International Journal of Economics and Financial Issues
Vol. 3, No. 2, 2013, pp.486-495
ISSN: 2146-4138
www.econjournals.com

On the Sustainability of Current Account Deficits in Cameroon

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ABSTRACT: Two approaches are used to analyze the sustainability of the current account deficits of Cameroon in order to find out whether current economic policies are sound enough to guarantee the country' s financial solvency. The first uses a structural procedure to compare current account deficits relative to an optimal benchmark using the Campbell-Shiller's methodology. The second uses a reduced form approach to test for intertemporal budget constraint through cointegration tests between imports and exports plus net transfer payments on foreign obligations. Our results suggest that the current account imbalances for Cameroon based on data from the period 1970-2002 are "excessive" and the deficits are currently unsustainable.

Keywords: Current account; Sustainability; Intertemporal budget constraint; Cointegration; Stationarity; Ponzi scheme
JEL Classifications: C51; C54; F32; F35; F37

1. Introduction

Monitoring current account deficits is an important concern for any economy. The priority given to this objective has a double purpose: identify any situation, in which the country might become bankrupt, that is, unable to pay off their foreign debt and ensure the national intertemporal solvency. High rates of foreign indebtedness constitute the principal source of current account imbalances in most developing countries. In Cameroon, these imbalances had been generated by an increase in the stock of the country's foreign debt whose service constituted a heavy burden relative to the national available resources. As a matter of fact, Cameroon was qualified in 2000 to the Enhanced Heavily Indebted Poor Countries Initiative (HIPCI) launched by the IMF and the World Bank group to relieve the foreign debt of HIPCI-qualified countries, under some set of prerequisite conditions. Besides, it has happen repeatedly that countries are cut off from the world capital markets because potential creditors had perceived them to be bad risks (Obstfeld and Rogoff, 1996). It is therefore essential to know whether current account data offers any relevant signal of national bankruptcy and take necessary measures to avoid it. The question to know to what extent the public authorities of Cameroon are undertaking "suitable" budget policies in this regard is therefore important for the design and evaluation of current and future macroeconomic policies.

The purpose of this paper is to empirically investigate the sustainability of current account deficits for Cameroon. In order words, analyze the evolution of foreign debt to check the sustainability on one hand and find whether the economy is able to sustain international financial obligations in the long run on the other. The former consists in comparing the levels of the current account deficits relative to an optimal bench-mark path of current account balances computed up front (Campbell and Shiller, 1987). The latter involves testing the intertemporal budget constraint using a cointegration approach which has been broadly discussed in the literature (Hamilton and Flavin, 1986). However, assessing the possibility of national bankruptcy is a very difficult matter for many reasons. First, it is hard to forecast future national output, and the share of the output that the country is willing to devote to the repayment of its foreign obligations maybe limited. Secondly, in the African context, economic

policy decisions are highly affected by some social parameters (such as political instability, corruption) that traditional quantitative analysis would fail to capture. The present work is therefore intended to capture only relevant facts that are economically and/or financially identifiable.

Many approaches have been used to evaluate the sustainability of current account deficits. Amongst the existing approaches, we first use one that focuses on answering the question of whether the current account deficits have been "excessive". This involves using a model that gives predictions about the equilibrium paths of current account imbalances and evaluates the discrepancy between actual deficits and theoretically predicted ones. The corresponding framework is a macroeconomic model with free capital mobility where the consumption behaviour (which is a random walk or a Martingale), determined according to the certainty equivalence principle, relies on the quadratic permanent income hypothesis (Ljungqvist and Sargent, 2004). These popular approaches that have been used in this context in the literature are the Campbell (1987) and Campbell and Shiller (1987) methodology which was further extended by Sheffrin and Woo (1990), Otto (1992), and Ghosh (1995) and Ghosh and Ostry (1995) also applied the test to a sample of developing countries. The strategy consists in using a vector autoregression (VAR)[1] analysis to estimate the consumption-smoothing current account which is the negative present discounted value of the expectation of changes in national cash flows (defined as output net of investment and government expenditure). Taking the predicted optimal path of the current account obtained from the VAR as a benchmark, the actual current account deficits is then compared to this benchmark to determine whether deficits have been excessive. This method provides a measure based on deviation from the optimal benchmark and can be used to evaluate the extent to which a given path of current account deficits is closed to unsustainability. Since this method relies (i) on structural assumptions some of which might not be compatible with the economic structure of some developing countries such as Cameroon, and also that (ii) (Kasa 2003) pointed out that the present value test of current account depend sensitively on the nature of trend specification, we complement the analysis with a non structural approach. This second method is solely based on the econometric analysis using unit root and cointegration tests of the long term relationship between quantities that directly affect current account imbalances: imports, exports and net transfer payments on foreign obligations. The tests determine whether a country is likely to sustain its current account deficits without defaulting on its foreign debt. This approach is borrowed from the seminal work of Hamilton and Flavin (1986) who established that sustainability re-quires that the stock of debt be stationary. The idea was further developed by Wilcox (1989) who came to the conclusion that the intertemporal budget constraint would hold only if the debt is stationary around a zero mean. Hakkio and Rush (1991) showed that with a stationary interest rate, testing for sustainability is equivalent to testing for the cointegration between government revenues and government total expenditures. The method was later extended by Quintos (1995) who introduced the notions of "strong" and "weak" sustainability. He further pointed out that the cointegration criterion is only a sufficient (but not a necessary) condition for sustainability, the necessary and sufficient condition being that the current account deficits remain lower than the growth rates of foreign indebtedness. Husted (1992) tested for cointegration between exports and im-ports plus interest payments abroad using a methodology similar to that of Hakkio and Rush (1991).

The rest of the paper is organized as follows. In section 2 we formally derive the conditions required for the sustainability of the current account deficits and then elaborate the concept of intertemporal solvency which link current account imbalances with intertemporal trade balance. In section 3 we develop the framework of the test of the stochastic small-country current account model which set the basis for the estimation of a benchmark for current account balances. We also provide a methodology to test for the sustainability criterion through unit root and cointegration tests for the reduced form approach. Section 4 describes data and presents empirical results. Section 5 concludes.

[1] Apart from this basic present value model of current account, other structural tests use small open economy RBC model to nest the present value model (Nason and Rogers, 2006); refine the cross equation restriction identification (Kano, 2008) or test the present value model with time-varying relative prices and habits in preferences (Bergin, 2013)

2. Current Account Dynamics, Sustainability and Intertemporal Solvency

To model the current account dynamics, we use Husted (1992) framework that implies a long-run relationship between exports and imports (See also Arize 2002). The theoretical basis of the model is an intertemporal balance model that examines the behavior of the stock of foreign debt to determine where a country's intertemporal budget constraint is satisfied. The current-period budget constraint at time t is given by :

$$C_t + I_t + G_t + B_t = Y_t + (1+r_t)B_{t-1}$$

where C_t, Y_t, I_t and G_t are consumption, output, investment and government expenditure respectively; r is a one-period interest rate and B_t is the stock of foreign claims (which can be positive or negative) available to the consumers. In an open economy, the following national account identity also holds:

$$Y_t - C_t - I_t - G_t = X_t - M_t = TB_t$$

where X_t and M_t are the exports and imports, respectively; TB_t is the economy trade balance at time t, representing the net amount of output the economy transfers to foreigners.
Therefore,

$$\begin{aligned} B_t &= (1+r_t)B_{t-1} + (Y_t - C_t - I_t - G_t) \\ &= (1+r_t)B_{t-1} + (X_t - M_t) \\ &= (1+r_t)B_{t-1} + TB_t \end{aligned} \qquad (1)$$

Since the budget constraint must be satisfied each period, forward iterating (1) gives:

$$B_t = -\sum_{i=1}^{\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}TB_{t+i} + \lim_{j\to\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}B_{t+i}$$

This implies that conditional on information at time t, the current debt can be written in terms of future expected trade balance schemes as:

$$B_t = -E_t\sum_{i=1}^{\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}TB_{t+i} + E_t\lim_{j\to\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}B_{t+i} \qquad (2)$$

where E_t is the mathematical expectation conditional on the information available at t. For the intertemporal budget constraint to hold, the following transversality condition needs to hold:

$$E_t\lim_{j\to\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}B_{t+i} = 0 \qquad (3)$$

It states that the present discounted value of the expected foreign debt should tend to zero as time tends to infinity. When this condition is satisfied, we have the intertemporal budget constraint:

$$\begin{aligned} B_t &= -E_t\sum_{i=1}^{\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}TB_{t+i} \\ &= -E_t\sum_{i=1}^{\infty}\prod_{j=1}^{i}(1+r_{t+j})^{-1}\left(Y_{t+i} - C_{t+i} - I_{t+i} - G_{t+i}\right) \end{aligned} \qquad (4)$$

Equation (4) states that the present value of the economy's expected transfers to foreigners most equal the value of the economy's initial debt to them. In other words, the country's initial foreign obligations should be paid through surpluses from the trade balance. If this condition fails to hold, this implies that the economy is continually borrowing to meet its interest payments on its foreign debt rather than transferring real resources to its creditors. This is why condition (3) is also called the Non-Ponzi-Scheme condition. This condition is also referred to as the intertemporal solvency condition for the country, a necessary and sufficient condition for the intertemporal budget constraint to hold.
Since the current account can also be written as:

$$\begin{aligned} CA_t &= r_tB_{t-1} + (Y_t - C_t - I_t - G_t) \\ &= r_tB_{t-1} + X_t - M_t = r_tB_{t-1} + TB_t = \Delta B_t \end{aligned} \qquad (5)$$

The intertemporal budget constraint also guarantees the sustainability of the current account.

3. Econometric Modeling

In this section we start by using the Campbell-Shiller method to construct an optimal benchmark for the current account balances which is a structural approach. We next test for the No-ponzi game condition using the cointegration approach to reduced form relationship between imports, exports and net transfers.

3.1 Structural approach: measuring the "excessive" deficits

Assume a linear quadratic permanent income hypothesis in the representative agent set-ting with capital mobility and efficient financial markets. In this setting, the consumption behaviour is a random walk or a Martingale determined according to the certainty equivalence principle (See Hall 1978). The martingale property for consumption is defined by

$$C_t = E_t C_{t+1} \qquad (6)$$

Assume a constant interest rate in the economy and define, for an arbitrary variable W, the variable $\tilde{W}$ by

$$E_t \tilde{W}_t = \frac{r}{1+r} E_t \sum_{i=0}^{\infty} \left(\frac{1}{1+r} \right)^i W_{t+i}$$

$\tilde{W}$ is the so-called permanent level of the variable W.

If we plug-in Equation (4) into (5) and use the martingale property for consumption given by Equation (6), we derive the following equation[2]:

$$CA_t = -\frac{r}{1+r} E_t \sum_{i=0}^{\infty} \left(\frac{1}{1+r} \right)^i (Y_{t+i} - I_{t+i} - G_{t+i}) + (Y_t - I_t - G_t) \qquad (7)$$

Which can be rewritten as:

$$CA_t = Z_t - E_t \tilde{Z}_t, \qquad (8)$$

where $Z = Y - I - G$ is the net output, that is, output less government consumption and investment. Rearranging the terms of Equation (7) yields:

$$CA_t = -\frac{r}{1+r} E_t \sum_{i=0}^{\infty} \left(\frac{1}{1+r} \right)^i \Delta Z_{t+i} \qquad (9)$$

To test for Equation (9) and compute predictions of the current account, the Campbell's (1987) approach consists in estimating a first-order vector autoregressive (VAR) model defined by:

$$\begin{bmatrix} \Delta Z_t \\ CA_t \end{bmatrix} = \begin{bmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \end{bmatrix} \begin{bmatrix} \Delta Z_{t-1} \\ CA_{t-1} \end{bmatrix} + \begin{bmatrix} \grave{o}_{1t} \\ \grave{o}_{2t} \end{bmatrix} \qquad (10)$$

The model's prediction of the current account is derived by

$$\hat{CA}_t = -\begin{bmatrix} 1 & 0 \end{bmatrix} \left(\frac{1}{1+r} \Psi \right) \left(I - \frac{1}{1+r} \Psi \right)^{-1} \begin{bmatrix} \Delta Z_t \\ CA_t \end{bmatrix} \qquad (11)$$

where Ψ is the matrix of the VAR coefficients (ψ_{ij}) and I is the 2×2 identity matrix. The actual current account deficits will be considered ``excessive'' if the variable $\hat{CA}$ is statistically distant from CA.

3.2 Reduced form approach: testing for cointegration

The starting point of the reduced form approach is Equation (2), which combined to Equation (5) yields the following equation

[2] see (Obstfeld and Rogoff 1995, p1784-1787)

$$CA_t = r_t B_{t-1} + X_t - M_t$$
$$= -E_t \sum_{i=0}^{\infty} \prod_{j=1}^{i} \left(\frac{1}{1+r_{t+j}} \right) \Delta TB_{t+i} + E_t \lim_{j \to \infty} \prod_{j=1}^{i} \left(\frac{1}{1+r_{t+j}} \right) B_{t+i} \qquad (12)$$

Following Hakkio and Rush (1991) we assume that the interest rate is stationary.[3] If the exports and the imports are integrated of order 1, that is are I(1), then the trade balance is stationary and so is the first term of the right hand side of Equation (12). In this case, a sufficient condition for the current account deficit to be stationary is that the second term of the right hand side of equation (12) vanishes, that is, the condition of Equation (3) is satisfied. Equation (12) can therefore be written in the following reduced form regression model

$$X_t^* = \alpha + \beta M_t + \eta_t \qquad (13)$$

where $X_t^* = X_t + r_t B_{t-1}$ represents total exports plus interest payments abroad and η_t is an error term. Under the null hypothesis that the economy satisfies the intertemporal budget constraint, the model must satisfy two conditions: $\beta = 1$ and η_t stationary. In other words, we need to test for the former and the later will be true if X_t^* and M_t are cointegrated given that they are both $I(1)$ in the first place (see Hakkio and Rush, 1991).

If X_t^* and M_t are not cointegrated, the intertemporal budget constraint cannot hold and the current account deficit is not sustainable. If there is cointegration but $\beta < 1$, the economy is said to be ``weakly'' sustainable as the transversality condition may still not hold.

4. Empirical Results

4.1 Data and descriptive statistics

The data used in this work are yearly time series from the sample period of 1970-2002. The data are taken from the World Development indicators dataset of the World Bank group. Preliminary conversion work has been performed on the data to synchronize the base years of deflators and the currency units used. Figure 1 depicts the evolution of the current account deficits for the period 1970-2002. The graphic exhibits a period of high fluctuation between 1971 and 1992, a period during which the economy registered dramatic deficits of its current account. This situation could partly be explained by difficulties faced by Cameroon which was confronted with a hard economic environment during the seventies and the eighties due to successive increases in the oil prices.

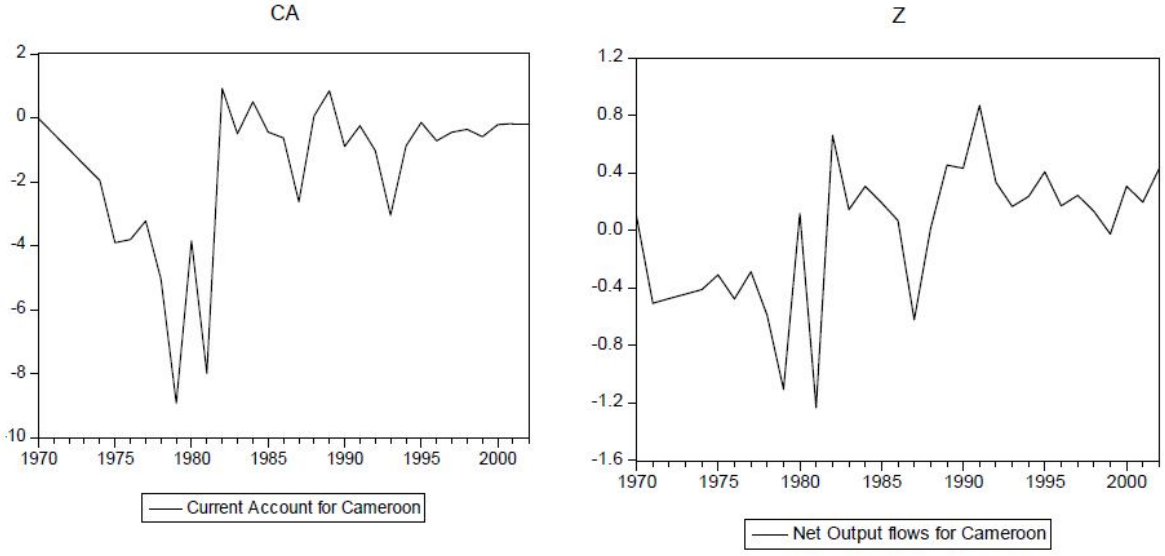
The implied deterioration of the terms of trade caused by oil crises resulted in a fall of the demand for exports good from the industrialized countries. Besides, international interest rates were continuously increasing, making the repayment of the debt service a continuously heavier burden. On the other hand, the real sector was similarly also characterized with continuous deficits in the net output.

At the beginning of the Eighties, the international creditors granted Cameroon the possibility to reschedule most of its foreign debt that was close to maturity. This situation gave some room to the public finances, involving a significant reduction of the current account deficit during this period meanwhile some surpluses in the net output began to surge (see Figure 1).The nineties where characterized with better achievements relative to the previous periods, especially at the end of the decade (1996-2002). But, as illustrated in the Figure 1, the beginning of this decade was stained with economic difficulties, mainly due to three major factors: the political move of Cameroon to a multiparty system which involved movements of civil rights and civil disobedience for at least four consecutive years (1990-1994), crippling the country's economy. During the same period a devaluation of the national currency(whose exchange rate was pegged to the French currency) was imposed to the country by its foreign partners including France, thus generating the short run negative effect implied by the so-called ``J curve'' scheme. A corollary of this economic turmoil was the collapse of the public

[3] This assumption was tested using a sample of interest rate over the period 1980-2002 and failed to reject.

sector that resulted to drastic wages cuts together with layoffs of significant proportion of civil servants.

Figure 1. The evolution of Current Account deficits and Net output in Cameroon



4.2 Econometric results

4.2.1 Actual versus predicted accounts

We estimate the VAR model of the Campbell's approach described in Section 3.2. The VAR(1,1) was estimated with annual data and an annual real interest rate of r = 0.05, representing the average interest observed during the period, was used to form the1×2-matrix given in equation (11). Estimation results are presented in Table 1.

The VAR characterizing the Cameroon data obtain is :

$$\begin{bmatrix} \Delta\hat{Z}_t \\ \hat{CA}_t \end{bmatrix} = \begin{bmatrix} -0.56 & -2.03 \\ -0.04 & 0.79 \end{bmatrix} \begin{bmatrix} \Delta Z_{t-1} \\ CA_{t-1} \end{bmatrix} \qquad (14)$$

with an $R^2 = 0.45$ and a global statistical significance of the model (see Table 1 in for detailed results).

Figure 2 pictures both the actual and the predicted current account balances for Cameroon. As we can see from this graph, the model shows divergence between actual and predicted current account patterns in the Cameroon data. There is little variability in the predicted current account balances while the actual current account deficits are very variable. The high shifts recorded in the actual current account deficits relative to the predicted ones suggest that the deficits should be considered as ``excessive''. This pattern is further investigated and confirmed with a statistical test of the discrepancy between the two series, $\hat{CA}_t$ and CA_t. To see this, we use the estimated version Equation (11) which can be rewritten as

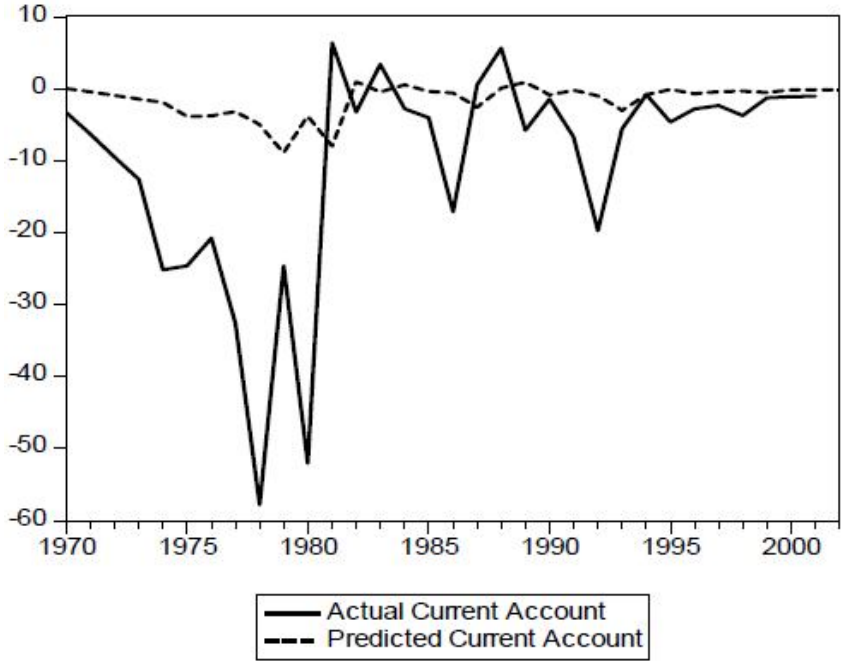
$$\hat{CA}_t = \begin{bmatrix} \Phi_{\Delta Z} & \Phi_{CA} \end{bmatrix} \begin{bmatrix} \Delta Z_t \\ CA_t \end{bmatrix}. \qquad (15)$$

The estimated coefficients are $\begin{bmatrix} \Phi_{\Delta Z} & \Phi_{CA} \end{bmatrix} = \begin{bmatrix} -13.33 & 5.14 \end{bmatrix}$, which formally reject the $\begin{bmatrix} 0 & 1 \end{bmatrix}$ null hypothesis at the 5% significance. In other words, the underlying short run fluctuations in the net output do not match the short run fluctuations of the spending.

Table 1. Structural estimates of the present-value model for the current account

VAR Estimates for current account CA_t and net output Z_t			
Parameter	Estimate	Stand.Dev	T-stat
ψ_{11}	-0.564	0.144	-3.912
ψ_{12}	-2.939	0.658	-3.101
ψ_{21}	-0.039	0.028	-1.399
ψ_{22}	0.795	0.130	6.114
	$R^2 = 0.45$	$F - stat = 23.914$	Number obs. = 31
Estimating the benchmark $\hat{C}A_t$ and testing for $\hat{C}A_t = CA_t$			
Parameter	Estimate	Stand.Dev	T-stat
$\Phi_{\Delta Z}$	-13.331	4.283	-3.111
Φ_{CA}	5.145	0.847	-6.075
	$R^2 = 0.344$	Number of obs. = 31	
Test for $H_0 : [\Phi_{\Delta Z} \quad \Phi_{CA}] = [0 \quad 1]$ $Wald - stat = 26.171$			

Figure 2. Actual and Predicted current account balances for Cameroon



The results provided here assess the deviation of the Cameroon current account deficits from an optimal benchmark structurally derived from a model that assumes perfect capital mobility and efficient financial markets. One may then argue that when using this method as a basis of policy evaluation it is not clear whether deviations from the benchmark is rather related to market imperfections such as borrowing constraints which characterize developing economies like Cameroon or to inappropriate economic policies per se. To further convince ourselves about the relevance of the above results, we complement the analysis with and check their consistency with reduced form results that do not rely on structural assumptions.

4.2.2 Reduced form results

We started by performing unit root tests over the variables under consideration. They are many such tests in the literature, but we limit our work on Augmented Dickey-Fuller (ADF) stationarity tests. We perform the tests on levels and first differences in order to determine the orders of integration of the variables studied. Figure 3 shows the evolution of imports and exports over the sample period. A graphical analysis clearly suggests that those series cannot be stationary in levels. However, the observation of the graphic for their differences is tricky and requires referring to the formal unit root test.

Figure 3. The evolution of Imports and Exports in Cameroon

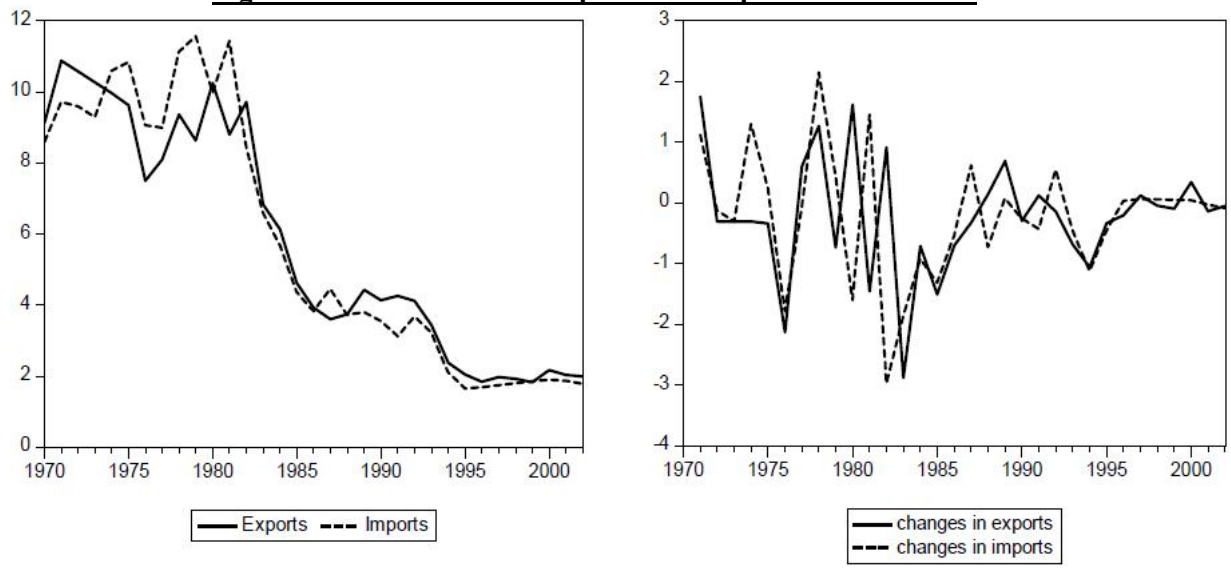


Table 2 shows the results of the stationarity tests and the corresponding orders of integration retained. As mentioned above, both series are not stationary as the ADF unit roots t-statistics yields to the non rejection of the null hypothesis of unit roots. On the other hand the changes of imports are stationary as well as the changes in exports.

This tells us that imports and exports are integrated of other 1 that is, $I(1)$ even though the exports are just "mildly"' stationary (See Phillips and Magdalinos, 2007). However, they are not cointegrated as confirmed by the Johansen-Juselius tests of cointegration (see Table 2). It also follows that the error term η in the model specification (13) cannot be stationary. Therefore, the model cannot qualify for sustainability. Furthermore, the test for the null hypothesis $\beta = 1$ is rejected at 5% significance level. Thus, the necessary conditions (that is, integration of order 1 of the series) are satisfied but the sufficient condition (that is, cointegration and $\beta = 1$) for sustainability is not. The conclusions of the testing procedure are contained in Table 2.

Our empirical findings using reduced form estimation therefore suggest that the current account deficit of Cameroon is not sustainable. This result is consistent with the one obtained from the structural approach produced earlier.

From reduced form analysis of the criteria of Current Account deficit sustainability, it appears evident how critical the importance of trade balance in influencing the intertemporal solvency is in Cameroon. Our results show that in Cameroon, sustainability of the current account deficit can be attributable to the sustainability of exports financing sources (the changes in exports are just 'mildly' stationary). Adequate policies to improve the trade balance and remedy the situation should therefore focus on this sector.

Table 2. Summary Results for the stationarity and cointegration tests

Stationarity Tests			
Variables	Stationarity of levels	Stationarity of first difference	Order of integration
X_t^*	t-stat=-0.575	t-stat=-0.7282	
	critical=-3.95	critical=-2.64	$I(1)$
	decision=No	decision=Yes	
M_t	t-stat=-0.728	t-stat=-5.284	
	critical=-3.95	critical=-2.64	$I(1)$
	decision=No	decision=Yes	
Sustainability tests			
Cointegration between	trace-prob=0.325	Max-eigen prob=0.753	Sustainability rejected
X_t and M_t	critical=0.05	critical=0.05	
	decision=No	decision=No	
$\beta = 1$	Chi2 prob=0.004	F-prob=0.006	
	critical=0.05	critical=0.05	
	decision=No	decision=No	
For the Johansen cointegration test, both trace and maximum eigenvalue statistics are considered.			
Only results for the case of no hypothesized correction error are reported. Other results are similar.			

5. Concluding Remarks

The purpose of this study was to analyze the sustainability of the current account deficits of Cameroon. We started by testing the present value model hypothesis by applying the Campbell and Shiller methodology. Our results show high shifts and variability recorded in the actual current account deficits relative to the predicted ones, suggesting that the current account deficits for Cameroon should be considered ``excessive''. We next employed a Hakkio and Rush (1991) procedure to test for the intertemporal solvency of the economy which is a necessary and sufficient condition for current account sustainability. The procedure used here is to test for cointegration between imports and exports plus net transfer payments on foreign debt service. Stationarity tests reject the possibility of cointegration. A cointegration test based on Johansen-Juselius's method further confirm the rejection of this assumption, thus asserting that there exists no long run equilibrium relationship between real exports and imports. Our empirical investigation therefore suggests that the current account of Cameroon violates the intertemporal budget constraint and is unsustainable.

The analysis suggests that the unsustainability in Cameroon is mainly due to the weakness of real exports that fail to sufficiently support the equilibrium of the trade balance. Sound policies regarding the improvement of the trade balance through exports are needed. One way to cope for this setback is to stimulate sectors of the economy that are likely to produce high exportable added values. Such sectors include agriculture, mining, natural resources extraction and fisheries (INS 2009).Trend of machinery, equipment, seeds and fertilizers that are required to enhance those sectors could be made available and improved through economic restructuring and endeavours to provide a sustainable substitution to raw material imports. A basic requirement to achieve such a goal would be the creation of a favourable environment for private businesses and entrepreneurship, the instauration of secure land tenure and enforced property right for farmers and agricultural investors.

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