Fiscal Reforms and the Fiscal Effects of Aid in Uganda

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Abstract

Uganda implemented public expenditure and revenue management reforms from the early 1990s with specific aims of improving budget planning and aligning aid with fiscal priorities. The dynamic relationship between aid and domestic fiscal aggregates is analysed using a Cointegrated Vector Autoregressive model with annual data for 1972-2008 and quarterly data for 1997-2014. Aid has been a significant element of long-run fiscal equilibrium, associated with increased tax effort and public spending and reduced domestic borrowing. Fiscal reforms have improved aid and expenditure management, contributing to improved fiscal performance in Uganda, with lessons for other African countries.

1 Introduction

Fiscal response models offer important insights into how donors could expect their aid to impact on the fiscal behaviour of a recipient government, in particular how aid affects government spending, tax revenue and domestic borrowing. In principal, because most of the aid that is spent in a country goes to or through the government, or finances the provision of public goods and services that would otherwise place demands on the budget, aid is a fundamental component of public sector fiscal behaviour (Morrissey, 2015a). Aid inflows are expected to be associated with a direct and significant effect on public spending, but may also affect taxation either because of influences on tax effort or because reforms linked to aid conditionality affect tax rates or the tax base (Morrissey, 2015b). Aid may be associated with lower domestic borrowing where this is an element of donor conditionality. This paper investigates the impact of aid on fiscal behaviour in Uganda.

Uganda is an interesting case for studying the fiscal effects of aid as significant aid inflows have supported government spending for over 25 years in an environment of low tax revenue. It is also important as a country that implemented major fiscal and expenditure management reforms in the 1990s; as the budgetary importance increased the government became more concerned with recording aid properly and incorporating it into fiscal planning. 'Since the mid-1990s the government of Uganda has encouraged donors to shift the composition of aid away from project aid and towards budget support so that the use of aid could be better aligned with its own priorities at the macro/fiscal, sectoral and intra-sectoral levels' (Brownbridge, 2010: 278). Thus, one expects to see that aid was an important influence on the budget process, especially spending, and that fiscal management has improved since the mid-1990s. One aim of the paper is to explore this empirically.

A particular problem faced by recipient governments in incorporating aid into budgetary processes is that not all aid that flows into a country is recorded by the government; aid directed to the budget is known but recipients have incomplete information about aid delivered through donor projects. Uganda is no exception, and is in fact a good exemplar of the issues and how they can be addressed. The mix of aid in the form of budget support and donor projects presents particular problems for incorporating aid in budget planning as only the former is fully recorded (while the latter can create future spending commitments). The Bank of Uganda did record disbursements of project loans but did not routinely record the larger flows in the form of project grants so a significant proportion of aid did not appear in the budget (Brownbridge, 2010). During the 1990s Uganda implemented a series of reforms to improve the incorporation of aid into budget and expenditure planning. Although the importance of aid declined in the 2000s, total donor support (both direct budget support and project aid) averaged about 43 per cent of the national budget over the 2003/4-2008/9 period (Ministry of Finance, Planning and Economic Development (MoFPED), 2009).

This study evaluates the fiscal effects of aid in Uganda over the period 1972-2008 using annual data and also over 1997-2014 using quarterly data. Annual data correspond to the annual budget cycles but the available donor measure of aid disbursements overstates aid to the budget and the deflator employed is not available for recent years (see Section 3). The advantages of the quarterly data are that aid is measured by the MoFPED, and should be closer than the donor measure to aid recorded in the budget, and it permits analysis of the recent period when fiscal planning and recording of aid by the government had been improved. The quarterly data are

not available before 1997 and a potential disadvantage is that they may not correspond fully with an annual budget planning cycle.

One strand of the empirical literature on the impact of aid on the fiscal behaviour of recipients is concerned with fungibility. Aid is said to be fungible if recipients fail to use it in the manner intended by donors. A concern of donors is that they want aid to finance spending in a particular sector, such as health, but fungibility reduces the extent to which aid increases spending in that sector (McGillivray and Morrissey, 2004). This is not addressed as the analysis does not consider the composition of spending (and one would need to know how much aid donors intend to be spent on particular areas of spending to assess if the aid is fungible). Concern here is with the effects of aid on total fiscal aggregates, the other strand of the literature. Fiscal response models (FRMs) adopt a broader approach allowing for the dynamic effect of aid on expenditure, tax revenue and domestic borrowing. The traditional framework is based on the assumption that the government maximizes utility based on a quadratic loss function subject to targets for each revenue and expenditure category (Franco-Rodriguez, McGillivray and Morrissey, 1998). There are many limitations of empirical applications of FRMs, mostly related to difficulties in the use and estimation of targets, the treatment of aid, and econometric techniques that often yield inconsistent estimates of core parameters (McGillivray and Morrissey, 2004). Furthermore, the theoretical framework does not provide a thorough representation of government behaviour, such as explaining how the targets are determined.

In an effort to overcome many of these difficulties, there is now a growing body of empirical literature estimating the FRM within a cointegrated vector autoregressive (CVAR) framework, which provides a tractable framework for the formulation and testing of hypotheses for links between aid and domestic fiscal variables. The CVAR takes into account the interactions between variables over time, allowing a distinction between the long run (equilibrium) and short run (adjustment to the equilibrium) relations. There is one equation for each and every variable, so all variables in the system are treated as potentially endogenous and each variable is explained by its own lags and lagged values of the other variables. Assumptions about exogeneity are tested directly, avoiding the need for strong *a priori* assumptions; by design the econometric model allows the data to identify the statistical relationship between variables (Juselius, 2006). It is therefore an atheoretical approach in the sense that one does not have to maintain the existence of, estimate or test specific theoretical

formulations of the budget planning targets, or to estimate structural parameters. Rather, economic theory is invoked to choose the variables to include in the analysis, select the appropriate normalizations and restrictions to identify particular effects (hypotheses), and to interpret the results. Data requirements are also relatively modest, although as is the case here, obtaining consistent data over a sufficiently long sample period to facilitate reliable estimation may be an issue. In an effort to overcome this, we estimate CVAR models using both annual and quarterly data.

Surveys and discussions of the literature on the country-specific fiscal effects of aid using a CVAR approach are provided in Morrissey (2015a). These include the first CVAR study, Osei, Morrissey and Lloyd (2005) for Ghana, the earlier version of which (Morrissey, Osei and Lloyd, 2002) informed the method applied in the Fagernäs and Roberts (2004) study of Uganda; Morrissey, M'Amanja and Lloyd (2007) for Kenya; Martins (2010) and Mascagni and Timmis (2016) for Ethiopia. It is clear that the impact of aid is country specific but this should not be surprising as governments differ in their fiscal behaviour.

Section 2 discusses the evolution of budget policy in Uganda since independence, in particular improvements in public financial management and how aid is incorporated into expenditure planning since the late 1980s. The data and econometric methodology are presented in Section 3. Section 4 discusses the empirical results. The conclusions and policy implications are in Section 5.

2 Aid and the Evolution of Fiscal Management in Uganda

In the context of the role of aid and donors in the budgetary and fiscal policy process it is helpful to distinguish three broad phases for Uganda. The period from independence in 1962 until 1986 was characterised by political and economic instability with low levels of aid, domestic revenue and expenditure. The first ten years or so under President Museveni (1986-97) was a period of active economic reform and rehabilitation with marked improvements in fiscal policy and processes and significant increases in aid as Uganda became something of a darling of the donor community. The aid/GDP share increased from a low of about one per cent in 1980 to about five per cent in 1986, reaching a peak of about 19 per cent in 1992, and averaged about 11 per cent between 1990 and 2006 (Egesa, 2011). Since about 1997 Uganda has had strong public financial management systems, at least by sub-Saharan Africa (SSA)

standards, and a more coherent budget and expenditure management system with efforts to improve the identification and incorporation of aid inflows into fiscal planning. Although 1997 is by no means a 'hard' dividing year as many of the important reforms were initiated earlier, the public financial management reforms were coming to fruition around then so we will use these three phases.

The Years of Instability: 1962-1986

Economic performance was good following independence in 1962, benefitting from being part of the East African Community (with Kenya and Tanzania). This lasted until about 1965, as increasing state intervention and a growing public sector began to take a toll on the economy while tensions on access to rents across ethnic and regional divisions contributed to political instability. In effect, 'Obote played one institution off another for political survival' (Atingi-Ego and Kasekende, 2007: 259). The army became the instigator of instability in the late 1960s, culminating in Idi Amin taking power in 1971.

The Ugandan economy was unstable and at best stagnant during the 1970s and the first half of the 1980s under the Idi Amin regime (1971-79) and the less notorious but no less destructive second regime of Milton Obote in the early 1980s. Aid inflows were low, mostly provided by the World Bank and declined dramatically by the late 1970s (Kasekende and Atingi-Ego, 1999). An IMF/World Bank Structural Adjustment Programme introduced in 1981 helped to stabilise and improve the economy but collapsed in 1984, largely because the dramatic increase in the fiscal deficit and inflation violated the conditionality of the programme (Loxley, 1989). The Obote government was removed in a military coup in 1984 leading to a period of economic chaos until the National Resistance Movement under the leadership of President Yoweri Museveni took power in January 1986.

The Years of Recovery: 1986-1996

The Museveni regime inherited an economy with almost two decades of impoverishment and instability. With support from the World Bank and IMF, Uganda implemented an ambitious economic liberalization programme which, by 1992, restored macroeconomic stability. The economic reform programme helped to revive GDP growth such that, given the geographical disadvantages and limited natural resources, Uganda was considered an economic success case

by the mid-1990s (Atingi-Ego and Kasekende, 2007). The success restored investor confidence and signalled a strong political commitment to the reform programmes (Collier and Reinikka, 2001), which in turn encouraged donors to increase support.

During the 1980s, most aid was in the form of concessional loans associated with World Bank and IMF programmes, and often given as import or balance of payments support. Although the specific intention was providing foreign currency to finance trade deficits and avoid import compression, the Bank of Uganda sterilized the inflow and the government benefited from the domestic currency equivalent. Rising coffee prices and the flexible exchange rate regime after 1993 supported improvements in the balance of payments and reduced the need for aid to plug the trade deficit so very little aid was provided for import support by 1997. However, this had no specific effect on integrating aid into the budget as import and budget (general or sector) support are essentially the same: each enhances the 'budget resource envelope' in the same way, through the Bank of Uganda converting the foreign currency inflow into domestic currency and crediting the treasury account (Brownbridge, 2010: 279). Thus, although import support declined as budget support grew, a significant proportion of aid entered the budget and was recorded as such (on-budget aid).

Once the government under Museveni had established its credentials and competence bilateral donors were also keen to offer support; aid increased from 2.7% of GDP in 1986/87 to 13.8% by 1992/93, and financed about 80% of public investment (Whitworth, 2010: 132). Grants from bilateral donors assumed increasing importance in the early 1990s, but this was mostly in the form of project aid and was inadequately incorporated in budget planning (often referred to as off-budget aid). Given the very weak capacity in Ministries, this created severe pressure on administration, compounded by the lack of coordination between the Ministry of Finance (responsible for aid loans and the recurrent budget) and the Ministry of Planning and Economic Development (responsible for aid grants and the development budget), in particular because the latter had limited information on aid projects (primarily for capital spending, hence relevant to the development budget). The government lacked information so that 'in Uganda in 1991 roughly half of the resources available for public expenditure were being allocated by government through the budget process, while decisions regarding the other half were being made individually by donors' (Whitworth, 2010: 136). Furthermore, the former were on-budget and largely for recurrent spending whereas the latter were mostly off-budget for development spending.

A particular problem arose with off-budget donor projects because they required some matched funding (counterpart funds, typically 10-20% of project cost) from public spending; as projects were at best only partially captured in budgets in the early 1990s, the government underestimated spending commitments. 'What was surprising is that the responsible donors failed to monitor the rapidly rising stock of counterpart funding they were imposing on Uganda' (Whitworth, 2010: 135). Fiscal control was weak in the late 1980s, culminating in a notable deficit in 1991/92 as no offsetting reductions were made in expenditures despite a shortfall in domestic revenue and on-budget aid. The government financed the deficit through domestic borrowing which generated high inflation and macroeconomic instability. This marked a turning point in Uganda's fiscal policy with an increased focus on fiscal discipline and budgeting within a medium-term macro framework (Fagernäs and Roberts, 2004). Some donors, especially the World Bank, recognized their contribution to the fiscal problems and responded to requests to postpone counterpart funds, either by covering the entire project costs or accepting related sector spending in lieu (Whitworth, 2010: 149).

In 1992 the two Ministries were merged into the Ministry of Finance, Planning and Economic Development (MoFPED), with a clear mandate to enforce fiscal discipline in budget planning and execution. This was an important first step in reform of fiscal administration and the MoFPED established effective control over the budget process and improved revenue estimation, with much tighter control over spending ministries' commitments and disbursements than had been exercised previously. Uganda was one of the first countries to introduce an effective medium-term expenditure framework (MTEF), an annually updated three-year rolling expenditure plan, formulated to be consistent with fiscal targets for macroeconomic stability and fiscal discipline incorporating expenditure proposals prepared by sector ministry working groups in which the main donors were invited to participate. The MTEF became 'a framework for linking policy formulation with budget allocations … a tool for policy based budgeting' (Brownbridge, Federico and Kutesa, 2010: 173). The aim was to ensure that expenditures were consistent with the resource envelop and that government levels of domestic borrowing from the domestic market were kept within levels compatible with low and stable inflation. Thus, for example, the aim was to constrain spending so as not to exceed the target deficit given revenue expectations implying that the government was better able to manage the budget process.

Expenditure planning and management was improved through the early 1990s, but there were more difficulties on the revenue side. Uganda's tax performance was poor even by SSA standards, with the tax/GDP ratio increasing from a mere 5.8% over 1985-90 to only 7.8% over 1991-96 compared to an average over the whole period of about 16% for non-oil SSA countries (Cawley and Zake, 2010: 104, Table 5.1). The underlying problem was a limited tax base as, after decades of instability, the private business and wage employment sector was small while trade liberalization reforms reduced potential revenue from export taxes and tariffs. A semi-autonomous Uganda Revenue Authority (URA) was established in 1991 with the aim of improving tax collection and increasing revenue, but there was no observable impact over the first few years. Tax revenue remained relatively stagnant during the first half of the 1990s. There was more success on aid, both through increasing inflows and implementing measures to accurately capture project aid in budget and expenditure planning, with improved monitoring and tracking of public expenditure on social sectors identified as priority (pro-poor and donor-supported) areas (Whitworth, 2010: 141-3).

A close relationship existed between Uganda and donors as aid was very important in supporting both the decision to reform and the nature of reforms; conditionality did play a role, initially creating pressure for reform but as the 1990s progressed it supported officials who were committed to reform. The evolution of the MTEF is an example as initially the process was supported by technical assistance and encouragement from donors but as it developed it reassured donors that expenditure planning was in place and made it easier for MoFPED to monitor spending by line ministries. The MTEF was fully incorporated into the budget process by 1998 and ensured that once the aggregate expenditure ceiling was determined 'the macroeconomic objectives of fiscal policy are paramount and are not compromised to meet demands for higher expenditures' (Brownbridge et al, 2010: 182). Thus, by about 1997 the major public financial management reforms were in place and major steps had been implemented to ensure that aid inflows were captured in budget planning.

The Years of Consolidation: 1997-2014

The practice of allocating project and programme aid receipts to the development budget regardless of whether the intended purpose was of a capital or recurrent nature changed after 1998 under the MTEF process, with increasing use of programme and output budgeting and a re-orientation of expenditure in line with the national poverty reduction strategy (MoFPED,

2005). Aid became linked to debt relief and budget support accounted for an increasing share to support public expenditure to achieve social and poverty reduction aims, accounting for about a third of total public expenditure by the early 2000s (Brownbridge, 2010: 290). The Government was increasingly concerned with integrating aid into the budget and stated a preference for budget support over project aid on the basis that 'different aid modalities are not equally compatible with efficient budget planning and management and national ownership of the budget' (MoFPED, 2003: 1).

Following the formalization of new practices in the Budget Act of 2001, the MTEF and annual budget processes became one and the same. The MoFPED set cash limits on expenditures consistent with resource availability and taking into account known commitments and recurrent needs so that domestic borrowing remained within the levels established in the budget. The government engaged donors in a cooperative relationship, where they participated in the formulation of budget framework papers and the public expenditure process, and monitored progress in quarterly meetings. At the operational level, donor projects were approved and monitored by a Development Committee in the MoFPED, whose External Aid department maintained data on aid receipts and expenditures to ensure that the sector allocation and purpose of aid projects were in line with the MoFPED's expenditure strategy (Foster and Mijumbi, 2002). However, this was difficult to achieve in practice given limited data on project aid. 'Donor projects, and their funding, are effectively outside the MTEF planning and thus are not fully integrated into MTEF sector ceilings' (Brownbridge et al, 2010: 195). The accuracy of recording aid inflows improved throughout the 1990s and so too did fiscal and expenditure planning.

The major tax reform of the period was initiated in 1996 with the introduction of a Value Added Tax (VAT) as part of a package of reforms intended to increase tax revenue. Tax revenue did increase gradually, from about 11% of GDP over 1995-2003 to almost 13% by 2007, but this is attributable to success of the Uganda Revenue Authority rather than increased collection due to VAT (Cawley and Zake, 2010: 109-11). Uganda's weak revenue collection resulted in a high dependency on foreign aid. Economic growth, aid inflows and increased domestic revenues contributed to a real increase in public expenditure since the early 1990s (Brownbridge et al, 2010).

Given the importance of budget support revenues, disbursement delays were a particular concern during the 1990s as shortfalls had to be financed by domestic borrowing

(with offsetting reductions in Bank of Uganda foreign exchange reserves to prevent an impact on money supply) within the budget year. 'Although *ex ante* estimates of donor project expenditures are captured in the MTEF, donor disbursement estimates for projects were not initially integrated into sector ceilings in the MTEF, and accurate *ex post* expenditure data was never available' (Brownbridge et al, 2010: 191). From the early 2000s a discount factor was applied to budget support commitments to plan for within year delays. By the late 2000s, however, recording of aid improved as the importance of aid declined; since 2006, tax revenues have exceeded aid receipts and aid has accounted for a steadily decreasing share of spending.

In terms of macroeconomic performance and the importance of aid, Uganda was not untypical of SSA countries since the 1970s. The full period has three broad phases (other SSA countries had similar phases, if for different years): 1972 to the late 1980s was largely a period of instability and poor performance; the late 1980s to mid-1990s was the period of economic stabilisation and growth recovery, with aid playing an increasingly important role; and since the late 1990s Uganda has exhibited gradual economic consolidation. Changes in economic policy were clearly important and donors influenced reform efforts, but are beyond the scope of this paper.

3 Data and Econometric Methodology

To investigate the role of aid in fiscal behaviour, annual (1972-2008) and quarterly (1997Q3 to 2014Q4) time series data in Ugandan Shillings (UGX) reported in constant 2005 prices are used. The fiscal data on spending, tax revenue and net domestic borrowing from the banking system are from the MoFPED in constant 2005 prices and recorded in a consistent manner. The non-tax revenue component of domestic revenue and other forms of borrowing are omitted from the system so we are not estimating an identity. The annual aid series is from OECD-DAC (2009), using GDP data from the Uganda Bureau of Statistics to express aid in 2005 prices. The OECD annual aid data are available after 2008, but in 2013 constant prices. However, in 2015 Ugandan GDP was rebased to 2009/10 prices, and while recent GDP data series are in 2009/10 prices, the historical GDP data has not been consistently rebased (we do not have a number of overlapping years for the GDP and OECD aid data in different constant prices to 'splice' reliably). The quarterly data we use, in contrast, includes aid and fiscal variables published by the MoFPED in constant 2005 prices (so neither GDP nor the GDP deflator is required). As there are reasons to suggest that expenditure and budget planning, and

especially the accuracy of recording aid, had improved significantly by 1997 (see Section 2) it seems sensible to utilise the quarterly data for the recent period. The ability to assess if the longer annual series permit the same inferences as the more recent quarterly series addresses concern that the equilibrium relationship has altered.

In principle, the measure of aid should capture total net disbursements of aid from all donors as recorded by the government so that it measures aid known to the fiscal authorities and therefore capable of affecting budget planning. While this should include all on-budget and programme aid, the appropriate treatment of project aid is complicated as some may be effectively on-budget (such as sector projects that are known to the government, especially if matching funds are required), some may be known and influence spending allocations (such as health projects that permit the government to reduce its own health spending) and some may be genuinely off-budget (such as technical assistance in an area the government would not otherwise fund). The available aid series do not permit these distinctions to be made consistently for aid disbursements. Furthermore, as discussed in Section 2, Ugandan recording of project aid was very partial until the late 1990s and incomplete thereafter. The analysis in the next section uses total disbursements and when interpreting results it should be recognized that this over-states the amount of aid known to the budget authorities. The quarterly data, in contrast, provides a more accurate measure of aid known to the Ugandan authorities (thus the aid data recorded at annual and quarterly intervals need not correspond exactly over the same year).

Figures 1 and 2 about here

The raw data are reported in Figures 1 and 2. Levels were low and relatively persistent until 1988 (coinciding with the start of the Museveni regime) after which spending and revenue followed a clear upward trend, whilst aid was more volatile (Figure 1). Aid increased dramatically between 1988 and 1991, declined until 1994 and then increased erratically until 2005. In relative terms, the donor measure of aid was equivalent to less than 10% of spending through the 1970s, increased steadily through the 1980s and was over 100% of spending over 1989-92 (demonstrating that much did not actually go to the government) although it usually ranged between 60% and 80% of spending until 2005 and then fell below 60%. The quarterly series are rugged, reflecting a degree of seasonality, with clear upward trends for revenue and spending but only a slight irregular upward trend for aid (Figure 2). Within years, aid tended

to be highest in the fourth quarter (or sometimes the second) and this was also the case, but less pronounced, for revenue. Spending tended to peak in the fourth quarter but this was not always the case. Borrowing was more variable and often negative. Reflecting the better measure, aid was equivalent to about 30% of spending in the late 1990s but this had fallen to below 10% by about 2012.

3.1 The cointegrated VAR (CVAR) model

By exploiting the parallels between the economics and econometrics of fiscal response models we can assess the role of aid in the budget. From an economic viewpoint aid can be used in the process of budget planning and/or by relaxing the budget constraint. Where aid forms part of the process of budgetary planning it may be viewed as having a long-run role, the recipient directly incorporating the level of aid as a component of the budget. As observed in Section 2, this was certainly the case in Uganda by the late 1990s. In contrast, aid may simply relax the budget constraint when it is received. This economic distinction corresponds to the econometric notions of long- and short-run in that the process of budgetary planning defines an equilibrium relation among the fiscal variables (of which aid may be one element) and a transitory relaxation in the fiscal constraint akin to a temporary shortfall. In other words, the cointegrating relation may be thought of as the statistical analogue of the budgetary equilibrium in fiscal response models. Since the former is a relationship among the levels of fiscal variables, which are likely to be non-stationary (i.e. integrated of order one, I(1)), it is clear that for aid to play a part in budgetary planning it too must be I(1). While the non-stationarity of aid is necessary for aid to play a role in planning it is not sufficient as there may be institutional factors in the donor and recipient that prevent aid (even if it is non-stationary) from entering the fiscal equilibrium. Where aid is I(1) it may potentially play a role in both the long-run process of budgetary planning and in the short run as a source of budget finance. However, where aid is I(0) it will not form part of the fiscal equilibrium relationship as it is too unpredictable (variable year-on-year) to be useful for planning, and will merely relax the budgetary constraint (i.e. its role is confined to the short run). This underlines the importance of the order of integration of aid as indicating the uses to which aid can be put in the budget of the recipient. In addition, whether recipients treat the level of aid received as being exogenous or endogenous affects aid's role in budget decision making. If donors respond to the fiscal conditions in the recipient

country when allocating aid, we may interpret this as evidence that it is endogenous to the fiscal equilibrium.

The empirical model distinguishes between the long- and short-run responses and tests for exogeneity - based on a 4-dimensional vector autoregressive model: $\mathbf{y}'_t = (DB_t, G_t, A_t, R_t)$, where (for year t) DB is domestic borrowing, G is government spending (GC for current and GK for investment), A is aid and R is tax revenue. To facilitate interpretation of the potentially complex dynamic interactions between the fiscal variables it is convenient to express the CVAR in its error correcting form which describes how the variables adjust over time. This is given by:

$$\Delta \mathbf{y}_t = \boldsymbol{\alpha}\boldsymbol{\beta}'\mathbf{y}_{t-1} + \sum_{i=1}^{k-1} \boldsymbol{\Gamma}_i \Delta \mathbf{y}_{t-i} + \boldsymbol{\Phi}\mathbf{D}_t + \boldsymbol{\varepsilon}_t \qquad (1)$$

where $\mathbf{y_t}$ is the 4-dimensional vector of endogenous variables, $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are (p x r) coefficient matrices, $\boldsymbol{\Gamma_i}$ is a (p x p) matrix of short-run adjustment coefficients, *i=1,...,(k-1)* is the number of lags included in the system, Δ is the first difference operator, $\mathbf{D_t}$ is (m x *1*) vector of m deterministic terms (constants, linear trends, dummies) and $\boldsymbol{\varepsilon_t}$ is a (p x *1*) vector of errors with standard properties. The coefficients in $\boldsymbol{\beta}$ describe the fiscal equilibrium (and hence the long-run response to a *ceteris paribus* change in each of the variables) and coefficients in $\boldsymbol{\alpha}$ govern the speed at which each variable adjusts following a shock to the fiscal equilibrium. Coefficients in the $\boldsymbol{\Gamma_i}$ matrices allow short-run adjustment in each of the variables to differ from that given by their long run rates (defined by the coefficients in $\boldsymbol{\alpha}$ **)** and hence, potentially at least, accommodate a wide range of dynamic responses. Note that if $k = 1$, then $\boldsymbol{\Gamma_i} = 0$ implying that the long run response is the same as the short run. Therefore, having been pushed away from equilibrium by a change in one of the variables, the system adjusts back to equilibrium exclusively through $\boldsymbol{\alpha}$ (Juselius, 2006). The appropriate value of the lag length k is empirically determined using information criteria (see Appendix).

To facilitate exposition of the key hypotheses of interest in the following section, consider the dynamically simple case where $k = 1$ in a model with unrestricted constant and $r = 1$ (so that a fiscal equilibrium exists). The error correction representation of the CVAR takes the form:

$$\begin{bmatrix} \Delta DB_t \\ \Delta G_t \\ \Delta A_t \\ \Delta R_t \end{bmatrix} = \begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{pmatrix} \left\{ \begin{pmatrix} \beta_1 & \beta_2 & \beta_3 & \beta_4 & \beta_5 \end{pmatrix} \begin{bmatrix} DB_{t-1} \\ G_{t-1} \\ A_{t-1} \\ R_{t-1} \\ t \end{bmatrix} \right\} + \boldsymbol{\mu}_0 + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{pmatrix} \quad (2)$$

To provide empirical content to the structural analysis underlying the causal links between aid and domestic fiscal variables, long run parameter restrictions are imposed (the method is described in the Appendix).

3.2 Fiscal Hypotheses

Martins (2010) proposes a set of nine testable hypotheses for possible fiscal effects of aid but we limit attention to four hypotheses to be tested in the CVAR analysis by applying restrictions on the long run fiscal β_i coefficients in equation (2) as discussed below. These can be interpreted as tests of the relationship between variables in the system. Starting from the unrestricted model and ignoring the constant in the exposition, the unrestricted long run equilibrium can be represented in the general form:

$$\beta_1 DB + \beta_2 G + \beta_3 A + \beta_4 R = 0 \quad (3)$$

Provided the variables that comprise (3) are each I(1), cointegration implies that deviations from the equilibrium in (3) are stationary (I(0)). Note that (3) can be normalized on any variable, so for example setting $\beta_1 = -1$ yields:

$$DB = \beta_2 G + \beta_3 A + \beta_4 R \quad (4)$$

Although (3) and (4) are econometrically identical, (4) may be useful to consider the effects of other variables on domestic borrowing. This feature can be helpful in interpreting the tests of alternative hypotheses outlined below.

i) Aid Spending ($\beta_2 = -1$, $\beta_3 = 1$)

To assess whether there is a one-for-one relationship between aid inflows and government spending simply involves testing whether the coefficients enter the equilibrium with equal and opposite effects. In terms of (3), this requires β_3 to be equal and of opposite sign to β_2 leaving β_1 and β_4 unrestricted; this measures the eventual effect of aid on spending keeping revenue and borrowing constant. This can be most easily seen by normalising on G:

$$G = \beta_1 DB + A + \beta_4 R \qquad (5)$$

If the coefficient restriction is upheld, then the full change in aid finds its way into government spending, keeping borrowing and revenue constant. This is related to the literature on whether or not aid is spent (Hussain, Berg and Aiyar, 2009; Killick and Foster, 2007), although in that context aid spending is defined as a widening of the fiscal deficit excluding aid, and therefore involves the relationship between aid and the difference between tax revenue and spending. Eifert and Gelb (2005) observe that recipients may face a suspension of aid if donors do not observe that aid increases spending. However, spending may not increase by the full amount of the aid, either because some aid is directed to other uses such as reducing borrowing or because tax receipts decline (the *ceteris paribus* assumption does not hold). It may be the case that some of the aid 'leaks' (perhaps due to corruption or inefficiency). Spending can increase by more than the aid if, for example, governments have to match aid revenue or aid-financed government spending generates subsequent claims on future spending (that may need to be financed by domestic resources), such as the recurrent costs required to maintain an investment. The situation where government spending increases by more than the amount of the net aid inflow has been described as aid illusion, such that officials misperceive and overestimate how much aid will be received and therefore spend in excess of the budget constraint (McGillivray and Morrissey 2001). A similar outcome could be observed if actual aid disbursements are less than anticipated.

ii) Balanced budget ($\beta_1 = 0$, $\beta_2 = -1$, $\beta_3 = 1$, $\beta_4 = 1$)

Another hypothesis is that domestic borrowing is not part of the budget balance in equilibrium so that the government aims to meet expenditure exclusively with domestic tax revenue and

aid ($G = A + R$). This can be tested with the additional, to (i), restrictions that $\beta_1 = 0$ and $\beta_4 = 1$, and can also be interpreted as a balanced or cash budget hypothesis. If accepted this would imply that borrowing is only resorted to as a short-run adjustment to a shock to other variables (in which case *DB* would not enter the long-run equilibrium relationship).

iii) Revenue displacement ($\beta_3 = 1$, $\beta_4 = -1$)

Donors may be concerned that the availability of aid is one reason why tax revenue has remained low. Aid may reduce tax effort if recipient governments use the extra fiscal space provided by aid to keep taxes low or reduce tax induced distortions, which may be desirable to crowd-in private investment (Martins, 2010). The hypothesis that aid displaces tax effort, from (3), is tested by leaving β_1 and β_2 unrestricted while restricting β_3 and β_4 to be equal and of opposite sign. Essentially this is a test that aid substitutes for tax revenue. Addressing the tax effect associated with aid tends to be difficult as there can be many effects in opposing directions (Morrissey, 2015b). For example, trade liberalization policies associated with aid conditionality may reduce tax revenue, at least in the short run, while donors who recognize this may increase aid to compensate (and encourage tariff reductions).

iv) Aid and domestic borrowing are substitutes ($\beta_1 = -1$, $\beta_3 = 1$)

The hypothesis of whether aid and domestic borrowing are perfect substitutes, from (3), is tested by restricting β_1 and β_3 to be equal and of opposite sign while leaving β_2 and β_4 unrestricted. This is of interest because governments may treat aid as an alternative to domestic borrowing if concerned that the latter may deter private investment (by increasing interest rates and/or reducing domestically available credit). In some cases multilateral institutions, such as the IMF in Ghana (Osei et al, 2005), may give aid to support conditionality to reduce domestic borrowing.

4 The Long Run Fiscal Effects of Aid

The CVAR method and hypotheses tests are implemented using the Cointegration Analysis for Time Series (CATS) software (Dennis, Hansen, Johansen and Juselius, 2006). The unrestricted model in (1) above is estimated with a restricted trend and an unrestricted constant. Including

an unrestricted constant allows for linear trends in both cointegrating space and in the variables in levels, and produces a non-zero mean in the cointegrating relation. Furthermore, it avoids creating quadratic trends in the levels, which would arise if both the constant and trend are unrestricted (Juselius, 2006: 99-100). As domestic borrowing (*DB*) was negative in many years a multiplicative model specification with a log transformation is not used. Retaining all the series in constant UGX values for the analysis also allows us to address key questions, such as by how much would the level of government spending change following an aid injection of one million UGXs? A lag length of one is selected for annual data and three lags for quarterly data on the basis of standard model selection criteria and is consistent with the expectation that aid's impact on the budget is likely to be contemporaneous with relatively quick adjustment dynamics. Using this model, cointegration tests detect a single equilibrium relation at conventional levels of significance using both annual and quarterly data. Testing confirms that all data are non-stationary [I(1)] processes and the statistical significance of each variable in the equilibrium relation (see appendix for details).

Table 1 reports the long-run (β) parameters of the equilibrium relationship for each of the possible normalizations and the associated adjustment coefficients (α). Considering first the estimates based on annual data, *ceteris paribus* estimates of the long run coefficients suggest that domestic borrowing is positively related to government spending and negatively related to aid and tax revenue (the first row), these relationships being signed in accordance with fiscal equilibrium. The coefficients on tax revenue are larger, suggesting that in the long run the budget is driven by tax revenue (or domestic revenue in general) more than by aid. This is consistent with the donor measure of aid overstating what is recorded in the budget (the fiscal variables are more strongly related to the known level of tax).

Table 1 about here

The estimated coefficient for the effect of aid on spending (0.61) for the annual data suggests that less than two-thirds of aid contributed to spending; as the measure overstates aid this must be interpreted with care, but is plausible and is consistent with aid being fully additional if at least one-third of the donor measure was not recorded in the budget. Tax revenue has a large coefficient on spending (2.17), suggesting that spending over-responds to tax. This is consistent with over-optimism regarding the sustainability of tax increases: the government commits to spend expected revenue and if this is not realised resorts to deficit financing (as

noted in Section 2, budget planning was based on a target deficit given revenue expectations so the latter may have been optimistic). This suggests poor budget management. Aid and revenue appear to be negatively related, although an increase in *R* has a much greater effect in reducing *A* than an increase in *A* would have in reducing *R*. This is consistent with the need for aid declining as domestic revenue increases.

The α coefficients suggest that spending, revenue and aid adjust to disequilibrium. The result on aid is consistent with Ugandan fiscal planners having a target for aid revenue that was incorporated into fiscal planning (in line with the theory in Franco-Rodriguez et al, 1998). Killick and Foster (2007) note that Uganda had a forward-looking view and achieved some success in getting more aid allocated as budget support and released early in the budget year. It could be the case that donors incorporated government spending in deciding how much aid to allocate to Uganda (*G* is associated with a more than proportional increase in *A*). This does not imply that the government has control over the aid allocated to Uganda by donors (aid commitments) but rather that disbursement could be a reaction to government's ability to meet donor administrative requirements and/or other policy pre-conditions (Eifert and Gelb, 2005). The relatively large trend terms may be due to measurement error, such as in the donor measure of aid (a significant overestimate), or trend behaviour in omitted variables.[1]

The quarterly data give similar qualitative results but with some notable differences in coefficients. The β coefficients on aid and tax are quite similar and the coefficients on the trend terms are much smaller (consistent with more accurate measurement and less importance of omitted variables).[2] About 75% of aid contributed to spending. As this measure still includes project aid and not all of this will be included directly as government spending there is no implication that aid has not been additional. Indeed, it is consistent with fully additional aid as over the period 1994-2004 on average, no more than 75 per cent of aid disbursements reported by donors appeared in the budget (Brownbridge, 2010: 280-1). The coefficient on tax of 0.88 is only slightly larger and is consistent with improvements in budget management as there is no tendency to overspend. Turning to the adjustment coefficients (α) the results from the quarterly model suggest that although tax and borrowing adjust quite quickly to disequilibrium, this is not evident for aid or spending, perhaps because the budget cycle is annual. Moreover, government borrowing appears to be making the greatest adjustment, and indicates overshooting quarter-on-quarter, again reflecting the annual nature of budgeting. The fact that it is performing an important role in maintaining the fiscal balance is at least consistent with

improved budget management and recording of revenues. Interestingly, with the annual data estimated over a longer period government borrowing adjusts more slowly suggesting that deficits were structural in nature and deeply embedded in spending plans (consistent with the large positive trend), in contrast to the results from the quarterly data estimated over more recent periods. Overall, fiscal management does appear to have improved since the late 1990s. Domestic borrowing is the main financing item in the system for a primary budget deficit net of aid, and an increase in aid is associated with lower domestic borrowing in the long run.

Table 2 about here

The supplementary hypotheses tests are reported in Table 2 (the only differences between the annual and quarterly data are slightly stronger rejection probabilities for the hypotheses). The aid spending hypothesis is accepted, or more strictly cannot be rejected. Treating borrowing and revenue as constant, aid leads to a corresponding increase in spending (even if not fully additional). The rejection is weaker for the annual data, consistent with improved fiscal management and recording of aid since the late 1990s. The balanced budget constraint is rejected, suggesting that domestically mobilized resources are insufficient to cover government spending needs and that aid inflows are necessary to fill this gap. Over the sample period (annual and quarterly) the government has relied on other borrowing to balance its fiscal accounts. This is not surprising as non-aid borrowing is typically considered to be financing of the last resort to finance an unanticipated gap between expenditure and revenue, and could be affected by the way aid is provided or if actual aid disbursements fall short of what had been programmed in the budget.

The hypothesis that aid displaces tax effort is rejected; there is no evidence that aid reduces tax effort despite the negative association between aid and tax revenue (Table 1). Similarly, the hypothesis that aid and domestic borrowing are substitutes is not supported and any substitution is not persistent. Although not perfect substitutes, aid has supported better management of domestic borrowing so that domestic borrowing in response to shortfalls in foreign aid is repaid when aid increases.

Bwire, Morrissey and Lloyd (2013) estimate a similar model but decompose government spending to investigate whether consumption and capital components of spending

play different roles in the budgetary equilibrium. Their results (reproduced in the appendix) suggest they do. Specifically, there is evidence that while borrowing is closely linked to capital spending, consumption spending may bedriven by tax revenue (as found for Ghana by Osei *et al*, 2005). This suggests that domestic borrowing tends to be used to finance public investment whereas revenue (aid and tax) determines recurrent spending, consistent with prudent budget policy.

5 Conclusions and Implications for Policy

This paper assesses the dynamic relationship between aid and domestic fiscal variables in Uganda over the period 1972 to 2014 using a cointegrated vector autoregressive (CVAR) model with annual (1972-2008) and quarterly (1997-2014) data. The analysis reflects features of the data in a period initially characterized by political and economic instability, followed in the 1980s with effects of policy shifts due to structural adjustment programmes and culminating in a sustained period of fiscal management reform and consolidation since the mid-1990s. The analysis should be interpreted as capturing primarily fiscal performance under the Museveni regime since 1987 (which encompasses over half the annual data and all of the quarterly data). The investigation of the long-run relation among the fiscal variables provides interesting insights into fiscal dynamics in Uganda. The existence of a budget constraint in the form of a non-balanced budget excluding aid is supported. Thus, whilst aid flows to Uganda have been substantial, the resource gap has remained large and often required domestic borrowing (repaid when revenues are healthy). The evidence is consistent with a situation where the government set spending targets and was quite successful in attracting aid to finance these targets. The spending targets may have been ambitious (motivated to some extent by expectations of rising tax revenue that were not realised) as aid was generally insufficient so there was frequent recourse to borrowing.

Aid is a significant element of the long run fiscal equilibrium and anticipated aid appears to have been taken into account in budget planning. Ugandan budget planners may have had a target for aid revenue or donors incorporated government spending in deciding how much aid to allocate to Uganda or a combination of both. The analysis is consistent with the public financial management reforms during the 1990s improving budget management so that the government set its spending targets according to its own development objectives, and then found resources to finance these ambitions, in a priority order of domestic revenue, aid and

domestic borrowing. As improved public finance management and reduced domestic borrowing are common policy conditions attached to aid, the results suggest that aid was either associated with or caused beneficial fiscal policy responses in Uganda.

Aid was associated with increased tax effort, lower domestic borrowing and increased public spending. Although the results suggest that spending increased by less than the amount of aid, this is most probably because the donor measure overstates the amount of aid actually received by the government. Using the quarterly data, about three-quarters of aid finances recorded spending, consistent with evidence that about a quarter of aid (mostly project aid) was not recorded in the budget during the 2000s. It is evident that spending was higher than it could have been in the absence of aid. As tax revenue relative to GDP rose only gradually over the period (and shocks to tax had only transitory effects), the government was unable to maintain a budget balance including aid so borrowing was frequent. The analysis here considers only domestic borrowing from the banking sector so a fruitful avenue for future research is to incorporate other forms of borrowing

The results suggest some policy implications. The most important is the evidence that the introduction of better expenditure management through the MTEF and associated measures in addition to better recording of aid inflows that finance public goods and services has been associated with improvement budget management. Aid is now a less important source of revenue than it was in the 1990s, but remains significant. There is evident scope to improve further the accuracy of recording aid in the budget and increasing donor coordination to ensure that aid disbursements are predictable. Unpredictable revenues, aid or tax, remain a challenge because 'the reality of budgeting in countries such as Uganda is that there is very little flexibility in the budget to reallocate funds to meet strategic priorities or accommodate fiscal shocks' (Brownbridge, 2010: 286). Uganda has shown an ability to integrate aid into improved budget and expenditure management so it remains a deserving candidate for budget support as this makes it easier for the government to pool resources and plan accordingly. Continued efforts by donors to coordinate aid delivery systems, make aid more transparent and support the improvement in government fiscal statistics would all contribute to improving fiscal planning. Recipients need to know how much aid is available to finance spending and how this is delivered through donor projects or government budgets.

The evidence suggests that donors need not be concerned that aid reduced tax effort. Mobilising domestic revenue remains a challenge because of the low tax base. The main

distortionary taxes, tariffs on imports and export taxes, were reduced significantly under trade liberalization since the mid-1990s; at first this would be expected to reduce tax/GDP ratios (given initial high dependence on trade taxes) but over time revenues could increase, either because of a trade response (such as increased imports with lower evasion so revenue rises) or substitution with other taxes. The slow growth of the private sector, and especially wage employment, has limited growth in the effective income tax base. Donors can assist with tax administration reforms to improve collection efficiency, but if Uganda is to reduce aid dependence growth in private sector incomes and employment is essential to facilitate an increase in tax revenue.

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Endnotes

1 Aid permits lower domestic borrowing and in the long run may have been used to offset domestic borrowing. Note that this is a *ceteris paribus* finding (holding other variables constant) and does not imply a trend decline in borrowing. Indeed, the magnitude of the trend term for *DB* (Table 1) suggests a tendency to increase, although this is not evident in Figure 1. The fact that the trend for the aid normalisation is the largest in magnitude is consistent with measurement error in the annual aid series (given the other included variables, aid appears to be increasing 'too much'). While trend terms are not easily interpreted in the *ceteris paribus* context, the negative trend for *G* and positive trend for *R* indicate the effect of omitted financing or revenue variables (necessary to avoid estimating an identity).

2 The quarterly data suggest some improvement in financing (the trend terms are all much smaller), although fiscal deficits and the government's domestic financing requirement have been rising since the mid-2000s as the share of donor aid in the budget resource envelope has fallen. While the government is subject to ceilings on its net domestic financing (under the IMF supported programmes), prior to 2012/13 the Bank of Uganda (BOU) also issued government securities, through primary auctions, to mop up the liquidity needed to meet its reserve money targets so that the size of domestic financing was an outcome of the interaction of the needs of monetary and fiscal policies. It is impossible to distinguish where fiscal policy, in terms of its financing needs, ended and where monetary policy began. Since the start of the 2012/13 fiscal year, the primary issues of government securities are only used for mobilising finance for the budget. Monetary policy is now conducted on the secondary market, through issuing repurchase or reverse repurchase operations and, more occasionally, through secondary market sales of the BOU's own holdings of Government securities. Although it is now possible to distinguish clearly between fiscal and monetary policy operations, the estimated relationship omits other financing and does not capture the effects (even if they can be inferred).

References

Atingi-Ego, M. and L. Kasekende (2007), Restarting and Sustaining Growth in a Post-Conflict Economy: The Case of Uganda, Chapter 8 in B. Ndulu, S. O'Connell, R. Bates and P. Collier (Eds), *The Political Economy of Economic Growth in Africa, 1960-2000, Volume 2*, Cambridge: Cambridge University Press (pp. 244-285)

Brownbridge, M. (2010), Aligning Aid with Government Fiscal Objectives, Chapter 13 in Kuteesa et al (2010), pp. 277-309

Brownbridge, M., G. Federico and F. Kuteesa (2010), Budget Reform and the Medium Term Expenditure Framework, Chapter 8 in Kuteesa et al (2010), pp. 172-207

Bwire, T., O. Morrissey and T. Lloyd (2013), A Time Series Analysis of the Impact of Foreign Aid on Central Government's Fiscal Budget in Uganda**,** World Institute of Development Economics Research (WIDER), Helsinki: *WIDER Working Paper No. 2013/101*

Cawley, G. and J. Zake (2010), Tax Reform, Chapter 5 in Kuteesa et al (2010), pp. 103-128

Collier, P. and R. Reinikka (Eds) (2001), *Uganda's Recovery. The Role of Farms, Firms and Government*, Washington, DC: The World Bank

Dennis, G. J., Hansen, H., Johansen, S., and Juselius, K. (2006), *Cointegration Analysis of Time Series, Version 2*, Evanston: Estima.

Egesa, K. A. (2011), The Effect of Falling Aid Flows on the Susceptibility of Aid Dependent Countries to External Shocks: Evidence from Uganda, paper presented at the *AERC/UNU-WIDER Conference on the Macroeconomics of Aid*, 2-3 December. Nairobi.

Eifert, B. and A. Gelb (2005), Improving the Dynamics of Aid: Towards More Predictable Budget Support, Washington, DC: The World Bank, *Policy Research Working Paper 3732*.

Fagernäs, S. and J. Roberts (2004), The Fiscal Effects of Aid in Uganda, London: Overseas Development Institute (ODI), ODI/DFID Economic and Statistics Analysis Unit (ESAU), *ESAU Working Paper 9*

Foster, M. and P. Mijumbi (2002), How, When and Why does Poverty get Budget Priority? Poverty Reduction Strategy and Public Expenditure in Uganda, London: Overseas Development Institute, *ODI Working Paper 163*

Franco-Rodriguez, S., M. McGillivray and O. Morrissey (1998), Aid and the Public Sector in Pakistan: Evidence with Endogenous Aid, *World Development*, 26, 1241–50.

Hussain, M., A. Berg, and S. Aiyar (2009), The Macroeconomic Management of Increased Aid: Policy Lessons from Recent Experience, *Review of Development Economics*, 13, 491–509.

Juselius, K. (2006), *The Cointegrated VAR Model: Methodology and Applications*, Oxford: Oxford University Press.

Kasekende, L. A. and M. Atingi-Ego (1999), Impact of Liberalization and Its Implications in sub-Saharan Africa: the case of Uganda, *Journal of International Development*, 2, 411–36.

Killick, T. and M. Foster (2007). The Macroeconomics of Doubling Aid to Africa and the Centrality of the Supply Side. *Development Policy Review*, *25* (2), 167-192.

Kuteesa, F., E. Tumusiime-Mutebile, A. Whitworth and T. Williamson (Editors) (2010), *Uganda's Economic Reforms: Insider Accounts*, Oxford: Oxford University Press.

Loxley, J. (1989), The IMF, the World Bank and reconstruction in Uganda, in B. K. Campbell and J. Loxley (eds.), *Structural Adjustment in Africa*, London: Macmillan Press, pp 67-91

McGillivray, M. and O. Morrissey (2001), Aid Illusion and Public Sector Fiscal Behaviour, *Journal of Development Studies*, 37, 188–36.

McGillivray, M. and O. Morrissey (2004), Fiscal Effects of Aid, in T. Addison and A. Roe (Eds), *Fiscal Policy for Development*, Basingstoke: Palgrave for UNU-WIDER, pp. 72–96.

Martins, P. (2010), Fiscal Dynamics in Ethiopia: A Cointegrated VAR Model with Quarterly Data, University of Nottingham, School of Economics: *CREDIT Research Paper 10/05*.

Mascagni, G. and E. Timmis (2016), Fiscal Effects of Aid in Ethiopia: Evidence from CVAR applications, *Journal of Development Studies*, this issue.

MoFPED (2003), *Partnership Principles between Government of Uganda and its Development Partners*, Kampala: Ministry of Finance, Planning and Economic Development

MoFPED (2005), *Poverty Eradication Action Plan 2005*, Kampala: Ministry of Finance, Planning and Economic Development

MoFPED (2009), *Background to the Budget 2008/09*, Kampala: Ministry of Finance, Planning and Economic Development (MoFPED)

Morrissey, O., R. Osei and T. Lloyd (2002), Modelling the Fiscal Effects of Aid: An Impulse Response Approach for Ghana, Hamburg Institute of International Economics: *HWWA Discussion Paper 170* (www.hwwa.de)

Morrissey, O. (2015a), Aid and Government Fiscal Behaviour: What Does the Evidence Say?, *World Development*, 69, 98-105

Morrissey, O. (2015b), 'Aid and Domestic Resource Mobilisation with a focus on sub-Saharan Africa', *Oxford Review of Economic Policy*, 31 (3-4): 447-461

Morrissey, O., M'Amanja, D., and T. Lloyd (2007), Aid and Growth in Kenya: A Time Series Approach, Chapter 16 in S. Lahiri (Ed), *Theory and Practice of Foreign Aid* (pp. 313-332), Amsterdam: Elsevier.

OECD-DAC (2009), *Geographical Distribution of Financial Flows Database*, Paris: Organization for Economic Cooperation and Development (OECD), Development Assistance Committee (DAC).

Osei, R., O. Morrissey, and T. Lloyd (2005), The Fiscal Effects of Aid in Ghana, *Journal of International Development*, 17, 1–17.

UBOS (various years), *National Accounts Estimates of Main Aggregates*, Kampala: Uganda Bureau of Statistics.

Whitworth, A. (2010), Planning and Development Budget Reform 1990-1995, Chapter 6 in Kuteesa et al (2010), pp. 129-156

Table 1: Long Run Estimates for Different Normalisations of the Fiscal Equilibrium

Panel A: Annual Data (1972-2008, N=30)

Coefficients of Cointegrating relationship (β)

DB	*G*	*A*	*R*	*Trend*
-1.000	0.223	-0.137	-0.484	244.387
4.485	-1.000	0.614	2.171	-1096.07
-7.31	1.63	-1.000	-3.538	1786.46
-2.066	0.461	-0.283	-1.000	504.932
(5.234)	(3.159)	(2.064)	(4.929)	(4.638)

Adjustment coefficients (α)

-0.252	-0.756	0.760	0.677
(-1.890)	(-3.010)	(2.081)	(3.362)

Panel B: Quarterly Aid Data (1997q3 – 2014q4, N=39)

Coefficients of Cointegrating relationship (β)

DB	*G*	*A*	*R*	*Trend*
-1.000	0.448	-0.334	-0.396	6.815
2.234	-1.000	0.746	0.884	-15.228
-2.994	1.340	-1.000	-1.184	20.407
-2.525	1.131	-0.843	-1.000	17.210
(7.838)	(4.610)	(7.322)	(2.693)	(3.065)

Adjustment coefficients (α)

-1.639	-0.141	-0.032	0.600
(-5.652)	(-0.466)	(-0.192)	(5.092)

Notes: The rows of β represent alternative normalisations of the one cointegrating relationship estimated in annual and quarterly data respectively (t-ratios in parentheses are identical irrespective of normalisation). The adjustment coefficients (α) are those obtained from normalising the cointegrating vector on *DB*.

Table 2: Hypotheses Tests for Fiscal Effects of Aid

Hypotheses	Beta (β) 1	2	3	4	d	Test Statistic Annual	Quarterly	Inference
Aid Spending	*	-1	1	*	1	2.408 [0.121]	0.981 [0.322]	Accept
Balanced Budget	0	-1	1	1	3	6.846 [0.009]	9.735 [0.002]	Reject
Revenue displacement	*	*	1	-1	1	7.258 [0.027]	14.332 [0.001]	Reject
Borrowing displacement	-1	*	1	*	1	7.203 [0.027]	13.350 [0.001]	Reject

Notes: Tests are based on equation (3) with one normalisation (-1, which does not affect the likelihood) and d restrictions (0 or 1, which do affect the likelihood) on the β coefficients, where * denotes unrestricted (β_5 on the deterministic time trend is unrestricted to capture non-zero average linear growth rates). Inference is based on a $\chi^2(d)$ test reported under test statistics, with P-values in brackets.

Figure 1: Fiscal variables 1972-2008

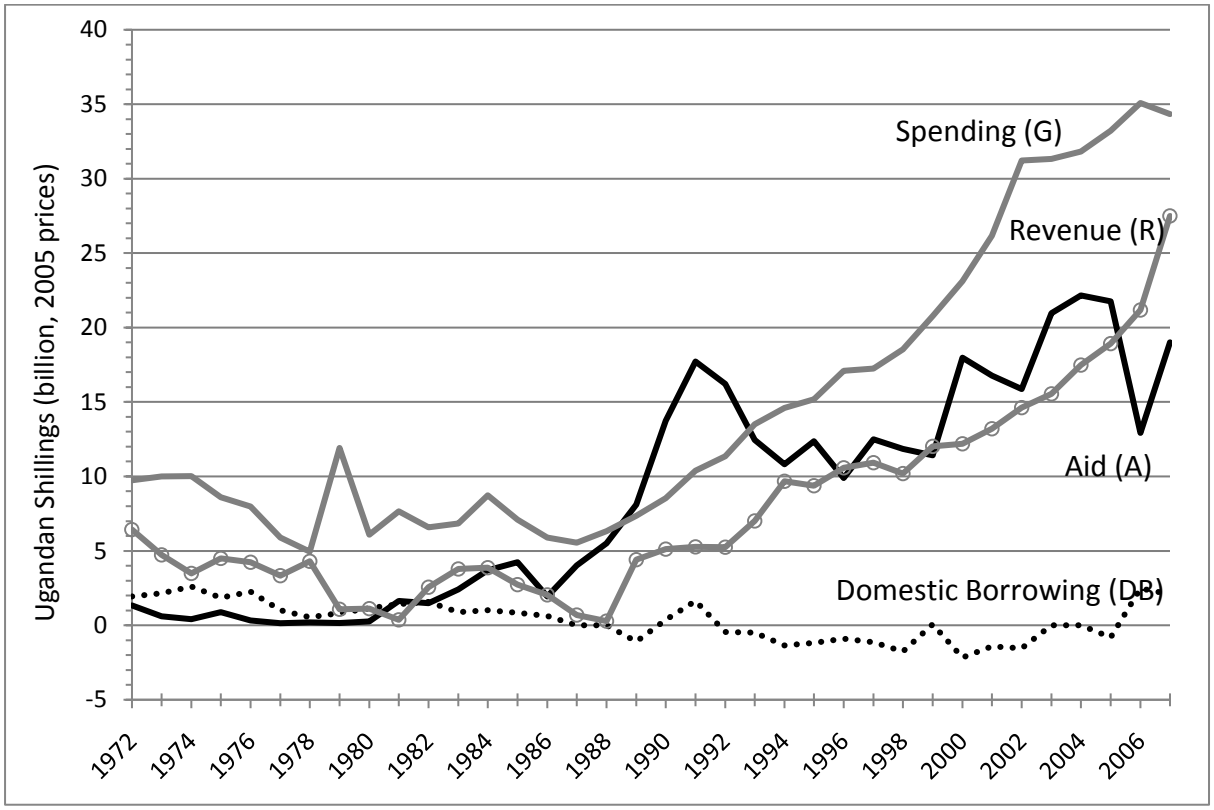
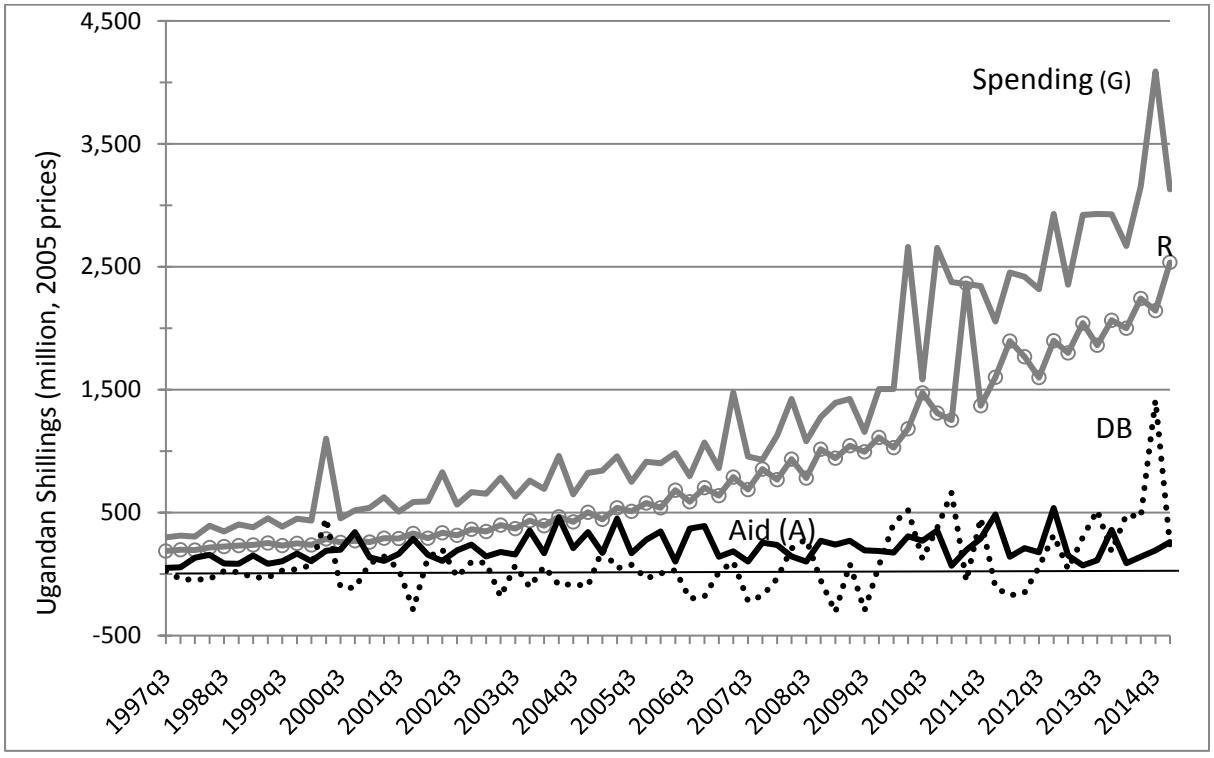


Figure 2: Fiscal variables Quarterly 1997Q1-2014Q4



Appendix: CVAR Specification

The testing procedures for the CVAR model (equation (1) in the text) are detailed here. The lag length is determined as the minimum number of lags that meets the crucial assumption of time independence of the residuals, based on a Lagrange multiplier (LM) test, starting with two lags for annual data and five lags for quarterly data. Both Schwarz and Hannan-Quinn information criteria suggest one lag for annual data, and with a lag of one the LM test does not reject the null hypothesis of no serial correlation in the residuals (Table A1). For quarterly data, while Schwarz information criteria favours one lag, Hannan-Quinn information criteria suggest four lags. However, with three lags, the LM test could not reject the null hypothesis of no serial correlation in the residuals (Table A1).The analysis is implemented with a lag of one for annual data and three lags for quarterly data.

Table A1 about here

Having determined the appropriate specification of the data generating process (DGP), cointegration rank is determined using Johansen's trace statistic, shown in Table A2. The trace tests support a cointegrating relation without dummies. An assessment of the system residual misspecification test reveals that the residuals are not auto-correlated. The determination of the cointegrating rank, *r*, relies on a top-to-bottom sequential procedure; this is asymptotically more correct than the bottom-to-top Max-Eigen statistic alternative (Juselius 2006: 131-4). The trace-test has been shown to have finite sample bias with the implication that it often indicates too many cointegrating relations so that the test is over-sized (Juselius 2006: 140-2). For a small sample such as used here the Bartlett correction for a small sample ensures a correct test size. Tests support the presence of one equilibrium (stationary) relationship corrected for small sample bias and a rank of one ($r = 1$) is supported by the data (Table A2). The results in Table 1 of the paper confirm that all variables are part of the long-run equilibrium (long-run exclusion tests support this (available on request).The stationarity of each variable by itself in the system is rejected, suggesting that the series are unit root non-stationary (Table A3).

Tables A2 and A3 about here

Disaggregated Spending

The long-run relation reported so far assumes that all forms of public spending have an equal effect on the other items in the budget. Bwire *et al* (2013, p. 20) investigate this by disaggregating total spending into current consumption (*GC*) and development (*GK*) spending and report the long run estimates for the annual data only (*t*-ratios in parentheses):

$$DB = 1.43GK - 0.11GC - 0.27A - 0.54R + 365.9Trend \qquad \text{(A1)}$$
$$\qquad (5.029)\ \ (-1.376)\ \ (-3.676)\ \ (-5.571)\ \ \ (9.109)$$

As with the aggregate results reported in the main text, estimates from (A1) suggest, that aid and tax revenue are negatively related to domestic borrowing. Coefficients on capital and consumption spending are opposite in sign suggesting they play distinct roles in the budget. Whereas domestic borrowing rises with capital spending, (echoing the result from the aggregate model), current spending does not increase *DB*. This seemingly counterintuitive result is consistent with the notion that government consumption adjusts to capital spending to maintain the budgetary equilibrium (although the *t* ratio indicates that this is not statistically significant at conventional levels), or that it is driven by aid and tax revenues. Importantly, these results imply that capital and consumption spending play distinct and possibly offsetting roles in the budget; the hypothesis that the *GC* and *GK* coefficients in Equation (A1) are equal is not be supported ($\chi^2(5) = 26.774$ [0.000]).

Table A1: Lag Length Determination

Model	*k*	*T*	*Regr*	*SC*	*H-Q*	*LM(1)*
Annual Sample: 1974:01 to 2008:01						
VAR(2)	2	35	10	61.241	60.077	0.333
VAR(1)	1	35	6	60.619	59.92	0.329
Quarterly Effective Sample: 1999:01 to 2014:01						
VAR(5)	5	46	22	39.657	37.47	0.229
VAR(4)	4	46	18	39.106	37.316	0.364
VAR(3)	3	46	14	38.815	37.422	0.11
VAR(2)	2	46	10	38.603	37.608	0.014
VAR(1)	1	46	6	38.527	37.931	0.005

Notes: Column headings *k* refers to number of lags; *T* the length of time series; *Regr* is the number of regressors (lags, constant and trend) in the model; *SC* the Schwarz Criterion; *H-Q* the Hannan-Quinn Criterion; and *LM(1)* is the LM-Test for autocorrelation of order 1.

Table A2: Johansen's cointegration trace test results

Annual aid data (1972-2008)							
p-r	r	Eig.value	Trace	Trace*	Frac95	P-value	P-value*
4	0	0.521	66.002	61.916	63.659	0.031	0.070
3	1	0.413	39.535	37.835	42.770	0.104	0.148
2	2	0.303	20.368	19.854	25.731	0.211	0.238
1	3	0.185	7.374	7.310	12.448	0.316	0.323
Quarterly aid data (1997q3–2014q4)							
p-r	r	Eig.value	Trace	Trace*	Frac95	P-value	P-value*
4	0	0.611	85.654	73.454	63.659	0.000	0.005
3	1	0.368	40.318	35.072	42.770	0.088	0.246
2	2	0.218	18.261	16.198	25.731	0.334	0.485
1	3	0.126	6.449	1.972	12.448	0.416	0.956

Notes: Trend assumption: Linear deterministic trend restricted; *: the small sample corrected test statistic (Dennis *et al.*, 2006: 159-60); Frac95: the 5% critical value of the test of H(*r*) against H(*p*). The critical values as well as the p-values are approximated using the Gamma (*I*) distribution.

Table A3: Test for stationarity: χ^2 (*p-r*)

DB	*G*	*A*	*R*
7.710	7.882	8.334	7.389
(0.052)	(0.049)	(0.040)	(0.060)

Notes: Restricted trend included in the cointegrating relationship(s); 5% C.V = 7.815; P-values in parentheses.