into the forex exposure management in a market that is primarily subject to the Shari'ah laws, its reliance on annual report data has been without limitations. For future studies, we suggest obtaining information from the top management of companies to uncover the missing details about their hedging strategy using Islamic vs nonIslamic currency derivatives. Future studies should also reexamine this current issue to verify the generalizability of the results in countries with substantial Islamic capital markets.

Notes

1. In this paper, we also use "forex exposure" to refer to OFE.
2. In a hadith narrated by Abu Hurairah, the Prophet s.a.w explained the seven gravest sins are "associating others with Allah (*shirk*), magic, killing a soul whom Allah has forbidden killing, except in cases dictated by Islamic law, consuming *riba'* (usury), consuming the property of

orphans, fleeing on the day of the march (to battlefield), and slandering chaste women who never even think of anything touching their chastity and are good believers."

3. From activities that are generally permissible or *maslahah* (public interest) but contain doubtful elements, the SAC limits the contribution to 20% of operating incomes. Debt ratio and cash and cash equivalents ratio are limited to 33%. Details of these Shari'ah compliance criteria can be accessed from the Resolutions of the SAC of the Securities Commission of Malaysia.
4. According to sections 31 and 32 of FRS 7 and section 37 of FRS 139, listed companies are required to disclose relevant information on foreign exchange risk including their business transactions with foreign countries denominating their cash flows, the hedging strategies and the notional amounts and fair values of derivative instruments.
5. About the foreign currencies denominating the companies' cash flows, 59% of the firms' foreign cash flows are denominated in US$, Singaporean dollar (5%) and Chinese renminbi and Hong Kong dollar (2% each). Among currency derivatives, forward is most popular (80%), whereas futures, swaps and options contribute about equally to the remaining 20%.

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