Macrothink Institute™

Journal of Social Science Studies
ISSN 2329-9150
2014, Vol. 1, No. 2

Fisher Effect: Evidence From Money Market in Malaysia

Nurazilah Zainal

Putra Business School, Universiti Putra Malaysia

43400 Serdang, Selangor Darul Ehsan

Tel: 6013-6966727 E-mail: nurazilahzainal@yahoo.com

Annuar Md Nassir

Faculty of Economics and Management, Universiti Putra Malaysia

43400 Serdang, Selangor Darul Ehsan

Tel: 6013-6722312 E-mail: annuar@upm.edu.my

Mohamed HishamYahya

Faculty of Economics and Management, Universiti Putra Malaysia

43400 Serdang, Selangor Darul Ehsan

Tel: 6019-3898015 E-mail: mohdhisham@upm.edu.my

Received: January 21, 2014 Accepted: February 24, 2014 Published: February 26, 2014

doi:10.5296/jsss.v1i2.4915 URL: http://dx.doi.org/10.5296/jsss.v1i2.4915

Abstract

The Fisher Effect, proposed by Fisher (1930), has been the subject of many empirical researches in various countries. In Malaysia, previous empirical studies on Fisher Effect have focused the relationship on stock and bond market, leaving the money market with no or very few studies. The Malaysian money market has gained importance and interests as it shows rapid growth in volume transaction. This paper aims at investigating the validity of Fisher Effect on Malaysian money market. The time series between 2000 to 2012 is chosen as the study duration. Three variables were targeted in this study, they are, inflation Rate (INF),

3-months treasury bills rate (MTB) and interbank rate (IBR). To study the relationship, this paper employs Autoregressive Distributed Lag (ARDL) bounds test that is capable of testing for the existence of a long-run relationship between the variables irrespective of whether the time series are I(0) or I(1). The estimation results indicate the presence of long run cointegration among the variables. Overall the study provides evidence on the Fisher Effect in Malaysia.

Keywords: Fisher effect, Inflation rates, Interest rates, Interbank rates, ARDL bounds test

1. Introduction

The Fisher (1930) equation is one of the oldest and simplest ways to model the relationship between nominal interest rates and inflation or purchasing power of money. Fisher's hypothesis postulates that changes in expected inflation leave the real interest rate unaffected by creating equal changes in the nominal interest rate. In other words, if the ex ante real interest rate is determined entirely by the real factors in an economy, such as the productivity of capital and investor time preference, then the nominal interest rate is related one-for-one with expected inflation. The theoretical equation of Fisher (1930) hypothesized that the nominal rate of interest (i) is made up of two components: the real rate of return (r) and the expected rate of inflation (π^e)

$$i = r + \pi^e \tag{1}$$

There are a number of reasons, according to Hawtrey (1997), as to why the Fisher hypothesis has maintained such a key position in economic literature. Firstly, the real rate of interest plays a pivotal role in any economy's economic growth, savings and investments, while also affecting trade and capital flows through its influence on the exchange rate. Secondly, there is a large amount of evidence, as proposed by Fama (1975), to suggest that nominal interest rates can be used to determine future inflation expectations. Thirdly, the Fisher hypothesis is an important factor of consideration for central banks to implement the monetary policies.

Historically, money market has existed in Malaysia since 1980 (Lin & Chung 1995). This once infant market has shown massive development in 1990s. Malaysia's money market took another step forward in January 1994 when Malaysian Islamic Inter-bank Money Market (IIMM) was introduced. The objective of the IIMM was to create a money market that is in compliance with Islamic banks for them to be able to adjust their portfolios through a short term funding facility (Note 1).

The role of the money market becomes more important and this is consistent with the positive economic trend. As the economic activities grow, more additional funding is needed. This is reflected by the increasing supply and demand of financial instruments in the financial system. According to the Bank Negara Malaysia(Malaysian central bank) report, the trading of money market and interbank funds volumes has increased tremendously in the 1990s.In 1995, the volume was recorded at RM885 million. After a couple of years, this market showed aggressive improvement when volume increased by 84% in 2012. The volume of interbank funds has reached its high at RM1.86 billion in 1997 (Note 2). The significant volume of interbank funds transaction is demonstrated in Figure 1.

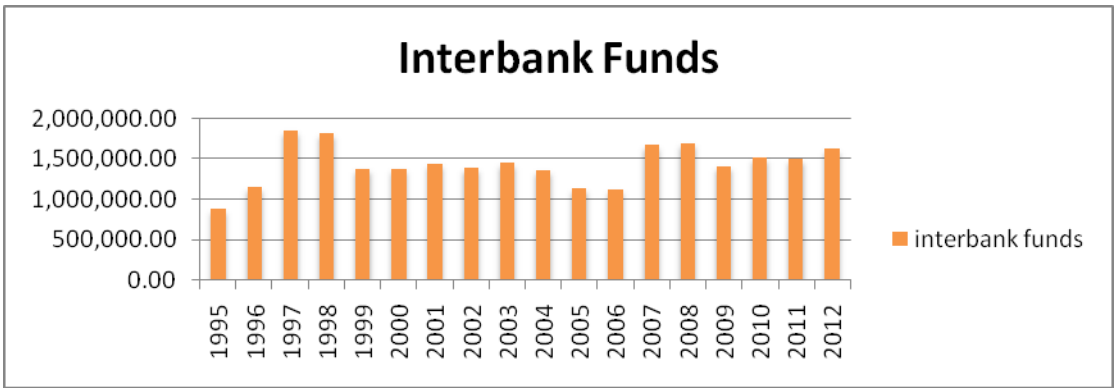

Figure 1. Volume of Interbank Funds in Malaysia

Economists have debated over the issue of Fisher effect about its role on inflation for decades. The inconsistencies of results and comments come from previous researchers are still valid in determining the significant relationship between nominal interest rates and expected inflation rates. Some provide evidence to support Fisher effect while any others failed to find any relationship. Therefore, no consensus on the Fisher effect theory.

In Malaysia, many studies have been done to investigate the Fisher Effect in stock market (Ibrahim, 1999; Al-Khazali, 2004), bond market (Fah & Annuar, 2012) and foreign exchange market (Asari, Baharuddin, Jusoh, Mohamad, & Jusoff, 2011). However, no study has been undertaken to determine the relationship between nominal interest rates and expected rate of inflation in the money market. This study takes this as an opportunity to find the Fisher effect evidence in Malaysian money market since this market can be considered as a rapid growth market that has contributed to the development of Malaysian economy for quite some time.

The main objective of this study is to investigate the validity of Fisher effect relationship in the Malaysian money market. The long run Fisher relationship among the variables is investigated. Based on the review of the preceding literature, research questions appeared;

a) Does Fisher effect relationship exist in Malaysian money market? To what extent does Malaysian money market have the ability to predict inflation in future?

The present study extends the finance literature by making several important contributions since Fisher effect has implications for debtors and creditors as well as for the effectiveness of monetary policy and efficiency in banking sector. Moreover, the effectiveness of monetary policy may also be affected by inflationary expectation. The study from Van Der Merwe (2004) shows that policy changes have to depend on the expected development in inflation under the inflation targeting monetary policy regime. The Malaysian central bank, Bank Negara Malaysia (BNM), has been appointed by the government as a regulator that is responsible for monetary policy implementation. As the purpose of this study is to investigate the Fisher relationship to predict inflation, BNM should consider Fisher Effect as one of the important variable in implementing monetary policy.

2. Literature Review

Understanding the relationship between inflation and interest rates has been a long-standing concern for economists and policy makers. The Fisher hypothesis, formalized by Irving

Fisher (1930) states that any change in expected inflation will be offset by a change in the nominal rate of interest, leaving the ex ante real interest rate unchanged. This is consistent with Ki- nal and Lahiri (1988), whereby, they state that the changes in real interest rates might be the result of changes in real economic factors. Fisher Effect theory was supported in many countries and is vital for monetary policy implementations. Nevertheless, with the existence of Keynesian school of thought the theory was rejected (Fatima & Sahibzada, 2012). However since 1970's onwards, more evidence has been found in support of the hypothesis showing that nominal interest rates and expected inflation rates are moving together. Many researchers examined the fisher hypothesis and obtained different results.

In a study by Fama (1975) on the reliability of the Fisher relationship in United States, his dual tests of market efficiency and the hypothesis that the expected real return on the Treasury bill is constant confirms the Fisher relationship. His results suggest that variation in nominal interest rates fully reflect inflation expectation and nominal interest rates can be used as proxies for expected inflation. Holvoet (1979) and Lenora (1980) also confirm this effect using Belgium and U.K data respectively. James and Bradley (1997) examine a sample of long run relationship between the nominal interest rate and expected rate of inflation over the 9 countries. Their finding shows unit proportional relationship was found in Malaysia, Pakistan and Sri Lanka confirming the validity of Fisher Effect. In the case of these three countries the Fisher hypothesis is supported suggests that the real interest rate is determined only by real factors and cannot be influenced by monetary policy.

Pakistan economy witnessed with high inflation in 1990's. However, inflation was brought down after financial liberalization in 1999. Hamid (1999) and Hafiz, Sajawal and Imtiaz (2004) are concerning with the persistence of a double-digit inflations in Pakistan economy. Hamid (1999) rejects the Conventional Fisher Hypothesis (weak-form) and Inverted Fisher hypothesis in favour of accepting the Partial Fisher Hypothesis. This is in contrast with the result from Hafiz, Sajawal and Imtiaz (2004). They examine to what extent the movements in nominal interest reflect changes to anticipated inflation in Pakistan. The study accepts the conventional Fisher Hypothesis is that there is one to one relationship between nominal interest rate and rate of inflation. This study concludes that interest rate accurately predicts inflation.

Hackan and Mohamed (2002) support the hypothesis that there is a one-to-one relationship between the interest rate and inflation for more than half of the countries under the study. They investigate the relationship by taking into consideration the short run dynamics of interest rates. In this work, attention was focused on testing the strong version of Fisher hypothesis. It is also found that the Fisher hypothesis holds more likely for the developed than the developing countries in the sample. Tai, Venus and Liew (2007) explore the Fisher Effect in 10 East Asian countries. They find a supportive evidence of Fisher hypothesis in East Asian economies using panel unit root tests(which allow for cross-country variations in the estimation). By means of univariate unit root tests, the researchers find the evidence of short-term Fisher effect in Malaysia, Taiwan and Philippines and long-term Fisher effect in China, Hong Kong, Indonesia and Singapore. Nonetheless, when panel unit root test is used, they find the evidence of Fisher effect for most of the sample countries in the study

In Malaysia, the earlier study of Fisher Effect in Malaysia has been done by Annuar, Shamser

and Zainal (1987). Using 3 months treasury bills discount rates to approximate monthly nominal return, the Malaysian 3 months Treasury bill market is found not to be efficient. They claim that there is no basis to use short-term interest rate as a proxy for expected inflation. In addition to this, they suggest that in efficient market, relevant available information is not fully utilized in setting interest rates. Fah and Annuar (2012) study the Fisher Effect relationship in the Malaysian bond market. Yield spreads of Malaysian Government Securities (MGS) and Gross Domestic Product (GDP) deflator is used to proxy nominal interest rate and inflation. The quarterly data provide evidences that the cointegration test explains that there is a long-run relationship between the MGS spreads and GDP deflator. This result is further supported by the Granger causality test where there is a unidirectional relationship running from GDP deflator to spreads.

The relationship between inflation and stock return has been extensively studied in Malaysia. Previous researchers attempt to investigate the existence of Fisher Effect in the stock market Ibrahim (1999), Al-Khazali (2004), Hawati et al. (2010) and Geetha, Chong, Mohidin, & Vivin Vincent Chandran, (2011). Ibrahim (1999) examines the dynamic interactions in term of long run equilibrium and short run dynamics between seven macroeconomic variables and the stock prices in Malaysia while Al-Khazali investigates the generalized Fisher hypothesis for nine equity markets in the Asian countries. However, both studies fail to find any significant relationship between inflation and stock returns. The study from Hawati *et al*. (2010) has provided contrary evidence. After considering money supply and industrial production in the model, using ARDL cointegration approach, the study finds evidence on the importance of sources of inflation on stock returns-inflation relationship in Malaysian market. Geetha *et al.* (2011) study the relationship between inflation and stock returns in Malaysia, United States and China. This study reveals that a long run relationship exists between expected and unexpected inflation with stock returns in all countries but short run relationship is found only in China.

Hatemi-J and Irandoust (2008) apply the Kalman filter to estimate the time-varying parameters. The results show that the data, in general, reject the Fisher effect. In the same year, this finding is contradictory with the study from Nusair (2008). He tests the validity of the Fisher hypothesis for six Asian countries including Malaysia using a cointegration procedure developed by Gregory and Hansen (1996) that allows for the presence of a one-time endogenously determined structural break in the cointegrating vector. Their results indicate the presence of the full Fisher effect for Korea and the partial effect for Malaysia, Singapore, and Thailand. Ahmad (2010) tests the presence of the long run Fisher effect in eight Asian economies. By using monthly data and a variety of interest rates, the paper employs a recent nonlinear methodology to capture the long run relationship between the nominal interest rate and the inflation rate. The results indicate stronger evidence for the presence of a long run relationship between interest rate and inflation rate on the basis of the KSS test compared to the traditional ADF test.

With regard to the important relationship between the rates of interest and inflation in economy, Nezhad and Zarea (2007) aims at investigating the Granger causality relationship between the rates of interest and inflation in Iran's economy from 1959 to 2002. Toda and Yamamoto's Granger test of causality as well as ARDL approach were used to test the

hypothesis. The variables used in this model are the rate of interest and the rate of inflation. Two types of official and non-official rates of interest are considered in this study. The former interest rate is measured by the amount of the interest of the deposits of long-term investment and the latter is determined by the market interest rates. The results show that in Iran's economy; the rate of (official and non-official) interest is the cause of inflation and not vice versa.

Shabbir (2010), tests the existing of Fisher relationship in two oil-producing and four South Asian countries. The available series of interest rates involved in this study are government bond rate, call money rate, deposit rate, money market rate, treasury bill rates and bank rate. The data span the period from 1971 until 2006. Using the ARDL estimation method, he finds the presence of Fisher effect in a weak form for Pakistan, Kuwait, Saudi Arabia, and India. However, no Fisher relationship has been found in Bangladesh and for Sri Lanka.

3. Data Selection

This study uses monthly data spanning a period of 13 years from January 2000 to December 2012.The secondary data for all variables are obtained from Bank Negara Malaysia's annual report. Data on the 3-months Treasury Bills Rates (MTB) and Interbank rate (IBR) are used to proxy money market rates while consumer price index (CPI) is used to compute inflation. CPI is one of the most frequently used statistics for identifying periods of inflation or deflation. This is because in a short period of time, large rises in CPI typically denote periods of inflation and large drops in CPI usually mark periods of deflation (Ur, Khan & Ahmad, 2004).

3.1 The Cointegration ARDL Bound Test

Saadet, Adnan and Evrim (2006) mention that the application of the conventional cointegration methodology is too restrictive. According to them, limiting the differencing parameters to integer value (0 and 1) could be misleading. They suggest that fractional cointegration can distinguish between cases in which the equilibrium errors are non-mean reverting but exhibit significant persistence in the short run. This would produce a misleading result. The ARDL methodology is more suitable in detecting the long-run relationship between the variables irrespective of whether the time series are I(0) or I(1). This is different with likelihood-based Johansen and Juselius (1990) and the residual-based Engle and Granger's (1987) approaches. Pesaran and Shin (1999) state in ARDL framework for small sample sizes, the estimators of the long-run coefficients are super-consistent. Many studies have success to support hypothesis by using ARDL methodology.

Before proceeding with the ARDL bound test, it is important to analyse the stationary properties of the macro time series by applying the unit root test. From econometrics point of view, there is a critical problem associated with non-stationary variables which can lead to spurious correlation. Thus, it is important to determine the stationarity of the data, because if the data is not stationary there will be no long run mean and its variance and covariance will exhibit non-constancy. Hence, in non-stationary data, variables may produce weak results in the regression.

After checking for data stationarity, next we proceed with the cointegration test approach. To study the relationship between nominal interest rates and inflation, we employ the ARDL

bounds test proposed by Pesaran, Shin and Smith (2001) and Pesaran and Shin (1996). The advantages of this method as it handles integer or fractional order of integration and does not impose restrictive assumption that all the variables under study must be integrated of the same order. This proved to be an important element as some variables may have fractional order of integration (Pesaran & Shin 1996). The following error correction version of the ARDL (p, q) model will be estimated in order to test the cointegration relationship between money market return and inflation

$$\Delta i_t = c + \beta_1 i_{t-1} + \beta_2 x_{t-1} + \sum_{j=1}^{p-1} \phi_i \Delta i_{t-i} + \sum_{i=1}^{q-1} \psi \Delta x_{t-i} + \phi \Delta x_t + \varepsilon_t \quad (2)$$

Where, Δ is the first difference operator, i_t = expected inflation (INF_t); x_t = money market return (MTB_t, IBR_t) and (ε_t) is white noise error term. Meanwhile, p and q denote the autoregressive lag orders of the variables INF and (MTB, IBR), respectively. In practice there is no reason why the lag lengths on the first differences variables need to be the same. The ARDL allows for the possibility of different lag lengths for each variable.

The long run cointegration relationship in equation (2) is measured using F-statistic and ordinary least squares. The calculated critical values of this test fall under two situations, *i.e.* when both series are I(0) and I(1) are developed by Pesaran et al. (2001).The two sets of critical values represent upper and lower bounds. If the calculated F-statistics falls below the lower critical value, we accept the null hypothesis of no long-run relationship between two variables. If the calculated F-statistic value falls above the upper critical value, the alternative hypothesis is true and this implies the existence of long-run relationship between the nominal interest rate and expected inflation rate. Furthermore, if the calculated F-statistics falls within these bounds, the result would be inconclusive.

We then continue to find the coefficients of the long run relations ARDL (p,q) between the nominal rates of interest rate and expected inflation rate. The p represents number of lag lengths of the first difference for nominal rates of interest and q is the number of lag lengths of the first difference for expected inflation rate. For the selection of optimal lag lengths, two different criteria, Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) are employed. Bahmani-Oskooee and Gelan (2006) mention that by checking the significance of the lagged error correction term (ECT) is the alternative way in finding the long-run relationship between the variables. They conclude that a statistically significant value of coefficient and negative value of ECT denote the existence of cointegration. The coefficient for ECM_{t-1} also measures the speed of adjustment between the nominal rates of interest and expected inflation rates to meet their long-run equilibrium.

4. Estimation Results

Before we proceed with the ARDL bounds test, we test the stationarity of all variables in order to determine the order of integration. Table 1 reports the unit root tests, namely the Augmented Dickey Fuller and Phillips-Perron tests. The results provided in Table 1 shows that none of the variables are integrated at an order higher than one based on both the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC), thus allowing for the

legitimate use of the ARDL bounds techniques.

Table 1. Results of the Unit Root Tests

	Augmented Dickey Fuller Test			
	Level		First Differences	
	Constant No Trend	Constant Trend	Constant No Trend	Constant Trend
INF	-3.6942(11)***	-3.7653(11)***	-6.3596(11)***	-6.3231(11)***
MTB	-2.4501(11)	-2.4444(11)	-9.9813(11)***	-9.9600(11)***
IBR	-2.0015(11)	-2.1019(11)	-5.0005(11)***	-4.9749(11)***

Note: *, **, *** denotes 10%, 5% and 1% significance level respectively.

	Phillips-Perron Test			
	Level		First Differences	
	Constant No Trend	Constant Trend	Constant No Trend	Constant Trend
INF	-3.2586**	-3.3036**	-4.9603***	-4.9010***
MTB	-2.1125	-2.1219	-10.077***	-10.0557***
IBR	-1.6791	-1.7581	-4.9809***	-4.9552***

Note: *, **,*** denotes 10%, 5% and 1% significance level respectively.

Using the ARDL methodology as suggested by (Pesaran & Shin, 1996, 1995), first we examine the relationship between money market returns and inflation.

$$\Delta INF_t = c + \beta_1 INF_{t-1} + \beta_2 MTB_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta INF_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta MTB_{t-i} + \varepsilon_t \quad (3)$$

$$\Delta INF_t = c + \beta_1 INF_{t-1} + \beta_2 IBR_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta INF_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta IBR_{t-i} + \varepsilon_t \quad (4)$$

Table 2. The Coefficient of MTB and IBR

Interest rates	Coefficient	T-statistics	P-value
MTB	1.8406	2.1412	0.034**
IBR	2.3299	3.0132	0.003*

Note: *, **, *** denotes 10%, 5% and 1% significance level respectively.

As reported in Table 2, we can see that interbank rate has a stronger relationship than Malaysian Treasury bills, as the coefficient value is slightly higher than Treasury bills'. The Malaysian Treasury bill is significant at 90% level and interbank rate is significant at 95% level. Therefore we reject the null hypothesis of no relationship between the variables. The findings suggest strong relationship exists between money market returns and inflation.

The next step after identifying the existence relationship between variables is to specify the Error Correction Model (ECM) in ARDL methodology. In some cases, both criteria selected the same number of lag lengths for the conditional ECM mentioned in Equation (2). The results are reported in Table 3. The first column of each table shows the interest rate series used in estimation, while the rest of columns indicate the calculated F-values and the order of ARDL (p, q) for each SBC and AIC criteria. The ARDL (p, q) model denotes p is the number of lagged differences of nominal interest rates and q is the number of lagged differences of the inflation rate.

Table 3. Estimated Long Run Coefficient ARDL Approach by using Akaike Information Criteria and Schwarz Information Criteria (2,0)

Interest rates	F(p,q)	AIC	F(p,q)	SBC	ECM_{t-1}	P-value
MTB	13.2439	(2,0)	13.2439	(2,0)	-0.1224	0.000
IBR	14.4879	(2,0)	14.4879	(2,0)	-0.1394	0.000

Table 4. Critical values for the bounds test in CaseIII: Intercept and Trend

Critical Value	Lower bound	Upper bound
Pesaran et al. (2001)		
5% significance level	3.79	4.85
10% significance level	3.18	4.23
Null Hypothesis: No Cointegration		

From the table above, it is clearly seen that the calculated F-statistics for both variables are larger than upper-bound critical value at 5 and 10 per cent. This indicates the presence of cointegration between the variables. From the table above, we find that the ECM_{t-1} value is negative and P-value is significant at 1per cent. This indicates the efficiency of long run cointegration exists between the variables (Bahmani-Oskooee & Gelan, 2006). The coefficient on ECM_{t-1} also gauges the speed with which the interest rate and inflation rates converge in the long-run.

5. Summary and Conclusion

This paper examines the validity of the Fisher hypothesis by testing the relationship between inflation and nominal interest rates in the Malaysian money market. This study employs the

ARDL econometric methodology introduced by Pesaran et al. (2001). Overall, the estimation results on the Malaysian treasury bill and interbank rates show that the presence of long run Fisher effect in the Malaysian money market is supported. However, interbank rate holds a strong relationship with expected inflation rates and this represents its capability to predict future inflation rates. In this respect, our findings are similar with the evidence reported by Fah and Annuar (2012) on the Malaysian Government Securites market. As a conclusion, this study provides the evidence on the Fisher Effect theory in Malaysian money market. This realization would help Malaysian monetary authorities to formulate better monetary policy in future.

References

Ahmad, S. (2010). The long-run Fisher effect in developing economies. *Studies in Economics and Finance, 27*(4), 268-275. http://dx.doi.org/10.1108/10867371011085129

Al-khazali, O. (1999). Nominal interest rates and inflation in the Pacific- Basin countries. *Management Decision, 37*(6), 491-498. http://dx.doi.org/10.1108/00251749910277989

Asari, F. F. A. H., Baharuddin, N. S., Jusoh, N., Mohamad, Z., & Jusoff, N. S. K. (2011). A Vector Error Correction Model (VECM) Approach in Explaining the Relationship Between Interest Rate and Inflation Towards Exchange Rate Volatility in Malaysia. *World Applied Sciences Journal, 12*, 49-56

Bahmani-Oskooee, M., & Gelan, A. (2006). On the relation between nominal devaluation and real devaluation: evidence from African countries. *Journal of African Economies*, August 29, pp. 1-26. http://dx.doi.org/10.1093/jae/ejl027

Berument, H., & Jelassi, M. M. (2002). The Fisher hypothesis: a multi-country analysis The Fisher hypothesis: a multi-country analysis, 34(April 2013), 1645-1655.

Carneiro, F. G., Ângelo, J., Divino, C. A, & Rocha, C. H. (2002). Revisiting the Fisher hypothesis for the cases of Argentina, Brazil and Mexico. *Applied Economics Letters, 9*(2), 95-98. http://dx.doi.org/10.1080/13504850110049405

Crichton, D. R., & Guimares-Filho, R. F. (2006). *Inflation Dynamics in Malaysia.*

Engle, R. F., & Granger, C. W. J. (1987). Cointegration and error correction: representation, estimation and testing. *Econometrica, 55*, 251-76. http://dx.doi.org/10.2307/1913236

Fah, C. F., & Annuar, N. (2012). A Cointegration Tests on Malaysian Government Securities (MGS) Spreads and Inflation 1. *Terengganu International Finance And Economics Journal,* 2(1), 15-27.

Fama, E. F. (1975). Short-terms Interest Rates as a Predictors of Inflation. *Journal of Financial Economics, 65*, 269-282.

Fatima, N., & Sahibzada, S. A. (2012). Empirical Evidence of Fisher Effect in Pakistan. *World Applied Sciences Journal, 18*(6), 770-773.

Fisher, I. (1930). The Theory of Interest, MacMillan: New York.

Geetha, C., Chong, V., Mohidin, R., & Vivin, V. C. (2011). The Relationship Between Inflation and Stock Market: Evidence from Malaysia, United States and China. *International Journal of Economics and Management Sciences, 1*(2), 1-16.

Granville, B., & Mallick, S. (2004). Fisher hypothesis: UK evidence over a century. *Applied Economics Letters, 11*(2), 87-90. http://dx.doi.org/10.1080/1350485042000200169

Gul, E., & Acikalin, S. (2008). An examination of the Fisher Hypothesis: the case of Turkey. *Applied Economics, 40*, 37-41. http://dx.doi.org/10.1080/00036840600994112

Gul, E., & Ekinci, A. (2006). The Causal Relationship Between Nominal Interest Rates and Inflation: The Case of Turkey. *Scientific Journal of Administrative Development, 4*, 54-69.

Hassan, H. (1999). Fisher effect in Pakistan. *The Pakistan Development Review, 38*, 153-66.

Hawati, J., Ruzita, R., Hasimi, Y., & Izani, I. (2010). Stock Returns and Inflation with Supply and Demand Shocks: Evidence from Malaysia. *Jurnal Ekonomi Malaysia, 44*, 3-10.

Hawtrey, K. M. (1997). The Fisher effect and Australian interest rates. *Applied Financial Economics, 7*, 337-46. http://dx.doi.org/10.1080/096031097333457

Ibrahim, M. (1999). Macroeconomic Variables and Stock Prices in Malaysia: An Empirical Analysis. *Asian Economic Journal, 13*(2), 219-231. http://dx.doi.org/10.1111/1467-8381.00082

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration - With Applications to the Demand for Money. *Bulletin of Economics and Statistics, 52*(2), 169-210. http://dx.doi.org/10.1111/j.1468-0084.1990.mp52002003.x

Ki-nal & Lahiri. (1988). A model for ex ante real interest rates and derived inflation forecasts. *Journal of the America Statistical Association, 83*, 665-673. http://dx.doi.org/10.1080/01621459.1988.10478646

Kasman, S., Kasman, A., & Turgutlu, E. (2006). Fisher Hypothesis Revisited: A Fractional Cointegration Analysis. Emerging Markets *Finance and Trade, 42*(6), 59-76. http://dx.doi.org/10.2753/REE1540-496X420604

Ling, T., Liew, V. K., & Syed, A. W. S. K. W. (2007). Fisher hypothesis: East Asian evidence from panel unit root tests. *Munich Personal Repec Archieve,* (5432).

Nezhad, M. Z., & Zarea, R. (2007). Investigating the Causality Granger Relationship between the Rates of Interest and Inflation in Iran. *Journal of Social Science, 3*(4), 237-244. http://dx.doi.org/10.3844/jssp.2007.237.244

Nusair, S. A. (2008). Testing for the Fisher hypothesis under regime shifts: an application to Asian countries. *International Economic Journal*, 22(2), 273-284. http://dx.doi.org/10.1080/10168730802095660

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326.

http://dx.doi.org/10.1002/jae.616

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association, 94*, 37-41.

R. van der Merwe, E. Wan, & Julier, S. J. (2004). Sigma-Point KalmanFilters for Nonlinear Estimation and Sensor-Fusion: Applications to Integrated Navigation. In Proceedings of the AIAA Guidance, Navigation & Control Conference, Providence. http://dx.doi.org/10.2514/6.2004-5120

Ur, H., Khan, S., & Ahmad, I. (2004). Does Fisher Effect Exist in Pakistan? A Cointegration Analysis. *Pakistan Economic and Social Review, 42*(1), 21-37.

Note 1: Source from Islamic Interbank Money Market Website

Note 2: Source from Bank Negara Malaysia.