Foreign Aid, Public Savings Displacement, and Aid Dependency in Côte d'Ivoire: An Aid Disaggregation Approach

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1. Introduction

The macroeconomic effectiveness of foreign aid in developing countries constitutes one of the central issues in development policy. The empirical evidence on the aid-growth nexus, which has received much attention in the aid effectiveness literature, remains inconclusive after almost four decades of research. On balance however, there are indications that aid does not spur growth, as predicted by the gap theories (see Chenery and Strout 1966). Burnside and Dollar (2000) and "Assessing Aid" (World Bank 1998) attribute this ineffectiveness of aid in promoting growth to the lack of good policy environment. They even went further to urge donors to allocate their aid only to countries with good policy environment.

However, as McGillivray and Morrissey (2001) remark, aid is channeled via the public sector, and, therefore identifying its fiscal effect is a prerequisite to understanding its macroeconomic effectiveness. The fiscal response literature has attempted to address this lacuna of the aid-growth literature, following the pioneering work of Heller (1975).

Studies such as Gang and Khan (1991), Franco-Rodriguez *et al*. (1998), McGillivray (2000), Franco-Rodriguez (2000), Mavrotas (2002) and Mavrotas and Ouattara (2003), among others, have looked at how the public sector allocates different revenues (including aid) among expenditure types.[1]

The present paper extends recent work by Mavrotas and Ouattara (2003) and the fiscal response framework to analyze the impact of aid flows on public savings and the public savings gap. There are several reasons why these two fiscal variables merit attention. With regard to public savings, Griffin (1970) argued that foreign aid inflows would displace domestic savings via an increase in government consumption and a reduction in taxation. Fiscal response studies have partially addressed this issue by looking at the impact of aid inflows on government consumption and taxation efforts. However, none of these studies looked directly at the impact of aid on public savings, despite the fact that this was one of the main concerns in Griffin (1970).

Turning to the public savings gap, its importance comes from the fact that it could shed some light on the issue of aid dependency and to some extent the link between aid and economic growth. Closing the gap would not only reduce the recipient country's dependence on aid and hence maintain the macroeconomic stability needed to promote long-term growth (Hjertholm *et al*., 2000, pp.365-6), it would also help achieve a sustainable growth rate without long-term dependence on aid (Doriye *et al*. 1993). This is one of the reasons why 'Structural adjustment programs during the 1990s have placed emphasis on closing this gap' (Hjertholm *et al*., 2000). The other key contribution of this paper is the use of disaggregated aid (project aid, program aid, technical assistance

and food aid) data to avoid the potential aggregation bias associated with many aid effectiveness studies.[2]

The structure of the paper is as follows. Section 2 presents the main features of the model and its solution. Section 3 briefly describes the data and discusses the econometric method used to estimate the structural and reduced form equations related to the public savings and the public savings gap. Section 4 provides the results and their interpretations. Section 5 concludes and suggests some policy recommendations

2. The Model

As with most fiscal response studies, it is assumed that the government maximizes a utility function. This behavior can be represented by the following general specification:

$$U = f(I_g, G, T, A_1, A_2, A_3, A_4, B) \quad (1)$$

Where Ig is public investment, T represents government revenue (tax and non-tax revenue, excluding grants), B is government borrowing from other sources, G is government recurrent expenditure or public sector consumption, A_1 is project aid from all donors, A_2 represents program aid from all sources, A_3 technical assistance grants and A_4 is program food aid (which excludes emergency food aid) from all donors.

Following Mosley *et al.* (1987), Bihn and McGillivray (1993) and more recently Franco-Rodriguez (2000) and Mavrotas and Ouattara (2003), the utility function (1) is

represented by a quadratic loss function without the linear terms. This loss function has the following form:

$$
\begin{aligned}
U = \alpha_0 &- \frac{\alpha_1}{2}(I_g - I_g^*)^2 - \frac{\alpha_2}{2}(G - G^*)^2 - \frac{\alpha_3}{2}(T - T^*)^2 \\
&- \frac{\alpha_4}{2}(A_1 - A_1^*)^2 - \frac{\alpha_5}{2}(A_2 - A_2^*)^2 - \frac{\alpha_6}{2}(A_3 - A_3^*)^2 \\
&- \frac{\alpha_7}{2}(A_4 - A_4^*)^2 - \frac{\alpha_8}{2}(B - B^*)^2
\end{aligned}
\qquad (2)
$$

The starred variables represent the different target variables associated with each of the endogenous variables and $\alpha_i \succ 0$ for i = 1,…, 8 represent the relative weights given to the different terms in the utility function and, without loss of generality, may be normalized so that they sum up to unity.

Aid (disbursements) variables are endogenized in the government utility function following Franco-Rodriguez *et al*. (1998), McGillivray and Ahmed (1999) Franco-Rodriguez (2000), McGillivray (2000) and Mavrotas and Ouattara (2003). The decomposition of aid into its functional form is motivated by two main reasons. Firstly, as argued by Cassen (1994) and White (1992, 1998) different categories of aid are likely to exert different impacts. Consequently, given that most aid is channeled via the public sector, it makes sense to assume that the government might have different behavior vis-à-vis these different types of aid. Recent works by Mavrotas (2002) appear to confirm this point. Secondly, within the context of the fiscal response framework it is most likely that the government would attach different weights to each of these categories. They are disbursed in different forms for specific expenditure types. If the government

prioritizes some types of expenditure over the others then the utility obtained from the financing of such (prioritized) expenditure will be higher. Put differently, the government would attach more utility to the specific aid inflows that are destined to its prioritized expenditures. Further, some of these types of aid (e.g. program aid) have conditions attached to them. Depending on the nature and implications of these conditions the utility obtained by the maximizer will be higher or lower compared to the type of aid that does not impose such conditions. Finally, the fact that these different types of aid are reported separately in the budget is a good indication that the government does see them differently. In short, failing to account for aid disaggregation in the government utility function may lead to aggregation bias in the results and, therefore, the conclusions and policy recommendations.

The analysis above shows why aid is disaggregated in the government utility function, i.e. why the government would attach different utilities to these aid inflows. A complementary issue that is worth highlighting is how these different categories of aid could influence the behavior of the recipient government. Project aid is disbursed for specific projects such as the development and the improvement of local infrastructure (social, economic, etc.). Aid (project) by financing these costs could allow the government to allocate resources elsewhere or to forgo a tax increase to finance such expenditures.[3] Financial program aid, often referred to as quick disbursement aid, is generally disbursed to help the recipient country overcome its balance of payments problems, via debt relief and/or import support, or to support the government's budget through the provision of free foreign exchange conditional on some policy reforms with monetary and fiscal outcomes. Technical assistance grants (free standing and

investment related) could affect the behavior of the recipient government in many ways. If these grants were targeted at students, trainees or research in the aid receiving country then the government would not have to use its own resources to finance such costs. If the grants take the form of wages (for experts from the donor countries) then the government of the aid recipient country would have less incentive to build local staff capacity, because its contribution to the wage paid to these experts are far below what they would have paid for local workers (White, 1998). Finally food aid, which includes not only foodstuffs but also medicines and fertilizers, could provide the government with additional funds (through monetization) or bear costs that the government would have otherwise undertaken.

Following Franco-Rodriguez *et al*. (1998), McGillivray and Ahmed (1999), Franco-Rodriguez (2000), and Mavrotas and Ouattara (2003) the government is assumed to maximize the utility function in (2) subject to the following constraints:

$$I_g + G = B + T + A_1 + A_2 + A_3 + A_4 \tag{3}$$

$$G \leq \rho_1 T + \rho_2 A_1 + \rho_3 A_2 + \rho_4 A_3 + \rho_5 A_4 + \rho_6 B \tag{4}$$

The first constraint implies that the government runs a balanced-budget, whereas the second constraint defines the maximum share of each revenue type that can be used to finance government consumption.

Applying the Lagrangean to the maximization problem, turning (4) into an equality and assuming that the borrowing target is zero[4], the structural equations, for each policy variable, can be derived as follows:

$$
\begin{aligned}
I_g = {} & (1-\rho_1)\beta_1 I_g^* + (1-\rho_1)\beta_2 G^* \\
& + (1-\rho_1)[1-(1-\rho_1)\beta_1 - \rho_1\beta_2]T^* \\
& + [(1-\rho_2) - (1-\rho_1)(1-\rho_2)\beta_1 - (1-\rho_1)\rho_2\beta_2]A_1 \\
& + [(1-\rho_3) - (1-\rho_1)(1-\rho_3)\beta_1 - (1-\rho_1)\rho_3\beta_2]A_2 \\
& + [(1-\rho_4) - (1-\rho_1)(1-\rho_4)\beta_1 - (1-\rho_1)\rho_4\beta_2]A_3 \\
& + [(1-\rho_5) - (1-\rho_1)(1-\rho_5)\beta_1 - (1-\rho_1)\rho_5\beta_2]A_4 \\
& + [(1-\rho_6) - (1-\rho_1)(1-\rho_6)\beta_1 - (1-\rho_1)\rho_6\beta_2]B
\end{aligned}
\tag{5}
$$

$$
\begin{aligned}
G = {} & \rho_1\beta_1 I_g^* + \rho_1\beta_2 G^* + \rho_1[1-(1-\rho_1)\beta_1 - \rho_1\beta_2]T^* \\
& + [\rho_2 - \rho_1(1-\rho_2)\beta_1 - \rho_1\rho_2\beta_2]A_1 \\
& + [\rho_3 - \rho_1(1-\rho_3)\beta_1 - \rho_1\rho_3\beta_2]A_2 \\
& + [\rho_4 - \rho_1(1-\rho_4)\beta_1 - \rho_1\rho_4\beta_2]A_3 \\
& + [\rho_5 - \rho_1(1-\rho_5)\beta_1 - \rho_1\rho_5\beta_2]A_4 \\
& + [\rho_6 - \rho_1(1-\rho_6)\beta_1 - \rho_1\rho_6\beta_2]B
\end{aligned}
\tag{6}
$$

$$
\begin{aligned}
T = {} & \beta_1 I_g^* + \beta_2 G^* + [1-(1-\rho_1)\beta_1 - \rho_1\beta_2]T^* \\
& - [(1-\rho_2)\beta_1 + \rho_2\beta_2]A_1 \\
& - [(1-\rho_3)\beta_1 + \rho_3\beta_2]A_2 \\
& - [(1-\rho_4)\beta_1 + \rho_4\beta_2]A_3 \\
& - [(1-\rho_5)\beta_1 + \rho_5\beta_2]A_4 \\
& - [(1-\rho_6)\beta_1 + \rho_6\beta_2]B
\end{aligned}
\tag{7}
$$

$$
\begin{aligned}
A_1 = {} & \beta_3 I_g^* + \beta_4 G^* - [(1-\rho_1)\beta_3 + \rho_1\beta_4]T \\
& + [1-(1-\rho_2)\beta_3 - \rho_2\beta_4]A_1^* \\
& - [(1-\rho_3)\beta_3 + \rho_3\beta_4]A_2 \\
& - [(1-\rho_4)\beta_3 + \rho_4\beta_4]A_3 \\
& - [(1-\rho_5)\beta_3 + \rho_5\beta_4]A_4 \\
& - [(1-\rho_6)\beta_3 + \rho_6\beta_4]B
\end{aligned} \tag{8}
$$

$$
\begin{aligned}
A_2 = {} & \beta_5 I_g^* + \beta_6 G^* - [(1-\rho_1)\beta_5 + \rho_1\beta_6]T \\
& - [(1-\rho_2)\beta_5 + \rho_2\beta_6]A_1 \\
& + [1-(1-\rho_3)\beta_5 - \rho_3\beta_6]A_2^* \\
& - [(1-\rho_4)\beta_5 + \rho_4\beta_6]A_3 \\
& - [(1-\rho_5)\beta_5 + \rho_5\beta_6]A_4 \\
& - [(1-\rho_6)\beta_5 + \rho_6\beta_6]B
\end{aligned} \tag{9}
$$

$$
\begin{aligned}
A_3 = {} & \beta_7 I_g^* + \beta_8 G^* - [(1-\rho_1)\beta_7 + \rho_1\beta_8]T \\
& - [(1-\rho_2)\beta_7 + \rho_2\beta_8]A_1 \\
& - [(1-\rho_3)\beta_7 + \rho_3\beta_8]A_2 \\
& + [1-(1-\rho_4)\beta_7 - \rho_4\beta_8]A_3^* \\
& - [(1-\rho_5)\beta_7 + \rho_5\beta_8]A_4 \\
& - [(1-\rho_6)\beta_7 + \rho_6\beta_8]B
\end{aligned} \tag{10}
$$

$$
\begin{aligned}
A_4 = {} & \beta_9 I_g^* + \beta_{10} G^* - [(1-\rho_1)\beta_9 + \rho_1\beta_{10}]T \\
& - [(1-\rho_2)\beta_9 + \rho_2\beta_{10}]A_1 \\
& - [(1-\rho_3)\beta_9 + \rho_3\beta_{10}]A_2 \\
& - [(1-\rho_4)\beta_9 + \rho_4\beta_{10}]A_3 \\
& + [1-(1-\rho_5)\beta_9 - \rho_5\beta_{10}]A_4^* \\
& - [(1-\rho_6)\beta_9 + \rho_6\beta_{10}]B
\end{aligned} \tag{11}
$$

$$
\begin{aligned}
B = {} & \beta_{11} I_g^* + \beta_{12} G^* - [(1-\rho_1)\beta_{11} + \rho_1\beta_{12}]T \\
& - [(1-\rho_2)\beta_{11} + \rho_2\beta_{12}]A_1 \\
& - [(1-\rho_3)\beta_{11} + \rho_3\beta_{12}]A_2 \\
& - [(1-\rho_4)\beta_{11} + \rho_4\beta_{12}]A_3 \\
& - [(1-\rho_5)\beta_{11} + \rho_5\beta_{12}]A_4
\end{aligned} \tag{12}
$$

With

$$\beta_1 = \frac{\alpha_1(1-\rho_1)}{\theta_1}, \beta_2 = \frac{\alpha_2\rho_1}{\theta_1}, \beta_3 = \frac{\alpha_1(1-\rho_2)}{\theta_2}; \beta_4 = \frac{\alpha_2\rho_2}{\theta_2}; \beta_5 = \frac{\alpha_1(1-\rho_3)}{\theta_3};$$
$$\beta_6 = \frac{\alpha_2\rho_3}{\theta_3}; \beta_7 = \frac{\alpha_1(1-\rho_4)}{\theta_4}; \beta_8 = \frac{\alpha_2\rho_4}{\theta_4}; \beta_9 = \frac{\alpha_1(1-\rho_5)}{\theta_5}; \beta_{10} = \frac{\alpha_2\rho_5}{\theta_5};$$
$$\beta_{11} = \frac{\alpha_1(1-\rho_6)}{\theta_6}; \beta_{12} = \frac{(\alpha_2\rho_6)}{\theta_6}$$

Where

$$\theta_1 = \alpha_1(1-\rho_1)^2 + \alpha_2\rho_1^2 + \alpha_3;\ \theta_2 = \alpha_1(1-\rho_2)^2 + \alpha_2\rho_2^2 + \alpha_4;$$
$$\theta_3 = \alpha_1(1-\rho_3)^2 + \alpha_2\rho_3^2 + \alpha_5;\ \theta_4 = \alpha_1(1-\rho_4)^2 + \alpha_2\rho_4^2 + \alpha_6;$$
$$\theta_5 = \alpha_1(1-\rho_5)^2 + \alpha_2\rho_5^2 + \alpha_7;\ \theta_6 = \alpha_1(1-\rho_6)^2 + \alpha_2\rho_6^2 + \alpha_8$$

However, the structural equations only capture the direct impacts on the endogenous variables. For policy purposes, however, it is important to derive the total impacts, which are captured by the reduced form Equations (13)-(20).

$$I_g = \delta_1 I_g^* + \delta_2 G^* + \delta_3 T^* + \delta_4 A_1^* + \delta_5 A_2^* + \delta_6 A_3^* + \delta_7 A_4^* \quad (13)$$

$$G = \delta_8 I_g^* + \delta_9 G^* + \delta_{10} T^* + \delta_{11} A_1^* + \delta_{12} A_2^* + \delta_{13} A_3^* + \delta_{14} A_4^* \quad (14)$$

$$T = \delta_{15} I_g^* + \delta_{16} G^* + \delta_{17} T^* + \delta_{18} A_1^* + \delta_{19} A_2^* + \delta_{20} A_3^* + \delta_{21} A_4^* \quad (15)$$

$$A_1 = \delta_{22} I_g^* + \delta_{23} G^* + \delta_{24} T^* + \delta_{25} A_1^* + \delta_{26} A_2^* + \delta_{27} A_3^* + \delta_{28} A_4^* \quad (16)$$

$$A_2 = \delta_{29} I_g^* + \delta_{30} G^* + \delta_{31} T^* + \delta_{32} A_1^* + \delta_{33} A_2^* + \delta_{34} A_3^* + \delta_{35} A_4^* \quad (17)$$

$$A_3 = \delta_{36} I_g^* + \delta_{37} G^* + \delta_{38} T^* + \delta_{39} A_1^* + \delta_{40} A_2^* + \delta_{41} A_3^* + \delta_{42} A_4^* \quad (18)$$

$$A_4 = \delta_{43} I_g^* + \delta_{44} G^* + \delta_{45} T^* + \delta_{46} A_1^* + \delta_{47} A_2^* + \delta_{48} A_3^* + \delta_{49} A_4^* \quad (19)$$

$$B = \delta_{50} I_g^* + \delta_{51} G^* + \delta_{52} T^* + \delta_{53} A_1^* + \delta_{54} A_2^* + \delta_{55} A_3^* + \delta_{56} A_4^* \quad (20)$$

Where, the δs are combinations of αs and ρs.[5]

The next task is to define the fiscal variables of interest. The first variable, public savings is defined as the difference between government revenue (T) and government consumption (G). This can be shown by rearranging equation (3), as below:

$$I_g = B + (T - G) + A_1 + A_2 + A_3 + A_4 \tag{21}$$

Following Bacha (1990) and Pattichis (2004) public savings is defined as government revenue (tax and non-tax) minus government consumption. Rearranging (21) gives:

$$I_g = B + S_g + A_1 + A_2 + A_3 + A_4 \tag{22}$$

Where Sg represents public savings. (22) Implies that public investment is financed by public savings, foreign aid and the public sector borrowing requirement. Subtracting Equation (6) from Equation (7), and rearranging, gives the structural equation for the public savings variable, as follows.

$$\begin{aligned} S_g = {} & \beta_1(1-\rho_1)I_g^* + \beta_2(1-\rho_2)G^* + (1-\rho_1)[1-\beta_1(1-\rho_1)-\beta_2\rho_1]T^* \\ & [-\beta_1 - \beta_2\rho_2 + \beta_1\rho_1(1-\rho_2) - \rho_2 + \beta_2\rho_1\rho_2]A_1 \\ & [-\beta_1 - \beta_2\rho_3 + \beta_1\rho_1(1-\rho_3) - \rho_3 + \beta_2\rho_1\rho_3]A_2 \\ & [-\beta_1 - \beta_2\rho_4 + \beta_1\rho_1(1-\rho_4) - \rho_4 + \beta_2\rho_1\rho_4]A_3 \\ & [-\beta_1 - \beta_2\rho_5 + \beta_1\rho_1(1-\rho_5) - \rho_5 + \beta_2\rho_1\rho_5]A_4 \\ & [-\beta_1 - \beta_2\rho_6 + \beta_1\rho_1(1-\rho_6) - \rho_6 + \beta_2\rho_1\rho_6]B \end{aligned} \tag{23}$$

Where the βs and ρs are defined as above.

The second fiscal variable, the public savings gap is defined as the difference between public investment and public savings. From Equation (22), it is clear that:

$$(I_g - S_g) = B + A_1 + A_2 + A_3 + A_4 \tag{24}$$

The structural equation for the public savings gap (written in terms of the target variables and the revenue variables) is obtained by subtracting Equation (24) from (5), which results in equation (25).[6]

$$\begin{aligned}(I_g - S_g) = & -2\beta_1\rho_1 I_g^* - 2\beta_2\rho_1 G^* + 2\rho_1[1 + \beta_1(1-\rho_1) - \beta_2\rho_1]T^* \\ & [(1-2\rho_2) + 2\beta_1\rho_1(1-\rho_2) + 2\beta_2\rho_1\rho_2]A_1 \\ & + [(1-2\rho_3) + 2\beta_1\rho_1(1-\rho_3) + 2\beta_2\rho_1\rho_3]A_2 \\ & + [(1-2\rho_4) + 2\beta_1\rho_1(1-\rho_4) + 2\beta_2\rho_1\rho_4]A_3 \\ & + [(1-2\rho_5) + 2\beta_1\rho_1(1-\rho_5) + 2\beta_2\rho_1\rho_5]A_4 \\ & + [(1-2\rho_6) + 2\beta_1\rho_1(1-\rho_6) + 2\beta_2\rho_1\rho_6]B\end{aligned} \tag{25}$$

Where the βs and ρs are defined as above.

In the same line of argument, the reduced form equation for both fiscal variables can also be derived. The reduced form equation for the public savings variable is obtained by subtracting equation (14) from (15). Thus the reduced form equation for public savings is:

$$S_g = \phi_1 I_g^* + \phi_2 G^* + \phi_3 T^* + \phi_4 A_1^* + \phi_5 A^*_2 + \phi_6 A_3^* + \phi_7 A_4 \tag{26}$$

Where the ϕs are combinations of αs and ρs. The reduced form equation for the public savings gap is obtained by subtracting Equation (26) from Equation (13) and this leads to the following equation:

$$(I_g - S_g) = \gamma_1 I_g^* + \gamma_2 G^* + \gamma_3 T^* + \gamma_4 A_1^* + \gamma_5 A_2^* + \gamma_6 A_3^* + \gamma_7 A_4^* \qquad (27)$$

Where the γs are combinations of αs and ρs.

3. Data and Econometric Method

The structural equations (23) and (25) and the reduced-form equations represented by (26) and (27) were estimated using 1975-1999 time series data for Côte d'Ivoire. All data are in billions of CFA franc using 1995 prices. Data on public investment (Ig), government consumption (G), and government revenue (T) were obtained from the *Ministère de l'Économie et des Finances* and from the African Live Database.

Data on project aid and program aid disbursements were constructed, with the help of the OECD CRS (Credit Reporting System), for Côte d'Ivoire. These series were constructed by drawing on the CRS database and the DAC (Development Assistance Committee) database. CRS data on program aid and project aid, which exist in commitments form, have been transformed into disbursements by applying their percentage share, in total project and program aid commitments, to total net aid (ODA) disbursements from DAC net of food aid and technical assistance.[7] Data on technical assistance and food aid has been obtained from the DAC online database. McGillivray

and Morrisey (2001) note that using the recipient's measure of aid may be more appropriate, because that is the flows of fund going through the country's fiscal budget. However, it was not possible to obtain all aid data from government sources so we relied on the OECD-DAC data, which is donor's measure of aid. This will tend to over-estimate the true effect of aid. It is also worth pointing out that due to corruption issues one cannot guarantee that the recipient's records of aid inflows, as published by the (recipient) government, would be what really go through the budget. In other words, even if aid data was obtained from the recipient there is no way to be certain that that we are capturing the true effect of aid flows.

The data on borrowing (B) represents the public sector borrowing requirement, which is obtained as a residual from the balanced budget constraint represented by Equation (3). Data for the target variables, Ig*, G* and T*, could not be obtained directly and have to be estimated as with most fiscal response studies, including Gang and Khan (1991), Franco-Rodriguez (1998) and Franco-Rodriguez (2000). There is no agreed methodology on how to derive these targets. However, like Franco-Rodriguez *et al.* (1998) and Franco-Rodriguez (2000), among others, this study makes use of unit root and cointegration techniques in setting the targets. The target for public investment (Ig*) was derived as a long-run cointegrating relationship between actual investment and private investment, while the target for government revenue (T*) was estimated as a long-run relationship between actual government revenue, income and the amount of aid commitments each year. Concerning the target for government consumption (G*) it was not possible to establish a cointegration relationship between actual government consumption and a number of variables. This target was, therefore, estimated using

auto-regressive techniques. Following Franco-Rodriguez *et al*. (1998), Franco-Rodriguez (2000), McGillivray (2000) and Mavrotas and Ouattara (2003) the targets for aid disbursements have been set equalled to their commitments.

The estimation process consists of three main steps. In the first stage, the structural equations (5)-(12) were estimated using the non-linear three stage least squares technique. This technique is used by most fiscal response studies. The estimates of ρs and βs obtained from this stage are used to compute the estimates of the parameters of the structural equations.[8] In the second stage of the estimation, the system formed by the estimates of these structural equations is solved through to obtain the estimates of the reduced form equations. Finally, in the third stage, using the estimated equations (structural and reduced form) of T and G, the structural equation (24) and the reduced form equation (26) for public savings (Sg) are derived. Using the estimated equations (structural and reduced form) for Ig and the estimated equations for public savings (Sg) the structural equation (25) and the reduced form equation (28) for the public savings gap are also derived.[9]

IV Results and Interpretations

The estimates of the structural equations related to public savings and the public savings gap are respectively:

$$\begin{aligned} S_g = {} & 0.259 I_g^{*} + 0.239 G^{*} + 0.096 T^{*} \\ & - 0.275 A_1 - 1.236 A_2 - 1.240 A_3 - 0.260 A_4 - 0.849 B \end{aligned} \qquad (28)$$

$$\left(I_g - S_g\right) = A_1 + A_2 + A_3 + A_4 + B \qquad (29)$$

The results related to the aid variables are summarized in Table 1. With regard to public savings, the results indicate that all forms of foreign aid exert a negative effect. Increasing project aid and food aid by a 1000 francs would reduce public savings by 725 and 260 francs, respectively. For the same increase in program aid and technical assistance inflows public saving is reduced by more than 1000 francs. This implies that, as far as the direct impacts of aid flows are concerned, program aid and technical assistance have greater displacement effect on public savings than project aid and food aid.

Table 1 Direct Impact of Aid Variables

Fiscal Variables	A1	A2	A3	A4
Public Savings	-0.725	-1.236	-1.240	-0.260
Public Savings Gap	1.000	1.000	1.000	1.000

Turning to the public savings gap, the results clearly show that all categories of foreign aid worsen Côte d'Ivoire's dependence on foreign aid on a one-to-one basis. However, as mentioned earlier, the structural equations only capture the direct impact of aid inflows. For policy purposes only the total impacts (direct and indirect) are imperative. These impacts are obtained via the estimates of the reduced form equations (26) and (27), as below:

$$S_g = -1.661G^* + 0.645Ig^* + 1.008T^* \\ -1.890A_1^* - 0.096A_2^* + 0.661A_3^* + 0.660A_4^* \quad (30)$$

$$\left(I_g - S_g\right) = 1.294G^* + 0.199Ig^* - 0.746T^* \\ + 0.932A_1^* + 0.340A_2^* - 0.294A_3^* - 0.295A_4^* \quad (31)$$

Table 2 reports the results related to the aid variables. The public savings results indicate that the extent of public savings displacement depends on the category of foreign aid. For instance, increasing project aid by 1000 francs would lead to a reduction of 1809 francs in public savings. Project aid reduces public savings for several reasons. Firstly, the financing of the recurrent costs of projects is often left to the recipient government, which has to use its own resources. For example, suppose a donor disburses funds to build new schools in a country. Once the schools are built it is generally the responsibility of the recipient government to finance the costs associated

Table 2 Total Impacts of Aid Categories

Fiscal Variables	A1	A2	A3	A4
Public Savings	-1.809	-0.096	0.661	0.660
Public Savings Gap	0.932	0.340	-0.294	-0.295

with teachers and other personnel, the costs related to the maintenance of the school buildings, and the provision of materials (computers, books, etc.). These activities would increase government consumption and thus reduce public savings, *ceteris paribus*. It is also worth noting the fact that, contrary to the view of Griffin (1970), the reduction in public savings is not the result of the government reducing its taxation effort, because it receives aid, but rather the result of government consumption increasing because of the recurrent costs of the projects. This finding also shows that the conclusions reached by Boone (1996) and "Assessing Aid" (World Bank 1998), who argue that aid is used to finance government consumption, is unfair to aid recipient countries because they do not highlight the fact that some of the consumption is in fact costs related to the sustainability of the projects financed by aid.

Turning to program aid, its impact on public savings appears to be nearly neutral. This is not surprising since adjustment and stabilization policies, associated with program aid, have put emphasis on reducing public sector consumption (e.g. wages, subsidies, etc.) and at the same time have attempted to minimize taxation in order to favor a market approach to the economy through privatization. In other words, the reduction in the government consumption is accompanied by a reduction in government revenue so that public savings remain almost unchanged.

Technical assistance and food aid inflows do not appear to reduce public savings, in the context of Côte d'Ivoire. An increase of 1000 francs in these two forms of aid increases public savings by approximately 660 francs. Food aid could increase public savings via three main channels. Food aid sometimes includes items such as medicines and

fertilizers. Aid, hence, by financing these costs helps the government to save its own resources. Furthermore, when food aid is used for feeding projects some governments cut education expenditure by more or less an equal amount of the food aid (Colding and Pinstrup-Anderson, 2000). In addition, food aid monetization provides the government with additional funds. All these factors would generate an increase in public savings. Technical assistance could also increase public savings via different channels. For example, recipient governments might refrain spending on education if it is believed that education grants will be made available. Moreover, as remarked by White (1998) recipient governments have sometimes little incentive to build up local staff capacity, because their contributions to the wages paid to these experts are far below what they would have paid for local workers.

With respect to the public savings gap the results indicate that Côte d'Ivoire's dependence on foreign aid is worsened with project aid inflows. For example, increasing these inflows by 1000 francs would increase the gap by almost the same amount. This could be explained by the negative effect project aid has on public savings. Program aid also appears to increase the country's dependence on aid, although on a smaller scale compared to project aid. Given that the impact of program aid on public savings is almost neutral, the increase in the public savings gap could mean that, in the context of Côte d'Ivoire, public investment is affected positively by program aid.

Technical assistance and food aid affect negatively the public savings gap, thus implying that increasing their inflows would help close the gap and reduce Côte d'Ivoire dependence on aid. For every 1000 francs increase in their inflows the public

savings gap is reduced by more than 290 francs. These two types of aid affect positively public savings and therefore, *ceteris paribus*, there are expected to reduce the public savings gap.

V Conclusions

This paper attempts to examine the public savings response to aid flows and the extent to which foreign aid affects the recipient country's dependence on foreign aid in the context of Côte d'Ivoire during the period of 1975 to 1999, using the fiscal response framework. The results indicate that project aid flows are associated with decreases in public savings, whilst the financial program aid has a neutral effect. In contrast, technical assistance grants and program food aid are associated with increases in public savings. Turning to the public savings gap, which measures the recipient country's dependence on aid, the results show that project aid tends worsen Côte d'Ivoire's dependence on aid. Financial program aid, also, appears to increase aid dependence but to a lesser scale when compared to project aid. Technical assistance grants and program food aid, by contrast, help to reduce dependence on aid.

These findings have important policy implications. Since project aid inflows tend to exert a negative impact on the public savings and program aid a neutral effect in the case of Côte d'Ivoire, there is a need for both donors and the Ivorian government to promote policies that would stimulate private savings to compensate for the fall in public savings. Donors could for instance channel part of their aid directly towards supporting the private sector development or improving financial institutions[10]. Additionally, given that project aid inflows affect negatively public savings because of

the recurrent costs of the projects donors could help the recipient by redirecting debt servicing towards the financing of these costs.

The finding that project aid and, to a lesser extent, program aid worsen Côte d'Ivoire's dependence on foreign aid implies that effort should be geared towards influencing the three fiscal variables (public investment, government consumption and tax revenue) that determine the gap. In practical terms given that increasing taxation could be distortionary it would imply that the government has to reduce total public expenditure. However, this could mean cutting investment in education and health, which is in clear contradiction with the millennium development goals. One policy option could be for donor countries to support the prices of cocoa and coffee, two primary commodities where Côte d'Ivoire has a comparative advantage. This would ensure that export revenues are maintained at a certain level so that the Ivorian Government does not have to borrow to make up for any shortfall of revenue. Further, given that technical assistance and food aid seem to help to closing the public savings gap suggests that the provision of non-financial aid might be a channel worth looking at from the donor viewpoint.

Finally, in terms of aid allocation, as each type of aid exerts a different impact on the fiscal behavior of the recipient government, and consequently the recipient's economy, donors have to get the balance right on the composition and magnitude of aid inflows allocated to individual countries. What is needed is not cutting back aid, as recommended by Burnside and Dollar (2000) and "Assessing Aid" (World Bank 1998),

but altering the composition of development aid based on the state and the need of the recipient as well as the objectives of donors.

Endnotes

[1] see McGillivray and Morrissey (2001) for a thorough review of the fiscal response literature

[2] See B. Ouattara (2003).

[3] Donors, often, exert a greater control over the use and management of project aid.

[4] This assumption has been extensively used in fiscal response studies (see Heller, 1975; Mosley 1987, McGillivray, 2000).

[5] Details about these parameters can be obtained from the author.

[6] The estimation of Equation (25) should give Equation (23).

[7] A new database providing a measure of project aid and program aid disbursements for most aid recipient countries is available upon request from the author. The database will, shortly, be accessible at: http://les1.man.ac.uk/ses/staffpages/ouattara.htm.

[8] A full set of these parameters can be obtained from the author.

[9] For the estimation process the software TSP 4.5 was used to obtain estimates of the parameters of the structural equations, while Mathematica 4 was used to compute the impact coefficients related to the reduced form equations.

[10] There is a growing literature on the importance of financial sector development in saving mobilisation in developing countries.

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