AN EMPIRICAL EVALUATION OF NIGERIA'S INTER-TEMPORAL CURRENT ACCOUNT SOLVENCY

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Abstract

This paper sets out to assess the state of capital mobility in Nigeria through the inter-temporal solvency approach. It is an attempt to identify the extent to which actual current account movements have deviated from what is considered optimal for international competitiveness. From this, one can infer a balance between export and import flows and the need to adopt macroeconomic policies necessary to ensure a sustainable external position. The results indicate the existence of a long-run equilibrium relationship between imports (including net investment income and transfers) and exports. However, in terms of current account sustainability, the results indicate otherwise. The presence of a structural break in the relationship between imports and exports is observed.

Keywords: Current account, capital mobility, Nigeria, sustainability.

JEL Classification: F32, F41.

1. INTRODUCTION

The world is often described as a global village in a sense that reflects the level of integration of world economies. Goh (2007), notes that the world economy has gone through significant transformations which resulted in a more integrated system via capital mobility. Integration is a product of liberalization movements around the world which manifest themselves in the form of reduced regulation of cross-border capital flows. A more integrated financial network on the other hand is a catalyst for a more efficient allocation and use of resources. According to Islamaj (2008), as a country becomes more liberalized, more of income risks are transferred to the world markets in or-

der to smooth consumption. Ghosh and Ostry (1995) argue that it is logical to employ a consumption-smoothing model to measure international financial integration. Ghosh and Ostry draw on the notion that, under high capital mobility, a nation's current account should serve as a buffer to smooth consumption in the face of shocks to output, investment, and government expenditure. Jordan and Stanford (2005) also note that the current account position indicates more than the merchandise balance between residents and non-residents. It is a measure of the extent to which an economy is a net borrower or net lender with the rest of the world. Therefore, researchers have resorted to investigate the solvency and sustainability of current account as a way to determine financial integration and consequently capital mobility.

Ostry (1997) documents three ways to identify if current account position of a country is problematic or not. First, inter-temporal solvency requires debt to be repaid in the future. If a country has the ability to cover its present trade deficits by expected future trade surpluses, then, the country is technically solvent. Second, sustainability of current account with an external deficit does not necessitate an immediate change in monetary or fiscal policy, or results in a balance of payments crisis. Third, is a model of optimal borrowing and lending which is based on consumption-smoothing. The consumption-smoothing model highlights how an economy can smooth consumption or protect consumption during temporary periods of shocks to national cash flow. Goh (2007) argues that the popularity of consumption-smoothing model is its simplicity. The model assumes capital mobility as well as the permanent income theory of consumption. Several researchers such as Ghosh (1995), Ghosh and Ostry (1995), Obstfeld and Rogoff (1995), Agenor et al. (1999), Fountas and Wu (1999), Bergin and Sheffrin (2000), Apergis et al. (2000), Adedeji (2001), Cashin and McDermott (2002) and Holmes (2006) had employed the model in one form or the other.

Karunaratne (2008) refers to the proponents of an activist policy targeting high current account deficits as scholars of the defunct paradigm of the static Keynesian-Mundell-Fleming (KMF) school of thought. According to Karunaratne, under the new paradigm, high current account deficits should not be a matter for policy concern. The rationale is based on the Australian experience over several years. This argument is shared by Roubini (2001). However, Ozer and Coskun (2011) note that current account imbalances represent an indicator of economic fragility. Other researchers, such as, Apergis et al. (2000) argue that persistent current account deficits can trigger financial crisis, an increase in domestic interest rates, a rapid depreciation of domestic currency and exert excessive burden on a country's future generations through a reduction in living standards.

Nigerian policymakers began an economic liberalization program in the 1980s in an attempt to open the economy to the outside world to promote international competitiveness. There is a shortage of empirical study of Nigeria's international financial integration. Adedeji (2001) is the only researcher who employs the consumption-smoothing approach to explore the issue of capital mobility focusing solely on Nigerian data. His sample period covers only 1960 through 1997. Thus, there is a need to explore the subject matter using updated data. Therefore, the first objective of this paper is to assess the state of capital mobility in Nigeria through the inter-temporal solvency approach. Moreover, this attempt is to identify the extent to which actual current account movements have deviated from what is optimal for international competitiveness. From this, one can infer a balance between export and import flows and the need to adopt macroeconomic policies necessary to ensure a sustainable external position.

2. BACKGROUND

The Nigerian government embarked on stabilization and economic adjustment policies in the 1980s in an attempt to move the economy from a regulated to a market-oriented one (Udah, 2011). In the early 1980s, there was a severe pressure on Nigeria's balance of payments. The situation was further complicated by increased debt service burden and accumulated trade arrears. The impact on the economy was devastating because it worsened the unemployment level in the face of acute shortage of inputs necessary to sustain a satisfactory industrial production (Ayadi et al., 2006, 2008). In view of a catalog of economic problems facing the Nigerian economy, the government embarked on a structural adjustment policy (SAP) with the following key objectives.

(i)   To restructure and diversify the productive base of the economy so as to reduce dependence on the oil sector and imports;
(ii) To achieve a fiscal and balance of payments viability;
(iii) To lay the basis for a reasonable non-inflationary growth; and
(iv) To lessen the dominance of unproductive investments in the public sector, improve the sector's efficiency and intensify the growth potential of the private sector.

The main strategy designed to achieve these objectives include an adoption of a realistic exchange rate policy, liberalization of external trade and payment system, and, adoption of appropriate policies in all sectors with greater reliance on market forces. Others include a reduction in administrative controls, and rationalization and restructuring of public expenditures

and custom tariffs. Ikhide and Alawode (2001), Udah (2011) and Uneze and Ekor (2012) contain a comprehensive discussion of the sequencing of SAP in Nigeria. They note that the program which began with the establishment of a second-tier foreign exchange market (SFEM) was augmented with several other reform efforts. For instance, in 2003, the National Economic Empowerment and Development Strategy (NEEDS) was introduced to build and promote comprehensive policies to support economic growth and development as well as a healthy external account position (Udah, 2011).

According to Udah (2011) in 1977, the Nigeria's current account deficit as a percentage of GDP was 3 percent. By 1978, it rose to 10 percent and peaked at 15 percent in 1982. For many years, the current account deficit exceeded the 5 percent threshold. However, most of the 1980s saw the current account in the positive territory, but this was short-lived as deficit reappeared in 1993 and continued to climb to about 10 percent in 1998. Olanipekun (2012) notes that there were 27 years of current account surplus between 1960 and 2008. According to the author, imbalances in Nigeria's current account position are attributed to fluctuations in oil prices. More importantly, the frequent current account deficits exhibit an expansion of domestic absorption which could not be met with domestic supply. The Nigerian current account in proportion to GDP from 1977 through 2010 is shown in Figure 1.

Figure 1: *Current account to gdp 1977-2010*
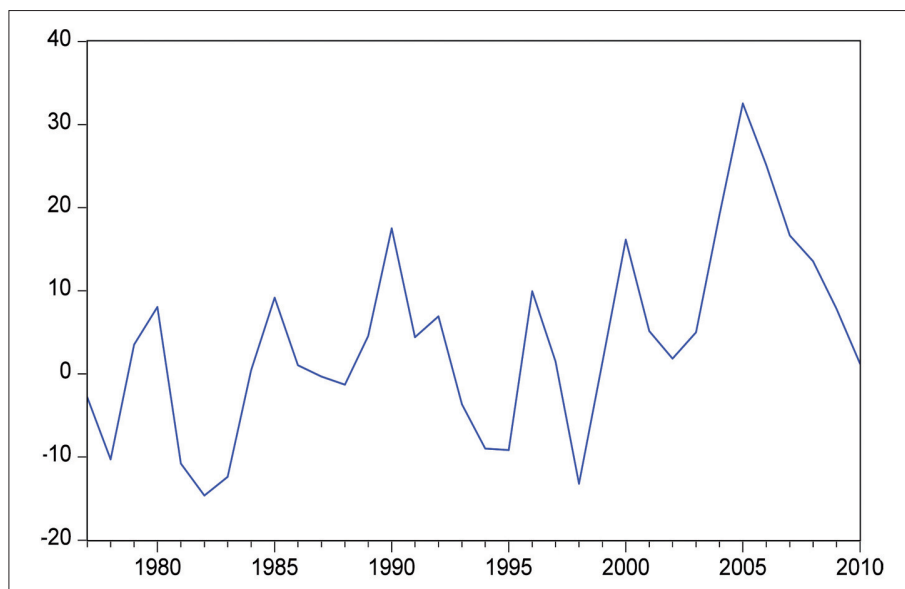
3. THEORETICAL MODEL

The theoretical model for testing the sustainability of current account is based on Hakkio and Bush (1991) and Husted (1992). An open economy is assumed to face the following budget constraint for each period:

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

Where Y_t represents output; B_t represents international borrowing; I_t represents investments; C_t represents consumption and r_t represents world interest rate. The budget constraint in Equation (1) must be satisfied for all periods. Therefore, it can be iterated forward to form an intertemporal budget constraint which is represented by the following equation:

$$B_t = \sum_{i=1}^{\infty} \mu_i \left[Y_{t+1} - C_{t+1} - I_{t+1} \right] + \lim_{n \to \infty} \mu_n B_{t+n}$$ [2]

Where $\mu_i = \prod_{j=1}^{i} \dfrac{1}{1 + r_{t+j}}$ and $Y_t - C_t - I_t) =$ Trade Balance (Exports less Imports)

Equation (2) states that the amount borrowed (lent) by a country, in international financial marketplace, is present value of the future trade surpluses (deficits) conditional on last term of the equation converging to a zero value. However, if the last term is non-zero and B_t is positive, then a "bubble financing" is implied by the external debt position. On the other hand, if B_t is negative, the implication is that welfare level can be improved if a country lends less (Husted, 1992; Ogus-Binatli and Sohrabji, 2012). Bubble financing refers to a situation in which borrowing diverges from the upper limit that is implied by intertemporal budget constraint. If bubble financing is observed, it means that a country's current account is not sustainable. By assuming a stationary world interest rate, Hakkio and Rush (1991) and Husted (1992) further manipulated Equation (2) to obtain:

$$EX_t = \alpha + MM_t - \lim_{i \to \infty} \frac{B_{t+1}}{(1 + r)} + \varepsilon_t$$ [3]

Where EX represents exports of goods and services and MM represents imports of goods and services plus net investment income plus net transfer payments.

If the last term in (3) vanishes, the remainder of the equation can be written as:

$$EX_t = \alpha + \beta MM_t = \varepsilon_t \qquad\qquad [4]$$

According to Hakkio and Rush (1991) and later Kalyoncu (2005), under the null hypothesis that the intertemporal budget constraint is satisfied in the economy, $\beta = 1$ and ε_t would be a stationary series. If exports (EX) and imports (MM) are nonstationary in levels, then a cointegration between them, is interpreted as satisfying the intertemporal budget constraint. The results of the aforementioned contegration test between EX and MM can help to reveal critical information about current account sustainability. Ozer and Coskun (2011) note that the current account is not sustainable if EX and MM are not cointegrated. However, if EX and MM are cointegrated and the cointegration coefficient, β is less than unity, current account is not sustainable because imports are growing faster than exports in the economy. Finally, if EX and MM are cointegrated and β is equal to unity, then current account is said to be sustainable. Roubini (2001) argues that the intertemporal budget constraint of a country puts a mild restriction on how a country's current account evolves. He argues further that a country is sovent if the discounted value of foreign debt is non-zero in the infinite limit because a country cannot increase its external debt faster than real interest cost on the debt. Given the intertemporal budget constraint, solvency is achieved by any current account path that guarantees the equality between the infinite sum of all current accounts and the initial external debt of a nation. Therefore, it is possible for a nation to run large current account deficits and still be solvent.

4. METHODOLOGY

Many attempts to apply econometric methods to time series are geared at evaluating the long-run equilibrium relationship within a dynamic framework. Thus, two time series are co-integrated if there is a long-run equilibrium relationship between them. In order to apply the co-integration method, the time series stationarity properties are first examined. The concept of stationarity is important in model building. If a model is based on past realizations of a time series, then a researcher assumes implicitly that there is some regularity in the process that generates the time series. This concept of regularity in the time series is what is referred to as stationarity. In a more technical form, a stationary time series is one whose mean and variance are con-

stant across time (Ayadi, 2005). The data used in this study are annual real imports plus net investment income and net transfers [MM] and real exports [EX] (in USD and well as percentage changes) from 1970 through 2011. The time series data are obtained from the International Monetary Fund (IMF).

The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992) test which is employed in this paper is based on modeling a time series as the sum of one stationary and one non-stationary component and testing the null hypothesis that the variance of the non-stationary component is zero. The trend stationary null is rejected when the KPSS statistic is larger than the approximate critical values tabulated in Kwiatkowski, Phillips, Schmidt, and Shin (1992). The KPSS test starts with a model of the form:

$$y_t = \beta' D_t + \mu_t + u_t \tag{5}$$

Where

$$\mu_t = \mu_{t-1} + \varepsilon_t \qquad \varepsilon_t \sim WN(0, \sigma_\varepsilon{}^2) \tag{6}$$

Note that D_t contains deterministic components such as a constant term or a constant and time trend terms. The error term in (6) is integrated of order zero which implies that the error term is stationary. Thus, under the KPSS test, the null hypothesis that y_t is stationary is consistent with $H_0 : \sigma_\varepsilon^2 = 0$. The KPSS statistic is the Lagrange multiplier (LM) for testing $H_0 : \sigma_\varepsilon^2 = 0$ against the alternative that $H_0 : \sigma_\varepsilon^2 > 0$.

Once the two variables, y_1 and y_2 have been determined to be non-stationary, a long-run equilibrium relationship between them implies that their stochastic trends are linked. This means that the two variables cannot move independently of each other (Enders, 1996). To test whether or not the series, y_1 and y_2 are co-integrated, the following regression equation is estimated by ordinary least squares:

$$y_{1t} = \alpha + \beta y_{2t} + z_t \tag{7}$$

The residuals from (7) are tested to determine if they have a unit root. Dolado et al. (1991) note that the parameters of Equation (7), may not be constant through time. To deal with the situation, Gregory and Hansen (1996) developed a co-integration approach which deals with occurrence of structural breaks in the intercept as well as in the slope. In this paper, three models of the Gregory-Hansen test are employed.

Model GH-1: Level Shift

$$Y_{1t} = \alpha_1 + \alpha_2 D(t_0) + \beta y_{2t} + z_t \tag{8}$$

Where $D(t_0)$ is a dummy variable such that $D(t_0) = 0$ if $0 < t \leq t_0$ and $D(t_0) = 1$ otherwise.

Model GH-2: Level Shift with Trend

$$Y_{1t} = \alpha_1 + \alpha_2 D(t_0) + \alpha_3 f + \beta y_{2t} + z_t \tag{9}$$

Where f is the trend

Model GH-3: Regime Shift (Intercept and Slope Coefficients)

$$Y_{1t} = \alpha_1 + \alpha_2 D(t_0) + \beta_1 y_{2t} + \beta_2 y_{2t} D(t_0) + z_t \tag{10}$$

The test of co-integration is done by testing for unit roots in the residuals from the aforementioned equations for GH-1, GH-2 and GH-3. The null hypothesis of no co-integration and no structural break is rejected if the augmented Dickey-Fuller statistic is smaller than the corresponding critical value. In the event that the variables are cointegrated, the long-run equilibrium relationship is estimated using the fully modified ordinary least squares (FMOLS) proposed by Phillips and Hansen (1990).

5. EMPIRICAL RESULTS

Table 1contains the results of the application of KPSS stationarity test. These results suggest that all variables are integrated of order one [I(1)]. This implies that the variables possess unit roots and can be stationary if they are differenced once.

Table 1: *KPSS Unit Root Test Results*

Variable	KPSS Statistic	Reject Null?
EX$ (Level)	0.171	Yes
EX$ (First Difference)	0.084	No
EX% (Level)	0.107	Yes
EX% (First Difference)	0.038	No
MM$ (Level)	0.175	Yes
MM$ (First Difference)	0.153	No
MM% (Level)	0.125	Yes
MM% (First Difference)	0.500	No

Note: The null hypothesis is that the variable under consideration is stationary.

Given that the sampled series are non-stationary with the same order of integration, the Johansen cointegration test is applied to determine if a long-run equilibrium relationship exists between each pair. At a significance level of one percent, the results reported in Table 2 show that exports and imports possess a long-run equilibrium relationship, indicating that the Nigerian current account deficit is *prima facie* sustainable during the sample period.

Table 2: *Johansen Cointegration Test Results*

Hypothesized # of CEs	Max. Eigenvalue Statistic	Trace Statistic	5% Critical Value	Probability
Panel A: EX$ and MM$				
None*	33.217	36.625	(14.265)[15.495]	0.000
At Most 1	3.408	3.408	(3.842)[3.842]	0.065
Panel B: EX% and MM%				
None*	21.957	25.053	(14.265)[15.495]	0.002
At Most 1	3.095	3.095	(3.841)[3.841]	0.079

Note: * denotes the rejection of null hypothesis at the 5 % confidence level. Both the Max Eigenvalue and the Trace tests indicate one cointegrating equation.

Table 3 shows that the estimated cointegration coefficients are negative which according to Bahmani-Oskooee and Rhee (1997) imply that Nigeria is in violation of its intertemporal budget constraint. However, this interpretation will be misleading if there is a shift in the long-run equilibrium relationship between imports and exports as a result of a structural change.

Table 3: *Johansen Cointegration Coefficient Results*

Variables	β	SE	$H_0 : \beta = 1$
EX$ and MM$	-1.35	0.037	-63.51*
EX% and MM%	-1.35	0.137	-17.15*

Note: * indicates rejection of null hypothesis (strong sustainability) at the 5% confidence level.

To explore the issue of structural change, the Gregory-Hansen (1996) residual-based test of cointegration is employed. The results, reported in Table 4, show the existence of cointegration with a structural break occurring around 2002 through 2003.

Table 4: *Gregory Hansen Cointegration Test Results*

Variables	t-statistic for:		
	Model 1: LS	Model 2: LST	Model 3: RS
EX$ and MM$	-4.867 (1990)	-4.422 (1990)	-5.844 (2003)
EX% and MM%	-5.648 (2002)	-5.238 (2003)	-5.446 (2002)

Note: LS stands for Level Shift, LST stands for Level Shift with Trend, and RS stands for Regime Shift.

Several researchers, including, Park and Phillips (1988), Phillips and Durlauf (1986) have argued that the performance of estimators of cointegrating vectors based on static regressions is adversely affected by the existence of second-order biases resulting from endogeneity of the regressors and/or serial correlation and heteroscedasticity in the error terms. The fully modified ordinary least squares (FMOLS) approach proposed by Phillips and Hansen (1990) is a robust tool for dealing with these biases. The results of the FMOLS test are reported in Table 5.

Table 5: *FMOLS Test Results*

Dependent Variable: Exports in dollars (EX$)			
Independent Variables	Coefficient	t-statistic	$H_0 : \beta = 1$ (Equation 4)
Constant	-1.97E+09	-2.09*	
Imports in dollars (MM$)	1.373	31.91*	Reject Null
Dependent Variable: Exports in Percentage (EX%)			
Independent Variables	Coefficient	t-statistic	$H_0 : \beta = 1$ (Equation 4)
Constant	-3.475	-0.83	
Imports in Percentage (MM%)	1.286	8.87*	Do Not Reject Null

Note: * indicates rejection of null hypothesis (strong sustainability) at the 5% confidence level.

The FMOLS results show a positive relationship between imports and exports. However, $H_0 : \beta = 1$, which is a test for the strong form of sustainability of Nigeria's current account position is only supported when imports and exports are defined in percentage changes. In terms of dollar amount the current account position of Nigeria is not sustainable during the sample period.

6. SUMMARY AND CONCLUSION

The Nigeria's current account deficit as a percentage of GDP has created some level of uneasiness for researchers as well as policymakers for many years. In 1978, it was 10 percent and peaked at 15 percent in 1982. For many years, the current account deficit exceeded the 5 percent threshold. However, most of the 1980s saw the current account in the positive territory, but this was short-lived as deficit reappeared in 1993 and continued to climb to about 10 percent in 1998. Olanipekun (2012) notes that there were only 27 years of current account surplus between 1960 and 2008 and that actions are needed to reverse this trend. Ozer and Coskun (2011) note that between the 1990s and 2000s, most of the financial crises around reveal the role of persistent and rising current account deficits. Therefore, it is critical to determine if Nigeria's situation has risen to the level that requires the use of policy tools to regulate it current account.

By employing both the Johansen and Gregory Hansen cointegration tests, an attempt is made to explore the long-run equilibrium relationship between exports and imports in the Nigerian economy from 1970 through 2011. The objective of this paper is to determine if there is a long-run equilibrium relationship and also to explore the sustainability of Nigeria's current account position during the period. The results indicate the existence of a long-run equilibrium relationship between imports and exports. However, in terms of current account sustainability, the results indicate otherwise. The presence of structural break in the relationship between imports and exports is observed. The results in this study imply that Nigeria exports increase by more than a dollar for every dollar increase in imports. This result is consistent with previous reports on why Nigeria goes through boom and bust cycles depending on what happens in the international market for oil Nigeria's only major export product. A solution to Nigeria's current account sustainability resides in the creation of a *rainy day* reserve account which should be used to cushion the effects of revenue shortages during periods of shortfalls. More importantly, Nigeria should learn from the experience of Australia as reported by Karunratne (2008), that a policy regime shift was effectively introduced with the floating of the Australian currency. The management of the Nigerian currency had witnessed several policy reversals in recent times. These policy reversals are a source of instability with consequences for Nigeria's current account. The solution should rest is allowing the market to function with minimum interference by policymakers in the foreign exchange market. The Nigerian currency should be allowed to freely float as is the case in Australia.

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Résumé

Ce papier dispose évaluer l'état de mobilité de capitale au Nigeria par l'approche de solvabilité inter-temporelle. C'est un essai doit identifier la mesure à laquelle les mouvements de balance des paiements réels ont dévié de ce qui est considéré optimal pour l'esprit de compétition international.

De cela, on déduira une balance entre l'exportation et importera des écoulements et le besoin d'adopter des macropolitiques économiques nécessaires de garantir une position externe durable. Les résultats indiquent l'existence d'un rapport d'équilibre de longue course entre les importations et les exportations. Pourtant, du point de vue de la balance des paiements sustainability, les résultats indiquent autrement. La présence d'interruption structurelle du rapport entre les importations et les exportations est observée.