

# LOCAL GOVERNMENT REVENUES AND EXPENDITURES IN UGANDA: A VAR APPROACH

Edward B. Sennoga<sup>†</sup>

## Abstract

This paper empirically tests the temporal relationship between local government revenues and expenditures in Uganda, a low income developing country. A Granger-causality test is conducted and estimation is via a vector autoregressive model using data from fifty six (56) districts for the period 2001 to 2003. The standard diagnostic tests are conducted and affirm that our specifications provide adequate representation of the data. Our findings reveal that the management of local government finances in Uganda conforms to the tax-spend hypothesis where local governments raise tax revenue and/or request for or receive grants before engaging in new expenditures. Further, our study shows that increases in revenues lead to less than proportionate increases in local government expenditures which lends credence to the flypaper effect.

Keywords: Public Finances, Causality, Vector Auto Regression

JEL Classification: H6, H7, C3

<sup>†</sup> Faculty of Economics and Management, P.O. Box 7062, Kampala, Uganda, email:  
[esenoga@fema.mak.ac.ug](mailto:esenoga@fema.mak.ac.ug)

## **I. Introduction**

Fiscal policy is widely considered an instrument that can be used to alleviate short-term fluctuations of output and employment and bring the economy closer to full employment (Zagler and Durnecker (2003)). This adjustment could proceed via changes in revenues, expenditures or both. On the revenue side, non-lump sum taxes can distort the behavior of economic agents as regards the accumulation and supply of factors of production. However, distortionary taxation can internalize the effect of the externality on private decision rules, consequently inducing the efficient allocation of resources (Turnovsky (1996)). On the expenditure side, endogenous growth models considered some public expenditure categories to critical drivers of economic growth. Examples here include expenditures on public infrastructure, research and development, education and health (Barro (1990); Romer (1990); and Bloom et al. (2001)).

When public expenditures exceed public revenues, the resulting deficit can be interpreted as a means of financing additional government expenditures. If such expenditures are considered growth enhancing, then a government deficit exhibits an indirect effect on long-term economic growth (Carneiro et al. (2005)). However, in a Ricardian world where agents view deficits only as taxes delayed, tax and deficit finance of government finance should be identical especially if the tax structure remains unchanged in the future (Ludvigson (1996)). In a non-Ricardian economy, say, due to credit constraints or overlapping generations, public debts can alter private incentives to accumulate factors of production and thus directly influence the rate of growth of the economy. It is important to note that a debt financed deficit could induce the government to absorb additional resources from the private sector, which could have been utilized instead for the accumulation of private capital (Araujo and Martins (1999)). However, the overall growth effect would be negative if the revenue raised in such a fashion is spent in a less productive way than it would have been by the private sector.

This paper focuses on the intertemporal relationship between revenues and expenditures. Four different hypotheses can be considered to examine such a problem. The “tax-spend” hypothesis postulates that governments raise tax revenues before undertaking new expenditures (Friedman (1978)); Buchanan and Wagner (1978)). The “spend-tax” hypothesis on the other hand suggests that governments engage in expenditures first and then increase tax revenues to finance these expenditures. (Carneiro et al. (2005); Peacock and Wiseman (1979); and Barro (1974)). The “fiscal synchronization” hypothesis predicts that governments take decisions about revenues and expenditures simultaneously (Musgrave (1966); Meltzer and Richard (1981)). Finally, fiscal independence regarding the decisions to spend and raise revenues is also a possible hypothesis (Baghestani and McNown (1994)).

The nexus between government revenues and expenditures is an issue that has been investigated for several countries though a consensus is yet to be reached. Dhanasekaran (2001) and Carneiro et al. (2005) examined the cases of India and Guinea Bissau, respectively. They report evidence in support of the spend-tax hypothesis. Ewing and

Payne (1998) have examined the case of five Latin American countries finding mixed results for this set of countries. Park (1998) found evidence in support of the tax-spend hypothesis for the case of Korea. The intertemporal relationship between revenues and expenditures is evidently an issue that is yet to be settled empirically.

In the sections that follow, we test these hypotheses using annual central government revenues and expenditure data for the period 1982-2006 as well as data from fifty six (56) districts in Uganda for the period 2001-2003. Thus, our study examines the revenue-expenditure relationship both at the national and sub national government levels. To the best of our knowledge, this study is the only one that examines the revenue-expenditure nexus using both national and sub national government data.

Uganda was one of the initial beneficiaries of the heavily indebted poor country (HIPC) initiative and has also been hailed by the IMF and World Bank for her remarkable growth following the civil strife that had engulfed the country in the early 1980's. Consequently, this study aims to examine whether fiscal discipline and sound public finance management could have been important factors engendering in efficient resource allocation and economic growth. The remainder of this paper is organized as follows. Section II presents the methodology, the third and fourth Sections report the empirical results, conclusions, and policy implications, respectively.

## **II. Empirical Methodology**

This study employs the vector autoregressive (VAR) and the Granger causality analysis developed by Sims (1980) and Granger (1980). We apply the VAR together with the Granger-Causality method to test for Granger causality between government expenditures and government revenues in Uganda. Our estimated VAR model consists of two endogenous variables: government expenditures and government revenues. The VAR model is preferred over the simultaneous equations approach because the latter is largely viewed to be too restrictive and the selection of endogenous and exogenous variables is arbitrary and can be subject to researcher's preferences. However, for the VAR technique, all variables in the model are endogenous and each variable can be expressed as a linear function of its own lagged values and the lagged values of all other variables in the system (Cheng and Lai (1997)). An additional advantage of the VAR is that it has been used to test for causality between two or more variables.

The investigative approach adopted by this study consists of four major steps. First the augmented Dickey Fuller, Phillips Perron (1988), and the KPSS (see Kwiatowski et al. (1992)) tests for stationarity are performed, second; the optimal lag length is determined using the Schwarz BIC model selection criterion (Stock (1994)); third, the Granger-Causality tests (see Granger (1980)) are implemented to estimate the pair wise causality for each equation; and fourth, we estimate the VAR model to test the causal relationship between government expenditures and revenues.

### III. Data and Empirical Results

Annual data for 56 local governments (districts) is used to examine the interrelationships between government revenues and expenditures. These local government data are for the period 2001-2003 and are obtained from Local Government Returns published by the Ministry of Finance, Planning and Economic Development. Prior to 2006, the major source of revenue for local governments in Uganda was the graduated tax—a presumptive tax—levied on each adult Uganda<sup>1</sup>. Other revenue sources for local governments in Uganda included property taxes, user fees and charges such as tourism taxes (for instance on recreational facilities such as beaches), taxes on the transportation of produce, urban authority permits, license fees and market dues.

Due to unavailability of consistent and comparable local government data on expenditures, we use transfers from the central government to proxy for local government expenditures. Such transfers include equalization transfers, funds for rural feeder roads, primary health care, agricultural extension (National Agricultural Advisory Services), UPE, and transfers to pay salaries. Though it is true that districts could use own generated funds to finance expenditures other than those covered under the local government transfers, we do not expect substantial deviations of the “actual” expenditures from local government transfers especially since the majority of local governments in Uganda rely on central government transfers to finance their programmes.

An obvious advantage of using local government data is that they depict revenue and expenditure variations over time as well as across (districts) local governments. It is anticipated that the additional variation will improve the quality of the estimated revenue-expenditure relationship.

#### 1. Tests for Stationarity

Literature shows that using non-stationary data in causality tests could yield spurious causality results. As emphasized by Park (1998), we first perform unit root tests on our variables before proceeding with the Granger-causality test so as to avoid the spurious regression problem and to account for the appropriate dynamic specification. Stationarity of the variables was tested using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. However, these tests have been criticized for their limited ability to distinguish between series that are purely non-stationary processes and those with near unit roots. Thus, we also run the KPSS (1992) test which has the null of stationarity. As mentioned above, the optimal lag length of the tests is determined using the Schwarz BIC model selection criterion as recommended by Stock (1994).

Table 1 shows that the ADF and PP tests allow for the rejection of the null hypothesis of non-stationarity for the levels of the variables while in the KPSS test we do not reject the null hypothesis of stationarity for the levels of the variables. Consequently, we conclude

---

<sup>1</sup> Exceptions here included the housewives, those serving in the armed forces and those under incarceration.

that our variables are stationary or integrated of order zero and we can then proceed with the simplest version of the Granger-causality test using the levels of the variables.

**Table 1.** Unit Root Tests for Levels of the Variables 2001-2003

Variables	ADF	Phillips-Perron	KPSS	Lag Length
Log levels:				1
ln G	-6.268	-6.341	0.107	1
ln T	-6.323	-6.354	0.0612	1

Notes: The lag length was determined by selecting the lowest Bayesian Information Criterion for each of the variables. The critical values for the different tests are: ADF and Phillips Perron 1% (-3.488); 5% (-2.886) and KPSS 1% (0.216); 5% (0.146).

## 2. The Granger-Causality Test

A test of causality is whether the lags of one variable enter into the equation for another variable (Enders, 1995). Consider two series  $\{k_t\}$  and  $\{l_t\}$ . If better predictions of  $\{k_t\}$  can be obtained by adding to lagged values of  $\{k_t\}$  the current and lagged values of another variable  $\{l_t\}$ , then  $\{l_t\}$  is said to Granger cause  $\{k_t\}$ . Stated differently,  $\{l_t\}$  is said to precede temporally  $\{k_t\}$  in that changes in  $\{k_t\}$  follow the changes in  $\{l_t\}$ . Thus, if  $\{l_t\}$  does not improve the forecasting performance of  $\{k_t\}$ , then  $\{l_t\}$  does not Granger cause  $\{k_t\}$ .

Table 3 presents results from the Granger-causality tests which were obtained with one lag for each variable. Annual data for the period 2001-2003 reveals that causality is unidirectional for Uganda's local governments: revenues (T) affect expenditures but the reverse is not true.

**Table 2.** Granger Causality Tests for Expenditures and Revenues: 2001-2003

Hypothesis	Test Statistic	Conclusion
Expenditures Granger-Cause Revenues	t-prob = 0.092	Reject
Revenues Granger-Cause Expenditures	t-prob = 0.719	Do not reject

## 3. The Vector Autoregression Model

The VAR approach is adopted because the purpose of this study is to determine the interrelationship among government expenditures (G) and revenues (T). Stated differently, we treat each variable (expenditures and revenues) symmetrically because we are not certain which one is exogenous. As mentioned above, there is some evidence in support of both the "tax-spend" and "spend-tax" hypotheses.<sup>2</sup> We let the time path of

<sup>2</sup> For instance see Buchanan and Wagner (1977), Friedman (1978), and Park (1998).

$\{G_t\}$  be affected by the current and past realizations of the  $\{T_t\}$  sequence and the let the time path of the  $\{T_t\}$  sequence be affected by current and past realizations of the  $\{G_t\}$  sequence. Our simple bivariate system can be represented as a first order VAR<sup>3</sup> as follows:

$$[1] \quad G_t = b_{10} + b_{12}T_t + \gamma_{11}G_{t-1} + \gamma_{12}T_{t-1} + \varepsilon_{Gt}$$

$$[2] \quad T_t = b_{20} + b_{21}G_t + \gamma_{21}G_{t-1} + \gamma_{22}T_{t-1} + \varepsilon_{Tt}$$

Where (as verified above), both  $G_t$  and  $T_t$  are stationary and the  $\{\varepsilon_{Gt}\}$  and  $\{\varepsilon_{Tt}\}$  are uncorrelated white noise disturbances. Here,  $b_{12}$  is the contemporaneous effect of a unit change of  $T_t$  on  $G_t$  and  $\gamma_{21}$  the effect of a unit change in  $G_{t-1}$  on  $T_t$ . In other words, the structure of this system incorporates feedback since  $G_t$  and  $T_t$  are allowed to affect each other. After some manipulation, the above structural VAR (equations [1] and [2]) can be reduced to following standard form:

$$[3] \quad G_t = a_{10} + a_{11}G_{t-1} + a_{12}T_{t-1} + e_{1t}$$

$$[4] \quad T_t = a_{20} + a_{21}G_{t-1} + a_{22}T_{t-1} + e_{2t}$$

Since equations [3] and [4] each have identical right-hand-side variables, estimation via ordinary least squares technique will yield efficient estimates. Table 3 shows results from the VAR estimation and were obtained with one lag for each variable. The results in Table 3 confirm the uni-directional causation between expenditures and revenues with causation running from government revenues to government expenditures. In other words, local government revenues and expenditures are related by a feedback causal mechanism, and this is consistent with the tax-spend hypothesis indicating that the local governments in Uganda raise revenues first and then identify spending priorities.

**Table 3.** VAR estimation results: 2001-2003

	Equation	
	ln revenues	ln expenditures
ln revenues	0.636 (6.77)***	0.067 (1.68)*
ln expenditures	-0.077 (0.36)	0.505 (5.54)***
Constant	9.292	9.727
Adj. $R^2$	0.37	0.40
Durbin-Watson	1.83	1.94

<sup>3</sup> The optimal lag length was determined using the Schwarz BIC model selection criterion.

Prob (F-stat.)	0.0	0.0
Number of observations	167	167

Notes: Absolute value of z statistics in parentheses;

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Further, the results reveal a low “tax-spend” elasticity. In particular, a 10 percent increase in revenues results in a 1 percent increment in expenditures. Though not the focus of this study the inelastic response of expenditures to changes in revenues is has important public finance implications. Public finance economists have come to refer to this phenomenon by different names ranging from the “fly paper” effect to mere abuse of office and/ or corruption. The former school of thought is premised on the argument that “money tends to stick” where is lands since only a fraction of a given dollar of public funds utilized in the provision of public goods and services. Proponents of the latter school of thought argue that the corruption and graft that has often plagued the public sector is one single most important reason for the absence of a one to one relationship between revenues raised and public expenditures.

#### **4. Testing for Autocorrelation in the Residuals**

We conduct a serial autocorrelation test in the residuals via the lagrange-mulitplier test which has a null hypothesis of no autocorrelation. The lagrange-multiplier test does not reject the null hypothesis of no autocorrelation in the residuals at the optimal lag order (one) which is consistent with a well specified model. The Chi-square statistic and p-values obtained at lag one (1) are 5.27 and 0.26, respectively, which does not allow for the rejection the null hypothesis of no autocorrelation.

Following Engle and Granger (1987), we regress the first difference of the residuals on the previous period disturbances. The test for unit root in the disturbances comprises testing whether the coefficient on the lagged disturbances is not statistically different from zero. Failure to reject the null hypothesis that this coefficient is not statistically different from zero indicates that the sequence of disturbance terms contains a unit root. Applying this procedure to our data leads to the rejection of the null hypothesis indicating that the residuals are stationary which rules out the null hypothesis of spurious regression.<sup>4</sup>

#### **5. Discussion of the Empirical Results**

The Granger-causality test and the VAR reveal unilateral causation between government revenues and expenditures with causation running from revenues to expenditures for Uganda’s local governments. In light of these findings, we can conclude that local governments in Uganda follow the “tax-spend” hypothesis. The “tax-spend” hypothesis means that local governments in Uganda seem to raise tax revenue and/or request for or receive grants before engaging in new expenditures. The “tax-spend” hypothesis is in line with the concept of budget framework papers which requires local governments to

---

<sup>4</sup> We reject the null hypothesis of unit root in the disturbances at the 1 percent level of significance.

identify their spending priorities first, say, through Local Government budget framework papers and budget conferences and then submit these requests to the Central Government for funding or raise the requisite funding necessary to finance these expenditure priorities.

The “tax-spend” hypothesis implicitly pre-supposes that local governments in Uganda do not run budget deficits since their expenditures are aligned to available funding. This is especially true in Uganda since local governments have limited access to both public (say, via the issuance of local government bonds) and private borrowing. Consequently, local governments have to prioritize the use of any available financial resources which improves fiscal discipline and controls the size of the local governments’ public deficits. However, in the absence of substantial transfers from the government, the limited ability to raise revenue coupled with inadequate own revenue sources suggests that several essential local government service delivery initiatives will more than likely be suspended.

Our findings are consistent with Park (1998) who found evidence in support of the tax-spend hypothesis for the case of Korea. Our findings also reaffirm earlier studies by Buchanan and Wagner (1977) and Friedman (1978) who argue that governments first raise tax revenues before engaging in new expenditures.

## **6. Conclusions and policy recommendations**

In this paper we assess the intertemporal relationship between government expenditures and revenues for Uganda’s local governments. Quantifying this relationship is important in as far as understanding the role of government in allocation of resources is concerned. The fundamental premise of this paper is that the “sourcing” of local government revenues precedes the spending of these revenues by local government expenditures in Uganda, which is also known as the tax-spend hypothesis.

This objective is achieved in several steps. First, using data for the period 2001-2003 from fifty six (56) local governments in Uganda, we are unable to reject the tax-spend hypothesis. Second, our econometric tests further reveal that while there is a stable long-run relationship between local government revenues and expenditures, there exists unilateral casualty running from government revenues to expenditures. Stated differently, local governments in Uganda face limited risk of budget deficit explosions over the long-term and this could be due to the fact that these sub-national governments raise funds first and subsequently finance expenditures.

Our results point to the importance of aligning both local and central government expenditures with revenue mobilization capacity. Such alignment will also to improve efficiency in the allocation of resources particularly to the growth-enhancing categories including infrastructure, health and education. The resulting control over expenditures rather than an increase in tax revenues will enhance Uganda’s fiscal discipline consequently fostering an effective medium term budgeting framework.

## References

- Araujo, J. T., and M.A.C. Martins (1999), "Economic Growth with Finite Lifetimes," *Economic Letters*, 62, 377-381.
- Baghestani, H., and R. McNown (1994), "Do Revenues or Expenditures Respond to Budgetary Disequilibria?" *Southern Economic Journal*, 311-322.
- Barnhart, S. W., and A. F. Darrat (1989), "Federal Deficits and Money Growth in the United States," *Journal of Banking and Finance*, 13, 311-322
- Barro, R. J. (1974), "Are Government Bonds Net Wealth?" *Journal of Political Economy*, 82, 1095-1118.
- \_\_\_\_\_ (1990), "Government Spending in a Simple Model of Endogenous Growth," *Journal of Political Economy*, 98.
- Bloom, D. E., D. Canning, and J. Sevilla (2001), "The Effect of Health on Economic Growth: Theory and Evidence," *National Bureau of Economic Research*, Working Paper No. 8587.
- Buchanan, J., and R. Wagner (1977), *Democracy in Deficit*, New York: Academic Press.
- Carneiro, F. G., J.R. Faria, and B.S. Barry (2005), "Government Revenues and Expenditures in Guinea-Bissau: Causality and Cointegration," *Journal of Economic Development*, 30(1), 107-117.
- Cheng, B. S., and T. W. Lai (1997), "Government Expenditures and Economic Growth in South Korea: A VAR Approach," *Journal of Economic Development*, 22(1), 11-24.
- Dhanasekaran, K. (2001), "Government Tax Revenue, Expenditure and Causality: The Experience of India," *India Economic Review*, 2, 359-379.
- Enders, W, (1995), *Applied Econometric Time Series*, John Wiley & Son, Inc.
- Engle, R. F., and C. W. J. Granger (1987), "Cointegration and Error-Correction: Representation, Estimation and Testing," *Econometrics*, 55, 251-276.
- Ewing, B., and J. Payne (1998), "Government Tax Revenue-Expenditure Nexus: Evidence from Latin America," *Journal of Economic Development*, 23, 57-69.
- Friedman, M. (1978), "The Limitations of Tax Limitation," *Policy Review*, 7-14.

- Granger, C. W. (1980), "Testing for Causality," *Journal of Economic Dynamics and Control*, 4, 229-252.
- Kwiatkowski, D., P.C.B. Phillips P. Schmidt, and Y. Shin (1992), Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?" *Journal of Econometrics*, 54: 159-178.
- Ludvigson, S. (1996), "The Macroeconomic Effects of Government Debt in a Stochastic Growth Model," *Journal of Monetary Economics*, 38, 25-45.
- Lutkepohl, H. (1982), "Non-Causality Due to Omitted Variables," *Journal of Econometrics*, 19, 367-378.
- Musgrave, R. (1996), "Principles of Budget Determination," in H. Cameron and W. Henderson, *Public Finance: Selected Readings*, New York: Random House.
- Meltzer, A., and S. Richard (1981), "A Rational Theory of the Size of the Government," *Journal of Political Economy*, 89, 914-927.
- Park, W. (1998), "Granger Causality between Government Revenues and Expenditures in Korea," *Journal of Economic Development*, 23, 145-155.
- Peacock, A., and J. Wiseman (1979), "Approaches to the Analysis of Government Expenditures Growth," *Public Finance Quarterly*, 3-23.
- Romer, P.M. (1990), "Endogenous Technological Change," *Journal of Political Economy*, 98, 71-102
- Sims, C. A. (1980), "Macroeconomics and Reality," *Econometrica*, 48, 1-48.
- Stock, J. (1994), "Unit roots, structural breaks and trends," in Engle, R. and McFedden, D. (eds.) *Handbook of Econometrics*, Volume 4: 2739-2841, Elsevier, Amsterdam.
- Turnovsky, S.J. (1996), "The Effect of Taxation on Human Capital," *Journal of Public Economics*, 60, 21-44
- Zagler, M., and Durnecker (2003), "Fiscal Policy and Economic Growth," *Journal of Economic Surveys*, 17, 397-422.