

Validity of Fisher Effect in Sri Lanka

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ABSTRACT

The objective of this research is to test the validity of fisher effect, the relationship between short term interest rate and inflation in the Sri Lankan context. Fisher hypothesis is regarded as one of the most important hypothesis in macroeconomics. The existence of Fisher Effect in an economy has important implications on the monetary policy of a country. Studies on this subject are very scarce in Sri Lanka. Three months Treasury bill rates and average inflation rates for the analysis were observed during January 1996 to December 2009. The level of integration is determined using Augmented Dickey Fuller unit root test and Phillips Perron test. The Engle Granger method was used to test the co integration and Johansen – Juselius method helped prove it further. Finally Granger Causality test was performed. From which it was discovered that interest rate could be important in predicting future inflation rates of the country. It was concluded that the short term interest rates and inflation rates are co integrated; hence the present research does not reject the validity of Fisher Effect in Sri Lankan context. This finding will be important for determining the financial market policies in a developing economy like Sri Lanka.

KEYWORDS: Co-integration, Fisher effect, Sri Lankan economy

INTRODUCTION

Interest rate and inflation rate could be considered as important tools in any economy. The fisher effect is a theory which explains the relationship between these two variables.

Fisher effect is also called the fisher hypothesis. This hypothesis describes the interconnection between the nominal interest rate, real interest rate and inflation rate.

It suggests that nominal interest rate and inflation rate has one to one relationship while the real interest rate remains a constant in the long run.

Fisher hypothesis can be considered as one of the most important hypothesis in macroeconomics. Over the years many studies have been conducted to test the existence of fisher effect in the United States and Europe, but still it remains a theory and not a proven fact.

However, studies conducted on fisher effect in developing countries are very limited. But in some of the studies, existence of fisher effect has accepted and some were not.

This research would try to evaluate the validity of fisher hypothesis in Sri Lankan context.

LITERATURE REVIEW

Literature on fisher effect is very scarce in Sri Lankan context. One of such studies carried out by Cooray during 2002-03 has rejected the existence of the fisher effect in Sri Lanka. Sathye et. al. (2008), conducted a similar research on the emerging economy of India and accepted the fisher effect in Indian financial market. Paul (1983) has also examined the fisher effect in India and got

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evidence on the existence of it. A joint test for fisher model linking stock returns and inflation was conducted over eight countries, United States, Germany, France, Netherlands, United Kingdom, Switzerland, Japan and Canada by Solnik & Solnik (1996) for time horizons ranging from 1-12 months and fisher model was not rejected in any time horizon. Mitchell-Innes (2006) conducted a research regarding the interest rate and inflation rate in South Africa and concluded that there is a long-term relationship between them.

METHODOLOGY

Secondary data of short term interest rate and inflation rate will be used for the research. The data will be analyzed using E-Views 5 statistical software package. The time series plot will be used to visually inspect the behavior of two time series.

The econometric techniques used in the research are similar to the one used by Sathye M, Sharma D & Liu S (2008).

As the first step, the order of integration of both interest rate and the inflation rate time series will be determined by using tests built by Dickey and Fuller (1979), Augmented Dickey Fuller unit root test (ADF test) and Phillips and Perron (1988) test (PP test) will further be used to prove it.

Secondly, if the first differences of the two series are stationary, the Engle-Granger test of co-integration will be performed, where the relationship between the short term interest rate and inflation rate will be investigated using the ordinary least squares method.

Thirdly, Johansen-Juselius (1990) procedure will be employed to strengthen the results of the above Engle-Granger co-integration test. Finally the Engle-Granger Causality test will be used to examine whether the two series display any causal relationship.

DATA COLLECTION AND ANALYSIS

Three months Treasury bill rate was chosen as an indicator of short term interest rate. Monthly interest rate was derived from calculating the average of weekly Treasury bill rates. Inflation rate was calculated using the Colombo Consumer Price Index (CCPI) because of its availability.

Both interest rate and inflation rate data sets were collected for the period from January 1996 to December 2009 from the statistic database maintained by the Central Bank of Sri Lanka.

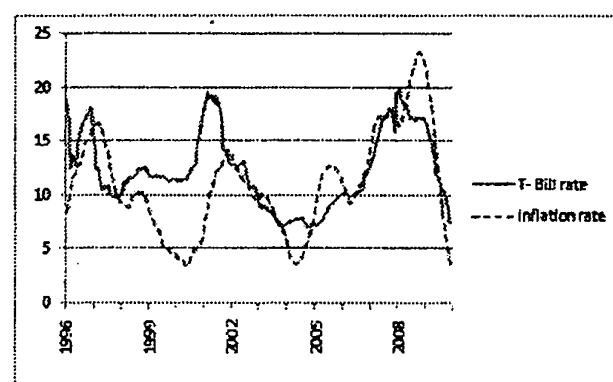


Figure 1: Time Series Plot of T-bill Rates and Inflation Rate

Two formal tests have been used to test the stationarity of the levels and the first differences of the two variables. This ADF test has been used as it gives the most reliable results. In this research the model without both intercept and interest rate were used.

Schwarz Info Criterion (SIC) was used to automatically calculate the lag length. As monthly data were used maximum lag was given as 12. The results of the test are shown in table 1.

Table 1: ADF Test Result

Variables	Types of Test			ADF test statistic	1% critical value	5% critical value	10% critical value	DW statistic	Probability
	c	t	n						
INT	0	0	2	-0.668725	-2.579052	-1.942768	-1.615423	1.770577	0.4261
D(INT)	0	0	2	-5.399743	-2.579139	-1.942781	-1.615416	1.981310	0.0000
INF	0	0	2	-1.720504	-2.579052	-1.942768	-1.615423	1.991236	0.0809
D(INF)	0	0	12	-2.452536	-2.580065	-1.942910	-1.615334	2.041256	0.0142

Table 2: ADF Test Results for Residuals

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.637120	0.0085
Test critical values:		
1% level	-2.578967	
5% level	-1.942757	
10% level	-1.615431	

Table 3: Johansen co-integration test result

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	5% Critical Value	1% Critical Value
None	0.075986	20.76045	15.49471	19.93711
At most 1	0.046447	7.799853	3.841466	6.634897

Table 4: Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Probability
INT does not Granger Cause INF	156	3.28653	0.00036
INF does not Granger Cause INT		1.47655	0.14073

After ensuring that both processes are of the same order of integration, the long-term relationship is estimated in linear form by the ordinary least squares method, and has led to the Engle Granger test of the residuals from its regression. The ADF and the PP unit root test were applied to the residuals to check the stationary. The result from the

ADF test is presented in Table 2. For bivariate time series, the Engle Granger test is adequate. However to cement the above results, Johansen test which is a more general technique is used.

This Johansen procedure requires that the appropriate lag length for the vector autoregressive (VAR) model to be estimated. This research employs three different criteria to determine the appropriate lag length: the Schwarz information criteria, Akaike information criteria and Hannan Quinn information criteria. After selecting the suitable lag, the Johansen test was conducted. The results at 1% and 5% level are summarized in Table 3.

Two series are co-integrated doesn't mean that one causes the other. To test whether short term interest rate causes inflation needs to be checked. Granger Causality test is deployed for the task. The results are shown in the Table 4.

RESULTS AND DISCUSSION

Two unit root tests were conducted to test the stationary of the interest rate and inflation rate variables. Table 1 reports the results of the ADF unit root test and it indicates that both interest rate and the inflation rate are non stationary because they have a unit root in their levels. However, the both series at their first differences rejects the existence of unit root in ADF test as well as PP test. Durbin Watson statistics also support this decision. Thus short term interest rate and inflation rate are both I (1) processes.

According to the ADF test and PP test both processes are of the same order of integration, which is a preliminary requirement for the co-integration test. The values of R^2 and adjusted R^2 are not significant although the coefficients are significant. But the model is not a good fit when the inflation series is regressed on the short term interest rate in level.

Therefore, the residuals from the regression need to be tested using Engle-Granger method. According to the procedure, both ADF and PP tests were applied to the residuals of which the ADF test results are presented in the Table 2. And the results are strongly stationary and are co-integrated. Durbin Watson statistic also supports this conclusion.

For a bivariate time series, the Engle-Granger co-integration method performed above is adequate. But to prove it further, Johansen test could also be used.

It was earlier found that both the interest rate and inflation rate are of order one, $I(1)$ processes. Before applying the Johansen test relevant order of lags of the vector autoregressive (VAR) model need to be found. Based on the Schwarz and Akaike information criteria and Hannan-Quinn information criteria, lag 3 was selected for the VAR model as the optimal lag.

The results obtained from the Johansen test are presented in Table 3. The trace test indicates two co-integrating equations at both 1% and 5% significant levels, which mean four null hypotheses, are rejected. Therefore the data supports the view of the existence of a relationship between short term interest rate and inflation rate in Sri Lanka.

Although it was concluded that there is a co-integration between the short term interest rate and inflation, there is no evidence to state that one causing the other. Granger Causality test is used to investigate the above matter. Figure 3 presents the results of the test. According to the results there is

substantial evidence not to reject the second hypothesis. But it is possible to reject the first hypothesis. Therefore it appears that Granger Causality runs one way from interest rate to inflation and not the other way round. In other words, inflation is granger caused by short term interest rate.

CONCLUSION

This research tested the validity of Fisher effect in Sri Lankan context. Both ADF and PP unit root tests showed that both interest rate and inflation rate series were non stationary at levels but are both stationary in their first differences. After confirming that both the series are of same order Engle-Granger test was performed to test the co-integration of two series. The result of the test which reveals that there exists a long-run relationship between the two variables was further confirmed by Johansen-Juselius technique. Finally Granger causality test resulted in providing evidence that the short term nominal interest rates do help in predicting future inflation in the Sri Lankan context.

As the present research confirms the validity of fisher effect in Sri Lanka, the hypothesis would be important in making policies for the financial markets of the country.

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