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THE IMPACT OF EXCHANGE RATE FLUCTUATION DETERMINANTS ON EXPORT EARNINGS IN KENYA

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Abstract

This study sought to understand the impact of exchange rate fluctuations determinants on export earnings in Kenya using annual data over 1970-2015 time periods by posting a structural relationship between exchange rate fluctuations determinants and export earnings. The results reveal that from unit root tests, the data series used in the model in this study are I (1) in the level series and the first differences series are I (0). Implication of these findings is the existence of a long run relationship between the dependent and independent variables. Cointegration test results that, on the basis of the trace test statistics, show there is one cointegrating vector for the VAR model suggesting that there is a unique long run equilibrium relationship. The coefficients of the dependent variables are all significant and less than one. Thus the responsiveness of export earnings in Kenya to fluctuations in inflation rates, interest rates, money supply and market liberalization is inelastic. From the error correction model, the results show that Kenya's export earnings can effectively be explained using the specified independent variables since the coefficient of multiple determinations, (R2) is high at approximately 80 percent. The significant error correction term implies that Kenya's export earnings model adjusts to changes in the specified independent variables. The economic importance of this empirical finding is that the export earnings speed of adjustment to correct long run disequilibrium between itself and its determinants is moderate, and 56 percent of the disequilibrium is eliminated in one year.

Keywords: Exchange rate fluctuation, Determinants of exchange rate, Export earnings, Vector error correction model

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INTRODUCTION

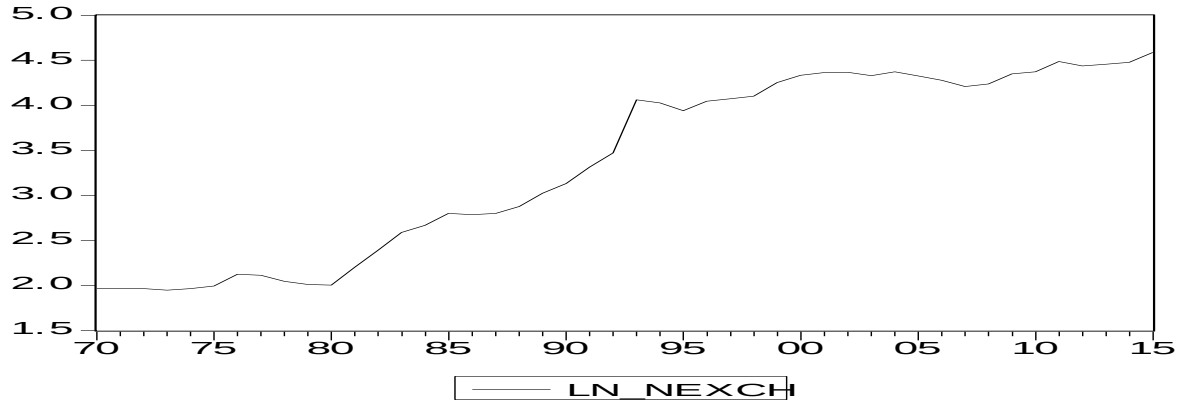
This study sought to understand the impact of exchange rate fluctuations determinants on export earnings in Kenya using annual data over 1970-2015. The specific objectives being to determine how interest rates, inflation rate affects, money supply as a percentage of Gross Domestic Product (GDP), trade openness / market liberalization and public external debt stock as a percentage of Gross National Income (GNI) impact on export earnings in Kenya.

Stanlake (2000) asserts that exchange rate is the rate at which a country's currency is exchanged for the currencies of other countries. The exchange rate can also be used as an instrument of monetary policy. Frequency changes in the currency's exchange rate would adversely affect investment because of the associated uncertainty.

According to Broda & Romalis (2003), a traditional criticism of flexible exchange rate regimes is that flexible rates increase the level of exchange rate uncertainty and thus reduce incentives to trade. Taussig (1924) was an early advocate of this idea. This criticism has generated a large literature that focuses on the impact of exchange rate volatility on trade. However, Mundell's (1961) optimal currency area hypothesis suggests an opposite direction of causality, where trade flows stabilize real exchange rate fluctuations, thus reducing real exchange rate volatility. Central banks in many developing countries have targeted real effective exchange rates in the past. This implies that even if the trade does not act as an automatic stabilizer, policy interventions will reduce bilateral volatility with major trading partners.

Exchange rates and export earnings over time in Kenya have shown the tendency to fluctuate over the years. For instance, as from January 1970 to December 2015, both have shown an upward fluctuation trend as shown in figure 1 and 2 below.

Figure 1. Official nominal exchange rate (KES per US$, period average)
for dates between 1970 to 2015



Source: World Development Indicators, International Monetary Fund,
International Financial Statistics

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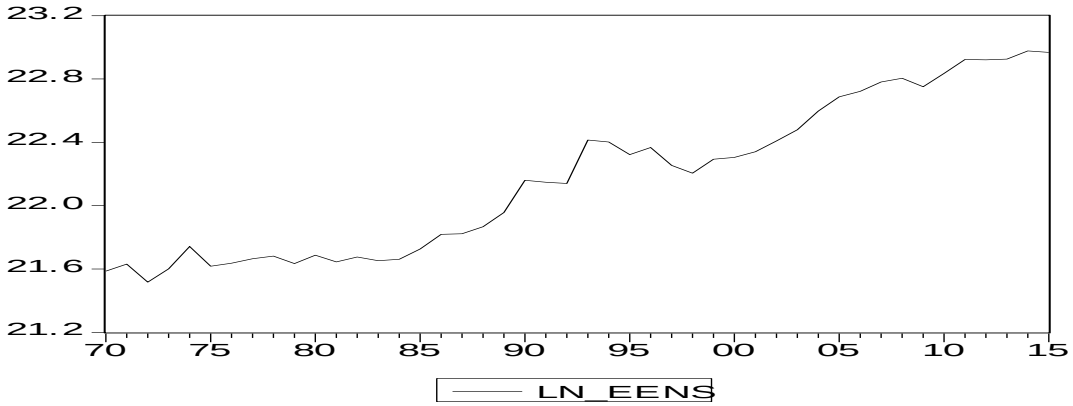
Figure 2. Export earnings in Kenya (Exports of goods and services, constant 2010 US$) for dates between 1970 to 2015



Source: World Development Indicators, World Bank national accounts data, and OECD National Accounts data files.

Kinya (2015) observes that exchange rate variability, if orderly and gradual, improves a country's export competitiveness but when depreciation occurs, it causes exports to be relatively cheaper than imports which improve a country's trade deficit over time. But abrupt and significant exchange rate swings may scare foreign investors who fear exchange rate risk and lead to them pulling portfolio investments out of the country, putting a further downward pressure on the currency.

Existing literature postulates that substantial exchange rate fluctuations create severe macroeconomic disequilibria on export earnings and the correction of this external balance requires both exchange rate devaluation and management policies. The main argument behind this is that an increase in exchange rate fluctuations leads to uncertainty which might have a negative impact on export earnings. According to Anderton and Skudelny (2001), the economic logic underpinning the negative link between exchange rate fluctuations and export earnings leads to the aversion of export firms from engaging in trade and this leads to loss of export earnings. In a study by, Baldwin, Skudelny and Taglioni (2005) they discovered that the effect of exchange rate risk occasioned by exchange rate fluctuations on export earnings in the EU countries is negative; Export earnings, therefore, increase as exchange rate fluctuations decrease and they decrease as exchange rate fluctuations increase.

Statement of the problem

According to Ozturk (2006), exchange rate volatility is defined as the risk associated with unexpected movements in the exchange rate. Economic fundamentals such as the inflation rate, interest rate, money supply, and the balance of payments, which have become more

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volatile in the 1980s and early 1990s, by themselves, are sources of exchange rate volatility. More recently, increase cross-border flows that have been facilitated by the trend towards liberalization of the capital account, the advancement in technology, and currency speculation have also caused the exchange rate to fluctuate (Hook and Boon, 2000).

The most commonly held belief is that greater exchange rate fluctuation, as witnessed in figure 1.2 above, generates uncertainty thereby increasing the level of riskiness of trading activity and this will eventually depress trade (Todani and Munyama, 2005, as cited by Kinya, 2015)

According to Danga (2016), exchange rate has been unstable in Kenya with a rising trend. It has come up with pervasive effects and consequences for prices, wages, interest rates, production levels and employment opportunities. His study was motivated by the rate at which KES was depreciating in 2015 against USD with the highest rate of 106.035 on 07 September 2015, the highest rate ever witnessed in Kenya since independence. In 2011 Kenya experienced exchange rate overshooting from KES 83 to over KES 100 within span of 6 months and it has risen steadily to over KES 106 in September 2015.

Elbadawi et al. (1997) found that while debt inflows enhanced economic growth, debt overhang had a negative impact on economic growth. They found that liquidity constraints caused by rising external debt servicing payments reduced exports and thus were an impediment to economic growth. However, different countries, or even the same country at different stages of economic development, can sustain different levels of debt depending on its growth profile and the credibility and quality of the relevant institutions that are charged with developing or implementing policy. Although there are debt sustainability benchmarks, these guidelines do not apply mechanically as they may depend on the political and economic constraints which limit a country's capacity to adjust.

There have been studies in Kenya on the effects of exchange rate volatility on aggregate horticultural exports done by Were *et al*., (2002), Minot and Ngigi (2004), Kiptui (2008), Gertz (2008), and Maana*et al*., (2010). However, these studies gave conflicting evidence on the effect of exchange rate volatility on exports as Were *et al*., (2002) and Kiptui (2008) show negative effects while Minot and Ngigi (2004), Gertz (2008) and Maana *et al*., (2010) indicate positive or no effects. Additionally, these studies used aggregated horticultural data and did not evaluate the effects of determinants of exchange rates on aggregate exports earnings in Kenya. Thus there is a gap in the literature on the lack of empirical evidence on the effects of determinants of exchange rates on exports earnings in Kenya. The purpose of this study was therefore to evaluate the impact of determinants of exchange rates on Kenya's exports earnings.

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General objective of the study

The general objective of this study was to analyze the impact of exchange rate fluctuations determinants on export earnings in Kenya using annual data from 1970 to 2015.

Specific objectives of the study

i. To determine how interest rates impact on export earnings in Kenya.
ii. To establish how inflation rate impact export earnings in Kenya
iii. To find whether money supply as a percentage of Gross Domestic Product (GDP)has any impact on export earnings in Kenya
iv. To ascertain how trade openness / market liberalization impacts export earnings in Kenya
v. To find whether public external debt stock as a percentage of Gross National Income (GNI) has any impact on export earnings in Kenya.

Research questions

i. What impact does interest rates have on export earnings in Kenya?
ii. What impact does interest rates have on export earnings in Kenya?
iii. What impact does money supply as a percentage of GDP have on export earnings in Kenya?
iv. What impact do trade openness / market liberalization have on export earnings in Kenya?
v. Does public external debt stock as a percentage of GNI have any impact on export earnings in Kenya?

Justification of the study

This study is vital as it sought to analyze the impact of interest rate, inflation rate, money supply, public external debt stock and market liberalization on export earnings in Kenya. Therefore, for policy makers interested in influencing the macroeconomic aggregates impacting exchange rates to influence export earnings, will be able to know the impact and how best to target each variable mentioned herein for maximum influence on export earnings.

The rationale behind this study was to enhance an understanding of the effects of determinants of exchange rate volatility on the export earnings in Kenya and also identify the recommendations for purposes of informing policy and towards enhancing long-term sustainability and competitiveness of Kenya's exports as portrayed in the Kenya's Vision 2030 Economic Pillar which emphasizes Kenya's intentions to be the lead manufacturing point for the

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regional market and the provider of choice for basic manufactured goods in Eastern and Central Africa.

The study will help exporting companies to have a clear understanding of how variations in the aforesaid determinants of exchange rates affect their financial performance. The study will make multiple contributions to the literature on export earnings through investigation of factors affecting exchange rates. Students interested in finance as a subject will find it useful and build on the existing body of knowledge. Finally, the study will be useful to the government as a regulator in its quest to enhancing a stable exchange rate to impact on the exporting sector bearing in mind that the economy as whole will benefit greatly on how the exporting sector performs.

Scope of the study

The study covered Kenya for the 45 year period as from 1970 to 2015. It involved time series data analysis methods. It considered annual time series data. The study was in line with general objective which was to investigate the impact of exchange rate fluctuations determinants on export earnings in Kenya. This study applied graphical methods and the Augmented Dickey Fuller (ADF) to test stationarity of variables, Cointegration to get the long-run relationships among the variables and Vector Error Correlation Mechanism (ECM) was used to explain short run dynamics relating to determinants of exchange rates and export earnings.

Limitation

This study mainly focused on the macroeconomic quantitative factors that are interest rates, inflation rate, money supply as a percentage of GDP, market liberalization and public external debt stock as a percentage of GNI impacting on export earnings in Kenya. The influence of macroeconomic qualitative factors such as political stability, institutional reforms and the ease to do business and such other factors which may impact on export earnings were not included in the analysis.

LITERATURE REVIEW

Theoretical Review

Theories of Exchange Rate Determination

Under this section, the study looked at the existing theories similarly reviewed by Otuori, (2013) and Simba (2015), their preconditions, implications and advantages and disadvantages. The exchange rate theories considered in this part can be classified into three kinds: partial equilibrium models, general equilibrium models and disequilibrium or hybrid models. Partial

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equilibrium models include relative PPP and absolute PPP, which only consider the goods market; and covered interest rate parity (CIRP) and uncovered interest rate parity (UCIRP), which only consider the assets market, and the external equilibrium model, which states that the exchange rates are determined by the balance of payments (Kanamori and Zhao, 2006).

Purchasing Power Parity (PPP)

The starting point of exchange rate theory is purchasing power parity (PPP), which is also called the inflation theory of exchange rates. PPP can be traced back to sixteen-century Spain and early seventeen century England, but Swedish economist Cassel (1918) was the first to name the theory PPP. Cassel once argued that without it, there would be no meaningful way to discuss over-or-under valuation of a currency. Absolute PPP theory was first presented to deal with the price relationship of goods with the value of different currencies. The theory requires very strong preconditions. Generally, Absolute PPP holds in an integrated, competitive product market with the implicit assumption of a risk neutral world, in which the goods can be traded freely without transportation costs, tariffs, export quotas, and so on. However, it is unrealistic in a real society to assume that no costs are needed to transport goods from one place to another. In the real world, each economy produces and consumes tens of thousands of commodities and services, many of which have different prices from country to country because of transport costs, tariffs, and other trade barriers (Kanamori and Zhao, 2006). Absolute PPP is generally viewed as a condition of goods market equilibrium. Under absolute PPP, both the home and foreign market are integrated into a single market. Since it does not deal with money markets and the balance of international payments, we consider it to be only a partial equilibrium theory, not the general one. Perhaps because absolute PPP require many strong impractical preconditions, it fails in explaining practical phenomenon, and signs of large persistent deviations from Absolute PPP have been documented (Kanamori and Zhao, 2006).

Interest Rate Parity

As early as the period of the gold standard, monetary policymakers found that exchange rates were influenced by changes in monetary policy. The rise of the home interest rate is usually followed by the appreciation of the home currency, and a fall in the home interest rate is followed by a depreciation of the home currency. This indicates that the price of assets plays a role in exchange rate variations. The interest rate parity condition was developed by Keynes (1923), as what is called interest rate parity nowadays, to link the exchange rate, interest rate and inflation. The theory also has two forms: covered interest rate parity (CIRP) and uncovered interest rate parity (UCIRP). CIRP describes the relationship of the spot market and forward

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market exchange rates with interest rates on bonds in two economies. UCIRP describes the relationship of the spot and expected exchange rate with nominal interest rates on bonds in two economies.

Covered Interest Rate Parity

This is the normal form of the covered interest rate parity, which states that the domestic interest rate must be higher than the foreign interest rate by an amount equal to the forward premium (discount) on domestic currency. According to CIRP, if the exchange rate of, say, the shilling against the USD is fixed, the interests of the two countries should be equal. Thus, a small country with a pegged exchange rate regime cannot carry out monetary policy independently.

Uncovered Interest Rate Parity

However, investors face uncertainty over future events. In a rational expectation framework, the forward exchange rate may be strongly influenced by the market expectations about the future exchange rate if new information is taken into consideration. In an uncertain environment, an un-hedged interest rate parity condition may hold. Very few empirical studies support UCIRP. For example, using a K-step-ahead forecasting equation and overlapping techniques on weekly data of seven major currencies, Hansen and Hodrick (1980) reject the market efficiency hypothesis for exchange. The Fisher Open condition can be a basis for covered interest rate parity. This condition implies that the expected real interest rates are equal in different countries, with the real interest rate defined as the nominal interest rate divided by the sum of one plus the expected inflation rate. The Fisher Open condition implies approximately that the difference of nominal interest rates equals the difference of expected inflation rate between two countries. Empirically, little evidence supports the Fisher Open hypothesis (Cumby and Obstfeld 1981, 1984). When the Fisher Open hypothesis is denied, real interest rate parity cannot hold.

The Mundell-Fleming Model

The Mundell-Fleming model is developed by extending the IS-LM model to the case of an open economy, and thus provides understanding of how the exchange rate is determined. The IS-LM model considers three markets: goods, money and assets, and is mainly used to analyze the impacts of monetary policy and fiscal policy. When the goods market is not in full employment equilibrium level, it shows how to use fiscal policy and monetary policy to adjust an economy to new full employment equilibrium. Since only two of the three markets are independent, the IS-LM model only establishes a linkage between the money market and goods market. In the

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Mundell-Fleming model, the balance of international payments is considered another equilibrium condition in addition to the money market and goods market (Kanamori and Zhao, 2006). One of the most important issues addressed by the model is the so-called trilemma, which states that perfect capital mobility, monetary policy independence and a fixed exchange rate regime cannot be achieved simultaneously. Specifically, it argues that a country cannot sustain monetary policy independence in a fixed exchange rate regime with perfect capital mobility. However, this argument is made in a small country setting, and it is not necessarily true in a bigger economy. The model also forecasts that the exchange rate level is perfectly correlated with the level of monetary supply in the long run, and thus that monetary policy may only play a trivial role. Another important implication is that devaluation may lead to further devaluation if fiscal discipline, inflation and balance of payments are not well managed or if the assets market produces a self-fulfilling bubble. Finally, the impact of devaluation on the improvement of the current account may be weakened if an economy is heavily reliant on the re-export processing industry (Kanamori and Zhao, 2006).

The Balance of Payments (BOP) Approach Theory

In addition to the above, Simba (2015) also reviews existing literature to the effect that BOP endeavors to explain the factors that determine the supply and demand curves of a country's currency. The balance of payments is a method of recording all the international monetary transactions of a country during a specific period of time. The transactions recorded are divided into three categories: the current account transactions, the capital account transactions and the central bank transactions. The aforementioned categories can show a deficit or a surplus, but theoretically the overall payments should be zero, which rarely happens (Norman, 2003).

As stated earlier, a currency's price depreciation or appreciation (the change in the price of one currency in relation to another or others), directly affects the volume of a country's imports and exports and, consequently, a likely fluctuation in the exchange rates can add to BOP discrepancies. For example, a likely depreciation will increase the value of exports in home currency terms. Conversely, the imports will become 'more expensive' and their value will be reduced in home currency (the larger the imports demand elasticity the greater the decrease). Consequently, we can argue that unless the value of exports increases less than the value of imports, the depreciation will improve the current account. More specifically, we can finally assess the impact of the currency's depreciation on the current account only by considering the price sensitivity of imports and exports. The Marshall Lerner Condition shows that if the sum of the price elasticity of demand for imports and exports is greater than one, then a fall in the exchange rate will improve the current account of BOP.

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Hx + Hm> 1

Hx: Price elasticity of exports volumes

Hm: Price elasticity of import volumes

The Monetary Approach Theory

This approach pays attention to the stock of currencies in comparison to the willingness of people to hold these stocks. According to the monetary theory, exchange rates adjust to ensure that the quantity of money in each currency supplied is equal to the quantity demanded Parkin and King, (1992).Both Quantity Theory of Money (QTM) and Purchasing Power Parity (PPP) have been used in support of the aforementioned theory. The QTM states that there is a direct relationship between the quantity of money and the level of prices of goods and services sold. In other words, more money equals more inflation.

In a domestic framework, the following equation has been formulated

MV = PY

M: Money supply/demand

V: Velocity of circulation (the number of times money change hands)

P: Average price levels

Y: GDP

It can therefore be concluded that an increase in the money supply leads to inflation, which in turn results in the decrease in the value of money or purchasing power. Consequently, if it is considered in an international context, it will be appreciated that following implications are most likely: Firstly, a rapid increase in the money supply, which result into inflation, will put into effect the PPP resulting in the depreciation of the currency's exchange rate. Secondly, a higher interest rate will also result in the currency's depreciation because of the positive relationship between interest rates and money circulation. Finally, if the GDP grows faster than overseas GDP, the demand for money will increase. Assuming there is a given supply of money, the exchanged rate will decrease, which is in direct contrast to the PPP approach, (Harry, 1972).

Empirical Review

According to Ozturk (2006), the volatility of exchange rates is the source of exchange rates risk and has certain implications on the volume of international trade, consequently on the balance of payments. Theoretical analyses of the relationship between exchange rate volatility and international trade transactions have been conducted by Hooper and Kohlhagen (1978) and many other economists. The argument is as follows: Higher exchange-rate volatility leads to higher cost for risk-averse traders and to less foreign trade. This is because the exchange rate

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is agreed on at the time of the trade contract, but payment is not made until the future delivery actually takes place. If changes in exchange rates become unpredictable, this creates uncertainty about the profits to be made and, hence, reduces the benefits of international trade. The exchange-rate risk for the country is generally not hedged because forward markets are not accessible to all traders. Even if hedging in the forward markets were possible, there are limitations and costs.

For example, the size of the contracts is generally large, the maturity is relatively short, and it is difficult to plan the magnitude and timing of all international transactions to take theoretical developments suggest that there are situations in which the volatility of exchange rates could be expected to have either negative or positive effect on trade volume. De Grauwe (1988) stressed that the dominance of income effects over substitution effects can lead to a positive relationship between trade and exchange-rate volatility. This is because, if exporters are sufficiently risk averse, an increase in exchange-rate volatility raises the expected marginal utility of export revenue and therefore induces them to increase exports. De Grauwe suggested that the effects of exchange-rate uncertainty on exports should depend on the degree of risk aversion. (Ozturk, 2006)

According to Ozturk (2006), recently, theoretical models of hysteresis in international trade have shown that increased uncertainty from high volatility in exchange rates can also influence foreign trade, in particular if significant sunk costs are involved in international transactions. It is difficult, however, to specifically identify how the trade was affected.

Several empirical studies such as Ethier (1973); Clark (1973); Baron (1976); Cushman (1988); Peree and Steinherr (1989) have shown that an increase in exchange rate volatility will have adverse effects on the volume of international trade. Other theoretical studies have demonstrated that increased volatility can have ambiguous or positive effects on trade volume: for instance, Viaene and de Vries (1992), Franke (1991) and Sercu and Vanhulle (1992). Numerous empirical studies have been conducted to investigate whether the trade is influenced by exchange rate volatility. It is widely believed that increased exchange rate volatility inhibits the growth of foreign trade. Negative effects of exchange rate uncertainty on trade flows are reported by many authors. They have all found that exchange-rate risk depresses trade flows. However, studies by Hooper and Kohlhagen (1978), Gotur (1985), Bailey et al. (1986, 1987),McKenzie (1997), Aristotelous (2001), Bailey and Tavlas (1988), Bahmani et al. (1993), and Gagnon (1993), among others, do not find any significant relationship between exchange-rate volatility and trade. On the other hand, McKenzie and Brooks (1997), Klein (1990), Franke (1991), Giovannini (1988), Brada and Mendez (1988), Asseery and Peel (1991), Kasman and

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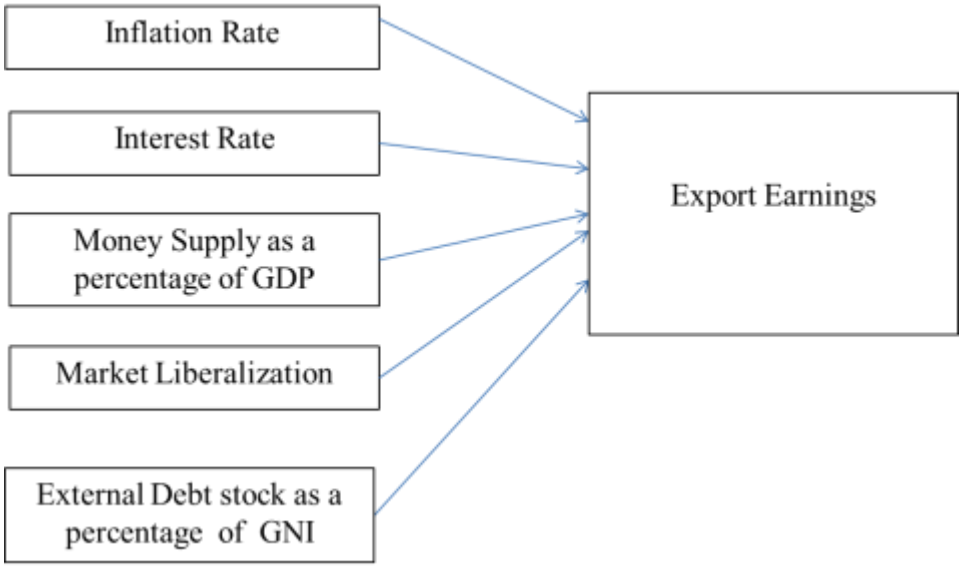
Kasman (2005), Sercu and Vanhulle (1992), Doyle (2001) and Bredin et al. (2003) have found positive effects of exchange rate volatility on trade.

Conceptual Frame Work

The conceptualization of this study is based on the above underpinnings that determine exchange rates and two strategies that have the objectives of facilitating exports to international markets. The two strategies being Export Processing Zones (EPZs) implemented in the 1990s to facilitate the growth of an export-led economy in Kenya and exchange rate control policy so as to encourage exports from Kenya and as such result to Balance of Payments and Terms of trade equilibrium. This will facilitate overall growth of the economy that is driven by exports. The independent variables are as stated and the dependent variable is the exports earnings to Kenya from international markets.

Figure 1. Conceptual Framework



Critique of existing literature relevant to the study

According to Hondroyiannis(2005), previous studies employing panel data have tended to find evidence of a negative and statistically significant relationship between exchange-rate volatility and trade. Wei (1999) estimated a panel of 63 countries over the years 1975, 1980, 1985 and 1990; a total of over 1000 country pairs were examined. Using switching regressions, the author found that, for country pairs with large potential trade, exchange-rate volatility had a negative and significant effect on bilateral trade among the countries considered. Dell'Arricia (1999) examined the effect of exchange-rate volatility on the bilateral trade of European Union

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members plus Switzerland over the period 1975-1970 using several definitions of volatility. In the basic OLS regression, exchange-rate volatility had a small but significant negative impact on trade; reducing volatility to zero in 1970 would have increased trade by an amount ranging from ten to 13 percent, depending on the measure of volatility used.

Using both fixed and random effects, the impact of volatility was still negative and significant, but smaller in magnitude. The author found that elimination of exchange rate volatility would have increased trade by about 3½ per cent in 1970. Rose (2000) also obtained similar results employing a gravity model. His data set consisted of 186 countries for the five years 1970, 1975, 1980, 1985, and 1990. In his benchmark results (without random effects), he found that reducing volatility by one standard deviation would increase bilateral trade by about 13 percent. Using random effects, he also found a small but significant negative effect; reducing volatility by one-standard deviation would increase bilateral trade by about four per cent. In general, Rose's results are consistent with those of Dell'Arricia. (Hondroyiannis, 2005)

Tenreyro (2004), however, cast some doubt on the robustness of Rose's results. Using annual data from 1970-1997 on a sample of 104 (developed and developing) countries, and employing a gravity model that took endogeneity into account, she found that volatility had an insignificant effect on trade. Clark, Tamirisa and Wei (2004) applied the gravity model using a battery of estimation techniques - including fixed and random effects - to a panel of 178 International Monetary Fund (IMF) members using every fifth year from 1975-2000. Using both country- and time fixed effects, the authors found a negative and significant impact of exchange-rate volatility on trade; a one-standard deviation fall in exchange rate volatility would raise trade by seven per cent. Allowing for time-varying random effects, however, a negative relationship was not evident. The authors concluded that, while there is evidence that increased exchange-rate volatility reduces the volume of trade, the finding depend on the particular estimation technique employed (Hondroyiannis, 2005)

Summary of the Literature Review

Despite the fact that numerous literature on the effects of exchange rate volatility on macroeconomic variables such as economic growth, studies that specifically focus on Kenyan economy and export earnings seem to be scanty. The few studies that have been undertaken in Kenya on the subject of exchange rate behavior have majorly laid emphasis on explaining the determinants of exchange rates focusing on the role of macroeconomic variables such as monetary policy shocks. For instance, Were et. al., (2001), analyzed factors that have influenced the exchange rate movements since the foreign exchange market was liberalized in 1993. A related study by Ndung'u (1999) assessed whether the exchange rates in Kenya were

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affected by monetary policy and whether these effects were permanent or transitory. Kiptoo (2007) focused on the real exchange rate, volatility, and misalignment, and its impact on Kenya's international trade, and investment. Sifunjo, (2011) did a study on chaos and nonlinear dynamical approaches to predicting exchange rates in Kenya. Even then, these studies including Ndung'u (1995), Ndung'u (2001), Kiptoo (2007), and Sifunjo, (2011) did not deal with the impact of exchange rate variability on Kenya's export earnings.

In the summing up of the review of the literature, it indicates that international evidence in support of various factors that affect exchange rates have been looked into overtime with the increase in the availability of data, improved econometric techniques and advancement in model specifications. Despite the fact of increased study of these factors still, it cannot be claimed outright superiority over other approaches to explain the effect of exchange rates determinants on export earnings.

Research Gap

Available literature shows mixed results on the effects of exchange rate volatility on exports plus relatively few of such studies in developing countries. The available studies in Africa include Vergil (2002) for Turkey, and Bah and Amusa (2003) and Takaendesa *et al*., (2005) for South Africa. Exchange rate volatility is a crucial element that needs to be considered for small countries like Kenya that depend extensively on trade. An understanding of the effects of exchange rate fluctuations determinants on exports earnings to Kenya is of interest to researchers, exporters and policy makers.

Kenya's main exports of tea, horticulture and coffee have been vulnerable to exchange rate volatility, but exchange rate risk hedging facilities in Kenya are virtually nonexistent (Kiptui, 2008). As a result, exporters bear the consequences of unexpected changes in the exchange rates. Despite the critical importance that earnings from exports play in Kenya's economic development and concerns raised by exporters and policy makers, the relationship between determinants of exchange rate fluctuations and export earnings in Kenya remains unclear.

As observed also by Samuel et al (2014), there have been limited studies in Kenya on the effects of exchange rate volatility on aggregate exports done by Were *et al*., (2002), Minot and Ngigi (2004), Kiptui (2008), Gertz (2008), and Maana *et al*., (2010). However, these studies gave conflicting evidence on the effect of exchange rate volatility on exports as Were *et al*., (2002) and Kiptui (2008) show negative effects while Minot and Ngigi (2004), Gertz (2008) and Maana *et al*., (2010) indicate positive or no effects. Thus there is a gap in the literature on the lack of empirical evidence on the impact of exchange rate fluctuations determinants on export earnings in Kenya.

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RESEARCH METHODOLOGY

Research Design

The research objectives and questions were studied through the use of a descriptive research design. Descriptive research describes data and characteristics about the population or phenomenon being studied. Descriptive research design was employed as it enables the researcher to generalize the findings to a larger population. The main focus of this study was quantitative analysis. The choice of the methodology is informed by the data generating process. Previous studies that have used a similar research design include Danga (2016), Samuel et al (2014), Danson et al (2012) and Kiptui (2007).

Target Population and Sampling

There are 45years between 1970 and 2015. This study will use time series data from all the 45 years period. All these years was studied since a conclusive and whole representative analysis is to be arrived at in the end.

Data Collection Procedures

This study used annual data from the International Monetary Fund, International Financial Statistics and World Bank covering the period from 1970 to December 2015. The study employed the use of secondary data in its analysis from the aforementioned sources.

Interest rates were used in the study as an independent variable for the period from 1970 to 2015. It is defined as the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets. Kenya being a net exporter country will have interest rates impact heavily on exports as lower rates indicates relative ease to borrow to finance investments in production that form part of exports putting a downward pressure on exchange rates. Data was sourced from World Development Indicators database, International Monetary Fund and International Financial Statistics from the World Bank website.

Money supply as a percentage of GDP is another independent variable in this study which influences exchange rates and therefore impacts on export earnings the dependent variable. The focus was M2 as it includes notes and coins in circulation and short term deposits easily converted to cash. An increase in the supply of money typically lowers interest rates, which in turns generates more investment and puts more money in the hands of consumers, thereby stimulating spending. Annual data from 1970 to 2015was used and the data was sourced from the Africa Development Indicators database, International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates form the World Bank website.

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Inflation is a persistence increase in the general price level and is typically expressed as an annual percentage rate of change. Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Rising inflation tends to lead to an increase in cost of goods and in particular exports. Annual inflation rate data for this study was sourced from the World Development Indicators database: International Monetary Fund, International Financial Statistics from 1970 to 2015.

According to Terry & Isaya (2014) they observe that increased borrowing requirements to finance investment in public infrastructure coupled with the stagnant foreign support to the budget has seen Kenya's public domestic debt rise to new levels in absolute terms over the last decade. The economy has also witnessed a series of shocks ranging from the global financial crisis and high oil prices to the post-election crisis in early 2008. These developments raise the question on whether the country's public debt remains sustainable and whether there is any impact of public debt on export earnings.

A sustainable debt provides confidence that the government was able to borrow and pay potential creditors. Unsustainable debt levels, on the other hand, present risks to government expenditures on development and social programmes since a large proportion of tax revenue would be diverted to debt service (IMF, 2004).

Public debt in this study was analysed through total external debt stocks to gross national income. Total external debt is the debt owed to non-residents repayable in currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad (World Bank, International Debt Statistics, 2017).

Data Processing and Analysis

According to Kothari(2004), data analysis is carried on the data collected to transform it into a form that is suitable for use in drawing conclusions that reflect on the ideas, and theories that initiated the inquiry. This study involved explaining the impact of exchange rate fluctuations determinants on export earnings in Kenya from 1970 2015 by posting a structural log linear relationship between exchange rate determinants and export earnings.

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Model Specification

This study employed a structural relationship between determinants of exchange rate fluctuations export earnings based on Goldstein and Khan (1978) and applied by Chowdhury (1993) and Arize *et al*., (2000). The model suggests a long-run relationship between exports, foreign economic activity, relative prices and exchange rate volatility. Modifying and adopting an the export demand model in accordance to Chowdhury (1993) and Samual *et al*., (2014) the model to be examined can be written as

$$lnEENS_t = \alpha + \beta_1 ln\, INTR_t + \beta_2 lnMSGDP_t + \beta_3 lnINFR_t + \beta_4 MLIB_t + \beta_5 lnEDGSNI_t + \varepsilon_t$$

Equation 1

Where,

$lnEENS_t$ =natural logarithm of export earnings at time, t

$lnINTR_t$= natural logarithm of Interest Rate at time, t

$lnMSGDP_t$ = natural logarithm of money supply as a percentage of GDP at time, t

$lnINFR_t$ = natural logarithm of Inflation Rate at time, t

$MLIB_t$ = Market Liberalization, t. This is a dummy variable to represent exchange rate liberalization with a value of 1 representing the post liberalization period (1994-2015) and 0 to stand for the period before exchange rate liberalization (1970-1993)

$lnEDSGNI_t$ = natural logarithm of External Debt Stock as a percentage of GNI at time, t

ε_t = the error term which represents all the unknown and unmeasured variables that impact on export earnings in Kenya

α = the intercept coefficient estimate, is interpreted as the value that would be taken by the dependent variable if the independent variables took a value of zero.

β_1, β_2, β_3, β_4 and β_5 are the coefficients of the various explanatory variables.

The log-linear form is adopted, since it is found to be the most suitable functional form and has been employed in many empirical studies and in addition to having the advantage of reducing heteroscedasticity (Maddala, 1992) as observed similarly by Samuel *et al.* (2014).

RESULTS AND DISCUSSION

This is the section that measures and reports the results of the impact of the exchange rate fluctuations determinants on export earnings in Kenya. In order to analyse this impact, the unit root tests were used to test the data series for stationarity or the order of integration in order to avoid spurious regression results while Johansen's maximum likelihood cointegration analysis was carried out and a cointegrating long run relationship of the export earnings model developed. Finally, Vector Error Correction model was developed and estimated to determine the short-run effects of the explanatory variables on exports earnings in Kenya.

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Unit root test results

Need is there to check for the stationarity of the data series before estimating the relationships between exports earnings and determinants of exchange rate fluctuations. The testing of the stationarity of economic time series data is valuable since standard econometric methodologies assume stationarity in the time series while they are, in fact, non-stationary (Engle and Granger, 1987). Consequently, the usual statistical tests are likely to be inappropriate and the inferences drawn are likely to be erroneous and misleading. Several tests for unit roots have been proposed in the literature. The commonly used ones are the Augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) unit root tests. The ADF procedure is a parametric test that is most commonly used but requires homoscedastic and uncorrelated errors in the underlying structure (Gujarati, 2005). The PP is a non-parametric test and generalizes the ADF procedure, allowing for less restrictive assumptions for the time series in question. The PP is a more powerful test for unit roots than the Augmented Dickey-Fuller (1979) test in small samples and follows a first order autoregression. In large samples, the results of the PP and ADF test statistic are similar in most empirical evaluations. The null hypothesis in the unit root test is that the time series under consideration has a unit root, that is it is non-stationary while the alternative hypothesis is that the time series is stationary (Green, 2004). This study makes use of both the Augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) unit root tests in order to corroborate the robustness of the test results and ensure that the inferences regarding stationarity are unlikely influenced by the choice of the testing procedure used. The tests were applied to each variable over the period of 1970-2015 at the variables level and at their first difference. The test results were compared against the MacKinnon (1991) critical values for the rejection of the null hypothesis of no unit root. The results of the unit root test as presented in Table 1 below.

The null hypothesis of non-stationarity or unit root is accepted if the absolute values of the computed ADF and PP statistics exceed the absolute critical values at 5 percent level of significance. The ADF test critical values at 5 percent level of significance are given as -3.50 (Enders, 2010) for the variables at the level and first difference series (Tables 1). Similarly, the PP test critical values at 5 percent level of significance are given as -3.50 (Enders, 2010) for the variables at the level and first difference series (Tables 1).

Making inference from Table 1 below, the computed test statistic for export earnings was -1.85and -1.77 in the ADF and PP level series respectively. In the first difference of the export earnings series the ADF and PP statistics were calculated as -5.93 and -6.69 respectively. The absolute values of the computed test statistic for the export earnings level series are less than the critical absolute values at 5 percent level of significance in both the ADF and PP test.

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However, the absolute values of the computed test statistics for the export earnings first difference series are greater than the critical absolute values at 5 percent level of significance in both the ADF and PP tests (Table1).

Table 1: Unit Root (ADF and PP) Tests Results

Series	**Level Series**		**First Differences**			**I(d)**
	ADF	PP	Lags	ADF	PP	
Dependent Variable						
Export Earnings	-1.85	-1.77	1	-5.93*	-6.69*	I(1)
Independent variables						
Interest Rates	-1.39	-1.55	1	-3.86*	-6.48*	I(1)
Money Supply	-2.30	-1.63	1	-8.35*	-9.46*	I(1)
Inflation Rate	-3.27	-3.30	1	-7.02*	-8.12*	I(1)
Market Liberalization	-2.04	-2.15	1	-4.58*	-6.55*	I(1)
Debt stock	-1.72	-1.73	1	-4.00*	-6.85*	I(1)
5% Critical Values	**-3.51**	**-3.51**		**-3.51**	**-3.51**	

Note: * Denotes rejection of the null hypothesis of a unit root at 5 percent level of significance (MacKinnon, 1991).

The results show the presence of a unit root or that the export earnings series are non-stationary in their level series. However, the first difference series are stationary, hence we conclude that the export earnings series is integrated of order one, that is; they are **I (1)**. Similarly, comparisons of the computed and critical values of the ADF and PP test statistics for the interest rates, money supply, inflation rates, market liberalization and external debt stock shows that all these variables are integrated of order one; **I (1)** in levels and of order zero; **I (0)** in first differences, meaning that they are non-stationary in levels and stationary in first differences (Table 1). From the results of the unit root tests, the conclusion is that the data series used in the model in this study are **I (1)** in the level series and the first differences series are **I (0)**. A key implication of these findings is the existence of a long run relationship between the dependent and independent variables. This means that in the long run, the dependent variable; export earnings are largely impacted by determinants of exchange rate fluctuations.

The non-stationarity of the level series of export earnings and exchange rate fluctuations determinants imply that the means and variances of these variables vary over time. In addition, regressions carried out on non-stationary variables often gives spurious results implying that the estimates are invalid and have no economic implications; hence the need to formally test for unit

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roots to determine the right choice of model to apply (Enders, 2010). This indicates that the variables are **I (1)** and specifying the export earnings and exchange rate fluctuations determinants in the level of the series was inappropriate and may lead to problems of spurious regression. The econometric results of the model in the level of series will not be ideal for policy making and such results cannot be used for prediction in the long-run. Hence given that the level series are **I (1)** and the first differences are **I (0),** the Johansen-Juselius (1990) cointegration test, therefore, become appropriate for assessing the existence of long-run relationships among the variables.

Cointegration analysis

Cointegration analysis refers to the process of getting equilibrium or long-run relationships among non-stationary variables. The idea is that although the variables are non-stationary, a linear combination of them may be stationary, given that all variables are integrated of the same order (Enders, 2010). The vector that links the variables in the long-run relationship is called the cointegrating vector. The cointegration analysis is useful because it shows whether the time series variables can jointly be used in the long run and avoids spurious regressions results. If long-run relationships are present, then it is rational to evaluate how short-run behavior responds in the long-run (Enders, 2010). Various tests for the presence of cointegration among I (1) variables have been proposed beginning with Engle and Granger (1987). The procedure used in this study was a multivariate procedure based on maximum likelihood methods introduced by Johansen (1988, 1991) and expanded upon by Johansen and Juselius (1990).

Having tested the stationarity of each time series, the next step was to apply the co-integration procedure as developed by Johansen and Juselius (1990) in order to test the presence of long-run equilibrium relationships among the variables above. Before proceeding to the results of the cointegration test, the optimal lag length for the vector autoregressive (VAR) model specification was determined using the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SCIC).

Table 2: Optimal Lag Length Selection

Dependent Variable:	Annual export earnings		
Independent Variables:	Interest rates, Money supply, Inflation rates, Market liberalization and external debt stock		
Lag	**Log L**	**AIC**	**SCIC**
0	-856.2615	42.06154	42.31230
1	-827.5932	41.72966*	42.02521*

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Table 2...

2	-812.8768	42.04506	42.34365
3	-788.5999	41.87368	42.17534
4	-772.3038	42.12453	42.42930
5	-750.4906	42.08281	42.39072

Notes: * indicates the lag length selected by the criterion

Log L: Log likelihood AIC: Akaike Information Criterion SCIC: Schwarz Information Criterion

Table 2 above shows the results of the lag length for the different information criteria used. The results explicitly show that the optimal lag length for the VAR model is 1. This arises from the fact that all the information criteria adopted chose 1 as its optimal lag length since it gave the minimum value in absolute terms for each of the evaluated information criteria in AIC and SCIC. On the basis of the optimal lag length chosen by the lag selection criteria, the results of the maximum eigenvalue and the trace statistic were obtained from the Johansen and Juselius (1990) method to ascertain the number of cointegrating relationships.

Table 3: Johansen Multivariate Cointegration Test Results

	Trace statistics				
H_0	r=0	r≤1	r≤2	r≤3	r≤4
H_a	r=1	r=2	r=3	r=4	r=5
Eigen value	0.99	0.94	0.89	0.74	0.27
5% critical values	94.15*	68.52	47.21	29.68	15.41

* denotes rejection of the hypothesis at 5 percent significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

The model was normalized on the export earnings variable ln_EENSt, in order to obtain the long run parameter estimates as reported in Table 3. The appropriate cointegrating vector is indicated by the fifth row from the critical values of trace statistics. Hence, starting with the null hypothesis of no cointegration (r≤1) among the variables; the trace test statistics reject the null hypothesis of more than one cointegrating vector at the 5 percent significance level (Table 3). Therefore we conclude that on the basis of the trace test statistics, there is one cointegrating vector for the VAR model. In particular, this suggests that there is a unique long run equilibrium relationship amongst the variables. Exchange rate fluctuations determinants (except for market liberalization) and export earnings were converted into their logarithmic forms in order to remove heteroscedasticity problem from the VAR model.

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Estimation of the Model

The results of the Johansen Multivariate Cointegration test indicate the presence of a long run cointegrating relationship between the variables. The estimation of the model results is the following cointegrating long-run relationship:

$$EENS\_t = 20.61 - 0.03\ EDSGNIt + 0.15\ INFLRt + 0.034\ INTRt + 0.25MSGDPt + 0.71MLIBt$$

Equation 2

Note: All the estimated elasticities are significant at 5 percent level of significance.

Where, $EENS_t$ is export earnings, $EDGNI_t$ is external debt stock as a percentage of GNI, $INFLR_t$ is the inflation rate, $INTR_t$ is the interest rate, $MLIB_t$ is a dummy variable to represent exchange rate liberalization with a value of 1 representing the liberalization period (1994-2015) and 0 to stand for the period before exchange rate liberalization (1990-1993) and $MSGDP_t$ represents money supply as a percentage of GDP.

The coefficient of external debt stock a percentage of GNI ($EDSGNI_t$) has negative long run effects on export earnings with elasticity of 0.03 (Equation 2). Thus the responsiveness of export earnings in Kenya to external debt stock fluctuations is inelastic. This implies that an increase in the shilling external debt stock fluctuation leads to a less than proportionate decrease in export earnings to Kenya. As the results indicate, a unit increase in debt stock in Kenya leads to less than unitary decrease in export earnings in Kenya.

Similarly, the coefficients of inflation rates, interest rates, money supply and market liberalization ($INFLR_t$, $INTR_t$, $MSGDP_t$ and $MLIB_t$ respectively) have a positive long run effects on export earnings with elasticity of 0.15, 0.034, 0.25 and 0.71 respectively (Equation 2). Thus the responsiveness of export earnings in Kenya to fluctuations in inflation rates, interest rates, money supply and market liberalization is inelastic. This implies that an increase in their fluctuation leads to a less than proportionate increase in export earnings to Kenya.

Error correction model

Having concluded on the inherent long-run relationships, it was important to evaluate the short run dynamics of export earnings and determinants of exchange rate fluctuations. As the Engle-Granger Representation Theorem (1987) suggests, the existence of the cointegrating relationship among a set of variables that are not stationary in levels implies there was a short run error correction relationship associated with them. The relationship represents an adjustment process by which the deviated actual export earning as a variable is expected to adjust back to its long-run equilibrium path (Engle and Granger, 1987). Engle and Granger (1987) provided a principal feature of the cointegrated variables in that their time paths are influenced by the deviation from the long-run relationship, given that cointegration implies error

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correction representation. Thus the cointegrated system in this study can be represented by an Error Correction Model (ECM), which represents the short-run relationship described as:

$$\Delta \text{EENS}_t = \text{C} + \gamma C_{t-1} + {}_{i=0}^{n}\sum\beta_{1i}\Delta\, lnINTR_{\,t-i} + {}_{i=0}^{n}\sum\beta_{2i}\Delta\, lnMSGDP_{\,t-i} + {}_{i=0}^{n}\sum\beta_{3i}\Delta\, lnINFLR_{\,t-i} + {}_{i=0}^{n}\sum\beta_{4i}\Delta\, MLIB_{\,t-i} + {}_{i=0}^{n}\sum\beta_{5i}\Delta\, lnEDSGNI_{\,t-i} + \varepsilon_t$$

The first difference of export earnings is a function of lagged exports earnings value, current and lagged values of the independent variables, and the lagged value of the long run disturbance term C_{t-1}. The parameter γ describes the short run adjustment and indicates the speed of adjustment towards the long run equilibrium state so that a high coefficient implies rapid adjustment and a low coefficient slow adjustment (Engle and Granger, 1987).

Table 4: Regression Results for Vector Error Correction Model (1970-2015)

Variable	Co-efficient	Standard error	t-statistic	ρ Value
Constant	0.046758	-0.01537	-3.04283	0.0051
ΔlnEENS$_{t-1}$	-1.134591	-0.23279	-4.87388	0.0478
ΔlnINTR$_t$	-0.878868	-0.19251	-4.56531	0.0422
ΔlnMSGDP$_t$	-1.421312	-0.26491	-5.36526	0.0494
ΔlnINFLR$_t$	0.056286	-0.02413	-2.33259	0.0103
ΔlnMLIB$_t$	-0.360108	-0.12453	-2.89173	0.0431
ΔlnEDSGNI$_t$	0.592323	-0.11711	-5.05783	0.0232
ECT$_{t-1}$	-0.561051	-0.05842	-2.53821	0.0230
Summary Statistics				
R^2	0.79624			
Durbin Watson	1.9824			
Serial Correlation	0.80977			
Heteroscedasticity, F-statistic	4.683628	(0.000)		
Normality, Jarque-Bera	2.6	(0.27)		

In Table 4 above, ln represents natural logarithm, the symbol Δ is the first difference operator, $EENS_{t-1}$ is the export earnings, INTRt interest rates, MSGDPt is money supply, INFLRt is inflation rates, EDSGNIt is debt stock, MLIBt is market liberalization dummy and ECMt-1 is the error correction term. The lag length for each variable and the sequence in which the variables were entered in the VECM was selected using Akaike (1969) Information Criterion and Schwarz Information Criterion. The coefficient of multiple determination, (R^2) is high at 0.79624 (Table 4). The high value of R^2 indicates that the model fits the data well and approximately 80 percent of the fluctuations in the export earnings are predicted by the independent variables. This shows a strong explanatory power of 80 percent of the independent variables in affecting change in

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export earnings in Kenya. The F-statistics of 4.68 with a statistical significance at 1 percent shows that the variation in the long-run export earnings is attributable to changes in the independent variables (Table4). The presence of autocorrelation test was carried out using the Durbin Watson statistics and found to be within the normal bound at 1.98 (Table 4). The model fulfilled all diagnostic tests of no serial correlation, homoscedasticity, and normality of residuals as indicated by the summary statistics (Table 4.4). The results show that Kenya's export earnings can effectively be explained using the specified independent variables.

The coefficients on the lagged values of ΔlnENNSt, ΔlnINTRt, ΔlnMSGDPt, ΔMLIBt and ΔlnEDSGNIt are short run parameters measuring the short run immediate impact of independent variables on ΔlnEENSt. The coefficients on the lagged values of ΔlnINTRt, ΔlnMSGDPt, and ΔMLIBt have negative signs (Table 4). This means that a unit change in any of these variables will impact negatively on the level of export earnings. The short run coefficients follow the same pattern as the long run coefficients but the magnitudes of the short run coefficients are smaller than the long run coefficients.

The economic implication of this is that the independent variables have smaller effects on export earnings in the short run compared with the long run. With the dynamic specification of the model, the short-run dynamics are influenced by the deviation from the long run relationship as captured by ECT_{t-1} term. The regressor ECT_{-1} corresponds to the one year lagged error correction term which is indicative of the measure of the average speed at which export earnings adjust to a change in equilibrium conditions or the average time lag for adjustment of exports earnings to changes in the explanatory variables.

The coefficient on error correction term ECTt-1 is negative as and is statistically significant at the 5 percent level (Table 4). The significant error correction term implies that Kenya's export earnings model adjusts to changes in the specified independent variables. This further confirms the existence of a stable equilibrium long run relationship among the variables in the model (Banerjee *et al.,* 1993). The result justifies the use of ECM specification and further confirms that the variables are indeed cointegrated. The magnitude of the error correction term reveals the change in export earnings per period that is attributable to the disequilibrium between the actual and equilibrium levels. The coefficient of the ECTt-1 shows the proportion of the disequilibrium that is corrected each year.

The economic importance of this finding is that the export earnings speed of adjustment to correct long run disequilibrium between itself and its determinants is moderate, and 56 percent of the disequilibrium is eliminated in one year. This implies that 56 percent of the disequilibria of the previous year`s shock adjust back to equilibrium in the current year. These estimates of ECM suggest that in the absence of further shocks, the gap to revert back to

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equilibrium would be closed within a period of 1.8years. These results indicate that the adjustment of export earnings to any change in the independent variables of the model takes a long time to return to equilibrium because market forces in the export market restore equilibrium moderately.

Danga (2016) while examining determinants of nominal exchange rate fluctuations in Kenya using an Autoregressive Distributed Lag (ARDL) approach over the period 1993Q3 when Kenya authorized floating exchange rate to 2014Q4 found out that money supply, foreign exchange reserves, interest rate differentials are significant determinants of the nominal exchange rate in Kenya while current account balance is not a significant determinant. The ARDL bounds test approach confirmed lung run relationship between nominal exchange rate and the explanatory variables.

Kiptui (2007), while examining whether exchange rate volatility harms exports found out that exchange rate volatility has significant negative short and long-run effects on Kenya's real exports of tea and horticulture. The elasticity with respect to the exchange rate risk variable is found to be -0.02 for tea and -0.33 for horticulture implying higher sensitivity of horticultural exports to exchange rate volatility.

The study by Kiptoo (2007), focused on real exchange rate volatility and misalignment on international trade and investment. The study used (GARCH) and unconditional standard deviation. The study found out that real exchange rate volatility has a negative and significance impact on trade and investment during the study period 1993 to 2003.

SUMMARY

The specific objective of this study was to evaluate the impact of exchange rate fluctuations determinants on export earnings in Kenya using annual data from January, 1970 to 2015. The study applied the Augmented Dickey-Fuller (1990) and Phillips-Perron (1988) methods to test for the long run stability of the variables used in the empirical analysis. In order to detect whether the variables moved along the same path or not, cointegration analysis using Johansen and Juselius (1990) method was used. The cointegrating long run relationship of the export demand model was developed using the annual data. To detect the speed of adjustment to equilibrium in case of sudden shock, the Vector Error Correction Model was used. This relationship represents an adjustment process by which the deviated actual export earnings are expected to adjust back to their long run equilibrium path.

The results of cointegration analysis using the Vector Autoregressive model indicated the presence of a long run equilibrium relationship between export earnings, interest rates, money supply as a percentage of GDP, inflation rate, liberalization and external debt stock as a

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percentage of GNI. The debt stock variable has a negative long run effects on export earnings with elasticity of 0.03 respectively. Therefore, the responsiveness of export earnings to interest rates and market liberalization is negative and inelastic. Additionally, inflation rate, interest rates money supply and market liberalization variables have positive long run effects on export earnings with elasticity of 0.15, 0.034 and 0.71 respectively. Therefore, the responsiveness of export earnings to inflation rate, interest rates money supply and market liberalization is positive and inelastic.

The short-run dynamics of the export earnings model were estimated using a Vector Error Correction Model and the coefficient on error correction term was found to be -0.56 and was statistically significant thus confirming the existence of a stable equilibrium long run relationship among the variables. The negative sign of this coefficient indicates that the direction of correction is towards the long-run equilibrium while the size indicates the speed of adjustment towards the long-run equilibrium. The economic importance of this finding is that export earnings adjust sluggishly to correct long run disequilibrium between itself and its determinants, and 56 percent of the equilibrium is eliminated in one year. This implies that 56 percent of the disequilibria of the previous year`s shock adjusting back to equilibrium in the current year. The conclusion is that the adjustment of export earnings to any change in the independent variables of the export earnings model takes a long period to return to equilibrium because market forces in the export market do not restore equilibrium quickly.

CONCLUSIONS AND RECOMMENDATIONS

The results of this study indicate that exchange rate fluctuations determinants influence performance of export earnings to Kenya to with a positive for inflation rates, interest rates, money supply and market liberalization variables and negative for debt stock and all variables inelastic in their short run and long run relationship. Based on the findings, following recommendations are made.

For Policy Making

The Central Bank should be given some instrument autonomy. Effective monetary targeting and accommodating monetary policies should be designed and implemented as the needs arise. This is in line with the need for the government to ensure price stability, as this help to reduce the pressure on the general price level. A stable and predictable inflation rate in an economy would stimulate exports by encouraging local production. This consequently adds to exportable products, which can generate some foreign currency, that will beef up the supply side of foreign exchange market and hence assist the economy to grow.

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In addition, there is need to consider diversification of the export products and markets while at the same time improving on quality to enhance competitiveness. In particular, considered export diversification strategies require enhanced emphasis on promoting non-traditional, higher-productivity and technology-intensive exports. On the other hand, with the rising economic integration, Kenya needs to balance its trade with developed and developing countries and increase its market share for exports in the East African Community and Common Market for East and Southern Africa because both have a huge and growing market potential hence enhancing export earnings. At the regional level, the East African Community needs to have a regional currency pegged to a major world currency to shield export operators from exchange rate volatility and stabilize their revenues.

Lastly, a need exists for a robust currency stabilization framework aimed at mitigating high exchange rate fluctuations to promote exports in Kenya hence export earnings. The government needs to seek ways of reducing the volatility of the Kenyan shilling exchange rate. In managing exchange rate risk, the government and the Central Bank of Kenya need foresight, better forecasting and a willingness to undertake calculated risk to avoid economic losses arising out of exchange rate fluctuations.

For Further Studies

This study sought to determine the effect of determinants of exchange rate on export earnings. The study recommends that an in-depth study should be carried out on other variables that affect export earnings apart from the impact of determinants of exchange rate fluctuations. The study recommends other studies to build on the study findings by incorporating the omitted variables like exchange rate volatility itself and qualitative variables such as political stability the ease to do business in Kenya.

This study covered a period of forty-five (45) years. A similar study should be conducted for a shorter period for instance 25 years (post liberalization period, 1990 - present) to establish the behavior of Kenya's export earnings and determinants of exchange rate fluctuations after market liberalization.

This study was carried out on export earnings to the whole world. Further research should be done on export earnings to specific markets for instance a trading block such as the East African Community.

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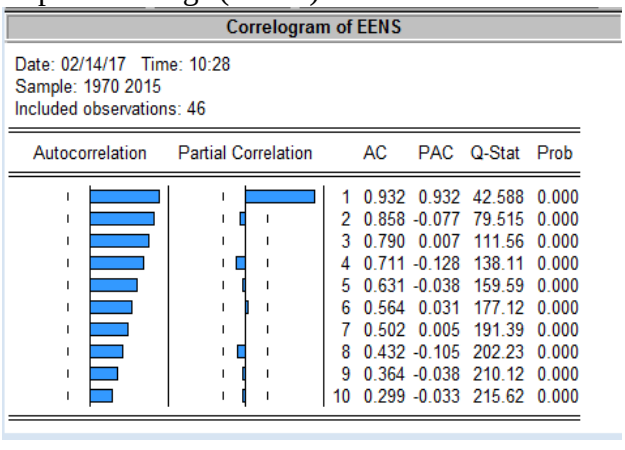
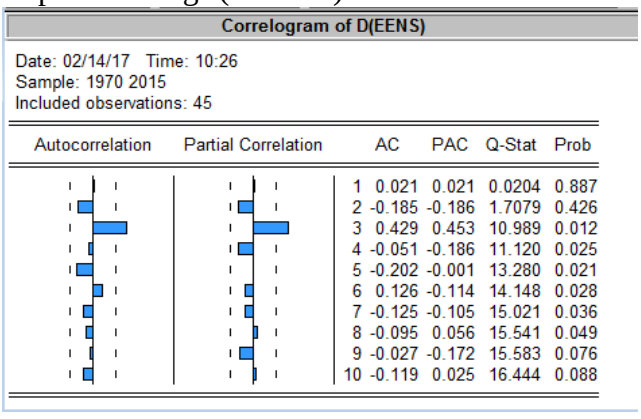
APPENDICES

Unit root test

Level Series	First difference
Export Earnings (EENS)	Export Earnings (DEENS)





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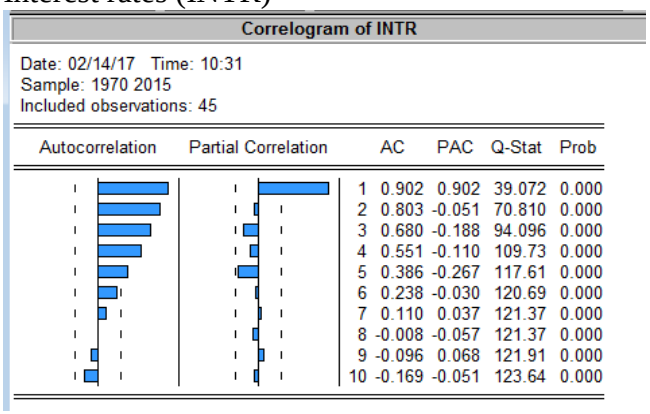
Interest rates (INTR)

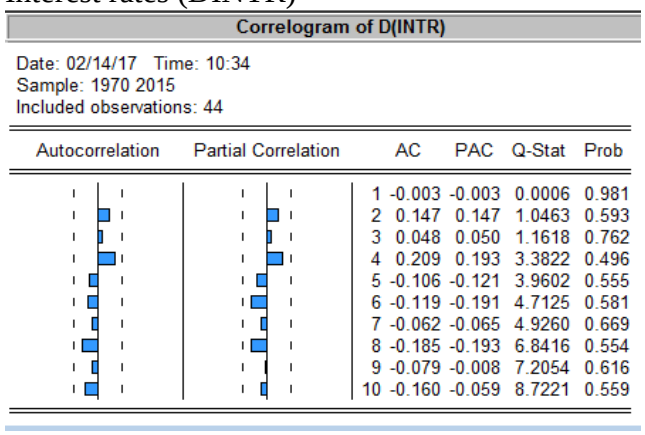


Correlogram of INTR

Date: 02/14/17 Time: 10:31
Sample: 1970 2015
Included observations: 45

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.902	0.902	39.072	0.000
2			0.803	-0.051	70.810	0.000
3			0.680	-0.188	94.096	0.000
4			0.551	-0.110	109.73	0.000
5			0.386	-0.267	117.61	0.000
6			0.238	-0.030	120.69	0.000
7			0.110	0.037	121.37	0.000
8			-0.008	-0.057	121.37	0.000
9			-0.096	0.068	121.91	0.000
10			-0.169	-0.051	123.64	0.000

Interest rates (DINTR)

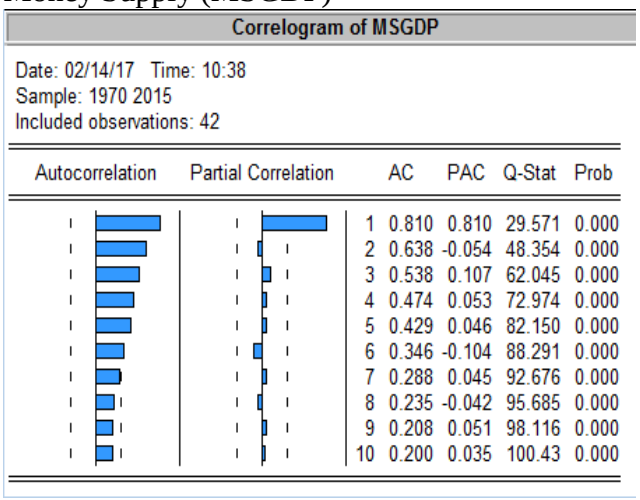


Correlogram of D(INTR)

Date: 02/14/17 Time: 10:34
Sample: 1970 2015
Included observations: 44

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			-0.003	-0.003	0.0006	0.981
2			0.147	0.147	1.0463	0.593
3			0.048	0.050	1.1618	0.762
4			0.209	0.193	3.3822	0.496
5			-0.106	-0.121	3.9602	0.555
6			-0.119	-0.191	4.7125	0.581
7			-0.062	-0.065	4.9260	0.669
8			-0.185	-0.193	6.8416	0.554
9			-0.079	-0.008	7.2054	0.616
10			-0.160	-0.059	8.7221	0.559

Money Supply (MSGDP)

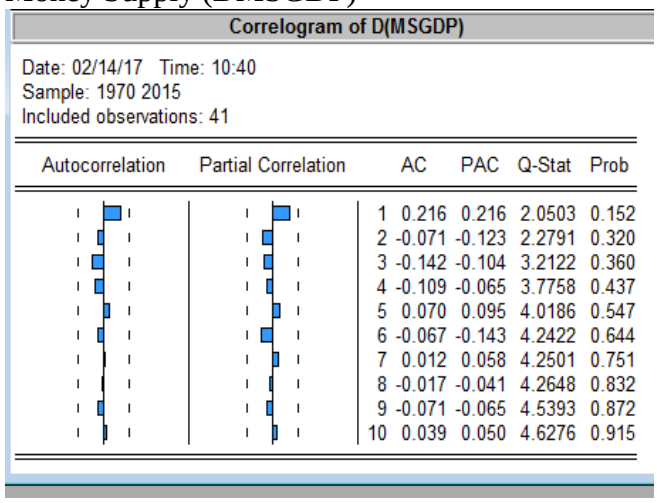


Correlogram of MSGDP

Date: 02/14/17 Time: 10:38
Sample: 1970 2015
Included observations: 42

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.810	0.810	29.571	0.000
2			0.638	-0.054	48.354	0.000
3			0.538	0.107	62.045	0.000
4			0.474	0.053	72.974	0.000
5			0.429	0.046	82.150	0.000
6			0.346	-0.104	88.291	0.000
7			0.288	0.045	92.676	0.000
8			0.235	-0.042	95.685	0.000
9			0.208	0.051	98.116	0.000
10			0.200	0.035	100.43	0.000

Money Supply (DMSGDP)

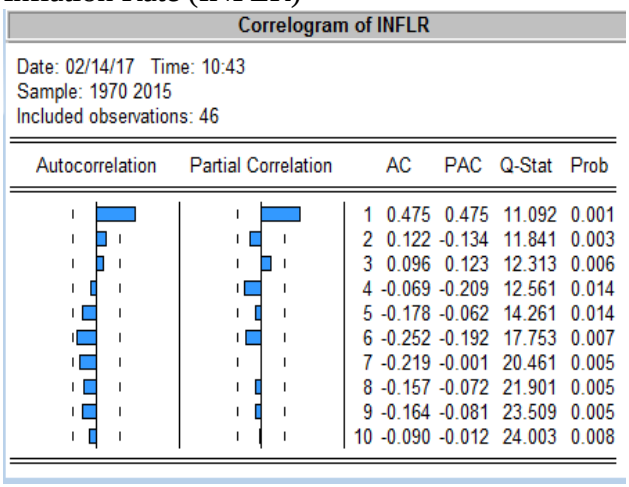


Correlogram of D(MSGDP)

Date: 02/14/17 Time: 10:40
Sample: 1970 2015
Included observations: 41

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.216	0.216	2.0503	0.152
2			-0.071	-0.123	2.2791	0.320
3			-0.142	-0.104	3.2122	0.360
4			-0.109	-0.065	3.7758	0.437
5			0.070	0.095	4.0186	0.547
6			-0.067	-0.143	4.2422	0.644
7			0.012	0.058	4.2501	0.751
8			-0.017	-0.041	4.2648	0.832
9			-0.071	-0.065	4.5393	0.872
10			0.039	0.050	4.6276	0.915

Inflation Rate (INFLR)

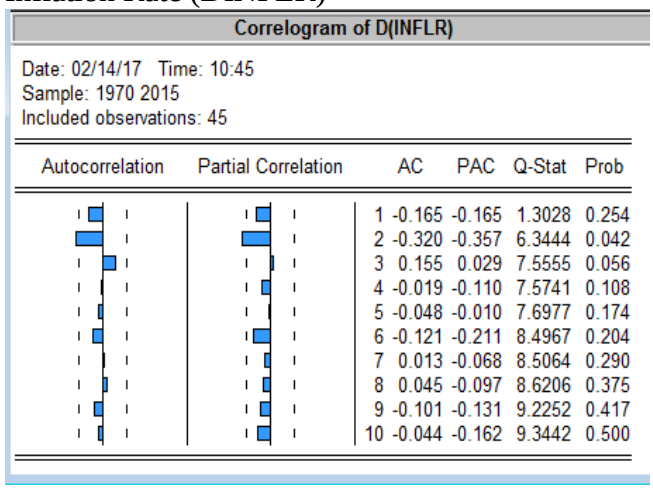


Correlogram of INFLR

Date: 02/14/17 Time: 10:43
Sample: 1970 2015
Included observations: 46

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.475	0.475	11.092	0.001
2			0.122	-0.134	11.841	0.003
3			0.096	0.123	12.313	0.006
4			-0.069	-0.209	12.561	0.014
5			-0.178	-0.062	14.261	0.014
6			-0.252	-0.192	17.753	0.007
7			-0.219	-0.001	20.461	0.005
8			-0.157	-0.072	21.901	0.005
9			-0.164	-0.081	23.509	0.005
10			-0.090	-0.012	24.003	0.008

Inflation Rate (DINFLR)



Correlogram of D(INFLR)

Date: 02/14/17 Time: 10:45
Sample: 1970 2015
Included observations: 45

	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			-0.165	-0.165	1.3028	0.254
2			-0.320	-0.357	6.3444	0.042
3			0.155	0.029	7.5555	0.056
4			-0.019	-0.110	7.5741	0.108
5			-0.048	-0.010	7.6977	0.174
6			-0.121	-0.211	8.4967	0.204
7			0.013	-0.068	8.5064	0.290
8			0.045	-0.097	8.6206	0.375
9			-0.101	-0.131	9.2252	0.417
10			-0.044	-0.162	9.3442	0.500

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Market Liberalization (MLIB)

Correlogram of MLIB

Date: 02/14/17 Time: 10:50
Sample: 1970 2015
Included observations: 46

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.935	0.935	42.860	0.000
		2	0.869	-0.034	80.776	0.000
		3	0.804	-0.035	113.96	0.000
		4	0.738	-0.036	142.63	0.000
		5	0.673	-0.038	167.02	0.000
		6	0.608	-0.039	187.41	0.000
		7	0.542	-0.041	204.06	0.000
		8	0.477	-0.042	217.28	0.000
		9	0.412	-0.044	227.39	0.000
		10	0.346	-0.046	234.74	0.000

Market Liberalization (DMLIB)

Correlogram of D(MLIB)

Date: 02/14/17 Time: 10:51
Sample: 1970 2015
Included observations: 45

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.023	-0.023	0.0259	0.872
		2	-0.024	-0.024	0.0537	0.974
		3	-0.024	-0.025	0.0833	0.994
		4	-0.025	-0.027	0.1148	0.998
		5	-0.025	-0.028	0.1486	1.000
		6	-0.026	-0.029	0.1845	1.000
		7	-0.026	-0.030	0.2229	1.000
		8	-0.027	-0.032	0.2639	1.000
		9	-0.027	-0.033	0.3076	1.000
		10	-0.028	-0.035	0.3542	1.000

External debt stock (EDSGNI)

Correlogram of EDSGNI

Date: 02/14/17 Time: 10:53
Sample: 1970 2015
Included observations: 46

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.894	0.894	39.175	0.000
		2	0.791	-0.037	70.564	0.000
		3	0.658	-0.210	92.764	0.000
		4	0.544	0.015	108.32	0.000
		5	0.449	0.045	119.16	0.000
		6	0.366	-0.022	126.57	0.000
		7	0.274	-0.139	130.81	0.000
		8	0.190	-0.026	132.91	0.000
		9	0.097	-0.086	133.47	0.000
		10	0.003	-0.107	133.47	0.000

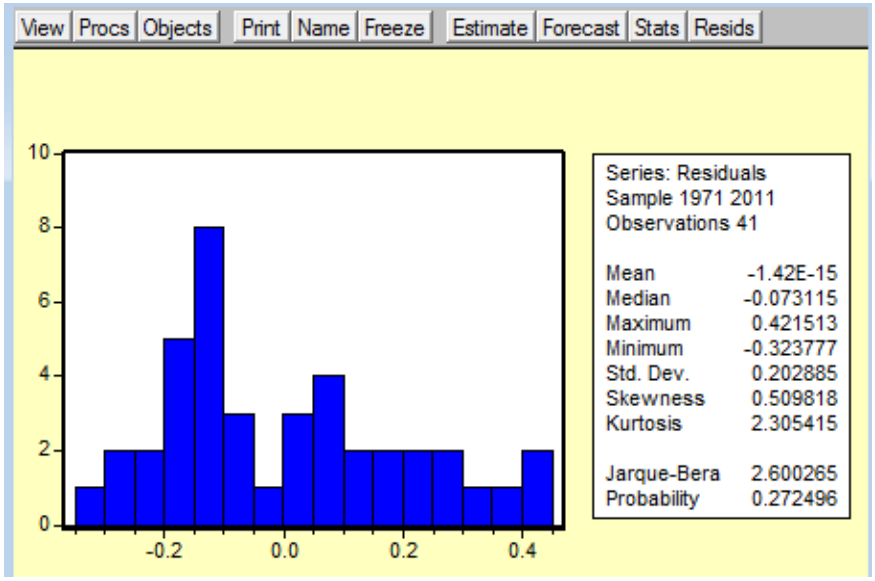
External Debt stock (DEDSGNI)

Correlogram of D(EDSGNI)

Date: 02/14/17 Time: 10:54
Sample: 1970 2015
Included observations: 45

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.040	-0.040	0.0781	0.780
		2	0.157	0.155	1.2846	0.526
		3	-0.085	-0.075	1.6456	0.649
		4	-0.077	-0.109	1.9498	0.745
		5	-0.077	-0.060	2.2644	0.811
		6	0.078	0.101	2.5920	0.858
		7	-0.086	-0.077	3.0016	0.885
		8	0.081	0.030	3.3786	0.908
		9	0.026	0.059	3.4189	0.945
		10	0.098	0.089	4.0047	0.947

VECM test diagnostic



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