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# Interest Rate, Exchange Rate, and Stock Prices of Islamic Banks: A Panel Data Analysis

Aishahton Ayub<sup>1</sup> and Mansur Masih<sup>2</sup>

## ABSTRACT

Understanding the empirical relationship between the exchange rates, interest rates and stock prices are important and useful to the policy makers, professional investors and academics. Although the scholars and practitioners have studied the subject extensively, few empirical studies are available in the context of the Islamic banking stock prices. In this paper, we make an humble attempt to fill in this gap in the empirical literature of Islamic banking, in particular. We use panel cointegration and panel vector error-correction (VECM) model to examine the existence and direction of the causal relationship between exchange rate, interest rate and Islamic banking sector stock prices using monthly data over the last five years. The VECM is employed to discern the short-run and long-run Granger causality by applying the dynamic Generalized Method of Moments (dynamic GMM). For 40 Islamic banks, the empirical results tend to indicate that the Islamic bank stock prices have negative significant relationship with the exchange rates but no significant relationship with the interest rates. In addition, we found that there exists a bidirectional Granger-causal relationship between the Islamic bank stock prices and exchange rates. This finding tends to suggest that this significant relationship between the exchange rates and Islamic bank stock prices should be borne in mind by the policy makers while formulating their policies.

**Keywords:** Exchange rate; Interest rate; Islamic bank stock prices; panel cointegration; panel vector error-correction (VECM); dynamic GMM, Granger-causality

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## **1.0 INTRODUCTION: THE ISSUE MOTIVATING THE PAPER**

Understanding the empirical relationship between the exchange rates, interest rates and stock prices are important and useful to policy makers, professional investors and academics. In fact, it has been debated for many years. Although the scholars and practitioners have studied the subject extensively, the effects of monetary developments in the stock markets are still not fully understood. It has been argued that a change in stock prices could affect exchange rates or a change in exchange rates could affect stock prices.

Kenani, Maonil and Nyirenda (2012) reveal no evidence of long-run relationship between the variables in Malawi, and then they employed standard Granger causality approach to test the direction of causality. The results show that stock prices and exchange rates do not cause each other during the period of the analysis<sup>1</sup>. Moreover they do not find any internal and external macroeconomic shocks have immediate influence on the stock and foreign exchange markets.

However, there are studies who believe that exchange rate and stock prices have significant relationship. Some studies of stock market volatility and exchange rates in emerging market, provide strong evidence that the relationship between stock and foreign exchange markets is regime dependent and that stock price volatility responds asymmetrically to events in the foreign exchange market (Walid, Chaker and Fry 2011). This is supported by prior studies (Aggarwal, 1981; Jorion, 1990; Pan, Fok and Liu, 2007) which suggest that there is a significant causal relationship from exchange rates to stock prices. Likewise the fluctuations in the term structure of interest rates result primarily from changes in inflationary expectations. Bashir and Hassan (1997) have explained that there is a certain relationship existing between stock returns and changes in interest rates. Despite all these, there is still not any conclusive causal relationship between exchange rate, interest rate and stock price. This is the issue that we attempt to focus the analysis in the banking sector. Why we focus on the banking sector? We believe that the liberalization of financial markets has caused exposure to many sources of risk. Thus, we also believe that the impact of exchange rate and interest rate changes on banks' stock return have attracted more interest and major concern to bank managers, regulatory authorities and academic communities due to the failure of some banks associated with the adverse effects of

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<sup>1</sup> The study considers the effect of internal and external macroeconomic structural shocks on the stock and foreign exchange markets.

fluctuations in the interest rate and exchange rates. Indeed it has also attracted much attention of the investors in the stock market.

As mentioned by Al-Abadi et al (2006) that any variations of the proposed factors may contribute their impacts on the movement of banks' stock return. Theoretically, the macroeconomics factors such as money supply, industry production index, exchange rate, interest rate, and inflation are considered as the sources of volatility of stock market and would be regarded as the leading indicator of banks' stock returns (Ozbay, 2009). In this case we intend to identify the sensitivity of banks' stock return against the changes of interest rate and exchange rate.

In this paper, we examine the importance of the reason why the banks' stock returns can be responsive to changes in interest rate and foreign exchange rate. According to Joseph and Vezos (2006), volatility transfer hypothesis suggests that random shocks can induce higher volatility in financial markets and also due to the contagion effect which are highest in more volatile markets, thus investors and banks may look abroad to invest in alternative financial assets. They also stated that the international portfolio diversification may cause to an increase in the bank stock return volatility due to greater exposure to interest rate and foreign exchange rate risks. However the sensitivity of bank stock returns to the changes of interest rate and exchange rates can be theoretically explained with several models and hypothesis. The Intertemporal Capital Asset Pricing Model (ICAPM) by Merton (1973) includes the interest rate risk as one-possible extra market factor, since a change in the interest rate may represent a shift in the investment opportunity set (Kasman and Tunc, 2011). According to them, the implications of Arbitrage Pricing Theory (APT) can provide whether interest rate (Sweeney and Warga, 1986) or exchange rate risks are priced factors in the equilibrium price of bank stocks.

The other reason that could explain the effect of interest rate and foreign exchange rate changes on bank stock returns is that they can affect bank balance sheet directly. In this case, the hypothesis of nominal contracts (kessel, 1956; Bach and Ando, 1957; French et al., 1983) has also been used to explain the sensitivity of interest rates, given the composition of their balance sheets. Kasman and Tunc (2011) has explained that this hypothesis stated interest rate sensitivity of a bank common stock returns depends on the amount of net nominal assets held by the bank. The nominal assets and nominal liabilities will affect the common stock returns through the redistributive effects of unanticipated inflation and unanticipated changes in the expected inflation (Flanner and James, 1984). If

there are more nominal assets than nominal liabilities on the firm's balance sheet, value of the stock will rise when there is an unexpected inflation. Instead, the stock price will decline with the presence of unexpected inflation if the nominal assets less than nominal liabilities. This implies that the interest rate will affect different bank stock returns differently according to the composition of their balance sheets.

Furthermore, through the revenues costs and profitability of banks also are directly influenced by the unexpected changes in interest rates and exchange rates (Saunders and Yourougou, 1990). Likewise the banks' discounted cash flows are influenced by the changes of interest rate and foreign exchange rate. This indicates that the changes of these variables will have impact on bank stock returns directly.

Despite the clear importance of an understanding of the impact of exchange rate and interest rate on the bank stock return, important questions arise in our observation is what the effect to Islamic banks, in particular. Do the changes of interest rate and exchange rate give impact on Islamic bank stock price? Do these variables have significant relationship on Islamic bank stock prices? If yes, what the direction of causal relationship among them? This is the subject of this paper which is focus on analysis of Islamic banking sector. This paper attempts to fill gap in the empirical literature on Islamic banking as no one else is doing research on Islamic bank stock price.

Islamic banking is different compared with the conventional banking. Islamic banking is a banking activity based on Islamic principles, which do not allow the paying and receiving of interest (*riba'*) and promotes profit sharing in the conduct of banking business. According to Zainol and Kassim, Salina H. (2010) has clarified in their study which is the changes in the conventional interest rate put pressure on the Islamic deposit rates as interest rate differentials could lead to easy arbitrage opportunity. Consequently, the Islamic banks are exposed to the interest movements similar to their conventional counterparts since the rate of return in the Islamic banks is sensitive to the changes in the interest rate. As an issue that we mentioned earlier, we are to examine the existence of interest rate can be influenced or not in stock prices of Islamic banking sector in particular. As the research conducted by Majid and Yusof (2006) about the interest rates and stock returns relationship, they find that when interest rate increases either domestically (TBR) or internationally (FFR), the Muslim investors will buy more Shari'ah compliant stocks; thereby escalating the Islamic stock prices.

The main purpose of the present study is to fill gap in the empirical literature on Islamic banking, in particular by introducing a recent method to estimate the relationship between exchange rate, interest rate and Islamic bank stock prices. Therefore, we humble to introducing a panel analysis to find the empirical evidence of the relationship between exchange rate, interest rate and Islamic bank stock prices and also looking for the direction of causation if they are related. In our expectation of this finding that Islamic bank stock prices has a positive significant with exchange rate but a negative significant in interest rate.

The remainder of paper is organized as follows. The next section begins the objective of this paper followed by theoretical framework in section 3. The reviewing some selected of the existing studies on bank stock is discussed in section 4 and then the very recent methodology used in section 5. In section 6 reviews the data, empirical results and discussions while section 7, concludes the study and give some policy implications.

## **2.0 THE OBJECTIVE OF THE STUDY**

The objective of this paper is to identify the relationship between exchange rate, interest rate and Islamic bank stock prices. Then, to know the intensity of relationship between exchange rate, interest rate and Islamic bank stock prices. This study also investigates whether exchange rates and interest rates have any impact on the Islamic bank's stock price

## **3.0 THEORETICAL FRAMEWORK**

There are many theories that have examined the relationship of interest rate and exchange rate of the bank's stock prices. However, there are divergent opinions about the existence of a causal relationship between the variables. According to economic theory suggests that there should be a causal relationship between stock prices and exchange rate (Caporale, Pittis and Spagnolo, 2002), however there is no consensus on the nature of this relationship (Harjito and McGowan, 2011). Following Fraser (2002) find a strong negative impact of interest rates on bank stock returns. Nevertheless, Simpsons and Evans (2003) in their study on Australia's bank stock market return clarified that there is no evidence of cointegration between bank stock return and interest rate either short term or long term. Furthermore, they find the evidence that causality runs from bank stock returns to interest rates.

Therefore, this issue as we mentioned earlier, we are motivated to find out whether the changes of interest rate and exchange rate may affect to Islamic banking sector stock prices, in particular. If yes, what is a causal relationship between of them? In this case we believed that many factors can cause the price of a stock to rise or fall like specific news about a company's earnings to a change in how investors feel about the stock market in general. Among the factors affected to stock prices such as company news, industry performance, investor sentiment and also economic factors. Liberalization of the financial markets which is has caused exposure to many sources of risk and it has led to this paper to analyze the changes of *exchange rate* and *interest rate* on banking sector stock prices, in particular, consequences of the fluctuation of these variables.

### **Interest rate and bank stock prices**

Interest rate is one of the monetary policy tools used by central banks, also represents one of the key forms of financial risk faced by banks. In fact, we believed that interest rate risk is a major source of risk that commercial banks are exposed to and even also that interest rate is hypothesized to have a negative relationship with stock returns. Based on the stock valuation model, whenever interest rate increases the value of cash flow is worth less after discounting. Therefore, the incentive to invest shrinks as well as the stock return. Interest rate also is assumed to be one of the most important among factors that affect the stock returns and the profitability of banks in the short term; as well as in the long run. Moreover interest rate a major cause of the numerous bank failures in the 1970s and 1980s was the high volatility of interest rates and the strong interest rate sensitivity of banking institutions (Verma and Jackson, 2008).

Elyasiani and Mansur (2004) has clarified that the volatility of the short-term interest rate has two opposing effects on the yield curve; the premium effect and the convexity effect. The premium effect inserts a positive impact on the long term interest rate. An increase in the volatility of the short-term interest rate induces higher expected rates for the longer maturities; whereas on the other hand, the convexity effect inserts a negative impact on the long term interest rate. An increase in volatility of the short-term interest rate increases the convexity, thereby reducing the yield for longer maturities. Thus, the premium effect dominates at the short end of the yield curve while the convexity effect dominates at the long end of the curve.

The changes in interest rates can also affect a bank's profitability by increasing its cost of funding, reducing its returns from assets, and lowering the value of equity in a bank. Moreover, recent decades have ushered in a period of volatile interest rates, leaving the investors with more unpredictable environment to work in (Joseph and Vezos 2006). A modern day investor's primary concern is now concerned around the impact of interest rates on commercial bank revenues, costs and profitability.

In terms of the bank's perspective, the fact that most commercial banks choose to lend long and borrow short, implies that the bank profits can decrease in case of an increase in short-term interest rate and a decrease in long-term interest rates (Elyasiani and Mansur 2004). In contrast to this a bank can be expected to benefit from a decrease in short-term interest rate and an increase in long-term interest rate. Moreover bank interest rate risk is assumed to be conditioned when has a change of net interest income, change of net income, also to the notional amounts of interest rate derivatives. However these factors are observable and can be easily measured and useful indicators for investors to anticipate how sensitive a bank's performance to interest rate risk is. If a bank successfully controls its interest rate risk, its net interest income and net income should be immunized against interest rate fluctuations. In addition to this; as banks are increasingly employing derivatives to hedge their financial risks; the national amount of interest rate derivatives for the purpose of non-trading is also analyzed. Since the financial market conditions have become more volatile in recent years, the effect of interest rate changes on bank stock returns has increasingly concerned investors, banking authorities, academicians and policy makers (Verma and Jackson 2008).

Therefore, the interest rate variable is very important for the valuation of common stocks of financial institutions because of the returns and costs of financial institutions are directly dependent on the interest rates. As should be noted that knowledge of interest rate's exposure to the financial institutions is most important for all as bank managers, who want to adequately manage their interest rate risk; investors, concerned about the pricing of bank equities for purposes of asset allocation and hedging; and bank regulators, primarily interested about the assessment of systemic interest rate risk and the stability and soundness of the banking system.

## **Exchange rate and bank stock prices**

Establishing the relationship between stock prices and exchange rates are important such as exchange rates have a direct impact on the price and value of stocks in home as well as it will affect the price of stocks in abroad. In addition, long-term movements in exchange rates are affected by fundamental market forces of supply and demand. As foreign investors convert their return on investments in to their home currency and exchange rate has vital importance because of this. Higher exchange rate makes them not to invest and move on to some other secure sources to invest.

Furthermore, the relationship between stock price and exchange rate has been an important issue because of the impact of volatility of exchange rate on the value of the firms. Therefore the various arguments are developed to support such a relation some of the major arguments state that the fluctuating exchange rates can have substantial impact on the performance and profitability of domestic firms and so does on the stock price of the firms. According to the theory of arbitrage suggests that that if a small number of factors describes an economy, then these factors may be priced in a such a way that to avoid these sources of risk, investors will be willing to pay a premium, in this context, if the relevant factors includes exchange rate as one among them, then hedging policy may affect the cost of capital of a firm.

Therefore we believed that exchange rate is also one of the factors like interest rate (as we mentioned earlier) can influence on bank stock returns. Chamberlain, Howe and Popper (1997) have stated that exchange rates most directly affect the banks with foreign currency transactions and foreign operations. In addition even without such activities, exchange rates can affect banks indirectly through their influence on the extent of foreign competition, the demand for loans, and other aspects of banking conditions. Financial institutions that hold assets and liabilities in different foreign currencies, is suggested by the economic theory to have an influence from the variation on foreign exchange rates.

The fluctuations in exchange rates may result in translation gains or losses depending on banks' net foreign positions, the exchange rate risk could be another potential determinant of bank stock returns. In fact, there are three ways that banks can be exposed to changes in exchange rates. First it may come from the short run exposure that arises from foreign exchange trading. Second, through the medium term exposure that arising from mismatches between the currencies in which a bank's assets and liabilities are

denominated. Finally, a longer-term exposure wherein might be related to a translation exposure that arises from banks' investments in the banking business in other countries where different currencies are used.

In short, many studies have carried various studies on the effect of both the interest rate and foreign exchange rate changes on the stock returns of banking sector. There are quite a lot of views related relationship between bank stock and interest rate and also exchange rate. These cases will be discussed on the literature review part. Even though, the results are still not conclusive whether in theoretical or empirical framework. Therefore with humble, we will make contribute to the existing literature especially on the Islamic banking sector by empirical answer.

#### **4.0 LITERATURE REVIEW**

During the past years, several studies have analyzed the effects of fluctuations of interest rates and exchange rates on the stock returns. Franck and Young (1972) were among the first authors to analyse the relationship between stock prices and exchange rates, using correlation regression analyses. They reported no significant interaction between these variables. However, Aggarwal (1981) found a positive correlation between effective exchange rate of the US dollar and stock prices. Solnik (1987) analyzed the relationship between exchange rates, interest rates and changes in inflationary expectations on stock prices. He found that no significant relationship between exchange rates variations and stock prices. Studies carried out by Edmister and Merriken (1989) claimed that changes in the interest rates have a direct influence on both the revenue and expenditure of a financial institution, and as a result, this influence has an effect on the stock returns of the same financial institutions. According to study by Kane and Unal (1988) employed a switching regression technique and found out that the interest rate sensitivity of bank, savings and loan stocks varied significantly over time. In particular, they found out that the interest rate beta shifted down sharply in the early 1980s and went back up a few years later.

Stone (1974) proposed a two factor model for incorporating both the market return and interest rate variables as return generating factors. Lloyd and Shick (1977) and Chance and Lane (1980) found out that the interest rate index contributed little to the return generating process of stocks of financial institutions. However, this finding were challenged

by the results of Lyngge and Zumwalt (1980), Flannery and James (1984), Booth and Officer (1985), Scott and Peterson (1986), and Bae (1990). The latter authors reported that stock returns of financial institutions were negatively affected by interest rate changes. Bashir and Hassan (1997) analyzed interest rate sensitivity to stocks in UAE. The results showed that interest rate fluctuations have a significant and negative effect on the stocks of banking sector. Furthermore, even in absence of an official stock market, investors in UAE do take in to consideration the interest rate factor while dealing in stocks. In 1977, a study that carry out by Chamberlain et al. wherein focusing on the banking industry reported that US banking stock returns were responsive to exchange rates changes. They also found that Japanese banking stock returns were not sensitive to changes in exchange rates.

Mansur and Elyasiani (1995), who investigated the effect of changes in both level and volatility of interest rates on the bank stock returns applying ARCH estimation models, revealed that both level interest rate and their respective volatilities were likely to influence bank stock returns. Using a two-factor GARCH model originally developed by Engle et al. (1990), Flannery et al. (1997) showed that though both the market and interest rate risks constituted a significant priced factor in non-bank stock portfolios, the effect of interest rate risk was found to be less strong in the bank stock portfolio. Elyasiani and Mansur (1998) indicated that change in interest rates had a negative impact on the first moment whereas the associated volatility exercised a negative impact on the second moment of the bank stock return distributions. In this case they are using the GARCH-M model to examine the effect of interest rate on bank stock return. Most studies found that bank returns exhibit a negative correlation with the changes of interest rates, while others found no significant association between the movements of the interest rates and the returns of the commercial banks (Zhu 2001).

Although it is well-known that unexpected changes in interest rates induce risk, market and interest rate risks are not the only risks faced by banks. They may also be affected by exchange rate risk, which increases as their international activities, and those of their clients, increase. So, are the exchange rates related to bank stock? In fact, the relationship between these two variables is also is debated for a long time. Since unexpected movements in exchange rates can affect the banks directly by generating translation gains or losses based on the net foreign position, the exchange risk could be another important determinant of bank stock returns. For instance, Wetmore and Brick (1994) empirically test the theoretical model of Choi et al. (1992), and confirm that US

commercial banks are exposed to exchange rate risk resulting from their increasingly uncovered foreign loans.

A study is carried out by Choi et al. (1992) estimate a multi-index model for measuring sensitivity of commercial banks stock returns to interest rate and exchange rate. The results show that a significant exchange rate effect occurs for money center banks after October 1979, while interest sensitivity is stronger before October 1979. In short, the exchange rate effect is attributed to increased foreign loan exposure of money center banks (Choi et al., 1992). In 1997, Chamberlain et al. has examined with comparing the exchange rate sensitivities of US banks with those of Japanese banks using the daily and monthly data. They found that stock returns of a significant portion of the US banking companies appeared to be sensitive to exchange rate changes, whereas only a few of the Japanese bank stock returns moved with the exchange rate. According to Jorion (1990) has expressing that there was little evidence to claim a strong relationship exists between the stock returns of a firm and the variances of exchange rates.

A study by Atindehou and Gueyie (2001) indicates that a positive and significant relationship between Canadian dollar appreciation and banks' stock returns. The result suggests that most of the Canadian banks' exposure to exchange rate risk results from changes in the US dollar relative to the Canadian dollar exchange rate.

A study conducted by Kasman, Vardar and Tunc (2011) using the OLS and GARCH estimation models to investigate the effects of interest rate and foreign exchange rate changes on Turkish banks' stock have found the interest rate and exchange rate changes have a negative and significant impact on the conditional bank stock return. In addition, bank stock return sensitivities are found to be stronger for market return than interest rates and exchange rates, implying that market return plays an important role in determining the dynamics of conditional return of bank stocks. The results further indicate that interest rate and exchange rate volatility are the major determinants of the conditional bank stock return volatility.

Tehseen and Anwar (2012) have examined about "the effects of interest rate, exchange rate and their volatilities on stock prices: evidence from banking industry of Pakistan". The cointegration result suggests the existence of significant negative long run relationship between exchange rate and short term interest rate with stock prices. On the other hand, positive and significant relationship exists between volatilities of exchange rate and interest rate with stock prices. Moreover, the causality analysis confirms bidirectional

causality between exchange rate and stock prices and unidirectional causality runs from short term interest rate to stock prices.

Although many studies are concern about the changes of interest rate and exchange rate on the bank stock but the nature of causal relationship between these two variables are still inconclusive. Moreover, no empirical studies are done into the Islamic banking stock sector. In this paper, with humble we attempts to fill gap in the empirical literature on Islamic banking, in particular.

## **5.0 ECONOMETRIC METHODOLOGY**

On the basis of theoretical and empirical discussion above, three steps have been carried out for the cointegration and causality analysis. First, we test a panel unit root to examine whether or not the variables in our model are stationary. Second, we test for cointegration among the variables employing the heterogeneous panel cointegration test developed by Pedroni (1999) and Larson et al (2001). Third, once cointegration relationship is established, we investigate the causal relationship between exchange rate, interest rate and Islamic bank stock prices employing panel vector error correction model. VECM is employed to discern the short-run and long-run Granger causality by applying the dynamic Generalized Method of Moments (dynamic GMM).

### **5.1 Panel Unit Root Test**

Before we proceed to cointegration techniques, we need to check that all variables are integrated to the same order. Therefore, we employed panel unit root tests of Im, Pesaran and Shin (1997) which is denoted by IPS and the null hypothesis is a unit root. This unit root tests that proposed are known to have more power and less restrictive compared to the first generation tests developed by Levin and Lin (1993). Moreover, the main drawback of the first generation test is that they do not allow for heterogeneity in the autoregressive coefficient.

Therefore, IPS proposed the test that solving the issues of correlation problem by assuming heterogeneity between units in a dynamic panel framework. IPS test is a pooled ADF test with heterogeneous slope coefficient of lagged Y for countries. This test makes the

restrictive assumption that the time period for all countries is the same (ie, balanced panel) to compute the 't' statistic. So, the basic equation for the IPS panel unit root test is as follows:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^p \phi_{ij} \Delta y_{i,t-j} + \varepsilon_{i,t}; i = 1, 2, \dots, N; t = 1, 2, \dots, T, \quad (1)$$

where  $y_{i,t}$  stands for each variable of our model,  $\alpha_i$  is the individual fixed effect and  $\rho$  is selected to make residuals uncorrelated over time. The null hypothesis is that  $\rho_i = 0$  for all  $i$  while the alternative is that  $\rho_i < 0$  for some  $i = 1, \dots, N_1$  and  $\rho_i = 0$  for  $i = N_1 + 1, \dots, N$ . The IPS statistic is based on the averaging individual ADF statistics;

$$t\_bar_{NT} = N^{-1} \sum_{i=1}^N t_{iT} \quad (2)$$

where  $t_{iT}$  is the ADF t-statistic for country  $i$  derived from the country-specific ADF regression as in Eq. (1). IPS shows that the null hypothesis is non-stationary, the  $t\_bar$  statistic asymptotically follows the standard normal distribution.

IPS standardizes their statistic based on simulations of the mean and variance of  $t\_bar$  :

$$Z_{tbar}^a = \frac{\sqrt{N}(t\_bar_{NT}) - E(t_{iT})}{\sqrt{Var(t_{iT})}} \quad (3)$$

and show that at the  $Z$  – statistic has an asymptotic standard normal distribution.

## 5.2 Panel Cointegration Test

In the next step is to test for the existence of a long run relationship among Islamic bank stock prices, exchange rate and interest. Thus we applied the cointegration analysis to examine whether a long run cointegration relationship exist among those variables. Cointegration implies that the relationship among the variables is not spurious i.e. there is a theoretical relationship among the variables and that they are in equilibrium in the long run (Masih, 2012b). Therefore, we apply Pedroni and Larsson's test method as to examine the possible existence of cointegration among the variables.

For this paper, we use a panel cointegration test due to Pedroni (1999). This test allow for multiple regressors for the cointegration vector to vary across different section and also for heterogeneity in the errors across cross-sectional units. Pedroni proposes two sets of test statistics: (1) a panel based on within dimension approach (panel v-, rho-, PP- and ADF-statistic), and (2) a group test based on the between dimension approach (group rho-, PP- and ADF-statistic). According to Liddle (2011) has expressing that Pedroni (1999) showed that the panel ADF and group ADF statistics have the best small-sample properties of the seven test statistics and also provide the strongest single evidence of cointegration.

### 5.3 Panel Cointegration Estimation

In this paper, we also estimate the long-run relationship using the dynamic ordinary least squares (DOLS) estimator as proposed by Mark and Sul (2003). The DOLS estimator corrects standard OLS for bias induced by endogeneity and serial correlation. The endogenous variable in each equation is regressed on the leads and lags of the first-differenced regressors from all equations to control for potential endogeneities and then, the OLS method is applied using the residuals from the first step regression. As we well know, the DOLS estimator may be preferred to the non-parametric FM-OLS estimator because of its performance.

According to Kao and Chiang (1999) the DOLS estimator maybe more promises than FM-OLS estimator in estimating cointegrated panel regressions. In addition, Harris and Dollis (2003) also suggest that non-parametric approaches such as FM-OLS are less robust if the data have significant outliers and have problems where the residuals have large negative moving average components, which is a fairly common occurrence in macro time series data. In short, the advantage of using this estimator is the form in which the data is pooled allows for greater flexibility in the presence of heterogeneity of the cointegrating vectors. The estimated model of panel DOLS is derived from the following equation:

$$\begin{aligned}
 SP_{i,t} &= \alpha_i + \delta_i t + \beta_i EXC_{i,t} + \gamma_i INT_{i,t} + v_{i,t} \\
 EXC_{i,t} &= \alpha_i + \delta_i t + \beta_i SP_{i,t} + \gamma_i INT_{i,t} + \varepsilon_{i,t} \\
 INT_{i,t} &= \alpha_i + \delta_i t + \beta_i SP_{i,t} + \gamma_i EXC_{i,t} + \eta_{i,t}
 \end{aligned}
 \tag{4}$$

### 5.4 Testing for causality : Panel VECM approach

In the last step, we are analyzing the direction of panel data causal links among interest rate, exchange rate and Islamic bank stock prices. Thus to identify the direction of causality, we estimate a panel-based VECM and use it to conduct Granger causality tests on the Islamic bank stock prices – interest rate and Islamic bank stock prices – exchange rates relationship.

A two-step procedure is applied. First, the long-run equations specified in equation (4) are used to obtain the deviations from the long-run equilibrium ( $v, \varepsilon, \eta$ ). Second, the error-correction model is estimated with one-period lagged residuals from the first step as dynamic error-correction terms. (Holtz-Eakin et al.,1988):

$$\Delta SP_{i,t} = \alpha_{1i} + \sum_{k=1}^h \theta_{11i,k} \Delta SP_{i,t-k} + \sum_{k=1}^h \theta_{12i,k} \Delta EXC_{i,t-k} + \sum_{k=1}^h \theta_{13i,k} \Delta INT_{i,t-k} + \lambda_{1i} v_{i,t-1} + \mu_{1i,t} \quad (5)$$

$$\Delta EXC_{i,t} = \alpha_{2i} + \sum_{k=1}^h \theta_{21i,k} \Delta SP_{i,t-k} + \sum_{k=1}^h \theta_{22i,k} \Delta EXC_{i,t-k} + \sum_{k=1}^h \theta_{23i,k} \Delta INT_{i,t-k} + \lambda_{2i} \varepsilon_{i,t-1} + \mu_{2i,t} \quad (6)$$

$$\Delta INT_{i,t} = \alpha_{3i} + \sum_{k=1}^h \theta_{31i,k} \Delta SP_{i,t-k} + \sum_{k=1}^h \theta_{32i,k} \Delta EXC_{i,t-k} + \sum_{k=1}^h \theta_{33i,k} \Delta INT_{i,t-k} + \lambda_{3i} \eta_{i,t-1} + \mu_{3i,t} \quad (7)$$

where  $\Delta$  is the first-difference operator,  $k$  is the lag length,  $\lambda_i$  is the speed of adjustment and  $u_{i,t}$  is the serially uncorrelated error term with mean zero. The differenced form takes care of the OLS estimation problem, which is due to correlation between country-specific effects and explanatory variables. However differencing introduces the problem of simultaneity because the lagged dependent variables are correlated with differenced error term. Furthermore, heteroscedasticity in the errors across the cross-section members is expected to occur.

Therefore, we have to apply an instrumental variable estimator to cope with these problems. A widely used estimator for the system in equation (5) – (7) is the panel generalized method of moments (GMM) estimator proposed by Arellano and Bond (1991).

## 6.0 DATA, EMPIRICAL RESULTS AND DISCUSSIONS

## 6.1 Data Analysis

For empirical analysis this study has used secondary data. We manually abstracted 40 Islamic banks in 13 countries across 2008 – 2012. The selection of Islamic banks is based on data availability on bank equity prices, exchange rate, interest rate, inflation and money supply (M2). After a tedious selection process (limited data) by checking data from different databases, we have 40 of Islamic bank stock prices left in our data set with the longest time series of 5 years for Bahrain, Bangladesh, Egypt, Jordan, Indonesia, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey, United Emirates States and United Kingdom.

This study employs quarterly time series data for the period 2008Q1 to 2012Q4. The quarterly bank stock prices of individual banks and the macroeconomic variables for each country are extracted from Datastream. The interest rates are derived from Central Bank of each country. Table 1 presents definitions of the main variables in our study along with their sources.

**Table 1**  
Descriptions and sources of the variables

| Variable   | Description  |
|--|--|
| <b>Dependent Variable</b><br>Islamic bank stock prices | Bank stock prices (fully-pledged – sharia compliance), consists of 40 Islamic banks in 13 countries; Bahrain, Bangladesh, Egypt, Jordan, Indonesia, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey, United Emirates States and United Kingdom |
| <b>Independent Variable</b><br>Exchange rate           | All currency data are denominated in US dollars to take into account the impacts of exchange rates and to ease the comparison across countries   |
| Interest rate<br><b>Control Variable</b>               | Overnight rate to measure interest rate  |
| Inflation<br>Money Supply                              | Consumer Price Index (as measure of inflation)<br>Money Circulation market category 2  |

## 6.2 Empirical Results

## 6.2.1 Descriptive Statistics

This section shows the summary of descriptive statistics of the variables included in the analysis. It shows that behavior of all variables during the post reform era (2008-2012). However, one out of seven variables has missing values.

**Table 2:**

(a) Summary Descriptive Statistics for panel data (2008Q1 - 2012Q4)

| Variable | No. of Observation | Mean     | Maximum   | Minimum | Std. Dev. |
|----------|--------------------|----------|-----------|---------|-----------|
| Time     | 800                | 201.5    | 211       | 192     | 5.77      |
| idcode   | 800                | 20.5     | 40        | 1       | 11.5506   |
| SP       | 800                | 139.0851 | 8100      | 0       | 850.049   |
| EXC      | 800                | 315.4207 | 11555     | 0.37637 | 1483.973  |
| INT      | 800                | 4.29687  | 33.54     | 0.15667 | 4.900666  |
| INF      | 799                | 124.4397 | 212.42    | 0       | 26.43721  |
| M2       | 800                | 27857777 | 723000000 | 0       | 122000000 |

(b) Correlation

|     | SP      | INT   | EXC     | INF   | M2    |
|-----|---------|-------|---------|-------|-------|
| SP  | 1.000   |       |         |       |       |
| INT | 0.045   | 1.000 |         |       |       |
| EXC | 0.903   | 0.071 | 1.000   |       |       |
| INF | -0.0262 | 0.451 | -0.0317 | 1.000 |       |
| M2  | -0.0339 | 0.227 | 0.451   | 0.495 | 1.000 |

As shown in Table 2, the average of bank stock prices for all Islamic banks is 139.0851. The standard deviation of Islamic bank stock prices, exchange rate and money supply indicates more volatile compared with interest rate and inflation. Bank stock prices and exchange rate have a strong positive relationship. It shows positive coefficients that bank stock prices and exchange rate are positively correlated, meaning they generally move in the same direction. The simple correlation above indicates that interest rate had a low correlation of 0.045 with bank stock prices.

### 6.2.2 Panel unit root results

The results from the panel unit root test are presented in Table 3. All variables are tested both in levels and first difference with a constant and with a trend. According to Table 3, the unit-root hypothesis is rejected the null hypothesis which the variables are stationary in level form. However we also do the first differences, the hypothesis of unit root non-stationary is rejected at the 1% level of significance.

**Table 3**  
Panel heterogeneous unit root test results

| Variables | Im, Pesaran, and Shin (IPS) |                  |
|-----------|-----------------------------|------------------|
|           | Level                       | First Difference |
| SP        | 14.9755*                    | 16.483*          |
| EXC       | 33.2395*                    | 26.7834*         |
| INT       | 45.6293*                    | 17.0098*         |

\*Denote significance at the 1%

### 6.2.3 Panel Cointegration results

The results of cointegration analysis among interest rate, exchange rate and Islamic bank stock prices are reported in Table 4. The cointegration test of Pedroni indicates a significant cointegration relationship between the variables. However, at 1% significance level only Panel PP and Group PP reject the null hypothesis of no cointegration but the others are accepted the null hypothesis. Even though the results are more strongly explain that do not reject the null hypothesis is no cointegration but we proceed to estimate the long-run cointegration coefficients using the panel DOLS approach (see Kao and Chiang, 2000) to see the robustness of this results.

**Table 4**

Result of panel cointegration tests

| <b>Pedroni Panel Cointegration Test</b> |            |        |
|---|------------|--------|
| Test statistics                         | Statistic  | Prob.  |
| <u>Common AR coefs.</u>                 |            |        |
| Panel v                                 | -3.403405  | 0.9997 |
| Panel rho                               | 2.674955   | 0.9963 |
| Panel PP                                | -3.847572* | 0.0001 |
| Panel ADF                               | -0.297120  | 0.3832 |
| <u>Individual AR coefs.</u>             |            |        |
| Group rho                               | 3.824691   | 0.9999 |
| Group PP                                | -10.62211* | 0.0000 |
| Group ADF                               | -0.395392  | 0.3463 |

Note: The null hypothesis is that the variables are not cointegrated.

\*indicates statistical significance at the 1% level

**6.2.4 Panel Estimation Results**

The results of panel DOLS estimation are presented in Table 5. The estimated coefficients of independent and control variables are insignificant except exchange rate that has a significant relationship with Islamic bank stock prices. In this case, the results of DOLS estimates confirm that existence of a long-run relationship with Islamic bank stock prices only the exchange rate. The interest rate indicates is a negative coefficient and not significant at 1% level. Thus, the fluctuation of changes of interest rate not affect to Islamic bank stock prices, this is also as per our expectation earlier. This implies that all Islamic banks in our case study are built around shariah, mainly prohibiting the charging of interest. Islam considers interest an unjustified increase of capital, with no effort made to earn it, it is considered of false value and therefore is prohibited. (Sarah S. Al-Rifae, Arab Reform Buletin). In addition, as we known well that Islamic banks do not act as they consider interest as riba (prohibition outlined in Quran). Therefore, we conclude that interest rate is not cointegrated with Islamic bank stock prices.

**Table 5**

Panel DOLS- Estimation of Long-Run Coefficients

| Variables                  | Coefficients | Prob. |
|----------------------------|--------------|-------|
| EXC (Exchange Rate)        | 0.5685112*   | 0.000 |
| INT (Interest Rate)        | -2.611324    | 0.614 |
| INF (Consumer Price Index) | -0.3769526   | 0.751 |
| M2 (money Supply)          | 9.25E-08     | 0.925 |

### 6.2.5 Causality Results

After establishing that Islamic bank stock prices has a long-run relationship only with exchange rate (as per cointegration and DOLS results). Therefore to identify of changes exchange rate can affect to Islamic bank or vice versa, we applied the Granger causality. The causality results from the panel VECM based on generalized method of moment estimation are reported in Table 6.

By applying the first differenced GMM technique to control the endogeneity, the coefficients and their corresponding t-values in parenthesis are reported in table 6. The major property of this method is that this includes the lag of dependent variable in the model as explanatory variable. The results indicate that when last year bank stock prices ( $SP_{t-1}$ ) increase by one percent, this increases current year's bank stock prices by 0.91 percentage points. This reveals that investor's expectation of current prices based on earlier prices is rational.

In table 6 reports that interest rate is negative and statistically insignificant to the bank stock prices, meaning that interest rate not influence to the Islamic bank stock prices. This is consistent with our expectations, wherein bank stock prices are not related with the interest rate. However, the exchange rate has a significant effect with bank stock prices and negatively sign to the bank stock. When exchange rate (EXC) increases by one percent, stock prices fall by 0.25 percentage point.

GMM results above show that the interest rate is insignificant at 1% with the bank stock prices. The sign of this variable is according to the expectation, yet the impact is insignificant. Even though, the correlation between bank stock prices is negative but the changes of this variable still give impact to the rate of return of Islamic banks. According to Chapra and Khan (2000), since Islamic banks use LIBOR as a benchmark in

their financing operations, it is natural for banks' assets will be exposed to the risk of changes in LIBOR rates. In such case, they have explained that a rise in LIBOR will automatically lead to an increase in the mark-up and, in turn, leads to higher profits payments to depositors in the future compared with those received by banks from the users of long term funds. In addition, they also have emphasized that the nature of investment deposits on the liabilities of Islamic banks add an extra dimension to this risk. As we can see in Table 6, the coefficient of interest is negative meaning that 1% increase in interest rate would be reducing the value of bank stock prices by - 1.74 percentage point. However, this study supported by Kasman, Vardar and Tunc (2011), the effects of interest rate changes on Turkish banks' stock have a negative impact on the conditional bank stock return.

In table 6 reported that exchange rate has a statistically negative significant on the bank stock prices. It means that, exchange rate (in US dollar) has a relationship with Islamic bank stock prices in Bahrain, Bangladesh, Egypt, Jordan, Indonesia, Kuwait, Malaysia, Pakistan, Qatar, Saudi Arabia, Turkey, United Emirates States and United Kingdom. Since 1% increase in exchange rate, it would be lower down bank stock prices by - 0.25 percentage point. In fact, the relationship between stock prices and exchange rates are important such as exchange rates have a direct impact on the price and value of stocks in home as well as it will affect the price of stocks in abroad. Since the exchange rates are highly responsive and correlated (see the correlation in Table 2(b)) to the Islamic stock market changes and global portfolio investments as compared to the past. Therefore, it is suggested that there is a need to evaluate the relationship between stock prices and exchange rates since the results would be able to bring some impact on monetary and fiscal policies.

The result is consistent according to the expectation. It also proves that Islamic bank stock prices are response to the exchange rate and sensitive to changes of interest rate, in particular. After discussion of estimated parameters using GMM, we use the Sargan test to determine any correlation between instruments and errors. For an instrument to be valid there should be no correlation between instruments and errors. We fail to reject the null hypothesis of this test, thus providing evidence of the validity of lagged levels.

In table (6), Sargan test value, and instrumental rank has been reported. The J-static is 691.567, and instrument rank is 176. This indicates that J-statistic is greater than the instrument rank. The J-statistic is the value of GMM objective function, and represents Sargan statistics. The Sargan test value is larger than the value of instrumental rank for first

differenced GMM. So the results explain that we cannot reject the null hypothesis of this test, thus providing evidence that valid instruments are used. It indicates that the GMM technique controls the firm-specific effects in the model.

Turning to Eq (5) – (7), GMM results report that exchange rate and Islamic bank stock prices has a bidirectional relationship but Islamic bank stock prices are insignificant relationship with interest rates and vice versa. This finding is consistent with a study conducted by Hussin, Muhammad, Awang and Abu (2012) wherein MYR (denoted as currency) has a negative significant relationship with Islamic stock index in Malaysia.

In summarize in GMM results, the most significant factor is previous behavior of stock prices that affects current year's stock price. Next the most significant factor is exchange rate that gives impact on stock prices. Therefore in this study, only the exchange rate has a statistically relationship with Islamic bank stock prices and indicates a negative sign to the coefficient of exchange rate. However, interest rate is insignificant with the Islamic bank stock prices but it still indicates a negative coefficient which is the changes of interest rate indirectly give effect to the rate of return that provided by Islamic bank.

**Table 6**

Dynamic panel GMM estimation for the full sample of all Islamic banks

| GMM (DIF) estimations |                                |                                 |                                 |
|-----------------------|--------------------------------|---------------------------------|---------------------------------|
| Explanatory Variables | GMM Coefficients<br>$SP_{t-1}$ | GMM Coefficients<br>$EXC_{t-1}$ | GMM Coefficients<br>$INT_{t-1}$ |
| SP                    | <b>0.9107266* (0.000)</b>      | -0.1069034 *(0.000)             | -0.001297 (0.042)               |
| INT                   | - 1.747594 (0.306)             | 0.5289141 (0.59)                | <b>0.1626669 *(0.000)</b>       |
| EXC                   | - 0.2598536* (0.00)            | <b>0.5591155 *(0.000)</b>       | 0.0005903 (0.628)               |
| INF                   | 0.5886393 (0.185)              | 0.2307679 (0.457)               | 0.0166207 (0.103)               |
| M2                    | -5.59E-08 (0.930)              | 1.61e-09 (0.997)                | -1.25e-08 (0.064)               |
| R-Squared             | -                              | -                               | -                               |
| Wald Test             | 4885.89 (0.000)                | 1567.28 (0.000)                 | 40.40 (0.000)                   |
| Sargan Test           | 691.5665 (0.00)                | 1084.108 (0.000)                | 675.5256 (0.000)                |
| Instrument Rank       | 176                            | 87                              | 166                             |
| Observations          | 718                            | 718                             | 718                             |
| Number of Bank        | 40                             | 40                              | 40                              |

\* Significant at 1%

## **7.0 CONCLUSIONS & POLICY IMPLICATIONS**

The investigation of the impact of interest rates and exchange rates on bank stock returns has been of special importance in recent years as a consequence of shifts in monetary policy regimes, free capital flows, financial and technological developments in communications, and trading systems. Therefore, this study examines the effects of interest rate and exchange rate on Islamic bank stock return by employing a panel cointegration and panel vector error correction (VECM).

The result of this paper indicates a significant cointegrating relationship between the variables. The coefficients of independent and control variables are insignificant except exchange rate that has a significant relationship with Islamic bank stock prices. In this case, the results of DOLS estimates confirm the existence of a long-run relationship between Islamic bank stock prices and the exchange rate. The dynamic panel data, GMM results show that interest rate has a negative impact and insignificant to the Islamic bank stock prices. On the other hand, the exchange rates have a negative impact and significant relationship to the Islamic bank stock prices. The finding proves that Islamic bank stocks prices are not affected by changes in interest rates, however the fluctuation of interest rates give a negative impact to Islamic banks indirectly because of the rate of return provided by Islamic banks being very sensitive to the interest rate.

The results has an important implication in the significant relationship, particularly to the impact of exchange rates and interest rates on Islamic stock returns which indicated the exposure of the Islamic stock market to external macroeconomic variables in Malaysia. In addition, an understanding of the relationship between two variables wherein will affect the the investment activities. The exchange rate variable is clearly the most influential macroeconomic variable, which displays mainly a negative relation on Islamic bank stock prices. The implication of this finding is that, for an export dominant economy, the currency appreciation has a negative effect on the stock market but the currency appreciation boosts the stock market for an import dominant economy. The insignificant relationship between Islamic bank and interest rates indicates that Islamic banks are operating their activities in line with the maqasid al-Shariah. In addition, this finding suggests that exchange rates and Islamic bank stock prices are important for the supervisor of banks to take care of changes of these two variables (exchange rates and Islamic bank stock prices)

## 8.0 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

In this paper, we examine the effects of macroeconomic factors on Islamic banks' stock prices. However, in future we suggest that the financial factors need included as determinant factors for the Islamic banks' stock prices.

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