THE RELATIONSHIP BETWEEN MONEY STOCK AND ECONOMIC GROWTH OF SRI LANKA: AN AEG TESTING APPROACH

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ABSTRACT: In modern economy, money stocky is identified as a mechanism of economic growth of all nations. The purpose of this study was to test the relationship among the money stocky and economic growth of Sri Lanka. The time series data of the gross domestic product and the money stockused in this study were collected from the sample period from 1959 to 2013. The Augmented Dickey Fuller (ADF) and Philips Perron tests were used to test the stationarity of the time series variables, and then the Augmented Engel – Granger (AEG) testing approach was employed to test the relationship between the variables.

Based on the Augmented Engel – Granger (AEG) testingresults, this study found that the money stock was positively impacting on economic growth of Sri Lanka. The partial p – Value of the money stock was less than 1% and the value of R- squared of this testing model was 0.85, which was higher than Durbin Watson statistic. In the meantime, the absolute value of the Augmented Dickey Fuller (ADF) test of the residual of the estimated model was stationary at 5% critical value. So, the conclusion was that the money stock and economic growth of Sri Lanka were maintained the relationship between them at I(0) level form.

Keywords: Economic Growth, Gross Domestic Product, Money stock, Modern economy, and Stationarity

1. Introduction

In the modern economy, money stock is a very importance tool to accelerate the economic growth of nations which play an essential role in the determination of price level and interest [1]. In the view of economics, the money stock means that the total amount of monetary assets available in an economy at a specific time [6]. As well, economic growth means percentage increase in Gross Domestic Product (GDP) or Gross National Product (GNP) on year to year basis [3].

In monetary economics, the Monetarist believes that variation in the money stock has major influence on national output, and that objective of monetary policy is the best by targeting the growth rate of the money supply rather than by engaging in discretionary monetary policy, consistent with the economic theory. The economic growth and money stock maintain very narrow causal relationship between them [7].

Even if there are several studies internationally (Owoye and Onafowora 2007, Gamal 2007, Zapodeanu and Cociuba 2010, Liang 2012, Ihasn and Anjum 2013)

about the relationship between the money stock and the economic growth, but no study is done using the AEG testing approach even in Sri Lanka as well. Therefore, it is an essential study in Sri Lankan context. This study is designed into the following items: introduction, objective of the study, methodology, results and discussion, finally conclusion and policy recommendations.

2. Objective of this study

The objective of this study is to test the relationship between the money stock and economic growth of Sri Lanka.

3. Methodology

- **Data and data collection:**
  This study considered the following time series variables such as the Gross domestic product as the proxy variable of the economic growth of Sri Lanka and the money stock of Sri Lanka. The data of these variables were collected from the annual reports of the Central Bank of Sri Lankafrom 1959 to 2013.

- **The stationarity testing of the variables:**
  In this study, the gross domestic product and the money stock were in time series. Therefore, these variables should be checked the stability of them through the stationary (unit root) test. To check the stationarity of the variables, the Augmented Dickey Fuller (ADF) and Philips Perron tests were recommended and used by this study.

- **The specification of regression Model:**
  This study specified the following regression model to test the relationship between the economic growth and the money stock.

$$GDP_t = f(MS_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$GDP_t = \beta_0 + \beta_1 MS_t + U_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

  Where: the dependent variable wasGDP_t, the independent variable was money stock which was noted byMS_t. Error term was indicatedbyU_t and β_0, β_1 were coefficients of the model.

- **Graphical testing and descriptive statistics of the variables:**
  This study used the Kernel fit diagram to test graphical relationship among the variables and mean value, median and standard deviation were used to identify the descriptive position of the variables.

- **Spurious problem of the estimated model**
  To detect the spurious problem of the estimated model, the stationarity of the residuals of the estimated model was testedby using the Augmented Dickey Fuller (ADF) testing method.

4. Results and Discussion

This section deems the following items: the testing of stationarity of the variables, discussion of descriptive statistics of the variables, Kernel fit analysis, the

Augmented Engel – Granger (AEG) testing results and the results of stationarity of the residuals.

- **The unit root testing results:**

In this study, the ADF and Philips Perron test are used to check the stationarity (unit root) of the gross domestic product and the money stock of Sri Lanka. The table – 01 and table – 02 show the unit root results of the variables.

Table – 01: The ADF testing results of the variables

Variable	Level					
Money stock	C	5%	C and T	5%	None	5%
	48.70	-2.91	34.88	-3.49	54.97	-1.94
GDP	3.52	-2.92	1.30	-3.50	4.00	-1.94

Source: Author's calculation

Table – 02: The Philips Perron testing results of the variables

Variable	Level					
Money stock	C	5%	C and T	5%	None	5%
	45.67	-2.91	45.66	-3.49	51.20	-1.94
GDP	4.18	-2.91	-2.93	-3.49	-4.74	-1.94

Source: Author's calculation

The ADF and Phillips Perron testing approach indicate that, both money stock and gross domestic product are stationary at 5% significance in the level form because the absolute values of the tests statistics of the ADF and Philips Perron testing methods are greater than the critical values of the test statistics.

- **Descriptive statistics of the variables**

The following table shows the details of the descriptive statistics of the gross domestic product and the money stock of Sri Lanka.

Table – 03: The descriptive statistics of the variables

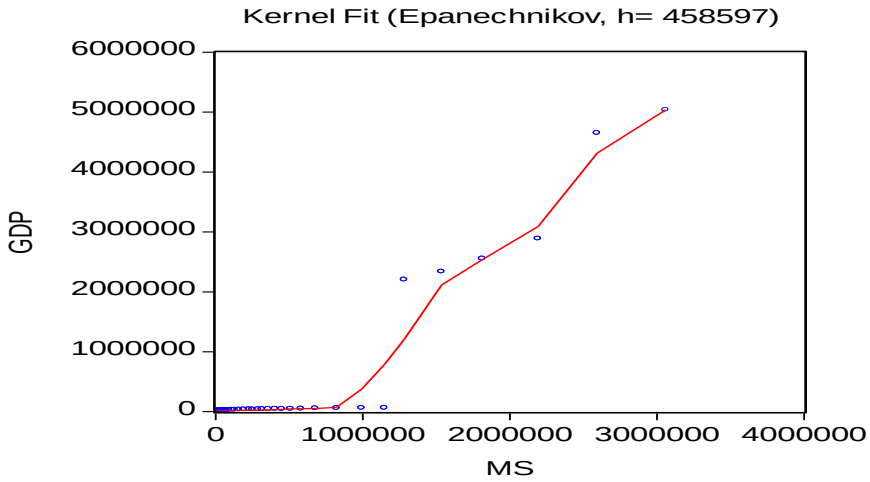
Variables	Mean value	Median	Maximum	Minimum	Std. Deviation
GDP	381919.8	29616.17	503709.1	6089.859	1090935
MS	377065.2	50860.00	3058793	1477.00	684751.7

The above tablementions that, the average value of the gross domestic product is 381919.8 and its' standard deviation is 1090935. Likewise, the average value of the money stock is 377065.2 and its' standard deviation is 68475.7; here the value of standard deviation clearly explains that, the every sample point of each variable is deviated from mean value of the each variable.

- **Kernel Fit:**

The Kernel fit to test the independent (money stock) variable and Dependent (Gross Domestic Variable – GDP) is used in this study.

Figure – 1: Kernel Fit for GDP and Money supply



The Kernel Fit is a non - parametric graphical method in which the relationship between the two variables is explained according to the Figure -1.There is a positive relationship between the money stock and GDP during the period of 1959 – 2013.

- **The estimated model:**

The following results of estimated regression show the relationship between the gross domestic product and the money stock of Sri Lanka.

$$GDP_t = -174626.1 + 1.475994MS_t$$

t –Statistics: (-2.730859) (17.91706)
p – Values: (0.0086) (0.0000)
R – Squared: 0.85, F – Value: 321.021

According to the regression results, the money stock maintains the positive relationship with the GDP of Sri Lanka and't' statistic of the money stockis 17.91 and R- squired of this model is 0.85 and also the Durbin – Watson statistic of this model is 0.615. In the meantime, if the money stock is increased by one unit, the gross domestic product of Sri Lanka will increase by the unit of 1.46.

- **The Augmented Engel –Granger testing method:**

To test the relationship between the gross domestic product and the money stock of Sri Lanka, the Augmented Engel – Granger testis used in this study. The following table shows the results of the Augmented Engel – Granger test.

Table – 04: The results of the Augmented Engel – Granger test

Dependent Variable: GDP
Included observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-174626.1	63945.48	-2.730859	0.0086
MS	1.475994	0.082379	17.91706	0.0000

R-squared	0.858297	Mean dependent var	381919.8
Adjusted R-squared	0.855623	S.D. dependent var	1090935.
S.E. of regression	414522.1	Akaike info criterion	28.74333
Sum squared resid	9.11E+12	Schwarz criterion	28.81632
Log likelihood	-788.4415	F-statistic	321.0211
Durbin-Watson stat	0.615462	Prob(F-statistic)	0.000000

Source: Author's calculation by using E – views software

In the above table, the gross domestic productand the money stock of Sri Lanka are maintained the relationship between them at level I(0) form.

- **The unit root testing approach of residuals:**

The stationarity of the residuals is checked to detect the spurious problem of the estimated model. Because, the R – squared of the estimated model is higher than the Durbin Watson test statistic. The following table shows the results of stationarity of the residuals.

Table – 05: The results of stationarity of the residuals

Null Hypothesis: U has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.284003	0.0217
Test critical values:	1% level	-3.588509	
	5% level	-2.929734	
	10% level	-2.603064	

*MacKinnon (1996) one-sided p-values.

Source: Author's calculation by using E – views software

In the above table -05, the ADF testing approach is used to test the stationarity of residual series ($\widehat{U}_t$). The ADF test statistics of the residual series mentions that the

absolute value of the test statistic is 3.28 and absolute value of the critical value is 2.92 at 5% significant level. Therefore, the residual series is stationary at level form. This study concludes that theestimated model is not suffering by the spurious problem.

5. Conclusion and policy recommendations

This study found that there is positive stable relationship between the money stock and the economic growth of Sri Lanka during the study period. The graphical investigation and the Augmented Engel – Granger (AEG) testinganalysis also proved that there is a significant relationship between the variables in Sri Lanka. Therefore, this study recommends that, the monitory policy makers of Sri Lanka should consider this relationship in future, when they formulate the macroeconomic concepts of the monetary policy for Sri Lanka.

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