



**A DERIVATION OF THE
OPTIMAL CURRENT ACCOUNT BALANCE
FOR BARBADOS, JAMAICA AND
TRINIDAD AND TOBAGO**

by

ALWYN JORDAN

and

SUNIELLE STANFORD
Research Department
Central Bank of Barbados
P.O. Box 1016
BRIDGETOWN

Presented at the 26th Annual Review Seminar
Research Department
Central Bank of Barbados
July 26-29, 2005

**A DERIVATION OF THE OPTIMAL CURRENT ACCOUNT BALANCE FOR
BARBADOS, JAMAICA AND TRINIDAD & TOBAGO**

by

Alwyn Jordan and Sunielle Stanford

Abstract

How can monetary authorities or policy makers determine whether the current account balance is problematic? One approach is based on the intertemporal consumption-smoothing model. From a theoretical viewpoint, the economy should be able to rely on the current account (through capital flows) to smooth out aggregate consumption in the event of shocks to national cash flow. This approach refers to the intertemporal consumption-smoothing model (or simply consumption-smoothing) and incorporates the permanent income theory of consumption. But does this theoretical perspective apply in reality? This paper utilises the intertemporal consumption-smoothing model – which is used to derive the optimal current account - to answer these questions. The optimal current-account model is applied to Barbados, Jamaica and Trinidad & Tobago. Once this model has been derived, it is then compared with actual current account balances and more stringent statistical tests to indicate the efficacy of the model. The important finding in this study is while the optimal consumption-smoothing model is not applicable to Barbados, in contrast, the optimal model that assumes no restrictions on capital flows is valid for Jamaica and Trinidad & Tobago.

I. INTRODUCTION

An analysis of the current account balances during the mid-1970s to early 2000s, for Barbados, Jamaica and Trinidad & Tobago reveals that all three countries have experienced widening current account imbalances (Charts 1 – 3 in Appendix A). In the strictest sense, a current account deficit is not necessarily problematic and moreover, may not be a sign of macroeconomic instability. The literature identifies three methods to determine whether a current account position can be deemed problematic. These are intertemporal solvency, sustainability and the model of optimal borrowing and lending (Ostry, 1997). The concept of intertemporal solvency only requires debt to be repaid in the future, so once a country has the ability to cover its present trade deficits by expected future trade surpluses, then technically the country is solvent. Ostry (1997) notes that policy makers find the intertemporal solvency criteria too limited since it does not impose sufficient restrictions on the build up of external debt over the medium term.

With regard to sustainability, a current account is said to be sustainable if external deficits do not necessitate an immediate change in monetary or fiscal policy or result in a balance of payments crisis. Conventionally, deficits 4% and over of GDP cause concern for policy makers and monetary authorities since large and unsustainable deficits place a strain on the level of the country's international reserves and moreover, have adverse implications for the country's ability to service its debt. While the ratio of the current account deficit to GDP serves as a benchmark for evaluating unsustainability, this ratio on its own, is a crude measure to assess whether a given external deficit is problematic.

This paper is particularly interested in the model of optimal borrowing and lending as it incorporates the consumption-smoothing model. The consumption-smoothing approach essentially seeks to explain how an economy can smooth out consumption or protect consumption during temporary periods of shocks to national cash flow, defined as GDP less private and public investment less government expenditure. Incorporated into this approach are the assumptions of high capital mobility and the permanent income theory of consumption. This suggests that these capital flows protect consumption when there are shocks to national cash flow. Furthermore, the current account position indicates more than the merchandise balance between residents and nonresidents. It also measures the extent to which an economy is a net borrower or net lender with the rest of the world. Hence it is essentially the current account (by means of capital flows) which is used to protect or buffer consumption amidst adverse changes to national cash flow. Within the consumption-smoothing framework, there is an inverse relationship between the current account and the expected movement in national cash flow. Thus, when a country's current account is in deficit, national cash flow is expected to grow and similarly, when the current account is in surplus, a fall-off in national cash flow is expected to follow. The intuition behind this inverse relationship is explained as follows: if national cash flow is expected to rise, then according to the permanent income theory, the country's optimal decision is to accumulate debt by borrowing against expected future increases in resources. This is achieved by running a current account deficit. Borrowing in stable periods makes sense, as this is the most likely time in which other countries would be willing to lend capital, since there is no perceived risk of the debtor country defaulting on

repayments. Thus, in line with the intertemporal consumption smoothing approach, the debtor country would be dissaving in the present period and consumption is maintained at a normal level by borrowing from abroad. In contrast, if there were an expected decline in national cash flow, then the country would increase its savings in the present time period. In this instance, the economy is said to be 'saving for a rainy day' and would thus run a surplus in order to maintain a normal level of consumption in a future time period.

The intertemporal consumption-smoothing model generates the optimal current account which can then be compared with actual current account data. If the two series do not move closely together, and specifically, if the actual current account has a larger deficit than the optimal current account, then this is suggestive that the current account balance can be deemed problematic. Thus, the aim of this article is to assess whether the intertemporal model of consumption smoothing is valid for Barbados, Jamaica, and Trinidad & Tobago, which on occasion have experienced current account imbalances in excess of the 4% of GDP benchmark. The intertemporal model is used over the other two methods since the model can be extended to incorporate countries with capital restrictions. Moreover, the intertemporal model can imply whether the deficit is the result of excessive private consumption spending.

The remainder of this paper is organised as follows: Section 2 presents the evolution of the current account balances for Barbados, Jamaica and Trinidad & Tobago over the periods 1970 – 2003. Section 3 provides a derivation of the optimal current account, while the following section reviews the literature on intertemporal consumption smoothing. Section 5 identifies the data and sources of data used in this research. Section 6 assesses the results and the final section contains some concluding remarks and policy implications.

II. EVOLUTION OF THE CURRENT ACCOUNT BALANCES FOR BARBADOS, JAMAICA AND TRINIDAD & TOBAGO

Barbados

Throughout the period 1970 to 2003, Barbados' current account balance fluctuated widely, mirroring the changes in the economy. The first half of the 1970s was characterised by substantial current account deficits as high prices for petroleum products led to a significant expansion in retained imports while exports of major commodities, particularly sugar, were virtually stagnant. From 1975-1980 the current account deficit improved due principally to higher export receipts, especially with respect to electronic components, as several component assembly plants were established. Additionally, continued expansion in tourism receipts boosted earnings in the services sector, and the stabilisation of oil prices during the period tempered the expansion in retained imports. Government also implemented measures to curb consumer demand in the first six months of 1976, which included the suspension of certain import licenses and the Central Bank imposed constraints on consumer instalment credit. The policies slowed consumer

import demand thereby tempering the growth in imports. The restrictions were later removed in 1979, in response to declines in consumer imports.

The deficit worsened again in 1981 partly in response to recessions in the US and the UK, two of Barbados' major trading partners. Exports plunged but imports rose sharply due in part to higher fuel prices internationally. Consequently, the government was forced to secure funding from the International Monetary Fund (IMF) in the fourth quarter of 1982. However, a change in fortunes, specifically with respect to tourism earnings and domestic exports, resulted in the current account moving from a large deficit to a surplus by 1985.

In contrast, the latter half of the 1980's was associated with declining exports and rising imports, which led to a steady deterioration in the external current account deficit. From 1986, the closure of the Intel plant caused a drastic fall in exports of electronic components, while protectionist measures put in place by regional markets contributed significantly to declining sales of clothing abroad. Sugar exports remained moribund, and there was moderate expansion in retained imports. These factors offset the growth in tourism receipts and by 1989 the Central Bank reintroduced credit controls to banks and other financial institutions to curb the rise in private sector credit. Consequently, banks were required to reduce their lending to the personal and distributive sectors by 5%.

Unfortunately, the rising political tensions in the Middle East, which precipitated the start of the Gulf War in 1991, caused a sharp contraction in tourist expenditure, leading to further worsening of the current account deficit and by extension the balance of payments.¹ This development prompted policy makers to drastically reduce credit availability and implement an 18-month Stand-by Arrangement with the IMF. As part of the programme, government implemented a set of measures aimed at reducing the fiscal deficit from an estimated 5.7% of GDP in fiscal year 1991/92 to approximately 1% of GDP in the following period.² Consequently, the fiscal deficit contracted by about 6 percentage points between 1990 and 1992, and the value of imports fell by 23% between 1991 and 1992, resulting in the current account moving from a deficit of approximately 1.3% of GDP in 1991 to a surplus of 9.0% of GDP in the following year.

From 1991-1997 Barbados recorded current account surpluses as tourist receipts expanded and import growth contracted. This marked the longest period since 1970 that current account surpluses were achieved. However, by 1997 the continuing rise in retained imports and an erosion in export earnings due, inter alia, to a loss of competitiveness caused a marked deterioration in the current account balance and this deficit has persisted to the present period.

¹ During this period the reserve cover declined to less than three weeks of imports.

² The measures included: the introduction of a Stabilisation Tax, an increase in national insurance contributions, an expansion in the employment levy, a reduction in import duty concessions and higher consumption taxes on certain categories of goods. Additionally, government reduced its expenditure by cutting the wages of civil servants by 8%, reducing its workforce and contracting capital spending. See, 'Summary of the Supplementary Budgetary Proposals September 1991', Central Bank of Barbados, Economic Review, December 1991, p.13.

Jamaica

Throughout the review period 1976-2002, the current account of Jamaica was characterised by large deficits, which resulted from a combination of external shocks and poor fiscal management by the respective governments. Between 1976 and 1978, Jamaica was forced to enter into a Standby agreement with the IMF, as the Organisation of Petroleum Exporting Countries (OPEC) induced oil crisis and a reduction in bauxite and alumina production,³ led to the almost complete exhaustion of the country's foreign exchange reserves. The stringent measures imposed to improve the country's BOP position, caused a partial improvement in the current account deficit. Unfortunately, the second oil price shock, which occurred in 1979, and the subsequent worldwide recession in the early 1980's, had a devastating effect on the current account, causing it to deteriorate from a deficit of -0.4% of GDP in 1977, to a high of -16% of GDP in 1984.

During the next four years, the deficit improved, as according to Hudson and Stennett (2003), the government's policy focus changed to increasing foreign exchange earnings through higher exports, while simultaneously containing aggregate demand. Consequently, goods exports and tourism receipts increased substantially and the current account improved to register a small surplus by 1988. From 1988 to 1992, the current account deficit varied widely as the after effects of Hurricane Gilbert and the jump in oil prices affected the economy. In 1988 the current account deficit improved as a result of higher tourism receipts and significant inflows for reinsurance claims due to Hurricane Gilbert. Unfortunately in the next two years, the deficit deteriorated, following a surge in imports (mainly fuel), reductions in net transfers and increased investment income outflows. On the contrary, between 1991 and 1992 the current account moved to a surplus, buoyed by, inter alia, contractions in certain categories of imports, higher tourism receipts and heightened transfers.

From 1992 to 1996, as Hudson and Stennett (2003a) note, the deficit improved due primarily to the liberalisation of the foreign exchange market and the opening of the capital account, which facilitated a reduction in the nominal exchange rate and led to heightened inflation, and significant monetary tightening. Unfortunately, from 1996 the current account balance progressively deteriorated due to declines in exports of goods such as garments, growth in consumer imports, fuelled to some degree by government's fiscal deficits, and the emergence of private sector dissavings in the final two years of the review period.

Trinidad and Tobago

The mid-nineteen seventies was marked by robust current account surpluses as high international prices paid for oil exports offset declining sugar prices and rising imports. However, from 1975-1978 continued expansions in retained imports, particularly capital goods, combined with contractions in sugar exports, the second largest category of exports,⁴ resulted in the current account surplus evaporating to almost zero.

³ The contraction in production levels was partly the result of government's attempts to obtain ownership interest and increase taxes in the bauxite and alumina industries.

⁴ As a consequence of both reduced production and declining international prices.

Despite the upturn in the merchandise and current account balances in 1979, which accompanied the oil price shock⁵, and an improvement in the price paid by the European Economic Community (EEC) for sugar exports, by the end of 1982 the current account recorded a deficit. This negative development was induced mainly by slumps in both oil and sugar prices, as well as growth in all categories of imports. The deficit continued to remain high (above 5% of GDP) in the next two years, as foreign firms repatriated profits, and fuel exports slid. However, the current account improved in 1985 reflecting the devaluation of the Trinidad & Tobago dollar which caused a marked reduction in imports on a US dollar basis. Additionally, the services balance also registered an upturn. Unfortunately, the current account remained in deficit between 1986 and 1989, as a result of the low level of world oil prices, which depressed export earnings.

The threat of war in the Gulf, propelled oil prices to their highest level in five years, and caused a turnaround in the current account in 1990. Consequently, the current account registered a surplus for the first time in ten years, as fuel exports surged, while imports contracted. However, in spite of measures aimed at improving the competitiveness of the country, including significant development of alternative fuel derived exports such as methanol, ammonia and urea, and the decision to let the TT dollar float against the US dollar in April 1993, the current account returned to a negative balance in 1997, as a consequence of rising import demand. The problem was further exacerbated in the following year due to the Asian Financial Crisis, which resulted in lower commodity prices for several of the country's main fuel and fuel-derived exports. Since the crisis however, a gradual recovery in world oil prices to above US\$20 per barrel, combined with further diversification of the oil sector into areas such as liquefied petroleum gas, resulted in current account surpluses between 1998 and 2002.

III. DERIVATION OF THE OPTIMAL CONSUMPTION-SMOOTHING CURRENT ACCOUNT

The analysis of the intertemporal consumption-smoothing model begins with the assumption of a small, open economy in which a consumer maximises his consumption:

$$E_t \sum_{j=0}^{\infty} \beta^j u(c_{t+j}) \quad 0 < \beta < 1 \quad (1)$$

where E_t is the expectations operator, c_t is private consumption, $u(\cdot)$ is a separable utility function such that $u' > 0$, $u'' < 0$, and β is the subjective discount factor.⁶ The world

⁵ Average crude oil prices rose by 133% in 1979. (Source: International Monetary Fund, International Financial Statistics)

⁶ For the purpose of empirical implementation, a quadratic utility function is chosen ($u(c_t) = c_t - c_t^2 / 2$, which requires that $c_t < 1$ for the marginal utility of consumption to remain positive) and the 'no Ponzi games' constraint is imposed. The quadratic approximation ensures that $u'''(\cdot) = 0$, which implies that the

interest rate, r , is exogenously determined. Letting b_t denote the stock of the economy's net foreign liabilities at the beginning of period t , y_t , i_t and g_t represent real output (GDP), public and private investment and government expenditure, respectively and Δ is the first difference operator, the consumer's budget constraint can be expressed as:

$$\Delta b_{t+1} = rb_t - (y_t - c_t - i_t - g_t) \quad (2)$$

Solving the dynamic optimisation problem in equations (1) and (2) yields the optimal level of consumption, c_t^* which is represented by:

$$c_t^* = (r/\Theta)[-b_t + (1+r)^{-1} E_t(\sum_{j=0}^{\infty} (1+r)^{-j} z_{t+j})] \quad (3)$$

where $\Theta = \beta r(1+r)/[\beta(1+r)^2 - 1]$ and $z_t = y_t - i_t - g_t$ is national cash flow. Equation (3) shows that consumption is proportional to expected wealth. Θ represents the consumption-tilting component of consumption and the magnitude of Θ informs about the consumption patterns of the economy. Since consumption represents a portion of permanent national cash flow, then Θ provides important information about the relationship between consumption and national cash flow. For Θ greater than 1, the country is tilting consumption towards the future, that is, experiencing a current account surplus or saving its reserves. For Θ less than 1, the country is tilting consumption to the present, or otherwise using up its reserves and running a current account deficit. Lastly, for Θ equals to 1, the economy is in equilibrium as consumption is equal to permanent national cash flow.

The current account is defined as GDP plus interest income on foreign assets less private and public investment, that is:

$$CA_t = y_t + rb_t - i_t - g_t - c_t = z_t + rb_t - c_t \quad (4)$$

Defining the consumption-smoothing component of the current account as $CA_t^* = z_t - \Theta c_t^* - rb_t$ and given that the current account equals stock of net foreign liabilities ($b_{t+1} - b_t$), then manipulating equations (2) and (3) gives

the consumption-smoothing component of the current account:

$$CA_t^* = -E_t[\sum_{j=1}^{\infty} (1+r)^{-j} \Delta z_{t+j}] \quad (5)$$

which mathematically explains the relationship between the current account and the present value of expected future changes in national cash flow. The above equation highlights how the current account acts as a buffer to smooth consumption in variables

optimal path for consumption is invariant to uncertainty over future consumption or the variability of income.

comprising of national cash flow. According to the interpretation of equation (5), when a country's current account is in deficit, then national cash flow is predicted to be positive. Economic agents can borrow since lenders of capital will be willing to provide credit to a country with a promising economic outlook. In such an instance, the residents of the country are borrowing against their expected future cash flow. In contrast, when the current account is in surplus, then national cash flow is expected to decline in a future time period, say, $t+1$, and economic agents will be inclined to "save/invest for a rainy day". Thus, the above equation reflects the intertemporal choices of residents of a country.

However, equation (5) is not empirically operational because the expression requires the researcher to be knowledgeable of the full information set of consumers' expectations. Campbell and Shiller (1987) explain that information on consumers' expectations is not required since the current account contains consumers' expectations of shocks to national cash flow. Callen and Cashin (1999) amended definition of national cash flow includes transfer payments less debt payments, $(z_t - rb_t)$. A VAR framework can then be used to estimate predicted changes in national cash flow. In the above derivation, where private consumption and national cash flow are stationary in first differences, there may exist a cointegrating relationship between the two variables. The residual from this cointegrating relationship is defined as the smoothed component of the current account (CA_t^{sm}). Since the smoothed-component of the current account is a linear combination of changes in national cash flow, assuming that national cash flow is stationary in first differences, the a priori assumption would be that smoothed component of the current account will be stationary in levels. Because this cointegrating criterion has been fulfilled, it is then possible to estimate the theory using an unrestricted Vector Autoregressive (VAR) model.

The VAR is estimated with the first difference of national cash flow and the consumption-smoothing current account and is expressed as:

$$\begin{bmatrix} \Delta(z_t^i - rb_t) \\ CA_t^{sm} \end{bmatrix} = \begin{bmatrix} \Psi_{11} & \Psi_{12} \\ \Psi_{21} & \Psi_{22} \end{bmatrix} \begin{bmatrix} \Delta(z_{t-1}^i - rb_{t-1}) \\ CA_{t-1}^{sm} \end{bmatrix} \quad (6)$$

which can be rewritten compactly as

$$x_t = \Psi x_{t-1} + \varepsilon_t \quad (7)$$

The k-step ahead expectation is $E_t(x_{t+k}) = \Psi^k x_t$ (8)

The optimal consumption-smoothing current account balance therefore becomes

$$\begin{aligned} CA_t^* &= -\sum_{j=1}^{\infty} \frac{1}{(1+r)^j} [10] \Psi^j x_t \\ &= -[10] \Psi / (1+r) \sum_{j=0}^{\infty} \frac{1}{(1+r)^j} \Psi^j x_t \\ &= -[10] [\Psi / (1+r)] [I - \Psi / (1+r)]^{-1} x_t \equiv \Gamma x_t \end{aligned} \quad (9)$$

The above analysis holds in the context of a small open economy in which there is high capital mobility. However, this assumption is not fully applicable in the countries being analysed. In Barbados, monetary authorities have historically exercised some degree of capital controls. In Jamaica, authorities implemented capital controls between 1989 and 1991 while in Trinidad & Tobago, there were restrictions on capital mobility prior to 1993. Thus equation (9) which is now termed the unconstrained model, can be adapted to include capital restrictions.

To implement the constrained current account model, the smoothed current account (\hat{CA}_t^{sm}) is decomposed into two separate components as follows:

$$\hat{CA}_t^{smP} = D_t^P \hat{CA}_t^{sm} \quad \text{where } D_t^P = \begin{cases} 1 & \text{if } \hat{CA}_t^{sm} > 0 \\ 0 & \text{if } \hat{CA}_t^{sm} \leq 0 \end{cases} \quad (10)$$

$$\hat{CA}_t^{smN} = D_t^N \hat{CA}_t^{sm} \quad \text{where } D_t^N = \begin{cases} 1 & \text{if } \hat{CA}_t^{sm} < 0 \\ 0 & \text{if } \hat{CA}_t^{sm} \geq 0 \end{cases}$$

where $\hat{CA}_t^{smP}(\hat{CA}_t^{smN})$ equals \hat{CA}_t^{sm} when \hat{CA}_t^{sm} is positive (negative) and $\hat{CA}_t^{smP}(\hat{CA}_t^{smN})$ is zero otherwise. $\hat{CA}_t^{smP}(\hat{CA}_t^{smN})$ indicates periods when national cash flow is temporarily low (high). Similarly, the variables Δz_t^P and Δz_t^N indicates periods of current account deficits and surpluses, respectively. The variables Δz_t^P and Δz_t^N are defined as:

$$\begin{aligned} \Delta z_t^P &= D_t^{zP} \Delta z_t \quad \text{where } D_t^{zP} = \begin{cases} 1 & \text{if } \Delta z_t > 0 \\ 0 & \text{if } \Delta z_t \leq 0 \end{cases} \\ \Delta z_t^N &= D_t^{zN} \Delta z_t \quad \text{where } D_t^{zN} = \begin{cases} 1 & \text{if } \Delta z_t < 0 \\ 0 & \text{if } \Delta z_t \geq 0 \end{cases} \end{aligned} \quad (11)$$

The optimal constrained current account is estimated using a four-variable VAR (Δz_t^P , Δz_t^N , \hat{CA}_t^{smP} and \hat{CA}_t^{smN}), which is compactly expressed as $X_t = \hat{\Psi} X_{t-1} + \varepsilon_t$, where $X_t = (\Delta z_t^P, \Delta z_t^N, \hat{CA}_t^{smP}, \hat{CA}_t^{smN})'$, ε_t is a 4x1 vector of error terms and $\hat{\Psi}$ is a 4x4 matrix of adjustment coefficients. Similar to equation (8), the k-step ahead expectation is $E_t(X_{t+k}) = \hat{\Psi}^k X_t$. The optimal constrained current account can be expressed as a nonlinear function of the VAR parameters:

$$\begin{aligned} \hat{CA}_t^{**} &= -[1100] [(1+r)^{-1} \hat{\Psi}] [I - (1+r)^{-1} \hat{\Psi}]^{-1} X_t \equiv \hat{\Phi} X_t \\ &\equiv [\hat{\Phi} \Delta_{z^P} \hat{\Phi} \Delta_{z^N} \hat{\Phi} \hat{CA}_t^{smP} \hat{\Phi} \hat{CA}_t^{smN}] X_t \end{aligned} \quad (12)$$

IV. LITERATURE REVIEW

In the literature surveyed, most researchers adopted an analytical framework similar to Campbell (1987) and applied the analysis to an open economy using present value models which incorporated the concept of intertemporal consumption-smoothing (or simply consumption smoothing). Campbell's work is based on the permanent income theory, according to which, household savings is equal to the expected present value of future declines in household income. Consumers use savings to smooth consumption over the periods when their income is expected to decline, and thus, economic agents 'save for a rainy day' when they expect a future decline in household income.

The main thrust of the papers reviewed was to determine whether the optimal current account served as a useful benchmark in judging the movement of the actual current account of selected countries. The systematic technique first required testing variables such as private consumption, national cash flow, and the current account for stationarity. This was followed by estimation using unrestricted Vector Autoregressive (VAR) methodology. In estimating this VAR, it was important to determine the level of world interest rates. Some authors made use of the conventional interest rate of 4%, while others imposed a restriction that the difference between the adjustment coefficients in the second column of a 2x2 matrix equalled $(1+r)$. Once the optimal current account had been achieved, formal tests of the validity of the consumption smoothing approach were conducted. These include: tests for Granger Causality, equality of variances and restrictions on the parameter estimates.

The paper by Sheffrin and Woo (1990) was based on the model of intertemporal allocation of consumption, and therefore the aim of the article was to establish whether the model was applicable to the sample of countries utilised. The model was applied to four developed countries – Belgium, Canada, Denmark and the United Kingdom for the sample period 1955 – 1985. For all the countries analysed, the variables net output (defined as GDP less the sum of investment and government purchases) was stationary in first differences and the current account (defined as GNP less the sum of consumption, investment, and government spending) was stationary in levels. It is important to note that the authors did not utilise current account data from the Balance of Payments citing that it "required an arbitrary allocation of some of the errors and omissions into the current account." Instead, the authors defined the current account as GNP less consumption, investment and government expenditure and transforming the data to real per capita terms. In estimating the unrestricted VAR, the change in national cash flow and current account were lagged for two time periods and interest rates of 4% and 14% per annum were utilised. The former rate, according to the authors was a standard estimate used and the latter interest rate was based on a study by Bernanke (1985) to explain the relationship between consumption and income. The findings indicated that the intertemporal model held for Belgium and Denmark. However, the model performed poorly for United Kingdom and Canada. In these countries, the current account appeared to be more volatile than the optimal current account. The authors explained these findings by suggesting that the response of United Kingdom's actual current account to the 1970s oil shock was so severe that it distorted the time series models. Additionally, there was no

explanatory power for the change in national cash flow in the unrestricted VAR. With regard to Canada, there was no conclusive explanation as to the poor performance of the model. In concluding, one of the observations outlined as a further area of research, involved the inclusion of oil reserves as an additional source of wealth, in the definition of cash flow.

Otto (1992) asked the question: Does the consumption-smoothing model have the ability to track the dynamic behaviour of the current account? The authors first tested the order of integration of the variables used in the VAR model. The tests were based on quarterly data from 1950:1 to 1988:4, for the United States and Canada. Results from the Augmented Dickey-Fuller statistics confirmed that the series private consumption expenditure, national cash flow, and national disposable income were integrated of order one, whereas the change in national cash flow and the current account were stationary in levels. As in the previous study, Otto (1992) did not utilise actual BOP current account data but rather derived the current account as national disposable income less private consumption. A world interest rate of 4.04% was used in the estimation of the optimal consumption-smoothing current account, as the view that the statistical outcome was independent of the value of the world interest rate was not supported in the paper. The author used a 5-lag VAR in the estimation of the optimal current account for Canada and a 4-lag VAR for the Canadian data. Moreover, the researcher posited that the sum of the coefficients on the lagged values of the current account should be negative to capture the inverse relationship between the current account and national cash flow. The results for United States indicated that the forecasted optimal current account tracked the actual de-meaned current account closely, with a correlation value of 0.932. Despite this, the restrictions imposed by the model did not hold. Similar to United States, the results for Canada were based on the change in national cash flow and the current account estimated in deviations from their means. The results however, were not robust – the restrictions of the model were rejected, the Granger causality criteria was only statistically significant at the 20% level, and the correlation between the predicted and actual current account was 0.735.

The study by Ghosh and Ostry (1995) was an analysis of the optimal consumption smoothing and actual current account balances for a cross-section of forty-five developing countries in Africa, Asia, Middle East, Latin America and the Caribbean. The data were annual observations covering the period from the late 1950s until as late as 1990. In order to estimate the actual current account, the authors first obtained the value of the consumption-tilting parameter (θ)⁷ from a cointegrating regression between private consumption and national cash flow. The authors computed the world rate of interest based on the restriction of the difference between the adjustment coefficients in the second column of a 2x2 matrix. Lastly, formal statistical tests - Granger Causality, equality of variances and restrictions – were conducted. The findings varied for all the

⁷ The consumption tilting parameter is defined as a constant proportion of consumption and represents the consumption patterns of the country. If the parameter value is less than 1, the current account is in deficit, if the value is greater than 1, the current account is in surplus and for a value of 1, national cash flow would be at a permanent level and thus there would be no need to protect consumption from shocks to national cash flow (Callen and Cashin, 1999).

countries tested. The authors noted that the Granger Causality tests confirmed that the current account helps predict changes in national cash flow in approximately 60% of the sample and hence, the sign of the coefficient had the expected a priori negative sign indicating that the country runs a current account surplus when national cash flow is expected to decline in the future. Of interest to note, in the case of Jamaica, the current account failed to Granger Cause changes in national cash flow. With regard to the restrictions of the model, the parameter estimates for national cash flow were close to zero and the restriction for the current account were close to unity, as required by theory. In testing the equality of variances, the null hypothesis that the country was able to smooth consumption amidst shocks failed to be rejected for most countries. The researchers therefore concluded that there was not “any systematic tendency for actual current account movements to be smaller than optimal movements, as would be the case if there were generalized effective barriers to international capital movements.”

Unlike the Ghosh and Ostry (1995) study, the paper by Callen and Cashin (1999) was the only paper surveyed which imposed restrictions on capital flows in their derived consumption-smoothing model. Another important development was the authors’ definition of national cash flow, which encompassed current transfers from abroad and debt payments ($z_t - rb_t$). The article focused on the sustainability of India’s current account balances over the period 1950/51 – 1998/99 and one of the approaches used to assess this was the intertemporal model of the current account. As in previous studies, actual balance of payments data was not utilised but instead the consumption-smoothing component of the current account (CA_t^{sm}) was derived by the cointegrating relationship between private expenditure and national cash flow. The residuals from this equation were used as the (CA_t^{sm}) series. This estimation was achieved by using the Phillips and Hansen (1990) Fully Modified (FM) approach. The unconstrained methodology followed that of previous studies, whereby the smoothed component of the current account was estimated along with the change in national cash flow in an unrestricted VAR. To derive the constrained consumption-smoothing component of the current account, the authors first made the assumption that there were capital restrictions on the inflow of capital but none on capital outflows. (CA_t^{sm}) was then decomposed into two parts, (CA_t^{smP}) and (CA_t^{smN}), representing periods of temporarily low cash flow and high cash flow, respectively. Similarly, the variable change in national cash flow (Δz_t) was decomposed into periods when the current account was in surplus (Δz_t^p) and when the current account was in a deficit (Δz_t^N). Thus, the constrained current account estimated a 4-variable unrestricted VAR to derive the optimal current account. The results confirmed that the intertemporal solvency model performed adequately in tracking India’s current account deficits over the 40-year period. However, as expected for an open developing economy with capital controls, the constrained consumption-smoothing current account tracked the actual current account more accurately in comparison with the constrained current account estimates.

The study on Current Account Sustainability in Jamaica by Hudson and Stennett (2003) followed a similar estimation procedure (the intertemporal model) in deriving the optimal

current account as in previous articles surveyed. Similar to the article by Ghosh and Ostry (1995), the interest rate was determined by certain a priori restrictions on the optimal consumption-smoothing model. The consumption-smoothing component of the current account, for the period 1962 - 2002, was derived from the residuals of the cointegrating relationship between private expenditure and national cash flow but instead of using the FM approach as proposed by Callen and Cashin (1999), the authors employed a Vector Error Correction (VEC) framework. Unlike the other studies surveyed, the variables used in the VEC were logged. The results indicated that the derived intertemporal model tracked the current account adequately.

V. DATA

The paper utilises annual data over the periods 1975 – 2002 for Barbados, 1976 - 2003 for Jamaica and 1970 – 2001 for Trinidad & Tobago. The series: private consumption expenditure, government consumption expenditure, investment, current transfers, interest payments on foreign liabilities and real gross domestic (GDP) product were obtained from various issues of the Central Bank of Barbados’ “Annual Statistical Digest” and “Balance of Payments” publications, internal data collected in the Central Bank of Barbados’ Research Department (the Bank’s forecasting model), various issues of the Bank of Jamaica’s “Balance of Payments”, various issues of Central Bank of Trinidad & Tobago’s “Annual Statistical Digest” and the “Balance of Payments” publications and the International Monetary Fund’s (IMF) International Financial Statistics (IFS) CD-ROM. All data were deflated by the GDP deflator which were sourced from the IFS for the representative countries.

VI. ECONOMETRIC METHODOLOGY AND RESULTS

This research adopts the methodology by Callen and Cashin (1999). The first step in the methodology is to determine the order of integration of the series private consumption, national cash flow, the change in national cash flow and the smoothed component of the current account (CA_t^{sm}). The national cash flow definition adopted in Callen and Cashin (1990) is also similarly defined in this article, that is, national cash flow is the sum of real GDP and real current transfers less the sum of real public and private investment, real government expenditure and real debt payments. Table 1 in Appendix B, displays the Augmented Dickey Fuller (ADF) unit root test results for Barbados, Jamaica and Trinidad & Tobago. The results confirm with a priori expectations. In all three countries, the series private consumption and national cash flow are stationary in first differences, while the series change in national cash flow is stationary in levels. Because this cointegrated criteria is fulfilled, it is possible to proceed with deriving the consumption-smoothing model and thus, testing the order of integration of (CA_t^{sm}). There are two econometric methods to deriving (CA_t^{sm}) - the Fully Modified (FM)

approach and the VAR analysis using Error Correction Methods (ECM). While the FM procedure used by Phillips and Hansen (1990) shows less bias in comparison to the ECM, the authors confirm that both the FM framework and the ECM framework yield similar results and perform well in finite samples. Given this, the VEC framework – based on the cointegrating relationship between private consumption and national cash flow - is utilised. The residuals from the cointegrating relationship between private expenditure and national cash flow ($z_t - rb_t$) is equivalent to (CA_t^m) and the statistical tests for the order of integration shows that the series is stationary in levels. At this stage, a check for residual tests of normality, homoskedasticity and the absence of serial correlation confirm in each country, that the null hypotheses cannot be rejected.

The cointegrating parameters and the accompanying standard errors are reported below. The cointegrating parameter values are all less than 1, indicating that the countries have been tilting consumption towards the present, that is, experiencing current account deficits. This is the expected result, as is depicted in the graphs in Charts 1 – 3 in Appendix A.

Table 1
Cointegrating parameters and respective standard errors for Barbados, Jamaica and Trinidad & Tobago

Countries	Cointegrating parameter and standard errors between private consumption and national cash flow
Barbados	0.277748 (0.42007)
Jamaica	-0.192546 (0.02870)
Trinidad & Tobago	-1.470593 (0.19020)

Source: Authors' estimates
Standard errors are in parenthesis

To derive the optimal consumption-smoothing unconstrained current account, the unrestricted VAR framework is estimated which consists of the system of equations, the change in national flow and the smoothed component of the current account, described in equation (6). The unrestricted VAR is estimated with a lag of 1 time period and no intercept in the system of equations. As previously stated, Callen and Cashin (1990) extend the analysis to include the presence of capital controls in the model – this is expected to be particularly relevant to the Caribbean countries as all the countries used in the analysis have at some point in the review period implemented capital controls. Thus, equation (9) is used to estimate the unconstrained current account while equation (12) derives the constrained current account for the selected Caribbean countries. In both

estimations, a world interest rate of 4%⁸ is utilised. The matrix generated from equations (9) and (12) is then transformed to derive the optimal unconstrained and constrained current account time plots for each country. It is important to note that while for example, Ghosh and Ostry (1995) and Otto (1992), relied on a mathematical derivation of the current account, for the purpose of this study actual published current account data is utilised. Finally, the current account data is then compared with the optimal constrained and unconstrained current accounts (Charts 4 – 6).

Ghosh and Ostry (1995) notes that “the benchmark and actual current account series should be highly correlated” and values reported in the literature, for example, range between 0.735 to 0.932 for the unconstrained current account (Otto, 1992) and approximately 0.230 for the constrained current account (Callen and Cahin, 1999). The negative coefficient results for Barbados (Table 2 below), for both the unconstrained and constrained current account, indicate that the series move in an opposite direction to the current account, thus initially suggesting that Barbados' actual current account is not at an optimal level. However, the smaller coefficient for the constrained model suggests that this model performs better than the unconstrained model (Chart 4). Jamaica is the only country in the sample which has positive coefficients, indicating the best tracking of the optimal current account with the actual current account. The magnitude of the coefficient (0.472) initially suggests that the unconstrained current account tracks the actual current account better than the constrained current account (Chart 5). Similar to Barbados, the negative correlation coefficients for Trinidad and Tobago indicate the opposing movements between the series and Trinidad & Tobago's current account is not at the optimal level (Chart 6).

Table 2
Correlation estimates showing the relationship between actual current account and both the constrained and unconstrained current account.

Correlation between actual current account and:	Barbados	Jamaica	Trinidad & Tobago
Unconstrained current account	-0.427	0.472	-0.452
Constrained current account	-0.206	0.363	-0.421

Source: Authors' estimates

As Ostry (1997) notes, when the actual current account deficit is larger than the optimal current account deficit, it implies that there has been excessive private consumption – since the model explicitly incorporates the decisions of private agents to consume or spend. Given this interpretation, in the case of Barbados, the periods 1979 - 1983 and

⁸ The use of 4% of the world interest rate conforms to other studies by Callen and Cashin (1990), Sheffrin and Woo (1990) and Otto (1992).

then again from late 1996 - 2002, when the actual current account was in excess of both the constrained and unconstrained optimal current account, indicates periods of excessive consumption, and more specifically, because there is no restriction on capital inflows, this effectively amounts to periods of excessive external borrowing or capital investment to finance individuals' consumption. This excessive borrowing also means that it was more than predicted by the optimal current account. For example, in 2001, when the current account deficit was approximately BDS\$215 million, the country should have been experiencing a marginal deficit of approximately BDS\$4 million following the unconstrained current account and about BDS\$79 million for the constrained current account (Chart 4). The interesting feature in this graphical representation is the higher variability in the constrained current account in comparison with the unconstrained current account and moreover, this tentatively indicates that the constrained current account might perform better in tracking movements in actual current account data for Barbados.

Jamaica has revised its exchange controls policy several times over the sample period 1976 - 2003. For example, there was a flexible exchange rate system in place from January 1984 until November 1989 when monetary authorities fixed the exchange rate at J\$6.46 buying and \$6.50 selling to the US\$, thus imposing restrictions on capital flows. In September 1991 the Removal of the Restriction Order was implemented, thus ending restrictions on exchange controls.⁹ With the exception of 1992, the actual current account deficit exceeded both the optimal constrained and unconstrained current accounts (Chart 5). Again, this reflects excessive borrowing in the economy to facilitate private consumption. In 1992, the constrained current account dominates the graph, and this is indicative of the magnitude of the shock to national cash flow in the Jamaican economy. Despite this innovation, the optimal unconstrained current account tracks the actual current account better than the constrained current account.

With regard to Trinidad & Tobago, the variability of the current account has been greater than that suggested by the constrained and unconstrained current account (Chart 6). The periods in which the current account deficit is greater than both the unconstrained and constrained current account, as explained previously, indicates excessive private consumption whereas the current account surpluses being larger than the optimal unconstrained and constrained current account indicates that Trinidad & Tobago, was increasing its savings. It is difficult to rely solely on Chart 6 to determine which of the two optimal series gives a better path of the current account variability. This point is also evident from the close magnitude of the correlation coefficients in Table 2.

Based on the rudimentary techniques of visual inspection and correlation techniques, the constrained current account appears to be more appropriate for Barbados, whereas the unconstrained current account appears to be more appropriate for Jamaica and the results for Trinidad & Tobago are inconclusive. Once the optimal current account model has been derived, then a number of implications can be tested. These include tests for Granger Causality and equality-of-variances. The tests for Granger Causality (Tables 2 –

⁹ Bank of Jamaica, Foreign Exchange Rates and Foreign Exchange Management Policy Revisions, pp.1 – 19, <http://www.boj.org.jm>.

4 in Appendix B) are based on the analysis of incorporating the constrained and unconstrained framework. A priori expectations for the unconstrained framework is the current account (CA_t^{sm}) should predict changes in national cash flow (Δz_t). For the constrained model, where there are restrictions on capital outflows, the country is not a net lender of capital in the international market, and thus in that economy, saving is greater than consumption. Thus, the Granger causality assumption that (CA_t^{smP}) will signal a decline in national cash flow (Δz_t^N) is violated, and the alternative model, that (CA_t^{smN}) will signal a rise in national cash flow, (Δz_t^P) is the a priori expectation.

For Barbados, there is no evidence of Granger Causality in the unconstrained model. The null hypothesis of no Granger Causality was accepted for all tests conducted using various lag lengths. Table 2 reports the results of the first lag for the unconstrained model. Similarly, in the constrained model, there is no evidence of Granger Causality at the 10% level of significance. Although there is evidence of causality at the 10% level of significance (0.083), in the unconstrained model, the direction of causality is not according to theory. Unlike Barbados, in Jamaica's unconstrained model (Table 3), there is evidence of Granger Causality at the 10% level of significance. The result is interpreted as the current account in the current period will help predict changes in national cash flow four years later. The only significant relationship in the constrained model does not have the correct direction of causality and may indicate a feedback relationship. With regard to Trinidad & Tobago (Table 4), the unconstrained outcome clearly satisfies the a priori expectations. At the 1% and 5% levels of significance, the current account helps predicts changes in national cash flow after two years. At the 1% level of significance at 2 and 7 lags, the direction of causality is inconsistent with a priori expectations. However, findings at the 5% level of significance in the constrained current account fulfil expected criteria. In this case, a current account deficit in the current period will help predict an increase in national cash flow, in period t+7.

The second implication of equality of variances is tested for both unconstrained and constrained analysis, the following hypotheses are formulated:

1. $H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$
2. $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$

where σ_1^2 is the variance of the actual current account and σ_2^2 is the variance of the (un)constrained current accounts. The equality of variances results for each country is outlined in Table 5. The interpretation starts with the unconstrained model for each country. The calculation is estimated based on the F-test for differences in two variables. In Barbados and Trinidad & Tobago, the null hypothesis of equal variances is rejected. However, to determine whether the variance of the actual current account is greater than the unconstrained current account, the second hypothesis is tested. Since the reported calculated value (1966.98 for Barbados and 4.49 for Trinidad & Tobago) is greater than the critical value, the null hypothesis is rejected and we conclude that the actual variance

is greater than the unconstrained variance. With regard to Jamaica, since the calculated value (1.17) lies between the upper and lower critical value limits, the null hypothesis of equal variances cannot be rejected.

For the constrained model, the null hypothesis of equal variances is rejected for all three Caribbean countries. As before, to determine whether the variance of the actual current account is greater than the unconstrained current account, the second hypothesis is tested. In each case, the reported calculated value is greater than the critical value, therefore the null hypothesis that the actual current account variance is less than or equal to the constrained current account, is rejected in favour of the alternative hypothesis, indicating that the variance of the actual current account is greater than the variance of the constrained current account.

It is worth noting that the variance ratio between the actual and constrained current account for Barbados is smaller than the ratio of actual to unconstrained current account which is in line with the graphical output. However, this finding is not supported by tests for Granger Causality since the null hypothesis of causality is rejected in both the unconstrained and constrained models. These findings contrast to those for Jamaica and Trinidad & Tobago. The variance ratio between the actual and unconstrained current account is smaller for these countries – especially so in Jamaica - in comparison to the variance ratio between the current account and constrained current account. This outcome is depicted by the close tracking of the unconstrained current account in current account movements. Additionally, this result is clearly supported in Trinidad & Tobago, where there is clear evidence of Granger Causality (at the 1% and 5% levels of significance) using the unconstrained model and also evidence of Granger Causality (at the 10% level of significance) in Jamaica using the unconstrained model. Thus, these findings suggest that the optimal unconstrained consumption-smoothing model is more appropriate for Jamaica and Trinidad & Tobago. The likely explanation for this outturn, perhaps rests in the stage of capital controls present in the economies investigated. Although Jamaica and Trinidad & Tobago have had some level of capital restriction during the review period by the early 1990s, these countries had almost complete financial liberalisation.

VII. CONCLUSION

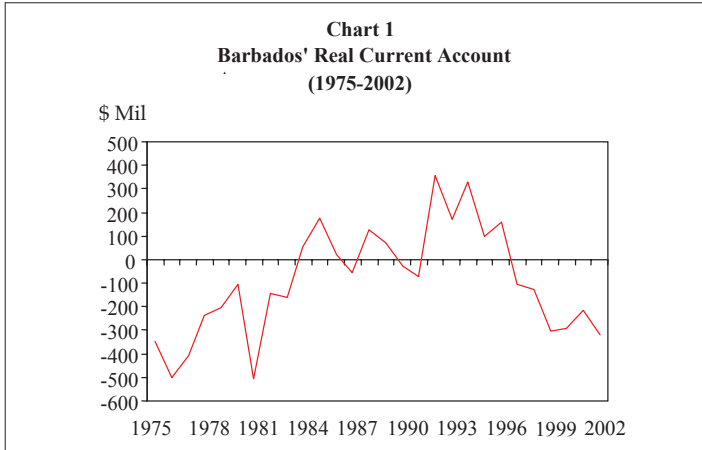
This article has tested whether the intertemporal model is valid for a selection of three Caribbean countries. One implication of the model is the current account should help protect consumption during periods of shocks to national cash flow, defined in this paper, as the sum of GDP and current transfers less the sum of real public and private investment, government expenditure and interest payments on debt. Since the intertemporal model is used to derive the optimal current account, then on a visual basis, the optimal current account serves as a benchmark to judge movements in the actual current account.

This study differs from the literature surveyed, because it utilises actual current account data as opposed to a mathematical construct for the current account. In the former case, the authors view this as having more operational relevance when comparing the optimal current account. The graphical representation for Barbados revealed that the constrained model tracked movements in the current account better than the unconstrained current account. On the contrary the opposite results were obtained for Jamaica and Trinidad & Tobago. In terms of interpretation, instances when the actual current account deficit was larger than the optimal current account would tend to indicate periods when there was excessive borrowing to finance private consumption. Periods when the actual current account surplus was larger than the optimal current account indicated that the country was building savings.

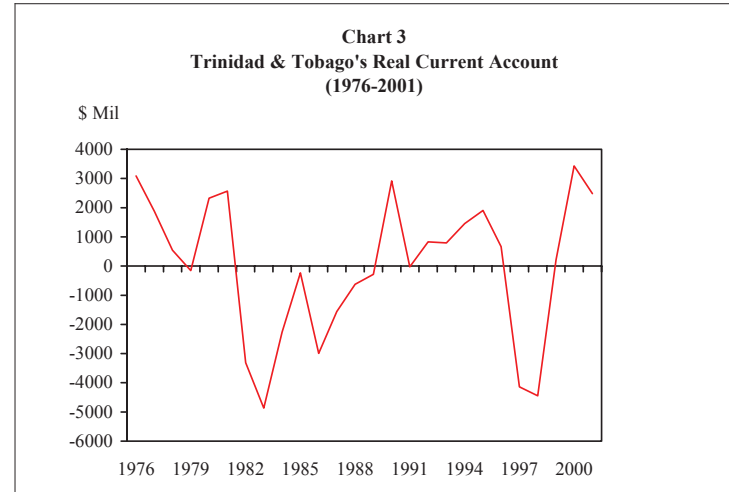
With regard to the statistical tests, in both the unconstrained and constrained models, there was no evidence of Granger Causality for Barbados. In both Jamaica and Trinidad & Tobago in the unconstrained model, the null hypothesis that the current account helps predict changes in national cash flow cannot be rejected. Additionally, there was evidence of equality of the variances for Jamaica using the unconstrained model. These critical statistical findings suggest that the consumption-smoothing model does not appear to apply to Barbados but there is evidence that the unconstrained consumption-smoothing approach is applicable to both Jamaica and Trinidad & Tobago. However, one of the main drawbacks of this study was the relatively short sample size employed. It is believed that longer time series may have added weight to the findings of Granger Causality and equality of variances in a higher portion of the sample.

This analysis has important implications for policy makers seeking to curtail widening current account imbalances. If the actual current account has a larger deficit than the optimal current account, then the current account is deemed problematic. Since the optimal current account gives an indication of where the country's current account position ought to be, policy makers must seek to implement measures to narrow the gap between optimal and actual current account balances.

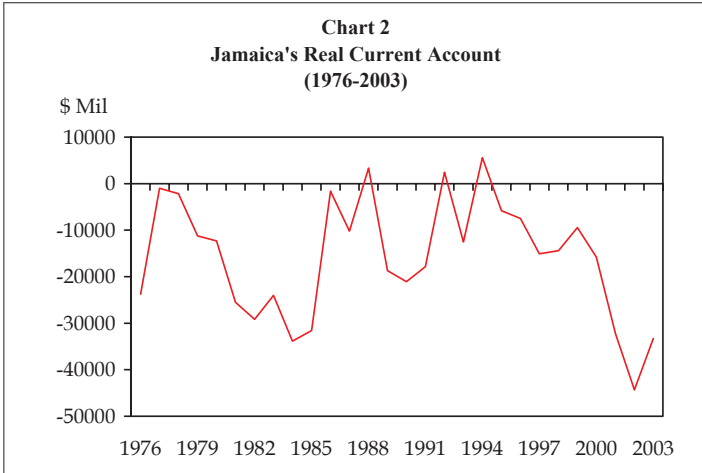
APPENDIX A



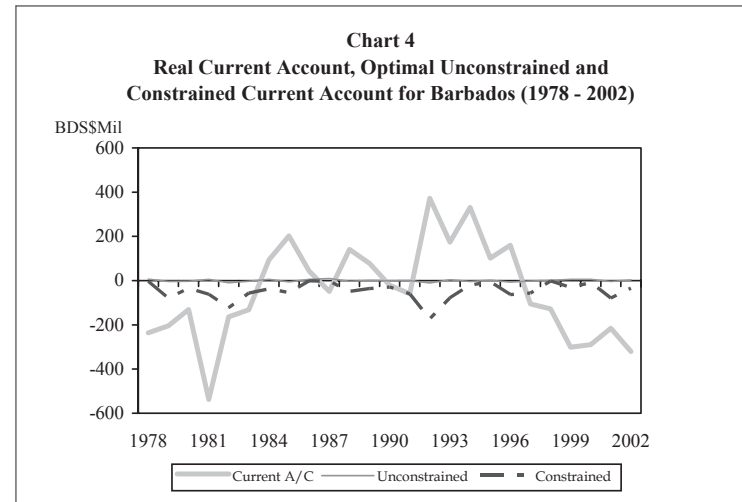
Source: Authors' estimates



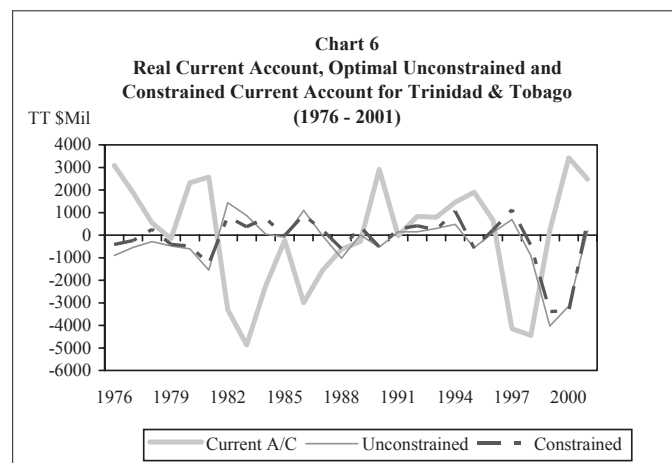
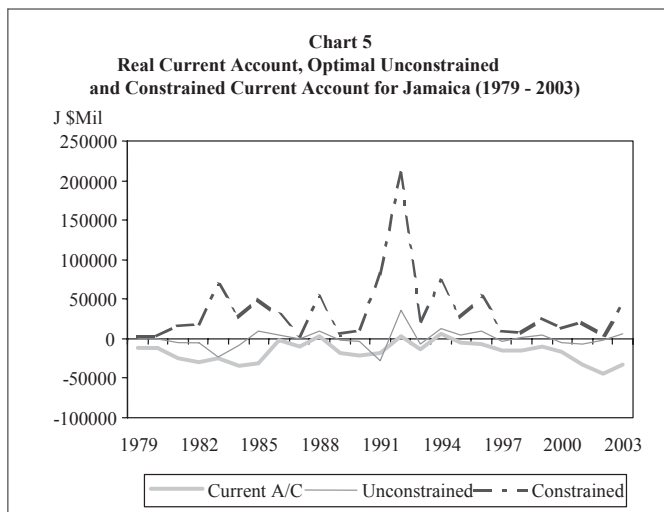
Source: Authors' estimates



Source: Authors' estimates



Source: Authors' estimates



APPENDIX B

Table 1
ADF Unit Root Results for Barbados, Jamaica and Trinidad & Tobago

	Variables	LEVELS		FIRST DIFFERENCE	
		Critical Values (5%)	ADF test statistic	Critical Values (5%)	ADF test statistic
Barbados	c_t	-1.954	0.391	-1.954	-4.062*
	z_t	-2.976	-2.856	-1.954	-5.457*
	Δz_t	-1.954	-5.457*	----	----
	CA_t^{sm}	-1.955	-6.394*	----	----
Jamaica	c_t	-1.956	2.322	-2.992	-4.984*
	z_t	-1.954	-1.713	-1.954	-6.521*
	Δz_t	-1.954	-6.521*	----	----
	CA_t^{sm}	-1.956	-4.022*	----	----
Trinidad & Tobago	c_t	-1.952	1.084	-1.952	-4.328*
	z_t	-3.568	-2.792	-1.953	-3.978*
	Δz_t	-1.953	-3.978*	----	----
	CA_t^{sm}	-1.953	-5.324*	----	----

Source: Authors' estimates

* Indicates stationarity at 5% level of significance

--- Test not conducted

Table 2
Granger Causality results for unconstrained and constrained current account models for Barbados

Lags: 1			
Null Hypothesis:	Observation s	F-Statistic	Probability
CA_t^{sm} does not Granger Cause Δz_t	24	2.342	0.141
Δz_t does not Granger Cause CA_t^{sm}		0.071	0.792
CA_t^{smN} does not Granger Cause Δz_t^P	24	2.822	0.108
Δz_t^P does not Granger Cause CA_t^{smN}		1.458	0.241
CA_t^{smN} does not Granger Cause Δz_t^N	24	3.325	0.083*
Δz_t^N does not Granger Cause CA_t^{smN}		0.068	0.798

Source: Authors' estimates
* Indicates significance at 10%

Table 3
Granger Causality results for unconstrained and constrained current account models for Jamaica

Lags: 4			
Null Hypothesis:	Observation s	F-Statistic	Probability
CA_t^{sm} does not Granger Cause Δz_t	21	2.514	0.097*
Δz_t does not Granger Cause CA_t^{sm}		1.844	0.185
Lags: 7			
CA_t^{smP} does not Granger Cause Δz_t^N	18	0.424	0.842
Δz_t^N does not Granger Cause CA_t^{smP}		16.508	0.021**

Source: Authors' estimates
** Indicates significance at 5%
* Indicates significance at 10%

Table 4
Granger Causality results for unconstrained and constrained current account models for Trinidad & Tobago

Lags: 2			
Null Hypothesis:	Observation s	F-Statistic	Probability
CA_t^{sm} does not Granger Cause Δz_t	27	6.135	0.008**
Δz_t does not Granger Cause CA_t^{sm}		0.043	0.958
Lags: 2			
CA_t^{smP} does not Granger Cause Δz_t^P	27	7.478	0.003**
Δz_t^P does not Granger Cause CA_t^{smP}		0.601	0.557
Lags: 7			
CA_t^{smP} does not Granger Cause Δz_t^P	22	8.237	0.006**
Δz_t^P does not Granger Cause CA_t^{smP}		0.552	0.774
CA_t^{smN} does not Granger Cause Δz_t^P	22	4.673	0.030*
Δz_t^P does not Granger Cause CA_t^{smN}		0.270	0.947

Source: Authors' estimates
** Indicates significance at 1% level
* Indicates significance at 5% level

Table 5
Variance Ratio test for Barbados, Jamaica and Trinidad & Tobago

	Model	Hypothesis	Critical Values		Variance Ratio
			F _L	F _U	
Barbados	Unconstrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$ $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$	0.46	2.21 1.94	1966.98*
	Constrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$ $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$	0.46	2.21 1.94	35.09*
Jamaica	Unconstrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$	0.46	2.21	1.17
	Constrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$ $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$	0.46	2.21 1.94	11.11*
Trinidad & Tobago	Unconstrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$ $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$	0.46	2.11 1.87	4.49*
	Constrained	$H_0 : \sigma_1^2 = \sigma_2^2$ versus $H_a : \sigma_1^2 \neq \sigma_2^2$ $H_0 : \sigma_1^2 \leq \sigma_2^2$ versus $H_a : \sigma_1^2 > \sigma_2^2$	0.46	2.11 1.87	5.00*

Source: Authors' estimates

σ_1^2 = variance of actual current account and σ_2^2 = variance of unconstrained (constrained) current account.

* Rejection of the null hypothesis at 5% level of significance.

REFERENCES

Bank of Jamaica, Balance of Payments of Jamaica, various issues.

-----, Foreign Exchange Rates and Foreign Exchange Management Policy Revisions, pp. 1 - 19, <http://www.boj.org.jm>.

Callen, T. and Cashin, P. (1999). "Assessing External Sustainability in India." International Monetary Fund, Working Paper 99/181, Washington, D.C.

Campbell, J. (1987). "Does Saving Anticipate Declining Labour Income? An Alternative Test of the Permanent Income Hypothesis." *Econometrica*, Volume 55, pp. 1249 – 1273.

Campbell, J. and Shiller, R. (1987). "Cointegration and Tests of Present Value Models." *Journal of Political Economy*, 95 (October), pp. 1062 – 1088.

Central Bank of Barbados, Annual Statistical Digest, various issues.

-----, Balance of Payments of Barbados, various issues.

-----, (December), *Economic Review*, pp. 13.

Central Statistical Office and Central Bank of Trinidad and Tobago, The Balance of Payments of Trinidad & Tobago, various issues.

Debelle, G. and Galati, G. (2005). "Current account adjustment and capital flows". Bank for International Settlement Working Papers No. 169.

DeFusco, R., McLeavey, D., Pinto, J. and Runkle, D. (2001). *Quantitative Methods for Investment Analysis*, United Book Press Incorporated, Baltimore.

Ghosh, O. and Ostry, J. (1995). "The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach". *The World Bank Economic Review*, Vol. 9, No. 2, pp. 305 – 333.

Hudson, S. and Stennett, R. (2003). "Current Account Sustainability in Jamaica". Bank of Jamaica, Working Paper.

International Monetary Fund (2005). *International Financial Statistics CD-Rom*, Washington, D.C.

Knight, M. and Scacciavillani F. (1998). "Current Accounts: What Is Their Relevance for Economic Policymaking?" International Monetary Fund, Working Paper 98/71, Washington, D.C.

Ministry of Planning and Development and Central Statistical Office, Trinidad and Tobago, Annual Statistical Digest, various issues.

Ostry, J. (1997). "Current Account Imbalances in ASEAN Countries: Are They a Problem?" International Monetary Fund, Working Paper 97/51, Washington, D.C.

Otto G. (1992). "Testing a present-value model of the current account: Evidence from US and Canadian time series". *Journal of International Money and Finance*, Vol. 11. pp. 414 – 430.

Phillips, P. and Hansen, B. (1990). "Statistical Inference in Instrumental Variables Regression with I (1) Processes". *The Review of Economic Studies*, Vol. 57 (1), No. 189.

Sheffrin, S. and Woo, W. (1990). "Present Value Tests of An Intertemporal Model of the Current Account". *Journal of International Economics*, Vol. 29, pp. 237 – 253.

Teixeria, H. (2003). "Consumption Smoothing in Latin America: An Empirical Assessment of Present Value Models". Dissertation presented to the Graduate School of Economics of the Getulio Vargas Foundation.

Trent, N. and Wood, C. (2005). *Central Bank of Barbados Chronicle of Central Bank Policy 1972 – 2004*.