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Foreign aid, public sector and private consumption in Uganda

A cointegrated vector autoregressive approach

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Abstract

This paper employs a cointegrated vector autoregressive model to assess the growth effect of aid in Uganda over the period 1972-2008. Results show that aid in Uganda has had both direct and indirect beneficial association with growth; that it is the productivity and not the *stead* state level of investment that contributes to achieving target growth rates; and that consumption spending is more beneficial to growth because it contributes to private incomes and consumption. In terms of policy, it is crucial to strengthen fiscal response to aid receipts and ensure aid funded projects are closely monitored and contract specifications are strictly enforced. Moreover, donors need to accept the politically unpalatable fact that aid has an important role in supporting consumption spending.

Keywords: aid, domestic fiscal variables, private sector growth, political and economic instability, ESAP, Uganda

JEL classification: C32, F35, O11

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Acronyms

ARDL	autoregressive distributed lag model
CVAR	cointegrated vector autoregressive
DAC	Development Assistance Committee of the OECD
DGP	data generating process
EAC	East African Community
ESAP	economic structural adjustment programme
GDP	gross domestic product
MoFPED	Macroeconomic Policy Department, Ministry of Finance Planning and Economic Development (of Uganda)
LM	Lagrange multiplier
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PAF	poverty action fund
PEAP	poverty eradication action plan
SSA	sub-Saharan Africa
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings

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1 Introduction

To date, there is no consensus on whether or not foreign aid has been effective in aid-dependent countries. The dominant strands in the literature focus on cross-country studies on the growth effect of aid, or more recently on welfare or poverty. Another, smaller, strand of the literature has focused on the effects of aid of fiscal behaviour, as most aid spent in a country goes through or may influence the government, typically with country studies, and more recently, the International Monetary Fund (IMF) initiated work on short- and medium-term effect of aid with important insights regarding absorption and spending[1] not analysed in more classical fiscal response literature. This paper combines elements of the literature on the effect of aid of fiscal behaviour and of the effect of aid on growth to investigate how aid mediated through fiscal variables affects growth in private income to address the growth response to aid in Uganda, a major sub-Saharan African (SSA) recipient of aid over the past few decades.

Uganda is an interesting case study for assessing the effectiveness of aid, as significant aid inflows have supported government spending for over twenty years in an environment of low tax revenue. The restoration of political stability in a country known for large-scale violence when the Museveni regime was established in 1986, with its commitment to economic reform programmes and the resolve to alleviate poverty, renewed donor enthusiasm in Uganda and has been associated with large increases in aid inflows (Brownbridge and Tumusiime-Mutebile 2007; Atingi-Ego 2005; Collier and Reinikka 2001). The aid-gross domestic product (GDP) share, which was about 1 per cent in 1980 rose significantly to about 5 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; Mugume 2008). In terms of the budget, total donor support (both direct budget support and project aid) has averaged 43 per cent of the national budget over the 2003/4-2008/9 period (MoFPED n.d.).

The rest of the paper is structured as follows. A literature review, including a discussion on the economic effect of aid is presented in section 2, while section 3 discusses economic performance in Uganda, data measurement and transformation. Section 4 outlines the econometric approach and the empirical results are presented in section 5. The conclusions and policy implications are drawn in section 6.

2 Literature review

2.1 The economic effect of foreign aid

The underlying economic rationale for aid to developing countries can be traced back to the two-gap model of Chenery and Strout (1966). In the model, investment is the cornerstone of growth, but requires domestic savings and, at least initially, imported capital goods. However, low-income countries are constrained by two gaps: insufficient domestic savings to provide the resources needed to finance the level of investment required to achieve their target growth rates and insufficient foreign exchange earnings (as they are unlikely to have sufficient export earnings) to finance capital imports. As these savings and foreign exchange gaps constrain growth, capital flows (of which aid is one form) are an important source of development finance (Franco-Rodriguez and Morrissey 1998; McGillivray and Morrissey

[1] Absorption is the widening of the current account deficit (excluding aid) due to more aid while spending is the widening of the fiscal deficit (excluding aid) due to incremental aid (Hussain, Berg and Aiyar 2009; Foster and Killick 2006: 3).

2000) as they relax the savings and foreign exchange constraints. Bacha (1990) adds the 'fiscal-gap' to allow for how aid relates to the effects of fiscal and monetary policies on investment (e.g., aid financed public investment may affect private investment).

Although aid is not an argument in the standard growth models, standard growth theory posits that fiscal policy has an important role in stimulating investment and economic growth. The belief is that given a right mixture of taxation and spending policies as well as other aspects of fiscal policy, the government can increase the quantity and productivity of aggregate investment (human and physical capital, research and technology) and thus, contribute to overall economic growth (Ram 1986; Barro 1990, Barro and Sala-i-Martin 1992, 1995; Easterly and Rebelo 1993). But not all aspects of fiscal policy are productive. Government operations are inherently bureaucratic and inefficient, and may retard rather than promote growth (Levine and Renelt 1992; Landau 1983). In particular, some expenditures are productive although the taxes required to finance them may create distortions, reducing the private returns to accumulation and therefore have a detrimental effect on economic growth. The conventional wisdom is that productive government spending financed by non-distortionary taxation is growth promoting, but unproductive spending (often interpreted as consumption spending) and distortionary taxes are growth retarding (Barro 1990). This notwithstanding, it is standard in public sector growth models to feature channels that explicitly incorporate government activities (Barro and Sala-i-Martin 1995). As aid is not an argument in this model and we do not have timeseries data on capital or labour, we adopt a more limited approach to investigate relationships of interest. As a source of revenue, aid does not have the price distorting effects of taxes that may reduce growth so that aid would be expected to have a direct contribution to increased growth if used to finance productive expenditure (Hansen and Tarp 2001; Lensink and Morrissey 2000). Moreover, government spending on public goods and services conditional on aid is expected to be more than what it could have been in the absence of aid. Through this channel, aid may have positive effects on the private sector and hence promote growth (Mosley, Hudson and Verschoor 2004; Lin 1994).

2.2 The empirical literature

In the broad literature, aid effectiveness has typically been judged in terms of its effect on economic growth usually in cross-country econometric studies. Surveys and discussions of the literature on the growth effect of aid are provided in Hansen and Tarp (2000, 2001), McGillivray et al. (2005), Roodman (2007) and many others, but significant disagreement remains, and neither does meta-analysis resolve the impasse. While Doucouliagos and Paldam (2008, 2009, 2010) argue that the 'collective evidence' suggests that aid is not effective, Mekasha and Tarp (2013) use similar methods to show a positive effect of aid on growth. This debate on the effectiveness of aid takes place in the shadow of the controversial Burnside and Dollar research (1997; 2000), especially having received prominence in the World Bank's landmark publication (1998), *Assessing Aid: What Works, What Doesn't and Why*.

In general, there are no signs of the aid effectiveness debate dissipating. Evidence from cross-country regressions is both inconclusive and puzzling. It is inconclusive in the sense that different stories have been told, each proposing a variable on which aid effectiveness depends. Some studies find that the impact of aid on growth is conditional only on policy (Burnside and Dollar 1997, 2000; Collier and Dehn 2001; Collier and Hoeffler 2002; Collier and Dollar 2002, 2004), whilst others find that aid does contribute to growth irrespective of

the policy environment (Dalgaard and Hansen 2001). Others observe that aid effectiveness depends on institutional quality (Burnside and Dollar 2004b), the amount of aid[2] or environment (Dalgaard, Hansen and Tarp 2004), etc. It is puzzling in the sense that most of these studies use data from the exact same publicly available databases, i.e., aid data from the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) and macro data from WDI and the PWT (Juselius, Møller and Tarp 2011), so that the opposing views on aid effectiveness may seem difficult to rationalize. Commentators have attributed the opposing views to the use of different proxies and context in which aid effectiveness is evaluated. Juselius, Møller and Tarp (2011) add a nuance, stressing that the contrasting conclusions are due to differences in econometric models and methods, exogeneity/endogeneity assumptions and choices of data transformations (logs, ratios, levels, growth rates, etc). The core problem is that different econometric specifications are associated with different technical complications and limitations (Juselius, Møller and Tarp 2011; Roodman 2008; Durlauf, Johnson and Temple 2005).

As can easily be realized from above, the literature on aid effectiveness is largely in cross-country econometric studies. Approximating cross-country evidence to what is inherently a timeseries phenomenon is a valuable exercise that allows one to attempt to draw general conclusions (Lloyd, Morrissey and Osei 2001: 1). However, countries (like aid in purpose and probably effect) are heterogeneous and country-specific factors may promote or constrain aid effectiveness. As Doucouliagos and Paldam (2008) argue, aid-growth results are associated with regional differences, and this could be of a serious concern when it comes to country-level differences. Thus, one major limitation of focussing on cross-country regressions is that country-specific questions regarding aid are omitted (Clist 2010), and Riddell (2007) argues that country-based evidence provides the only reliable backdrop against which to judge aid effectiveness. Thus, to enhance our understanding of country-specific questions regarding aid effectiveness, it is desirable to conduct studies of the impact of aid on growth in specific countries. There are virtually no country-specific empirical studies on how aid, mediated by fiscal variables impact on growth of private incomes, but an extensive literature search turned up the following general studies:

Lloyd, Morrissey and Osei (2001) use an autoregressive distributed lag (ARDL) model approach and find that exports, aid and public investment are (all) positively related to long-run growth in private consumption in Ghana. Studies by Gounder (2001) for Fiji, and Bhattarai (2009) for Nepal using, respectively, the ARDL and the Johansen Maximum Likelihood (ML) approaches show that foreign aid has had a significant positive impact on economic growth. In the only directly comparable study, Morrissey, M'Amanja and Lloyd (2007) investigate the impact of aid on growth within a fiscal framework and find in Kenya that grants were associated with increased spending and that government spending had a positive effect on growth (grants also had a small positive association with growth). Loans, on the other hand, had a negative association with growth.

In some of the most recent applications, Juselius, Møller and Tarp (2011) rely on country-based timeseries analysis and perform a comprehensive study of the long-run effect of official development assistance (ODA) on a set of key macroeconomic variables in 36 SSA countries from the mid-1960s to 2007. Using a statistical benchmark of a CVAR model, they provide broad support for a positive long-run impact of aid on investment in 33 of the 36 countries in the sample, but hardly any evidence that aid has been harmful. Kargbo (2012) uses a triangulation of approaches and specifications on Sierra Leonean data and finds results

2 These studies are summarized in Table A2 in McGillivray et al. (2005: 21).

that are consistent with the view that aid significantly contributes to economic growth. In a sharp contrast, however, Fenny (2005), and Javid and Qayyum (2011) use a similar ARDL approach on Papua New Guinea and Pakistan, respectively, but do not find evidence that aid contributes to economic growth.

Some studies, mostly country-specific but a few cross-country (most of these are rather old and limited) have investigated the effect of aid on the budget behaviour of recipient governments, i.e., the effect on spending and taxation. These are reviewed and discussed in McGillivray and Morrissey (2001a, 2004) and Morrissey (2012). Although we cannot generalize on how aid affects government fiscal behaviour in recipient countries, it clearly does (and the effects may differ by country). Thus, overt concern with the growth effect of aid in the literature distracts attention from understanding how aid affects the economy through the broader fiscal dimension, and at the same time, studies on the fiscal effect of aid do not reflect on the fact that it is difficult to perceive of aid as a lump-sum transfer, independent of the level of income or growth in the aid recipient (Hansen and Tarp 2001: 7). Even more, the focus in the IMF inspired studies on the short- and medium- term effects of aid, i.e., absorption and spending (see Berg et al. 2010, 2007; Portillo et al. 2010; Hussein, Berg and Aiyar 2009; Foster and Killick 2006) have not been analysed in more classical fiscal response models.

This paper considers aid effectiveness in Uganda, but in an economy-wide context over the period 1972-2008 (reflecting data availability). A cointegrated vector autoregressive (CVAR) model is employed to investigate how aid, mediated by fiscal variables and exports, impacts on growth of private consumption as the context for estimating the growth response to aid in Uganda. CVAR allows the data to speak freely about the empirical content of the model without compromising high scientific standards. Importantly, instead of assuming aid exogeneity/endogeneity, all variables, including aid, are modelled jointly as a system of equations and the question of whether aid is endogenous or exogenous is tested. The alternative approaches to estimating the growth effect of aid, i.e., single equations raise the likelihood that parameter estimates may suffer from endogeneity bias especially when weak instrumental variables are used. We focus on the growth of private consumption because in macro-accounting terms, many of the key variables of interest are in fact components of GDP. So there could be a possible identity problem in estimating any long-run relationship in levels, and as Hansen and Tarp (2001: 7) argue, it is difficult to perceive aid as a lump-sum transfer, independent of the level of income (suggesting a possible simultaneity bias). To circumvent these problems, we place private consumption expenditure on the left hand side. This can then be interpreted as capturing how aid mediated through fiscal variables affects growth (and the CVAR approach seems appropriate for such an exercise).[3] The relation(s) to be estimated assumes that aid and government spending capture the effect of public investment and public wages, taxation captures distortions due to government, and exports capture private sector competitiveness. Imports are omitted because they are financed using foreign exchange from exports and aid which are explicitly modelled. Also, with particular reference to Uganda, no study to our knowledge has broadened the empirical search for aid effectiveness as we do in this study.

Moreover, although one could argue that private consumption is not a measure of growth (usually measured as growth in GDP) or investment (as in Morrissey, M'Amanja and Lloyd 2007), our approach has both theoretical (following Barro 1990; Barro and Sala-i-Martin

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3 See Juselius, Møller and Tarp (2011: 2) for a detailed justification in favour of the technique, which is adopted here on exactly the same grounds.

1992, 1995) and conceptual (Lloyd, Morrissey and Osei 2001) foundations. Barro and Sala-i-Martin (1992) argue that private consumption can be used as a measure of economic growth as the correlation of output and other variables can be modelled from the production or utility side of the household. This is because government activities may indirectly increase the total output of a country through its interaction with the private sector (Lin 1994). Conceptually, the concern in economic development is more about what is happening to private incomes and consumption levels rather than the overall size of the economy (Lloyd, Morrissey and Osei 2001). This is also reflected in the recent shift in the donor objectives where greater importance is attached to using aid to reduce poverty (World Bank 2000). As argued in Gomanee et al. (2005), using aid to guide or influence the allocation of government spending is one important way to increase the leverage of aid on private incomes or poverty alleviation. In addition, the fact that private consumption expenditure captures non-income dimensions of poverty, it may be more important than economic growth (World Bank 2000). Thus, given this view point and the high population growth rates in Uganda, we have opted to use per capita measures of private consumption.[4]

Thus, we consider the implications of our findings to capture the growth effect of aid in Uganda. This notwithstanding, it is fair to observe that the growth process depends on an intricate range of interacting characteristics and lines of influence (Aghion and Howitt 1998; Barro and Sala-i-Martin 1995). Thus, the simple analytical framework adopted here may not fully capture the growth process. Our concern is not with identifying the determinants of growth, but rather how aid and public sector affect the growth of private income, providing the variables included in the system are cointegrated.

3 Economic performance in Uganda

As can be seen later from Figure 1, trends in the macroeconomic variables track Uganda's economic performance over the period 1972-2008, covering successive phases of mismanagement, conflict and economic decline prior to 1988, and economic stability with the Museveni regime from the late 1980s. In 1971, Uganda was considered among those African countries with a chance of achieving a GDP growth rate of 7 per cent for the rest of the century (O'Connell 2002). However, during that same year, Uganda embarked on a spiral of violence and economic decline (O'Connell 2002). Economic wars, political turmoil, social disorder, a highly over-valued exchange rate, export taxation and quantitative restrictions on imports were at the root of poor economic performance. Public expenditure fell from over 20 per cent of GDP in 1972 to less than 10 per cent of GDP by 1978 while the taxbase and tax yields shrank more rapidly on account of new distorting taxes (Fagernäs and Roberts 2004a). Aid inflows from the World Bank and western countries generally ceased because of the highly distorted macroeconomic framework, and probably the tendency of the regime to lean towards socialism (Baffoe 2000; Kasekende and Atingi-Ego 1999a) so that inflationary pressures increased with monetization of the deficit (Fagernäs and Roberts 2004a).

ODA flows fell from an already low level of 0.2-0.6 per cent of GDP at the beginning of 1970s to virtually nothing by the end of the decade, then rose to an average of 1.5 per cent of GDP between 1981 and 1985 (OECD-DAC 2009) during the implementation of the first standby arrangement supported by IMF with considerable donor support. This was a result of the return of Milton Obote to power in 1980. The only distinct feature in the 1970s was the high value of total government expenditure in 1979, which coincides with the overthrow of

4 Aggregate levels are interesting in cross-country comparisons where the size of the economy matters.

Idi Amin's regime, the second oil price shock and the collapse of the East African Community (EAC). Between 1973 and 1979, real GDP per capita fell by over 3 per cent per year (O'Connell 2002), qualifying Uganda as a chronic case of economic failure.

With political stability and the successful implementation of a World Bank and IMF economic structural adjustment programme (ESAP) in mid-1980s after the Museveni regime was established, Uganda began its recovery, reversing the economic decline of 1970s and early 1980s, restoring macroeconomic stability by the late 1980s. This, together with the resolve to alleviate poverty and the good relationship with major donors made it an attractive target for official aid inflows. ODA inflows (in absolute terms) increased from UGX 12,489.26 (or equivalently US$869.92) million in 1996/97 to UGX 15,990.39 (US$1,377.12) million in 2008/09 (OECD-DAC data 2009), much of which took the form of budget support rather than project aid (Berg et al. 2007).

The sector allocation of aid over time has been characterized by an adjustment in donor funding from heavy capital expenditures in the early 1990s to current expenditures towards poverty reduction through the poverty action fund (PAF) in support of government's social programmes enshrined in the first poverty eradication action plan (PEAP) in 1997/98. Subsequently, the increase in donor inflows through the years has resulted in a rapid increase in current expenditures with an equally fast increase in PAF which rose from US$3.5 million in 1998 to a high of US$142 million in 2004 and was estimated at US$138 million in 2009 (Egesa 2011).

Table 1 shows selected indicators of the central government fiscal operations between 2003/04 and 2008/09. Over this period, total donor support has averaged 43 per cent of the national budget (MoFPED) and currently stands at some 42.4 per cent (RoU 2008/9: 51). ODA flows are some 6.6 per cent share of GDP (MoFPED). Recurrent spending rose exponentially at an average of 1.6 percentage points per annum over the period 2003/04-2006/07 while capital formation spending decayed at an average of 8.4 percentage points per annum over the same period. This trend, however, has changed in the last two periods, and as the table shows, current spending has fallen while capital spending has shown a strong increase. Though there has been remarkable improvement in current revenue, the current share of about 13 per cent of GDP still remains low even by SSA standards.

Also from Figure 1, private consumption seems to have declined at an accelerating rate during the 1970s, with no discernible trend during the first half of 1980. The cumulative effect of inappropriate policies of successive governments together with the second oil price shock and the collapse of the EAC at the end of 1970s may explain this brink of collapse. The only exception is the high value in 1978/9, which coincides with the peak of political and economic instability and subsequent overthrow of Idi Amin's regime. Economic recovery started in 1986 with the successful implementation of ESAP, and as can be seen, private consumption seems to have increased steadily. In fact, since the mid-1990s, Uganda has witnessed declining trends in income poverty, falling from 44 per cent in 1997/98 (Appleton et al. 1999) to 38.4 per cent in 2002/03 and further to 31.3 per cent in 2005/06 (UBOS 2006; Appleton 2001).

Exports exhibited a steady decline in the 1970s, remained moderately low through the 1980s and increased above their historically low levels thereafter. The decline in exports in the 1970s is probably because exports were discriminated against through the tax system, price and marketing controls and the overvaluation of the exchange rate, which encouraged outward smuggling of exports (Kasekende and Atingi-Ego 1999b). As a result, all exports except for coffee collapsed (leaving exports to be highly concentrated in coffee) (Collier and

Reinikka 2001; Henstridge 1996), and this also meant that changes in world prices were not passed-through to farmers. Effective 1992 however, the government underwent comprehensive goods and factor markets liberalization, rescinding massive implicit taxation by liberalizing financial and foreign exchange markets as well as coffee marketing; thus signalling a conscious effort by the government to improve the 'pass-through' of export proceeds to farmers. This may help explain why exports and private consumption appear to move together. This potential regime or level shift from 1988 and transitory blip in 1979/80 are accounted for in the empirical analysis.

Table 1: Selected indicators of central government fiscal operations for Uganda

Indicators	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Gov't final consumption expenditure / total budget	82.7	83.7	84.3	88.1	87.6	79.8
Public Investment/total budget	17.3	16.3	15.7	11.9	12.4	20.2
Gov't final consumption expenditure / GDP	15.3	14.5	14.1	12.7	11.2	10.1
Public investment / GDP	5.4	5.0	4.6	4.9	4.4	4.6
Aid / total budget	52.3	46.9	38.5	48.4	27.6	42.4
Aid / GDP	11.3	10.5	7.5	9.0	4.9	6.6
Domestic revenue / GDP	11.8	13.8	12.7	12.8	13.3	12.6
Tax revenue / GDP	n.a	13.6	12.3	12.4	12.9	12.2

Source: Authors' calculations based on UBOS and MoFPED (various years).

3.1 Data, measurement and sources

Annual timeseries data for the period 1972-2008 are used. Foreign aid constitutes total net disbursement of aid from all donors to Uganda, i.e., sums up aid grants and aid loans having a grant element of at least 25 per cent. Data on aid disbursement are obtained from Geographical Distribution of Financial Flows (OECD-DAC 2009) databases. Domestic tax revenue data and data on net domestic borrowing from the banking system are from the Bank of Uganda (BoU), while data on total government spending (and its disaggregated components: current and capital spending), exports and private consumption are from Uganda Bureau of Statistics (UBOS). Capital spending constitutes central government outlays on additions to fixed assets plus net changes in the government's level of inventories net of private investment. Current spending sums up expenditures by all government bodies on general public administration, defence, public order and safety affairs, education, health, community, social and economic services, agriculture, roads, water, loans repayment and pensions, among others. Total government spending is the sum of current and capital spending. The disaggregated components of total government spending are considered because we analyse a variant model as a refinement of one in which spending is aggregated.

Exports include the value of all goods and other market services provided to the world (i.e., value of merchandise, freight, insurance, travel, and other non-factor services). Private consumption is measured as the market value of all goods and services, including durable products purchased or received as income in-kind by households, and payments and fees to governments to obtain permits and licenses, and the expenditures of non-profit institutions serving households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings, and is computed as a per capita measure. All the data are in millions of constant 2005 Uganda shillings (UGX) prices, and are shown in levels in Figure 1 and in first differences in Figure 2 below.

Figure 1: Variables in levels

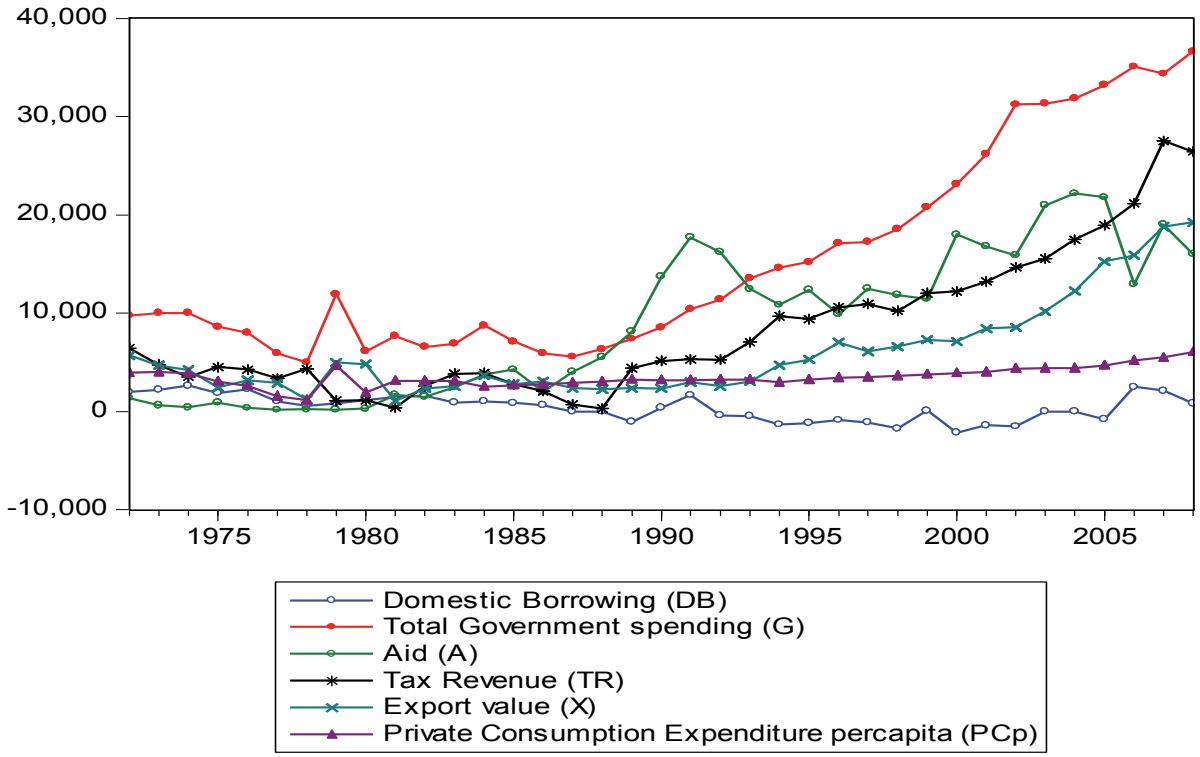
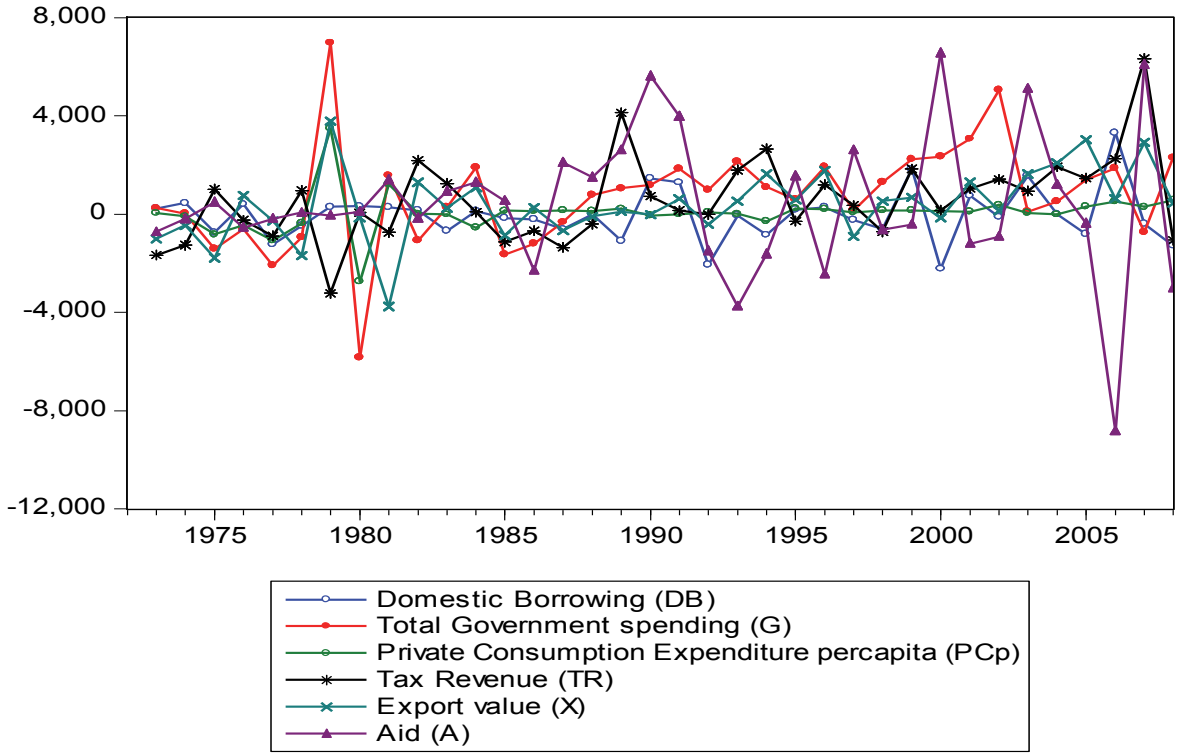


Figure 2: Variables in first differences



Source for Figures 1 and 2: OECD-DAC (2009), BoU and UBOS.

A visual inspection of the data in Figure 1 shows that all variables are typically trending over time, but stationary around trend (i.e., trend-stationary) in Figure 2. This suggests a multiplicative rather than additive model specification, which under log transformation is

brought back into additive form. However, this transformation is innocuous as long as the series datapoints are strictly positive or are at least not too close to zero (Juselius, Møller and Tarp 2011). As can be seen from Figure 1, log-transformations in the case of domestic borrowing is problematic, jeopardizing the validity of the transformation as it may result in losing more observations in an already small sample. Furthermore, it may weaken the power of the tests, making the CVAR analysis less reliable. One option would be to leave out 1972-79 from the analysis: aid is low so its impact questionable, but more importantly, this was a period of considerable turmoil in Uganda due to the Idi Amin regime, so the behaviour of most of the variables considered is likely to be erratic and different from the time after his regime. However, given the large number of parameters to be estimated in the CVAR and the already very small sample size, this would provide far too few degrees of freedom. Moreover, the trending seems to begin from 1988 onwards, with the Museveni regime, and this kind of shift might be lost with log-transformation. The other option would be to omit non-positive observations, but this will be non-random and therefore lead to selection bias in our sample, making log-transformation perhaps even more undesirable. Thus, we choose to use all series in non-log specification.

4 The econometric approach

4.1 The cointegrated VAR (CVAR) model

We consider a 6-dimensional VAR model for $y_t' = (DB_t, G_t, A_t, TR_t, X_t, PCp_t)$; all variables defined as in Figure 1. The model is structured around *r* cointegration relations (or the pulling forces) corresponding to *p-r* stochastic trends (or the pushing forces). The pulling forces are formulated as the CVAR model:

$$\Delta \mathbf{y}_t = \boldsymbol{\alpha}\boldsymbol{\beta}'\mathbf{y}_{t-1} + \sum_{i=1}^{k-1} \boldsymbol{\Gamma}_1 \Delta \mathbf{y}_{t-i} + \boldsymbol{\Phi}\mathbf{D}_t + \boldsymbol{\varepsilon}_t \tag{1}$$

where $\mathbf{y}_t$ is a 6-dimensional vector of endogenous variables, $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are (*p x r*) coefficient matrices, $\boldsymbol{\Gamma}_1$ 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 a first difference operator, $\mathbf{D}_t$ is (*m x 1*) vector of *m* deterministic terms (constants, linear trends, 'spike' and/or intervention dummies), $\boldsymbol{\Phi}$ is a (*p x p*) matrix of coefficients, and $\boldsymbol{\varepsilon}_t \sim \mathbf{iidN(0,\Sigma)}$ is a (*p x 1*) vector of errors. As shown in Juselius, Møller and Tarp (2011: 7), if $k = 1$, then $\boldsymbol{\Gamma}_1 = 0$ and implies that the long run is the same as the short run. Therefore, the system, after having been pushed away from equilibrium by an exogenous shock, will adjust back to equilibrium exclusively through $\boldsymbol{\alpha}$. Note, however, that the appropriate value of *k* will be empirically determined.

As has been alluded to, aid effectiveness has typically been judged in terms of its effect on economic growth, and has not been considered within an economy-wide context, i.e., how growth is mediated by the interrelationship between aid and public sector fiscal behaviour. However, our model allows for a complete *fiscal representation* (i.e., all budget variables are included, with an omission so that there is no estimation of an identity). This *fiscal representation* could justify the existence of one cointegrating vector as predicted by the fiscal response theory (McGillivray and Morrissey 2000, 2004). Going a step further, an additional link is considered, i.e., aid, fiscal variables, exports and growth in private consumption. Thus, our empirical framework allows for the possibility of two cointegrating vectors because in principle, one relationship is the statistical analogue of the budgetary

equilibrium among the core fiscal variables, and a relationship between aid, public sector (essentially comprising fiscal variables), exports and private consumption. If we find two cointegrating vectors, their interpretation would be facilitated by the fiscal response and public sector growth theories outlined above, including offering guidance to the specification of each vector.

Thus, assuming for simplicity, a case where *r=2*, *p-r=4*, an unrestricted constant ($\boldsymbol{\mu}_0$), *k=1*, and a vector of linear trends ($\boldsymbol{\alpha\beta' t}$) restricted to lie in the cointegrating space for the data vector at hand, the restricted CVAR model takes the form:

$$\begin{bmatrix} \Delta DB_t \\ \Delta G_t \\ \Delta A_t \\ \Delta TR_t \\ \Delta X_t \\ \Delta PCp_t \end{bmatrix} = \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \\ \alpha_{41} & \alpha_{42} \\ \alpha_{51} & \alpha_{52} \\ \alpha_{61} & \alpha_{62} \end{bmatrix} \left\{ \begin{pmatrix} \beta_{11}, \beta_{12}, \beta_{13}, \beta_{14}, \beta_{15}, \beta_{16}, \rho_{11} \\ \beta_{21}, \beta_{22}, \beta_{23}, \beta_{24}, \beta_{25}, \beta_{26}, \rho_{21} \end{pmatrix} \begin{bmatrix} DB_{t-1} \\ G_{t-1} \\ A_{t-1} \\ TR_{t-1} \\ X_{t-1} \\ PCp_{t-1} \\ t \end{bmatrix} \right\} + \boldsymbol{\mu}_0 + \boldsymbol{\varepsilon}_t \qquad (2)$$

where $\boldsymbol{\beta}_i' \mathbf{y}_t$ is the equilibrium error, $\boldsymbol{\alpha}_{ij}$ is the adjustment coefficient, and $\boldsymbol{\mu}_0$ is a $(p \times 1)$ vector of an unrestricted constant. Given the data generating process (dgp), the long run is the same as the short run and the system, after having been pushed away from equilibrium by an exogenous shock, will adjust back to equilibrium exclusively through $\boldsymbol{\alpha}_{ij}$ so that weak exogeneity is then the same as long-run exogeneity. To provide empirical content to the structural analysis underlying the causal links between aid, domestic fiscal variables, exports and private consumption, we impose jointly, where permissible, restrictions on the long-run parameters (i.e. $\boldsymbol{\beta}_{ij}$ and $\boldsymbol{\alpha}_{ij}$). For example, restrictions on $\boldsymbol{\alpha}_{ij}$ coefficient would tell us which variables adjust to maintain equilibrium after the system has been pushed out of its long-run equilibrium.

5 Empirical results

5.1 Empirical model specification

As the variables in levels appear to be trending and we are not sure whether these linear trends will cancel out in the cointegrating relation, the unrestricted 6-dimensional CVAR model in (1) 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 creation of quadratic trends in the levels, which would arise if both the constant and trend are unrestricted. Further justification for this type of specification is in Juselius (2006: 99-100). The choice of the lag-length was 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. We began with 2 lags and employed a general-to-specific modelling approach. Both Schwarz and Hannan-Quinn information criteria suggested one lag, and with a lag of one, the LM test could not reject the null hypothesis of no serial correlation in the residuals. Thus, all subsequent CVAR analyses were implemented with a lag of one.

An assessment of the system residual misspecification test reveals that although the residuals are not auto-correlated (which is very important), the hypothesis of multivariate normality is not strongly supported (ChiSqr(12) = 25.807 [0.011]. Non-normality of the error terms was detected in *PCp*, *X* and *G* equations, where we observe two non-cumulated blips (one in 1979 and the other in 1980) with opposite directions in level plus two cancelling cumulated mean shifts (one before 1979 and the other after 1980, 1979 and 1980 exclusive). As a common way of dealing with outlier observations, this suggests inclusion of a transitory innovation dummy, i.e., dum_{79} = (...,0, 0, 1, -1, 0, 0,...), i.e. 1979=1, 1980=-1, 0 elsewhere in the model. In addition, inspection of actual and fitted residuals reveal a slight but detectable shift in behaviour from about 1988 corresponding to a change in institutional environment (ESAP reforms). This institutional knowledge motivates the inclusion of a shift dummy, $D_{88} = (...,0,0,0,1,1,1,...)$, taking the value 1 for each year after 1988 inclusive, 0 otherwise to capture the 'ESAP reform intervention effects'. So allowing for transitory blip and level shift, we restrict dum_{79} and D_{88} to lie in the cointegrating space, albeit noting that dum_{79} cancels out as a consequence of cointegration.[5] Although this modification slightly improves specification of the CVAR model, we still cannot accept multivariate normality (ChiSqr(12) = 24.167 [0.019]). This suggests that the two variant models, i.e., without (and with dummies) are not statistically different, so dummies may be impotent in the model (i.e., dummies do not correct for the model misspecification problems detected in the 'basic model'). This notwithstanding, the good news is that estimates of the VAR model are robust to deviations from normality assumption providing residuals are not autocorrelated.

5.2 Determination of the cointegration rank

Having determined the appropriate specification of the dgp, cointegration rank was determined using Johansen's (1988) trace statistic,[6] but applied on two variants of the model, without ('basic model'), and with dummies as a sensitivity analysis, and also test for the presence of unit roots in the multivariate framework given the cointegration space. However, the *trace*-test has been shown to have finite sample bias with the implication that it often indicates too many cointegrating relations, i.e., the test is over-sized (Juselius 2006: 140-2; Cheung and Lai 1993b; Reimers 1992). Hence, as shown in Table 2, we also report results for small sample Bartlett correction, which ensures a correct test size (Johansen 2002).

As results in the table show, the two variant model specifications yield both conflicting and inconclusive cointegration rank test results. Whilst for the 'basic model' the test suggests presence of two equilibrium (stationary) relations (even when corrected for small sample bias) among the variables as postulated at the conventional 10 per cent level of significance, this result disappears when the model is estimated with dummies. As the lower panel of results in Table 2 shows, only one cointegrating relation is suggested, albeit only in the finite sample. Although this is puzzling, it would appear dummies may not have a long-run effect in the model. A test of a null hypothesis of long-run exclusion of t_{88} shift dummy from the only indicative relation (in a model with dummies) cannot be rejected (L.R test: CHISQR(1) = 0.013 [0.911]).

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5 In the cointegrating space, a transitory innovation dummy produces two non-cumulated blips with opposite directions but no adjustment afterwards as they cancel each other.

6 In the test, 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 alternative (i.e., Max-Eigen statistic) (Juselius 2006: 131-4).

Table 2: Johansen's cointegration trace test results

I(1)-ANALYSIS (Model with no dummies or 'basic model')						
p-r	r	Eig.value	Trace	Trace*	Frac95	P-Value	P-Value*
6	0	0.715	138.202	123.993	117.451	0.001	0.017
5	1	0.641	93.040	85.423	88.554	0.022	0.084
4	2	0.529	56.203	52.723	63.659	0.187	0.304
3	3	0.342	29.094	27.843	42.770	0.562	0.635
2	4	0.234	14.031	13.677	25.731	0.660	0.688
1	5	0.116	4.438	4.399	12.448	0.681	0.686
I(1)-ANALYSIS (Model with dummies)							
p-r	r	Eig.value	Trace	Trace*	Frac95	P-Value	P-Value*
6	0	0.784	150.579	135.098	146.478	0.028	0.187
5	1	0.652	95.446	87.631	113.492	0.401	0.658
4	2	0.504	57.403	53.849	84.328	0.816	0.902
3	3	0.396	32.142	30.759	59.025	0.938	0.959
2	4	0.259	14.020	13.666	37.361	0.982	0.985
1	5	0.086	3.230	3.202	18.911	0.993	0.994

WARNING: Critical/P-values correspond to a model with no dummies.
WARNING: The Bartlett corrections correspond to the 'basic model'.

Notes: Trend assumption: Linear deterministic trend restricted; 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 Γ distribution (Doornik 1998); Obs: number of variables = 28 ('basic model') and 25 (model with dummies); and * is the small sample of Bartlett correction.

Source: Authors' computation.

Corroborating the evidence that the inclusion of dummies does not significantly improve system multivariate normality, that variables in the system cointegrate with a rank of 2 (as postulated) without having to incorporate dummies, and more formally, the fact that a test of long-run exclusion of t_{88} shift dummy from the only indicative relation (in a model with dummies) could not be rejected—all suggest that inclusion of dummies is not warranted for the sample analysed here. Moreover, a number of sensitivity checks (see Juselius 2006: 142), including graphs of the cointegration relations and the recursively calculated trace tests (given in the Appendix) suggest, as the trace test (in the 'basic model'), that the preferred rank is $r = 2$. So the rest of the analysis is based on a model with no dummies without losing the generality of the argument.

Following the confirmation of the cointegrating rank, the presence of unit roots within the multivariate framework can be tested using the CATS procedure, given the hypothesis of stationarity of variable y_i as

$$H_O : \beta = \left(\beta_1^0, \beta_2\right),$$

where $\beta_1^0 = \varepsilon_i$ and β_2 is a (*p x (r-1)*) dimensional matrix of unrestricted coefficients (Dennis 2006: 73). Here, the null hypothesis is that a series is stationary (Kahn and Ogaki 1992; Kwiatkowski et al. 1992), is conditional on the $r(\mathbf{\Pi})$ (where $r = 2$ in our case) and is a $\chi^2(p-r)$ test (Dennis 2006: 11-2). Test results for stationarity are presented in Table 3. Given the results, we see that stationarity of each variable by itself in the system is rejected at

the conventional 5 per cent level of significance, suggesting that the series are unit root non-stationary or I(1).

Table 3: Test for stationarity: LR-test, $\chi^2(4)$

DB	G	A	TR	X	PCp
14.637 (0.006)	18.269 (0.001)	15.126 (0.004)	17.950 (0.001)	15.779 (0.003)	16.768 (0.002)

Notes: Restricted trend included in the cointegrating relationship(s); 5% C.V = 9.488; P-values in parentheses.
Source: Authors' computations.

5.3 Long-run identification strategy and structural analysis

The two joint long-run stationary relationships detected above are unidentified and merely represent statistical rather than meaningful economic relationships. To uniquely identify these two relations, we assumed, in the spirit of the fiscal response theory (McGillivray and Morrissey 2000, 2004) that the first vector links only the fiscal variables, i.e., DB_t, G_t, A_t, and TR_t. In this relation, both X_t and PCp_t are restricted to zero as these are not fiscal variables. The second relation relates to the link between A_t, G_t, DB_t, X_t and PCp_t. Following the recognition that aid is primarily given to the government, and that the impact of aid on the economy is mediated by government fiscal behaviour allows us to investigate issues relating to the effect of aid and public sector on the growth of private consumption per capita, i.e., a growth-type relation (see Barro and Sala-i-Martin 1995). In this relation, TR_t is restricted to zero because it measures (in practice) more or less the same thing as government expenditure (Hansson and Henrekson 1994: 390); and in a framework where the government is assumed to be free to borrow (especially that we allow for domestic borrowing in the model), taxes may have zero long-run effect on growth (Milesi-Ferretti and Roubini 1995). M'Amanja, Lloyd and Morrissey (2005) argue that government effect on long-run growth is through expenditure, and taxes have no or a marginal impact (as tax was found to be insignificant).

More formally, identification is checked by imposing (over-) identifying restrictions (i.e., imposing at least $r(r-1)$ restrictions on each cointegrating vectors (Dennis 2006: 62). In our case, we required two normalizations and at least one restriction(s) per cointegrating vector, but imposed jointly for just-identifying the system in Equation (2). So we normalized jointly on DB_t in the fiscal vector (as this is a residual and is incorporated to identify the fiscal balance) and on PCp_t in the second vector (as our focus is on the growth of private consumption per capita). As shown in Table 4, long-run exclusion of X and PCp from Beta1 could not be rejected, as is TR, which seems to be unimportant in both cointegrating relations but important in the first. Equally important is the result that aid is a significant element of both the long-run fiscal and growth-type equilibria. This suggests that aid is likely to have—or strictly, policy conditions attached to aid may have—caused beneficial fiscal policy responses in Uganda (or that in fiscal terms, aid may have been used sensibly), and may, in the growth-type relation, capture the effect of aid on private consumption per capita.

Table 4: Test of exclusion: LR-test, $\chi^2(r)$

r	DB	G	A	TR	X	PCp	Trend
1	4.621 (0.032)	7.902 (0.005)	7.382 (0.007)	7.566 (0.006)	0.512 (0.474)	0.900 (0.343)	6.653 (0.010)
2	14.350 (0.001)	9.497 (0.009)	12.165 (0.002)	1.488 (0.475)	15.646 (0.000)	7.258 (0.027)	16.364 (0.000)

Note: Null hypothesis: variable *i* is excludable from the respective cointegrating relation(s); P-values in parentheses.
Source: Authors' computations.

Table 5: Test of weak exogeneity: LR-test

Relations	DB	G	A	TR	X	PCp
System: $\chi^2(2)$	10.062 (0.007)	0.416 (0.812)	8.860 (0.012)	7.164 (0.028)	7.322 (0.026)	1.859 (0.395)
Fiscal relation: $\chi^2(3)$	11.546 (0.009)	9.529 (0.023)	10.306 (0.016)	11.677 (0.009)	—	—
Growth-type relation: $\chi^2(2)$	6.313 (0.043)	4.452 (0.108)	5.588 (0.014)	—	6.348 (0.042)	5.045 (0.080)

Notes: Null hypothesis: a variable is weakly exogenous. A large test statistic (small prob.) indicates that the null hypothesis of weak exogeneity is rejected. 5% C.V = 5.991; P-values in parentheses.

Source: Authors' computations.

Furthermore, aided by the automated CATS mining procedure, *X* and *PCp* are restricted to zero in the first relation, but stationarity of Beta1 vector could not be rejected ($\chi^2(2)=4.309$ [0.116]) Similarly, while restricting *TR* to zero in the second relation, stationarity of Beta2 vector could also not be rejected ($\chi^2(1)=0.083[0.774]$). Moreover, the resulting globally loaded model is stationary and this rank condition was just-satisfied with a *p*-value of 0.189 for 3 degrees of freedom. In our last of the identification schemes, *X* and *PCp,* and *TR* are respectively excluded from Beta1 and Beta2, but jointly, i.e., a joint (over-) identifying restriction is imposed using the LR test. Consistent with all the other joint identification tests, the LR test could not be rejected (ChiSqr(1)=1.311(0.252)), albeit noting that the standard errors of $\widehat{\beta}_{ij}$ could not be generated as this depends crucially on whether each cointegrating vector has been properly normalized. These statistical evidences, taken together, reinforce our choice of the variables that we include in the respective cointegrating relations: *X* and *PCp* are not fiscal variables and therefore do not need to enter into the first (fiscal) relation but in the second (growth-type) relation. Similarly, it seems clear that *TR* does not have to enter into the long-run growth-type relation but is important for the fiscal relation.

Having identified the long-run structure, we focus next, as part of the structural analysis underlying causal links between aid and the rest of the macrovariables in Uganda, on the long-run weak exogeneity test (i.e., a zero row in $\boldsymbol{\alpha}$) using procedures proposed in Johansen (1996). As our focus is on aid, we establish whether aid in Uganda is weakly exogenous for the long-run system in (2), and is evaluated as $\alpha_{3,1}=\alpha_{3,2}=0$, whilst other $\boldsymbol{\alpha}$ coefficients are unrestricted (as is for any of the other variables in the system). However, as this test is applied on the entire cointegrating system, it is difficult to pin down the role played by aid, fiscal and the other variables in reinstating equilibrium in each of the identified vector-specific relations. Thus, a test of weak exogeneity for each of the variables in the fiscal and growth-type relations is as important. Hence, as shown in Table 5, we report weak exogeneity results in the system, fiscal and growth-type relations.

Based on the system results, the null hypothesis of weak exogeneity cannot be rejected only for total public spending and private consumption per capita. These do not seem to adjust to system disequilibrium, and are as such exogenous to the long-run relations. Weak exogeneity is firmly rejected for aid, domestic borrowing, tax revenue and exports, suggesting these adjust to maintain equilibrium, and are, as such, endogenous to the long-run relations. Relatedly, *G* and *PCp* are in the margins of significance of weak exogeneity in the growth-type relation.

5.4 Long-run growth effect of aid

Section 5.3 shows the links between aid and the macrovariables in Uganda but these are uninformative about the signs and magnitude of the individual effects of aid on individual macrovariables. In this section, we investigate the signs and significance of the direct and multiplier effect associated with aid on private consumption per capita. For example, a significant positive association of aid with private consumption per capita could imply that aid contributes to private income growth. Furthermore, allowing for the fact that aid itself is included in government spending, then, a positive significant correlation of public spending with private consumption per capita may capture, in part, the multiplier effect associated with aid. Long-run estimates[7] as set in Table 6 are obtained (t-ratios in parentheses):

Table 6: Vector error correction estimates (aggregate model)

The matrices based on 2 cointegrating vectors							
	DB(-1)	G(-1)	A(-1)	TR(-1)	X(-1)	PCp(-1)	@T(72)
Fiscal relation	-1.000	0.306 (2.973)	-0.624 (-5.359)	-0.659 (-5.155)	0.000	0.000	340.391 (3.482)
Growth relation	-9.825 (-7.182)	2.304 (4.866)	3.058 (6.000)	0.000	6.519 (7.263)	-1.000	1918.61 (4.355)

Notes: Normalization is on DB in the fiscal relation and on PCp in the growth-type relation. X and PCp are restricted to zero in the fiscal relation, and so is TR in the growth relation; In parentheses are t-ratios; Obs: number of variables = 29.

Source: Authors' computations.

From the results in the first row of the table, i.e. the fiscal relation, we see that *ceteris paribus,* estimates suggest a negative correlation of aid and tax revenue with domestic borrowing and a positive correlation with government spending in the long run. Estimates show that any increase in the revenue pool (tax revenue or aid) is associated with reduction in borrowing and an increase in public spending appears to balloon the budget deficit and hence a need for increased borrowing. Also, aid and tax revenue coefficients have the same sign, suggesting that borrowing in general is the main financing item of primary budget deficit net of aid. In fact, visual inspection of the trends in Figure 1 suggests that increases in aid are associated with lower domestic borrowing (i.e., aid implies a lower deficit to finance) and vice versa. Although an increase in spending as a ratio of the aid alone may not be demonstrated with precision,[8] results show that the impact on spending is more than proportional to aid,[9] i.e., aid illusion (McGillivray and Morrissey 2001b) and mirrors the 'flypaper' effect (World Bank 1998).[10] The trend term is significantly different from zero,

7 VECM is re-specified, conditioning on *G* in Beta2- the only weakly exogenous variable (Harris and Sollis 2005: 135-7).

8 Because governments have to match aid revenue or aid-financed government spending usually 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. For example, the construction of schools and health units has to be accompanied with increased spending on consumables such as textbooks, recruitment of teachers, enhancement of teacher's salaries, training of health workers, equipment, ambulances and medical supplies, etc.

9 Note that normalization is arbitrary and could be done on any other variable without changing the VEC results (Juselius 2006). For this particular result, we normalized on G.

10 The flypaper effect is a term used in the fiscal federalism literature to capture situations where 'a higher tier of government provides a grant to a lower tier of government, with the result that lower tier expenditure increases by more than the amount of the grant (Barnett 1993). In this way, the grant is used to expand the public budget' (Dollery and Worthington 1996).

suggesting *prima facie* that holding other factors constant, borrowing does increase every time. However, graphical inspection of the data in Figure 1 suggests there have been reductions in domestic borrowing since the mid-1980s. Given this, the trend term is actually picking up measurement errors in the donor measure of aid which is a significant over-estimate of the aid that actually goes to government. It includes some aid that is not even spent in Uganda (most technical cooperation and assistance is spent in the donor country), while some is spent under the control of the donors (donors retain control over project aid). We recognize the limitations of donor measure of aid used in the study up-front but note that these are the only available consistent data. Overall, the results show that in the long run, aid is associated with increased public spending, increased tax effort and reduced domestic borrowing. The speed of adjustment, occurring in the *G* equation, is about 28 per cent.

In the second row of the table are the long-run estimates of growth in private income per capita, and as results show, all variables have the expected signs. *Ceteris paribus,* public spending, aid and exports positively contribute to growth in private income per capita in Uganda, while the impact of domestic borrowing is negative. In the fiscal relation, aid is associated with incremental spending, and spending has a significant positive effect on the growth of private consumption per capita. This confirms the view that incremental expenditure on public goods and services due to incremental aid generates positive externalities for the private sector. From this angle, aid appears to have an indirect (positive and significant) multiplier effect on private consumption, and presumably through this on growth. Aid itself has a positive significant coefficient, suggesting that aid, in Uganda, has had a direct beneficial association with growth in private incomes per capita. The result for a rise in government bond issuance linked to public investment spending (as estimates of the disaggregated variant model will show) implies that domestic borrowing is associated with a 'crowding out' effect as it raises domestic interest rates, constraining wealth creation. In this regard, deficit financing stifles household consumption demand.

Consistent with both the direct and the multiplier growth in the private income per capita impact of aid, the trend term has a positive significant coefficient, suggesting that private income has been increasing with time. This mirrors the remarkable declines in income poverty or a rise in household living standards in Uganda over the past two decades. Income poverty has declined from 44 per cent in 1997/98 (Appleton et al. 1999) to 38.4 per cent in 2002/03 and further to 31.3 per cent in 2005/06 (UBOS 2006; Appleton 2001). Since this period coincides with large increases in aid inflows on a scale that Uganda had never previously received (Egesa 2011; Mugume 2008), it could be the case that a rising private income trend has a bearing on the aid inflows. The speed of adjustment, occurring in the *X* Equation, is about 8 per cent. Overall, it is quite remarkable from the results that all regressors have coefficients well above unit, implying that a change in either of these may increase or decrease private consumption by more than one-to-one.

5.5 A disaggregated variant model

Kweka and Morrissey (2000) argue that the nature of the impact of increased government spending due to incremental aid on growth depends very much on its form. Verschoor (2002) argues that some categories of public spending are recognized as being pro-public and tend to do so in a manner that is pro-poor especially as the level of spending increases. Specifically, social sector spending and expenditures on rural roads, microcredit, agricultural extension

etc., may be as beneficial to the poor as it could be to the public at large.[11] So we considered disaggregating *G* into current consumption (*GC*) and development (*GK*) spending. Thus, a refinement of the model in Table 6 is considered and estimated to reveal the overall importance of the form of spending in Uganda's growth record.[12] Results are set out in Table 7 [t-ratios in parentheses].

Table 7: Vector error correction estimates (disaggregated variant model)

The matrices based on 2 cointegrating vectors								
	DB(-1)	GC(-1)	GK(-1)	A(-1)	TR(-1)	X(-1)	PCp(-1)	@T(72)
Fiscal	-1.000	0.301 (1.212)	0.436 (2.027)	-0.900 (-4.538)	-0.783 (-3.038)	0.000	0.000	490.99 (3.024)
Growth	-1.941 (-7.610)	0.441 (3.761)	0.119 (0.461)	0.277 (3.439)	0.000	0.830 (5.145)	-1.000	254.37 (3.543)

Notes: Normalization is on DB in the fiscal relation and on PCp in the growth-type relation. X and PCp are restricted to zero in the fiscal relation, and so is TR in the growth relation; In parentheses are t-ratios; Obs: number of variables = 28.

Source: Authors' computations.

Save for the *GC* and *GK* coefficients in the fiscal relation shown in the first row in the table, the rest of the coefficients are consistent with those in the aggregate model. In addition, current spending coefficient is insignificant, so comment is restricted to capital spending coefficient. Results suggest that in the long run, domestic borrowing is more closely linked to capital spending. We however caution that care should be exercised when interpreting this result. There may be a measurement problem where the aggregation of productive (investment) expenditure includes substantial non-productive (consumption) expenditure (Kweka and Morrissey 2000). Adjustment occurs in the *GC* Equation, but insignificantly.

The decomposition results in the second row in the table (growth relation) suggest, *ceteris paribus*, that current spending, aid and exports positively contribute to growth in private income per capita in Uganda, while the impact of domestic borrowing is negative. The fact that aid is associated with increased spending, the significance of current spending suggests that some aid finances government consumption spending via probably public sector wages and services, which contribute to aggregate demand. Egesa (2011) observes that donor funding has been characterized by an adjustment from heavy capital expenditures in the early 1990s to social programme spending enshrined in the PEAP (and specifically the PAF). In fact, available statistics from UBOS and MoFPED show that government consumption spending has averaged about 14.5 per cent of GDP over the 2001/02–2007/08 period, while investment spending over the same period has been about 5.2 per cent of GDP on average. Therefore, the results above are not entirely surprising as they could be driven by the spending patterns.

Results in the fiscal relation (see row 1 in the table) show that domestic borrowing is linked to investment spending. However, investment spending itself is insignificant in the growth-type relation. This could be because investment (even when it was actually undertaken) was

11 While one may discredit this argument on the grounds that there could be limited efficiency of service delivery especially to the poor, Devarajan and Reinikka (2004) and Reinikka and Svensson (2004) argue that new techniques for monitoring expenditure and delivering services offer potential for improvement.

12 VECM is re-specified, conditioning on *GK* and *PCp* jointly in both Beta1 and Beta2 because these have been found to be weakly exogenous in the system.

in unproductive state-owned enterprises (Collier and Reinikka 2001). Lloyd, Morrissey and Osei (2001) find a similar result for Ghana: investment spending is not significant in their solved long-run relationship, and (in addition to investment itself being unproductive), they argue that in the pre-ESAP period, much of the money designated as government investment ended up in private accounts. This noted, it may be the case that a similar situation potentially reduced long-run capital accumulation in Uganda. The speed of adjustment occurring in the *DB* equation is about 62 per cent.

6 Conclusions and implications

This study adopted CVAR and investigated the impact of aid on growth of private consumption in Uganda, but in an economy-wide context over the period 1972 to 2008. Attention is paid to the differential impact of aid and the overall importance of the form of spending in Uganda's growth record, and is reflected in the analysis features of the data over 1972-79, a period characterized by political and economic instability and the possibility that policy reforms due to structural adjustment programmes and the Museveni regime created a more favourable environment for growth in private incomes. A summary of the key results is given in the following.

Aid and the Ugandan macrovariables are significantly cointegrated, and a battery of sensitivity and robust checks demonstrate that the cointegration rank is 2. We use this rank condition to test for causal links of interest between aid and macrovariables in Uganda. We find that aid is a significant part of the long-run equilibria, and this is separately robust to the fiscal and growth-type relations. The hypothesis of aid exogeneity is optimally tested within a system of equations, and separately in the fiscal and growth-type relations, but this is not statistically supported.

There is broad support for the observation that aid to Uganda has been associated with long-term higher public spending, increased tax effort and reduced domestic borrowing. As improved public finance management and reduced domestic borrowing are common policy conditions attached to aid, this suggests that aid was either associated with or caused beneficial policy responses in Uganda. Importantly, there is strong evidence that aid has had both direct and indirect beneficial association with growth in private per capita income in Uganda. Even more, although theory would suggest that public investment is growth-promoting while current spending is unproductive, our evidence for the sample analysed here shows otherwise. It is current spending—not investment spending—that is beneficial to growth in Uganda because it contributes to private incomes and consumption. This has implications especially if we consider the emphasis put on investment spending (i.e., the overt recommendation to increase public investment's share of the national budget, and so is the preference of donors to earmark aid to investment spending in developing countries). Our evidence suggests that the argument that tagging aid to investment spending contributes to achieving target growth rates may be exaggerated. It is efficiency (value for money) not the steady-state investment that determines the growth impact of aid-financed public investment. Also, the widely held view that aid allocated to consumption spending is growth reducing or reduces effectiveness of aid (World Bank 1998) is misleading. The role of structural changes remains unclear as the policy shift dummy seems unimportant for the long-run fiscal and growth relations, but may matter for the short run.

In terms of policy, the need for: (i) appropriate fiscal response to aid receipts; and (ii) effective monitoring and enforcement of contract standards/specifications of aid funded projects is highly desired. In part, this would save on public resources routinely spent on the

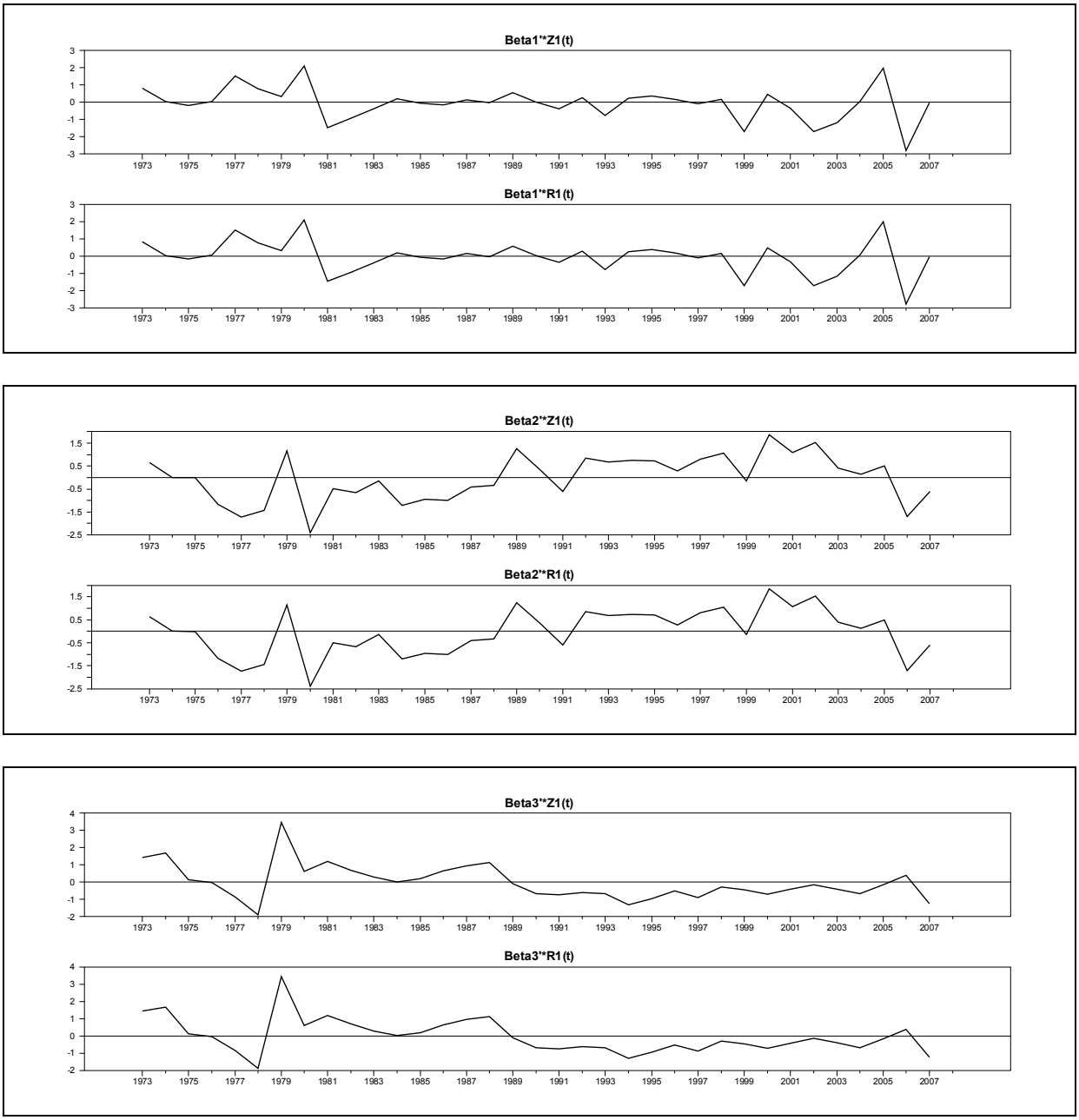
repair of socioeconomic infrastructure due to shoddy work or payment for no work done or contracts not delivered on time. Also, donors need to accept the politically unpalatable fact that aid has an important role in supporting consumption spending, and this happens to be more beneficial to growth in Uganda than is commonly acknowledged.

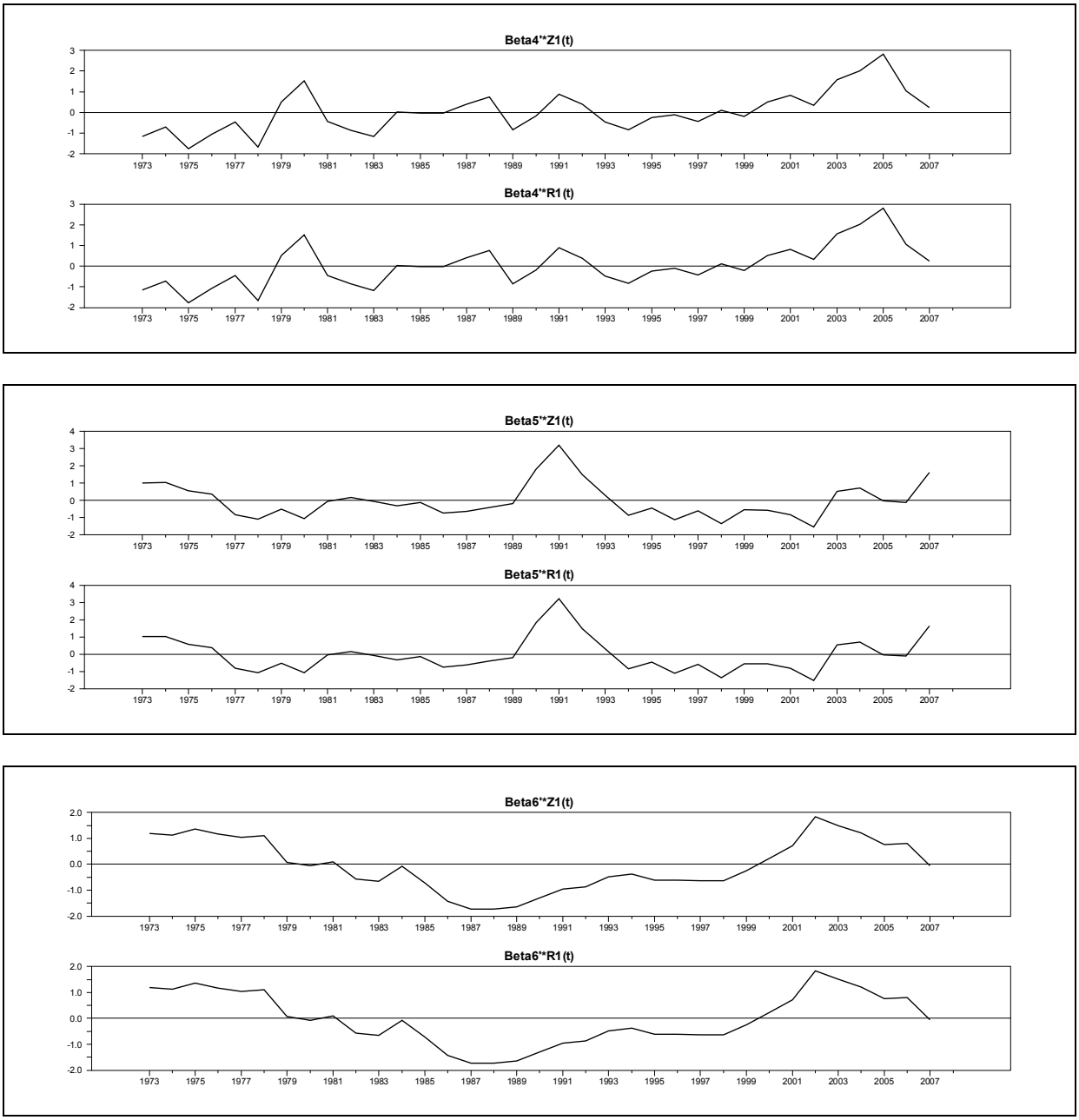
Appendix 1: Sensitivity analysis of the rank condition

Residuals of cointegrating relation

In Figure A1 are plots of all the six potential cointegrating relations from the model (we assume full rank of the $\mathbf{\Pi}$ matrix). Each of the cointegration relation comprises a pair of residuals, $\hat{\beta}'Z_{1t}$ and $\hat{\beta}'R_{1t}$. The former is the equilibrium error as a function of short-run dynamics and deterministic components, while the latter concentrates out the lagged short-run dynamics (i.e., the concentrated model). Given the DGP (i.e. lag-length $k=1$) in the model, $\hat{\beta}'Z_{1t}$ and $\hat{\beta}'R_{1t}$ are similar as this nullifies the short-run adjustment effects embodied in $\hat{\beta}'Z_{1t}$ which $\hat{\beta}'R_{1t}$ corrects for.

Figure A1: Residuals of cointegrating relation





Note: Plots of all the six potential cointegrating relations from the model (we assume full rank of the $\mathbf{\Pi}$ matrix) comprise two sets of residuals, $\hat{\beta}'Z_{1t}$ and $\hat{\beta}'R_{1t}$. The former is the equilibrium error as a function of short-run dynamics and deterministic components, while the latter concentrates the lagged short-run dynamics (i.e., the concentrated model. The Z-form (full model) and the R-form (concentrated) versions of the model are similar because the DGP (i.e., lag-length $k=1$) nullifies the short-run adjustment effects embodied in $\hat{\beta}'Z_{1t}$ which $\hat{\beta}'R_{1t}$ corrects for.

Source: Authors' computations.

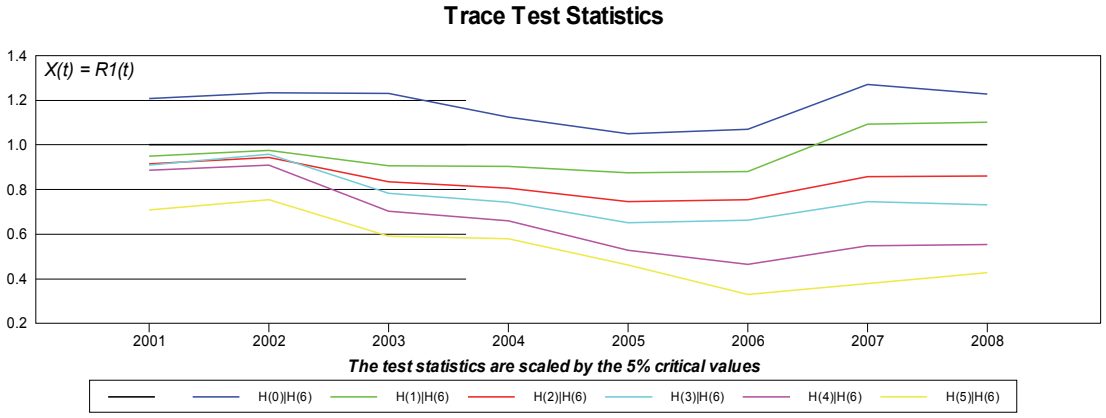
Based on the figure, the first two, i.e. the first and second cointegrating relations appears to be stationary, and may suggest presence of two cointegrating vectors.

Recursive graphs of the trace-test statistics

In Figure A2 are the recursive graphs of the recursively calculated trace-statistics, scaled by the critical value of the trace test distribution derived for a model without exogenous

variables, shifts or dummies: 'basic model' (Dennis 2006:100). A baseline model was estimated for a subsample period, $t_1 = 2001$, and then was recursively extended until the full sample is covered, noting that the **X**-form (full model) and the **R**-form (concentrated) versions of the model are similar. The main point in this figure is to observe the time path of the trace statistics. The visual impression from the figure is that the two test statistics are above unity, suggesting $r = 2$, albeit showing the effect of policy regime shift on the eigenvalues.

Figure A2: Recursive graphs of the trace-test statistics



Source: Authors' computations.

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