

## The Impact of Interest Rate Changes on the Islamic Foreign Exchange Forward in the Malaysian Derivative Market

*(Impak Perubahan Kadar Faedah ke Atas Pertukaran Asing Kehadapan Islam dalam Pasaran Derivatif di Malaysia)*

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### ABSTRACT

*Islamic foreign exchange forward plays a significant role to mitigate various foreign currency exchange risks. The main challenge that impedes the development and operation of the Islamic foreign exchange forward as a hedging instrument is the behaviour of relying on existing conventional framework with core conception of relying on interest rate and excessive risk taking. This study utilized monthly data from April 2004 to October 2017 of the Malaysian derivatives market. This study found that in the absence of an alternative profit-rate related benchmark and cross border activities, Islamic banks are constrained to use the interest rate benchmark. In the short run, both medium term (6-months) and longer term (12-months) tenures indicate faster speed of adjustment possibility due to higher trading volume and less demand for the medium term for the Islamic foreign exchange forward contract. It implies a need of the Islamic foreign exchange forward as a longer term hedging instrument and not for a short term speculation and risk-taking purposes, as prohibited by shariah.*

*Keywords: Islamic hedging; Islamic foreign exchange forward; risk management; Malaysia*

### ABSTRAK

*Pertukaran asing kehadapan Islam memainkan peranan penting untuk mengurangkan risiko pertukaran mata wang asing. Cabaran utama yang menghalang perkembangan dan operasi pertukaran asing kehadapan Islam sebagai instrumen lindung nilai adalah tingkah laku bergantung kepada kerangka konvensional sedia ada dengan konsep utama bergantung kepada kadar faedah dan pengambilan risiko yang berlebihan. Kajian ini menggunakan data bulanan dari April 2004 hingga Oktober 2017 dari pasaran derivatif Malaysia. Kajian ini mendapati bahawa jika tiada penanda aras berkaitan keuntungan dan aktiviti rentas sempadan alternatif, bank Islam dikekang menggunakan penanda aras kadar faedah. Dalam jangka masa pendek, tempoh jangka sederhana (6 bulan) dan tempoh jangka panjang (12 bulan) menunjukkan kelajuan pelarasan yang lebih pantas disebabkan oleh jumlah dagangan yang lebih tinggi dan permintaan yang kurang untuk jangka masa sederhana bagi kontrak hadapan pertukaran asing kehadapan Islam. Ia bermaksud keperluan pertukaran asing kehadapan Islam sebagai instrumen lindung nilai jangka panjang dan bukan untuk spekulasi jangka pendek dan tujuan mengambil risiko, seperti yang dilarang oleh shariah.*

*Kata kunci: Lindung nilai Islam; pertukaran asing Islam ke hadapan; pengurusan risiko; Malaysia*

### INTRODUCTION

Islamic finance has experienced a rapid expansion in terms of cross border activities and has a broad range of financial products in the financial market. The cross border activities and wide acceptance of its financial products have allowed Islamic finance to integrate with international financial markets. The fundamental in Islamic finance requires financial transactions to be supported by real economic activities that add economic value and encourages risks sharing. The inception of financial technologies have amplified the risks endured by Islamic banks as an important component of value creation in Islamic finance.

Traditional focus on intermediation theory, such as transaction costs and asymmetric information, are less relevant in explaining the development of the banks as intermediaries (Allen & Santomero 1997; Holmstrom & Tirole 2000). Banks should focus on the issues of risk trading, risk management and participation costs as significant factors for the existence of modern intermediaries. These transformations entail different risks thus raising the issue of risk management in the

financial intermediation. The emergence of new financial instruments and development of information technologies have resulted in the changing roles of Islamic banks. Technological advancement has substantially reduced the cost of information and minimized informational asymmetry but keeps the demand for financial services increasing (Allen & Santomero 1997, 2001; Scholten & Wensveen 2000, 2003; & Genberg 2007). The impressive growth track of Islamic banking and cross border transactions have created high expectations from stakeholders. It has compelled the major players of the banking industry to provide competitive risk management instruments, such as the Islamic foreign exchange forward contract that are *Shariah* compliant and able to create values. However, the main challenge that impedes existing risk management instruments in the financial market, is the behaviour of relying on existing conventional instruments that draw the core conception based on interest and excessive risk taking.

In Malaysia, the banks operate in a dual banking system. Conventional and Islamic banks co-exist. The growing demand of Islamic risk management instruments can be witnessed by the increasing average volume foreign exchange forward transactions (BNM 2017). Consequently, it proves the importance of foreign exchange forward as one hedging instrument against the volatility of foreign exchange. The forward markets of foreign exchange have been highly developed by commercial banks and investment banks in foreign exchange trading and widely used to hedge foreign exchange risks and exposure. Malaysia has experienced various economic crises since 1967 and various measures have been undertaken in managing the foreign exchange risks. These milestones indicate that Malaysia's foreign exchange forward markets is more matured, structured and well developed. This is also in line with the statistic by Bank Negara Malaysia (BNM), on the significant milestones in the Malaysian foreign exchange market for the past years. Malaysia has adopted a managed float for the Ringgit (MYR) exchange rate in July 2005. A managed float regime means the country's central bank would occasionally intervene to affect the country's exchange rates. The purpose of the intervention is to act as a buffer against an external economic distress before its effects become truly disruptive to the domestic economy. In the conventional market, the foreign exchange forward rate is determined by the foreign exchange spot and foreign exchange swap point. The foreign exchange swap point's calculation formula is based on the interest rate and foreign exchange spot rate.

According to the industry practice, Islamic banks use the same pricing formula for foreign exchange forward rates as being used by the conventional banks. The formula uses interest rate as a benchmark in the calculation of foreign exchange swap points for a certain specific tenure. Sheikh Nizam Yaqubi and Sheikh Muhammad Taqi Usmani opined through its 1998 fatwa that the true Islamic banks and financial institutions must be free from using interest rates as benchmark (Al-Habsi 1994).

This is because it is not desirable to use the interest rates for *halal* transactions and it does not advance the basic philosophy of Islamic economy having no impact on the system of distribution. The Islamic scholars encourage the Islamic financial institutions to strive for developing its own benchmark by creating own interbank market based on Islamic principles (Meera, Kamel & Razak 2005). According to Faisal (2016), there are a few elements that are not considered as *Shariah* compliant. One of the elements is the interest rates mechanism. His arguments are based on the inappropriateness of using the interest rate for *halal* transactions. One of the critics is Islamic banks tend to benchmark against conventional interest rates in the pricing of their products (Sukmana & Ibrahim 2017).

Nevertheless, Islamic banks have been using the foreign exchange swap point as one of the components to compute the Islamic foreign exchange forward price. The interest rate differential is the basis of getting the foreign exchange swap point. The questions that arise are: To what extent does the change in interest rate affect Islamic foreign exchange forward price in the Malaysia derivative market? Can the Islamic foreign exchange forward be an alternative hedging instrument in the Islamic derivative market? The volume for foreign exchange forward transactions in Malaysia has increased in the past years as indicated by Bank Negara Malaysia (BNM 2016). Thus, the Islamic foreign exchange forward not only fulfils the needs for a *Shariah* compliant product but beyond. This study aims to provide empirical evidence on the impact of interest rate changes on the Islamic foreign exchange forward in the Malaysian derivative market. The expected findings are important as inputs to analyse the actual market behaviour and provide information to the market agents and relevant authorities. The remaining of this paper is presented as follows. Section 2 presents a review of the literature. Section 3 provides the data collection procedures and methodology used in the study. Next, section 4 discusses the findings of the study. Finally, section 5 concludes.

## LITERATURE REVIEW

Technically, foreign exchange risk is a financial risk that occurs when a financial transaction is denominated in a currency other than the base currency (Reviews 2016). Forward foreign exchange transaction is a hedging tool used in the market for financial risk mitigation. Hedging is an option to mitigate the risks that arise from the foreign exchange transactions. It is an instrument to fulfil modern financial requirements of individuals and business for financial risk management.

In Malaysia, a dual banking system provides different financial risk mechanisms in the derivative market. The conventional banking system uses the foreign exchange forward contract while Islamic banking utilises the foreign exchange forward promise. Technically, promise or

*wa'd* is permissible but it is not a contract. The *Shariah* principles allows an exchange of money to be taken place immediately but not for the future, unless it is merely a promise. The *Shariah* Advisory Council of Bank Negara Malaysia has approved the currency exchange up to two business days or on the spot. Unlike the foreign exchange forward transaction, the exchange or money settlement which takes place in the future and this contravenes the *Shariah* principles. For Islamic banking, the foreign exchange forward transaction must be executed using the *wa'd* (promise) concept based on the *Shariah* principles. It is executed on an agreed future date, whereby the parties to the transaction promise to buy from or sell to the other counterparty a specific currency at an agreed exchange rate and settlement date (SAC 2010).

#### THE FOREIGN CURRENCY EXCHANGE FROM ISLAMIC PERSPECTIVE

Foreign currency exchange is a process of exchange of one currency against another currency at an agreed rate and to be delivered at a certain agreed date. Technically, it is a sale of money for money (*bay'al-sarf*). In the Islamic financial system, money is merely a medium of exchange, which is categorized as a *ribawi* item. An exchange of money including the foreign exchange currency transaction is subjected to certain rulings of *ribawi* items. The basic rule and condition of *bay'al-sarf* is the parties to the foreign currency exchange contract must take possession of the exchanged currency at the time of conclusion of the contract. In other words the currency must be exchanged and completed in the same session that the contract is concluded.

The foreign exchange forward transaction is one of the financial instruments for hedging in managing the foreign exchange risk. Generally, based on the Accounting and Auditing Organization of Islamic Financial Institution (AAOIFI) *Shariah* Standard 1: Trading of currencies 2/2:

It is prohibited to enter any forward contracts. This rule applies whether such con-tracts are affected through the exchange deferred transfers of debt or through the execution of a deferred contract in which the concurrent possession of both of the counter values by both parties does not take place.

However, entering a foreign exchange forward transaction based on *Wa'd* is allowable. The Islamic foreign exchange forward is a unilateral contract between two parties, where the first party promises with the second party to buy or sell currency for settlement on a forward value date at the rate and amount determined today (Dusuki 2011). This is in line with the provision of AAOIFI *Shariah* Standard 1: Trading of currencies 2/9 (a):

Bilateral promise to purchase and sell currencies: a) A bilateral promise to purchase and sell currencies is forbidden if the promise is binding, even for the purpose of hedging against currency devaluation risk. However a promise from one party is permissible even if the promise is binding.

It is permissible to manage tolerable risks through hedging and comply with the *Shariah* legal maxims of '*al-ghunm bi-alghurm* (the entitlement of gain must be accompanied by responsibility for loss), free from the element of excessive *gharar* (uncertainties) and the underlying contracts must be based on the *Shariah* principle (Agha & Sabirzyanov 2015).

In Islamic finance, *Bay'al sarf* is referred to a foreign exchange spot transaction. It allows a delivery and settlement of an exchange to take place in two working days after a deal date (BNM 2016). In summary, the types of foreign exchange transactions are based on its valuation date and can be classified into four types, namely; Value Today – the deal date and settlement date is on the same day (T). 'T' represents today; Value Tomorrow – the deal date is today but the settlement date is on the next day (T+1); Value Spot – the deal date is today but the settlement date is on the following two business days from the deal date (T+2); Value Forward – the deal date is today but the settlement date only take place on a future agreed date, for example one month from the spot date.

In the foreign exchange market, the foreign exchange rates of all currencies in the world are paired with the USD. The foreign exchange rate (or price) is quoted in both ways, bid and offer (asking price). Currently, most of the local Islamic banks adopt the *wa'd mulzim* or unilateral binding, for the foreign exchange forward transaction. Unilateral binding means only the promisor is bound to fulfil the promise (Ahmad et. al. 2012). There are many similarities in the characteristics of the foreign exchange forward for both Islamic and conventional hedging instruments including its pricing method. The only difference is the foreign exchange forward transaction is a contract whilst the Islamic foreign exchange forward transaction is a promise (*wa'd*).

Theoretically, the theory of purchasing power parity denotes that exchange rates between currencies are in equilibrium when their purchasing power is the same in each of the two countries. When inflation rate of one country rises relative to that another country, the increase in import and decrease in export would depress the country's currency (Inyiama & Ekwe 2014). Generally, when imports are higher than exports, the home country has to buy more foreign currency to meet the payment and at the same time receive less export proceeds and income. The basis of this theory is the exchange rates between any two currencies would be adjusted to reflect changes in the price levels of the two currencies. It applies the law of one price. The law of one price indicates that if two countries produce identical goods, transportation costs and trade barriers are very low, the price of the good should be the same throughout the world no matter which country produces it (Mishkin 2007). The theory of Purchasing Power Parity suggests that the long run equilibrium level of the exchange rate should be equal to a ratio of a domestic to a foreign price level (Azali, Habibullah & Baharumshah 2001).

The difference between the forward rate and the spot rate for a particular currency pair is expressed in pips and it is known as swap points. The Interest Rate Parity Theory states that the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate of the particular currency pair. For instance, if investors can obtain higher risk-free interest rate in one currency, for example Malaysian Ringgit (MYR) than the other pair of currency (USD), MYR will be changed at a higher future price (foreign exchange forward rate) than the current price (foreign exchange spot rate) (Ebiringa & Anyaogu 2014). However, a parity or equality does not always happen. Thus, when there are interest rates differential between two countries, it encourages the currency carry trade transaction. A currency carry trade refers to strategy in which an investor sells a certain currency with a relatively low interest rate and uses the funds to purchase a different currency yielding a higher interest rate.

In the market, Islamic and conventional banking apply a similar pricing formulation to determine the foreign exchange forward price. It derives from a foreign exchange spot rate plus or minus a foreign exchange swap point. The foreign exchange swap points are translation of interest rates differentials between two countries. The foreign exchange swap points are also quoted in both bid and offer. A swap point can be either at premium or at discount. A premium swap indicates that the foreign exchange forward rate is higher than a foreign exchange spot rate. It also indicates that interest rate of the local currency is higher than the interest rate of the base currency. A discount swap indicates the opposite to the premium swap. It indicates that the interest rate of the quoted currency is lower than the interest rates quoted currency. If the foreign exchange swap points are premium, it will be added to the prevailing foreign exchange spot rates to derive the foreign exchange forward rate. If the swap points are at discount, to derive the foreign exchange forward rate, the swap points will be deducted from the foreign exchange spot rates. If there is no interest rate differential between the currencies, the foreign exchange forward rates is near to the foreign exchange spot rates or both rates are traded at par. Meaning, the foreign exchange spot and foreign exchange forward rate is the same rate.

In a nutshell, there a strand of previous studies, such as Mohamad and Tabatabaei (2008) presented on instrument method for hedging instrument; Aripin (2010), Bello (2012) and Ahmad, Yaacob and Zain (2014) debated on the Islamic principles for foreign exchange forward; and Faisal (2016) discussed on different types of risk management and hedging instruments in the Islamic commodity markets. Nevertheless, these studies have focused more on the *Shariah* issues for the foreign exchange transaction as hedging instruments rather than an empirical study. Therefore, this study seeks to provide empirical evidence on the market behaviour of Islamic foreign exchange forward.

## METHODOLOGY

This study made use of monthly data from April 2004 to October 2017 of the Malaysian derivatives market. The data set was obtained from the Bloomberg Terminal and the Department of Statistics. The study used the foreign exchange swap point, a translation of interest rates differential between two currencies as the dependent variable. The foreign exchange swap point is a number of basis points or pips, added to or subtracted from the current spot rate of a currency to determine the forward rate for delivery on a specific value date. When a point is added to a spot rate, it is called a forward premium. Whilst, a subtraction from a spot rate is referred as a forward discount depending on whether the interest rate for a base currency is higher or lower than that for a quoted currency. The data set used in the study showed that all the USD/MYR foreign exchange swap points were at premium. The interest rate of based currency (US Federal Rate) is lower than interest rate of quoted currency (Overnight Policy Rate of Malaysia). In other words, the Malaysian Ringgit is traded at premium against the USD.

Theoretically, the foreign exchange rates are determined by the supply and demand of the currencies by various factors (Mirchandani 2013; Inyama & Ekwe 2014). The present study aimed to gauge the impact of interest rate changes on the Islamic foreign exchange forward. Table 1 presents the descriptions of the variables used in the study. The dependent variable was the foreign exchange swap point that is the difference between the foreign exchange forward rate and the foreign exchange spot rate. It was determined by the interest rate differential between the countries of the currency pair. The values of the foreign exchange swap points were for 1-month, 6-months and 12-months. The independent variables were; interest rates represented by Kuala Lumpur Interbank Offered Rate (KLIBOR) for 1-month, 6 months and 12-months. It is an official indicator of the conditions in the interbank money market. The rates that the KLIBOR submitters quote for KLIBOR setting indicate the rates at which they are willing to lend ringgit funds for the relevant tenors to KLIBOR submitters and are mainly used as reference for other products such as the floating leg of interest rate swaps, options, futures and structured products. It is a tool deployed by Bank Negara Malaysia as the target for day-to-day liquidity operations and to the signal monetary policy stance (Mohd Yusof, Usman & Mahfudz 2017). In addition, the study included common macroeconomic factors (Ramasamy & Abar 2015; Aftab 2015; and Patel et al. 2014) that affect the foreign exchange transactions, namely; a foreign exchange spot rate for USD against MYR. It is the current exchange rate at which a currency pair could be bought or sold. There are previous studies that relates to the foreign exchange forward rates behaviour. It is believed that the foreign exchange forward rates act as an indicator of the future spot rate and affect speculators' positions, which in turn affect the implied relative riskiness of the marginal purchases of domestic

and foreign assets (Carlson & Osler 1999). Balance of payment measures the difference between the movement of merchandise trade leaving a country (exports) and entering a country (imports). This measure tracks the value of the merchandise trade balance. The Balance of Trade Theory works on the current account, which deals with the trade of goods that indirectly give a clue on the direction of exchange rate. In other words, the balance of trade affects the currency exchange rates through its effect on the supply and demand for foreign exchange. The Consumer Price Index provides information on average price changes reflecting the value of the home currency (in this study the currency referred to is MYR), to find its purchasing power (Brown 2005).

This study employed the ARDL approach to co-integration. The ARDL models examine the co-integrating relationships between variables through the work done by Pesaran and Shin (Pesaran & Shin 1998; Pesaran,

Shin & Smith 2001). The models are applicable for the data series that are stationary and integrated to the same orders. The ARDL bounds testing is used when the series are integrated of different orders. In other words some series are a combination of variables that are stationary at level  $I[0]$ , some at  $I[1]$  fractionally integrated. However the ARDL bound model can be used for all the cases as long as none of the series is beyond  $I[0]$ , or at 2nd difference  $I[2]$  (Pesaran & Shin 1998). The bound test is a test for co-integration between series that integrated of different orders less than  $I[2]$ . The ARDL bounds testing method encompasses testing for co-integration and deriving the error correction model and the long run coefficient next (Osuji 2015). The ARDL bounds test is based on the assumption all variables in the series are  $I[0]$  or  $I[1]$ . The orders of the lags in the ARDL model are selected by the Schwarz Criterion (Pesaran & Shin 1998).

TABLE 1. Definition and interpretation of variables

Bil.	Variables	Mnemonic	Definition
1.	Dependent Variables	lswap-1m lswap-6m lswap-12m	Foreign Exchange Swap Point or Foreign Exchange Forward point is the different between Foreign Exchange Forward rate and Foreign Exchange Spot Rate. The values were determined by interest rate differential between the countries of the currency pair (USD/MYR Pips or FX Swap Points) for 1-month, 6-months and 12-months.
2.	Independent Variables	klibor-1m klibor-6m klibor-12m	The interest rates represented by the Kuala Lumpur Interbank Offered Rate (KLIBOR) submitters quote for that indicate the willingness rates to lend ringgit funds for the relevant tenors (1-month, 6-months and 12-months) to KLIBOR submitters.
3.		lspot	Foreign Exchange Spot rates of USD/MYR represented by an exchange rate for USD against MYR. The base currency was USD (1 USD equivalent to the MYR). The values of the foreign exchange spot rates were the closing rate of USD/MYR at the end of each month starting from April 2004 until October 2017.
4.		ltradebal	The international trade balance measures the difference between the movement of merchandise trade leaving a country (exports) and entering a country (imports). This measure tracks the value of the merchandise trade balance in the MYR (Billion)
5.		lcp	Inflation rates represented by the Consumer prices (CPI) index. It is a measure of prices paid by consumers for a market basket of consumer goods and services.

## RESULTS

This study empirically analysed the impact of interest rate changes on the Islamic foreign exchange forward rate in the Malaysian derivative market. This study used monthly data from April 2004 to October 2017 which were obtained from the Bloomberg Terminal and the Department of Statistics. The study used three difference maturities of the Foreign exchange swap point and KLIBOR of 1-month, 6-months and 12-months to gauge the impact of the time dimension differences.

Table 2 presents the descriptive statistics of the data sets. The findings showed that all variables were not normally distributed. Table 3 shows the statistical output

for unit root test using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests with trend. The null hypothesis states all variables have a unit root or non-stationary. If the null hypothesis is rejected, the series is stationary and has a unit root. Based on the ADF test, the results depicted that most of the variables were non-stationary at level  $I[0]$  but stationary at first difference  $I[1]$ . The natural logarithm of trade balance and the natural logarithm of consumer price index were stationary at level  $I[0]$  but with significant levels of 1% and 5%, respectively. For consistency, the study used the Phillips-Perron test to test the stationarity for all variables. The results showed a consistency of stationarity for all variables used in the Models, except for the natural logarithm of the consumer

TABLE 2. Descriptive statistics

	lswap 1m	lswap 6m	lswap 12m	klibor 1m	klibor 6m	klibor 12m	lspot	ltradebal	lswap
Mean	3.9483	5.6319	6.1960	1.1001	1.17058	1.1991	1.2506	2.0342	4.6498
Max	4.7004	6.2722	6.8189	1.2837	1.3686	1.3812	1.5011	2.7581	4.7899
Min	0.6931	2.0794	1.6094	0.7371	0.7419	0.7323	1.0855	0.0392	4.4379
Std. Dev.	0.7056	0.6803	0.7349	0.1438	0.1655	0.1643	0.1224	0.4494	0.0883
JB	1331.8	429.32	975.05	53.460	37.156	56.178	11.979	199.90	9.0812
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000	0.0106

TABLE 3. Statistical output for unit root test

	Level		First Difference	
	Dickey-Fuller	Phillips-Perron	Dickey-Fuller	Phillips-Perron
lswap-1m	0.8372	-3.1482	-9.7278*	-4.3883*
lswap-6m	-3.7963	-3.1507	-7.7010*	-7.4973*
lswap-12m	-1.0957	-3.1505	-4.3101*	-4.3101*
klibor-1m	-2.2388	-2.2424	-8.2571*	-8.3898*
klibor-6m	-2.4015	-2.2708	-7.4823*	-7.4433*
klibor-12m	-2.5756	-2.3563	-7.1471*	-7.1291*
lspot	-1.0807	-1.0952	-12.512*	-12.514*
ltradebal	-5.5342*	-9.7701*	-0.5033*	-0.7008*
lapi	-3.9117**	-2.7640	-8.8753*	-8.4775*

(Symbols of \* $p < .01$ , \*\* $p < .05$ , \*\*\* $p < .10$ ).

All variables are in natural logarithms.

price index which was stationary at first difference [I]. In conclusion, some series were stationary at level I[0], some at I[1] fractionally integrated. Pesaran and Shin (1998) suggested that the ARDL bound model can be used for all the cases as long as none of the series is beyond I[0], or at 2nd difference I[2].

Table 4 presents the statistical results for the Bound test. The study applied the F-Statistics for co-integration test or Bounds test of the three models. The study used the Schwarz criterion as optimal lag selection criteria for all models. The estimations were based on three different maturities of the Islamic foreign exchange forward price and KLIBOR rates of 1-month, 6-months and 12-months.

The test statistics of the F-statistics 9.5573, 8.6782 and 33.1767 exceeded the upper critical bounds which confirmed co-integration at the 1% level for Model 1, 2 and 3, respectively. These results implied that we can reject the null hypothesis as there was no equilibrating relationship. It can be concluded that there were long run relationship among the series for the three models of different maturities.

The study further examined the marginal impacts of changes in the KLIBOR rate, Foreign Exchange Spot rate, Balance of Trade and Inflation on the Islamic foreign exchange forward price in the long run.

TABLE 4. Statistical output for Bounds test

Model Estimation	F-Statistics	Lag Length	Significance Level	Bound Critical Values (Unrestricted intercept and no trend)	
				I[0] (Lower Bound Value)	I[1] (Upper Bound Value)
Model 1	9.5573*	4	10%	2.45	3.52
Model 2	8.6782*	4	5%	2.86	4.01
Model 3	33.1767*	4	1%	3.74	5.06

Symbols of \* $p < .01$ , \*\* $p < .05$ , \*\*\* $p < .10$ .

Critical value bounds are computed by surface response procedure developed by Pesaran, Shin & Smith (2001).

Table 5 presents the regression results of the Model 1, Model 2 and Model 3. The findings showed that the interest rate changes caused a negative impact to the Islamic foreign exchange forward price in the long run. However, the result indicated that only the medium (6-months) and long term (12-months) tenures were significant at the 10% and 1%, respectively. These results are consistent with Mirchandani (2013) who observed a

significant and negative impact of interest rate change on the foreign exchange forward price. In addition, the foreign exchange spot rate and trade balance impacted the Islamic foreign exchange forward price was negative and significant in the long run for all models. Whilst, the Consumer Price Index had a positive impact on the Islamic foreign exchange forward price in the long run and significant the at 1% level for all tenures.

TABLE 5. Long run models

Variables	Model 1 lswap-1m	Model 2 lswap-6m	Model 3 lswap-12m
Constant	-19.3128 (9.5573)	-28.6058 (5.9463)	-30.4249 (3.5992)
lklibor-1m	-0.8860 (0.6183)	-	-
lklibor-6m	-	-1.2309*** (0.6525)	-
lklibor-12m	-	-	-1.4328* (0.4409)
lspot	-1.1617*** (0.6697)	-2.1406* (0.6260)	-2.1190* (0.4197)
ltradebal	-0.4150*** (0.2162)	-0.1923 (0.1901)	-0.2296*** (0.1316)
lcpi	5.7523* (1.0572)	8.3285* (1.4597)	8.9024* (0.8791)
R <sup>2</sup>	0.7526	0.8979	0.8750
Adjusted R <sup>2</sup>	0.7331	0.8888	0.8640

Symbols of \*p < .01, \*\*p < .05, \*\*\*p < .10.

TABLE 6. Short run models

Variables	Model 1 $\Delta$ lswap-1m	Model 2 $\Delta$ lswap-6m	Model 3 $\Delta$ lswap-12m
Constant	-8.2937 (-2.1927)	-6.7322 (-1.2315)	-14.131 (-1.7155)
$\Delta$ lklibor-1m	0.4942 (-0.9662)	-	-
$\Delta$ lklibor-6m	-	1.7689*** (-0.9561)	-
$\Delta$ lklibor-12m	-	-	2.7344*** (-1.3861)
$\Delta$ lspot	-1.8977 (-1.4519)	-2.6794* -0.6646	-2.4045* -0.9069
$\Delta$ ltradebal	-0.0774 (-0.0778)	-0.0121 (-0.0362)	-0.0708 (-0.0489)
$\Delta$ lcpi	-40.9898* (-6.7134)	-1.9653 (-4.5912)	-5.8532 (-6.3054)
ECT <sub>t-1</sub>	-0.4294* (-0.0631)	-0.2353* (-0.0461)	-0.4439* (-0.0430)
R <sup>2</sup>	0.4186	0.4181	0.6508
Adjusted R <sup>2</sup>	0.3727	0.3662	0.6232

Symbols of \*p < .05, \*\*p < .0, \*\*\*p < .10.

Standard Error are in parentheses.

Table 6 explains the short run estimates. The error correction term ( $ECT_{t-1}$ ) values for Model 1, Model 2 and Model 3 were -0.4294, -0.2353 and -0.4439, respectively. The negative and significant speed of adjustment values indicate that shocks in the short run were corrected by 42.94%, 23.53% and 44.40% monthly towards the long run equilibrium for each model. The  $ECT_{t-1}$  for shorter tenure (1-month) and longer tenure (12-months) is faster possibly due to the high volume of the Islamic foreign exchange forward promise for such tenures and less demand for the medium-term foreign exchange forward promise in the derivative market.

In conclusion, technically, the Islamic foreign exchange forward price mirrored conventional banking in determining a foreign exchange forward contract. The dependency of the Islamic foreign exchange price on the interest rate (KLIBOR rates of different maturities) changes is evident from the findings. However, the limitation is the foreign exchange forward price not only takes into account the interest rate of one country but also the other country's currency pair, which may not have an Islamic interbank rates framework. In the absence of an alternative profit-rate related benchmark, Islamic banks

are constrained to use the interest-rate related benchmark (Dusuki 2009). The result showed that the interest rate was significantly affects the Islamic foreign exchange forward price in the long run impact for the medium and long term tenure. The use of conventional methods on deriving the Islamic foreign exchange forward price is crucial in the absence of the non interest-rate related benchmark. A possible alternative for Islamic banks is to utilize the Islamic interbank rates (KLIRR) introduced by Bank Negara Malaysia. The utilization of the Islamic interbank rates can differentiate Islamic banks activities. In the absence of an alternative profit-rate related benchmark, Islamic banks are constrained to use the interest-rate related benchmark. Nevertheless, Islamic banks are exposed to the risks of market volatility and fluctuation either in the currency market or the interest rate market (Dusuki 2009). Therefore, this will automatically expose the income, expenditure and value of assets of Islamic banks to the interest rate risks. There is a need to mitigate financial risks to ensure its competitiveness, viability and sustainability. The models passed the diagnostic tests of serial correlation, normality, heteroscedasticity and Ramsey RESET as indicated in Table 7.

TABLE 7. Results of diagnostic testing

	Serial Correlation LM Test	Normality Test (Jarque Bera)	Breusch-Pagan Test	Ramsey RESET Test
Model1	1.4296 (0.1753)	2.8916 (0.2355)	0.8108 (0.6186)	1.7466 (0.1668)
Model 2	0.6123 (0.3477)	4.0061 (0.1349)	1.0195 (0.4316)	0.6023 (0.5511)
Model 3	0.2267 (0.6726)	0.0499 (0.9753)	1.0967 (0.3589)	0.2975 (0.7438)

Symbols of \* $p < .01$ , \*\* $p < .05$ , \*\*\* $p < .10$ .  
P-values are in parentheses.

The serial correlation LM test showed an insignificant p-value at the 5 percent significance level and it failed to reject the null hypothesis. The normality of error term in the series of residual was showed insignificant at the 5 percent significance level. The error terms in the series of residual were normally distributed. The Breusch-Pagan test was conducted in order to examine whether the variance of the errors from a regression is dependent on the values of the independent variables. The results showed an insignificant result with the p-values of the chi-square being more than the significance level of the 5 percent. There was no heteroscedasticity present in data sets. The models have passed the specification test of the Ramsey RESET Test.

The stability of the long run parameters was checked using the CUSUM test. The findings confirmed the stability of the long run parameters. The plots of the residuals were in between the 5 percent critical bounds for Model 1, Model 2 and Model 3 even though, there was a slight deviation between the year 2010 to 2011 in the Model

3. There was no structural break after further test was conducted using the Chow test as suggested by Islam, Shahbaz, Ahmed and Alam (2013).

## CONCLUSION

This study empirically examined the impact of changes in the interest rate on the Islamic foreign exchange forward price in the short run and long run. The study aimed to gauge the impact of interest rate changes on the Islamic foreign exchange forward price for different tenures; short term (1-month), medium term (6-months) and long term (12-months). Additionally, the study incorporated macroeconomics variables in the models as control variables; namely, foreign exchange spot rate, balance of trade and consumer price index. This study used monthly data from April 2004 to October 2017. The data set was obtained from the Bloomberg Terminal and the Department of Statistic, Malaysia. The study



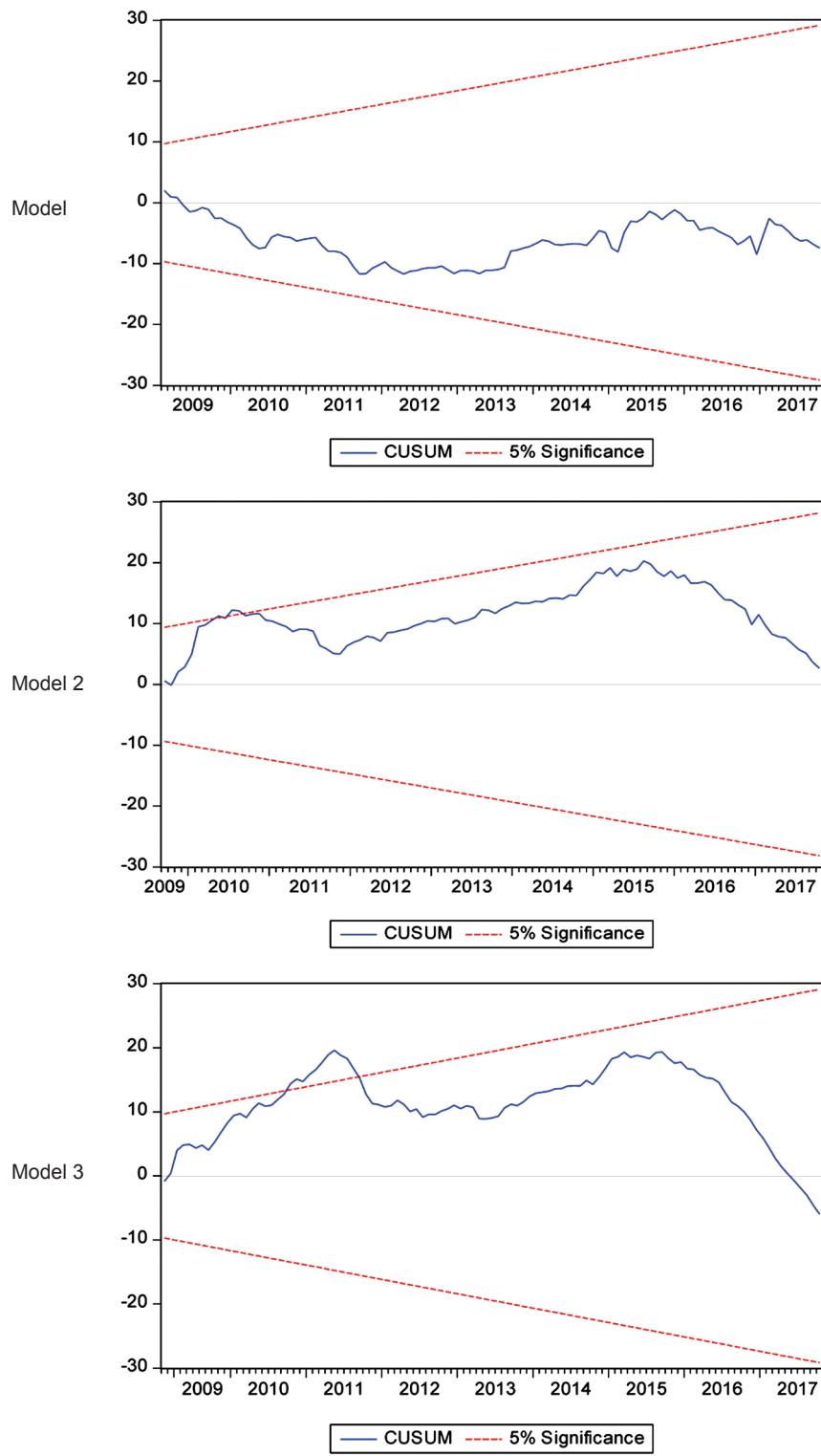


FIGURE 1. Recursive least square of CUSUM test

found that the changes in the interest rate had impacted the Islamic foreign exchange forward price in the short and long run. However, in the long run estimation model changes in the interest rates affected the Islamic foreign exchange forward prices significantly negative for the medium tenure (6-months) and longer tenure (12-month). In the short run estimation models, the shorter tenure

(1-month) and longer tenure (12-months) indicated a faster speed of adjustment possibly due to higher volume trading and less demand for medium term of the Islamic foreign exchange forward contracts. It implies the need for the Islamic foreign exchange forward contract as a longer term hedging instrument and not for a short term speculation and risk taking purposes, as prohibited by

*Shariah*. In the absence of an alternative profit-rate related benchmark, Islamic banks are constrained to use the interest rate related benchmark (Dusuki 2009). However, Bank Negara Malaysia has put efforts to introduce Islamic Interbank Rates (KLIRR) that can be used as the base rate. The main challenge that impedes the development and operation of the Islamic foreign exchange forward contract as a hedging instrument, is reliance on the existing conventional framework with a core conception based on interest rate and excessive risk taking which are prohibited in Islam. Finally, the propositions developed in this study have some limitations. The availability of information in representation of the Islamic foreign exchange swap points to determine the Islamic foreign exchange forward price was limited. Most of the previous studies done were merely theoretical and conceptual basis rather than collecting empirical evidence from the market.

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