



***EVIDENCE OF FISHER EFFECT IN SOUTH EAST ASIAN AND PACIFIC
REGION***

BRENDA BOPULAS

FEP 2013 14

**EVIDENCE OF FISHER EFFECT IN SOUTH EAST ASIAN AND PACIFIC
REGION**

By

BRENDA BOPULAS

**Project Paper Submitted in Partial Fulfilment of the Requirement for the
Master of Economics
Faculty of Economics and Management
University Putra Malaysia
2013**

ABSTRACT

EVIDENCE OF FISHER EFFECT IN SOUTH EAST ASIAN AND PACIFIC REGION

By

BRENDA BOPULAS

This study intends to examine the validity of Fisher Effect on selected developing countries in South East Asia and Pacific Region. A total of 10 developing countries are selected which are Malaysia, Philippines, Papua New Guinea, Solomon Island, Thailand, Vanuatu, Tonga, Fiji, Vietnam and Indonesia. Quarterly data is used that start as early as 1990:1 because this is the start of financial liberalization in most developing countries. Dependent variables used include nominal interest rate proxy by Treasury Bill Rate (TBR), Deposit Rate (DR) and Money Market Rate (MMR) depending on the availability data of respective countries. While Independent Variables used is Consumer Price Index (CPI) as a proxy for inflation rate.

The empirical test that is used in this study is unit root test. The models that are employed are Autoregressive model to find the expected inflation and also Autoregressive Distributed lag model to determine the cointegration between both variables. The results show that only Thailand exhibits Fisher Effect while the other nine countries could not detect the existence of Fisher Effect.

ABSTRAK

BUKTI *FISHER EFFECT* DI RANTAU ASIA TENGGARA DAN PASIFIK

Oleh

BRENDA BOPULAS

Kajian ini bertujuan untuk mengkaji kesahihan *Fisher Effect* di negara membangun yang dipilih daripada rantau Asia Tenggara dan Pasifik. Sejumlah 10 negara membangun telah dipilih yang terdiri daripada Malaysia, Philippines, Papua New Guinea, Solomon Island, Thailand, Vanuatu, Tonga, Fiji, Vietnam and Indonesia. Data sukuan telah digunakan yang bermula seawal 1990:1 kerana tahun ini bermulanya liberalisasi kewangan terutamanya di kebanyakan negara membangun. Pembolehubah bergantung yang digunakan termasuk kadar faedah nominal diwakili dengan Kadar *Treasury Bill*, kadar deposit dan kadar pasaran wang. Pembolehubah bebas ialah kadar inflasi yang diwakili dengan indeks harga pengguna.

Ujian empirikal yang digunakan termasuk ujian kepegungan. Model yang digunakan ialah Autoregressive (AR) model untuk meramal kadar inflasi di masa hadapan. Autoregressive Distributed lag (ARDL) model juga digunakan untuk menentukan kopengamiran antara kedua-dua pembolehubah. Keputusan menunjukkan hanya Thailand mempunyai *Fisher Effect* sementara sembilan negara yang lain tidak dapat mengesahkan kewujudan *Fisher Effect*.

ACKNOWLEDGEMENT

First and foremost, I would like to say thank you to my university, University Putra Malaysia (UPM) for their support and also effort in ensuring that all of the master of economics student would be able to take their project paper as it is one of the prerequisites in order to enable the students to qualify for their graduation. I would also like to thank my faculty, Faculty of Economics and Management for all their support and also the resources that they had provided in order for me to successfully complete my paper.

Secondly, a warm thank you also to my supervisor, Professor Dr Muzafar Shah Habibullah for the time and patient that he had invested in supervising me all the way until the completion of this paper is made possible. This paper would not be able to be completed without his guidance and advices.

Not forgetting also the lecturers of Faculty of Economics and Management that had teaches me all the fundamental knowledge and concept of economics. The knowledge that I learn all the while had help me in completing my paper.

Lastly, I would also like to thank all my friends, course mates and family that always by my side to motivate me and offer encouraging words to me that help me overcome all the difficulties and tension during the process of doing this paper, without their motivation and trust, I would not be able to complete this paper.

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ABSTRAK	iii
ACKNOWLEDGEMENT	iv
APPROVAL	v
DECLARATION	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
CHAPTER	
1 INTRODUCTION	1
1.0 Introduction	1
1.1 Background of Study	1-2
1.1.1 Trend of nominal interest rate and inflation rate	2-8
1.2 Problem Statement	8-11
1.3 Significance of Study	11-12
1.4 Objectives of Study	13
1.4.1 General Objective	13
1.4.2 Specific Objectives	13
2 LITERATURE REVIEW	14
2.0 Introduction	14
2.1 Theoretical Framework	14-15
2.2 Fisher's Finding	16-17
2.3 Empirical Testing Procedure	17
2.3.1 Time Lag Structure	17-18
2.3.2 Expected Inflation	18-19
2.3.3 Methodology adopted in Validating Fisher Effect	20-21
2.4 Empirical Evidences	21
2.4.1 Empirical Evidence in Developed Countries	21-24
2.4.2 Empirical Evidence in Developing Countries	25-26

3	METHODOLOGY	27
3.0	Introduction	27-28
3.1	Model and Data Description	28-31
3.2	Empirical Testing Procedure	31
3.2.1	Unit Root Test	31-33
3.2.2	Forecasting Model	33-34
3.2.3	Autoregressive Distributed Lag (ARDL)	34-36
4	RESULTS AND DISCUSSION	37
4.0	Introduction	37-38
4.1	Unit Root Test Result for Actual Inflation Rate and Nominal Interest Rate	38-42
4.2	Autoregressive (AR) Model results	43-45
4.3	Unit Root Test Results for Expected Inflation Rate	45-46
4.4	Cointegration test results	46-48
4.5	Long-run and Short run ARDL estimation	49-51
5	CONCLUSION AND RECOMMENDATIONS	52
5.0	Introduction	52
5.1	Summary of Findings	53
5.2	Policy Implication and Suggestion	54
5.2.1	Monetary Policies	54
5.2.2	Fiscal Policies	54-55
5.2.3	Supply Side Policies	55-56
5.3	Limitations	56
5.4	Recommendations for future studies	56-57
5.5	Contribution of Study	57
5.6	Concluding Remark	57-58
	REFERENCES	59-63
	APPENDICES	64

LIST OF TABLES

	Page
Table 3.1: List of Countries and data period	29
Table 4.1: Results from Augmented Dickey Fuller (ADF) test	40
Table 4.2: Results from Phillip Perron (PP) test	41
Table 4.3: Autogressive Model Lag Selection	42
Table 4.4: Results from ADF test for LEINF	44
Table 4.5: Results from PP test for LEINF	45
Table 4.6: Critical value bounds of the F-statistic unrestricted intercept and no trend	47
Table 4.7: Bound Test for Cointegration	48
Table 4.8: ARDL estimation for long-run coefficients	50
Table 4.9: ARDL estimation for Error Correction Model	50

LIST OF FIGURES

	Page
Figure 1: Treasury Bill Rate and Inflation Rate in Malaysia	2
Figure 2: Deposit Rate and Inflation Rate in Fiji	3
Figure 3: Treasury Bill Rate and Inflation Rate in Philippines	3
Figure 4: Treasury Bill Rate and Inflation Rate in Papua New Guinea	4
Figure 5: Deposit Rate and Inflation Rate in Thailand	4
Figure 6: Treasury Bill Rate and Inflation Rate in Solomon Island	5
Figure 7: Deposit Rate and Inflation Rate in Vanuatu	5
Figure 8: Deposit Rate and Inflation Rate in Tonga	6
Figure 9: Deposit Rate and Inflation Rate in Vietnam	6
Figure 10: Money Market Rate and Inflation Rate in Indonesia	7

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter is divided into four parts which the first section will covers on the concept of study, the next section the significance of this study to the stakeholder will be discussed. After that, the research issues and the problem involving the topic of study will be explained and lastly the objective of doing this particular study.

1.1 Background of Study

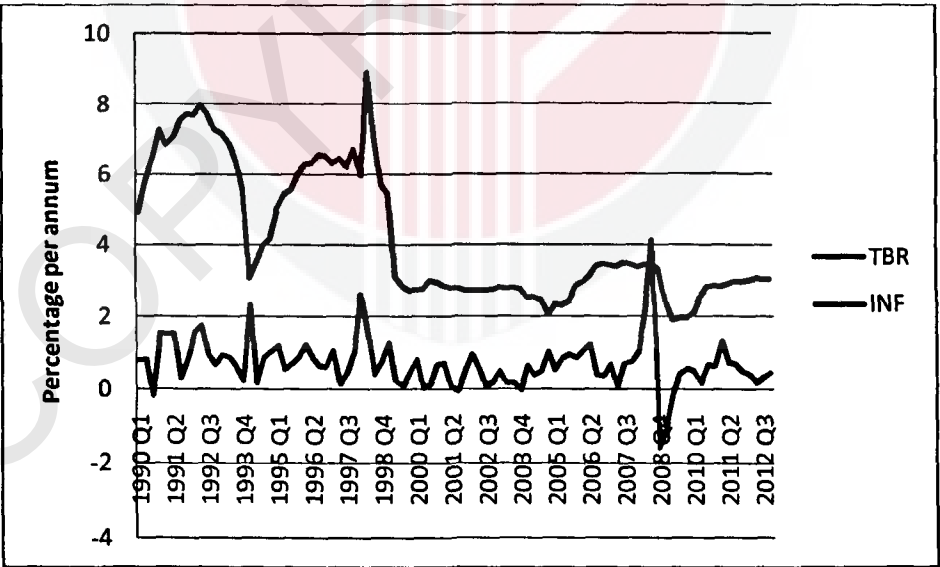
The relationship between interest rates and inflation was first introduced by Fisher (1930). He states that in any period of time, nominal interest rate is equal to the sum of real interest rate and expected inflation rate. This relationship is later named as Fisher Effect. The hypothesis in Fisher Effect state that nominal interest rate could be decomposed into two components. They are a real rate plus and expected inflation rate. There claimed to be a one to one relationship between inflation and interest rate, with real interest rate being unrelated to the expected rate of inflation and determine completely by the real factors of economy. If real interest rate is related to the expected rate of inflation then the changes in the real rate will not lead to full adjustment in response to expected inflation.

Fisher hypothesis has maintained a key position in economic literature and according to Hawtrey (1997), one of the reason is because real interest rate plays an

essential role in any economic growth, savings and investment and also trade and capital flow which eventually will affect the exchange rate. The second reason was proposed by Fama (1975), he suggested that nominal interest rates can be used to determine future inflation expectation. The third reason is because Fisher hypothesis is an important factor for central banks to consider. This is mainly because if a long run Fisher effect is established between interest rates and expected inflation then this will means that real interest rate is not affected by monetary policy but determined by real economics factor alone (Payne and Ewing, 1997).

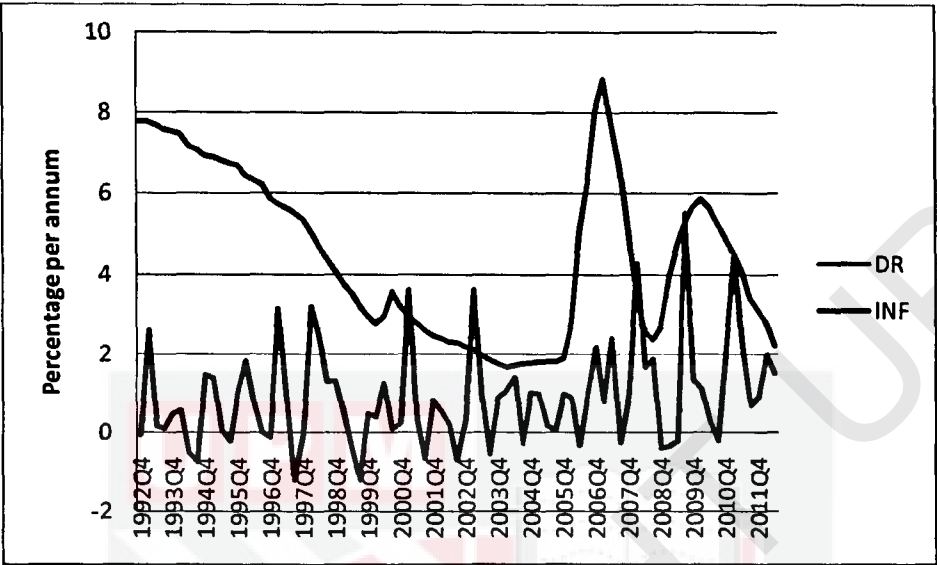
1.1.1 Trend of nominal interest rate and inflation rate

Figure 1: Treasury Bill Rate and Inflation Rate in Malaysia



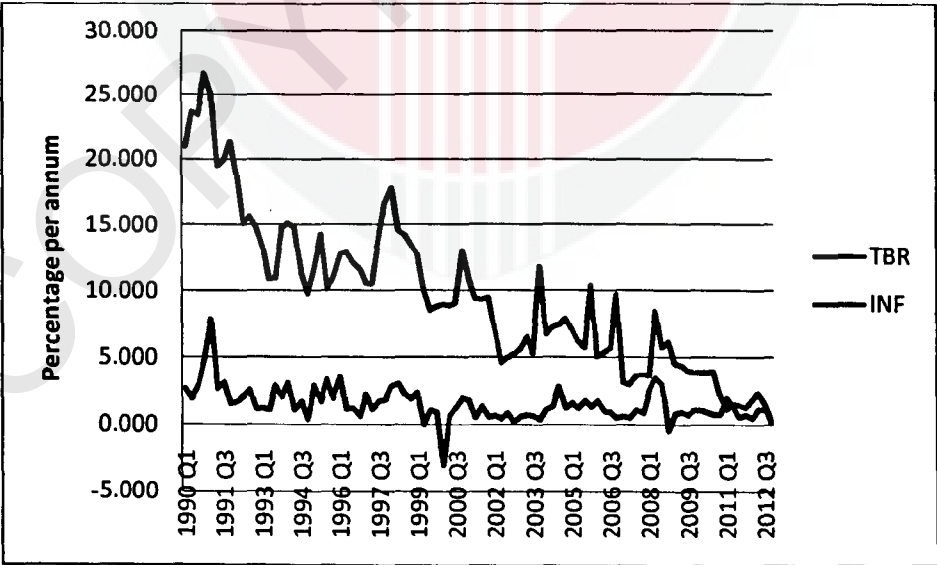
Source: International Monetary Fund, International Financial Statistic

Figure 2: Deposit Rate and Inflation Rate in Fiji



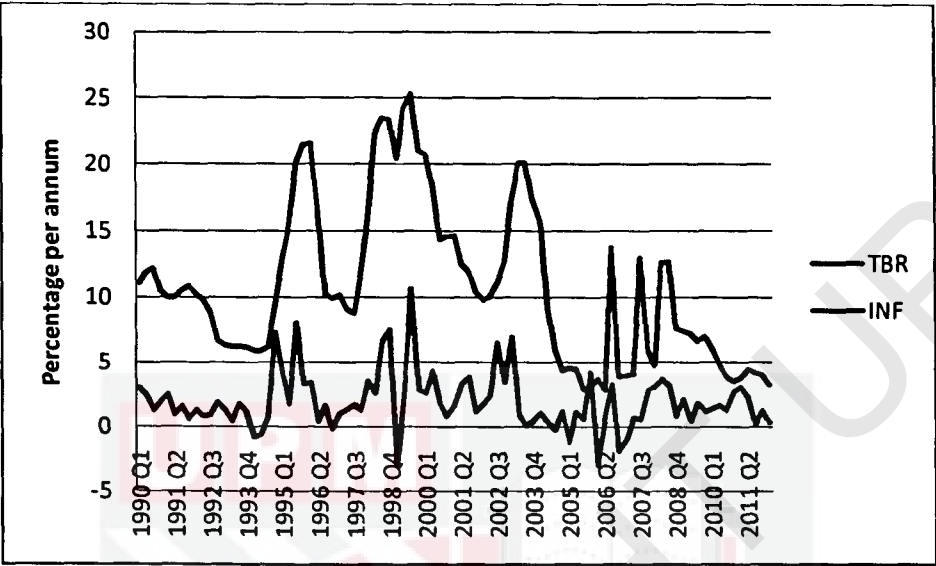
Source: International Monetary Fund, International Financial Statistic

Figure 3: Treasury Bill Rate and Inflation Rate in Philippines



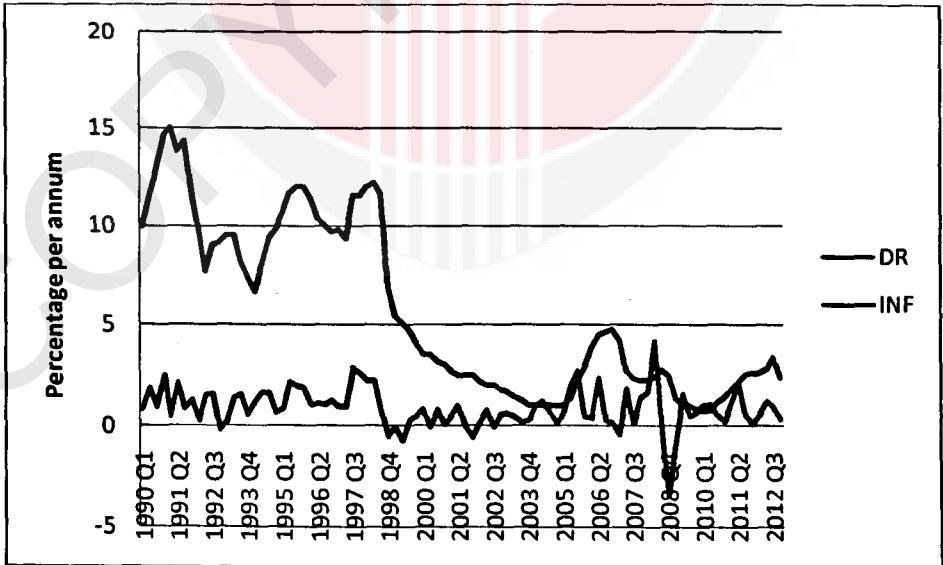
Source: International Monetary Fund, International Financial Statistic

Figure 4: Treasury Bill Rate and Inflation Rate in Papua New Guinea



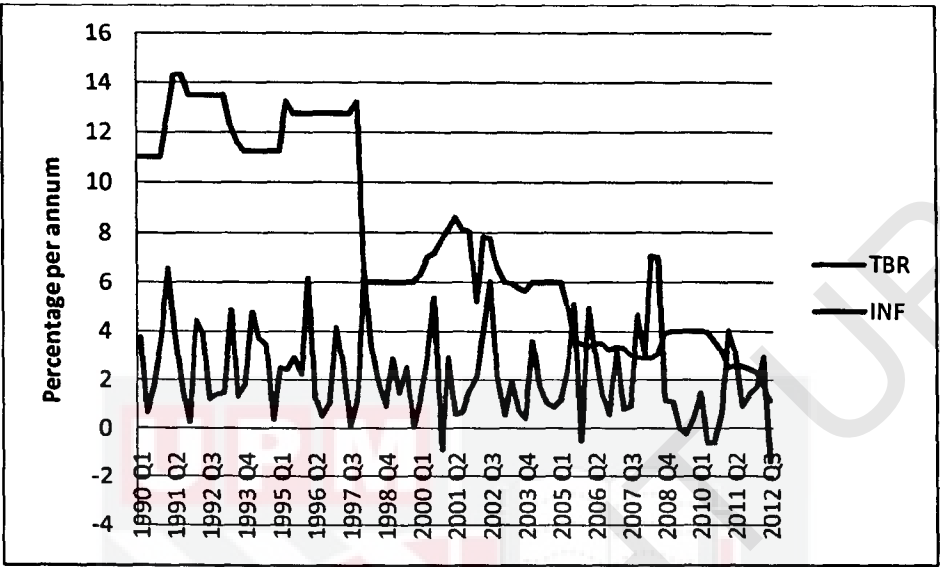
Source: International Monetary Fund, International Financial Statistic

Figure 5: Deposit Rate and Inflation Rate in Thailand



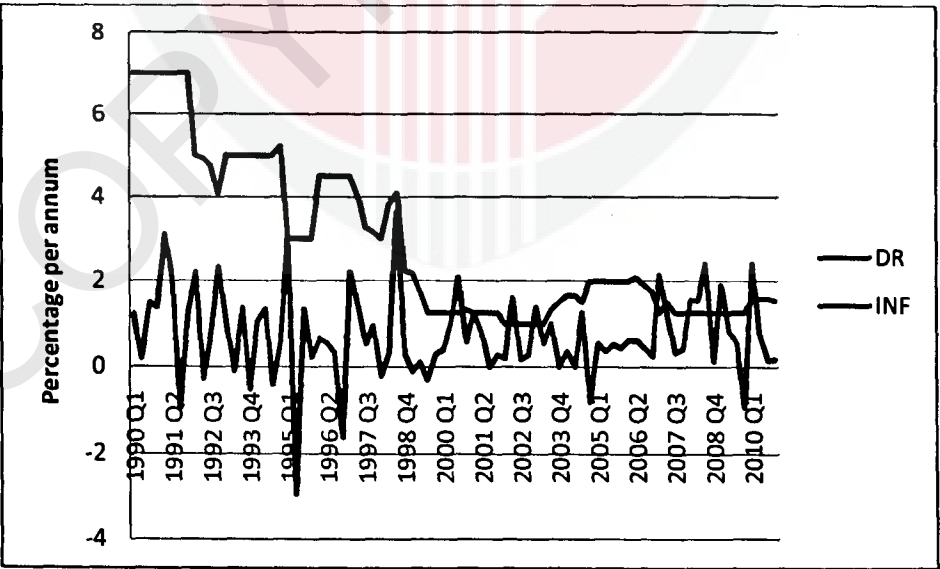
Source: International Monetary Fund, International Financial Statistic.

Figure 6: Treasury Bill Rate and Inflation Rate in Solomon Island



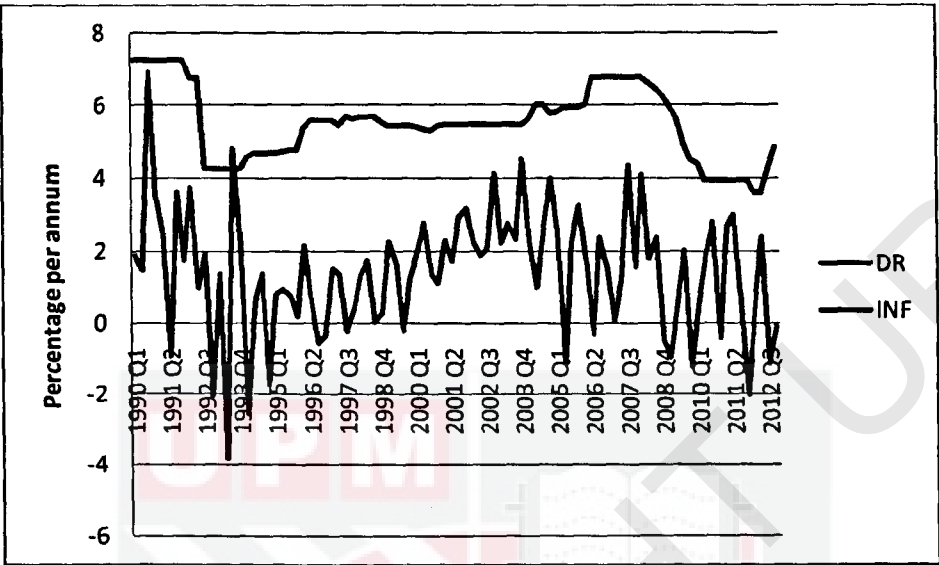
Source: International Monetary Fund, International Financial Statistic.

Figure 7: Deposit Rate and Inflation Rate in Vanuatu



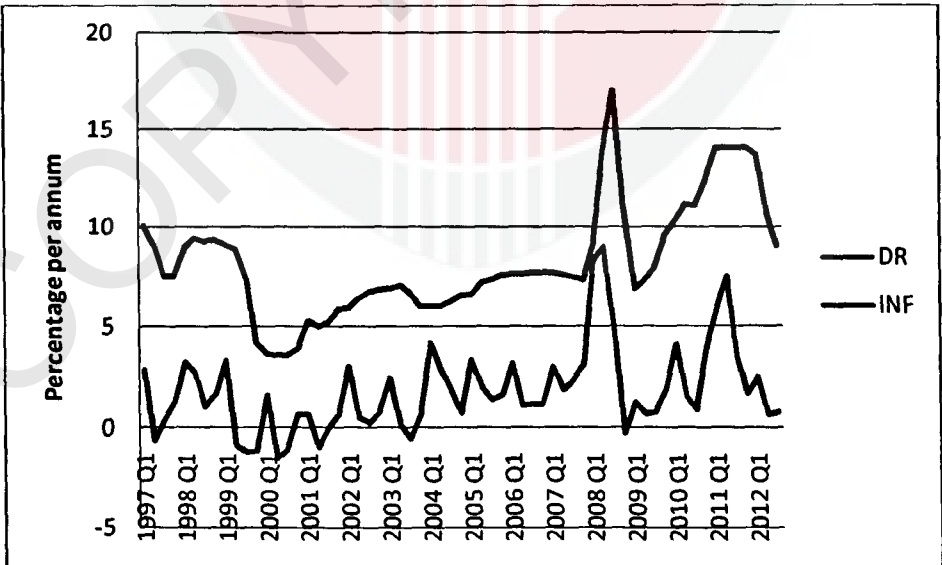
Source: International Monetary Fund, International Financial Statistic

Figure 8: Deposit Rate and Inflation Rate in Tonga



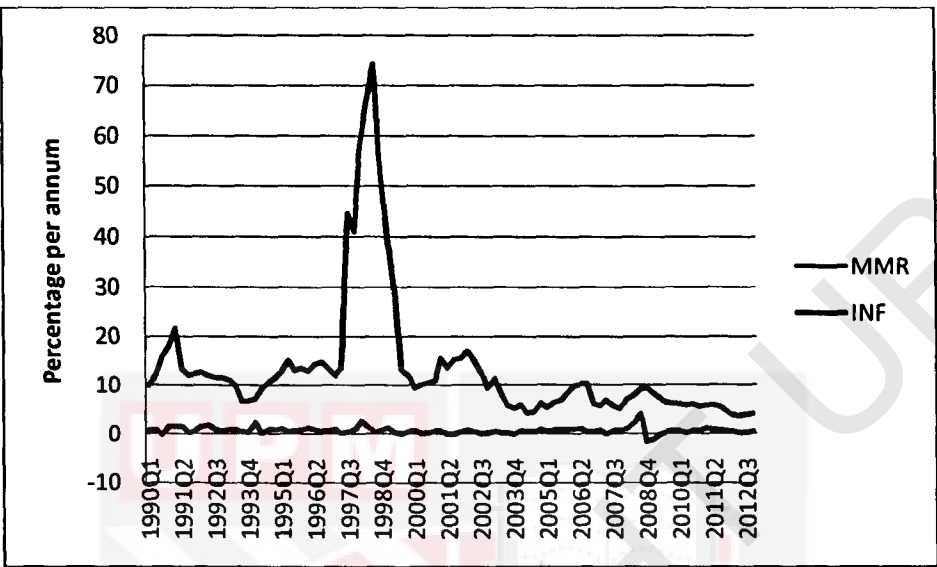
Source: International Monetary Fund, International Financial Statistic.

Figure 9: Deposit Rate and Inflation Rate in Vietnam



Source: International Monetary Fund, International Financial Statistic.

Figure 10: Money Market Rate and Inflation Rate in Indonesia



Source: International Monetary Fund, International Financial Statistic

Figure 1 to 10 show the trend of nominal interest rate and inflation rate in Malaysia, Fiji, Philippines, Papua New Guinea, Thailand, Solomon Island, Vanuatu, Tonga, Vietnam and Indonesia. Mishkin (1992) states that long run Fisher effect exists if inflation and interest rates have a common stochastic trend when they exhibit trends. For Malaysia, Solomon Island, Fiji, Vanuatu and Tonga it can be seen that inflation rate fluctuate more frequently compared to interest rate. On the other hand, for Indonesia nominal interest rate is more volatile compared to inflation rate. Around the year of the financial crisis, interest rate suddenly rose very high compared to the other years which have a high possibility becoming an outlier.

For Papua New Guinea, it can be observed that the trend for both interest rate and inflation rate are almost similar especially in the later years. However, for Thailand,

Philippines and Vietnam, these countries interest rate and inflation rate actually exhibit a quite similar trend in which when inflation fluctuate or increase, interest rate also have the same pattern. Despite that, the pattern for Vietnam after the financial crisis in 1997 and 1998 for both nominal interest rate and inflation rate differ as interest rate become more stable while interest rate more volatile.

From the graphs, the entire countries nominal interest rate trend is higher than their inflation rate trend. Besides that, it can be observed from the graph that for South East Asian countries, nominal interest rate before are high however after the occurrence of the crisis, nominal interest rate tend to decrease. While during the subprime mortgage crisis around 2007 to 2008, all the 10 countries recorded a sudden surge in inflation rate.

1.2 Problem Statement

There is a lot of studies on Fisher Effect that had been done for example Fama (1975), Mishkin (1992), Yuhn (1996), Crowder and Hoffman (1996), Dutt and Ghosh (1995), Hawtrey (1997), Koustas and Serletis (1999) and Mishkin and Simon (1995) where all of this studies were taken place in developed countries. On the other hand, study by Garcia (1993), Carneiro, Divino and Rocha (2002) and Phylaktis and Blake (1993) were in the perspective of developing countries. The empirical studies on the existence of Fisher Effect in developing countries remain scanty compared to developed countries as developing countries government still lack of transparency thus obtaining data had become a problem. Besides that, the financial sector of developing countries are

not so developed and regulated thus this lead to the question whether Fisher effect still valid in a partially developed financial sector.

Apart from that, investigating the relationship between nominal interest rate and inflation rate had been a popular research topic since long ago. However, in researching the existence of long run relationship between nominal interest rate and inflation rate there are a lot of issues emerge. One of the issues present is regarding to the period of estimation. Mishkin (1992) found that Fisher effect occurs during a particular period while in some period there is no evidence of Fisher Effect. Another question emerge here is whether different time period can yield different results.

The next issue exist is the method used to estimate the validity of Fisher Effect. Since 1980s, method of estimation keeps on renewing mainly due to the development of time series especially for studying non-stationary data. Even cointegration technique also consists of a lot of type such as Engle and Granger (1987) and Johansen (1988). Johansen technique was used by Dutt and Gosh (1995) in studying the Fisher effect in Canada however no evidence of long run relationship was found between nominal interest rate and inflation rate.

On the other hand, Crowder (1997) utilized the same technique and found evidence of Fisher Effect for Canada. In addition, Atkins (1989) using Engle and Granger co-integration technique for United States and Australia, Atkins found evidence of a long run relationship between nominal interest rate and inflation but MacDonald and Murphy (1989) applying the same technique on the same countries found no

evidence of such relationship. This bring to the conclusion that there are no best model exist as even the simplest model is able to help in validating Fisher effect as long as it is estimated correctly.

The problem or weakness with both of the cointegration test lies with the fact that they need the involved time series to be non-stationary. Although sometimes there is evidence which show the existence of unit root however such unit root test actually have low power. In these cases any hypotheses that will be made on the validity of Fisher Effect is conditional to the assumption that both nominal interest rate and inflation rate are $I(1)$. So, estimation model that do not suffer this particular shortcoming would need to be used to provide a solid statistical ground.

Besides that, inflation could leads to several problems. The first one is the effect of inflation towards balance of payment. When domestic prices rises more rapidly than foreign countries prices, exports tend to lag behind imports. This causes the rate of exchange to depreciate both on account of failing purchasing power of currency within the country and also adverse balance of payments. There are also in some cases occur outflow of capital. For developing countries, they might not be able to easily handle the problem of adverse balance of payment which could let these countries suffer from large institutional and other rigidities.

Inflation could also distort the financial system of the country. In its initial stages, financial system would be able to withstand the adverse effect of inflation as financial institution by their very nature tend to ignore the purchasing power of money

and operate with reference to interest rates and maturity of financial instruments. However, when inflation gathers strength, the financial system cannot withstand it and will eventually collapses. Thus, this study in the end attempt to solve:

- i. Whether nominal interest rate and inflation rate need to trend together in order for Fisher effect to exist.
- ii. Whether Fisher effect exists in developing countries with partially developed financial system.
- iii. The validity of Fisher effect using model without the assumption of the time series to be nonstationary.

1.3 Significance of Study

Fisher effect can be seen as a cornerstone of neutrality in monetary models from a macroeconomic perspective. Besides that, it can also be considered as an essential tool in explaining the other economic fundamentals for example exchange rate. This become practically important because inflation exist in all economies no matter your country is developed or less developed. In addition, the difference between nominal and real interest rate can affects all inter temporal savings and investment decisions in the economy. Thus, by understanding whether fisher effect exist in a country can be a key to gaining knowledge on how the economy runs as a whole and how they interact together.

By understanding the relationship between nominal interest rate and inflation, the Central Banks in the South East Asian and Pacific region can know whether nominal interest rate can affect inflation rate. If nominal interest rate and inflation rate are not

related to each other, increasing the interest rate or in other word manipulation of interest rate to lower the inflation rate will either make no changes or worst could even increase the level of inflation. Thus, by knowing the relationship between them can enable Central Bank to make wiser and appropriate decision or in other words setting the optimum interest rate and as a result implementing a policy which will benefit the economy as a whole.

Besides Central Bank, other stakeholders that can be affected indirectly are the households. If interest rate and inflation are not related, as mention previously it might worsen the economy and also cause a huge burden especially to the household. This is because usually when bank increases interest rate, they seldom increase interest rate of their business partners or also called as the big companies thus mostly households are the victim of the increasing interest rate which in the end not only it did not solve the problem of inflation but also cause a decrease in the purchasing power of the household thus slow down the economy even more. So, by studying the underlying relationship, this kind of problem can be avoided

Moreover, by investigating Fisher effect in South East Asian and Pacific region could also generate answer whether Fisher hypothesis applies to these countries. This directly also validate whether Fisher Effect still effective in today's world where most of the things had encounter enormous changes especially in the financial system in which there is a lot of channel that can be manipulated to control the level of inflation.

1.4 Objectives of Study

1.4.1 General objective

There is an extent to which inflation rate can be lowered by manipulating interest rate. The Fisher equation is therefore able to make a significant contribution to understanding the dynamics between nominal interest rates, real interest rates and expected inflation within these developing countries that was selected. Thus, this study aims to ascertain whether or not a Fisherian link exist between nominal interest rates and expected inflation in South East Asian and Pacific region.

1.4.2 Specific Objectives

The specific objectives of the study are:

- i. To determine the expected inflation rate for the selected developing countries in South East Asian and Pacific region.
- ii. To investigate whether long run relationship exist between nominal interest rate and inflation rate in the developing countries in South East Asian and Pacific region.
- iii. To find the speed of adjustment in a quarter when disequilibrium happen.

REFERENCES

- Atkins, F. J. (1989). Co-integration, error correction and Fisher effect. *Applied Economics*, 21, 1611-1620.
- Atkins, F. J., & Coe, P. J. (2002). An ARDL bounds test of the long run Fisher Effect in the United States and Canada. *Journal of Macroeconomics*, 24 (2), 255-266. doi: 10.1016/S0164-0704(02)00019-8
- Atkins, F. J., & Serletis, A. (2003). A bounds test of the Gibson Paradox and the Fisher effect: Evidence from Low-frequency International Data. *The Manchester School*, 71(6), 673-679. doi: 10.1046/j.1467-9957.2003.00373.x
- Atkins, F.J., & Sun, Z. (2003). *Using wavelets to uncover the Fisher Effect*. Discussion Paper 9, University of Calgary. Retrieved from <http://econ.ucalgary.ca/sites/econ.ucalgary.ca/files/u58/WP2003-09.pdf>
- Bonham, C. S. (1991). Correct Cointegration Test of the Long Run Relationship between Nominal Interest and Inflation. *Applied Economics*, 23, 1487-1492.
- Central Bank of Kenya. (2011). Monthly Economic Review: November 2011. Nairobi: Central Bank of Kenya.
- Carlson, J.A (1977). Short Term Interest Rates as Predictors of Inflation: Comment. *American Economic Review*, 67, 469-475. Retrieved from <http://www.jstor.org/stable/1831418>
- Carneiro, F. G., Angelo, J., Divino, C. A., & Rocha, C. H. (2002). Revisiting the Fisher Hypothesis for the cases Argentina, Brazil and Mexico. *Applied Economics Letters*, 9, 95-98. doi: 10.1080/13504850110049405
- Cooray, A. (2002). Testing the Fisher Effect for Sri Lanka with a forecast rate of inflation as proxy for inflationary expectations. *The Indian Economic Journal*, 50(1), 27-37. Retrieved from <http://gso.gbv.de/DB=2.39/PPNSET?PPN=1637360053>
- Crowder, W. J. (1997). The Long run Fisher Relation in Canada. *Canadian Journal of Economics*, 30(4), 1121-1142. Retrieved from <http://www.jstor.org/stable/136313>

- Crowder, W. J. & Hoffman, D. L. (1996). The Long run Relationship between Nominal Interest Rates and Inflation: The Fisher Equation Revisited. *Journal of Money, Credit, and Banking*, 28(1), 102-118. Retrieved from <http://www.jstor.org/stable/2077969>
- Darby, M. (1975). The Financial and Tax Effects of Monetary Policy on Interest Rates. *Economic Inquiry*, 13(2), 266-276. doi: 10.1111/j.1465-7295.1975.tb00993.x
- Davidson, R. & MacKinnon, J. G. (1993). *Estimation and Inference in Econometrics*. Oxford University Press: New York.
- Dickey, D. A. & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74 (366), 427-431.
- Dutt, S. D. & Ghosh, D. (1995). The Fisher Hypothesis: Examining the Canadian Experience. *Applied Economics*, 27(11), 1025-1030. doi: 10.1080/00036849500000084
- Engle, R. F. & Granger, C. W. J. (1987). Co-integration and error correction representation, estimation and testing. *Econometrica*, 55, 251-276.
- Fahmy, Y. A. F. & Kandil, M. (2003). The Fisher Effect: New Evidence and Implication. *International Review of Economics & Finance*, 12(4), 451-465. doi: 10.1016/S1059-0560(02)00146-6
- Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25, 1025-1030. Retrieved from <http://www.jstor.org/stable/2325486>
- Fama, E. F. (1975). Short Term Interest Rates as Predictors of Inflation. *American Economic Review*, 65(3), 269-282. Retrieved from <http://www.jstor.org/stable/1804833>
- Fisher, I. (1930). *The Theory of Interest*. New York: Macmillan.
- Browne, F. & Doran, D. (2005). Do Equity Index Industry Groups Improve Forecasts of Inflation and Production? A US Analysis. *Applied Economics*, 37(15), 1801-1812.
- Garcia, M. G. P. (1993). The Fisher Effect in a signal Extraction Framework: The recent Brazilian Experience. *Journal of Development Economics*, 41(1), 71-93. doi: 10.1016/0304-3878(93)90037-N
- Gibson, W. E. (1970). Price Expectation Effects on Interest Rates. *Journal of Finance*, 25, 19-34. doi: 10.1111/j.1540-6261.1970.tb00410.x

- Gujarati, D. N. & Porter, D. C. (2009). *Basic Econometrics*. McGraw Hill: New York.
- Hawtrey, K. M. (1997). The Fisher Effect and Australian Interest Rates. *Applied Financial Economics*, 7(4), 337-346. doi: 10.1080/096031097333457
- Inder, B., & Silvapulle, P. (1993). Does the Fisher Effect apply in Australia? *Applied Economics*, 25(6), 839-843. doi: 10.1080/00036849300000138
- Jareno, F. & Tolentino, M. (2012). The Fisher Effect in the Spanish Case: A Preliminary Study. *Asian Economic and Financial Review*, 2(7), 841-857.
- Jensen, M. J. (2009). The Long Run Fisher Effect: Can it be Tested. *Journal of Money, Credit and Banking*, 41(1), 221-230.
- Joines, D. (1977). Short Term Interest Rates as Predictors of Inflation: Comment. *American Economic Review*, 67, 469-475. Retrieved from <http://www.jstor.org/stable/1831419>.
- Johansen, S. (1988). Statistical analysis of Co-integrated vectors. *Journal of Economic Dynamics and Control*, 12, 231-254.
- Johansen, S. & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration: with application to the Demand for Money. *Oxford Bulletin of Economics and Statistics*, 52, 169-210.
- Junttila, J. (2001). Testing an Augmented Fisher Hypothesis for a Small Open Economy: The Case of Finland. *Journal of Macroeconomics*, 23(4), 577-599. doi: 10.1016/S0164-0704(01)00179-3
- Koustaş, Z., & Serletis, A. (1999). On the Fisher Effect. *Journal of Monetary Economics*, 44(1), 105-130. doi: 10.1016/S0304-3932(99)00017-3
- Kwiatkowski, D., Phillips, P. C. B., Schmidt, P. & Shin, Y. (1992). Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root: How sure are we that Economic Time Series have a Unit Root. *Journal of Econometrics*, 54, 159-178.
- Lahiri, K. (1976). Inflationary Expectation: Their Formation and Interest Rate Effect. *American Economic Review*, 66, 124-131. Retrieved from <http://www.jstor.org/stable/1804950>
- Lardic, S., & Mignon, V. (2003). Fractional Cointegration between nominal interest rates and inflation. A re-examination of the Fisher relationship in the G7 countries. *Economic Bulletin*, 3(14), 1-10. Retrieved from <http://www.economicsbulletin.com/2003/volume3/EB-03C20002A.pdf>

- Law, S. H., Tan, H. B. & Baharumshah, A. Z. (1999). Financial Liberalization in ASEAN and the Fisher Hypothesis. *Jurnal Ekonomi Malaysia*, 33, 65-86.
- MacDonald, R. & Murphy, P. D. (1989). Testing the long run relationship between nominal interest rates and inflation using co-integration techniques. *Applied Economics*, 21, 439-447
- Mishkin, F. S. (1992). Is the Fisher Effect for Real? A Reexamination of the Relationship between Inflation and Interest Rates. *Journal of Monetary Economics*, 30, 195-215. doi: 10.1016/0304-3932(92)90060-F
- Mishkin, F. S., & Simon, J. (1995). An Empirical Examination of the Fisher Effect in Australia. *Economic Record*, 71(214), 217-229. doi: 10.1111/j.1475-4932.1995.tb01889.x
- Miyagawa, S., & Morita, Y. (2003). The Fisher Effect and the Long run Phillips Curve in the case of Japan, Sweden and Italy. Working Paper in Economic 77, Goteborg University. Retrieved from <http://hdl.handle.net/2077/2832>
- Muscattelli, V. A., & Spinelli, F. (2000). Fisher, Barro and the Italian Interest Rate 1845-93. *Journal of Policy Modeling*, 22(2), 149-169. doi: 10.1016/S0161-8938(99)00010-1
- Muth, J. F. (1961). Rational Expectations and the Theory of Price Movements. *Econometrica*, 29(3), 315-335. Retrieved from <http://www.jstor.org/stable/1909635>
- Nelson, C. & Schwert, G. W. (1977). Short Term Interest Rates as Predictors of Inflation: On Testing the Hypothesis that the Real Rate of Interest is Constant. *American Economic Review*, 67, 478-486.
- Obi, B., Nurudeen, A. & Wafure, O. G. (2009). An Empirical Investigation of the Fisher Effect in Nigeria: A Cointegration and Error Correction Approach. *International Review of Business Research Papers*, 5(5), 96-109.
- Olekalns, N. (1996). Further Evidence on the Fisher Effect. *Applied Economics*, 28(7), 851-856. doi: 10.1080/000368496328290
- Payne, J. E. & Ewing, B. T. (1997). Evidence from Lesser developed countries on the Fisher Hypothesis: a Cointegration Analysis. *Applied Economics Letters*, 4(11), 683-687. doi: 10.1080/758530649
- Pelaez, R. F. (1995). The Fisher Effect: Reprise. *Journal of Macroeconomics*, 17, 333-346.

- Pesaran, H. M. & Shin, Y. (1995). *Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis*. Department of Applied Economics, Working Paper No. 9514.
- Pesaran, H. M., Shin, Y. & Smith, R. (1996). *Testing the Existence of A Long-run Relationship*. Department of Applied Economics, Working Paper No. 9622.
- Pesaran, H. M. (1997). The role of Economic Theory in Modeling the Long run. *Economic Journal*, 107, 178-191.
- Pesaran, H. M. & Shin, Y. (1999). *Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis*. Cambridge: Cambridge University Press.
- Phylaktis, K., & Blake, D. (1993).. *Weltwirtschaftliches Archiv*, 129(3), 591-599. doi: 10.1007/BF02708004
- Rapach, D. E., & Weber, C. E. (2004). Are Real Interest Rates really nonstationary? New Evidence from Tests with Good Size and Power. *Journal of Macroeconomics*, 26, 409-430.
- Sargent, T. J. (1969). *Commodity Price Expectation and the Interest Rate*. New York: Mc Graw Hill Book Co.
- Schwert, G. W. (1981). The adjustment of stock prices to information about inflation. *The Journal of Finance*, 36(1), 15-29.
- Tobin, J. (1965). Money and Economic Growth. *Econometrica*, 33(4), 671-684.
Retrieved from <http://www.jstor.org/stable/1910352>
- Wallace, M. S. & Warner, J. T. (1993). The Fisher Effect and the term Structure of Interest Rates.: Tests of Cointegration. *Review of Economics and Statistics*, 75, 320-324.
- Yohe, W. P. & Karnosky, D. S. (1969). *Interest Rates and Price Level Changes*. New York: McGraw Hill Book Co.
- Yuhn, K. (1996). Is the Fisher Effect Robust? Further Evidence. *Applied Economics Letters*, 3, 41-44. doi: 10.1080/758525514