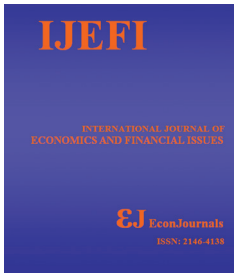

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# Real Exchange Rate and Trade Balance Dynamics in Cote d'Ivoire

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**ABSTRACT**

This study examines the relationship between real exchange rate and trade balance in Cote d'Ivoire during the period from 1975 to 2017. The study employs the ARDL bounds testing approach to cointegration developed by Pesaran et al. (2001) in the examination of this nexus. Cointegration analysis and error correction modeling are used to determine the long run as well as short run dynamics, between real exchange rate and trade balance. The empirical results show negative and significant effects of domestic income on trade balance both in the short and long run. Further, a depreciation of real exchange rate causes an improvement in the trade balance in a significant way both in the short and long run. This suggests that exchange rate variations are effective for increasing balance of trade for Cote d'Ivoire.

**Keywords:** Trade Balance, Real Exchange Rate, Bounds Test, Cote d'Ivoire
**JEL Classifications:** C22, F10, F31

## 1. INTRODUCTION

The responsiveness of trade balance to exchange rate variations has been a subject of discussion among different scholars and policymakers. They were concerned about whether depreciation of real exchange rate improves trade balance. A study by Bhattarai and Armah (2005) showed that exchange rate depreciation has been used as a tool for increasing flows of trade and capital by many developing countries facing persistent deficits in the balance of payments position. These countries showed inelastic demand for both exports and imports to prices. Furthermore, the growth rate of imports was higher than that of exports resulting in rising trade imbalances over time. On the theoretical ground, the popular Marshall-Lerner condition posits that currency devaluation improves the trade balance of a country in the long-run if the sum of the price elasticities of exports and imports is greater than one. On the other hand, the J-curve phenomenon suggests that depreciation of a country's currency first deteriorates the trade balance before subsequently improving it (Magee, 1973). Thus, theoretically, the real exchange rate depreciation is expected to lead to an improvement in the trade balance in the long-run after a short-run deterioration.

On the empirical ground, the relationship between real exchange rate and trade balance has been extensively investigated in both developed and developing countries using different econometric techniques and data. The evidence from this burgeoning literature remains mixed and inconclusive. While some empirical studies (e.g., Himarios, 1989; Kale, 2001; Baharumshah, 2001; Bahmani-Oskooee, 2001; Boyd et al., 2001; Lal and Lowinger, 2002; Onafowora, 2003; Narayan, 2006) supported the view that real depreciation of exchange rate improves trade balance, others (e.g., Rose and Yellen, 1989; Rose, 1991; Wilson and Tat, 2001; Hatemi and Irandoust, 2005; Duasa, 2007; Shahbaz et al., 2011; Akpansung and Babalola, 2013; Ziramba and Chifamba, 2014) provided evidence of a negative or insignificant relationship

between real exchange rate and trade balance. Most of these studies are on developed countries and developing countries from other parts of the world apart from Sub-Saharan Africa.

This study attempts to enrich the empirical literature on the African continent by investigating the case of Cote d'Ivoire using aggregate data for the period from 1975 to 2017. Cote d'Ivoire is a member country of the West African Economic and Monetary Union (WAEMU), which regroups 8 countries in West Africa using the CFA franc as common currency. The CFA franc was pegged to the French franc and to the euro since January 1999. The French Treasury guaranteed the currency under a fixed exchange rate dependent on the deposit of a portion of the WAEMU's currency reserves in an operating account with the French Treasury. This operating account allows the WAEMU countries to finance without difficulty their import requirements for goods and services. The Central Bank of West African States is responsible for coordinating monetary exchanges through the operating account. Over the period 1979-1993, the economic growth rate averaged −0.1%. The budget deficit worsened and reached 13.5% of GDP in 1993. The current account deficit increased from 10.6% of GDP in 1978 to 18% in 1980 and fall by 11% in 1993. The surplus of trade balance decreased from 12.3% in 1987 to 7.1% in 1993. The debt stock increased from 37.2% of GDP in 1978 to 123% in 1993. The external position was also characterized by decline in foreign exchange earnings, overvaluation of the CFA franc exchange rate, accumulation of trade arrears and debt overhang. In view of this condition, many structural adjustment programs were adopted in the 1980s in order to get out of this trap of economic difficulties. In January 1994, the CFA franc was devalued raising the parity rate from 50 CFA francs per French franc to 100 CFA francs per French franc. This devaluation was considered an important step in strengthening competitiveness and economic growth. After the devaluation, the economic growth registered a recovery with annual growth rate of 7.73% in 1996. Budget deficit decreased from 13.5% of GDP in 1993 to 2.1% in 1996. The current account deficit also reduced by 4.8% of GDP in 1996. Trade balance surplus reached 16.4% in 1994 and 13.7% in 1996. Real effective exchange rate depreciated by 43% in 1994, correcting most of the overvaluation of the currency accumulated since 1986. However, between 1994 and 2009, real effective exchange rate recorded an appreciation corresponding to a loss of competitiveness of around 24%. From 1999, Cote d'Ivoire entered a period of political uncertainty leading to political tension that lasted up 2011. The country has suffered from this situation recording an average economic growth rate of 0.5% over the period 1999-2011. With the end of the conflict in 2011 and the return of political stability and peace, Cote d'Ivoire is enjoying remarkable economic progress, recording an annual average economic growth rate of 8.8% during the period 2012-2017. Cote d'Ivoire envisions to become an emerging country by 2020. To achieve this vision, the government embarked on policies aimed at attracting external financial resources into the country. The high level of infrastructure investment over that period has stimulated increased imports of goods and services, resulting in a decreasing trend in trade surplus. The recent high economic growth rate coupled with decrease in trade surplus spark some questions: what are the driving forces of the trade balance in Cote d'Ivoire? How responsive is the trade balance to real exchange rate in the long run or short run? Is a significant part of Cote d'Ivoire's trade balance growth-led? Do the Marshall-Lerner condition and the J-curve phenomenon hold for Cote d'Ivoire?

The objective of this paper is twofold. First, it examines the existence of a long-run relationship between trade balance, real exchange rate and domestic income. Second, the paper provides estimates for the long and the short run elasticities of trade balance with respect to exchange rate and domestic income. To achieve these ends, we adopt the reduced form of the trade balance model postulated by Goldstein and Khan (1985) and Rose and Yellen (1989) and then employ the autoregressive distributed lag (ARDL) bounds testing approach to cointegration initiated by Pesaran et al. (2001). The study also employs Fully-Modified OLS (FMOLS) and Dynamic OLS (DOLS) to estimate the long run relation linking trade balance, real exchange rate and domestic income. The empirical analysis utilized annual data covering the period from 1975 to 2017.

The rest of the study is organized as follows. Section 2 reviews the empirical literature on the effect of real exchange rate on trade balance. Section 3 outlines the econometric methodology of the study and describes the data. Section 4 discusses the empirical results. Section 5 concludes the study and gives some recommendations.

## 2. LITERATURE REVIEW

Real exchange rate refers to the rate at which domestic goods and services can be traded for those produced abroad. It is a reflection of the competitiveness of a country. Since the advent of floating exchange rates in the 1970s, the effectiveness of exchange rate depreciation in improving the trade balance has become a common subject of interest. The Marshall-Lerner condition postulates that in the long run, real devaluation of domestic currency has favorable effect on the trade balance. Real depreciation of exchange rate improves the trade balance through two different channels. Firstly, real devaluation of the currency makes the domestic goods cheaper as compared to the foreign goods, thus making export more competitive. Secondly, quantity of imports decreases, as imports are relatively more expensive. Alternatively, amount of export and import may not responsive at initial period of depreciation. Thus, following a depreciation of exchange rate, trade balance worsens in the short term due to decrease in value of exports and increase in value of imports but progressively improves due to increases in exports and reductions in imports. This time path followed by the trade balance is known as the J-curve effect introduced by Magee (1973). Bahmani-Oskooee and Ratha (2004) provide a very comprehensive review of the literature on J-curve phenomenon.

Many studies using different methodologies investigated the relationship between real exchange rate and trade balance under the umbrella of the Marshall-Lerner condition and the J-curve hypothesis. Bahmani-Oskooee et al. (2013) provides a review of the related empirical literature. The empirical evidence from this literature is quite mixed and inconclusive. For instance, Baharumshah (2001) identified the effect of exchange rate on

bilateral trade balances of Malaysia and Thailand with the US and Japan over the period 1980-1996. The results from Johansen cointegration revealed evidence that depreciation of real exchange rate improves the trade balance of both countries in the long-run; but there is no J-curve effect in the short run. Bahmani-Oskooee (2001) assessed the response of Middle Eastern countries' trade balances to real exchange rate depreciation by applying the Johansen and Juselius (1990) cointegration methodology. The results provided evidence supporting the view of a favorable long-run effect of a real depreciation on the trade balance for all seven countries (Bahrain, Egypt, Jordan, Morocco, Syria, Tunisia, and Turkey). Boyd et al. (2001) also found evidence supporting the reduction in trade balance in the short run and Marshall-Lerner condition of positive impact in the long run in eight OECD countries. Kale (2001) examined the case of the Turkish economy and found that a real depreciation improves the Turkish balance of trade in the long run, implying the validity of Marshall-Lerner condition. Wilson and Tat (2001) examined the case of Singapore for its bilateral trade with the US over the period 1970 to 1996. Their findings revealed that the real exchange rate does not have a significant impact on the bilateral trade balance.

Lal and Lowinger (2002) examined the determinants of trade balance for seven East Asian countries using quarterly data covering the period from 1980 to 1998. The results from cointegration technique indicated that a depreciation of the real effective exchange rate leads to an improvement in the trade balance in the long-run. The error correction model and impulse response function showed that a depreciation of a country's currency leads to an initial worsening of the trade balance, subsequently followed by an improvement. The results showed significant differences in the duration and the extent of the J-curve effect across countries. In a case study of Malawi for the period 1967-1996, Musila and Newark (2003) found that devaluation improves exports and mitigates the growth of imports in the long run, leading to improvement in the trade balance. Onafowora (2003) examined the relationships between the real trade balance and real exchange rate for three Asian countries (Thailand, Malaysia, and Indonesia) in their bilateral trade with the US and Japan over the period 1980-2001. The results from Johansen cointegration and vector error correction model showed that the Marshall-Lerner condition holds in the long run with varying degree of J-curve effects in the short run. Singh (2004) investigated the case of India using quarterly data from 1975 to 1996. The results did not show any evidence for the presence of the J-curve effect in the balance of trade.

Hatemi and Irandoust (2005) examined the bilateral trade between Sweden and its six major trading partners for the period 1960-1999. Using cointegration test, they found that Sweden did not satisfy Marshall-Lerner condition. The trade balance in Sweden is sensitive to changes in income but not to real exchange rate. Narayan (2006) examined the nexus between China's trade balance and the real exchange rate vis-à-vis the USA. Using the bounds testing approach to cointegration, he found that in both the short run and the long run, a real devaluation improves the trade balance; a result not consistent with the J-curve relation. Duasa (2007) examined the relationship between trade balance, real exchange rates, income and money supply in Malaysia. Using the bound testing approach to cointegration and error correction models, he found evidence of a long-run relationship between trade balance and income and money supply variables but not between trade balance and real exchange rate. The results also rejected the Marshall–Lerner condition in the long-run. Yol and Baharumshah (2007) applied panel cointegration to examine the effects of exchange rate changes on bilateral trade balance between 10 African countries and the U.S. using data covering the period 1977-2002. They found that real exchange rate depreciation improves the trade balance of six countries (Botswana, Egypt, Kenya, Nigeria, Tunisia, and Uganda), but worsens that of Tanzania and has no effect in Ghana, Morocco and Senegal in the long run. Further, foreign real income improves the trade balance in three countries (Senegal, Tunisia, and Uganda), but worsens it in another two (Egypt and Ghana). Finally, domestic real income worsens the trade balance in four countries (Egypt, Ghana, Kenya, and Tunisia), but improves it in another three (Morocco, Uganda, and Tunisia). Bahmani-Oskooee et al. (2008) investigated the bilateral trade balance of Canada with her 20 major trading partners over the period 1973-2000. Using the bounds testing approach to cointegration and error-correction modelling, they provided evidence of J-curve in 11 out of 20 countries.

Halicioglu (2008a) tested for the existence of the J-curve phenomenon for Turkey over the period 1980-2005. The results from the bounds testing cointegration approach confirmed the J-curve effect in the short-run. Halicioglu (2008b) re-examined the bilateral trade balance dynamics for Turkey with her 13 trading partners over the period 1985-2005. The results did not support the J-curve effect in the short-run; but showed a positive impact of real depreciation of domestic currency on Turkey's trade balance with a few countries in the long-run. Bahmani-Oskooee and Kutan (2009) investigated the case of 11 east European emerging economies, using monthly data over the period 1990-2005. The results from the application of the bounds testing approach to cointegration and error-correction modelling showed evidence supporting the J-curve hypothesis in three countries (Bulgaria, Croatia and Russia). Bahmani-Oskooee and Cheema (2009) reported no evidence of long run effect of exchange rate on trade balance and any support for J-curve in case of Pakistan. Yusoff (2009) examined the effects of real bilateral exchange rates on Malaysia's bilateral trade balances with its three major trading partners: the USA, Japan, and Singapore. The results suggested that in the long-run, Malaysia's bilateral trade balances are found to be responsive to the changes of bilateral exchange rate in the cases of the USA and Singapore but irresponsive for Japan. There is evidence supporting the J-curve effect only in the case of Malaysia's trade balance with the United States.

Amzath et al. (2010) examined the effect of real exchange rate on the balance of trade of Cote d'Ivoire over the period of 1975-2007. They found positive effect of real exchange rate on the trade balance both in the short and the long run. The impulse response function indicated the J-curve phenomenon. Chiu et al. (2010) applied the heterogeneous panel cointegration method to examine the long run relationship between the real exchange rate and bilateral trade balance of the U.S. with her 97 trading

partners over the period from 1973 to 2006. They found that the devaluation of the US dollar deteriorates her trade balance with 13 trading partners, but improves it with 37 others. Adeniyi et al. (2011) examined the case of four West African Monetary Zone (WAMZ) countries, namely The Gambia, Ghana, Nigeria and Sierra Leone. They used data from 1980 to 2007 and applied the bounds testing approach to cointegration. The results confirmed the J-curve effect only in Nigeria. In the case of The Gambia and Ghana, real devaluation initially improves the trade balance and then deteriorates it later while Sierra Leone exhibits no clear pattern. Loto (2011) examined the effect of devaluation on the Nigerian's trade balance for the period 1986 to 2008. The study employed the ordinary least squares (OLS) method to estimate the import and export demand functions. The results showed that devaluation does not improve the trade balance, implying that the Marshall-Lerner condition does not hold. Shahbaz et al. (2011) investigated the impact of real exchange rate on the trade balance of Pakistan using the ARDL bound testing approach to cointegration over the period from 1980 to 2006. They found that the impact of currency devaluation on trade balance is negative, that is devaluation worsens the trade balance. They also did not find J-curve relation. Tsen (2011) examined the impacts of real exchange rates on the bilateral trade balances of Malaysia with the USA, Japan and Singapore. The results showed that depreciation of real exchange rates improves bilateral trade balances in the long run. In the short run, there is some evidence of the J-curve effect. Aziz (2012) reported evidence supporting the J-curve hypothesis for Bangladesh using cointegration and impulse response functions and quarterly data for the period from 1980 to 2009.

Bahmani-Oskooee and Gelan (2012) analyzed the trade balance of nine African countries (Burundi, Egypt, Kenya, Mauritius, Morocco, Nigeria, Sierra Leone, South Africa, and Tanzania) with the rest of the world. Using the bounds testing approach to cointegration and error-correction modelling, they found no support for the J-Curve effect. Akpansung and Babalola (2013) found a negative but insignificant relationship between trade balance and real exchange rate in Nigeria. Umoru and Oseme (2013) explored the J-curve effect in Nigerian using the vector error correction methodology. They found that the short-run prediction of the J-curve does not hold in Nigeria but the long run Marshall-Lerner condition holds. Igue and Ogunleye (2014) examined the impact of exchange rate on trade balance in Nigeria using the Johansen and Juselius (1990) method of cointegration and vector error correction methodology. They reported evidence in support to the Marshall–Lerner condition, implying that depreciation of the exchange rate leads to an improvement of trade balance in Nigeria. They also established that growth in domestic income improves trade balance. Schaling and Kabundi (2014) reported evidence supporting the J-curve effect in South Africa for the period 1994-2011. Suleman et al. (2014) studied the existence of J-curve phenomenon in the bilateral trade between Pakistan and Saudi Arabia using data from 1973 to 2010. The results from the ARDL approach to cointegration do not support the existence of J-curve. This implies that depreciation cannot be used to improve the trade balance of Pakistan with Saudi Arabia. Tran and Dinh (2014) examined the effects of FDI inflows on external imbalances in the developing and transition countries in Asia during the period 1991-2011. To this end, they extended the conventional trade balance model by reformulating the determinants of exports and imports. The empirical findings suggested that FDI inflows worsen the trade balance first and then improve it. They also found that a real depreciation of exchange rate worsens trade balance because of the import content of exports.

Ziramba and Chifamba (2014) assessed the responsiveness of South Africa's trade balance to depreciation of the real effective exchange rate over the period 1975-2011. Using the bounds test approach to cointegration, they found that the real effective exchange rate has a negative but statistically insignificant effect on trade balance in the long run. In the short run, the results do not support the J-curve phenomenon. Anning et al. (2015) used cointegration analysis and error-correction model to examine the exchange rate-trade balance nexus in Ghana with the view of testing the Marshall-Lerner Condition. Using aggregated data from 1980 to 2013, they found that a real depreciation of exchange rate leads to a deterioration in Ghana's trade balance in the short run followed by an improvement in the long run. Caporale et al. (2015) employed fractional integration and cointegration methods to Kenya over the period 1996q1 2011q4, and found supportive evidence of Marshall-Lerner condition. Baba and Yazici (2016) examined the J-curve and the Marshall-Lerner condition between Nigeria and 15 European Union countries using quarterly data for the period 1999 and 2012. The study employed the Autoregressive Distributed Lag approach and found no evidence of the J-curve and the Marshall-Lerner hypothesis in Nigeria's trade balance with the 15 EU countries. However, using disaggregated bilateral trade data between Nigeria and each of the European countries, they found evidence of J-curve in bilateral trade between Nigeria and Austria, Denmark, Germany and Italy in the short run. In the long run, the Marshall-Lerner condition holds only in the case of Luxembourg. Ogbonna (2016) applied cointegration analysis and vector error correction model to investigate the effect of exchange rate devaluation on the trade balance of Benin for the period 1950-2008. He found that exchange rate depreciation has a long-run positive impact on the trade balance but the J-curve effect does not hold in the short run. Prakash and Maiti (2016) assessed the impact of devaluation on the trade balance of Fiji. The results showed that appreciation of currency has been responsible for the rising trade deficit in Fiji. Furthermore, the devaluation does not exert an effect consistent with the J-curve phenomenon.

Hunegnaw and Kim (2017) investigated the effects of real exchange rate on trade balance in ten East African countries, employing the ARDL procedure. The results for individual country estimations showed that real exchange rate depreciation significantly improves trade balance in the long run in four countries (Ethiopia, Madagascar, Mauritius, and Rwanda). A significantly negative relation was not found in any of the countries. The result of the panel estimation also showed a positive long-run relationship between trade balance and real effective exchange rate. Further, the panel estimation showed a positive long-run effect of domestic real GDP on the trade balance but a negative long-run effect on foreign real GDP. The short-run elasticity of trade balance with respect to real effective exchange rate was positive and significant in four countries (Kenya, Madagascar, and Rwanda). For the

remaining countries, the short run effect was not significant. The panel estimates showed a positive but insignificant short run effect of exchange rate on trade balance, suggesting lack of evidence for J-curve. The short run effect of domestic real GDP on trade balance was positive but insignificant while that of foreign real GDP was positive and significant. Iyke and Ho (2017) examined the validity of the J-curve phenomenon in Ghana by using the linear and nonlinear ARDL approaches. Based on quarterly data spanning the period 1986-2016, they found no evidence in support of the short- and long-run impact of exchange rate changes on the trade balance in the linear specification. In contrast, in the nonlinear specification, real depreciations improve the trade balance in the long run, while real appreciations do not have any impact on the trade balance. Ousseini et al. (2017) investigated the main determinants of trade and current account balance of West African Economic and Monetary Union (WAEMU) for the period 1980-2013. The findings from the panel VAR method revealed a negative and significant effect of money supply, household consumption expenditure on trade Balance. On the contrary, real exchange rate, income, inflation, and investment showed positive and significant effects on the trade balance. The significance of exchange rate effect on the trade balance provides support of the Marshall-Lerner condition for WAEMU. Bawa et al. (2018) examined the nexus between exchange rate and trade balance in Nigeria over the period 1994-2018. Empirical results from the long-run linear model revealed that real depreciation would lead to an improvement in Nigeria's trade balance, in line with the Marshall-Lerner proposition. The long run non-linear ARDL model results showed that the impact of real exchange rate changes on trade balance is asymmetric in the sense that real depreciation has a significant effect on trade balance while real appreciation does not have an impact. The short-run results revealed that the J-curve effect does not hold in Nigeria, as the effect of exchange rate is negative and significant.

Venkatraja (2018) examined the response of India's bilateral trade balance with U.S to exchange rate shocks. Using monthly data for the period from 2009 to 2017 and VAR methodology, the results do not support the J-curve pattern of trade balance rather it follows an inverted J-curve. Akoto and Sakyi (2019) investigated the determinants of trade balance in Ghana over the period 1984-2015. They applied the bounds testing approach to cointegration and the error-correction model within a symmetric and asymmetric autoregressive distributed lag (ARDL) framework. The results from both symmetric and asymmetric models showed the absence of the Marshall-Lerner condition and the J-curve effect. Thus, depreciation of the Ghana cedi is not an appropriate tool to improve the country's trade balance position. Yazgan and Ozturk (2019 examined the relationship between real effective exchange rates and the bilateral trade flows of 33 countries. Their results revealed that for the majority of the countries, a real depreciation of exchange rate improves the home country's trade balance in the long run. However, the short run J-curve phenomenon was not observed. Kamugisha and Assoua (2020) investigated the effect of a devaluation on the trade balance in Uganda. The econometric method applied the bound testing approach to cointegration. The results established the existence of a long run relationship between the trade balance, exchange rates and income. Further, an increase in income leads to increased trade balance in both the long and short run, whereas exchange rate has a significant effect on the trade balance in the short run. This implies that a devaluation may not be an appropriate tool to improve trade balance in Uganda. Keho (2020) examined the impact of FDI on trade balance in Cote d'Ivoire by including domestic income and real effective exchange rate as control variables. He employed the ARDL bounds testing approach to cointegration and found that domestic income, real effective exchange rate and foreign direct investment are important drivers of trade balance. A real depreciation of domestic currency was found to improve the trade balance both in the long and short run, thus consistent with Marshall-Lerner condition.

As the above review indicates, the empirical literature fails to reach a consensus on the effect of real exchange rate on trade balance. Given the conflicting findings from the literature, the effectiveness of devaluation in improving trade balance is still a debatable subject. The focus of the current study is therefore to assess the long-run as well as the short-run effects of real exchange rate on the trade balance of Cote d'Ivoire. The following section outlines the empirical methodology of the study.

## 3. MODEL, DATA AND METHODOLOGY

### 3.1. Model Specification

To examine the impact of real exchange rate on trade balance, we use the standard trade model incorporating domestic and foreign incomes as control variables:

$$\ln TB_t=\beta_0+\beta_1 \ln Y_t+\beta_2 \ln WY_t+\beta_3 \ln RER_t+\beta_4 D94_t+\mu_t \quad (1)$$

where ln represents natural logarithm, TB is trade balance on goods and services, Y is gross domestic income, WY is foreign income, RER is real effective exchange rate, D94 is a shift dummy variable that takes the value of zero for the period before 1994 and one otherwise, and $\mu_t$ is an error term assumed to be a white-noise process.

For *a priori* signs of the explanatory variables, the expected signs of the coefficients on domestic and foreign income are uncertain. Following the Keynesian view, an increase in domestic income would stimulate the demand for imports, which initially deteriorates trade balance position. But when domestic income increases, the production of import substitute goods reduces and more goods are exported, this improves trade balance. An increase in foreign income stimulates home country exports and hence improves the trade balance. But also, an increase in world real output may mean increasing production of imported goods which lowers the trade balance of the home country. The effect of changes in real effective exchange rate on trade balance is also ambiguous. The J-curve theory postulates that a real depreciation of the domestic currency worsens the trade balance in the short-run and improves it in the long-run. Our main interest in this study is examining the effect of exchange rate on trade balance, that is, whether a depreciation (appreciation) of the real exchange rate would improve (deteriorate) trade balance. For the Marshall-Lerner condition to hold, the coefficient $\beta_3$ should be negative, implying that a decrease in the real exchange rate (real exchange rate depreciation) results in an improvement in trade balance in the long-run.

### 3.2. Econometric Methodology

Our empirical analysis involves the following steps. As a first step, we check the order of integration of the series using the PP unit root test of Phillips and Perron (1988) and the KPSS test of Kwiatkowski et al. (1992). These tests are documented in the empirical literature. With the results from the unit root tests, we test in a second step whether there is a long run relationship among the variables. For this purpose, we employ the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration developed by Pesaran et al. (2001). This approach has been found to perform well in small samples without concerning whether the explanatory variables are stationary or integrated of order one. Basically, the ARDL approach to cointegration involves estimating the following error correction model for the trade balance:

$$\Delta \ln TB_t = \varphi_0 + \varphi_1 \ln TB_{t-1} + \varphi_2 \ln Y_{t-1} + \varphi_3 \ln WY_{t-1} + \varphi_4 \ln RER_{t-1} + \sum_{i=1}^{m} \gamma_{1i} \Delta \ln TB_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta \ln Y_{t-i} + \sum_{i=0}^{p} \gamma_{3i} \Delta \ln WY_{t-i} + \sum_{i=0}^{q} \gamma_{4i} \Delta \ln RER_{t-i} + \delta D94_t + e_t \quad (2)$$

where $\Delta$ is the difference operator defined as $\Delta Z_t = Z_t - Z_{t-1}$. The presence of a long run relationship between the variables is tested by restricting coefficients of lagged level variables equal to zero. That is, the null hypothesis of no long-run relationship is $H_0$: $\phi_1 = \phi_2 = \phi_3 = \phi_4 = 0$. This hypothesis is tested through an *F*-test. Under the null hypothesis, however, the distribution of this F-statistic is non-standard, irrespective of whether the variables are integrated of order zero or one. Pesaran et al. (2001) have provided critical values that account for integrating properties of the variables.

The ARDL bounds testing procedure is sensitive to the selection of the lag structure (*m, n, p, q*). In this study, maximum lag length on each variable was set to five and the optimal lag structure was selected using the AIC criterion following the recommendations of Lutkepohl (1991) and Liew (2004). The model was tested for serial correlation, normality and heteroskedasticity. The stability of the model has also been scrutinized using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). Once a long-run relationship is identified amongst the variables, the estimated long run coefficients are obtained as the negative value of the coefficients for the lagged explanatory variables divided by the coefficient for the lagged dependent variable. The short-run effects of real exchange rate on the trade balance are given by the estimates of $\gamma_{4i}$. The J-curve will be supported if $\gamma_{4i}$ takes positive values for first lags and negative values after.

### 3.3. Data Description

The study uses annual time series data spanning the period from 1975 to 2017. The dependent variable is trade balance defined as the ratio of exports to imports. This ratio or its inverse has been used in a number of empirical studies (e.g., Bahmani-Oskooee, 1991; Baharumshah, 2001; Onafowora, 2003; Ogbonna, 2016; Keho, 2020). This measure allows expressing the trade balance variable in logarithm form regardless of whether exports are greater or less than imports. An increase (decrease) in the ratio of exports to imports indicates an improvement (deterioration) in the trade balance. The explanatory variables are domestic real GDP in constant US dollar as a proxy for gross domestic income, world real GDP in constant US dollar as a proxy for foreign income, and real effective exchange rate. Data on trade balance, domestic real GDP, and world real GDP were extracted from the 2019 World Development Indicators database of the World Bank. Data on real effective exchange rate (RER) were obtained from the Central Bank of West African States (BCEAO). Real effective exchange rate is such that an increase means a real appreciation of domestic currency, while a decrease means a real depreciation. All variables are transformed into natural logarithm in the empirical analysis. Figure 1 plots the patterns of trade balance and real effective exchange rate in their natural logarithm. We can see that both variables exhibit considerable fluctuations over the sample period. In particular, the real effective exchange rate has been appreciating after the devaluation of the CFA franc in January 1994. Between 1994 and 2009, real effective exchange rate appreciated by about 24%, and started to depreciate from 2009. It is worth mentioning that structurally low inflation rate over the post-devaluation period helps limit the appreciation of the real effective exchange rate, which is still trading 25% below the 1993 level.

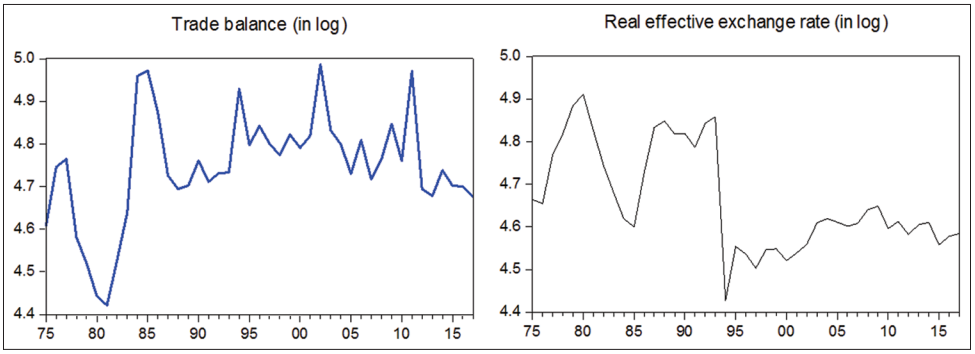
Table 1 provides descriptive statistics and correlations of the variables. It can be observed that trade balance averaged 4.746 over the sample period, and ranged from 4.421 to 4.986. The correlation matrix indicates a positive and significant relationship between trade balance and foreign income. A negative and significant relationship exists between trade balance and real exchange rate. A cursory observation from Table 1 reveals that there is a severe collinearity problem between domestic income and foreign income, because the correlation value of 0.913 is high. For this reason, the foreign income variable was left out.

**Table 1: Descriptive statistics and correlation matrix**

| Variables | lnTB | lnY | lnWY | lnRER |
|---|---|---|---|---|
| **Panel A: Summary statistics** | | | | |
| Mean | 4.746 | 23.755 | 31.415 | 4.662 |
| Median | 4.746 | 23.747 | 31.406 | 4.6125 |
| Maximum | 4.986 | 24.399 | 32.015 | 4.911 |
| Minimum | 4.421 | 23.326 | 30.772 | 4.427 |
| Std. dev. | 0.127 | 0.237 | 0.367 | 0.122 |
| Skewness | −0.410 | 0.868 | −0.032 | 0.477 |
| Kurtosis | 3.479 | 3.463 | 1.783 | 2.095 |
| Jarque-Bera | 1.620 | 5.794 | 2.660 | 3.098 |
| Probability | 0.444 | 0.055 | 0.264 | 0.212 |
| **Panel B: Correlation matrix** | | | | |
| lnTB | 1.000 | | | |
| lnY | 0.101 | 1.00 | | |
| lnWY | 0.308* | 0.913* | 1.000 | |
| lnRER | −0.588* | −0.499* | −0.569* | 1.000 |

* and ** indicate statistical significance at the 5% and 10% levels, respectively

**Figure 1:** Trade balance and real exchange rate (in log) over the period 1975-2017




## 4. EMPIRICAL RESULTS AND DISCUSSION

The study begins the empirical analysis by testing for the order of integration of the variables using the PP unit root test of Phillips and Perron (1988) and the KPSS test of Kwiatkowski et al. (1992). The PP procedure tests the null hypothesis of a unit root, while that of KPSS tests the null of stationarity. The results from the PP and KPSS tests are portrayed in Table 2. They indicate that all the variables have unit root in their level but are stationary at the first difference. Thus, the results are conclusively in favour of I(1) processes. Based on this result, the next step of our empirical investigation is to test for the existence of long run relationship among the variables.

To investigate the existence of a long-run relationship between the variables, the ARDL bounds test is employed. The results are displayed in Table 3. The calculated F-statistic value (F=9.330) is greater than the upper bound critical value of 4.61 at 5% level of significance. All diagnostic tests do not exhibit any evidence of violation of the classical linear regression model assumptions. We can infer that there exists a cointegrating relationship between real exchange rate, domestic income and trade balance. To crosscheck our results we also carry out the multivariate Johansen and Juselius (1990) approach to cointegration. According to the results reported in Table 4, both the trace and maximum eigenvalue statistics confirm the existence of one cointegrating relationship between trade balance, domestic income and real exchange rate. Based on these tests, it is evident that there exists a long run relationship among the variables under investigation.

Given the above results, we proceed to estimating the long run coefficients associated with each independent variable. To that end, we employ the ARDL approach along with Fully Modified OLS (FMOLS) estimator proposed by Phillips and Hansen (1990), and Dynamic OLS (DOLS) estimator suggested by Stock and Watson (1993). These estimation techniques account for the possible endogeneity of the variables and perform better in small samples. The results reported in Table 5 indicate that all the explanatory variables enter the model significantly. As mentioned above, the sign on domestic income is uncertain, depending upon whether it represents the level of economic activity or the supply of exportable goods. In all cases, the results indicate a negative and significant long-run relationship between domestic income and trade balance. This implies that an increase in domestic income leads to a deterioration in trade balance in the long run. In the

**Table 2: Results of unit root tests**

| Series | Level | | First difference | | Order of integration |
|---|---|---|---|---|---|
| | PP | KPSS | PP | KPSS | |
| lnTB | −3.274 | 0.135 | −7.712* | 0.246 | I(1) |
| lnY | −0.919 | 0.147* | −4.376* | 0.202 | I(1) |
| lnRER | −3.138 | 0.080 | −6.940* | 0.051 | I(1) |

TB, Y and RER denote trade balance, real GDP, and real effective exchange rate, respectively. * indicates the rejection of the null hypothesis at 5% level of significance

**Table 3: Results of the ARDL cointegration test**

| Model | ARDL | F-stat. | Diagnostic tests | | |
|---|---|---|---|---|---|
| | | | Norm. | Hetero. | Correl. |
| TB=f(Y, RER) | ARDL (2,1,1) | 9.330* | 0.520 | 0.602 | 0.336 |
| | Critical values | | | | |
| | I(0) | | I(1) | | |
| 5% | 3.88 | | 4.61 | | |
| 10% | 3.38 | | 4.02 | | |

TB, Y and RER denote trade balance, real GDP, and real effective exchange rate, respectively. Lag length on each variable is selected using the AIC criterion with maximum lag set to 5. Critical values are from Pesaran et al. (2001). The model ARDL includes a trend and a dummy variable taking value 1 from 1994 to 2017 and zero otherwise. * indicates the rejection of the null hypothesis of no cointegration at the 5% level of significance

ARDL model, a 1% increase in domestic real income leads to 0.676% deterioration in trade balance. Such a finding supports the "demand as driver" view that increases in domestic output stimulate higher imports. This view was confirmed by Keho (2019) who reported that domestic output plays a significant role in explaining aggregate import demand for goods and services in Cote d'Ivoire. Further, the results show a negative effect of real exchange rate on trade balance, meaning that the real exchange rate depreciation improves the trade balance in a significant way. The impact of real exchange rate on trade balance is stronger in absolute value than that of domestic income. Specifically, keeping other things constant, a 1% depreciation in real exchange rate leads to 1-2.4% improvement in trade balance. Such an evidence is supporting the Marshall-Lerner condition in the case of Cote d'Ivoire. This finding accords with Amzath et al. (2010) for Cote d'Ivoire, Ogbonna (2016) for Benin, Hunegnaw and Kim (2017) for ten East African countries, Ousseini et al. (2017) for the West African Economic and Monetary Union, Umoru and Oseme (2013), Igue and Ogunleye (2014) and Bawa et al. (2018) for Nigeria, but contradicts with Loto (2011) for Nigeria and Akoto and Sakyi (2019) for Ghana. Finally, a statistically significant coefficient on the shift dummy variable is observed in all models.

This suggests that the 1994 CFA franc devaluation and the reforms driven by this event, significantly impacted Cote d'Ivoire's real trade balance.

Table 6 outlines the regression results on the short-run effects of domestic income and real exchange rate on the trade balance. The coefficient on the first lag of the error-correction term is negative and statistically significant, confirming the existence of a long-run relationship among the variables. The value of this coefficient shows a high rate of convergence to the long run equilibrium. Nearly 83% of a deviation from the long-term relationship is corrected within 1 year. It can also be observed that domestic income growth significantly and negatively affects trade balance in the short run. The negative sign on the coefficient of domestic income supports the Keynesian argument that an increase in income will lead to increased demand for foreign goods, thus deteriorating the trade balance. The results also show a negative value on the current first-differenced real effective exchange rate followed by a positive value on the lagged first-differenced variable. This implies that real exchange rate depreciation improves the trade balance in current year but deteriorates it 1 year later. Therefore, the J-curve phenomenon is not supported in the context of Cote d'Ivoire.

**Table 4: Johansen cointegration test results**

| Nb. cointegration | Trace statistic | Prob. | Max-Eigen statistic | Prob. |
|---|---|---|---|---|
| None | 71.877* | 0.000 | 53.050* | 0.000 |
| At most 1 | 18.827 | 0.291 | 16.630 | 0.120 |
| At most 2 | 2.196 | 0.955 | 2.196 | 0.955 |

The model includes a trend and a dummy variable taking value 1 from 1994 to 2017 and zero otherwise. The optimal lag length is k=2 based on the AIC criterion with maximum lag set to 5. * denotes rejection of the null hypothesis of unit root at the 5% significant level

**Table 5: Long-run coefficients of trade balance function**

| Regressors | Dependent variable is lnTB | | |
|---|---|---|---|
| | ARDL | DOLS | FMOLS |
| lnY | −0.676* [−2.981] | −2.276* [−8.211] | −0.632* [−5.725] |
| lnRER | −2.084* [−3.649] | −2.373* [−4.861] | −1.014* [−6.245] |
| Trend | 0.017* [3.310] | 0.028* [5.632] | 0.014* [5.348] |
| D94 | −0.451* [−2.687] | −0.270* [−3.249] | −0.180* [−2.896] |
| Constant | 20.601* [6.897] | 69.326* [9.575] | 24.297* [9.045] |
| $R^2$ | 0.759 | 0.940 | 0.616 |
| Obs. | 41 | 34 | 42 |

The dependent variable is the log of trade balance, defined as the ratio of exports to imports. Y and RER denote real GDP and real effective exchange rate, respectively. The dummy variable D94 takes value 0 from 1975 to 1993 and value one otherwise. The time trend variable captures terms of trade effects. Figures in brackets are t-statistics. The asterisk * denotes statistical significance at the 5% level

**Table 6: Short-run dynamic of trade balance**

| Variables | Coeff. | Std. error | t-stat. | Prob. |
|---|---|---|---|---|
| $\Delta lnY_t$ | −0.960* | 0.228 | −4.201 | 0.000 |
| $\Delta lnRER_t$ | −0.613* | 0.119 | −5.120 | 0.000 |
| $\Delta lnRER_{t-1}$ | 0.391* | 0.145 | 2.696 | 0.010 |
| $ECT_{t-1}$ | −0.827* | 0.119 | −6.938 | 0.000 |
| Constant | 25.205* | 3.630 | 6.942 | 0.000 |

Y and RER denote real GDP and real effective exchange rate, respectively. The model includes a dummy variable $DUM_{94}$ taking value 0 from 1975 to 1993 and value one otherwise. ECT denotes the error correction term. Figures in brackets are *t*-statistics. The asterisks * and ** indicate significance at the 5% and 10% levels, respectively. The asterisk * denotes statistical significance at the 5% level

## 5. CONCLUSION

This study has examined the impact of real effective exchange rate on the trade balance of Cote d'Ivoire over the period from 1975 to 2017. The study employed the bounds testing approach to cointegration along with other efficient estimation techniques. The results support the existence of a long run relationship between real exchange rate, domestic income and trade balance. The results also show negative and significant effects of domestic income on trade balance both in the short and long run. This suggests that economic growth is playing a crucial role in explaining the trade balance position of Cote d'Ivoire. Economic growth contributes to the deterioration of trade balance in Cote d'Ivoire through increased imports of goods and services. Consequently, policy actions that are geared towards increasing export performance, as well as diversifying domestic production in order to reduce imports should be encouraged. With respect to real exchange rate, the results show that its depreciation causes an improvement in trade balance in a significant way both in the short and long run. Such a finding is consistent with the Marshall-Lerner condition but not with the J-curve effect.

The implication of this result for policy formulation is that policy efforts should be concentrated towards import substitution strategy such that goods that can be produced locally would not be imported. This import substitution strategy can help create sustainable employment and development of industrial manufacturing sector. As Cote d'Ivoire is a member country of the West African Economic and Monetary Union (WAEMU), we cannot suggest exchange rate devaluation as an effective tool for balance of trade improvement in Cote d'Ivoire. To recommend such a policy, we have to examine the impact of currency depreciation on the trade balance of the Union. In addition, we have to bear in mind that devaluation has its own adverse effects on economic growth. It raises the cost of imported goods and this affects supply side of the economy. In the case where devaluation causes inflation in the domestic market, it decreases purchasing power of money, resulting in a decline in domestic demand for goods and services and economic growth.

This study is not free of shortcomings. First, the study has considered aggregate trade balance between Cote d'Ivoire with the rest of the world. It is obvious that Cote d'Ivoire has different export and import prices with its trading partners. Using aggregate trade balance data, the study may suffer from aggregation bias in the sense that significant positive elasticities with some trading partners may be more than offset by significant negative or insignificant elasticities with other partners. In other words, if the response of trade balance to real exchange rate movements differs across trading partners, the aggregate trade balance approach could provide misleading results. Therefore, future research should be conducted using bilateral trade balance of Cote d'Ivoire with its major merchandise partners. Second, our analysis did not consider the existence of asymmetric effects of real exchange rate on trade balance. The possibility of exchange rate appreciations and depreciations affecting differently trade balance has recently been receiving increasing interest in the economic literature. This can be attributed to adjustment cost, price rigidities and quantity

restrictions (Bussiere et al., 2013). We intend to investigate these lines of research in future studies.

## REFERENCES


Adeniyi, O., Omisakin, O., Oyinlola, A. (2011), Exchange rate and trade balance in West African monetary zone: Is there a J-curve? The International Journal of Applied Economics and Finance, 5(3), 167-176.

Akpansung, A.O., Babalola, S.J. (2013), Effects of real exchange rate on trade balance: Empirical evidence from Nigeria. Asian Journal of Empirical Research, 3(5), 605-617.

Akoto, L., Sakyi, D. (2019), Empirical analysis of the determinants of trade balance in post-liberalization Ghana. Foreign Trade Review, 54(3), 177-205.

Amzath, A., Drama, B.G.H., Shen, Y. (2010), The effects of real exchange rate on trade balance in Cote d'ivoire: Evidence from the cointegration analysis and error-correction models. Journal of Applied Research in Finance, 2(3), 44-66.

Anning, L., Riti, J.S., Yapatake, K.T. (2015), Exchange rate and trade balance in Ghana-testing the validity of the Marshall-Lerner condition. International Journal of Development and Emerging Economics, 3(2), 38-52.

Aziz, N. (2012), Does a real devaluation improve the balance of trade? Empirics from Bangladesh economy. The Journal of Developing Areas, 46(2), 19-41.

Baba, A.K., Yazici, M. (2016), The J-curve hypothesis: An investigation of bilateral trade between Nigeria and European Union. Journal of International and Global Economic Studies, 9(1), 46-74.

Baharumshah, A. (2001), The effect of exchange rate on bilateral trade balance: New evidence from Malaysia and Thailand. Asian Economic Journal, 15(3), 291-312.

Bahmani-Oskooee, M. (1991), Is there a long-run relation between the trade balance and the real effective exchange rate of LDCs? Economics Letters, 36(4), 403-407.

Bahmani-Oskooee, M. (2001), Nominal and real effective exchange rates of Middle Eastern countries and their trade performance. Applied Economics, 33(1), 103-111.

Bahmani-Oskooee, M., Ratha, A. (2004), The J-curve: A literature review. Applied Economics, 36(13), 1377-1398.

Bahmani-Oskooee, M., Goswami, G.G., Talukdar, B.K. (2008), The bilateral J-curve: Canada versus her 20 trading partners. International Review of Applied Economics, 22(1), 93-104.

Bahmani-Oskooee, M., Kutan, A.M. (2009), The J-curve in the emerging economies of Eastern Europe. The International Trade Journal, 41(20), 2523-2532.

Bahmani-Oskooee, M., Cheema, J. (2009), Short-run and long-run effects of currency depreciation on the bilateral trade balance between Pakistan and her major trading partners. Journal of Economic Development, 34(1), 19-41.

Bahmani-Oskooee, M., Gelan, A. (2012), Is there J-curve effect in Africa? International Review of Applied Economics, 26(1), 73-81.

Bahmani-Oskooee, M., Harvey, H., Hegerty, S.W. (2013), Empirical tests of the Marshall-Lerner condition: A literature review. Journal of Economic Studies, 40(3), 411-443.

Bhattarai, D.K., Armah, M.K. (2005), The Effects of Exchange Rate on the Trade Balance in Ghana: Evidence from Cointegration Analysis. Research Memorandum 52. Cottingham: Business School, University of Hull.

Bawa, S., Abdul, R.M., Sani, Z., Dauda, M. (2018), Testing the J-curve phenomenon in Nigeria: An ARDL bounds testing approach. West African Journal of Monetary and Economic Integration, 18(1), 47-71.

Boyd, D., Caporale, G.M., Smith, R. (2001), Real exchange rate effects on the balance of trade: Cointegration and the Marshall-Lerner condition. International Journal of Finance and Economics, 6(3), 187-200.

Bussiere, M., Callegari, G., Ghironi, F., Sestieri, G., Yamano, N. (2013), Estimating trade elasticities: Demand composition and the trade collapse of 2008-2009. American Economic Journal: Macroeconomics, 5(3), 118-151.

Caporale, G.M., Gil-Alana, L., Mudida, R. (2015), Testing the Marshall-Lerner condition in Kenya. South African Journal of Economics, 83(2), 253-268.

Chiu, Y.B., Lee, C.C., Sun, C.H. (2010), The U.S. Trade imbalance and real exchange rate: An application of the heterogeneous panel cointegration method. Economic Modelling, 27, 705-716.

Duasa, J. (2007), Determinants of Malaysian trade balance: An ARDL bound testing approach. Global Economic Review, 36(1), 89-102.

Goldstein, M., Khan, M.S. (1985), Income and price effects in foreign trade. In: Jones, R.W., Kenen, P.B., editors. Handbook of International Economics. North-Holland, Amsterdam: Elsevier. p1041-105.

Halicioglu, F. (2008a), The J-curve dynamics of Turkey: An application of ARDL model. Applied Economics, 40(18), 2423-2429.

Halicioglu, F. (2008b), The bilateral J-curve: Turkey versus her 13 trading partners. Journal of Asian Economics, 19(3), 236-243.

Hatemi, J.A., Irandoust M. (2005), Bilateral trade elasticities, Sweden versus her trade partners. American Review of Political Economy, 3(2), 38-50.

Himarios, D. (1989), Devaluations improve the trade balance? The evidence revisited. Economic Inquiry, 40(1), 143-168.

Hunegnaw, F.B., Kim, S. (2017), Foreign exchange rate and trade balance dynamics in East African countries. The Journal of International Trade and Economic Development, 26(8), 979-999.

Igue, N.N., Ogunleye, T.S. (2014), Impact of real exchange rate on trade balance in Nigeria. African Development Review, 26(2), 347-3578.

Iyke, N.B., Ho, S.Y. (2017), The real exchange rate, the Ghanaian trade balance, and the J-curve. Journal of African Business, 18(3), 380-392.

Johansen, S., Juselius, K. (1990), Maximum likelihood estimation and inference on cointegration with applications to the demand for money. Oxford Bulletin of Economics and Statistics, 52(2), 169-210.

Kale, P. (2001), Turkey's trade balance in the short and the long run: Error-correction modeling and cointegration. The International Trade Journal, 15(1), 27-56.

Kamugisha, G., Assoua, J.E. (2020), Effects of a devaluation on trade balance in Uganda: An ARDL cointegration approach. International Journal of Economics and Finance, 12(7), 42-53.

Keho, Y. (2019), An econometric testing of traditional import demand function for Cote d'Ivoire. Journal of Economics and Business, 2(3), 608-616.

Keho, Y. (2020), Impact of foreign direct investment on trade balance: Evidence from Cote d'Ivoire. International Journal of Economics and Finance, 12(7), 113-124.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., Shin, Y. (1992), Testing the null hypothesis of stationarity against the alternative of a unit root. Journal of Econometrics, 54(1-3), 159-178.

Lal, A., Lowinger, T. (2002), The J-curve: Evidence from East Asia. Journal of Economic Integration, 17(2), 397-415.

Liew, V.K.S. (2004), Which lag length selection criterion should we employ? Economics Bulletin, 3(33), 1-9.

Loto, M.A. (2011), Does devaluation improve the trade balance of Nigeria: A test of the Marshall Lerner condition. Journal of Economics and International Finance, 3(11), 624-633.

Lutkepohl, H. (1991), Introduction to Multiple Time Series Analysis. Germany: Springer-Verlag.

Magee, S.P. (1973), Currency contracts, pass through, and devaluation. Brookings Papers of Economic Activity, 1, 303-325.

Musila, J.W., Newark, J. (2003), Does currency devaluation improve the trade balance in the long run? Evidence from Malawi. African Development Review, 15(2-3), 339-352.
Narayan, P.K. (2006), Examining the relationship between trade balance and exchange rate: The case of China's trade with the USA. Applied Economics Letters, 13(8), 507-510.
Ogbonna, B.C. (2016), Trade balance effect of exchange rate devaluation in benin republic: The empirical evidence. IOSR Journal of Economics and Finance, 7(2), 33-43.
Onafowora, O. (2003), Exchange rate and trade balance in East Asia: Is there a J-curve. Economics Bulletin, 5(18), 1-13.
Ousseini, A.M., Hu, X.J., Aboubacar, B. (2017), WAEMU trade and current account balance deficit analysis: A panel VAR approach. Theoretical Economics Letters, 7, 834-861.
Pesaran, M.H., Shin, Y., Smith, R. (2001), Bounds testing approach to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326.
Phillips, P.C.B., Hansen, B.E. (1990), Statistical inference in instrumental variables regression with I(1) process. Review of Economic Studies, 57(1), 99-125.
Phillips, P.C.B., Perron, P. (1988), Testing for a unit root in a time series regression. Biometrika, 75(2), 335-346.
Prakash, K., Maiti, D. (2016), Does devaluation improve trade balance in small Island economies? The case of Fiji. Economic Modelling, 55, 382-393.
Rose, A.K., Yellen, J.L. (1989), Is there a J-curve? Journal of Monetary Economics, 24(1), 53-68.
Rose, A.K. (1991), The role of exchange rates in a popular model of international trade, does the Marshall Lerner condition hold. Journal of International Economics, 30(3-4), 301-316.
Schaling, E., Kabundi, A. (2014), The exchange rate, the trade balance and the J-curve effect in South Africa. South African Journal of Economic and Management Sciences, 17(5), 601-608.
Shahbaz, M, Awan, R., Ahmad, K. (2011), The exchange value of the pak-rupee and pak-trade balance: An ARDL bounds testing approach. Journal of Developing Areas, 44(2), 69-93.
Singh, T. (2004), Testing J-curve hypothesis and analysing the effect of exchange rate volatility on the balance of trade in India. Empirical Economics, 29(2), 227-245.
Stock, J., Watson, M.W. (1993), A simple estimator of cointegrating vectors in higher order integrated systems. Econometrica, 61(4), 783-820.
Suleman, S., Cheema, A.R., Riaz, M.F., Yousaf, M.M., Shehzadi, A. (2014), Time series investigation of J-curve of Pakistan with Saudi Arabia. Journal of Finance and Economics, 2(6), 210-214.
Tran, T.A.D., Dinh, T.T.B. (2014), FDI inflows and trade imbalances: Evidence from developing Asia. European Journal of Comparative Economics, 11(1), 147-169.
Tsen, W.H. (2011), Bilateral trade balances: Evidence from Malaysia. Asian Economic Journal, 25(2), 227-244.
Umoru, D., Oseme, A. (2013), Trade flows and exchange rate shocks in Nigeria: An empirical result. Asian Economic and Financial Review, 3(7), 948-977.
Venkatraja, B. (2018), Sensitivity of trade balance to exchange rate depreciation: Evidence from indo-U.S. Bilateral trade. Asian Economic and Financial Review, 8(5), 691-703.
Wilson, P., Tat, K.C. (2001), Exchange rates and the trade balance: The case of Singapore 1970 to 1996. Journal of Asian Economics, 12(1), 47-63.
Yazgan, M.E., Ozturk, S.S. (2019), Real exchange rates and the balance of trade: Does the J-curve effect really hold? Open Economies Review, 30, 343-373.
Yol, M.A., Baharumshah, A.Z. (2007), Estimating exchange rate and bilateral trade balance relationships: The experience of Sub-Saharan African Countries. South African Journal of Economics, 75(1), 35-51.
Yusoff, M.B. (2009), Bilateral trade balance, exchange rates, and income: Evidence from Malaysia. Global Economy Journal, 9(4), 1850183.
Ziramba, E., Chifamba, R.T. (2014), The J-curve dynamics of South African trade: Evidence from the ARDL approach. European Scientific Journal, 10(19), 346-358.