IMPACT OF FOREIGN INFLOWS ON CONSUMPTION: AN ECONOMETRIC ANALYSIS FOR SIX DEVELOPING COUNTRIES 1960-83

A. Chhibber
and
H. Ghanem

CPD Discussion Paper No. 1984-25
August 1984

CPD Discussion Papers report on work in progress and are circulated for Bank staff use to stimulate discussion and comment. The views and interpretations are those of the authors.
Impact of Foreign Inflows on Consumption:

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1960-83

A. Chhibber & H. Ghanem

August 1984

We thank J. Hammer, H. Kharas, J. Levinsohn, R. Myers, Z. Shalizi and participants at the CPD Informal Seminar Series for many helpful comments on an earlier draft.

Resource Mobilization
Country Policy Department
World Bank
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Summary and Conclusions

This paper analyses the relationship between foreign inflows and public and private consumption for six small open economies: Bolivia, Costa Rica, Malawi, Senegal, Sudan and Thailand: for the period 1960-83. It differs from previous work on the subject in four aspects: (a) The direct and indirect (through income) effects of foreign inflows on consumption are differentiated because of divergent policy implications. (b) The problem of simultaneity between consumption and income is rectified by using Instrumental Variable Estimation. (c) Nested hypothesis tests are used to select appropriate consumption function forms for each country. (d) Shift tests are used to detect structural changes associated with foreign inflows.

The results of the analysis indicate that in four countries Bolivia, Sudan, Senegal and Malawi foreign inflows led to structural shifts upwards in their respective consumption functions and a decline in savings. In Malawi the increase in consumption associated with net inflows was primarily in the public sector, in Bolivia primarily in the private sector and in Senegal and Sudan in both the public and private sector. These results imply that foreign inflows in these countries have been used as a substitute for domestic resource mobilization.
1. **Introduction**

The relationship between domestic savings (consumption) and foreign inflows has been a source of considerable controversy in the development literature. This controversy centers on the observation that foreign inflows, more often than not, reduce the propensity to save, and thereby adversely affect LDCs' long-run growth prospects. \(^1\) The issues raised in this debate have resurfaced as a result of recent large net foreign inflows in the form of aid and credit to a number of developing countries, accompanied by accumulating debt service problems, low growth rates, and unsustainable consumption levels. In view of the important policy implications for both the borrowers and the lenders, this paper examines the problem from a new perspective and at the same time attempts to correct some of the econometric problems with past empirical work in this area.

The paper analyses the relationship between private and public consumption and foreign inflows for six developing countries: Bolivia, Costa Rica, Malawi, Senegal, Sudan and Thailand. All the countries in this sample with the exception of Thailand are facing debt servicing problems and have rescheduled their debt service payments several times during the last eight years. The data presented in Table 1 indicate the magnitude of those countries' debt problems. The table shows that the period 1973-82 has witnessed a rapid growth in the stock of debt outstanding and disbursed as well as a sharp rise in the debt/GNP and debt service ratios. Furthermore, in

\(^1\) For example, see A. Rahman (1968), Gupta (1975), Chenery-Eckstein (1970), Landau (1966), Weiskoff (1972), Papanek (1972).
three of the six countries; Bolivia, Senegal and Sudan the rate of growth of total consumption has exceeded the growth in GDP.

All six countries are small, relatively open economies with a large share of output and exports originating in the primary sector. However, the policy regimes, especially with respect to price, credit and exchange rate policies are substantially different.

Table 1: Growth in Consumption, GDP and Foreign Debt 1973-82

<table>
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<tr>
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<tbody>
<tr>
<td>Bolivia</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>16.7</td>
<td>49.5</td>
<td>39.1</td>
<td>15.7</td>
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<tr>
<td>Malawi</td>
<td>14.7</td>
<td>45.2</td>
<td>48.8</td>
<td>7.7</td>
<td>22.8</td>
</tr>
<tr>
<td>Senegal</td>
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<td>14.4</td>
<td>55.0</td>
<td>7.9</td>
<td>21.8</td>
</tr>
<tr>
<td>Sudan</td>
<td>29.4</td>
<td>19.6</td>
<td>71.2</td>
<td>11.6</td>
<td>21.3</td>
</tr>
<tr>
<td>Thailand</td>
<td>28.3</td>
<td>4.2</td>
<td>17.1</td>
<td>2.5</td>
<td>8.4</td>
</tr>
<tr>
<td>All LDCs</td>
<td>18.9</td>
<td>14.3</td>
<td>23.5</td>
<td>10.3</td>
<td>12.9 c/</td>
</tr>
</tbody>
</table>

a/ Total debt outstanding and disbursed (MLT only)

b/ Total debt service divided by exports of goods and services.

c/ 1981 figure.

The present analysis of the relationship between foreign inflows and consumption for these six countries differs from previous work done on this subject in four aspects:

(a) Foreign inflows affect consumption directly, and indirectly through their effect on income. Most previous work has concentrated on estimating the direct effect of foreign inflows on consumption. The indirect effect of foreign inflows on consumption through income is clearly a welfare gain to the economy but can still create debt service problems if the debt is incurred by the government but effective resource mobilisation policies are not followed to repay the debt. In view of the divergent policy implications of the direct and indirect effects of foreign inflows on consumption, this paper attempts to calculate the magnitude of the two effects.

(b) The mid and late seventies have witnessed a rapid increase in LDC borrowing as well as a rise in their average propensity to consume. This observation implies that in many cases the rise in foreign inflows has been associated with an upwards shift in the consumption function. An analytical model showing that foreign inflows could result in a structural shift in consumption behavior was presented by Michaely (1981). Yet, the hypothesis that massive foreign inflows have been correlated with a structural change in many developing economies leading to higher consumption has not been tested empirically elsewhere in the literature.
Past work on the impact of foreign inflows on consumption and savings has ignored the fact that different countries may have different consumption (or savings) functions due to social and cultural factors, or due to differences in the structure of the economy, especially with respect to credit and pricing policies. Despite well-known econometric tests for selecting appropriate consumption functions, such tests have not been used in the past even on time-series data. This paper applies nested hypothesis tests for selecting consumption functions separately for each country in the sample.

A well-known but often ignored problem in consumption function analysis is that consumption and income could be simultaneously determined. The estimates of the propensities to consume may therefore be subject to simultaneous equation bias. This paper rectified the problem by estimating the structural form consumption functions using instrumental variables. 2/

It must be noted at the outset that although the paper is arguing that foreign borrowing during the seventies has lead to a decline in the domestic savings rate in many LDCs, it does not address the question of whether this behavior was optimal. 3/ It is assumed that the six countries in

---

2/ It must be noted, however, that some empirical evidence have been presented in the literature showing that income is exogenous with respect to consumption. See Ortmeyer (1980) for evidence from Korea and Japan, and Sargent (1978) for evidence from the U.S.

3/ For a discussion of the optimal level of borrowing see Kharas and Glick (1984).
the sample are credit constrained, \(^4\) and therefore foreign borrowing is treated as a predetermined variable. The paper is divided into five additional sections. In Section 2, the channels through which borrowing can affect consumption are traced by means of a simple macro model. Section 3 describes the tests for the selection of the appropriate consumption function for each country, and presents estimates of the structural parameters. In Section 4, the reduced form equations for each country are derived, and the estimates of those equations are presented. Section 5 examines whether the increase in foreign inflows was accompanied by a shift in the consumption function. The final section outlines the limitations and conclusions of the paper.

\(^4\) Eaton and Gersovitz (1980) present some empirical evidence supporting this assumption.
2. Impact of Foreign Inflows on Consumption

2.1 Channels

Foreign inflows can affect consumption through several channels, both direct and indirect. If the inflows are made by the private or public sector for smoothening fluctuations in their respective consumption paths the impact of foreign inflows on consumption are direct. However, there are various indirect mechanisms through which foreign inflows can affect consumption. These indirect mechanisms are quantitatively important because changes in any set of macro-economic variables can potentially affect consumption in a general equilibrium framework.

If foreign money is borrowed for investment, for example, the resulting increase in income can lead to an increase in consumption if effective resource mobilization policies are not introduced to repay the debt. Likewise, an increase in public consumption from foreign inflows can lead to an increase in income and private consumption through a Keynesian multiplier. If capacity utilisation is constrained by shortages of intermediate imported goods, net foreign inflows can lead to increases in income and consumption by relieving this constraint. In several LDCs, an increase in foreign inflows has been accompanied by a slackening of the fiscal effort. The subsequent increase in disposable income can result in an increase in private consumption. In addition, foreign inflows can be used to finance subsidy and transfer programs which increase private real disposable income and consumption.
The large and growing parastatals sector is another channel by which foreign inflows to the public sector can translate into increases in private consumption. The leakages through mismanagement and corruption, inflated workforce and poorly supervised and overinvoiced contracts between private firms and the parastatals are a common feature in many LDCs. The net result is an unrecorded resource transfer to the private sector resulting in increases in private consumption.

2.2 The Model

The model used in this paper attempts to unravel the direct and indirect effects of net foreign inflows on consumption and address the problem of simultaneity between income and consumption. The choice of the functional form for private and public consumption is based on tests presented in the next section. In this section simple Keynesian functions are used to explain the model.

The model consists of four behavioural equations, for private consumption, public consumption, investment and tax revenues and the GNP identity.

\begin{equation}
PC = c_0 + c_1 (Y - T) + c_2 D \\
1 > c_1 > 0, 1 > c_2 > 0
\end{equation}

\begin{equation}
BC = b_0 + b_1 Y + b_2 D \\
1 > b_1 > 0, 1 > b_2 > 0
\end{equation}

\begin{equation}
I = i_0 + i_1 Y + i_2 D + i_3 I_{-1} + i_4 T \\
1 > i_2 > 0, i_3 > 0
\end{equation}
\[ T = t_0 + [t_1 - t_2 D/y] y \]

\[ 1 > t_1 > 0, t_2 > 0 \]

\[ Y = PC + BC + I - D \]

where

PC is real per capita private consumption, BC is real per capita public consumption, I real per capita investment (including changes in stocks), T is real per capita net taxes, D is real per capita net external inflows (defined as the current account deficit) and Y is real per capita GNP.

Private consumption is a function of disposable income and net foreign inflows (Equation 1). \( 5/ \) Public consumption is a function of GNP and net foreign inflows (Equation 2). \( 6/ \) An investment function (Equation 3) of the most general form is specified with GNP, net foreign inflows, lagged investment and net taxes as the explanatory variables. A net tax function is also included (Equation 4) with the tax rate specified as a function of the net foreign inflow to GNP ratio.

The model distinguishes between a direct and an indirect effect of net inflows on consumption. The direct effect is defined as the effect of net inflows on consumption with GNP held constant.

---

\( 5/ \) Interest rates are not included in the consumption function. For recent evidence on the interest inelasticity of savings (consumption) see Giovannini (1983), Friend and Hasbrouck (1981) and Evans (1983).

\( 6/ \) The actual functional forms are tested in the next section and are used to derive the reduced-form equation. The private and public consumption functions selected here are for illustrative purposes only.
The indirect effect is the product of the effect of net inflows on GNP and the marginal propensity to consume out of GNP. It can be written as follows:

\[
\frac{dPC}{dD} = \frac{\partial PC}{\partial D} + \frac{\partial PC}{\partial y} \frac{\partial y}{\partial D}
\]

The direct effect \(\frac{\partial PC}{\partial D}\) can be derived by substituting (4) into (1) to give

\[
PC = C_o - C_1 t_o + C_1 (1 - t_1) y + (C_2 + C_1 t_2) D \quad (6)
\]

\[
= d_o + d_1 y + d_2 D
\]

\[
d_1 > 0, \quad d_2 > 0 \quad (6')
\]

\[
d_1 < c_1, \quad d_2 > c_2
\]

Note that \(d_1\), measures the marginal propensity to consume GNP, which will be smaller than the marginal propensity to consume disposable income \((c_1)\). Note also that \(d_2\) includes the private consumption from inflows directly plus the increase in consumption from higher disposable income \((c_1 + t_2)\).

The total effect of net external inflows on private consumption can be derived by substituting (2) & (3) into (5) and substituting further into (6').

The total effect of net external inflows on consumption is

\[
\frac{dPC}{dD} = \frac{c_1 (1-t_1) [(c_1 + t_4) t_2]}{tm} + (c_2 + c_1 t_2)
\]
where
\[ \frac{\partial PC}{\partial y} = c_1 (1 - t_1) \]
\[ \frac{\partial y}{\partial D} = \frac{(c_1 + i_4) t_2}{tm} \]
\[ \frac{\partial PC}{\partial D} = c_2 + c_1 t_2 \]

\[ tm = 1 - c_1 (1 - t_1) - b_1 i_1 (1 - t_1) \]

\( tm \) is the inverse of the Keynesian multiplier.

 Consumption and GNP are also affected by net inflows in previous years through lagged consumption and investment variables which enter the reduced-form equations of the model.

 For example,

\[ \frac{dPC}{dI_{-1}} = \frac{c_1 (1 - t_1) i_3}{tm} \]

 Similarly, the coefficients for lagged public and private consumption can be derived if these variables enter the structural-form equations (1) and (2) for any particular country.

 If capacity utilisation is constrained by shortages of imported intermediate goods, the impact of net foreign inflows on GNP will be larger than is suggested by the model. Since this constraint is relevant for most of the countries in our study we can write

\[ \frac{dy}{dD} = \frac{(c_1 + i_4) t_2}{tm} + cu \]

ForeignBor/H.Ghanem-A.Chhibber/draft/B-3-84/DLN
where \( cu \) is the capacity utilisation effect of higher intermediate goods imports.

It should be noted that the model presented here only provides the single period effects of net inflows on consumption. The long-run effect of inflows on consumption are likely to be larger. The magnitude of the long run effects will depend on the coefficients of the lagged consumption and investment variables. 7/ Moreover, the increase in future consumption comes about through an increase in income and not through direct consumption from foreign inflows or through fiscal slackening which has a strong bearing on the current debt crises. 8/

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7/ If \( X = \Omega (-1) + \tau D + v \). Then the cumulative effect of \( D \) on \( X \) is \( \tau (I - \Omega)^{-1} \).

8/ The composition of GNP growth between tradeable and non-tradeable goods production is relevant for repayment of debt but is not our concern in this paper.
3. The Choice of A Consumption Function

3.1 The Theories of the Consumption Function

In this Section the appropriate form of the consumption function to be used in the structural model for each of the six countries in our sample is selected. Four theories of the consumption function are tested. The first theory is the permanent income hypothesis. According to this hypothesis consumption is a function of permanent income only, and the consumption function is of the following form.

\[ C_t = bY^P_t + u_t \]  \hspace{1cm} (1)

The second hypothesis to be tested comes from the rational expectations literature. In its purest form, rational expectations implies that if consumer's decisions are based upon permanent income and if markets are efficient, consumption will follow a random walk.

\[ C_t = dC_{t-1} + u_t \]  \hspace{1cm} (2)

The simple Keynesian model makes consumption a function of measured income. It implies a consumption function of the form.

\[ C_t = a + dY^M_t + u_t \]  \hspace{1cm} (3)

where \( y^M_t = y^P_t + y^T_t \), and \( y^T_t \) is transitory income.

Finally, a partial adjustment model is also tested, where:

\[ \text{ForeignBor/H.Ghanem-A.Chhibber/draft/8-3-84/DLW} \]
\[ C_t^* = a + \delta v_t^M + u_{1t} \]  \hspace{1cm} (4)

\[ k (C_t^* - C_{t-1}) = C_t - C_{t-1} \]  \hspace{1cm} (5)

Equations (4) and (5) imply:

\[ C_t = \alpha + \beta C_{t-1} + \gamma Y_t^M + u_t \]  \hspace{1cm} (6)

Since one purpose of the exercise is to test the direct effect of foreign inflows on consumption, all of the above functions are modified by adding inflows to the structural form-equations. The tests are carried out by estimating the most general form of the consumption function.

\[ C_t = a + b Y_t^P + c Y_t^T + d C_{t-1} + e D + u_t \]  \hspace{1cm} (7)

which will be used to test the following hypothesis

\[ H_o^1: a = c = d = 0 \text{ , against } H_a^1: H_o^1 \text{ is not true.} \]

A rejection of \( H_o^1 \) implies a rejection of the permanent income theory. The next test is,

\[ H_o^2: b = c \text{ ; } H_a^2: b \neq c \]
A rejection of $H_0^2$ means that the partial adjustment model is rejected.

The next test is,

$$H_0^3: \ a = b = c = 0$$

$$H_{a}^3: \ H_0^3 \text{ is not true}$$

A failure to reject $H_0^3$ implies a failure to reject the random walk specification. The following test is also carried out:

$$H_0^4: \ d = 0, \text{ and } b = c$$

$$H_a^4: \ d \neq 0, \text{ and } b \neq c$$

Failure to reject $H_0^4$ implies a failure to reject the Keynesian consumption function. Note that both the random walk and simple Keynesian specifications are nested in the partial adjustment model. Thus, whenever the test fails to reject $H_0^3$ or $H_0^4$, it must be true that it will also fail to reject $H_0^2$. Therefore, the partial adjustment model is chosen only if the test fails to reject $H_0^2$ while rejecting both $H_0^3$ and $H_0^4$. Of the above four null hypotheses, $H_0^1$, $H_0^3$ and $H_0^4$ must be tested by means of an F-test while $H_0^2$ can be tested by either a t-test or an F-test. In order to maintain consistency the F-test is used throughout this paper. The test statistic is given by the following formula:
\[ \frac{R_u^2 - R_q^2}{1 - R_u^2} \cdot \frac{N - K}{q} \sim F_q, N - K \]

where $R_u^2$ is the $R^2$ from the unconstrained regression, $R_q^2$ is the $R^2$ from the constrained regression, $N$ is the number of observations, $K$ is the number of explanatory variables and $q$ is the number of constraints to be tested. All the data used are in domestic currencies and have been appropriately deflated and presented in per capita terms. 9/ Income is defined as GNP adjusted for changes in the terms of trade. Permanent income is defined as a weighted average of present and the two previous periods' income. Foreign inflows are defined as the current account deficit. Since consumption and income are simultaneously determined, all structural parameters have been estimated by using instrumental variables.

3.2 The Choice of A Private Consumption Function

The results of the tests carried out on the four null hypothesis described above are presented in Table 2.

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9/ That is, consumption (both private and public) is deflated by the CPI, exports and imports are deflated by the export and import price indexes, respectively. All remaining variables are deflated by the GDP deflator.
<table>
<thead>
<tr>
<th></th>
<th>$H^1_o$</th>
<th>$H^2_o$</th>
<th>$H^3_o$</th>
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<tr>
<td></td>
<td>$F$</td>
<td>$F^*$</td>
<td>$F^*$</td>
<td>$F$</td>
</tr>
<tr>
<td>Bolivia</td>
<td>15.6</td>
<td>3.29</td>
<td>0.88</td>
<td>4.54</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>31.7</td>
<td>3.34</td>
<td>0.00</td>
<td>4.60</td>
</tr>
<tr>
<td>Malawi</td>
<td>22.3</td>
<td>3.29</td>
<td>0.82</td>
<td>4.54</td>
</tr>
<tr>
<td>Senegal</td>
<td>1.3</td>
<td>3.24</td>
<td>0.00</td>
<td>4.49</td>
</tr>
<tr>
<td>Sudan</td>
<td>9.1</td>
<td>3.24</td>
<td>0.66</td>
<td>4.49</td>
</tr>
<tr>
<td>Thailand</td>
<td>17.0</td>
<td>3.20</td>
<td>3.4</td>
<td>4.45</td>
</tr>
</tbody>
</table>

\(F^*\) is the critical value of \(F\) at the 5 percent confidence level.

From the above table \(H^1_o\) (the permanent income hypothesis) is rejected for all the countries in our sample except Senegal. \(H^2_o\) is not rejected for all six countries. Therefore the hypothesis that the marginal propensity to consume transitory income is equal to the marginal propensity to consume permanent income is not rejected. The random walk specification \(H^3_o\) is rejected for all countries except Thailand. The Keynesian consumption function \(H^4_o\) is not rejected for Costa Rica, Malawi and Sudan; but is rejected for the remaining three countries. For Senegal both the permanent income and the partial adjustment models are not rejected. In order to differentiate between those two hypotheses the Cox test for differentiating
between nonnested hypotheses was used. The results of this test indicated that private consumption in Senegal is best described by a partial adjustment model. The results of this subsection indicate that private consumption in the six countries in our sample is described by three different functional forms. It is best described by a random walk in Thailand, by a Keynesian function in Costa Rica, Malawi and Sudan, and by a partial adjustment model in Bolivia and Senegal.

3.3 The Choice of a Public Consumption Function

Although most models treat public consumption as an exogenous variable, empirical evidence as well as intuitive reasoning suggest that public consumption changes in response to changes in the various macroeconomic aggregates. Therefore, public consumption is treated as an endogenous variable, and its specification is tested in the same manner as the private consumption function.

**Table 3: Testing the Various Specifications of the Public Consumption Function**

<table>
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<tr>
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<th>$H^1_0$</th>
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<td>$F^*$</td>
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<td>$F^*$</td>
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<td>$F$</td>
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<td>$F$</td>
<td>$F^*$</td>
<td></td>
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<tr>
<td>Bolivia</td>
<td>79.4</td>
<td>3.29</td>
<td>0.0</td>
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<td>3.29</td>
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<td>25.2</td>
<td>3.34</td>
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<td>3.34</td>
<td>53.9</td>
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</tr>
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<td>Senegal</td>
<td>29.1</td>
<td>3.24</td>
<td>16.2</td>
<td>4.49</td>
<td>3.5</td>
<td>3.24</td>
<td>5.5</td>
<td>3.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>6.9</td>
<td>3.24</td>
<td>0</td>
<td>4.49</td>
<td>0.32</td>
<td>3.24</td>
<td>8.8</td>
<td>3.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>37.2</td>
<td>3.20</td>
<td>0</td>
<td>4.45</td>
<td>0.81</td>
<td>3.20</td>
<td>14.0</td>
<td>3.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a/\ F^*$ is the critical value of $F$ at the 5 percent confidence level.

---

$^{10/}$ For a description of this test see Judge et al (1980) or Pearson and Deaton (1978).
From Table 3, the permanent income hypothesis is rejected for all the countries in our sample. The hypothesis that the marginal propensity to consume transitory income is equal to the marginal propensity to consume permanent income cannot be rejected for any country except Senegal. The random walk hypothesis cannot be rejected for Sudan, Malawi and Thailand, but is rejected for the remaining three countries. The Keynesian consumption function is rejected for all six countries. Therefore, public consumption is best described as a random walk in Sudan, Malawi and Thailand, by a partial adjustment model where the marginal propensity to consume transitory income is equal to the marginal propensity to consume permanent income in Bolivia and Costa Rica, and by a partial adjustment model with different MPCs for permanent and transitory incomes in Senegal.

3.4 Estimating The Marginal Propensities To Consume

The estimates of the selected consumption functions using instrumental variables are presented in the Appendix. The results for private consumption show that Sudan has the largest long-run marginal propensity to consume GNP (0.81), followed by Senegal (0.69), Costa Rica (0.56), Bolivia (0.47) and Malawi (0.38). In Thailand, changes in GNP have no impact on private consumption. The marginal propensity to spend foreign inflows on private consumption is again highest in Sudan (0.71), followed by Bolivia (0.59), Senegal (0.4), and is insignificant in the remaining three countries. Changes in GNP have no effect on public consumption in Malawi, Sudan and Thailand. Bolivia has the highest marginal public propensity to consume (0.21), followed by Costa Rica (0.18) and Senegal (0.14). Senegal has the highest marginal propensity to spend foreign inflows on public consumption (0.2) followed by Sudan (0.14), Thailand (0.12) and Malawi (0.11). This coefficient is insignificant in the remaining two countries. By adding up the
effects on both private and public consumption, the six countries in our sample can be ranked according to their marginal propensities to consume GNP or according to their marginal propensity to consume foreign inflows. The results of this ranking are presented in the following two tables.

Table 5: Ranking Countries According to Their Long-Run Marginal Propensity to Consume GNP a/

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Senegal</td>
<td>0.83</td>
</tr>
<tr>
<td>2</td>
<td>Sudan</td>
<td>0.81</td>
</tr>
<tr>
<td>3</td>
<td>Costa Rica</td>
<td>0.74</td>
</tr>
<tr>
<td>4</td>
<td>Bolivia</td>
<td>0.68</td>
</tr>
<tr>
<td>5</td>
<td>Malawi</td>
<td>0.38</td>
</tr>
<tr>
<td>6</td>
<td>Thailand</td>
<td>insignificant</td>
</tr>
</tbody>
</table>

a/ Defined as the sum of the marginal propensities to consume private and public goods.

Table 6: Ranking Countries By Their Marginal Propensity to Consume Foreign Inflows a/

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sudan</td>
<td>0.85</td>
</tr>
<tr>
<td>2</td>
<td>Senegal</td>
<td>0.60</td>
</tr>
<tr>
<td>3</td>
<td>Bolivia</td>
<td>0.59</td>
</tr>
<tr>
<td>4</td>
<td>Thailand</td>
<td>0.12</td>
</tr>
<tr>
<td>5</td>
<td>Malawi</td>
<td>0.11</td>
</tr>
<tr>
<td>6</td>
<td>Costa Rica</td>
<td>insignificant</td>
</tr>
</tbody>
</table>

a/ Defined as the sum of the marginal propensities to consume private and public goods.
4. Reduced-Form Consumption Functions

4.1 Derivation of Reduced-Form Equations

The model presented in Section 2 indicates that the total effect of foreign inflows on consumption can be decomposed into a direct effect and an indirect effect. The direct effect is defined as the effect of net inflows on consumption with income held constant. The indirect effect is the product of the marginal propensity to consume GNP into the change in income due to net inflows. The previous section provided estimates of the direct effect of net inflows on consumption. This section estimates the total effect of net inflows on consumption with the help of country-specific reduced-form consumption equations derived by using the model in Section 2 and the selected functional forms in Section 3. The effect of net inflows on GNP is also derived from the reduced form coefficients and the direct effects estimated in the previous section.

Bolivia

The partial adjustment Keynesian functional form is selected for both private and public consumption in Bolivia. The reduced-form equations are

\[ PC = PC \left( PC_{-1}, BC_{-1}, I_{-1}, D \right) \]

\[ BC = BC \left( PC_{-1}, BC_{-1}, I_{-1}', D \right) \]

Sudan and Malawi

In Sudan and Malawi, private consumption follows a simple Keynesian functional form, whereas public consumption follows a random walk.
The reduced-form equations are

\[ PC = PC(BC_{-1}, I_{-1}, D) \]
\[ BC = BC(BC_{-1}, D) \text{ 11/} \]

**Costa Rica**

In Costa Rica private consumption follows a simple Keynesian form, whereas the public consumption function is partial adjustment Keynesian.

The reduced-form equations are

\[ PC = PC(BC_{-1}, I_{-1}, D) \]
\[ BC = BC(BC_{-1}, I_{-1}, D) \]

**Senegal**

The Senegalese private consumption function is partial adjustment Keynesian, whereas the public consumption function is of the most general form i.e., it includes lagged public consumption, permanent income and transitory income.

The reduced form equations are

\[ PC = PC(PC_{-1}, BC_{-1}, I_{-1}, YP, D) \]
\[ BC = BC(PC_{-1}, BC_{-1}, I_{-1}, YP, D) \]

---

11/ Constant equal to zero.
Thailand

Thailand's private and public consumption follow a random walk. The reduced-form consumption equations are:

\[ PC = PC (PC_{-1}, D) \]
\[ BC = BC (BC_{-1}, D) \]

4.2 Empirical Results

The reduced-form equations were estimated with annual data for the period 1962-83 for Sudan and Thailand; 1962-81 for Bolivia and Malawi; 1963-83 for Senegal; and 1963-81 for Costa Rica. The estimated equations are presented for private consumption in Table 7 and for public consumption in Table 8.

At the outset, it should be noted that the effect of net foreign inflows on consumption is not invariant to the choice of the consumption function. In Senegal, for example, dropping the permanent income variable from the reduced-form equation results in an insignificant coefficient for net foreign inflows \( D \) on consumption. The correct specification of the consumption function is therefore necessary to test accurately the effect of net foreign inflows on consumption.

---

\[12/ \text{ Constant equals zero.} \]

\[13/ \text{ Data were obtained from the current EPD data base at the World Bank.} \]
<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Const.</th>
<th>Private Consumption $^{\text{FC}_{-1}}$</th>
<th>Public Consumption $^{\text{EC}_{-1}}$</th>
<th>Investment $^{\text{I}_{-1}}$</th>
<th>Permanent Income $^{\text{YP}}$</th>
<th>Net External Inflows $^{\text{D}}$</th>
<th>$R^2$</th>
<th>D.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>1962-81</td>
<td>1189.8</td>
<td>0.08</td>
<td>1.93</td>
<td>0.11</td>
<td>0.69</td>
<td>0.94</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(7.97)</td>
<td>(3.67)</td>
<td>(0.81)</td>
<td>(4.56)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1963-81</td>
<td>2564.07</td>
<td>-0.91</td>
<td>0.32</td>
<td>0.96</td>
<td>0.94</td>
<td>1.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(15.28)</td>
<td>(1.77)</td>
<td>(5.72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td>1962-81</td>
<td>68.96</td>
<td>0.02</td>
<td>0.31</td>
<td>0.25</td>
<td>0.53</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(7.71)</td>
<td>(3.18)</td>
<td>(1.31)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>1963-83</td>
<td>-6916.5</td>
<td>-0.11</td>
<td>0.11</td>
<td>0.17</td>
<td>0.78</td>
<td>0.50</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.65)</td>
<td>(0.44)</td>
<td>(0.83)</td>
<td>(8.3)</td>
<td>(3.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>1962-83</td>
<td>125.62</td>
<td>-0.13</td>
<td>1.23</td>
<td>1.22</td>
<td>0.88</td>
<td>1.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(8.98)</td>
<td>(3.92)</td>
<td>(4.10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>1962-83</td>
<td></td>
<td>1.03</td>
<td></td>
<td></td>
<td>0.04</td>
<td>0.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(145.7)</td>
<td></td>
<td></td>
<td>(0.39)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Reduced-Form Public Consumption Functions  
(Real Per Capita)

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Const.</th>
<th>Private Consumption EC-1</th>
<th>Public Consumption EC-1</th>
<th>Investment I-1</th>
<th>Permanent Income Yp</th>
<th>Net External Inflows D</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>1962-81</td>
<td>131.28</td>
<td>-0.09</td>
<td>1.20</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.10)</td>
<td>(2.72)</td>
<td>(10.39)</td>
<td>(0.16)</td>
<td>(0.60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1963-81</td>
<td>493.07</td>
<td>0.11</td>
<td>(0.01)</td>
<td>0.10</td>
<td>0.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(12.3)</td>
<td>(0.39)</td>
<td>(0.49)</td>
<td>(3.67)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td>1962-81</td>
<td></td>
<td>0.93</td>
<td></td>
<td>0.11</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(18.66)</td>
<td></td>
<td>(2.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>1963-83</td>
<td>-2619.0</td>
<td>-0.06</td>
<td>0.87</td>
<td>0.14</td>
<td>0.04</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.3)</td>
<td>(1.54)</td>
<td>(11.5)</td>
<td>(1.98)</td>
<td>(1.77)</td>
<td>(4.90)</td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>1962-83</td>
<td></td>
<td>0.91</td>
<td></td>
<td></td>
<td>0.14</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(20.43)</td>
<td></td>
<td></td>
<td></td>
<td>(2.36)</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>1962-83</td>
<td></td>
<td>1.02</td>
<td></td>
<td></td>
<td>0.12</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(75.5)</td>
<td></td>
<td></td>
<td></td>
<td>(3.22)</td>
<td></td>
</tr>
</tbody>
</table>
Table 9: Increase in Consumption and GNP with Unit Increase In Foreign Inflows

<table>
<thead>
<tr>
<th></th>
<th>Private Consumption</th>
<th>Public Consumption</th>
<th>Total Consumption</th>
<th>GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudan</td>
<td>1.22*</td>
<td>0.14*</td>
<td>1.36</td>
<td>0.63</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>0.96*</td>
<td>0.10*</td>
<td>1.06</td>
<td>1.70</td>
</tr>
<tr>
<td>Senegal</td>
<td>0.50*</td>
<td>0.22*</td>
<td>0.72</td>
<td>0.20</td>
</tr>
<tr>
<td>Bolivia</td>
<td>0.69*</td>
<td>0.02</td>
<td>0.69</td>
<td>0.35</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.04</td>
<td>0.12*</td>
<td>0.12</td>
<td>n/a</td>
</tr>
<tr>
<td>Malawi</td>
<td>0.25</td>
<td>0.11*</td>
<td>0.11</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Significant at the 5 percent significance level.

The reduced-form equations estimate the single period total (direct plus indirect) effect of net inflows on private and public consumption. The effect of foreign inflows is positive and significant for both private and public consumption in Costa Rica, Senegal and Sudan; only on private consumption for Bolivia, and only on public consumption for Thailand and Malawi. Table 9 presents the countries in rank order of the magnitude of the total effect of net inflows on consumption. It also presents the estimates of the effect of net foreign inflows on GNP. The results indicate clearly that in Sudan, Senegal, Bolivia and Malawi a decline in savings was associated with net foreign inflows. In Costa Rica, on the other hand, savings increased with net foreign inflows and the direct effect of net inflows on consumption was insignificant. In Thailand, since both the private and public consumption functions follow a random walk, it was not possible to calculate the impact of net inflows on GNP.

14/ It must be noted that this result does not imply that foreign inflows have had no effect whatsoever on GNP in Malawi. This is the case because the reduced form equation does not capture the lagged effect of inflows on GNP.
The coefficients of some of the variables in the reduced-form equations need explanation. For example, although Bolivia's private consumption function is partial adjustment Keynesian, the coefficient of PC-1 is insignificant in the reduced-form equation because of high multicollinearity between PC-1 and BC-1. Similarly, none of the lagged explanatory variables are significant in the private consumption function for Senegal, this can be explained by the multicollinearity that exists between those variables and the permanent income variable.
5. Testing For a Structural Shift In the Consumption Function

5.1 Description of the Test

The rise in the average propensity to consume in the latter half of the 1970's observed in Sudan, Senegal, Malawi and Bolivia suggests significant changes in the marginal propensities to consume. This section presents tests on changes in these propensities for the six countries in the study. These tests will attempt to determine whether high rates of foreign inflows were accompanied by an upwards shift in the consumption function. This issue is worth investigation, since such a decrease in the marginal propensity to save will tend to make it more difficult for the country to repay its debts.

The stability of the consumption function is examined by means of a Chow test, which is based upon the following test statistic:

\[
\frac{(SSE_c - SSE_1 - SSE_2)/k}{(SSE_1 + SSE_2)/(n + m - 2k)} \sim F_k, n + m - 2k
\]

The null hypothesis is that there has been no shift in the parameters. \(SSE_c\) is the sum of squared residuals obtained from the regression over the entire period under study, and \(SSE_1\) and \(SSE_2\) are the sum of squared residuals obtained from the regressions using data from the two subsamples; \(n, m\) and \(k\) are the number of observations in the first and second subsample and the number of explanatory variables, respectively. For each country, the sample period is divided into observations with high borrowing and observations with low borrowing. The test determines if a shift in the consumption function was associated with high foreign inflows. For most countries this meant that the dividing line was 1975, since foreign inflows increased dramatically after this year. Bolivia, and Sudan have witnessed periods of high per capita inflows during
the sixties, therefore, those observations were included in the high inflows subsample.

5.2 Results of the Chow Test

<table>
<thead>
<tr>
<th>Private Consumption</th>
<th>Public Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>F*</td>
</tr>
<tr>
<td>Bolivia</td>
<td>4.60</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>1.14</td>
</tr>
<tr>
<td>Malawi</td>
<td>1.30</td>
</tr>
<tr>
<td>Senegal</td>
<td>3.37</td>
</tr>
<tr>
<td>Sudan</td>
<td>4.30</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.07</td>
</tr>
</tbody>
</table>

The results in the above table indicate that there was a shift in the private consumption function for Sudan, Senegal and Bolivia, and the public consumption function for Malawi. This implies that for those four countries foreign inflows were accompanied by a structural shift in the consumption function. In order to test the robustness of the conclusion in Section 3 concerning the direct effect of foreign inflows on consumption, the foreign inflow variable was removed from the structural form consumption function, the parameters were re-estimated and tested for their stability. As would be expected in a situation with a missing variable, a shift was detected for all countries where the coefficient for net inflows was significant.

5.3 Testing Stability By Means of Dummy Variables

The Chow test can be used to detect a shift in the parameters. However, it does not provide any information regarding which parameter has actually shifted. In order to do so the consumption functions were estimated for the four countries in which consumption shifts were detected using slope
dummies for the period during which the shift occurred. For Sudan the result was as follows:

\[
PC = -5.2 + 0.75 y -1.9 D + 0.01 (d^* y)
\]
\[
(-.14) (4.8) (-1.3) (1.3)
\]
\[+ 0.9 (d^* D)
\]
\[(2.7)
\]
\[
R^2 = 0.95 \quad \quad \text{D.W} = 2.2
\]

Where \(d=1\) for observations with high borrowing and zero otherwise. The above result indicates that in Sudan the marginal propensity to consume out of net foreign inflows increased. This shift may be explained by a change in \(t_2\), the coefficient of net inflows in the tax function. The above result suggests that the increase in Sudan's average propensity to consume \(15/\) which occurred during the period of high inflows was due to an increase in the propensity to consume debt caused by the slackening of the fiscal effort that accompanied the rise in foreign inflows. \(16/\)

The same seems to be true for Senegal. Senegal's private consumption is best described by the partial adjustment model. The following equation was estimated.

\[
PC = \beta_0 + \beta_1 PC_{-1} + \beta_2 y + \beta_3 D + \beta_4 (d^* PC_{-1})
\]
\[+ \beta_5 (d^* y) + \beta_6 (d^* D)
\]

\(15/\) Defined as real per capita consumption divided by real per capita income.
\(16/\) See Appendix 2.

ForeignBor/H.Ghanem-A.Chhibber/draft/8-3-84/DLW
The null hypothesis that \( \beta_4 = \beta_5 = 0 \), was tested and could not be rejected; which implies that there has been no shift in the long run marginal propensity to consume GNP. The dummy variable for net inflows was positive and significant in Senegal.

\[
\text{PC} = -12048.4 + 0.29 \text{PC}_{-1} + 0.64 y - 0.05D \\
\qquad (2.5) \quad (4.4) \quad (10.9) \quad (-0.37) \\
\qquad + 0.33 (d^* D) \\
\qquad (3.3)
\]

Therefore it can be concluded that the marginal propensity to consume out of net inflows increased in Senegal after 1975.

The re-estimation of the private consumption function for Bolivia using dummy variables yielded the following result:

\[
\text{PC} = 966.3 - 0.19 \text{PC}_{-1} + 0.51 y + 0.92 D + 0.74 (d^* \text{PC}_{-1}) \\
\qquad (2.6) \quad (-0.6) \quad (4.2) \quad (2.4) \quad (2.4) \\
\qquad - 0.51 (d^* y) + 0.04 (d^* D) \\
\qquad (-2.6) \quad (0.09)
\]

\[
R^2 = 0.97
\]

The above estimate indicates that private consumption in Bolivia has changed from being a simple Keynesian function prior to 1975 to being a function of past consumption and foreign inflows only after 1975. The coefficient on foreign inflows did not change between the two periods. A study of the causes and implications of this change is certainly warranted but is outside the
scope of the present analysis. This shift in the form of the private consumption function was accompanied by a rapid increase in consumption. Real per capita consumption rose from 71 percent of real per capita GNP in 1975 to approximately 80 percent in 1980.

The same exercise was carried out for public consumption in Malawi. The results of the regression were as follows:

\[
\begin{align*}
BC &= 1.02 \, BC_{-1} - 0.01 \, D - 0.12 \, (d \times BC_{-1}) + 0.24 \, (d \times D) \\
& (11.9) \quad (-0.2) \quad (-1.25) \quad (2.5)
\end{align*}
\]

\[
R^2 = 0.88 \quad \hat{p} = 0.3
\]

The Durbin \( h \) statistic indicated the existence of first order auto correlation. Therefore, the above equation was estimated using the Cochrane - Orcutt procedure. The regression presented above indicates that prior to 1975 net inflows were not used to finance public consumption in Malawi. However, after 1975 this situation changed as the government started to rely on foreign inflows to finance its consumption expenditures.
6. Conclusions and Limitations

6.1 Summary of the Results

This paper reaches the broad conclusion that net foreign inflows have been positively correlated with consumption and, for at least four countries: Costa Rica, Sudan, Senegal and Malawi, with a decrease in savings. It seems clear that even if foreign inflows are not intended for consumption directly, an increase in consumption can occur through various indirect mechanisms. It has also been shown that in four of the countries which have witnessed a rapid increase in foreign inflows during the mid and late seventies, the increase in foreign inflow was associated with an upwards shift in the consumption function. This result seems to imply that foreign inflows in these countries has been used as a substitute for domestic resource mobilization.

The policy implications of this analysis for the different countries in the sample can be summarized as follows:

a) Thailand. The rapid growth in indebtedness during the seventies has been associated with no increase in the consumption of private goods. However, it has had an impact on the public consumption function, but, it should be noted that the average propensity to consume public goods in Thailand is still well below that for the other countries in the sample. Moreover, debt indicators such as the ratio of DOD to GNP and TDS to XGS seem to indicate that Thailand is not facing any immediate debt servicing problems.

b) Bolivia, Senegal and Sudan. The rapid growth in these countries' indebtedness during the seventies has been associated with an upward shift in the consumption function and a decline in savings. All three
countries are facing severe debt servicing problems, and the results seem to indicate that the decline in savings is at least partially responsible for the present crisis. Therefore, it can be concluded that policy measures that would reduce the marginal propensity to consume GNP and thus increase the level of domestic resource mobilization, should be an important part of any policy package that attempts to resolve those countries' debt problems.

c) Costa Rica. Foreign inflows in Costa Rica were associated with a rapid increase in both GNP and consumption. As a result, there has been no decline in savings nor an increase in the propensity to consume. Yet, Costa Rica is facing a debt crisis. This may be due to the inability of the government to capture some of the surplus generated by the rise in GNP and use it to meet its debt service obligations, indicating a need to increase the fiscal effort. Another possible explanation for Costa Rica's debt problem is that most of the increase in GNP occurred in the nontradeable sector. If this is the case, then policy measures that would encourage the production of tradeables are necessary.

d) Malawi. Foreign inflows in Malawi were associated with an increase in public consumption, and no immediate increase in GNP. Therefore, in addition to reducing the public sector's marginal propensity to consume out of debt, an effort to restrict new investments to productive activities and possibly higher allocation of foreign inflows to finance imports of intermediate goods to improve capacity utilization from past investments will be a necessary component of any program that attempts to resolve Malawi's debt servicing crisis.
6.2 Limitations of the Present Analysis and Areas for Future Research

The effort of this paper has been to correct some glaring problems with past work on the subject. Considerable improvement and further analysis of some of the issues addressed here is warranted. Some useful directions for future work are listed below.

(i) It should be noted that the existence of a positive correlation between foreign inflows and consumption does not imply any direction of causality. The direction of causality between consumption and foreign inflows is a function of foreign and domestic credit restrictions which can fluctuate over time. More research in this area is clearly needed.

(ii) The results of this paper indicate that the availability of foreign funds has led to a slackening of the fiscal effort in many countries. An econometric analysis of the relationship between foreign inflows and net taxes will therefore be an important contribution to the literature.

(iii) The results of this paper indicate that foreign borrowing has been associated with a rise in GNP. Changes in GNP could occur as a result of increases in aggregate supply or aggregate demand. Additional work in this direction is needed to quantify the importance of supply and demand constraints. One potentially fruitful approach would be to examine appropriate specifications of private investment functions in LDCs.

(iv) The paper has shown that the form of the consumption function varies across countries. In five countries, current income is the most important explanatory variable, but the adjustment to changes in current income differs across these countries. The
differences in adjustment probably arise due to variations in credit constraints, price flexibility and expectation formation and would form an interesting area for further research. A detailed analysis of the factors affecting the shape of the consumption function and of the impact of the shape of this function on the propensity to consume would be an important contribution to the literature.

(v) Finally, the model presented in this paper incorporates the impact of public consumption on private consumption and vice versa, through its impact on income. However, public expenditure level and its pattern is likely to have a direct effect on private expenditure. Further work is needed to explore this effect.
References


APPENDIX I

A. Estimates of the Structural Form Private Consumption Functions:

i) **Bolivia:** (1962-81)

\[ PC = 441.8 + 0.41 PC_{-1} + 0.28y + 0.59 D \]
\[ R^2 = 0.96 \]

ii) **Costa Rica:** (1963-81)

\[ PC = 580.8 + 0.56 y + 0.07 D \]
\[ R^2 = 0.97 \quad D.W. = 1.9 \]

iii) **Malawi:** (1962-81)

\[ PC = 45.0 + 0.38y - 0.05 \]
\[ R^2 = 0.78 \]

iv) **Senegal:** (1963-83)

\[ PC = 827.9 + 0.26 PC_{-1} + 0.51 y + 0.4 D \]
\[ R^2 = 0.95 \]

v) **S ri:** (1962-83)

\[ PC = -28.0 + 0.81 y + 0.71 D \]
\[ R^2 = 0.93 \quad D.W. = 1.7 \]

vi) **Thailand:** (1962-83)

\[ PC = 1.03 PC_{-1} + 0.04 D \]
\[ R^2 = 0.99 \]

B. Estimates of the Structural Form Public Consumption Functions:

i) **Bolivia:** (1962-81)

\[ BC = -88.9 + 0.62 BC_{-1} + 0.08y - 0.02 D \]
\[ R^2 = 0.99 \]
ii) Costa Rica: \((1963-81)\)

\[
BC = -40.72 + 0.61 BC_{-1} + 0.07 y - 0.03 D \\
= (-2.36) (10.88) (5.93)^{\tau} (1.34) \\
R^2 = 0.96
\]

iii) Malawi: \((1962-81)\)

\[
BC = 0.93 BC_{-1} + 0.11 D \\
= (18.7) (2.01) \\
R^2 = 0.81
\]

iv) Senegal: \((1963-83)\)

\[
BC = 2436.4 + 0.83 BC_{-1} - 0.03 yP + 0.20 D + \\
= (2.05) (0.82) (-1.22) (3.65) \\
0.14 yT \\
= (2.14) \\
R^2 = 0.91
\]

v) Sudan: \((1962-83)\)

\[
BC = 0.91 BC_{-1} + 0.14 D \\
= (20.43) (2.36) \\
R^2 = 0.59
\]

vi) Thailand: \((1962-83)\)

\[
BC = 1.02 BC_{-1} + 0.12 D \\
= (75.5) (3.22) \\
R^2 = 0.98
\]
Appendix II

Testing the Tax Function in the Model

The model presented in the paper disaggregates the impact of foreign inflows on private consumption into a direct effect and an indirect effect. The direct effect is defined as the effect of foreign inflows on consumption with income (GNP) held constant. The indirect effect is the product of the effect of foreign inflows on GDP into the propensity to consume out of GNP.

\[
\frac{dc}{dD} = \frac{dc}{dD} / y + \frac{dc}{dy} \frac{dy}{dD}
\]

The model has two mechanisms for explaining the impact of foreign inflows on GNP.

(a) inverse tax multiplier from fiscal weakening;

(b) increase in capacity utilisation from higher intermediate goods imports.

The impact of foreign inflows on tax revenues (fiscal weakening effect) was tested with Sudanese data for the period 1962-83 by estimating the tax function specified in the model.

\[
T = 8.57 + 0.11 y - 0.24 D
\]

\[
(0.78) \quad (2.19) \quad (-2.21)
\]

\[
R^2 = 0.41
\]
The estimated coefficient shows that in Sudan the impact of foreign inflows on tax revenue is significantly negative. Future research should extend this analysis to include more countries as well as provide a clear explanation of how foreign borrowing could affect net taxes, and consumption.