EE
E u r o E c o n o m i c a
Issue 2(34)/2015 *ISSN: 1582-8859*

Examination of the effects of public spending and trade policy on real exchange rate in Cameroon

Victalice Ngimanang ACHAMOH[1], Francis Menjo BAYE[2]

[1]*Faculty of Economics and Management, University of Dschang, ngimanang@yahoo.com*

[2] *Faculty of Economics and Management, University of Yaoundé II, bayemenjo@yahoo.com*

Abstract. The study adopts the inter-temporal model of Rodríguez (1989) and Edward (1989) extended in Elbadawi and Soto (1997) to empirically examine the effect of public expenditure and trade openness on the real exchange rate using Cameroon data from 1977 to 2010. After exploring some issues on exchange rate and reviewing the relevant literature, the study employs residual based-cointegration technique. All the variables were stationary at level form or first differences. Public spending significantly appreciates the real exchange likewise the trade openness variable in the longrun. The results of the study suggests that appreciation of real exchange rate could be prevented by contracting public spending or adopting restrictive trade measures especially in the long run.

Keywords: RER, trade policy, public spending, fundamental approach, Cameroon.

1 Introduction

Issues related to exchange rate management are amongst the important concerns of the current debate on economic reform of most countries. Exchange rate plays a crucial role in the stabilisation and adjustment programs (Rodríguez, 1989; Servers and Solimano, 1992). Exchange rate reform was given a special attention in the adjustment program which was adopted after the economic crisis of the late 1980s (Elbadawi and Soto, 1997). Like is the case with Cameroon, most of the Sub Saharian African (SSA) countries produce and export primary products which need to be competitive in the world market (Aron, Elbadawi and Khan, 1997). This makes exchange rate an important policy instrument.

Real exchange rate (RER) is an expression of the total macroeconomic environment and is equally a major influence of international competitiveness. It is an important relative price signalling intersectoral growth in the long-run. The level of the real exchange rate (relative to an equilibrium real exchange rate level) and its stability greatly influence the volume of exports and private investment (Servers and Solimano, 1992).

As is the case with other members of the Franc Zone (FZ), the exchange rate is exogenous to Cameroon and does not constitute a policy instrument in the country. The nominal exchange rate (NER) of CFA franc was institutionally pegged to French Franc and through the French Franc to EURO since member countries do not have the opportunity to unilaterally change the nominal exchange rate as a policy option without the permission of France plus consensus among them. It is thus imperative to provide other macroeconomic variables that a country like Cameroon with restricted decision on its nominal exchange rate can manipulate to influence its real exchange rate. In order to make any adjustment on the exchange rate, policy makers need to be informed about the probable tendency of the equilibrium exchange rate and by how much it has changed. Real exchange

rate equilibrium itself says nothing about under-or over-valuation of the domestic currency.

To determine at any period whether real exchange rate (RER) is undervalued or overvalued, or at equilibrium, and to maintain a target RER is therefore among the preoccupations of policy makers. To do this, there is need to specify the equilibrium RER model in view of inferring, particularly, the effect(s) of public spending and trade policy. The main determinants of real exchange rate noted in a number of studies[1]include the terms of trade, trade openness of the economy, capital flows, per capita real GDP growth relative to other countries andforeign borrowing.

Importantly, trade policy measures the extent to which an economy is opened through trade liberalization. Trade policy includes the use of exchange controls, tariffs, quotas and import licenses. Liberal trade measures have to do with reduction of tariffs and licenses on tradables which lower its relative price, increase the volume of trade thereby inducing a real exchange rate appreciation (Aron *et al*., 1997). Trade restrictive policies cause real exchange rate appreciation through their impact on the price of non tradables (Edwards, 1989; Elbadawi and Soto, 1997).

Another crucial real exchange rate determining factor that has attracted the attention of many researchers is public expenditure. To Elbadawi and Soto (1997), Baye and Khan (2002) and others, public sector consumption increases aggregate demand in the economy and its impact on real exchange rate depend on both the level and distribution of the expenditure between tradable and non-tradable goods. Increase in demand arising from public spending always raises relative prices of non-tradable leading to real exchange rate appreciation. Edwards (1989) tested and confirmed this result for a set of 12 developing countries.

In spite of the role played by real exchange rate in shaping country-wide policies, little quantitative work has been carried out to thoroughly examine the influence of some key macroeconomic variables on real exchange rate in Cameroon. Amin and Awung (1997) evaluated the determinants of real exchange rate, simulated the path of the equilibrium real exchange rate and evaluated the degree of its misalignment. Using the cointegration methodology, they found that the explanatory variables have only a short-run impact on the real exchange rate. They failed to explicitly identify the path of the equilibrium real exchange rate. Elbadawi and Soto (1997) and Baye and Khan (2002) used the fundamental approach in the determination of equilibrium RER but did not take into account the effect of financial development and FDI on the RER determination. In addition, these studies neglected to conduct a causality test between RER and economic growth in Cameroon.

With these lapses in literature, one is pushed to ask the following question: what is the nature of the relationship between government spending, trade policy and real exchange rate in Cameroon? The choice of these variables is motivated by the fact that Cameroon is a mixed economy with government practically intervening in almost all the sectors. The economy is equally very opened to the rest of the world most especially through external trade. It is therefore of interest to augment the existing knowledge in this field with the possible nexus between these variables and real exchange rate.

The objective of this study is therefore to examine the determinants of real exchange rate in Cameroon. Specifically, to verify the link between public expenditure, trade policy and real exchange rate using Cameroon's time series data

Two research hypotheses are prominent from the forgoing objective, assuming other things constant.

- Government spending tends to appreciate the real exchange rate of domestic currency.
- Trade openness has the tendency of appreciating the real exchange rate in Cameroon.

[1]Edwards (1989),Ghura and Grennes (1994), Aron et al (1997), Elbadawi and Soto (1997) among others.

Having introduced the paper in Section 1, the rest of the study is arranged in the following order: Section 2 focuses on theoretical and empirical literature whereas Section 4 describes data and econometric techniques used in investigating short- and long-run relationships between the variables; Section 5 presents and discusses the economic results, meanwhile Sections 6 concludes the paper.

2 Theoretical and empirical literature review

Theoretical review

Equilibrium exchange rate evolves following a trajectory determined by fundamental modifications. Long-run real exchange rate in the Edwards model depends exclusively on real variables. In the works of Ghura and Grennes (1994), Aron *et al*. (1997), Elbadawi and Soto (1997) taken as a whole, real exchange rate determinants are mainly the terms of trade, the degree of openness of the economy, and capital flows, Foreign exchange reserves, and Per capita real GDP growth relative to other countries.

Trade liberalisation or the openness of the economy is characterised by a reduction or elimination of export taxes and import tariffs, and hence leads to an increase in the volume of trade. The import tariffs and export taxes account for only explicit commercial policy but implicit commercial policy has also been important. This includes the use of exchange controls, quotas and import licenses. Increasing trade liberalisation is expected to depreciate the real exchange rate (Aron *et al*., 1997). Foreign exchange reserve is expected by the theoretical model to have a positive impact on the real exchange rate, consistent with its role as a relatively liquid indicator of the stock of national wealth.

Edwards (1989) finds that an increase in public expenditure induces a real exchange rate appreciation for a set of 12 developing countries. Given that government often spends more on non-tradable than tradable goods, public spending often appreciate the RER as the relative prices of non-tradables will likely increase. Public expenditure increases aggregate demand in the economy and its impact on real exchange rate does not only depend on its level but also on its distribution between tradable and non-tradable goods. Increase in government consumption of non-tradable goods would induce an increase in demand which raise the price of non-tradable goods relative to those of tradable and hence result to a real exchange rate appreciation (Baye and Khan, 2002).

Many approaches are proposed in the literature for measuring the equilibrium real exchange rate (ERER). This includes the PPP approach, the elasticities approach, the DLR (Devarajan, Lewis and Robinson, 1993) approach based on an extension of the Salter-Swan model, and the fundamental approaches. The purchasing power parity (PPP) concept associates the ERER with the value of the real exchange rate in a period of external balance (known as the base year), adjusted for inter-country differences in inflation rates. Williamson (1994) considered the PPP concept inadequate and misleading due to difficulty in identifying the base year when the current account would be in equilibrium and also the fact that the ERER is a constant under the approach and does not change.

The elasticity approach estimates the equilibrium real exchange rate that will equilibrate the balance of trade. Here the ERER is defined as the rate for which the market is in equilibrium or at an acceptable or sustainable level of disequilibrium. There are a number of difficulties with this approach. The first difficulty is that of the subjective way in which the sustainable level is determined and another difficulty is the determination of import and export elasticities, since imports and exports are aggregates of many different products with very different price elasticities.

The DLR approach divides the economy into three goods: exports, imports and domestic goods. In this approach, the ERER is that RER which is consistent with a particular current account target, given

changes in import and export prices, and terms of trade shocks. This approach though apparently looking very appealing as it allows a quick calculation of RER misalignment and is equally very parsimonious in its use of data has two main shortcomings. First, it is difficult to determine the base year. The choice of base year relies on the personal judgment of the researcher as is the case with the PPP approach. It is equally difficult to estimate the elasticities of transformation and substitution which is required in this method (Elbadawi and Soto, 1997; Baye and Khan, 2002).

The method adopted in the present study is the fundamentals approach (Edwards, 1989; Williamson, 1994; and Ghura and Grennes, 1994; Elbadawi and Soto, 1997; Baye and Khan, 2002), which models the evolution of the RER as a function of the fundamentals (terms of trade, public expenditures, trade liberalization or openness, technical progress, capital flows, and so on) of the economy. It estimates the responsiveness of the RER to changes in these fundamentals. Data requirements of fundamental approach is however large as compared with the DLR approach.

Empirical review

According to Williamson (1994), the inadequacies of African exchange rate policies have for some years been one of the stumbling blocks to the continent's progress. The validity of statements like this has attracted a lot of interest in exchange rate issues in Africa in the latter half of the 1980s and the 1990s. Many studies have been conducted to understand and explain the role of the exchange rate in these economies (Edwards, 1988; Cottani *et al*., 1990; Elbadawi, 1992; Elbadawi and Soto, 1997; Parikh, 1997; and many others). The interest was further increased as the international donors targeted the exchange rate as one of the key instruments in the structural adjustment programmes to many African countries. As an economic-wide relative price signalling for inter-sectoral resource transfers, the RER concept has assumed a central position in debates on economic development and growth strategies (Elbadawi and Soto, 1997).

Capital flows is another major fundamental considered at the empirical level. It is noticed that long-term capital flows is a long-run determinant of the real exchange rate, whereas short-term flows influence the adjustment to equilibrium (Froot and Stein, 1991). Part of the rationale for this is that much of short-term capital flows is speculative and responding to short-term factors. Aron *et al*. (1997) outlined some four factors that complicate the interpretation of the South African capital flows figures, and in part, the long-run and short-run distinction. These include the existence of the disinvestment campaign against South Africa from the 1970s and the imposition of financial sanctions; the classification of sales of assets of an indefinite holding period; and, finally, the debt crisis of 1985.

A number of these studies have focused on RER determination, and on how RER misalignment and RER volatility affect the economy as a whole or particular sectors or sub-sectors. Ghura and Grennes (1994) examine the impact of RER misalignment on macroeconomic performance in Sub-Saharan Africa. Dordunoo and Njinkeu (1997) investigate the impact of exchange rate regime choice on macroeconomic performance and conclude that what is more important is regime management than regime choice.

Ogun (1998) examines the effect of RER volatility and misalignment on export performance in Nigeria and affirms that they negatively affect export growth. Devarajan (1997) studies the misalignment of the RER in twelve CFA countries prior to, and following the 1994 devaluation. He finds that the RER was highly overvalued in most of these countries before the devaluation, and remained overvalued in a number of countries (especially Cameroon) immediately after the devaluation. But there were huge differences in the degree of misalignment among the countries.

Sekkat and Varoudakis (1998) strengthen the idea according to which the chronic misalignments of real exchange rate are a major factor of the weak economic performances of developing countries. Ghura and Grennes (1994) show on a panel of African countries that real exchange rate misalignment negatively affects economic growth, exports, investment and saving.

Despite the vital role played by RER in expressing the overall macroeconomic environment of the country, little quantitative work has been carried out on the role and determinants of the RER in Cameroon. Amin (1996) and Amin and Awung (1997) are among the first to empirically address the role of RER in Cameroon. In particular, Amin and Awung (1997) evaluated the determinants of real exchange rate, simulated the path of the equilibrium real exchange rate and evaluated the degree of its misalignment. Using the cointegration methodology, they found that the explanatory variables have only a short-run impact on the real exchange rate. The main problem with their paper is that they failed to explicitly identify the path of the equilibrium real exchange rate. This led to the use of the PPP framework, which they themselves criticised.

Elbadawi and Soto (1997) and Baye and Khan (2002) used the fundamental approach in the determination of equilibrium RER but did not take into account the effect of financial development and FDI on the RER determination. In addition, causality test between RER and economic growth in Cameroon was not conducted in the previous studies. These two gaps are addressed in the present study.

This study therefore pushes a step ahead by taking these variables into account in the first fold and by controlling for other variables and investigating the effect of some variables frequently used in the literature, trade policy and government spending, on RER using Cameroon's data.

3 Research methodology

Theoretical framework

This section examines the inter-temporal model of the determinants of the RER proposed by Rodríguez (1989) and Edwards (1989) and extended in Elbadawi and Soto (1998). The specification of the theoretical model is consistent, at the econometric level, with a co-integration error correction structure, which enables us to separate the short and long-run determinants of the RER and provides us a simple framework for computing its equilibrium level.

Like in Elbadawi and Soto (1998) the illustrative framework employed in this paper starts by considering an open economy with three productive sectors (importables, exportables and non-tradable goods), for which the international price of traded goods is assumed to be exogenous. The domestic price of tradables, then, is determined by the level of tariffs to importables and exportables and the nominal exchange rate. Let P^*_x and P^*_m be the dollar-denominated international prices of exportables and importables, E the nominal exchange rate, and t_x and t_m the net export and import tax rates, respectively. The domestic price index of tradable goods is defined as:

$$P_T = E[(1 - t_x)P^*_x]^{\alpha}.[(1 + t_m)P^*_m]^{1-\alpha} \quad (1)$$

The price of non-tradables, on the other hand, is endogenously determined as the result of the interaction of supply and demand forces in the domestic market. Since there is casual evidence that consumers and the government may have a different propensity to spend in traded and non-traded goods, the demand for the latter is disaggregated in two components. We assume that the proportion of private expenditure allocated to non-tradable goods -denoted by E_{PN}- depends on the prices of exports, imports and non-traded goods (P_x, P_m, and P_n, respectively), while that of the government (E_{GN}) is a

fraction (g_N) of total government expenditure. Hence, the latter is a policy or control variable for the government. The total demand for non-traded goods is expressed as:

$$E_N \equiv E_{PN} + E_{GN} = d_n(P_x, P_m, P_n).[A - g.Y] + g_N.gY \quad (2)$$
$$\_+ \quad + \quad -$$

where dn(.) is the proportion of private expenditure devoted to non-traded goods, A is absorption, Y is income, and g is the ratio of government expenditures to income. The signs of the price elasticities appear below the dn(.) function. The supply of nontraded goods, which is also specified as a fraction of total income, depends on the prices of tradable and non-tradable goods as shown by the sign of the elasticities below the Sn(.) function:

$$S_N = s_n(P_x, P_m, P_n)\, Y \quad (3)$$
$$- \quad - \quad +$$

Equation (4) sets the equilibrium condition in the non-traded goods market (SN = EN), which in turn determines Pn:

$$s_n(P_x, P_m, P_n) = d_n(P_x, P_m, P_n).\left[\frac{A}{Y} - g.\right] + g_n.\, g \quad (4)$$

Defining the real exchange rate, **e**, as the relative price of traded to non-tradable goods implies:

$$RER = \frac{EP_x^{*\alpha} P_m^{*1-\alpha}}{P_n} = \frac{EP_x^{*\alpha} P_m^{*1-\alpha}(1-t_x)^{\alpha}(1+t_m)^{1-\alpha}}{P_n} \quad (5)$$

An increase in 'e' in equation 5 signifies a depreciation of the RER indicating that the prices of tradable goods rise in relation to the prices of non-tradables, and the reverse when the rate appreciates. Equations (4) and (5) can be solved for the level of the RER that ensures instantaneous equilibrium in the non-traded goods market, for given levels of foreign and domestic "fundamentals":

$$RER = RER\left(\frac{A}{Y},\ TOT,\ t_x,\ t_m,\ g_N,\ g\right) \quad (6)$$
$$(+) \quad (?) \quad (+) \quad (+) \quad (+) \quad (?)$$

where TOT represents the terms of trade (Px*/Pm*). Equation (6) implies that higher levels of absorption, trade taxes, and public expenditures on non-traded goods are consistent with a more appreciated RER. The effects of TOT and total government expenditures on the RER cannot be determined a priori; the empirical evidence, however, shows that improved TOT and higher government expenditure usually lead to a RER appreciation. Government expenditure tends to appreciate the real exchange rate, due to the tendency of governments to spend more on non-traded goods than the private sector.

Following Elbadawi (1994) and Elbadawi and Soto (1994), we extend the basic model of equation (6) by endogenizing private absorption as a function of net capital inflows (i.e., the sustainable level of current account deficit) and the real consumption rate of interest:

$$\frac{A}{Y} = \frac{A}{Y}\left[\frac{FDI}{Y}\right]. (r_t^* + r_\theta) - \mu({}_tRER_{t+1} - RER_t)] \quad (7)$$

(+) (-)

FDI in equation (7) is a measure of sustainable foreign capital inflows, **μ** is a parameter, r* is the international real interest rate, r_θ is a measure of the country-risk premium, and ${}_tRER_{t+1}$ is the expected real exchange rate at $_{t+1}$ (based on the information set available at time t), so that ${}_tRER_{t+1} - RER_t$ is the expected change in the real exchange rate. Equation (7) implies that a rise in sustainable capital inflows allows a higher sustainable level of absorption, while an increase in foreign interest rates, the country risk or the expected depreciation of the RER reduces current absorption through an intertemporal relocation of consumption towards the future (i.e., wealth effects are not dominant). The sovereign risk premium, r_θ, is given by the following expression:

$$r_\theta = (\hat{a}^2_\pi - \hat{a}_{\pi\pi^*} + \beta\hat{a}^2_{RER}) - \hat{a}^2_E \frac{E(m^*+b^*)}{m+b+E(m^*+b^*)} \quad (8)$$

where $\hat{a}^2_\pi$ is the instantaneous variance of domestic inflation (π), $\hat{a}^2_{RER}$ is the instantaneous variance of the real exchange rate, $\hat{a}_{\pi\pi^*}$ is the covariance between domestic and foreign inflation, $\hat{a}^2_E$ is the variance of the nominal exchange rate, m and b are the domestic stocks of money and bonds, while *m** and *b** are their international counterparts.

The presence of the expected value of the real exchange rate (${}_tRER_{t+1}$) in equation (7) yields a forward-looking expression for the equilibrium real exchange rate as a function of the expected path of its fundamentals. Linearizing equations (7) and (8), solving for RER_t and rearranging, we obtain the following reduced-form dynamic equation for the real exchange rate.

$$LogRER_t - \lambda_t LogRER_{t+1} = \alpha' F_t \quad (9)$$

$$\alpha = [\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7]'$$

Where F_t represents the vector of fundamentals, α is a vector of coefficients and λ corresponds to a combination of μ in equation (7) and some coefficients of α in equation (9). The model in equation (9) can be solved to yield:

$$LogRER_t = \sum_{i=0}^{\infty} \lambda^j \alpha_t' F_{t-j} \quad (10)$$

Equation (10) shows that in this framework the equilibrium real exchange rate (RER), in addition to clearing the non-traded market in every instant is consistent with the expected long-run evolution of the fundamentals. Equation (10) appears in several forms in the empirical tradition of the RER literature[2]. Following the fundamental approach, F_t could be expressed as follows

$$F_t = \left[1, Log(TOT_t), Log(g_t), r_t^* + r_{\theta t}, Log(OP_t), \frac{FDIt}{GDPt}, Log\left(\frac{PEt}{GDPt}\right)\right] \quad (11)$$

This thesis laid emphasis only on potential effects of two variables which are considered as proxies for fundamentals: OP_t, which is defined as the sum of exports and imports as ratio to the GDP, is used as a proxy for trade policy and PE_t represents public spending considered as percentage of public expenditure to GDP.

[2]See for instance, Edwards (1990 and 1998), Elbadawi (1997), and, Mundlak et al (1989)

As discussed earlier, in order to have an empirical measure of the equilibrium RER, it is necessary to estimate the sustainable path of the fundamentals. In this section, we follow the methodology proposed by Elbadawi (1994) and Elbadwi and Soto (1998), which exploits the time series properties of the variables to get the long-run trajectory of the RER fundamentals, by using a cointegration approach.

Model of Real Exchange Rate

Based on literature in this paper, a specification similar to the one used by Kaminsky (1988), Ebaldawi (1994) and Ebaldawi and Soto (1998) is employed, but taking into account other essential determinants of RER such as financial development (FD), and foreign direct investment (FDI) which have been neglected in most studies on determinants of RER. The present study however emphasizes on the potential effects of two key fundamentals while controlling for other variables. From the theoretical framework developed in the previous section, the model of long-run cointegrated equilibrium RER can be written as follow:

$$LogRER_t = \alpha' F_t + \mu_t \quad (12)$$

Where:

$LogRER_t$ stands for the logarithm of real exchange rate,

α' is is the co-integrating vector of coefficients

F_t represents the vector of fundamentals which includes the logarithm (Log) of;

OP_t = trade openness of the economy measured as a ratio of export plus import to GDP

PE_t= public expenditure (government consumption expenditure to GDP ratio)

TOT_t= the external term of trade (ratio of price index of export to price index of import)

FDI_t= net foreign capital inflow

FD_t= financial development (credit to the private sector as a ratio of GDP)

GDP_t= growth of real GDP

FB_t = foreign borrowing (ratio external debt stock to GNI), and μ_t is the error term

Variables Description.

Real exchange rate (RER). Real exchange rate is considered as an endogenous variable and is captured in this study by the ratio of price of tradables to price of non tradables (P_T/P_N) where an increase in the ratio indicates the RER depreciation ($P_T>P_N$) and vice versa.

Level of public expenditure (PE). Public expenditure increases aggregate demand in the economy and its impact on real exchange rate does not only depend on its level but also on its distribution between tradable and non-tradable goods. Increase in government consumption of non-tradable goods would induce an increase in demand which raise the price of non-tradable goods relative to those of tradable and hence result to a real exchange rate appreciation. Government final consumption expenditure as a percent of GDP is used to proxy public expenditure. Given that government often spends more on non-tradable than tradable goods, public spending is expected to appreciate the RER as the relative prices of non-tradables will likely increase.

Openness of the economy (OP)

The of degree of openness of an economy considers the relation of an economy with the rest of the

world and could be used to capture how trade restrictive policies influence the real exchange rate through their impact on the price of tradable goods. Trade liberalization has to do with reduction or elimination of taxes and other barriers on tradables. The openness variable is taken as the sum of imports and exports as a ratio of GDP (X+M)/GDP. The more an economy is opened through trade, the more likely the RER of the country is likely to fall (appreciate) irrespective of the regime of the exchange rate while restrictive commercial policy causes the RER to depreciate as it raises duties on tradables, reduces the volume of trade, and thus raises the relative prices of tradables to those of non-tradable goods.

Terms of trade (TOT). The effect of terms of trade on the RER operates through import and export price variations. If the, terms of trade improve from increment in the world prices of exports, it will like cause the RER to appreciate. A change in the foreign price of imports, on the other hand, may cause the demand curve for foreign exchange to increase or decrease, depending on the elasticities of demand. Term of trade is captured by the ratio of price index of export to price index of import and a negative relation is hypothesized for the variable.

GDP growth (GDP). The growth of real GDP of a country has a great impact on country's real exchange rate. In general, an overexpansion in the economy from technological progress increases productivity which helps to lower the prices of tradable goods and may appreciate the RER. This appreciation is achieved by making exports more competitive due to their relatively low prices and improved quality. This effect has been coined in the literature, as the "Ricardo-Balassa effect". Growth rate of real GDP is expected to appreciate (or negatively influence) the RER in Cameroon.

Foreign Direct Investment (FDI). Foreign capital inflow is an important source of external financing to a country which increases physical and human capital for recipient households (Yang 2008). Developing countries witnessed constant influx of foreign capital mostly from developed nations, and this increased in financial capital puts upward pressure on recipient countries' local currency[3]. Appreciation of RER resulting from FDI inflow is analogous to "Dutch disease" dynamics and the hypothesis is expected to hold for the case of Cameroon using FDI inflow as proxy for foreign direct investment.

Financial sector development (FD). Financial development is an important internal variable that may equally influence the real exchange rate. Domestic credit could increase the demand for tradable goods used for investment purposes and the prices of these goods would increase relative to those of non-tradables leading to a depreciation of the RER. Financial development variable is expected to depreciate (raise) the real exchange rate.

Foreign Borrowing (**FB**). Another source of an imbalance in the external accounts is foreign borrowing which leads to an increase in the ratio of external debt to GDP which can likely result to an appreciation of the real exchange rate (Baye and Khan, 2002). Excessive foreign borrowing leads to the accumulation of long-term debt which is expected to appreciate the real exchange rate, whereas servicing such debts reduces the debt stock ratio and hence leads to real exchange rate depreciation. Foreign borrowing is taken as debt stock ratio and is expected to appreciate the real exchange rate.

Data and estimation procedure

Annual time series data used for empirical analysis in this paper are collected mainly from the World Development Indicators CD-ROM (2011), International Financial Statistics CD-ROM (2010) and World Tables Version 6.2 (1969-2000) and National Institute of Statistics in Yaounde for the period of

[3] See Amuedo-Dorantes and Pozo (2004), Acosta, Lartey, and Mandelman (2007), Lopez, Molina, and Bussolo (2007), Acosta,Lartey, Mandelman, (2007), and Acosta et al, (2009)

study which runs from 1977 to 2010.

As a pre-testing procedure, all the variables are tested for unit roots by the Augmented Dickey Fuller (ADF) test and Phillips-Perron test to eliminate any possibility of spurious regression and to verify whether they can be represented more appropriately as difference or trend stationarity processes. Thereafter, the model is investigated by employing cointegration analysis and error correction mechanism of Engle and Granger (1987). A method which consists of first estimating each of the model with Ordinary Least Square and then using ADF test to verify if the error term possesses a unit root or not. If so, then the parameters of ECM are estimated.

4 Results and discussion

Results of Unit Roots Tests

The results of unit root tests obtained by comparing the ADF and PP statistics with the respective Mackinnon critical values at difference significant levels is presented in Table 1

The results provided by Eviews 7 econometric software reveals that most of the variables are not stationary in their level form, except the variable for growth rate. However, the variables are all stationary in their first differences. Hence, the risk of using the original Engle-Granger formulation is minimal.

Table 1 Results of unit root tests using the ADF and PP statistics tests

Variables	ADF level form	ADF first difference	PP level form	PP first difference	Order of integration
Log(RER)	-2.042	-3.889[a]	-2.255	-5.885[a]	I(1)
Log(PE)	-1.322	-4.101[a]	-0.310	-4.004[a]	I(1)
Log(OP)	-1.301	-4.154[a]	-1.048	-4.726[a]	I(1)
Log(FD)	-1.277	-3.332[a]	-1.117	-4.279[a]	I(1)
Log(TOT)	-2.381	-3.154[b]	-1.780	-3.544[a]	I(1)
Log(FDI)	-2.320	-3.198[b]	-3.714[b]	-7.369[a]	I(1)
Log(GDP)	-3.903[a]	-7.522	-3.199[a]	-8.451	I(0)
Log(FB)	-0.919	-2.475[b]	-0.702	-3.801[a]	I(1)

MacKinnon critical values at 1%, 5% and 10% are respectively -3.6496, -2.9558 and -2.6164

Note that the superscripts [a], [b], [c] indicate variables significantly stationary at 1, 5, and 10% levels of confidence respectively.

Results of cointegration model and the corresponding ECM of RER

The regression results of cointegration model are presented in Table (2). The model is globally significant and has a good explanatory power as the fundamental variables explained up to 96.1 percent of long run variations in the RER model. The coefficient estimates of trade openness and government spending variables displayed the hypothesized signs. The variable for public spending has the negative sign as expected and it is only significant at a borderline of 10 percent. The Trade openness coefficient displays a negative sign which is significant at 1 percent in explaining long-run

variations in the RER. The coefficients of the term of trade and financial development are also significant at 1 percent.

The unit root test on the error correction term is found to be significant at 1 percent and its coefficient bears the correct negative sign. The array of further diagnosis tests of both models indicates that, the outcomes of Cointegration and ECM of the RER are serially uncorrelated, and normally distributed.

Table 2 Results of cointegration regression model of RER in Cameroon**.**

Cointegration Model Of the Log of Real Exchange Rate- Log(RER)$_t$

Variables		**Coefficient**	**Std. Error**
C		6.627***	0.391
		(16.943)	
Log(PE)$_t$		-0.087*	0.044
		(-1.958)	
Log(OP)$_t$		-0.288***	0.054
		(-5.291)	
Log(FD)$_t$		0.079***	0.024
		(3.300)	
Log(TOT)$_t$		-0.199***	0.063
		(-3.120)	
Log(FDI)$_t$		0.0004	0.007
		(0.057)	
Log(GDP)$_t$		0.019	0.017
		(1.159)	
Log(FB)$_t$		-0.013	0.015
		(-0.867)	
Unit root on ECT	**ADF**	**-2.841****	
	PP	**-3.550*****	
R-squared		**0.975**	
Adjusted R-squared		**0.961**	
F-statistic		**73.161** (*p=0.001*)	
Jarque-Bera normality test		**0.731** (*p*=0.694)	
White Heteroskedasticity Test		**1.243** (*p*=0.417)	
Breusch-Godfrey LM Test		**0.831** (*p*=0.379)	

Note: ***, **, * indicate significance at the 1, 5, and 10% levels, respectively. Values in parentheses represent the calculated t-statistics and p values are the respective probabilities.

The residuals of the cointegrated regression possess a unit root at their levels as indicated by the PP and ADF test. This confirms the existence of the Error Correction Mechanism counterpart of the cointegration model. The results of the ECM specification are presented on Table (3). The estimation of the short run parameters show that there exist a strong error correction mechanism, through the error correction term. The ECM is globally good with the explaining power of 72.5 percent and F-statistic is significant at 5 percent levels. In the short-run, the effect of trade policy on real exchange rate is negative as expected and significant. The effect of government spending is instead positive and insignificant. Term of trade, financial development, and the error correction term equally have significant effects on the evolution of the RER in the short-run.

Table 3 Results of corresponding Error Correction Model of RER in Cameroon

Error Correction Model of the Log of Real Exchange Rate: Δ(LogRER)$_t$

Variables	Coefficient	Std. Error
C	-0.026	0.023
	(-1.137)	
$\Delta(LogPE)_t$	0.011	0.134
	(0.080)	
$\Delta(LogOP)_t$	-0.138*	0.069
	(-2.006)	
$\Delta(LogFD)_{t-1}$	-0.192**	0.066
	(-2.890)	
$\Delta(LogTOT)_t$	-0.118*	0.051
	(-2.305)	
$\Delta(LogFDI)_t$	-0.002	0.004
	(-0.636)	
$(LogGDP)_t$	0.015	0.012
	(1.284)	
$\Delta(LogFB)_t$	-0.036	0.027
	(-1.342)	
ECT_{t-1}	-0.948**	0.292
	(-3.245)	
R-squared	**0.725**	
Adjusted R-squared	**0.412**	
S.E. of regression	**0.018**	
F-statistic	**2.313** (*p= 0.143*)	
Jarque-Bera normality test	**1.414** (*p*= 0.493)	
Breusch-Godfrey LM Test	**0.246** (*p*= 0.793)	

Note: **, * indicate significance at the 5 and 10% levels, respectively. Values in parentheses represent the calculated t-statistics and p values are the respective probabilities.

The empirical results of the real exchange rate model reveals that the RER is cointegrated with public expenditure and trade openness variables in addition to other factors in varying degrees. Public spending (PE) has a negative and significant effect on the real exchange rate. The negative coefficient of '0.087' is an indication that government spends more on non-tradables than on tradables. The increment in expenditure on the non-tradable goods tends to raise the prices of non-tradables relative to those of tradables. The net outcome of this leads to an appreciation of the real exchange rate. A similar result was obtained in Elbadawi and Soto (1997) and Baye and Khan (2002).

The effect of trade openness (OP) on the real exchange rate is also negative and highly significant. This result signifies that the removal of trade barriers lowers the prices of tradable goods, renders imports and exports more competitive due to their relatively low prices and thus appreciates the real exchange rate. It equally indicates the extent to which restrictive trade policy through the use of exchange controls, quotas and or import duties could be crucial in improving the real exchange rate level in Cameroon. Such policies lower the volume of trade by rendering both tradable goods less attractive thereby inducing the RER depreciation.

Apart from the two main determinants of the real exchange rate, the effect financial development on the RER was equally positive and significant. The implication of this outcome is that credit granted to the private sector, used to capture this variable, could increase the demand for tradables used

especially for investment purposes and the prices of these goods would increase relative to those of non-tradables leading to depreciation of the RER. Terms of trade has a negative and significant effect on the RER. This negative relation following Edward (1989) indicates that the income effect outweighs the substitution such that a favourable TOT would tend to appreciate the real exchange rate.

Growth rate of GDP, foreign borrowing stock and FDI have the expected signs but are not very influential in explaining long-run variations in the RER within the period under study. These variables are equally insignificant in explaining short-run dynamics in the RER in Cameroon and have the expected signs except the variable for foreign direct investment.

5 Conclusion and policy implications

The study attempted to provide decision makers in Cameroon like in other countries of Central Africa Economic and Monetary Community (CEMAC) with optional ways to manage its real exchange rate since she does not use its nominal exchange rate as a policy instrument. This was tackled by investigating the effect of public expenditure and trade openness on the real exchange rate. After exploring some issues on exchange rate and reviewing the relevant literature on the study, we verified the stationarity properties of the data using the Augmented Dickey Fuller and the Phillip-Perron tests.

The results obtained indicate that most of the variables are non-stationary at level form, but stationary at first differences (integrated processes of one "I(1)"). Based on Engle and Granger (1987) test for cointegration, the effect of public spending on real exchange rate is negative and significant. Trade openness variable also has a negative and highly significant effect on the real exchange rate.

After conducting all the necessary post estimation tests, the resulting Error Correction Model, ECM, does not provide any evidence of significant short run relation between public expenditure and the RER. Only the effect of one key fundamental variable (trade openness) on the RER variation was significant. Although the ECM model was globally significant with the exogenous variables explaining up to 81% of short term variation in the RER, the effect of both variables the RER are negative. The rationale behind this result is that there is always a time lag between the implementation of government spending policy and its overall outcome on general prices of tradables and non tradables upon which, the RER depends. This implies that trade policy is faster in action than public spending in the management of domestic RER.

The result of this paper suggests that real exchange rate management in Cameroon could require the government to manipulate internally, government spending and trade policy as two essential variables, if she intends to enhance the global competitiveness of the economy. Expansion of public expenditure and liberal trade policy are two important policy options which could be implemented to restore an economy to its long-run equilibrium real exchange rate path when it is under-valued, with the role of the former being stronger. This implies that, appreciation of real exchange rate could be prevented by contracting public spending or adopting restrictive trade measures especially in the long run. This result provides a special package to policy makers in Cameroon especially as their power to use the nominal exchange rate as a policy option is restricted.

6 References

Amin, A. A. (1996), "The Effects of Exchange Rate Policy on Cameroon's Agricultural Competitiveness".AERC Research Paper (42), Nairobi

Amin, A. A. and Awung, W. J. (1997), "Determinants of Real Exchange Rates in Cameroon, Congo and Gabon". *African Journal of Economic Policy*. 4(1): 29-60.
Aron, J., Elbadawi I. and Khan B. (1997), "Determinants of the Real Exchange Rate in South Africa". Working Paper Series, (16), Centre for the Study of African Economies.
Baye, M. F. and Khan, S. (2002), "Modelling the Equilibrium Real Exchange Rate in Cameroon: 1970-1996". *Nigerian Journal of Economic and social Studies*, 44(1): 299-321.
Cottani, J., Cavallo, D. & Khan, M.S. (1990). Real Exchange Rate Behavior and Economic Performance in LDCs. *Economic Development and Cultural Change*. 39, pp. 61-76.
Devarajan, S. (1997), "Real Exchange Rate Misalignment in the CFA Zone", *Journal of African Economies*, 6(1).
Devarajan, S., Lewis, J.D & Robinson, S. (1993). External Shocks, Purchasing Power Parity and the Equilibrium Real Exchange Rate. *World Bank Economic Review*, 7(1), pp. 45-63.
Dordunoo, C. and Njinkeu, D. (1997), "Foreign Exchange Rate regimes and Macroeconomic Performance in Sub-Saharan Africa". AERC Plenary Sessions: December 1995 & May 1996. *Journal of Africa Economies*, Supplement to, 6(3).
Edwards, S. (1989), "Real Exchange Rate, Devaluation and Adjustment". Cambridge: MIT Press.
Elbadawi, I. A. (1992), "Real Over-valuation, Terms of Trade Shock, and the cost of Agriculture in Sub-Saharan Africa". Policy Research Working Papers, WP 5831.Washington, DC:
Elbadawi, I. A. (1994), "Estimating Long-run Equilibrium Real Exchange Rates", in Estimating Equilibrium Exchange Rates, J. Williamson (ed.), Institute for International Economics, Washington, D.C
Elbadawi, I. A. and. Soto, R. (1997), "Real Exchange Rates and Macroeconomic Adjustments in Sub-Saharan Africa and Other Developing Countries". AERC Plenary Sessions: Dec. 1995 & May 1996. *Journal of Africa Economies*, Supplement to, 6(3).
Engle, R. F. and Granger, C. W. J. (1987), "Cointegration and Error Correction: Representation, Estimation, and Testing". *Econometrica*, 55: 251-276.
Froot, K. and Stein, J. (1991), "Exchange rates and foreign direct investment", Working Paper (9), *Quarterly Journal of Economics* 106: 1191-1218.
Ghura, D. and Grennes, T. (1994), "Aggregate Trade Respond to Economy-Wide Distortions in Sub-Saharan Africa". *Journal of African Economies*.,3(3)359-386.
Kaminsky, G. (1988), "The Real Exchange Rate since Floating: Market Fundamentals or Bubbles", mimeo, University of California, San Diego.

Ogun, O. (1998), "Real Exchange Rate Movements and Export Growth: Nigeria", 1961-1990, AERC Research Paper 82.
Parikh, A. (1997), "Determinants of Real Exchange Rates in South Africa: A Short-run and Long-run Analysis", South Africa.
Rodríguez, C. A. (1989), "Macroeconomic Policies for Structural Adjustment," World Bank Working Papers Series 247.
Sekkat, K. and Varoudakis, A. (1998), "Exchange-Rate Management and Manufactured Exports in Sub-Sahara Africa". Development Center Technical Paper No. 134, OECD, Paris.
Servers, L. and Solimano, A. (1992), "Private Investment and Macroeconomic adjustment: A Survey." The World Bank Research Observer, 7(1).
Williamson, J. (1994), "Estimating Equilibrium Exchange Rates". *Institute of International Economics*, Washington DC.
World Bank, (2011), "World Development Indicators on CD-ROM, World Bank", Washington, D.C.