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DOES THE MARSHALL-LERNER CONDITION HOLD FOR KENYA'S BILATERAL TRADE? A DYNAMIC PANEL DATA APPROACH

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ABSTRACT

Between 2010 and 2012, Kenya's degree of trade openness averaged 70.1% underlining the importance of international trade to the country. In 2012, Kenya's trade deficit reached 20.8% of GDP, contributing a negative 4 % drag to GDP growth and further threatening macroeconomic stability. Previous attempts to establish the existence of Marshall-Lerner condition used aggregated data which suffers from aggregation bias. This paper therefore aims to investigate the Marshall-Lerner condition in Kenya's bilateral trade using the recently developed Extended Trade Balance Model. The Im-Pesaran-Shin (IPS) unit root test and the Pedroni cointegration test were applied on the data after which Mean Group estimation technique was used in the analysis. The findings indicated that the Marshall-Lerner condition was only fulfilled for trade between Kenya and China, UAE, India and South Africa. This paper recommends that while considering currency devaluation, Kenya should do so in bilateral terms.

Key Words: Marshall-Lerner Condition, Exchange Rate, Bilateral Trade Balance, Mean Group Estimation, Kenya.

1. INTRODUCTION

International trade has increasingly become important as imports and exports significantly contribute to the GDPs of most countries. However, international trade is relatively more vital to small developing countries as compared to the developed, self-sufficient economies. Empirical evidence from developing countries suggests that a rise in the degree of trade openness over the years has been accompanied by widening trade balance deficits which have threatened to plunge these economies into macroeconomic instabilities (Shakur, 2011).

Most of the countries in the Sub-Saharan Africa have experienced persistent trade balance deficits on the account of poor economic strategies adopted by these countries. They have also over-relied on certain specific primary products for exports while importing relatively expensive manufactured goods (Shawa and Shen 2013). With a trade-to-GDP ratio of 70.1 % for the period between 2010 and 2012, Kenya heavily relies on international trade. But since early 1970s, the value of Kenya's imports has exceeded that of exports and in recent times the trade balance deficit has risen to alarming levels reaching a high of 20.8 % of Gross Domestic Product (GDP) in 2012 (Kenya National Bureau of Statistics (KNBS), 2013)**.** These trade balance deficits have been attributed to rising oil prices and low exports. According to the World Bank (2013), the trade balance deficits are a drag on economic growth, having reduced overall growth rate by 4.1 % in 2012. The World Bank (2013) further explained that if Kenya had a balanced trade balance position, the country would already be growing at an overall growth rate of 8%.

A common policy employed in a bid to improve a trade balance deficit is exchange rate devaluation. Exchange rate decisions represent important policy tools for developing countries and the effect of exchange rate on trade balance has been a key area of empirical analyses over a long period of time. Theoretically, exchange rate devaluation is expected to make a country's exports cheaper and imports more expensive leading to an improvement in the trade balance. Empirically though, studies have failed to achieve a common finding on whether exchange rate devaluation would fulfil the Marshall-Lerner (M-L) condition. The M-L condition states that a devaluation or depreciation will only improve trade balance if the absolute sum of imports' and exports' elasticities is greater than unity. The impact of real exchange rate on the trade balance depends on the price elasticity of demand of both exports and imports. Low export price elasticities of demand are common when the concentration of exports lies within a few primary commodities (Reinhart, 1995).

Studies exploring the M-L condition are grouped into two; those that use aggregated trade data and those that employ bilateral trade data. Studies that use aggregated data suffer from aggregation bias by assuming that what is true for a group of countries is also true for an individual country thereby ignoring the existence of heterogeneities among economies. This may result into incorrect inferences by policy makers especially if the bilateral trade elasticities for each trading partner are significantly different from the aggregate trade elasticities. According to Bahmani-Oskooee and Brooks (1999), a country's trade balance could be improving with one trading partner and at the same time deteriorate with another trading partner while a country's currency could also appreciate against one currency and simultaneously depreciate against another. Therefore aggregated data obscures important bilateral movements such as bilateral exchange rate movements thus yielding an incorrect link between the trade balance and its determinants.

Furthermore, Khan and Hossain (2010) argue that in bilateral trade analysis the absolute values of the coefficients do not give the correct relationship between trade balance and its determinants, rather the relative size of these coefficients offer more clearer understanding of the determinants of trade balance. In

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this regard, the M-L condition should be examined while taking into account the issue of heterogeneity by capturing vital bilateral information concerning the interaction of variables for both policy applications and empirical analyses. This study therefore seeks to avoid the shortcomings of aggregation and aims to investigate whether the M-L condition holds for Kenya's bilateral trade.

1.1 An Overview of Kenya's Trade Balance, Exchange Rate Regimes and Trade Policies

For the greater proportion of the post-independence era, Kenya's trade balance has persistently remained in deficit save for a few years. After independence, the country inherited the import substitution strategy from the colonial government and the policy impressed as Kenya recorded back-to-back trade surpluses from 1963 to 1969 with an exceptionally small trade balance deficit which averaged 0.91%of the GDP in 1967. The policy also produced a remarkable real GDP growth rate of 6.6% for the period between 1964 and 1974 (Were *et al.*, 2006). During that period the economy had adopted a fixed exchange rate regime with the Kenyan shilling pegged to the U.S Dollar. Figure 1 shows the trend of the Kenya's trade balance as a percentage of GDP from 1963 to 2013.

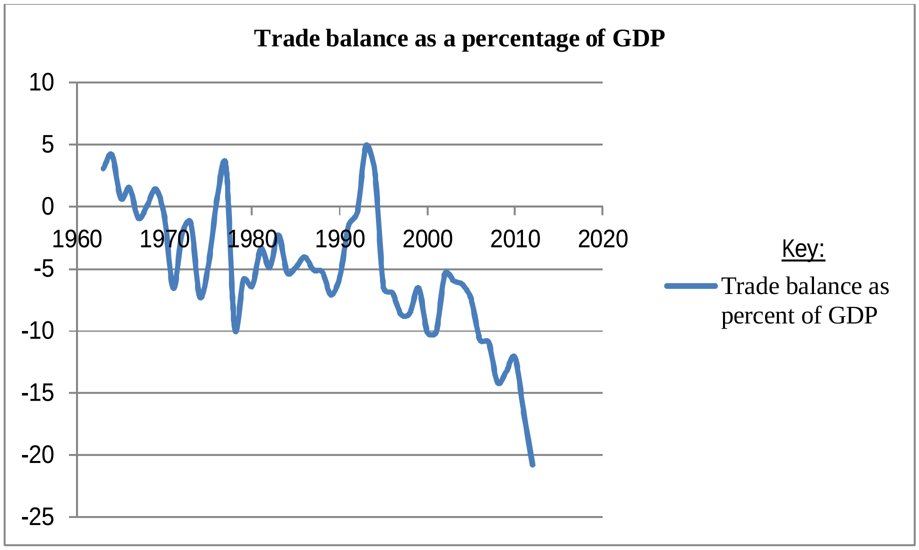

Figure 1: Kenya's Trade Balance as a percentage of GDP (1963-2013)

Source: World Bank (2013)

The turning point came in the early 1970s as Kenya's exports were surpassed by imports and between 1970 and 1971 the economy suffered a balance of payment (BOP) crisis. Instead of devaluing the Kenyan shilling, the government decided to impose more strict controls which resulted into distorted resource allocation, reduced foreign competition and restricted inflow of technology from abroad (Bigsten and Durevall, 2006). In 1974, the Kenyan Shilling was depegged from the Dollar and the peg was changed to the Special Drawing Rights (SDR). From Figure 1, the trade balance deficit reached 7.22% of the GDP in 1974.

The coffee boom of 1976 and 1977 contributed to two years of trade balance surpluses as the trade balance surplus reached 0.69% and 3.37% of GDP respectively. In general, the economy achieved a growth rate of 5.6 % despite the collapse of the East Africa Community (EAC) in 1977. The collapse of the EAC meant a shrinking market for Kenyan goods and as a result, this pushed the government to increase protection for the local manufacturing sector (KIPPRA, 2007). During the same period, the Kenyan Shilling was devalued by 14 % to stabilize it due to its irregular movements against the dollar. In 1979, the international oil prices soared and the economy slowed down resulting into serious BOP problems (Wagacha, 2000).

Kenya adopted the Structural Adjustment Programs (SAPs) in early 1980s due to pressure from multi-lateral financial institutions (Were *et al.*, 2006). They required the government to adopt more liberal trade, exchange rate and interest rate regimes as well as implement a more outward-oriented industrial policy. Between 1980 and 1982, the Kenya shilling was devalued by about 20% in real terms measured against the Special Drawing Rights (SDR). After these devaluations, the exchange rate regime was changed to a crawling peg in real terms by the end of 1982 and the regime lasted until 1990 (Ndung'u, 1999). Between 1981 and 1989, the trade balance deficit averaged 4.68% of the GDP.

A dual exchange rate system was adopted in 1990 and it lasted until October 1993 when the country moved to liberalize the exchange rate by adopting a floating exchange rate regime. In May 1993, the government abolished both the import licensing requirements and the foreign exchange controls under the dual exchange rate system (Glenday and Ndii, 2000). Over 1993-1994, all current account and capital account restrictions were lifted. Additionally, the tariff structure was harmonized and tariff dispersion lowered (Were *et al.*, 2006). The impact was immediately reflected in the trade flows as imports which had averaged 24% of GDP from 1981-1992 jumped to over 30 % of GDP. Exports on the other hand, surged by about 7% of GDP as well (Glenday and Ndii, 2000). According to data from WDI (2013), over 1993 and 1994, the trade balance recorded a surplus of 4.95% and 2.81% of GDP. The Kenyan shilling on the other hand began to depreciate after exchange rate liberalization and slightly appreciated in 1999 by 4.2% after the country had changed to a managed float regime in 1998. The shilling then began depreciating once more and stabilized between 2000 and 2004 after which it sharply depreciated reaching an exchange rate of 207.2 against the basket of major currencies in 2012.

Since 2005 Kenya adopted the common external tariff of the EAC as its main trade policy instrument (Were *et al.*, 2006). Kenya's trade balance deficit increased significantly between the year 2005 and 2012, reaching 20.8 % of the country's GDP in 2012. This ever-rising trade balance deficit has attracted the attention of economists, policy makers and even the World Bank, with the latter warning Kenya of walking a tight rope with her ballooning trade deficit as the country was risking a BOP crisis (World Bank, 2012).

1.2 Kenya's Trade With Bilateral Trading Partners

Like most other Sub-Sahara African countries, Kenya's export structure is predominantly composed of agricultural commodities which include tea, coffee and horticultural products. These commodities account for over 50% of the total value of Kenya's commodity exports. Kenya's key export commodities in 2013 included; tea, horticultural products, coffee, petroleum products, fish, cement while key imports included; machinery, transportation equipment, petroleum products, motor vehicles, iron, steel, resins and plastics (KNBS, 2014).

Kenya exports most of the agricultural products to member countries of the European Union and most of the manufactured goods to Sub-Saharan Africa countries. The country's top trading partners between the year 2007 and 2012 included; Uganda, Tanzania, South Africa, United Arab Emirates (UAE), China, India, United Kingdom (UK), United States of America (USA), Germany and Netherlands. Between 2007 and 2012, these top 10 trading partners made up slightly more than 62.05 % of Kenya's total imports while absorbing 56.15 % of Kenya's total exports, (KNBS, 2013).

Table 1 Kenya's Bilateral Trade Balance (in Million Ksh.) with Key Partners.

Year / Country	2008	2009	2010	2011	2012
Uganda	37,064	41,813	42,880	65,616	52,127
Tanzania	21,959	22,277	22,662	26,073	31,634
Netherlands	12,949	8,869	8,403	10,290	13,421
United Kingdom (UK)	9,936	1,610	2,341	3,520	-3,219
United States of America (USA)	-7,037	-32,633	-16,793	-18,856	-39,561
Germany	-26,946	-15,377	-18,653	-24,406	-31,703
South Africa	-43,050	-66,981	-57,337	-68,446	-59,270
China	-61,444	-72,037	-118,136	-140,247	-161,822
India	-83,762	-78,105	-99,764	-139,372	-187,702
United Arab Emirates (UAE)	-106,250	-78,992	-97,188	-179,472	-121,271

Source: KNBS (2013)

From Table 1, it is clear that Kenya has had persistent trade surpluses with Uganda, Tanzania and Netherlands. The country has also had huge persistent trade balance deficits with China, UAE and India, and relatively smaller trade deficits with Germany and USA. The causes of these deficits are the importation by Kenya of high value manufactured commodities and machineries from the partner countries while exporting low value primary goods (Osoro, 2013).

Africa is the principal destination for Kenya's exports, with EAC and the Common Market for Eastern and Central Africa (COMESA) being the leading destinations. In 2010 alone, the EAC absorbed 24 % of Kenya's total exports. Kenya exported 12.7 % of total exports to Uganda (Kenya's leading export destination), while Tanzania and Rwanda absorbed 8 % and 2 % of Kenya's exports respectively. These two countries ranked as the fourth and tenth key Kenya's exports destinations in the whole world (Muluvi *et al.*, 2012).

2. LITERATURE REVIEW

The link between the exchange rate and the trade balance is explained by the Keynesian elasticity approach to balance of trade determination. The approach emphasizes on responsiveness of import and export demand to changes in relative prices as a key determinants of a country's trade balance. The approach postulates that devaluation will improve the balance of trade through the M-L Condition. The essence of this view is the substitution effects in consumption and production induced by the relative price changes caused by devaluation. If a country's import demand is highly elastic, then a depreciation of a country's currency will lead to a massive decline in import volumes.

The effect of exchange rate movements on trade balance has received a lot of attention from researchers who have investigated the M-L Condition using different econometric models and techniques. Nevertheless, the findings have been mixed. Some studies have established the fulfilment of the M-L condition while others have failed to find any evidence of it. Earlier studies used aggregated data while recent studies have adapted the use of bilateral data.

Caporale *et al.* (2012) investigated the existence of M-L condition in Kenya. Using quarterly import and exports data, they employed fractional integration and cointegration methods and found the existence of a cointegrating relationship between trade balance, the real exchange rate and the domestic and foreign incomes. They concluded that the M-L condition holds for Kenya. In a similar study, Eita (2013) applied cointegrated vector error correction modeling to empirically estimate the M-L condition in Namibia. The study found that real exchange rates had significant impact on exports and imports and the sum of the elasticities were greater than one implying M-L condition holds for Namibia.

Hasan and Khan (1994) used aggregated export, import and trade balance data as well as effective exchange rate data to test whether devaluation could improve trade balance for Pakistan. Using annual data from 1972-1991, the authors employed 3 Stage Least Squares (3SLS) to test for the M-L condition. They found that devaluation could improve Pakistan's trade balance. But a study by Akhtar and Malik (2000), found varied results. The authors also applied 3SLS technique, with bilateral trade data, to investigate the M-L conditions of Pakistan and her 4 trading partners, UK, USA, Germany, and Japan. They found that M-L condition was fulfilled for trade with only two partners; UK and Japan.

Reinhart (1995) used the Dynamic Ordinary Least Squares (DOLS) methods to estimate import and export elasticities for 12 developing countries for the period 1968-1992. The results indicated the M-L condition was met. The author also established that Africa had large enough coefficients to meet the M-L condition. But a recent study by Prawoto (2007), using a similar methodology (DOLS), obtains mixed results for the M-L condition test between four Asian countries which included Malysia, Indonesia, Thailand and Singapore. The author established that the M-L condition was met for Malaysia and Thailand only.

Loto (2011) tested M-L condition for Nigeria and failed to establish existence of the condition. The study used Ordinary Least Squares (OLS) method to estimate the import and export demand functions. The findings suggested that import-dependent countries like African countries cannot benefit from currency devaluation. But Ogbonna (2011), using a data set covering the period 1970-2005, employed Johansen and Juselius cointegration approach and found that the M-L condition holds for Nigeria.

Hatemi-J and Irandoust (2005) tested for the fulfillment of M-L condition for the bilateral trade between Sweden and five trading partners which included Denmark, France, Germany, Norway, the UK, and the USA. Using the Pedroni cointegration test, they found that the sum of the price elasticities is greater than one only in the case of Germany. Likewise, Irandoust *et al.* (2006) studied Sweden's trade with basically the same sample but with the addition of Netherlands and Finland. The authors applied the panel cointegration test of Larsson *et al.* (2001) and found that only France and Netherlands met the M-L condition.

The Theoretical Model

The Standard Trade Model

The Standard Trade Balance Model was formulated by Goldstein and Khan (1985) in a reduced form equation. The model, as used by Bahmani-Oskooee and Wang (2006) makes an assumption that imports are imperfect substitutes for domestically produced goods. The Standard Trade Model as derived by Khan and Hossain (2010) expresses the demand for imports by country i from country j as a function of relative prices of imports and domestic real income, such that:

$$M_{ij}^{d} = M_{ij}^{d}(RP_{mi}, Y_i) \quad (1)$$

Where;
M_{ij}^{d}- is the domestic demand for imports by country-i,
RP_{mi}- is the relative price of imported goods to domestically produced good,
Y_i -is country i's real income.
Letting ER_{ji} be the nominal exchange rate, defined as the rate at which a domestic currency is exchanged for a foreign currency. Therefore, the relative price of imports can thus be presented as:

$$RP_{mi} = \left(\frac{P_{xj}}{ER_{ji}P_i}\right)\left(\frac{P_{xj}}{P_i}\right) = (RER_{ji})RP_{xj} \quad (2)$$

Where;
P_{xj} - is the foreign currency price of foreign exports,
P_i and P_j - are the domestic (country i's) price indices and foreign (country j's) price indices of all goods respectively,
RER_{ji} - is the real exchange rate, defined as $RER_{ji} = [(1/ER_{ji})\ (P_j/P_i)]$, so that an increase in RER_{ji} means the domestic currency is appreciating relative to the foreign currency.
RP_{xj} - is the relative price of foreign (j's) exports of foreign produced goods.
Substituting RP_{mi} from equation 2 into equation 1 produces the following equation;

$$M_{ij}^{d} = M_{ij}^{d}(RER_{ji}.RP_{xj}, Y_i) \quad (3)$$

Likewise, foreign demand for imports is a function of real income and relative import prices.

$$M_{ji}^{d} = M_{ji}^{d}\left(\frac{RP_{xi}}{RER_{ji}}, Y_i\right) \quad (4)$$

Since at equilibrium, the exports supply by country i must equal imports demand by country j and vice versa, it therefore means that;

$$X_{ij}^{s} = M_{ji}^{d} \quad (5)$$

$$X_{ji}^{s} = M_{ij}^{d} \quad (6)$$

Following Dash (2013), the domestic trade balance of country i with country j is expressed as the ratio of exports over imports (i.e. X_i / M_i). Such that;

$$TB_{ij} = \frac{X_{ij}^{s}}{M_{ij}^{d}} = \frac{M_{ji}^{d}}{M_{ij}^{d}} = \frac{M_{ji}^{d}\left(\frac{RP_{xi}}{RER_{ji}}, Y_j\right)}{M_{ij}^{d}(RER_{ji}.RP_{xj}, Y_i)} \quad (7)$$

But equations 1 to 4 constitute structural equations that can be modified with equations 4 and 7, and be substituted into equation 8. Making assumption that RPx_i and RPx_j are stationary, then the reduced-form equation can then be expressed as:

$$TB_{ij} = TB_{ij}(RER_{ji}, Y_i, Y_j) \quad (8)$$

This is the standard model of trade balance consisting of three explanatory variables, real exchange rate (RER_{ji}), real GDP$_i$ (Y_i), and GDP$_j$ (Y_j) which captures the factors influencing bilateral trade balance as postulated by the elasticity and income approaches to balance of trade determination.

The Extended Trade Balance Model

The direction of response by the dependent variable in equation 8 due to changes in some explanatory variables is ambiguous. According to Khan and Hosain (2010), the signs of the coefficients of GDP_j could either be positive if changes in GDP_j represent changes in demand of domestic country's exports due to changes in country j's income or negative if changes in GDP_j represent changes in production of import substitutes by country j. This means that *GDP* measures both the productive and absorption capacity of a country. To eliminate this ambiguity, Khan and Hossain (2010) offer that absolute factors do not correctly determine bilateral trade, rather relative factors determine export supply and import demand. So, the author explains that the GDP ratio of the trading pair (GDP_j/GDP_i) shows the relative production capacity of partner country (country j) compared to domestic country i. And the ratio of per capita income (per capita GNP_j/per capita GNP_i) is a key determinant of import demand since it represents the relative absorption capacity of the trading partners. And so the Trade balance model stands as;

$$TB_{ij} = TB_{ij}\left(RER_{ji}, RGDP_{ji}, RPGNP_{ji}\right) \qquad (9)$$

Where;

TB_{ij} - is a measure of the trade balance between domestic country i and trading partner j

RER_{ji} - is the bilateral real exchange rate between the domestic currency and country j's currency

$RGDP_{ji}$ - denotes the income of the trading partner j relative to that of domestic country i (Kenya)

$RPGNP_{ji}$ - denotes the per capita income of trading partner j relative to that of domestic country i (Kenya).

3. METHODOLOGY

Data Type and Sources

This study used bilateral panel data for Kenya and the country's ten trading partners for the period 1970-2013. The data were obtained from Direction of Trade Statistics (DOTS) and International Financial Statistics (IFS) databases of the IMF, World Development Indicators (WDI) and Kenya National Bureau of Statistics (KNBS).

Model Specification

Following Bahmani-Oskooee and Brooks (1999) and Dash (2013), equation 9 was presented in log-log form. The advantage of log-log functional form is that it allows the regression coefficients to be treated as elasticities (Dash, 2013). Another advantage is that it gives the M-L condition exactly, not through approximation (Boyd *et al.*, 2001). Therefore, taking logarithm on both sides and adding the time subscript, *t*, and the error term, the model now becomes;

$$ln(TB_{ij})_t = \alpha_o + \beta_1 ln(RER_{ji})_t + \beta_2 ln(RPGNP_{ji})_t + \beta_3 ln(RGDP_{ji})_t + (\varepsilon_{ij})_t \qquad (10)$$

Where;

TB_{ij} - is a measure of the trade balance between domestic country i and trading partner j

RER_{ji} - is the bilateral real exchange rate between the domestic currency and country j's currency

$RGDP_{ji}$ - denotes the income of the trading partner j relative to that of domestic country i (Kenya)

$RPGNP_{ji}$ - denotes the per capita income of trading partner j relative to that of domestic country i (Kenya).

ε_{ij} – error term,

While subscripts *i*, *j* and *t* represent Kenya, her bilateral trading partner and time respectively.

Justification and Measurement of Variables

Real Exchange Rate (RER)- Changes in real exchange rate induce changes in relative prices of exports and imports. In case of devaluation, the exports are expected to increase as they become more competitive due to price reduction. The imports on the other hand become more expensive. The expected sign is positive

Relative GDP (RGDP)- The GDP ratio of the trading pair (GDP_j /GDP_i) shows the relative productive capacity of partner country compared to Kenya. It means that if the trading partner's GDP increases, then her productive capacity increases and so the trading partner will import less from Kenya. The expected sign is negative.

Relative per capita GNP (RPGNP)- higher relative per capita GNP (RPGNP) implies higher absorption capacity of the country. Due to increase in absorption capacity of trading partner, it is expected that the country will import more from Kenya therefore improving Kenya's balance of trade in the long-run. The relative per capita GNP gives the income differential between country pair, denoting the differences in factor endowment between trading partners. It also represents the relative factor endowment of a country. A ratio of per capita income (y_j/y_i) of greater than one implies that country-j is more labor endowed than country-i, taking the classical assumption of homogeneity of labor in all countries (Khan and Hossain, 2010).

Analysis Techniques

In order to test for the validity of M-L condition in a panel where the number of time series observations (T) is greater than the number of cross-sectional units (N), this study follows Comunale and Hessel (2014) and considers three alternative estimation techniques; Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Fixed Effects (DFE) which are based on ARDL framework. These methods differ on the assumptions surrounding the long-run coefficients. The PMG estimation constrains the long-run coefficients to be homogenous across the panels but allows the short-run coefficients to vary with each cross-sectional unit. The MG technique on the other hand allows for heterogeneous long-run and short-run coefficients across all panels. On the other hand, DFE estimation assumes that both the long-run and the short-run coefficients are homogenous across all the cross-sectional units. The DFE estimation is eliminated on theoretical grounds since trade elasticities cannot be similar for all trading partners. This is because the composition of trade differs among countries. The Hausman test must be conducted to select between PMG and MG estimation techniques since the assumption of PMG renders the estimates inconsistent if the true model is heterogenous.

To establish the M-L condition from equation 10, an ARDL (p; q1, q2,… qk) dynamic panel specification was employed as follows;

$$lnTB_{ij,t} = \sum_{m=1}^{p} \alpha_{ij,m} lnTB_{ij,t-m} + \sum_{m=0}^{q} \beta'_{ij,m} lnX_{ij,t-m} + \mu_{ij} + \varepsilon_{ij,t} \quad (11)$$

Where;

j= 1,2,…N - represents Kenya's trading partners,

t=1,2,…T - represents the number of time periods,

$TB_{ij,t}$ - is the bilateral trade balance between Kenya and country j at time t.

α_{ij} - is a scalar

X_{it} - is a k×1 vector of explanatory variables that were used. These variables included; the natural log of bilateral real exchange rate (LnBRER), the natural log of relative real GDP (LnRGDP), the natural log of relative real per capita GNP (LnRGNP).

β_{ij} - is a k×1 vector of coefficients,

μ_{ij} - is the bilateral-specific effect,

$\varepsilon_{ij,t}$ - is the error term at time t.

An error correction model to establish how the short-run dynamics of the variables in the model are influenced by the deviations from equilibrium was tested through a reparameterization of equation 11 into an error correction model as follows;

$$\Delta lnTB_{ij,t} = \phi_{ij}\left(lnTB_{ij,t-1} - \theta'_{ij}X_{ij,t}\right) + \sum_{m=1}^{p-1} \alpha^{*}_{ij,m}\Delta lnTB_{ij,t-1} + \sum_{m=0}^{q-1} \beta'^{*}_{ij,m}\Delta lnX_{ij,t-m} + \mu_i + \varepsilon_{it} \quad (12)$$

Where;

$\phi_{ij} = -\left(1 - \sum_{j=1}^{p} \alpha_{ij,m}\right)$, and is the error-correction speed of adjustment parameter, implying that if it is equal to zero then there would be no evidence of a long-run relationship.

$\theta_{ij} = \sum_{l=0}^{q} \beta_{ij,m} / \left(1 - \sum_{l}^{p} \alpha_{ij,m}\right)$, and represents the long-run coefficients of the model,

$\alpha^{*}_{ij,m} = -\sum_{l=m+i}^{p} \alpha_{il}$, m=1,2,…,p-1

$\beta^{*}{}_{ij,m} = -\sum_{l=m+1}^{n} \beta_{il}$, m=1,2,…,q-1

Pesaran *et al.* (2001), suggested the use of Schwarz Bayesian information Criteria in choosing the optimal lag-length because it showed better performance on small samples as compared to the other criteria. Further, they recommend a maximum of 2 lag-lengths in the case of annual data so as to preserve the degrees of freedom. Following Azizan and Sek (2014), the M-L condition will hold if the coefficient of the long run real exchange rate assumes a negatively signed value.

Panel Unit Root Tests

Existence of unit roots in data series has been regarded a major problem in econometric analyses as regression analyses conducted on such data yield spurious and inconsistent regression results. A data series that contains one or more unit roots has no constant mean and its variance is dependent on time implying that the series lacks a long-run mean to revert to and its variance approaches infinity as time progresses. To remove these unit roots, the data must be differenced. Testing for the presence of unit roots is done after each differencing until all the unit roots are removed and the number of times the data is differenced until all the unit roots are eliminated is termed as the order of integration. Data which has no unit root is said to be stationary and therefore, a unit root test aims at establishing stationarity of a data series.

Im *et al.* (2003) developed a unit root test for panel data which is commonly abbreviated as IPS. IPS tests the null hypothesis of presence of unit root against an alternative hypothesis of absence of unit roots. The test is based on equation 13.

$$\Delta Y_t = \varphi_i Y_{t-1} + Z_{it}'\delta_i + \varepsilon_{it} \quad (13)$$

Where; φ_i is panel specific. Unlike Levin-Lin-Chu test, Breitung test and Haris-Tsavalis test which assume that the autoregressive parameter φ is common across panels, Im *et al.* (2003) argue that in the presence of cultural, institutional and other panel-specific factors, the assumption of a common autoregressive parameter cannot hold for both macro-panel and micro-panel datasets.

The test is based on averaging individual unit root tests and the Monte Carlo simulations have shown that the IPS performs better for small samples as compared to the Levin-Lin-Chu test. Whereas the Levin-Lin-Chu test, Breitung test and Haris-Tsavalis test confine the ε_{it} in equation 13 to be homogenous across panels, the IPS test relaxes this restriction and assumes that ε_{it} is independently distributed normal for all i and t with a heterogeneous variance across the panels.

The test is based on the following hypotheses;

H_0: There is presence of a unit root in each panel

H_1: There is absence of a unit root in each panel

The IPS test was performed on all the variables and the results were as presented in Table 2. A linear time trend was included and the cross-sectional averages were subtracted from the series. According to Levin *et al.* (2001), the removal of cross-sectional means alleviates the effects of cross-sectional dependence.

Table 2: Results of Im-Pesaran-Shin (IPS) Panel Unit Root Test

Variable		IPS (Level)		IPS (First Difference)		Order of Intergration
		Statistic	P-Value	Statistic	P-Value	
LnBTB	t-bar t-tilde-bar z-t-tilde-bar	-1.6220 -1.5685 -0.3930	0.3471	-7.6828 -4.8714 -13.4136	0.0000	I(1)
LnBRER	t-bar t-tilde-bar z-t-tilde-bar	-1.1023 -1.0796 1.5307	0.9371	- 3.1596 -2.6866 -4.0059	0.0000	I(1)
LnRGDP	t-bar t-tilde-bar z-t-tilde-bar	-1.0438 -0.9400 2.0800	0.9812	-5.0451 -3.992 -9.9766	0.0000	I(1)
LnRPGNP	t-bar t-tilde-bar z-t-tilde-bar	-1.0861 -1.0771 1.5407	0.9383	-4.6726 -3.7874 -9.1424	0.0000	I(1)

Note: Critical values at different significance levels are reported in the Appendix A.

From Table 2, all the variables were non-stationary at their levels and had to be differenced once to remove the first unit root after which they were tested and found to be stationary at 5% level of significance.

Pedroni Cointegration Test

Since the variables exhibited non-stationarity properties, then they were examined for cointegration. The aim of cointegration testing is to establish whether two or more non-stationary variables move together in the long-run. The variables were subjected to a cointegration test using Pedroni's residual-based (1999) cointegration test. The test calculates Pedroni's seven test statistics and is suited for panels exhibiting heterogeneity. The first four test statistics include; panel v, panel rho, panel t and panel ADF for panel statistics. These panel statistics constrain the first-order autoregressive to be equal across all the cross-

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sections. The remaining three statistics represent the group test statistics and they include; group rho, group t and group ADF. These three group statistics allow the first-order autoregressive term to vary across the cross-sections. The test's null hypothesis is of no cointegration.

Table 3: Results of Pedroni's Cointegration Test

Test Statistics	Panel	P-Value	Group	P-Value
v	2.010	0.0222		
rho	-3.607	0.0002	-2.731	0.0032
t	-4.757	0.0000	-4.047	0.0000
adf	-4.3028	0.0000	-4.417	0.0000

All the test statistics are normally distributed with a mean of zero and a variance of one. Apart from the the variance ratio statistic v, the other six test statistics have a left hand rejection regions and cointegration is established when all the test statistics, with the exception of panel v statistic, diverge to negative infinity as the P-Value converges to zero thereby rejecting the null hypothesis of no cointegration. From the cointegration results on Table 3, all the seven statistics reject the null hypothesis of no cointegration at 5% significance level and so a long-run relationship is established between the dependent variable (lnBTB) and the explanatory variables (lnBRER, lnRGDP and lnRPGNP).

The Hausman Test

Hausman test was carried to determine whether to use Pooled Mean Group estimation or Mean Group estimation. The test checks whether the long-run coefficients across the panels are equal. If they are equal, the PMG estimation technique is preferred and if they are not, the MG estimation technique is selected.

Table 4: Results of the Hausman Test

<table>
<tr><td colspan="2">Chi-square</td><td rowspan="2">p-value</td></tr>
<tr><td>Degrees of freedom</td><td>Statistic</td></tr>
<tr><td>3</td><td>12.83</td><td>0.0050</td></tr>
</table>

Ho: difference in coefficients is not systematic

The calculated Hausman statistic is 12.83 and is distributed as a Chi-square. Since the p-value is 0.0050 which is less than 0.05 the null hypothesis is rejected and so the Mean Group (MG) estimation technique was selected.

4. EMPIRICAL RESULTS AND DISCUSSION

Since the bilateral trade balance variable (LnBTB) was found to be cointegrated with the explanatory variables and the MG estimation was chosen, then the long-run parameters are estimated and presented in Table 5. An ARDL (1,1,0,0) model was estimated using MG estimation technique and the lag-length was selected using Schwarz-Bayesian Information Criteria (SBIC).

Table 5 displays the MG results of the test to establish the existence of M-L condition for the bilateral trade between Kenya and the ten trading partners. These results show that the estimated bilateral exchange rate coefficient is negative and significant at 5% significance level for China, India, South Africa, and UAE. The results therefore imply that the M-L condition holds in Kenya's bilateral trade relations with these four countries. A 1 % depreciation of the bilateral exchange rate between Kenya Shilling and the currencies of China, India, South Africa, and UAE would lead to a 0.5439%, 0.4241%, 0.5358% and 0.2034% improvement in the bilateral trade balances respectively. This therefore means a relatively weaker Kenyan Shilling would make Kenya's exports cheaper and more competitive. The imports from the foreign countries would become more expensive discouraging importers, since the importers would now require more Kenyan Shillings to exchange for a unit of foreign currency in order to purchase foreign goods and services in the long-run. The findings confirm the postulates of the elasticity approach to balance of trade determination.

Table 5: Long-run Mean Group Estimation Results for the effect of Bilateral Exchange Rate on Bilateral Trade Balance

Trading Partner	Coefficient	Std. Error	z	p >z
China	-0.5439	0.1887	-2.88	0.004
Germany	0.8076	0.9806	0.82	0.410
India	-0.4241	0.1267	-3.35	0.001
Netherlands	0.6706	0.4922	1.36	0.173
South Africa	-0.5358	0.2490	-2.15	0.031
Tanzania	-0.3001	0.5506	-0.55	0.586
UAE	-0.2034	0.0350	-5.81	0.000
Uganda	-0.3901	0.2240	-1.74	0.082
United Kingdom	-0.1439	0.3706	0.388	0.698
USA	0.6530	0.4808	1.35	0.174

The results of the MG estimation of the long-run bilateral trade balance indicate that the M-L condition is not met for Kenya's trade with the United Kingdom, Germany, Netherlands, Tanzania, Uganda and USA. This implies that an exchange rate devaluation of the Kenyan shilling against the currencies of these trading partners will not improve the bilateral trade balance. The results of bilateral trade for the United Kingdom, Germany and USA are consistent with those obtained by Canipe (2012). The perverse positive signs of the bilateral real exchange rate suggest that the overall expenditure on imports increases even as the currency depreciates against that of the trading partners. This finding is confirmed by Canipe (2012) who established that the perverse signs occur when a country is heavily dependent on imports and therefore the demand for imports remains inelastic even if the relative prices change. Similarly, the finding of inexistence of M-L condition may also imply that although domestic currency devaluation may cause higher growth rates of exports, the growth rate may not be big enough to outdo the growth rate of imports and so there may not be significant improvement of the trade balance.

Table 6: Short-run Mean Group Results of Bilateral Trade

Trading Partner	**Error Correction Model**		**Short-run Bilateral Real Exchange Rate**	
	coefficient	**p-value**	**coefficient**	**p-value**
China	-0.4226	0.002	-0.4210	0.831
United Kingdom	-0.6154	0.000	0.1387	0.800
Germany	-0.2172	0.033	-0.6174	0.113
India	-0.7180	0.000	-0.5353	0.653
Netherlands	-0.6876	0.000	-1.8198	0.113
South Africa	-0.5594	0.000	3.2956	0.029
Tanzania	-0.5009	0.001	-0.3559	0.592
Uganda	-0.1381	0.021	3.8118	0.010
United Arab Emirates	-0.3532	0.000	0.6156	0.006
United States of America	-0.7860	0.000	-0.0527	0.511

The results, as reported in Table 6, show that the coefficient of the error correction term bears the correct sign and is significant for all countries. The short-run error-correction term coefficients for the United Kingdom, India, Netherlands South Africa, Tanzania and USA are -0.6154, -0.7180, -0.6876, -0.5594, -0.5009 and -0.7860 respectively. These values signify that there is a fairly high speed of adjustment of the bilateral real trade balance towards its long-run equilibrium. The speed of adjustment is slower for China, Germany, Uganda and UAE. The error correction term coefficients for these countries are -0.4226, -0.2172, -0.1381 and -0.3532 respectively. This implies that the bilateral trade balance does not immediately return to its equilibrium after an exchange rate shock pushes it away from its steady state. This result may be explained by the fact that if a country is over-dependent on imports, provided that these imports have no perfect substitutes, domestic currency devaluation would result in a slower speed of adjustment of the trade towards equilibrium. Therefore, given that Kenya has had persistent trade deficits with China, Germany and USA means that the country heavily relies on imports from the countries and therefore the slower speed of adjustment of the trade balance to the long-run equilibrium.

The short-run coefficients for bilateral real exchange rates are positive and significant (at 5% significance level) for South Africa, UAE and Uganda. This indicates that bilateral real exchange rate depreciation will lead to deterioration of the bilateral trade balance in the short-run. This is due to the fact that in the short-run, the value effect will dominate the volume effect. This may be attributed to the effect of several lags such as recognition, decision, delivery, replacement and production lags following a real depreciation. These lags cause exports and imports to have inelastic demand in the short run resulting in a slow response to the relative price changes.

Table 7: Long-run MG results of RGDP and RPGNP

Trading Partner	Relative GDP		Relative per capita GNP	
	coefficient	p-value	coefficient	p-value
China	-5.8851	0.120	3.5683	0.129
United Kingdom	-0.1826	0.817	0.2320	0.028
Germany	4.1069	0.135	1.2367	0.433
India	0.4258	0.753	0.4657	0.562
Netherlands	-1.7109	0.031	0.9577	0.000
South Africa	-6.3029	0.000	-0.9648	0.270
Tanzania	-0.4300	0.049	0.9542	0.041
Uganda	-10.3691	0.387	0.9536	0.850
United Arab Emirates	-3.5958	0.002	1.6026	0.106
United States of America	0.4026	0.759	0.5152	0.269

The results in Table 7 show that if the productive capacities of Netherlands, South Africa, Tanzania and UAE increase relative to that of Kenya, the Kenya's trade balance will deteriorate in the long-run. Therefore, 1% increase in the relative GDP of Netherlands, South Africa, Tanzania and UAE will result into a 1.7109%, 6.3029%, 0.4300% and 3.5958% deterioration of Kenya's bilateral trade balance respectively indicating that as the economy of the trading partner expands, the country develops more diversified methods of production thereby becoming more self-sufficient. This means the trading partner country will import less from Kenya and since its exporting capacity has also increased, then it will export more into Kenya leading to a deterioration of Kenya's bilateral trade balance in the long-run. This result is consistent with that of Khan and Hossain (2010) and also the findings of Abd-El-Kader (2013).

The long-run coefficient of relative per capita GNP (RPGNP) bears a significant (at 5% significance level) positive sign for United Kingdom, Netherlands and Tanzania indicating that a 1% increase in the incomes of the citizen of these countries will lead to a 0.2320%, 0.9577% and 0.9542% improvement of Kenya's bilateral trade balance respectively. This is because an increase in the per capita income in these countries will lead to increase in the purchasing power of their citizens resulting into increased demand for goods and services, some of which will have to be imported from Kenya, thereby improving the trade balance.

5. CONCLUSION

The main focus of this study was to ascertain the validity of the M-L condition for the trade between Kenya and its top-ten trading partners. The variables included in the model were selected based on the propositions of elasticity and absorption approaches to balance of trade determination. Unit root testing was performed using the IPS panel unit root test. All the four variables were non-stationary at their levels but stationary after differencing once. Therefore, Pedroni cointegration test was performed to establish whether there existed a linear long-run relationship among the variables. All the variables were found to be cointegrated.

The Hausman test results led to the selection of the Mean Group estimation technique. The Mean Group estimation results showed that the M-L condition was met for trade between Kenya and China, India, South Africa and the U.A.E. For trade with the other remaining trading partners (United Kingdom, United States, Germany, Uganda and Tanzania) a devaluation of the Kenyan Shilling was found to have no significant effect on the trade balance and so the M-L condition was not fulfilled.

Previous studies had used aggregated data for all the variables to analyze the existence of M-L condition in Kenya's foreign trade rather than using bilateral trade data. The use of bilateral trade data between Kenya and the ten trading partners provided more detailed estimates since it established that a depreciation of the Kenyan shilling will not improve the bilateral trade balance with each trading partner.

To reduce Kenya's trade balance deficit that has persisted for most of the post-independence era, and raise the country's global competitiveness in international trade, policies that enhance foreign trade need to be formulated and adopted. The policy recommendations from the Mean Group estimation results reveal that Kenya Shilling's devaluation will not have uniform effect on trade with trading partners and therefore Kenya should devalue her currency against the currencies of China, India, South Africa and UAE. For cases where the M-L condition was not met, a devaluation policy should not be undertaken. Furthermore, the fulfillment of the M-L condition suggests that while maintaining a stable exchange rate is important, strategies to maintain a highly overvalued bilateral exchange rate could discourage exports. Therefore, policy makers should ensure that movements in the bilateral exchange rate are in such a way that they are optimal incentives to exportation. Nevertheless, the present concentration of trade with countries where real devaluation does not have a significant effect on the respective bilateral trade balance, suggests a need for Kenya to diversify its export destinations.

The high level of import demand is an indication of overreliance on imports by the country. Therefore, the Kenyan government through its Ministry of Foreign Affairs and International Trade needs to increase the marketing of its exports especially to the countries with which Kenya has huge bilateral trade deficits. The Ministry of Industrialization should also formulate policies to encourage local industries to produce imports substitutes so as to encourage consumption of locally produced commodities which will not only improve the country's balance of trade, but also contribute to economic development through provision of employment.

APPENDIX

A. Critical Values for Im-Pesaran-Shin (IPS) (2003) Panel Unit Root Test.

Fixed-N exact critical values		
1% significance level	5% significance level	10% significance level
-2.770	-2.590	-2.500

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