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External debt servicing and Current account balance in Kenya

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Abstract

Kenya has experienced persistent current account deficits that have remained underneath the threshold that economists would consider sustainable. At the point when a nation runs steady current account deficit for a long period, it raises worries about the sustainability of this deficit. The persevering current account deficit has led to increase of liabilities to the rest of the world that are financed by the capital account surplus. These should be paid back in the long run. There is no consensus as regards the relationship between external debt servicing and the current account balance in Kenya. The main objective of this study was to analyze the relationship between external debt servicing and current account balance in Kenya. Vector error correction model (VECM) was utilized because there was insufficient theory that connects these variables. The study found that external debt service granger causes current account balance in Kenya. Policies on external debt management should be carefully designed not to weaken macroeconomic fundamentals because they take long time before fizzing out.

Keywords: Current Account Balance; Debt Servicing; Balance of Payments, Kenya

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1. Introduction

Constant current account imbalances in many developing nations has energized extensive enthusiasm among economists and policy makers looking to have clear understanding of the significance of current account balance in macroeconomic issues. Many countries have run huge and constant current account deficits which have been followed by economic slowdowns and severe financial crises (Kariuki, 2009). Current Account Balance (CAB) is one of the components of the Balance of Payments (BoP) in open economy (Mwangi, 2014). The other components are capital account and financial account.Current account balance (CAB) captures the trade balance (net export), unilateral transfers such as foreign aid and the net factor income from abroad such as interest and dividends. CAB which also represents the difference between domestic saving and investment is a key economic indicator of how a country is performing externally (Giancarlo, 2002).

Current account balance constitutes an integral measure of national saving and therefore it can be used as an indicator of a country's saving and spending behaviour (Mwangi, 2014). The information contained in current account balance is quite useful in projecting BoP, compilation and measurement of national income. CAB plays a leading role and it is an important factor in policy formulation, analysis and decision-making processes in the increasingly interdependent world economy (Edwards, 2001).

Economic theory contends that whether current account deficit (CAD) is beneficial or detrimental to the economy depends on the factor that gave rise to it (Ghosh and Ramakrishnan, 2006). Generally, large persistent current account deficit may signal ill-performance and vulnerability of the economy (Todaro and Smith, 2003). Persistent CAD is also a key indicator of low national savings and investments, lack of international competitiveness and structural economic problem such as an undeveloped financial system. Furthermore, current account imbalance means a potential loss of output, increased unemployment and unbalanced economic growth (Nusrate, 2008; Ogwuru, 2008; Ghosh and Ramakrishnan, 2006).

In Kenya the import-export gap grew by nearly 33 percent in the year 2002 due to the country importing machinery and other capital goods for infrastructure projects. This led to high current account deficit during the same year. Although the deficit was contributed by investment in transport projects, which will be paid off economically after their completion, there was high likelihood that this deficit was one of the main causes of the depreciation of the shilling during the same period (Mwenga, 2007).

The Kenya Vision 2030, which goes for changing Kenya into a prosperous country by year 2030, identified key strategic areas keeping in mind the end goal to accomplish high monetary development, social improvement and great administration. So as to accomplish the Vision, the strategies put in place will influence the investment, national saving, and fiscal performance among other macroeconomic variables. These are some of the key factors that will influence the current account position. This is the central inspiration driving the current account balance research.

1.1. Trend of the current account balance (CAB) in Kenya, 1980-2015

Kenya keeps on encountering constant current account deficit for the whole time frame under investigation. Although current account deficit may be something good when it measures the investment finance gap that

ought to be topped off, it can likewise speak a dangerous and unsustainable imbalance between national saving and national investment and consequently prompt accumulation of outer debt.

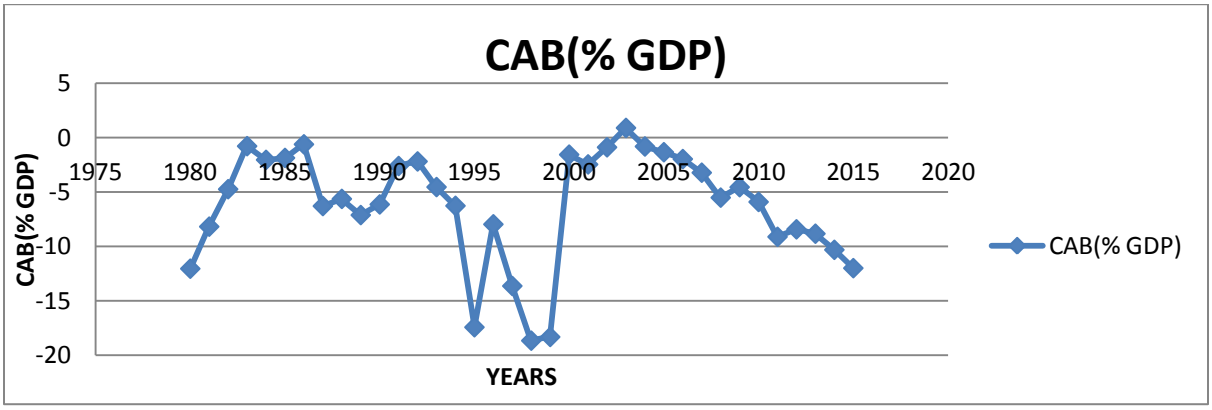

Figure 1. Trend of current account balance in Kenya, 1980 to 2015 (Source: International Monetary Fund: World Economic Outlook Database, 2015)

Figure 1 shows the trend of current account balance in Kenya for the period between 1980 and 2015. The figure reveals that current account balance in Kenya was unstable between 1980 and 2015 with current account deficits dominating the scene. Patterns in current account deficit in Kenya have been increasing to the tune of 18.7 percent of GDP in 1998 as shown in figure 1. There is a concern that since 2003, the upward pattern in growth of the current account deficits has proceeded unabated.

1.2. Current account balances of selected East African countries

East African Countries have experienced persistent current account deficit for the period between 1980 and 2015. From 2007 the upward pattern in growth of the current account deficits has proceeded unabated. With this upward trend unsustainable current account deficit can emerge very rapidly.

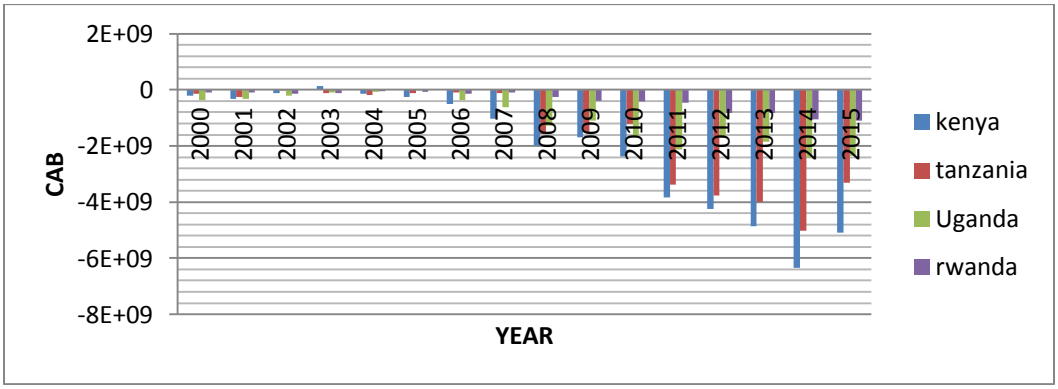

Figure 2. Current account balances of selected East African countries (Source: International Monetary Fund: World Economic Outlook Database, 2015)

Figure 2 shows the trend of current account balances of different countries in East Africa. It is observed that Kenyan current account balance has been worse compared to other countries in East Africa. This unfavourable trade scenario has been exacerbated by the fact that Kenya's exports are dominated by few primary commodities, which have low price and income elasticities. Generally, Kenya is a net-importer. These deficits have contributed to unsustainable imbalance between investment and national savings which has led to accumulation of external debt. Thus, the importance of maintaining sustainable current account balance cannot be underestimated.

1.3. External debt servicing and current account balance in Kenya

High cost of external debt has an implication on the social and economic sectors' investments and ultimately on the overall output of an economy. Like most Sub-Sahara Africa (SSA) countries, bigger percentage of Kenya's external debt comprises of debt basically from bilateral sources. The extent of concessional debt has been increasing since 1990s.

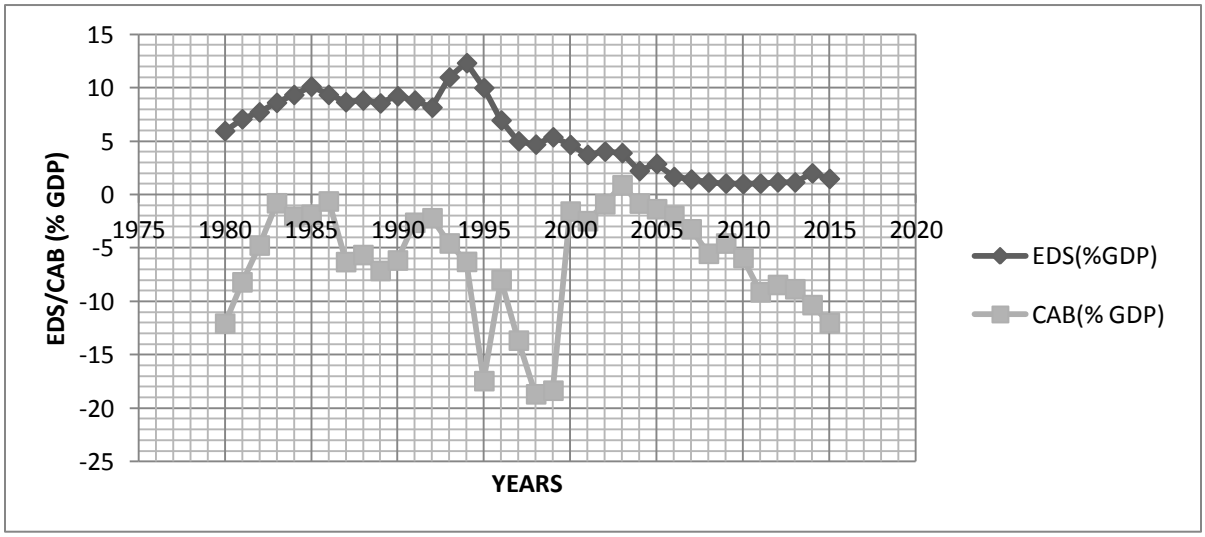

Figure 3. Trends of external debt servicing and current account balance as a percentage of GDP (Source of the basic data: International Monetary Fund (IMF): World Economic Outlook Database, 2015)

Figure 3 shows that the external debt servicing and current account balance in Kenya have been fluctuating from 1980 to 2015. The highest external debt service in 1994 was followed by a huge current account deficit in 1995. Figure 3 reveals that a current account surplus in 2003 was followed by the lowest external debt service in 2004. A critical look at Kenya's fiscal scene reveals an expansionary fiscal phase indicated by an increase in the primary deficit. These fiscal developments have resulted to an increase in the share of debt service in total spending over the years. This is due to accumulating debt stock, which increases servicing amounts. For instance, external debt servicing rose from 8.1 percent to 12.3 percent of recurrent

spending, equivalent to 4.2 percent of GDP between 1993 and 1994. In the mid-1980s the world loan fees expanded pointedly as an outcome of anti-inflationary programmes in the industrialized nations. Meanwhile, the terms of trade debilitated for the borrower world as crude material costs fell. Kenya's growth of export income declined from 26 percent in 1980 to 13 percent in 1981.Due to debt discounts and a decrease in bilateral and private obligation the growth of external debt in 1988 and 1989 declined further. In 1989, Kenya was excused its external debt adding up to US$463 million.

In 1990s, the debt burden turned out to be so intense and Kenya rescheduled its debt for the first time. The government started to amass unpaid debts on official debt in the late 1990s with the curtailment of donor financing. External financing help began loosening in the 1990s in spite of the dramatic build-up in nominal aid flows amid the same period. The level of outside obligation has been falling (Magero, 2015). In spite of the fact that Kenya might not have enormous obligation when contrasted with other heavily indebted poor countries (HIPCs), her present poor financial performance and inability to meet her debt obligations have genuine ramifications on monetary development.

2. Statement of the problem

Kenya has faced perennial current account deficits that have additionally remained beneath what economists would consider feasible. When a country runs persistent current account deficit for an extended period, it raises concerns about the sustainability of this deficit (Summer, 1996). As a rule of thumb, current account deficit (CAD) above 5 percent of GDP is alarming especially if funded by short-term debt or foreign reserves (Kenen, 1995). The deficit worsened by 50.6 percent in quarter two of 2013. Kenya has not just operated with deficits surpassing 5 percent for the greater part of the years in her history, but the current account deficits have likewise shown some volatility. The persistent current account deficit has led to building up of liabilities to the rest of the world that are financed by flows in the capital account. Inevitably, these should be paid back. Empirical studies have focused on determinants of international trade flows with particular emphasis on the relationship between current account balance and key macroeconomics variables in various countries yielding different results. The review of these empirical studies has shown that it is inadequate to generalize the link between external debt servicing and current account balance. The objective of this study was to evaluate the relationship between external debt servicing and current account balance in Kenya. This study took care of causality consequences using dynamic modelling that aim at examining impulse responses to establish the empirical impact of external debt servicing on current account balance in Kenya.

3. Objectives of the Study

The general objective of the study was to investigate the nature of the relationship between external debt servicing and current account balance. Specifically this study aims to determine the causality between external debt serving and current account balance.

4. Literature review

4.1. Theoretical literature

4.1.1. Debt overhang theory

The debt overhang hypothesis initially examined by Myers in 1977 depends on the way that if debt will surpass the nation's reimbursement capacity with some probability later on, at that point the expected debt service is probably to be increasing as the nation's yield level increases. In this way a bit of profits from investing into the domestic economy will be exhausted away to pay the current creditors and this will demoralize new foreign investors (Claessens et al., 1996). The borrower nation will hence utilize just halfway of any increase in output and exports since a decent portion of that increment will be utilized to service external debt. This creates a problem because if a country has a new investment project which may generate positive net present value**,** the country will not invest due to an existing debt position hence the country's level of investment will start decreasing.

The presence of this stock of external debt changes the incentive of either the creditor or the debtor. External debt relief may therefore benefit either of them. The creditor could have an incentive to keep on lending in order to avoid a loss thinking that the debtor will improve its economic conditions and will be in a position to repay the debt in the near future. On the other hand, the debtor has disincentive to invest because of the assumption that all the gains will be taxed away to pay the lender. This theory implies that a decrease in the amount of external debt will lead to increase in domestic investment and a reduction in government spending. An increase in the level of investment will worsen the current account balance while reduction in government spending will improve the current account balance (Elbadawi et al., 1996).

4.1.2. The absorption approach

The absorption approach was developed by Murshed (1997). According to this theory the difference between domestic output and spending (absorption) represents the current account balance. If income is greater than absorption there would be a trade surplus and vice versa. The theory emphasizes on changes in real domestic income and therefore it is referred to as real-income theory of the balance of payments (Kosimbei, 2002). The theory assumes that prices remain constant. It is based on Keynesian national income framework which is given as:

$$Y = C+I+G+X-M \quad (1)$$

where: C is Consumption, I is Investment, G is Government expenditure andY is Output.

Absorption (A) which is also known as aggregate spending is given as:

$$A = C+I+G \quad (2)$$

Substituting the absorption equation 2 into equation 1 and rewriting the resultant equation:

$$X - M = Y-A \quad (3)$$

Current account balance (CAB) is defined as a sum of three components: the net export, net current transfers and the net income from abroad.

$$CAB = X-M +NI+ CT \quad (4)$$

where: X and M are Exports and imports respectively. NI and CT are net income from abroad and net current transfers respectively.

Net incomes from abroad (NI) and net current transfers (CT) are assumed to be very small and negligible for the case of Kenya, hence they can be dropped from equation 4 yielding the following equation:

$$CAB = X-M \quad (5)$$

Substituting the current account balance equation 5 into equation3 and rewriting the resultant expression yields:

$$CAB = Y -C-I-G \quad (6)$$

From equation 5 it is clear that factors that affect consumption, investment and government expenditure will indirectly affect current account balance.

4.2. Empirical literature

Chinn and Prasad (2003) carried out an empirical analysis on the effectiveness of various macroeconomic variables on current account in different country grouping. The study applied panel regression techniques in analysing the data for different country grouping. The study revealed that current account balance of non-oil developing countries is affected by both external and internal factors. The study indicated that external debt servicing and current account balance were negatively related.

Hermann and Jochem (2005) analysed the effect of selected macroeconomic variables on current account balance in central and east European Union using Feasible Generalized Least Squares estimation technique. The study used quarterly panel data framework. The study revealed a negative relationship between current account balance and external debt services.

Mbanga and Sikod (2008) analyzed the impact of debt and its interest repayment on macroeconomic variables in Greece. Using vector autoregressive (VAR) the study pointed out that the external debt servicing and the rate of inflation greatly affected the current account developments during 1995-2006 in Greece. The main assumption of the study was that stationary current account series ensured the long-run relationship.

Morsy (2009) investigated the relationship between current account balance and currency crisis in oil exporting countries using Intertemporal Approach. The study revealed that external debt among other factors influenced the position of the current account balance. The study used panel data for different oil exporting countries. Unit root test revealed that current account balance was a stationary series in the period and therefore co integration methods were not appropriate. The study therefore applied generalized methods of moments (GMM) which controls for endogeneity and corrects for the bias.

Kayikci (2011) studied the effectiveness of current account balance determinants in Turkey using vector auto regression. Annual time series data for the following variables was used: The results established

bidirectional causality between current account balance and external debt service. This confirmed the hypothesis that the values of current account balance can also be used to predict the values of external debt service. It was established that 40 percent of variations in current account balance were caused by innovations in current account balance (past) and 26 percent of the variations were caused by external debt service.

Magero (2015) examined the impact of total debt servicing on macroeconomic performance in Kenya using Vector autoregressive model. The study found that debt servicing has a significant effect on macroeconomic performance. This is due to the estimated effects on the macroeconomic fundamentals. Debt servicing crowded out private investment with no existence of debt overhang. Further innovations in total debt servicing would persist in the economy for over ten years to shrivel.

4.3. Overview of literature review and research gaps

Some findings of the existing literature reviewed deserve further examination. The majority of these studies utilized econometric tools that were insufficient in representing the unpredictability of relationships between macroeconomic variables. This was due to the fact that there were no enough economic theories that could be used in determining the right specification. Studying these literatures reveal conflicting and inconclusive evidence that raises doubts about the nature of the relationship between these macroeconomic variables. Most of the studies such as Mwangi (2014) and Kariuki (2009) yields mixed results about the factors that impact the movement of current account balance in Kenya hence it is hard to make generalization on the relationship between external debt service and current account balance. This study took care of causality consequences using dynamic modelling that aim at examining impulse responses to establish the empirical effects of external debt servicing on current account balance in Kenya.

5. Methodology

5.1. Theoretical model

This study adopted the absorption approach to current account balance. Murshed (1997) argued that the difference between domestic output and spending (absorption) represents the current account balance. Murshed, 1997 emphasized on the changes in real domestic income and assumed that prices remain constant. Absorption approach is also referred to as real-income theory of balance of payments (Kosimbei, 2002). According to absorption approach current account balance (CAB) is expressed as:

$$\text{CAB= Y-C-I-G} \qquad (7)$$

The behavioural equations for the components in equation 7 can be written as follows:

$$C = a + bY^d \qquad (8\text{-a})$$

$$Y^d = Y - T\ , I = \partial + \gamma i \text{and G} = G^* \qquad (8\text{-b})$$

Where: Y is the level of output, C is the level of consumption,Y^d is the disposable income, T is the Tax revenue, I is Investment,$\partial$is exogenous investments,$\iota$is interest rate, G is exogenous government expenditure (G*) and a, b, ∂ and γ are coefficients.

Substituting the bahavioural equations into equation 1 and rearranging the resultant yields the following equation:

$$CAB = (1-b)Y - (a+\partial) - \gamma i - (\mathrm{G}^* - \mathrm{T}) \quad (9)$$

Budget deficit is the difference between government revenues and expenditures. With an assumption that the government`s total income is derived from taxes, then $G - T$ is equal to the deficit. Hence equation 9 can be rewritten as:

$$CAB = (1-b)Y - (a+\partial) - \gamma i - BD \quad (10)$$

5.2. Empirical model specification

Given the fact that Kenya is a small open economy with no ability to influence international economy, an empirical counterpart of equation 10 may be obtained by introducing the methods of financing the budget deficit such as external debt service (EDS) among other related policy variables into the function as part of the X-vector of explanatory variables. Other factors have been identified from the relevant literature; they include rate of inflation (INF), terms of trade (TOT), nominal exchange rate (NER) and real gross domestic product (rGDP). The empirical model for this study was expressed in general form as:

$$\mathrm{CAB} = \mathrm{f}\,(\mathrm{INF}, \mathrm{EDS}, TOT, IR, \mathrm{NER}, \mathrm{rGDP}, \mathrm{BD}) \quad (11)$$

The Study utilized vector Auto Regressive (VAR) model. VAR model does not impose restrictions to the system but treats all the variables systematically (Sims, 1980).The compact form of a VAR model that link current account balance and external debt service among other explanatory variables in equation (11) took the form:

$$X_t = \Theta_0 + \Theta_1 X_{t-1} + \Theta_2 X_{t-2} + \Theta_3 X_{t-3} \ldots + \Theta_{\mathrm{p}} X_{t-p} + \varepsilon_t \quad (12)$$

where Θ_0 is n × 1 vector of constant coefficients, X_t is a n×1 vector of the selected endogenous variables (CAB, INF, EDS, TOT,IR, NER, rGDP, BD) and εt is a disturbance terms with a constant variance and Zero means. In this case the equation for current account balance was expressed as:

$$CAB_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i\, CAB_{t-i} + \sum_{i=1}^{m} \beta_i\, EDS_{t-i} + \sum_{i=1}^{n} \beta_i\, INF_{t-i} + \sum_{i=1}^{p} \beta_i\, TOT_{t-i} + \sum_{i=1}^{s} \beta_i\, NER_{t-i} + \sum_{i=1}^{u} \beta_i\, IR_{t-i} + \sum_{i=1}^{q} \beta_i\, rGDP_{t-i} + \sum_{i=1}^{r} \beta_i\, BD_{t-i} + \varepsilon_t \quad (13)$$

Before the model was estimated various information criteria such as Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC), Likelihood ratio (LR), and Final Prediction Error (FPE) were employed to decide the proper lag length for the model.

LR test utilized equation 14:

$$LR = (T - m)(\ln|\Sigma_r| - \ln(\ln|\Sigma_u|) \sim \chi^2(q) \quad (14)$$

where: T is the number of observations , M is the number of parameters estimated , $\ln|\Sigma_r|$ is the natural log of the determinant of the covariance matrix of residuals and q is number of the restrictions in the system

The information criteria (AIC and SIC) are not tests that pick the lag that minimizes the criteria, they just show goodness of fit of choices and therefore they were only employed to complement the LR tests. The cointegrating test results confirmed that there was cointegration and thus the relationship between the variables could be described by restricted VAR also known as Vector Error Correction model (VECM). The general VECM with deterministic trend is:

$$\Delta Y_t = \emptyset + \pi Y_{t-1} + \alpha t + \sum_{i=1}^{p-1} \tau_t \Delta Y_{t-1} + \epsilon_t \quad (15)$$

where $\emptyset = \emptyset_1 - \gamma\emptyset_2 \; and \; \alpha = \alpha_1 - \gamma\alpha_2$

To estimate equation 15, the equation was further rewritten as:

$$\Delta Y_t = \emptyset = \emptyset_1 + \alpha_1 t + \gamma(\beta^{\wedge\prime} Y_{(t-1)} - \emptyset_2 + \alpha_2 t) + \sum_{i=1}^{p-1} \tau_t \Delta Y_{t-1} + \epsilon_t \quad (16)$$

The intuition of this expression is that a change in Y_t can come from the time trend. The last part of the expression with a summation is used to eliminate serial correlation.

5.3. Granger causality test

The study tested for existence of causality between the economic variables using the granger causality test. This is a test which checks if one-time series could be used to predict another time series (Engle and Granger, 1987). To examine Granger causation between external debt service and current account balance the granger causality test was done through estimation of two regression equation expressed as follows:

$$CAB_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i CAB_{t-i} + \sum_{i=1}^{m} \beta_i EDS_{t-i} + \sum_{i=1}^{n} \beta_i INF_{t-i} + \sum_{i=1}^{p} \beta_i TOT_{t-i} + \sum_{i=1}^{s} \beta_i NER_{t-i} + \sum_{i=1}^{u} \beta_i IR_{t-i} + \sum_{i=1}^{q} \beta_i rGDP_{t-i} + \sum_{i=1}^{r} \beta_i BD_{t-i} + \varepsilon_t \quad (17)$$

$$EDS_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i EDS_{t-i} + \sum_{i=1}^{m} \beta_i CAB_{t-i} + \sum_{i=1}^{n} \beta_i INF_{t-i} + \sum_{i=1}^{p} \beta_i TOT_{t-i} + \sum_{i=1}^{s} \beta_i NER_{t-i} + \sum_{i=1}^{u} \beta_i IR_{t-i} + \sum_{i=1}^{q} \beta_i rGDP_{t-i} + \sum_{i=1}^{r} \beta_i BD_{t-i} + \varepsilon_t \quad (18)$$

5.4. Definition and measurement of variables

Current account balance (CAB): This is the value of Kenya's net exports of goods and services in one year. Grants were excluded because their inclusion will give biased results.

Inflation rate (INF): This is general change in prices paid by consumers over a given time. It was measured by the recorded inflation rate for the given year.

External debt Servicing (EDS): External debt service is the payments of both principal and interest charged on the external debt. It also included any late payment fees. It was standardized by expressing it as a percentage of GDP.

Terms of Trade (TOT): This is the difference between the prices of goods exported and the prices of goods imported. In this study 2000 was used as the base year.

Interest rate (IR): Interest rate is the reward of parting with liquidity for a specified period usually one year. It was measured in percentage per annum by taking the annual average.

Budget deficit: Is the value of Kenya's central government revenues net its expenditures in one year. In this study it was expressed as a percentage of GDP.

Nominal Exchange Rate (NER): Is the price of a US dollar in terms of Kenya shillings.

Real Gross domestic product (GDP): This is the monetary value of all the completed goods and services produced within a country's borders within one year. It was standardized by taking its annual growth.

5.5. Time series properties

The study tested for time series properties such as the presence of nit roots and cointegration before estimation. This ensured that the results were meaningful. To perform the unit root test, the study employed Augmented Dickey Fuller (ADF) test procedure.

The choice of ADF was supported by the fact that it retains the validity of the tests. The non-stationary time series were then differenced until they become stationary. To confirm the ADF test the Phillips-Perron (PP) test proposed by Phillips and Perron (1988) which takes care of structural breaks and serial correlation in the time series was employed. The ADF test involved estimating the following three equations:

$$\Delta y_t = \varphi y_{t-1} + \sum_{i=1}^{n} \lambda_i \Delta y_{t-i} + \mu_t \quad (19)$$

$$\Delta y_t = \gamma + \varphi y_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta y_{t-i} + v_t \quad (20)$$

$$\Delta y_t = \delta + \omega\, t + \varphi y_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta y_{t-i} + v_t \quad (21)$$

where: δ is the intercept, ωt is the trend, i represents the number of lags in Δy_{t-i} with the maximum being n and μ_t is the random error term

5.5.1. Cointegration analysis

Two or more non-stationary time series are said to be cointegrated if they are integrated of the same order and a linear combination between them is stationary (Greene, 2008). Thus, cointegration suggests that despite the time series being exclusively non-stationary, there is existence of a long run relationship between them. Cointegration makes it conceivable to capture relationship between non stationary time series inside a model which is stationary. The commonly used tests for Cointegration are Johansen's method and Granger two-step methods (Engle and Granger, 1987). Johansen's methodology was utilized to test for Cointegration in this study since it licenses for more than one cointegrating relationship, unlike the Engle– Granger technique (Johansen, 1988).

5.6. Data type and source

Secondary annual time series data for the period between 1980 and 2015 was utilized. The sources of data included: statistical absracts from Kenya National bureau of statistics (KNBS), The World Bank African Development indicators and the Central Bank of Kenya.

5.7. Diagnostic tests

Diagnostic tests were undertaken to ensure consistent coefficient estimates. Various econometric tests such as Breusch-pagan test and Goldfeld-Quandt were conducted to test for heteroskedasticity and multicollinearity (Gujarati, 2004). Since some of the variables were lagged the study used Durbin's h test to test for serial autocorrelation (Gujarati, 2004). The Jarque-Bera test was also conducted to test normality of the error term. This is a test that involved computing standard deviation, skewness, probability and kurtosis.

5.8. Data and analysis techniques

To achieve the objective of determining the nature of the relationship between external debt servicing and current account balance granger causality was used which involved estimating equations (17) and (18).

6. Empirical findings

6.1. Descriptive statistics

Descriptive statistics reveal the salient features of the variables used in the study. The descriptive statistics helps one understand the nature of the variable one isdealing with. They include the measures of central

tendency and the measures of dispersion such as the standard deviation and the range. These statistics are presented in Table 1.

Table 1. Summary statistics for selected macroeconomic variables

	CAB	EDS	INF	GDP	*IR*	NER	TOT	BD
Mean	-6.207	5.568	11.264	3.789	7.440	53.114	90.945	-4.361
Median	-5.581	5.196	9.12	4.169	6.356	59.55	89.79	-4.15
Maximum	0.888	12.329	45.979	8.402	21.096	98.18	114.02	1.75
Minimum	-18.67	1.004	1.554	-0.799	-8.009	7.42	70.15	-17.78
Std. Dev.	5.1420	3.516	8.517	2.333	6.695	29.234	10.347	3.77
Skewness	-0.948	0.094	2.297	-0.18	0.069	-0.317	0.297	-1.302
Kurtosis	3.211	1.631	9.239	2.064	2.759	1.541	2.561	5.728
Jarque-Bera	5.465	2.863	90.0421	1.507	0.115	3.798	0.819	21.339
Probability	0.065	0.239	0	0.471	0.944	0.149	0.664	0.000
Sum	-223.46	200.473	405.505	136.439	267.855	1912.09	3274.02	-157
Sum Sq. Dev.	925.422	432.695	2538.779	190.455	1568.976	29911.52	3747.294	497.928
Observations	36	36	36	36	36	36	36	36

The average value of current account balance as a percent of GDP in Kenya was -6.207 percent. The minimum and maximum current account balance as a percent of GDP stood at -18.679percent and 0.888percent respectively during the same period. A standard deviation of 5.142 percent indicated a high variation from the mean during the period under study. The median current account balance of -5.582percent as shown in Table 1 which is not the same as the mean value of -6.207percent indicates that the observations are not symmetrically distributed. The figures supported the study background that reveals that Kenya had instability in its current account balance with current account deficits dominating the scene and registering invisible current account surpluses.

The descriptive statistics also show that on average Kenya used 5.569 percent of GDP in servicing her external debt during the period under study. The external debt service in the country ranged between 1.004 percent and 12.329 percent of GDP and a standard deviation of 3.516 percent which showed that there was a very high variation from the mean. The median external debt service was 5.197 percent of GDP.

Table 1 shows that current account balance was negatively skewed implying that the distribution had a long left tail. On the other hand, external debt service is positively skewed hence the distributions have long right tail.

Jarque-Bera was used to determine whether the observations were normally distributed or not. This test captures the difference between skewness and kurtosis of observations. Table1 shows that Jarque-Bera statistic rejects the null hypothesis of normal distribution for budget deficit and inflation rate (INF) because the probability is less than 0.05 ($P<0.05$). Since the p-valuefor the external debt service and current account

balance was greater than 0.05 the study did not reject the null hypothesis of normal distribution hence external debt service was normally distributed.

6.2. Time series property results

6.2.1. Unit root test

The study employed Augmented Dickey-Fuller test (ADF) and Phillip-Perron test (PP) to affirm stationarity of variables under study. The PP test is a superior criterion because it takes care of serial auto correction and structural breaks. If the computed t-statistics is greater than the asymptotic critical values in absolute terms, the null hypothesis that the series contained unit root was rejected and the series was concluded to be stationary(Gujarati, 2004).The findings of the test are shown in Table 2

Table 2. Unit Root Tests Results

Variable	Type of test	Form of test	Test statistics	Conclusion
CAB Level	ADF	Intercept	-2.822	Non-stationary
		Trend & Intercept	-2.879	
	PP	Intercept	-2.825	Non-stationary
		Trend & Intercept	-2.724	
CAD 1st Difference	ADF	Intercept	-6.619**	Stationary
		Trend & Intercept	-6.589**	
EDS Level	ADF	Intercept	-0.537	Non-stationary
		Trend & Intercept	-3.012	
	PP	Intercept	-2.235	Non-stationary
		Trend & Intercept	-2.768	
EDS 1st Difference	ADF	Intercept	-4.518**	Stationary
		Trend & Intercept	-4.524**	
INF Level	ADF	Intercept	-3.127**	Stationary
		Trend & Intercept	-3.735**	
	PP	Intercept	-3.153**	Stationary
		Trend & Intercept	-3.258*	
NER Level	ADF	Intercept	-0.596	Non-stationary
		Trend & Intercept	-1.845	
	PP	Intercept	-0.590	Non-stationary
		Trend & Intercept	-1.929	
NER 1st Difference	ADF	Intercept	-5.391**	Stationary
		Trend & Intercept	-5.296**	
TOT Level	ADF	Intercept	-2.041	Non-stationary
		Trend & Intercept	-2.436	
	PP	Intercept	-2.289	Non-stationary
		Trend & Intercept	-2.676	

Table 2. *Cont.*

TOT 1st Difference	ADF	Intercept	-5.887***	Stationary
		Trend & Intercept	-5.825**	
BD	ADF	Intercept	-5.234***	Stationary
		Trend & Intercept	-5.323**	
	PP	Intercept	-5.373**	Stationary
		Trend & Intercept	-5.456***	
GDP	ADF	Intercept	-3.42***	Stationary
		Trend & Intercept	-3.687**	
	PP	Intercept	-3.46***	Stationary
		Trend & Intercept	-3.707**	
IR	ADF	Intercept	-4.018***	Stationary
		Trend & Intercept	-3.955**	
	PP	Intercept	-4.043***	Stationary
		Trend & Intercept	-3.993**	

*Note: ***stationary at 1%; ** stationary at 5%; * stationary at 10% levels of significance*

The results in Table 2 show that, for budget deficit (BD), GDP, INF and IR the test statistics was greater than the critical value at 5 percent for both ADF and PP test in absolute terms. The null hypothesis of non-stationary at level was therefore rejected and therefore the above variables were integrated of order zero I (0). Current account balance (CAB), external debt service (EDS), nominal exchange rate (NER) and terms of trade (TOT) were non-stationary at level but after the first difference they become stationary hence integrated of order one I(1).

6.2.2. Cointegration analysis

Johansen's methodology was utilized to test for Cointegration in this study since it licenses for more than one cointegrating relationship, not at all like the Engle– Granger technique. Johansen Cointegration test was applied to examine the co integrating vectors in the model. The results are reported in Table 3.

Table 3. Cointegration results

Unrestricted Cointegration Rank Test (Trace)				
Trend assumption: No deterministic trend (restricted constant)				
No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.88779	244.0809	169.5991	0
At most 1 *	0.767004	169.7099	134.678	0.0001
At most 2 *	0.652816	120.181	104.8473	0.0027
At most 3 *	0.549124	84.21238	77.98277	0.0126
At most 4 *	0.455551	57.12924	54.07904	0.026
At most 5*	0.444016	36.45787	36.29375	0.0363
At most 6	0.241728	16.4993	21.26284	0.1523
At most 7	0.188248	7.091043	9.265546	0.1217

Table 3. *Cont.*

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigen value)				
No. of CE(s)	Eigen value	Max-EigenStatistic	Critical Value (0.05)	Prob.**
None *	0.88779	74.37097	51.28894	0.0001
At most 1 *	0.767004	49.52894	48.17997	0.0267
At most 2 *	0.652816	35.96863	41.9568	0.0337
At most 3 *	0.549124	27.08314	34.80587	0.0496
At most 4	0.455551	20.67137	28.58808	0.3625
At most 5	0.444016	19.95857	23.39962	0.1028
At most 6	0.241728	9.408261	16.8921	0.3913
At most 7	0.188248	7.091043	9.285546	0.1217
Max-eigen value test indicates 4 cointegrating eqn (s) at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level				

Trace value test statistic indicates that there were at most five cointegrating vector equations among the variables (P<0.05). The Max-eigen value test statistic confirms at most three cointegrating vector equations among the variables (P<0.05). Using the trace value test statistic, the study rejects the null hypothesis of no cointegrating vector and also the null hypothesis of at least four cointegrating vectors at 5 percent level of significance. However, using the Max-eigen value test statistics the study rejects the null hypothesis of no cointegrating vector and also the null hypothesis of at least three cointegrating at 5 percent level of significance. The cointegrating test results confirmed that there was cointegration and thus the relationship between them could be described by Vector Error Correction model (VECM).

6.3. Lag order selection

Before estimating the VECM model, the study determined the optimal lag length (K). This was to ensure that the model specified should have the "right" number of lags included. This is because including too many lags will lead to loss of degrees of freedom. If the included lags are too few then the model will be imprecise. The results for the lag length selection are given in Appendix I Table A1.2. From the results 2 lags were selected as the optimal.

6.4. Post estimation diagnostic test

6.4.1. Multicollinearity test

Multicollinearity between regressors leads to inaccurate estimates since the presence of multicollinearity makes standard errors of affected coefficients to be large thereby affecting the predictors. To avoid having inaccurate estimates, correlation between regressors was done to test for multicollinearity. The results of the correlation coefficients are represented by correlation matrix in Table 4.

Table 4. Multicollinearity results

	DCAB	DEDS	DTOT	DNER	GDP	INF	I	BD
DCAB	1							
DEDS	-0.48596	1						
DTOT	-0.28549	-0.35089	1					
DNER	0.191596	0.399829	0.23038	1				
GDP	-0.1509	-0.03865	-0.01865	-0.37223	1			
INF	0.007864	0.349402	0.316592	0.669139	-0.5353	1		
I	-0.4124	0.277698	-0.25596	-0.20294	0.425137	-0.4491	1	
BD	0.370515	-0.4071	-0.29423	-0.43754	-0.03766	-0.1621	-0.176	1

Multicollinearity results indicate that the correlation coefficients between independent variables were less than 0.8 proving there was no serious multicollinearity among the variables.

6.4.2. Normality test

The basic assumption of good regression model is that the error term should be normally distributed for the results to be meaningful. To affirm the normality test, the probability of the Jarque Bera should not be less than 0.05. The Jarque Bera statistic was found to have probability value greater than 0.05 thus the null hypothesis was not rejected meaning that the residual was normally distributed.

6.4.3. Serial correlation test

Breusch-Godfrey Serial Correlation LM test was employed in the study to test for the presence of serial correlation. The results are presented in Table 5.

Table 5. Breusch-Godfrey Serial Correlation LM Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.715367	Prob. F(2,20)	0.2053
Obs*R-squared	4.978288	Prob. Chi-Square(2)	0.083

Table 5 confirmed that there was no evidence of autocorrelation as the probability of the observed R-squared 0.083 hence the study did not reject the null hypothesis of no serial correlation.

6.4.4. Heteroskedasticity test

Heteroscedasticity transpires when the variance of the residuals in a model is not constant. Breusch-Pagan-Godfrey test was employed to test for the presence of heteroskedasticity. The null hypothesis for the test, H_0:

Variance is constant (homoscedasticity). If the probability value is greater than 0.05 the null hypothesis is not rejected.

Table 6. Heteroskedasticity Test Results

Breusch-Pagan-Godfrey			
F-statistic	0.981475	Prob. F(11,22)	0.4907
Obs*R-squared	11.1925	Prob. Chi-Square(11)	0.4273
Scaled explained SS	7.619553	Prob. Chi-Square(11)	0.7469

Since the probability value is greater than 0.05, the null hypothesis is not rejected, concluding there is no problem of heteroskedasticity

6.5. Granger causality test

To achieve the objective of the study the nature of causality between current account balance and external debt servicewas tested using the Granger Causality Test. This is a test which checks if one-time series could be used to predict another time series (Engle and Granger, 1987). The results are presented in the Table 7.

Table 7. Granger causality Results

Var granger causality/block exogeneity wald tests Dependent variable: current account balance			
Excluded	Chi-sq	Df	Prob.
External debt service	0.00414	2	0.0186
Nominal exchange rate	1.7925	2	0.0451
Terms of trade	8.26193	2	0.0042
Gross domestic product	0.1478	2	0.0556
Inflation rate	0.624	2	0.4294
Interest rate	0.6182	2	0.4317
Budget deficit	4.174393	2	0.0409
ALL	21.433	14	0.0032
Dependent variable: External debt service			
Excluded	Chi-sq	Df	Prob.
Current account balance	0.0928	2	0.07606
Nominal exchange rate	0.0058	2	0.9391
Terms of trade	0.2927	2	0.5885
Gross domestic product	4.2111	2	0.0402
Inflation rate	2.637	2	0.1044
Interest rate	0.0335	2	0.8547
Budget deficit	1.9595	2	0.1616
All	8.3356	14	0.0057

Table 7 reveals that the study rejects the null hypothesis of no granger causality between external debt and current account deficit (P=0.0186< 0.05). This confirms the presence of unidirectional causality between external debt servicing and current account deficit. This implies that external debt could be used to explain current account deficit in Kenya. This was further confirmed by a p-value (0.076) for null hypothesis that current account balance does not granger cause external debt service. Since 0.076>0.05 the study does not reject the null hypothesis hence current account balance do not granger cause external debt service.

7. Summary, conclusions and policy implications

The general objective of this study was to investigate the relationship between external debt servicing and current account balance. Specifically, the study investigated the nature of causality between external debt servicing and current account balance. The real inspiration of this study was based on the fact that persistent current account deficits of the country have been of concern to economists in the Kenyan economy. The study adopted granger causality test to establish the nature of relationship between external debt service and current account balance alongside other control variables such as terms of trade, budget deficit, nominal exchange rate, real gross domestic product, rate of inflation and interest rates. The study found that external debt service granger causes current account balance in Kenya. The results implied that this causation should be vital tool of designing external debt policies. The national treasury should consider the linkage between external debt and other macroeconomic variables such as current account balance before exposing itself to any external debt. This is on the grounds that solvency requires that the nation be willing and able to produce adequate current account surpluses to reimburse what it has borrowed to finance the current account deficits. The study recommends that there should be clear implementation of the medium term debt strategy. This medium term debt strategy should aim at having an optimal borrowing mix between domestic debt and external debt. This will guard against vulnerability to external debt shocks and crowding out effect.

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Appendices

APPENDIX I

Table A1.1. The residual normality test

VEC Residual Normality Tests			
Null Hypothesis: residuals are multivariate normal			
Sample: 1980 2015			
Component	Jarque-Bera	Df	Prob.
1	2.735552	2	0.2547
2	0.629777	2	0.7299
3	0.633974	2	0.7283
4	2.169775	2	0.3379
5	1.225907	2	0.5417
6	0.725281	2	0.6958
7	2.824655	2	0.2436
8	2.831989	2	0.2427
Joint	13.77691	16	0.6153

Table A1.2. Lag length selection results

VAR Lag Order Selection Criteria						
Lag	Log L	LR	FPE	AIC	SC	HQ
0	-714.8503	NA	1.47e+09	43.80911	44.17190	43.93117
1	-627.7909	126.6318	4.06e+08*	42.41157	45.67668	43.51018*
2	-560.4204	65.32895*	7.08e+08	42.20730*	48.37472*	44.28245

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error
AIC: Akaike information criterion, SC: Schwarz information criterion

Table A1.3. VECM estimation results

Vector Error Correction Estimates

CointEq	CointEq1	CointEq2	Coint3					
ror Correction:	D(CAB)	D(EDS)	GDP)	D(INF)	D(NER)	D(IR)	D(BD)	D(TOT)
CointEq1	-0.27681	-0.059404	0.001156	-0.642464	-0.692093	-0.256429	-0.199934	0.07115
	(0.1537)	(0.04084)	(0.11423)	(0.34788)	(0.25972)	(0.27716)	(0.16453)	(0.2915)
	[-1.8004]	[-1.45450]	[0.01012]	[-1.84679]	[-2.6647]	[-0.92521]	[-1.21520]	[0.2440]
CointEq2	-0.196924	-0.213647	-0.424176	0.070340	-2.173377	0.997512	0.779986	1.02150
	(0.40510)	(0.10761)	(0.30097)	(0.91662)	(0.68434)	(0.73027)	(0.43351)	(0.7682)
	[-0.48611]	[-1.98533]	[-1.40934]	[0.07674]	[-3.1758]	[1.36594]	[1.79924]	[1.3298]
CointEq3	-0.630318	-0.214922	-0.189540	-1.577277	-1.192973	-0.421881	-0.014743	-0.66514
	(0.31309)	(0.08317)	(0.23262)	(0.70844)	(0.52891)	(0.56442)	(0.33505)	(0.5936)
	[-2.01320]	[-2.58407]	[-0.8148]	[-2.2264]	[-2.255]	[-0.7474]	[-0.0440]	[-1.1204]
D(CAB(-1))	-0.095111	-0.011440	0.004115	0.448532	0.156304	0.231748	-0.066294	-0.42493
	(0.14137)	(0.03755)	(0.10503)	(0.31987)	(0.23881)	(0.25484)	(0.15128)	(0.2680)
	[-0.67280]	[-0.30464]	[0.03918]	[1.40222]	[0.65451]	[0.90938]	[-0.43822]	[-1.585]
D(EDS(-1))	0.041175	-0.067842	-0.015049	-2.902800	-1.496051	-0.759633	-0.812572	-0.29087
	(0.63938)	(0.16985)	(0.47504)	(1.44675)	(1.08012)	(1.15263)	(0.68423)	(1.2123)
	[0.06440]	[-0.3994]	[-0.0316]	[-2.0064]	[-1.3850]	[-0.6590]	[-1.1875]	[-0.2399]
D(GDP(-1))	0.138313	0.196125	-0.143405	1.381219	0.925781	0.192941	0.474286	-0.67607
	(0.35977)	(0.09557)	(0.26730)	(0.81406)	(0.6077)	(0.64857)	(0.38500)	(0.6821)
	[0.38445]	[2.05212]	[-0.53650]	[1.69670]	[1.5232]	[0.29749]	[1.23190]	[-0.9910]
D(INF(-1))	-0.099573	0.054365	-0.131430	0.162085	-0.020805	0.262548	0.394486	-0.32348
	(0.12602)	(0.03348)	(0.09363)	(0.28514)	(0.21288)	(0.22717)	(0.13486)	(0.2389)
	[-0.79015]	[1.62401]	[-1.40377]	[0.5684]	[-0.0977]	[1.15572]	[2.92525]	[-1.3538]
D(NER(-1))	0.195006	0.002955	0.050829	-0.106192	-0.102240	0.489313	0.003219	0.8521
	(0.14565)	(0.03869)	(0.10821)	(0.32957)	(0.2460)	(0.26257)	(0.15587)	(0.2761)
	[1.33885]	[0.07637]	[0.4697]	[-0.32221]	[-0.415]	[1.86356]	[0.02065]	[3.0854]
D(IR(-1))	-0.104831	0.006486	-0.08862	0.193381	-0.330650	0.121601	0.104972	0.10569
	(0.13333)	(0.03542)	(0.0990)	(0.30168)	(0.22523)	(0.24035)	(0.14268)	(0.2528)
	[-0.78627]	[0.18313]	[-0.8947]	[0.64101]	[-1.4680]	[0.50593]	[0.73573]	[0.4180]
D(BD(-1))	-0.257278	-0.046800	-0.108058	-0.473228	-0.230488	0.399717	-0.619052	0.07196
	(0.12585)	(0.03343)	(0.09350)	(0.28477)	(0.21260)	(0.22688)	(0.13468)	(0.2386)
	[-2.04428]	[-1.39984]	[-1.15564]	[-1.66179]	[-1.0841]	[1.76183]	[-4.59648]	[0.3015]
D(TOT(-1))	-0.294497	-0.014721	0.170224	-0.361693	0.156440	0.243107	-0.092121	-0.10866
	(0.10242)	(0.02721)	(0.07610)	(0.23175)	(0.17302)	(0.18463)	(0.10960)	(0.1942)
	[-2.87537]	[-0.54108]	[2.23700]	[-1.5607]	[0.9041]	[1.3166]	[-0.84049]	[-0.559]
R-squared	0.656119	0.587914	0.334599	0.481139	0.378114	0.617621	0.647870	0.45084
Adj.R-squared	0.5066	0.408747	0.045294	0.255547	0.107729	0.451369	0.494770	0.21208

Sum sq. resids	232.49	16.40691	128.3390	1190.372	663.4977	755.5659	266.2540	835.905
S.E. equation	3.1794	0.844597	2.362193	7.194115	5.371008	5.731552	3.402391	6.02857
F-statistic	4.3883	3.281363	1.156562	2.132783	1.398427	3.714975	4.231679	1.88824
Loglikelihood	-80.926	-35.85673	-70.82526	-108.6901	-98.75371	-100.9627	-83.23145	-102.680
Akaike AIC	5.4074	2.756278	4.813251	7.040596	6.456101	6.586042	5.543026	6.68709
Schwarz SC	5.901281	3.250101	5.307073	7.534419	6.949923	7.079865	6.036849	7.1809
Mean depen	-0.112322	-0.164324	0.057054	-0.028676	2.621471	0.131933	0.092059	0.41647
S.D.depen	4.526359	1.098405	2.417579	8.337938	5.686007	7.738062	4.786738	6.79162