



# TESTING OF PARAMETER CONSTANCY AND DYNAMIC NEXUS BETWEEN GOVERNMENT REVENUE AND ITS EXPENDITURE: EMPIRICAL EVIDENCE FROM INDONESIA

## KEYWORDS

Chow Test, Cointegration, Error Correction Model, Government expenditure, Government revenue, Unit Root Test, Vector Autoregressive Model. JEL Classification: E62; C22; C5

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## ABSTRACT

This study examines the direction of causality between government revenue and its expenditure in the short-run and long-run by using Vector Error Correction Model and Unrestricted Vector Autoregressive Model during entire sample period. This paper is devoted to examine the stability of parameter throughout the entire time period and its impact in the existing causal relationship between government revenue and government expenditure. The unit root test confirms non-stationarity of revenue and expenditure series during the period of study. There exists a long-run relationship between government revenue and government expenditure as evident from Engel-Granger Two step Method. The Vector Error Correction Model exhibits no causality between government revenue and its expenditure in the short-run while in the long-run, Indonesia government takes the decision of revenue first and then expenditure i.e Tax-and-Spend principle as observed from Unrestricted Vector Autoregressive Model. The dataset exhibits that a structural change has been occurred in the year 1997 as revealed from Chow test. Vector Error Correction Model confirms Bi-directional causality between government revenue and its expenditure in the short-run during the sub-period 1968-1997 while fiscal neutrality principle is observed in the long-run. The empirical findings from 1998 to 2008 reveal that uni-directional causality running from revenue to expenditure exists in the short-run but no causal (Granger) relationship between revenue and expenditure exists in the long-run memory. The estimated causal relationship with historical dataset may not provide reliable guideline for making policy decisions. On the other hand, the estimated causal relationships under different sub-periods may provide reliable guidelines for decision making process.

## INTRODUCTION

The economy of Indonesia is the largest economy in Southeast Asia. Indonesia's public finances had been undergoing a budget deficit from 1972 to 2000. The financial crisis in the late 1990s caused a huge economic contraction & a commensurate decline in public spending. Due to its sound fiscal & debt management, Indonesia's fiscal position has improved & government maintained a fiscal deficit of less than 3% of GDP over the 2000-2006 period. The nexus between government revenue and expenditure has attracted significant interest. This is due to the fact that the nexus between government revenue and expenditure has an impact on the budget deficit. In view of persistent budget deficit in Indonesia the nexus between government revenue and expenditure needs to be examined.

According to Locus Critique, the relationship among macro-economic variables estimated by using the historical dataset may not represent the dynamic nature of the relationship. The relationships among the variables undergo change following structural changes in the economy. The structural changes may be due to external forces or internal forces. So it becomes pertinent to identify structural changes in the long-run dataset of the revenue and expenditure series because of expansionary expenditure programme coupled with erosion of revenue as a result of Asian financial crisis in 1997 and then examine the impact of changes on the relationship. The assumption of stability in the long-run relationship between revenue and expenditure following structural changes would be an important potential shortcoming of the past research. No study has been carried out in this particular direction in Indonesia which justifies the need of more research. Hence this study provides useful findings to policy makers of Indonesia for effective policy formation.

## OBJECTIVES

In the light of above discussion firstly the present study presents an attempt to examine the dynamic nexus between government expenditure and government revenue in Indonesia over the period 1968-2008 and secondly to investigate the parameter constancy throughout the sample period along with its effects in the existing relationship.

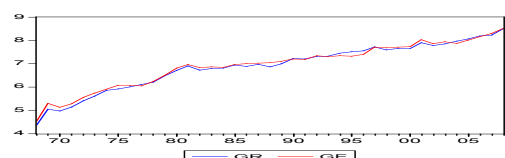
## DATA

The study takes the use of annual dataset for revenue and expenditure in Indonesia covering the period from 1968 to 2008. The data have been collected from different issues of International Financial Statistics (IFS) where the year 2000 is taken as the base period. We have used log values of real revenue and real expenditure as denoted by  $R_t$  and  $E_t$  respectively in order to remove heteroscedasticity in the dataset.

## TIME PLOT OF $R_t$ AND $E_t$

It is observed from the following figure (1) that both the series are highly trended the period concerned. This feature of the series is pointers to their non-stationarity. This leads us to examine the nature of stationarity of  $R_t$  and  $E_t$  series respectively.

Figure-1: Time Plot of  $E_t$  and  $R_t$  (At level)



Source: International Financial Statistics

The remainder of the paper is organized as follows. Section II presents empirical literature review, section III deals with methodology, section IV exhibits stationarity, section V provides cointegration, section VI and VII deals with vector error correction model and vector autoregressive model respectively. Section VIII highlights parameter constancy and its effects in the existing relationship and section IX concludes.

## II. EMPIRICAL LITERATURE

A number of empirical works have been done in connection with revenue and expenditure relationship. Several empirical studies have been taken up since 1980 with varying conclusions regarding the relationship between expenditure and revenue levels in different countries. These studies differ in the matter of research methodologies, target countries, period of studies, frequencies of dataset etc. Some of the important studies are being reviewed below.

Manage and Marlow (1986) for USA over the periods 1929-1982 gave support to a Bi-directional causality between government expenditure and government revenue. Ram (1988) in the USA over the period 1929-1983 supported Bi-directional Granger causality. Miller and Russck (1990) found Bi-directional Granger causality for the USA over the period 1946-1987. Naidu, Mohasin and Nishe (1995) observed Bi-directional causality in the state of Andhra Pradesh, India over the period 1969-1990. Brandely T. Ewing and James E. Payne (1998) examined Latin American countries and got mixed results supported the evidence of Bi-directional causality between government revenue and government expenditure. The Chile and Paraguay results supported the evidence of Bi-directional causality between government revenue and government expenditure. Khalid H.A Al-Qudair (2005) found the existence of Bi-directional causality between government revenue and government expenditure in the kingdom of Saudi Arabia. Abdul Aziz and Shah Habibullah (2000) investigated the causality between government revenue and government expenditure in Malaysia for the period 1960-1997 and gave support to the existence of Bi-directional causality between government revenue and government expenditure. Mukhopadhyay and Maitra (2006) investigated the Granger Causality between government revenue and government expenditure in India for the period 1950-2005 and observed 'Fiscal Synchronization Principle' in India. They also found the evidence of fiscal 'Synchronization Principle' in Sri Lanka over the period 1957-2004.

Anderson, Wallace and Warner (1986) found the evidence of spend and tax principle in the USA over the period 1946-1983. George Hondmyianmis and Evangelia papapethru (1996) observed spend and tax principle in Greece over the period 1987-1993. D.M. Mithani and Goh Soo Khon (1999) examined the causal relationship between government revenue and government expenditure in Malaysia over the period 1970.1- 1994.1 and observed the unidirectional causality from expenditure to revenue. Dhannasekharan (2000) examined the revenue and expenditure relationship in India for the period 1960-1997 and found the existence of spend and tax principle. Hussain (2004) investigated the relationship between government revenue and government expenditure for Pakistan from 1973-2003 and found the evidence of spend and tax principle in Pakistan. Mukhopadhyay and Maitra (2008) examined the causal relationship between government revenue and government expenditure in Pakistan over the period 1957-2008 and found the evidence of spend-tax principle in Pakistan. Lusinyan and Thornton (2010) examined the relationship

between government revenue and government expenditure in presence of structural break and found spend-tax principle in UK during 1750-2005.

Joulfinia and Mookherjee (1991) studied the revenue and expenditure relationship in OECD countries during the period 1955-1986 and found Tax and Spend principle in OECD countries. Baghestani and Mc. Mown (1994) examined the granger causality between government revenue and government expenditure in USA for the period 1955-1989 and testified the validity of Tax and Spend Principle in USA. Darrat (1998) examined the revenue – expenditure nexus in Turkey and reported principle of Tax and Spend in Turkey. Wan Kyu Park (1998) investigated the Granger causality between government revenue and government expenditure in Korea over the period 1964-1992 and found the unidirectional causality from revenue to expenditure in Korea. Omo Aregbeyen and Taofik Mohammed Ibrahim (2005) studied the long-run relationship and dynamic interaction between government revenue and government expenditure in Nigeria for the period 1970-2008 and they confirmed the Tax-Spend hypothesis in Nigeria. Wong Hock Tsen and Lim Kian Ping (2005) examined the relationship between government revenue and government expenditure in Malaysia and found the evidence of Tax-Spend Principle in Malaysia over the period 1965-2002. Jaka Sriyana (2009) studied the relationship between government revenue and government expenditure for Indonesia over the period 1970-2007 and suggested the principle of Tax-Spend principle in Indonesia. Muhammed Imtaz Subhami, Syed Akif Hasan, Amber Osman and Tanzeed Rafiq (2012) examined the nexus between government revenue and government expenditure for Pakistan from the period 1979-2010 and they found Tax-Spend Principle.

## III. METHODOLOGY

The present study involves use of battery of test for stationarity like ADF, PP and KPSS. The Engel-Granger cointegration method is used to test the long-run relationship between the variables concerned. The Vector Error Correction Model (VECM) is applied to examine whether the long-run relationship is stable along with causality test in the short run. Unrestricted Vector Autoregressive Model (UVAR) is used for Granger Causality between the variables concerned in the long run. In order to investigate the parameter constancy in the dataset we use the Chow test.

## IV. TEST OF STATIONARITY

Stationarity of government revenue and government expenditure can be studied with the Augmented Dickey Fuller (ADF), Phillips-Perron (PP) Test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test. The results of unit roots tests are presented in table 1.

**Table-1: Results of ADF, PP and KPSS Unit Root Tests**

variable	Model specification	ADF	PP	KPSS
		Statistics	statistics	Statistics
$E_t$	Intercept	-2.45	-2.85	0.78
	Intercept & trend	-3.10	-4.37*	0.18
$\Delta E_t$	Intercept	-9.38*	-9.55*	0.35*
	Intercept & trend	-9.19*	-9.60*	0.17*
$R_t$	Intercept	-2.77	-3.20	0.77
	Intercept & trend	-4.21*	-4.45*	0.17
$\Delta R_t$	Intercept	-9.26*	-9.26*	0.48*
	Intercept & trend	-9.30*	-9.09*	0.19*

Note- \*denotes significance at 5% level. Lag length automatic based on modified AIC,Max lag=9 in ADF test. Newey-West using Bartlett Kernal in PP test.  $\Delta$  represents first difference.

It is observed from the table (1) that ADF test reveals that expenditure series is non-stationary at level with intercept model and also with intercept and constant model while it is stationary at level by PP test with intercept and constant model. But KPSS test confirms non-stationary of expenditure series at level. Both ADF and KPSS test exhibit that revenue series is non-stationary at level but PP test indicates stationarity of the revenue series at level. The results are contradictory because of strong autocorrelation and structural break in the revenue series. ADF, PP and KPSS test exhibit that both revenue and expenditure series are stationary at first difference.

**V. ENGEL-GRANGER COINTEGRATION: THE MODEL**

According to Engel-Granger (1987), the variables will be cointegrated when the linear combination of the non-stationary variables is stationary. In this study  $E_t$  and  $R_t$  are found to be integrated of 1.i.e I(1).consequently the cointegration between  $E_t$  &  $R_t$  is being examined through the estimations of the following equations.

Results of estimation of revenue & expenditure equations are shown below.

$$R_t = -0.36 + 1.05E_t \quad (1)$$

(0.09) (0.01)  
(-3.48) (76.04)

$R^2 = .99, \text{ Adjusted } R^2 = .99, F\text{-statistic} = 5901.507, D.W = 1.00$

$$E_t = 0.39 + .95R_t \quad (2)$$

(0.08) (0.01)  
(4.57) (76.81)

$R^2 = .99, \text{ Adjusted } R^2 = .99, F\text{-statistic} = 5901.10, D.W = 1.00$

Stationarity of the corresponding residuals  $\hat{\eta}_t$  and  $\hat{\epsilon}_t$  has been examined through the ADF and PP tests .The results of the tests are given by the table (2)

**Table 2: Results of ADF & PP unit Root tests on residuals ( & )**

Variable	Null Hypothesis	ADF Test statistic	PP Test statistic	Critical values at 5%	Degree of Integration
$(\hat{\eta}_t)$	has a unit root(intercept)	-3.59*	-3.53*	-2.93	I(0)
$(\hat{\epsilon}_t)$	has a unit root(intercept)	-3.60*	-3.55*	-2.93	I(0)

Note- Lag length automatic based on modified AIC, Max lag=9 in ADF test./  $\uparrow$ Newey-West using Bartlett Kernal in PP test. Value in the bracket (.) indicates probability values. /\*denotes significance at 5% level.

It is observed from the table (2) that the null hypothesis of unit roots with intercept for the are rejected by the ADF and PP test at 5% level .So the residuals  $\hat{\eta}_t$  &  $\hat{\epsilon}_t$  are stationary. Since both the tests testify for the stationarity of the residuals. Hence  $E_t$  &  $R_t$  are cointegrated at level i.e. CI (1,1). This indicates that there exists a long-run relationship between revenue and expenditure series. Cointegration study confirms the existence of long-run relationship between expenditure and revenue series in Indonesia. However it is imperative whether the relationship is stable.

Stability of the long-run relationship is established if the short-run shocks transmitted through  $E_t$  or  $R_t$  channel converges before long. This stability of long-run relationship is studied through the estimation of Vector Error Correction Model (VECM). The optimum lag length is determined by the AIC or SBC etc. Both AIC & SBC gives the lowest minimum value at lag structure equal to one.

**VI. VECTOR ERROR CORRECTION MODEL.**

The results of the estimation of the equations of VECM are being presented through the tables (3) and (4).

**Table 3: Results of the VEC Estimation (Revenue Equation)**

Dependable variable	Explanatory variable	Coefficient	S.E	t- statistic
$\Delta R_t$	Constant	0.10	0.02	4.61
	$Z_{1t-1}$	-0.12	0.28	-0.42
	$\Delta R_{t-1}$	-0.32	0.30	-1.05
	$\Delta E_{t-1}$	0.15	0.28	0.52

It is observed from the table (3) that the coefficient of  $Z_{1t-1}$  is insignificant at 5% level. This indicates that any shock in revenue produces a insignificant change in the long-run relationship that revenue maintained with expenditure. This implies that revenue does not respond to the discrepancy from its long-run equilibrium values. The coefficients of lagged expenditure and revenue are insignificant at 5% levels. These findings indicate the absences of short-run Granger causality running from expenditure to revenue.

**Table 4: The results of the VEC Estimation (Expenditure Equation)**

Dependable variable	Explanatory variable	Coefficient	S.E	t- statistic
$\Delta E_t$	Constant	0.10	0.02	4.35
	$Z_{2t-1}$	-0.69	0.28	-2.41*
	$\Delta R_{t-1}$	-0.42	0.30	-1.40
	$\Delta E_{t-1}$	0.26	0.28	0.92

\* denotes significance at 5% level.

It is observed from the table (4) that the coefficient of  $Z_{2t-1}$  is significant at 5% levels. It indicates that short-run shocks transmitted through expenditure channel significantly affected the long-run dynamic relationship which expenditure maintained with revenue. The sign of  $Z_{2t-1}$  is negative. This indicates that any positive short-run shocks, expenditure declined. In other words, short-run shocks pulled down the government expenditure below the long-run equilibrium value. The absolute value of the coefficient is 0.69 which is less than unity. It implies that following short-run shocks, oscillations of expenditure followed converging time path. It satisfied the stable long-run relationship between the concerned variables. The coefficient of lagged expenditure and lagged revenue are insignificant at 5 % level. These findings indicate that the causality (Granger) running from revenue to expenditure does not exist in the short-run. Thus long-run relationship which expenditure maintained with revenue was stable. The statistical results of ECM indicate that no feedback relation between government revenue & government expenditure exists in Indonesia during the study period.

**VII. VECTOR AUTOREGRESSIVE MODEL**

We have performed the VAR Model with two period lagged in order to capture the dynamic relationship between revenue and expenditure in the long-run. The lag period two (t=2) is chosen on the basis of Ender's method.

The Results of the estimation of the VAR Model are being presented through the tables (5) and (6)

**Table 5: Results of Estimation of VAR (Expenditure Equation)**

Dependent variable	Explanatory variable	Coefficient	Standard error	t-statistics
ΔE <sub>t</sub> (2)	Constant	0.06	0.02	2.19
	ΔR <sub>t-1</sub>	0.11	0.27	0.42
	ΔR <sub>t-2</sub>	0.61	0.27	2.20*
	ΔE <sub>t-1</sub>	-0.04	0.25	-0.18
	ΔE <sub>t-2</sub>	-0.44	0.25	-1.76

R<sup>2</sup> = 0.13, Adj R<sup>2</sup> = 0.02, F-statistic = 1.25, D.W = 2.29  
 Δ represents first-difference series.  
 Figure in the bracket (.) denotes lag length of the model.

**Table 6: Results of Estimation of VAR (Revenue Equation)**

Dependent variable	Explanatory variable	Coefficient	Standard error	t-statistics
ΔR <sub>t</sub> (2)	Constant	0.08	0.02	2.90
	ΔR <sub>t-1</sub>	-0.14	0.27	-0.52
	ΔR <sub>t-2</sub>	0.45	0.27	1.63
	ΔE <sub>t-1</sub>	0.09	0.23	0.37
	ΔE <sub>t-2</sub>	-0.31	0.24	-1.31

R<sup>2</sup> = 0.09, Adj R<sup>2</sup> = 0.01, F-statistic = 0.85, D.W = 2.34  
 Δ represents first-difference series.  
 Figure in the bracket (.) denotes lag length of the model

The table (5) and (6) report that in expenditure equation the coefficient of second period lagged revenue is significant while other lagged independent variables are insignificant. In revenue equation all lagged independent variables are insignificant. These findings revealed that revenue do cause expenditure during the period of study. Hence the economy of Indonesia was marked by the unidirectional causality running from government revenue to government expenditure in the long-run. VAR satisfies the stability condition as no root lies outside the unit circle (not reported here but available on demand)

**VIII. CHOW TEST FOR PARAMETER CONSTANCY**

In order to investigate any structural change in the relationship between these two fiscal variables we apply Chow Break-Point Test which is basically a 'Recursive Estimation Procedure' with the historical data set. Table (7) reports the observed values of F-Statistic obtained from the recursive estimations of the relationship between revenue & expenditure during entire time span. Table (7) shows the observed values of F-Statistic obtained from the recursive estimations of the relationship between revenue & expenditure during the period 1968-2008. The Error Correction Mechanism and VAR approach are used for each sub-period separately to detect the direction of causality between government revenue and government expenditure.

Table (7) presents the values of F-statistic on recursive residual estimation of the equation.

$$E_t = \alpha + \beta R_t + \vartheta_t \tag{3}$$

**Table 7: Results of Chow Break-Point Test (1968-2008)**

Year	F-statistic	probability
1972	0.696170	0.504902

1973	0.802396	0.455900
1974	0.922032	0.406654
1975	0.614856	0.546151
1976	1.89020	0.315886
1977	1.150361	0.327584
1978	0.778369	0.466527
1979	0.896213	0.416786
1980	1.049788	0.360204
1981	0.519314	0.599201
1982	0.392365	0.678235
1983	0.296788	0.744955
1984	0.298019	0.744052
1985	0.295447	0.745940
1986	0.324468	0.724948
1987	0.358573	0.701073
1988	0.39761	0.675322
1989	1.546054	0.226539
1990	3.161744	0.053994
1991	2.750419	0.076980
1992	2.372036	0.073970
1993	2.816088	0.072709
1994	2.623046	0.086036
1995	1.919718	0.160974
1996	2.482325	0.097361
1997	4.983213*	0.012119
1998	5.384128	0.008864
1999	3.701371	0.034249
2000	3.013997	0.061283
2001	2.071944	0.140308
2002	0.760969	0.474385
2003	0.474040	0.626211
2004	0.959196	0.392524
2005	0.652131	0.526818.
2006	1.174831	0.320128

\*denotes Chow break point.

It is observed from the table (7) that there exists a structural change in the relationship between government revenue & government expenditure during the whole period 1968-2008. Two sub-periods exist in the historical dataset. The first sub-period covers the time period 1968-1997 and the next sub-periods range over 1998-2008.

During the first sub-period 1968-1997, the causality link between government revenue & government expenditure is examined by using Error Correction Mechanism (ECM) for short-run & VAR approach for long-run. The results of ECM are presented in the tables (8) and (9).

**Table 8: Estimates of Vector Error Correction Model (Sub-Period 1968-1997)**

Dependent variable	Explanatory variable	coefficient	Standard error	t-statistics
$\Delta E_t(1)$	Constant	0.11	0.02	4.69
	$Z_{t-1}$	-1.20	0.32	-3.72*
	$\Delta R_{t-1}$	-0.83	0.34	-2.41*
	$\Delta E_{t-1}$	0.64	0.31	2.02*

$\Delta$  denotes first difference.

Figures in the parentheses (.) denotes t-statistics/ \*denotes significance at 5% level.

**Table 9: Estimates of Vector Error Correction Model (Sub-Period 1968-1997)**

Dependent variable	Explanatory variable	coefficient	Standard error	t-statistics
$\Delta R_t$	Constant	0.11	0.02	4.69
	$Z_{t-2}$	-1.20	0.32	-3.72*
	$\Delta R_{t-1}$	-0.83	0.34	-2.41*
	$\Delta E_{t-1}$	0.64	0.31	2.02*

$\Delta$  denotes first difference.

Figures in the parentheses (.) denotes t-statistics \*denotes significance at 5% level.

It is observed from the table (8) and (9) that the error-correction term ( $Z_{t-1}$ ) in expenditure equation is significant at 5% levels. In expenditure equation, first period lagged revenue and expenditure are significant at conventional level of significance. The error-term  $Z_{t-2}$  in revenue equation is also significant & all the independent lagged variables are also significant. The JB Statistic shows normality of the residuals and LM and Portmanteau tests depict no serial correlation problem (not reported here). All these findings indicate that there is a bi-directional causality between revenue and expenditure in the short-run during the period 1968-1997.

We have sought to enquire into the interrelationship between government expenditure & government revenue in long-run by establishing a structural model of revenue & expenditure. For this purpose, we have performed the VAR Model with one period lagged in order to capture the dynamic relationship between revenue and expenditure. The lag period one (t=1) is chosen on the basis of lowest value of AIC & SBC.

**Table 10: Results of VAR Estimation (Sub period 1968-1997)**

Dependable variable	Explanatory variable	Coefficients	S.E	t- Statistics
$\Delta R_t(1)$	Constant	0.11	0.02	4.07
	$\Delta R_{t-1}$	-0.38	0.32	-1.16
	$\Delta E_{t-1}$	0.25	0.30	0.85

$R^2 = 0.05$ , Adj  $R^2 = -0.01$ , F-statistic = 0.78, D.W=2.40

**Table11: Results of VAR Estimation (sub period 1968-1997 Results)**

Dependable variable	Explanatory variable	Coefficients	S.E	t- Statistics
$\Delta E_t(1)$	Constant	0.09	0.02	3.35
	$\Delta R_{t-1}$	0.13	0.35	0.37
	$\Delta E_{t-1}$	0.01	0.33	0.03

$R^2 = 0.02$ , Adj  $R^2 = -0.05$ , F-statistic = 0.31, D.W=2.24

$\Delta$  represents first-difference series. Figure in the bracket (.) denotes lag length of the model.

All the results from table (10) and (11) testify that in revenue equation, first period ( $E_{t-1}$ ) is insignificant at 5% level and in expenditure equation, first period lagged revenue ( $R_{t-1}$ ) is insignificant at 5% level. The JB Statistic shows normality of the residuals. LM and Portmanteau test depict no serial correlation problem and VAR satisfies the stability condition because all the roots lie inside the circle (not reported here but available on demand)

All these findings indicate that there did no causality (Granger) link between government revenue & government expenditure in the long-run during the sub-period 1968-1997. The empirical findings do confirm the fiscal neutrality principle in the long-run in Indonesia during the sub-period 1968-1997.

The statistical results reveal an important fact that bidirectional causality was observed in the short-run in this sub-period. This important fact did not observe in the short-run while dealing with the historical dataset. In the long-run during this sub-period fiscal neutrality principle observed & this was sharply not contrasted with the findings from the econometric study of historical dataset.

The results of estimation of ECM during the sub-period 1998-2008 is reported in the tables (12) and (13) and results of VAR in tables (14) and (15)

**Table 12: Results of estimation of ECM (Sub-period 1998-2008)**

Dependent variable	Explanatory variable	coefficient	Standard error	t-statistics
$\Delta E_t$	Constant	0.15	0.04	3.30
	$Z_{t-1}$	-1.62	0.69	-2.32*
	$\Delta R_{t-1}$	-1.81	0.77	-2.35*
	$\Delta E_{t-1}$	0.93	0.59	1.57

**Table 13: Results of estimation of ECM (Sub-period 1998-2008)**

Dependent variable	Explanatory variable	Coefficient	Standard error	t-statistics
$\Delta R_t$	Constant	0.15	0.04	3.26
	$Z_{t-2}$	-0.81	0.68	-1.17
	$\Delta R_{t-1}$	-1.57	0.76	-2.07
	$\Delta E_{t-1}$	0.82	0.58	1.40

It is evident from the table (12) and (13) that in expenditure equation the error correction term  $Z_{t-1}$  is significant at

5% level and the first period lagged revenue is also significant at 5% level. In revenue equation the error correction term  $Z_{t-2}$  is insignificant at 5% level and first period lagged expenditure is also insignificant at 5% level. These results indicate that revenue causes (Granger) expenditure in the short-run during the sub-period 1998-2008.

Next, we have performed the VAR Model by varying lag structure from one to three in order to capture the dynamic relationship between revenue and expenditure. The lag period one (t=1) is chosen on the basis of own logical judgment. Here VAR (2) & VAR (3) model are not reported. But the findings remain consistent with the study of VAR (1)

**Table 14: Results of VAR Estimation (Sub-period 1998-2008)**

Dependable variable	Explanatory variable	Coefficients	S.E	t-Statistics
$\Delta R_t(1)$	Constant	0.11	0.04	2.64
	$\Delta R_{t-1}$	-0.55	0.53	-1.04
	$\Delta E_{t-1}$	0.16	0.45	0.36

$R^2 = 0.17$ , Adj  $R^2 = -0.05$ , F-statistic = 0.76, D.W=2.23

$\Delta$  represents first-difference series.

Figure in the bracket (.) denotes lag length of the model.

**Table 15: Results of VAR Estimation (Sub-period 1998-2008)**

Dependable variable	Explanatory variable	Coefficients	S.E	t-Statistics
$\Delta E_t(1)$	Constant	0.14	0.05	2.64
	$\Delta R_{t-1}$	0.20	0.52	0.39
	$\Delta E_{t-1}$	-0.76	0.76	-1.00

$R^2 = 0.12$ , Adj  $R^2 = -0.12$ , F-statistic = 0.49, D.W= 2.54

$\Delta$  represents first-difference series.

Figure in the bracket (.) denotes lag length of the model.

The above table (14) and (15) reports that in expenditure equation, first period lagged revenue is insignificant at 5% levels and in revenue equation, first period lagged expenditure is also insignificant at 5% level. The JB Statistic shows normality of the residuals and LM and Portmanteau tests depict no serial correlation problem. All these findings indicate that no-way causality link between revenue and expenditure exists in Indonesia in the long-run during the sub-period 1998-2008. Hence empirical findings do confirm the evidence of fiscal neutrality principle in Indonesia in the long-run during this sub-period 1998-2008.

During the sub-period 1998-2008, the empirical results suggest that unidirectional causality running from revenue to expenditure exists in the short-run but the causality link between revenue & expenditure one-way or two-way do not persist in the long-run. These empirical findings were not in conformity with the findings of the study from the historical dataset.

**IX. CONCLUSION**

During the entire time span 1968-2008, the study reveals that both revenue and expenditure have a long-run relationship. There is no-way causal relationship between revenue and expenditure in the short-run but unidirectional causality (Granger) running from government revenue to government expenditure did exist in the long-run. During the sub-period 1968-1997, an econometric study exhibits a bi-directional causal relationship between two fiscal variables in the short-run but accept the evidence of fiscal neutrality principle in the long-run. These short-run & long-run relationships between revenue and expenditure do differ significantly with the findings as evidenced by historical dataset. The empirical findings from 1998 to 2008 reveal that revenue do cause expenditure in the short-run but no causal (Granger) relationship between revenue and expenditure exists in the long-run memory. This was not in conformity with the findings observed in historical dataset. The estimated causal relationship with historical dataset may not provide reliable guideline for preparing fiscal policy. On the other hand, the estimated causal relationships under different sub-periods may provide reliable guidelines for decision making process.

## REFERENCE

- Abuai-Foul, Bassam and Baghestani, Hamid (2004) "The Causal Relation between Government Revenue and Spending: Evidence from Egypt and Jordan" *Journal of Economics and Finance*, vol.28,issue.2: pp260-269. | Al-Qudair, Khalid H.A. (2005) "The Relationship between Government Expenditure and Revenue in the kingdom of Saudi Arabia: Testing for Cointegration and Causality" *JKAU:Econ and Adm.*,vol.19 no.1,pp31-33. | Aregbeyen Omo and Mohammed Ibrahim Taofik (2012) "Testing the Revenue and Expenditure Nexus in Nigeria: An Application of the Bound Test Approach" *European journal of social sciences*, ISSN, vol.27, No.3, pp 370-380. | Barro, Robert J, (1989), "The Ricardian Approach to Budget Deficits" *Journal of Economic Perspective*, vol. 3 (Spring), pp37-54. | Barro,R.J.,(1979), "On the Determination of Public Debt" *Journal of political Economy* 81 ,pp 940- 971. | Blackley, P. R. (1986), "Causality Between Revenues and Expenditures and Size of the Federal Budget", *Public Finance Quarterly* 14, pp 139-156. | Dayang- Affizzah, A.M., Habibullah Muzafar Shah and Azman- Sain W.N.W (2006) " Expenditures and Revenues: Testing for Causality in Sabah Local Government Finances" *International Journal of Economics and Management*, ISSN1803-836X vol.1, No. 1 pp. 1-23. | Dhanasekaran, K., (2001)"Government Tax Revenue, Expenditure and Cusality: The Experience of India", *Indian Economic Review*, Vol. XXXVI. No.2. pp 359 - 379. | Dickey,D.A. & Fuller, W.A (1981) " Likelihood Ratio Statistics for Autoregressive Time Series With a Unit Root",*Econometrica*, vol.49 No.4,pp 1057-72. | Engel, R.F. and Granger, C.W.J. (1987) "Cointegration and Error Correction: Representation, Estimation and Testing" , *Econometrica*, vol.55, No.2, March, pp. 251-276. | Ewing, Bradley T.and Payne,James E (1998) " Government Revenue-Expenditure nexus: Evidence from Latin America" *journal of Economic Development*,vol.23, issue.2,pp. 57-69 | Granger, C.W.J., (1986) , "Developments in The Study of Cointegrated variables ,*Oxford Bulletin of Economic and Statistics* , vol.48, pp.213-228. | Handroyannis George and Papapethrou Evanelia (1996) "An Examination of the Causal Relationship between Government Spending and Revenue: A Cointegration analysis," *public choice*, vol.89, pp363-374. | Kollias , Christos and Paleogou, Susana-Maria (2006) " Fiscal Policy in the EU: Tax and Spend, Spend and Tax, Fiscal Synchronization or Institutional Separation?" *Journal of Economic Studies*, vol. 33, issue 2, pp 108-120 | Lusinyan Lusine & Thornton John (2010) "The Intertemporal relation between Government Revenue and Expenditure in the United Kingdom, 1750-2004" *Bangor Business School Working Paper*,BBSWP/10/007. | Mehrara, Mohsen, & Pahlavani , Mosayeb and Elyasi, Yousef (2011) " Government Revenue and Government Expenditure Nexus in Asian Countries: Panel Cointegration and Causality" *International journal of business and social science*, vol.2,issue.7Special Issue. | Mithani ,D.M. and Khoon , Soo Goh (1999) " Causality between Government Expenditure and Revenue in Malaysia : A Seasonal Cointegration Test" *Asian Economic Bulletin* , vol.16, no.1, pp.68-79 | Muhammad, Adnan Qazi HYE and Anwar Jalil, M (2010) "Revenue and Expenditure Nexus: A Case Study of Romania" *Romanian Journal of Fiscal Policy*, vol.1,Issue1, pp 22-28 | Mukhopadhyay, C. K. and .Maitra, B (2007) " Fiscal Synchronization Hypothesis in the Economy of Sri-Lanka (1957-2004) – An Econometric and Time Series Analysis" *Journal of South Asian Economy*, vol. 1, March ,2007. | Narayan,P.KandNarayan, Seema (2006) "Government Revenue & Government Expenditure Nexus: Evidence from Developing Countries" *Applied Economics* ,vol.38,Issue3,Feb.2006,pp285-291. | Owoye, Oluwole and Oluwobenga Onafowora, A. (2011) "The Relationship between Tax Revenues and Government Expenditure in European Union and Non-European Union OECD countries" *Public Finance Review*, vol. 30,no. 3, pp 429-461. | Park, Wan Kyu (1998), "Granger Causality between Government Revenue and Expenditure in Korea" *Journal of Economic Development*,vol.23. no. pp. 145-155. | Sriyana, J. (2009) "A causality relationship between tax revenue and government expenditure in Indonesia", *Economic Journal of Emerging Market*, vol.1,issue.2 pp.93-101. | Subhani, Imtiaz Muhammad and Hasan, Akif Syed , Osman, Amber and Rafiq, Tanzel (2012) "An investigation of granger causality between tax revenue and government expenditure" *European journal of scientific research*, ISSN,vol.68.no.3 pp. 340-344. | Tsen Hock Wong and Ping Kian Lim (2005) "The Relationship between Government Revenue and Government Revenue in Malaysia" *IJMS*, Vol.12,issue.2, pp.53-72. | Wolde-Rufael Yamane (2008), "The Revenue-Expenditure Nexus: the Experiences of 13 African Countries" *African Development Review*, vol.20, issue. |