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**PUBLIC SPENDING COMPOSITION AND PUBLIC SECTOR
EFFICIENCY: IMPLICATIONS FOR GROWTH AND POVERTY
REDUCTION IN UGANDA**

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ABSTRACT

This paper examines the interrelationships between public spending composition and Uganda's development goals including economic growth and poverty reduction. We utilize a dynamic CGE model to study these interrelationships. This paper demonstrates that public spending composition does indeed influence economic growth and poverty reduction. In particular, this study shows that improved public sector efficiency coupled with re-allocation of public expenditure away from the unproductive sectors such as public administration and security to the productive sectors including agriculture, energy, water, and health leads to higher GDP growth rates and accelerates poverty reduction. Moreover, the rate of poverty reduction is faster in rural households relative to the urban households. A major contribution of this paper is that investments in agriculture particularly with a view to promoting value addition and investing in complementary infrastructure including roads and affordable energy contributes to higher economic growth rates and also accelerates the rate of poverty reduction.

Keywords: Sub-Saharan Africa, Uganda, Public Expenditure, Efficiency, Economic Growth, Poverty Reduction, Computable General Equilibrium

JEL classification: C68, D58, E62, F15, H62, I32

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1.0 INTRODUCTION

Governments in developing countries are more often than not faced with expenditure needs that outstrip the resource envelopes, and usually have limited options to raise additional resources domestically. For instance, most developing countries have a large informal sector which in addition to inefficiencies in tax administration imply lower than average tax-to-GDP ratios. Further, given the narrow tax base, raising additional tax revenues would often lead to significant distortions and create disincentives for the private sector to save and invest. To the extent that the debt carrying capacity of most developing countries is low, external financing—even when contracted at concessional terms—should always be a last resort. An alternative here would comprise creating fiscal space by re-allocating spending from the less efficient to the more efficient uses. In addition, the effective use of public resources for instance to improve human and physical capital will lead to increased productivity and income and consequently expand the scope for private and public consumption opportunities in the future (World Bank, 2007a). This in turn engenders more GDP growth and enhances the revenue raising capacity.

Uganda is currently in the process of developing a five year National Development Plan (NDP) and already there are indications that additional resources would be required to attain the 6.7 per cent annual growth necessary to achieve the NDP goals and targets over the NDP period. The NDP suggests that the required additional expenditures would be met by running budget deficits and increasing reliance on external financing. However, given the macroeconomic effects of deficit financing on consumption and private sector development¹, authorities need to explore the possibility of creating fiscal space in Uganda through the shifting of expenditures from unproductive to the growth generating sectors of the economy. Further, given the inter-temporal effects associated with the efficient use of public resources, for instance through an improved human and capital stock, the

¹ Tax financing of deficits comes at the expense of current consumption and savings while debt finance crowds out private investment which limits capital accumulation.

resulting growth and poverty reduction outcomes should be superior than in cases where public resources are allocated inefficiently.

This paper therefore seeks to examine whether the composition of public spending in Uganda influences the achievement of growth and poverty reduction objectives. We identify at least two reasons for pursuing this line of inquiry for Uganda.

First, in a bid to ensure that the economy stays afloat during the current global economic slowdown, Uganda is faced with difficult fiscal reform choices, particularly regarding the composition of government expenditure. Such choices include possible changes in public expenditures on health, education and public infrastructure. In the last few years, the government has allocated considerable resources to education and health (about 25 percent of the total budget) and more recently to infrastructure development. The allocations to education and health while commendable have not transcended into quality services. While Uganda might meet its millennium development goal for primary education enrollment owing to the Universal Primary Education Programme implemented, the quality of education provided is still questionable. In addition, the millennium development goals for health will most likely not be met before 2015, unless considerable resources and service delivery mechanisms are improved for the health sector.

While the emphasis on infrastructure in Uganda is a welcome development, a more prudent approach to achieving efficient expenditure allocations would require systematic analyses of the implications of such allocations on long-term productivity, growth and poverty reduction outcomes (Agenor and Blanca, 2006).

Second, while there is considerable evidence that investment in human capital is as important as physical capital accumulation, most dynamic studies have paid little or no attention to the dynamic efficiency effects of public spending on human capital accumulation (See Matovu (2000); Hjerpe, Hamalainen, Kiander, and Viren (2007)). This study uses a dynamic computable general equilibrium model to investigate these dynamic

efficiency effects. It is important to note however that, when government prioritizes infrastructure spending, the growth effects have been shown to be substantial due to the increased household productivity which results from the positive externality effects associated with good infrastructure² (Matovu, 2000). Consequently, our study seeks to examine the growth and poverty reduction effects of increased public spending on human and physical capital accumulation in Uganda.

Our analysis should be of interest to policy-makers in developing countries who are concerned about prioritizing the use of the meager public resources particularly in the face of the global economic slowdown. For Uganda, the analysis is especially important as it comes at a time when authorities are in the process of finalizing a five-year NDP that focuses on sustaining economic growth and providing “prosperity for all”. While the country’s future growth process is likely to benefit from continued economic liberalization and increased stability in northern Uganda and the rest of the region, we argue that reallocating expenditures from the unproductive to the growth generating sectors coupled with increased efficiency in the public sector will not only mitigate the effects of the global financial crisis on Uganda’s economy but also ensure the achievement of lasting gains in economic growth, socio-economic transformation, and poverty reduction.

The rest of this paper is organized as follows. Section 2 presents some topical developments in Uganda, Section 3 reviews literature and identifies gaps, Section 4 discusses the priorities of the current NDP, Section 5 presents the methodology, data used and simulations. In Section 6 we discuss the findings, while Section 7 concludes with policy recommendations.

2. OVERVIEW OF UGANDA’S MACROECONOMIC PERFORMANCE

² Williamson and Canagarajah (2003) and World Bank (2002) argue that roads, agriculture and water and sanitation may yield higher returns for employment and income creation in Uganda than primary health care and education and that the poverty action fund, through the promotion of a narrow interpretation of pro-poor programmes has led to the skewing of budget allocations away from programmes that may have resulted in greater poverty reduction.

This section provides a brief overview to the economic reconstruction and reform process in Uganda since the mid 1980's, highlighting some of the key economic and structural changes.

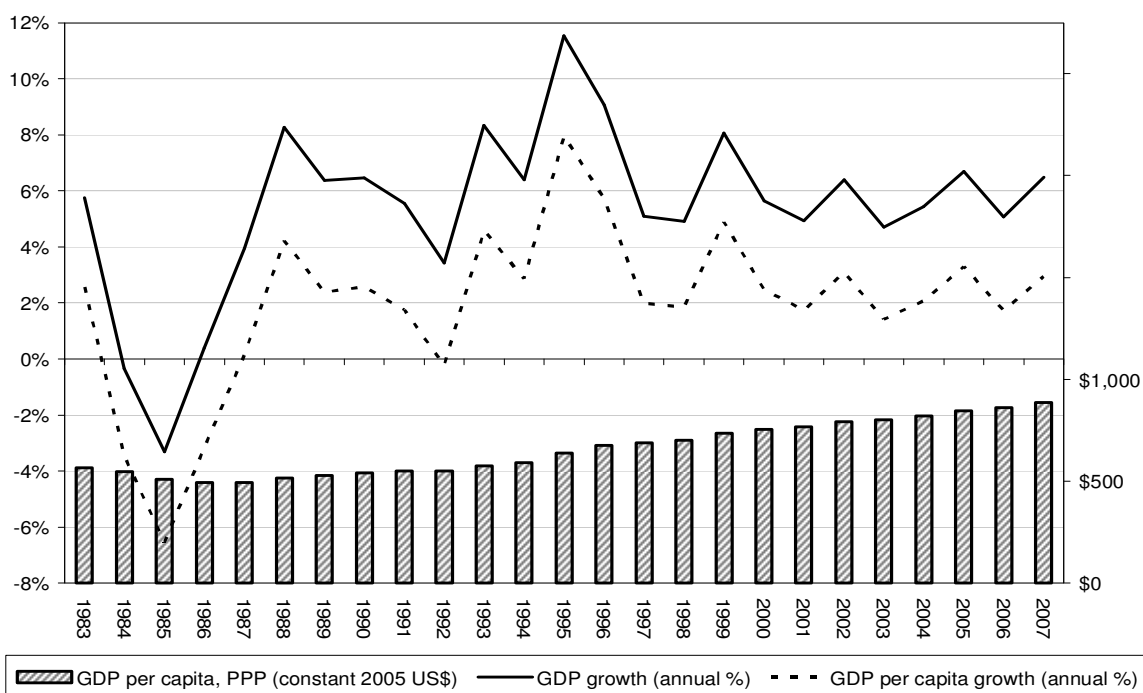
Economic reconstruction and reform

For the past two decades Uganda has achieved an impressive record of economic growth. Since the end of decades of political instability and civil war in 1986, the economy has grown on average by 7.0 per cent per annum (UBOS, 2009). Initial economic growth was driven by post-war recovery and reconstruction, and since the early 1990s by comprehensive macro-economic and structural reforms (Collier and Reinikka, 2001; Dijkstra and van Donge, 2001). In addition, there has been some significant structural changes in the economy with the share of agriculture in GDP declining from about 50 per cent in 1992 to about 23 per cent in 2009 (UBOS, 2008). Economic expansion has raised average incomes by 80 per cent between 1987 and 2007 (World Bank, 2009), and leading to decline in the incidence of poverty from 56 per cent in 1992/93 to 31 per cent in 2005/06 (Ssewanyana and Okidi, 2007). Uganda's growth record is quite impressive especially as it comes against a backdrop of numerous bottlenecks including the country's land-locked status and the resultant high transportation costs; lack of mineral resources³ (at least to-date); a severe HIV/AIDS epidemic; a prolonged and devastating civil war in the northern parts of the country as well as regional instability (in Sudan, Democratic Republic of Congo and more recently in Kenya in 2008). More importantly, growth has been sustained far beyond typical spurts of growth found in empirical studies (Pritchett, 2000; Hausmann et al 2004). Nonetheless, in spite of the structured change in Uganda's economy, the per cent of people still employed in the agriculture sector is in excess of two-thirds of the population (UBOS, 2008). In addition, despite the reduction in poverty rates, inequalities of income has increased making current economic growth less effective in reducing poverty (Kappel et al 2004). While gains in economic and social development have been impressive in recent years, Uganda still ranks 156 out of 179 countries on

³ Oil explorations are currently on-going in several parts of the country and initial reports indicate that Uganda could have oil deposits sufficient to produce over 500,000 barrels per day, although production may not start until 2015.

UNDP's Human Development Index and is classified in the lowest category of achievements in human development (UNDP 2008). Moreover, once annual GDP growth is adjusted for Uganda's extremely high population growth, GDP per capita trends reveal a far from impressive growth record (Fig. 1). Uganda is also faced with the highest dependency ratio in the world (World Bank, 2007b).

Fig. 1: Uganda's economic growth performance (Percent, real terms)



Source: World Development Indicators (2009).

Consolidating past gains in economic growth is largely considered Uganda's overarching priority especially as the Government replaces the Poverty Eradication Action Plan (PEAP) with the five year NDP. This change in Uganda's development framework will also imply a shift from poverty reduction and expansion in access to social services to a greater focus on investments in economic infrastructure and commercialization of agriculture, as the main instrument for national economic and social development policy planning. Uganda, like the rest of the world is faced with the global financial and economic crisis but initial fears that the global economic slowdown would reverse some of the past gains and also

impede further economic growth and transformation are beginning to subside. For instance, recent projections by the African Development Bank indicate that Uganda's growth projections for 2009 have been revised upward to 6.5 per cent as at October 2009, an improvement of 1.5 percentage points when compared to the May 2009 forecast. However, some downside risks still remain. For instance, the forecast for the overall fiscal balance as a percent of GDP—including grants—has been revised upward from -2.4 percent as at May 2009 to -2.7 percent as at October 2009. Projections for the external current account as a percent of GDP—including grants—have also been revised upward from -7.5 percent to -8.0 percent during the same period.

The foregoing projections indicate that both domestic revenues and external inflows are not expected to keep pace with Uganda's growing public expenditures needs, suggesting that the authorities will need to ensure that the available meager resources are both spent efficiently and also allocated to the growth generating sectors. This paper examines the relationship between public spending composition and Uganda's development objectives so as to establish whether public spending composition does indeed influence the achievement of these objectives. The section that follows summarizes some of the arguments on the interrelationships between public spending composition, economic growth and poverty reduction.

3. RELEVANT LITERATURE

Several studies have been undertaken to analyze the relationship between the composition of government expenditures and growth. However, neither theory nor empirics provide clear cut answers on how the composition of government expenditures affects economic growth. While the theory develops a rationale for government provision of goods and services based for instance on the failure of markets to provide public goods, the need to internalize externalities, and to cover the costs especially when significant economies of scale exist, such theoretical notions usually do not easily translate into operational rules regarding which component of public expenditure should be reduced or increased (Devarajan, et. al. 1996).

A commonly cited argument in support of scaling up of public spending on infrastructure is that infrastructure services could have a strong growth-promoting effect through their impact on the productivity of private inputs and the rate of return on capital, particularly when a country is starting from a low base of infrastructure assets. For instance see United Nations Millennium Project (2005), the Blair Commission (2005), and the World Bank (2005a, 2005b). However, recent analytical and empirical research has highlighted the fact that public infrastructure, in addition to its direct effects on the productivity of private inputs and the rate of return on private capital, has the potential to spur growth through a variety of other channels (Agenor and Blanca, 2006). For instance, it has been argued that good public infrastructure including a reliable power grid or well-maintained roads, by reducing the need for the private sector to spend on maintenance of its own stock of physical capital, may raise the rate of capital formation and spur growth. A significant body of microeconomic evidence suggests also that infrastructure may have a significant impact on health and education outcomes. Moreover, this impact tends to be magnified through interactions between health and education themselves (Agenor and Blanca, 2006). In particular, better health has been shown to have a strong impact on the ability to learn and study, in addition to enhancing the productivity of workers.

Endogenous based growth models of among others, Aschauer and Greenwood (1985) and Barro (1990) emphasize the crucial distinction between nonproductive public goods (such as government consumption) and public goods that complement private sector production. To the extent that government consumption has no direct effect on private sector productivity, an increase in the share of nonproductive government expenditures reduces incentives to invest and which results in lower growth rates⁴. On the other hand, productive expenditures, such as education, research and development, job training, and physical infrastructure, positively affect the efficiency of private sector production and consequently lead to higher per capita growth. These finds are confirmed by Grier and

⁴ Aschauer and Greenwood (1985) and Barro (1990) argue that while it provides additional utility to households, government consumption reduces economic growth because the higher taxes needed to finance the consumption expenditure lowers the returns on investments and the incentive to invest.

Tullock (1987) who find a negative relationship between the growth rate of real GDP and the government's consumption share of GDP. On the other hand, government investment expenditure, for instance the provision of infrastructure services, is identified to provide an enabling environment for growth.

The literature also presents evidence that not all government capital is productive or that decomposing the effects of public spending on development outcomes comprises complex chains of linkages and as such, needs to be understood from a dynamic perspective. For instance, Devarajan et. al. (1996) argue that earlier empirical analyses linking particular components of government expenditure to private sector productivity and economic growth have been constrained by the absence of a rigorous theoretical framework. In a framework that abstracts from the issues of the financing of public expenditures and in which government decisions are exogenous, Devarajan et. al. (1996) find a positive relationship between per capita real GDP and current spending share of total public expenditure while the relationship between real per capita growth and the capital component of expenditures is found to be negative. These findings are justified by the argument that a higher level of government spending necessitates higher distortionary taxes and as such, the steady-state growth rate will increase only if the productivity of that government spending exceeds the deadweight loss associated with the taxes required to pay for it. Further, Devarajan et. al. (1996) argue that previous work (see for instance Grier and Tullock (1987), and Easterly and Rebelo (1993)) do not account for the composition and level effects of public spending on growth since a unit increase in the budgetary share of one sector has to be matched by a unit decrease in some other spending share (composition effect), as the total spending remains fixed⁵.

Paternostro et. al. (2006) argue that the impact of public spending on common economic goals including growth, equity and poverty reduction is difficult to assess because of the complex chain of linkages, the time lags involved and the interdependence among the goals. They add that both initial conditions and institutional capabilities have an important

⁵ Devarajan et. al. (1996) use the total expenditure share of GDP to control for level effects.

influence on the effectiveness of transmission mechanisms and must be factored into country-specific policy recommendations. Paternostro et. al. recommend that the trade-offs between social expenditure and infrastructure expenditure, or between policy interventions in general, need to be understood from a dynamic perspective.

Computable General Equilibrium (CGE) models have also been used to examine the relationship between the composition of public spending and development outcomes (growth and poverty reduction). Dabla-Norris and Matovu (2002) use a dynamic CGE model to examine the contribution of primary, secondary, and tertiary education and infrastructure to growth in developing countries with special application to Ghana. They report that increasing primary and secondary education has significant macroeconomic and poverty reduction benefits, although these benefits come at the expense of infrastructure investment. Lofgren and Robinson (2004) also use a dynamic CGE to model the relationship between development outcomes and spending on agriculture, health, education, transport-communications, social security and defense for a sample of sub-Saharan countries. Their findings indicate that increased expenditures on agriculture, transportation and communications generate modest economic growth, but increased investment in health leads to more rapid growth and significant reductions in poverty. Jung and Thorbecke (2003) report that well targeted education expenditures can be effective for poverty alleviation in Tanzania and Zambia, but note that to maximize these benefits, education spending needs to be complemented by sufficient public investment

These studies present evidence to support the argument that prioritizing public expenditures toward growth generating sectors including infrastructure, promotes growth and accelerates poverty reduction. However, an emerging theme from these studies is that economic growth theory is necessary to derive the necessary guidance on how public spending could be used to stimulate growth, improve the distribution of income and reduce poverty.

Our study uses a CGE model to examine the dynamic interrelationships and trade-offs between the composition of government spending, growth and poverty reduction in Uganda. Our framework also models the effects of improved public sector efficiency on these development objectives.

4 PRIORITY SPENDING UNDER THE NATIONAL DEVELOPMENT PLAN

In view of the past macroeconomic performance and the binding constraints identified for Uganda, the NDP will mainly focus on reorienting resources towards the more productive sectors which will sustain the recent growth spurt, increase employment opportunities and reduce poverty.

The NDP identifies agriculture as a primary growth sector. It is a key sector contributing to exports, employment, and food security. In 2005, agricultural households constitute 78.8 percent of the total household population. The sector accounts for 48 percent of exports and provides a large proportion of raw materials for industry. The sector growth rate has been declining from 7.9 percent in 2000/01 to 2.6 percent in 2008/09 (UBOS, 2008). The decline is attributed mainly to the fall in volume and productivity; limited value addition; lack of sustainable markets for agro-products; land tenure issues; and inadequate agricultural policies and institutions. The Plan will focus on boosting production and productivity in a sustainable way; value addition; finding and building markets; ensuring policy consistency; and strengthening agricultural policies and institutions.

The specific interventions in the sector will include: scaling up research efforts in public institutions on improved farm inputs and appropriate technologies; empower farmers in technology development and advisory services through demonstration farms; develop technology for post harvest and value addition; increase supply of farm inputs to farmers; carry out early predictions of the incursions, monitor and surveillance on crop pests, weeds and diseases; increase current acreage under irrigation.

Over 95 percent of Uganda's exports are primary agricultural commodities. World prices of some primary agricultural commodities have been unstable and declining and more

recently declined owing to the global recession. For the country to benefit more from agriculture, value addition and industrialization is required. Emphasis will be given to the development of new competitive agro-based industries; strengthening R&D capabilities; strengthening institutional and physical support industrial infrastructure; as well as creating technology transfer and capabilities to enhance productivity.

Uganda's tourism has also been identified as a primary growth sector. Its potential is exemplified by the country's natural and cultural endowment, a factor illustrated by the country's unique geography and rich history. Tourism is the fastest growing industry in the world and in Uganda the international visitor numbers have grown exponentially in the past decade albeit a moderation in growth due to the global recession. The competitiveness of the tourism sector is currently constrained by the infrastructural deficit of key tourist access routes and transport services; the manpower gap that has hindered the quality of services; and limited investment in accommodation and the development of sites. The private sector requires appropriate support to develop and compete in the global market. The sector will focus on the strengthening the regulatory and support policy framework; development of markets and products for key attractions; and sustainable development that protects wildlife and cultural resources.

The plan will prioritize investment in physical infrastructure, focusing on all forms of transport infrastructure (air, water, railway and road), energy (power, biomass, etc), communications, water and sanitation facilities. The development of this infrastructure will assist the country in overcoming the challenges of being a landlocked country by facilitating regional trade, tourism, and other services.

Energy remains one of the most binding constraints for Uganda's economic growth. This is demonstrated by very high tariff rates compared to neighboring countries albeit Uganda's significant potential to generate hydro-power. Over the five year planning period, resources will be devoted to the construction of three dams: Karuma, Isimba and Ayago. The total cost of constructing these three dams is estimated at UG Shs 6.7 trillion over the planning period. With the recent oil discovery, the NDP has also budgeted for the construction of an oil refinery to add value to the crude produced and building a pipeline

that will link the oil fields to Mombasa for exporting the crude oil.

Owing to the poor road infrastructure, this has led to the cost of doing business in Uganda to be very high. Poor roads infrastructure also significantly limit accessibility to markets by producers. This key binding constraint is addressed by increasing spending for the sector to address some of the following specific interventions: (i) Increase the percentage level of the paved national roads from 15% (3,050km) to 21% (4105km) by 2015, (ii) Rehabilitate 11,067 km for district roads, including 10,095 km with low cost sealing (LCS); Undertake periodic maintenance on 4,500 km each year; and place 21,513 km under routine maintenance (iii) Improve 1,000 km of Community access roads each year to access level 2. (iv) Implement the Kampala Rapid Bus Transport System (RBTS) (v) Construct a standard gauge rail system connecting Kampala to Malaba with future connectivity to other parts of the country.

Without compromising the earlier efforts to increase accessibility, the NDP also identifies a key area which would require urgent attention with implications especially on the agriculture sector. With the effects of the climate change becoming a reality and the impact this has had on the weather patterns, NDP focuses on allocating more resources to increase accessibility to water for production. Some of the specific interventions include: (i) Increase acreage under irrigation from the current level of 14, 418 ha to 22,000 ha, (ii) Increase supply of water in the cattle corridor from the current 36% to 50% and those outside the cattle corridor from 21% to 30%, and (iii) Increase water supply systems for rural industries to facilitate agro-processing and other industrial activities. As a result, this would require allocating UG. Shs 490 billion per year compared to the 137 billion shillings allocated to the water sector.

A skilled, healthy and cheap labor force is central in enhancing the output and productivity of the nation. Investing in human resource development with a focus on health, education and skills development will be a key priority for the NDP. This will entail thorough diagnosis of the available skills and competences against what is required for national, regional and international markets. Increased emphasis will be placed on supporting practical science education in schools and colleges, including enabling science teachers to refresh and

extend their skills so that young people gain skills for work. The share of spending on education and health will increase over the planning period from 28 to 30 percent. The NDP period also envisage an improvement in the efficiency of use of resources in these two sectors. This will include addressing regional disparities and dealing with the significant management and other issues impeding the delivery of cost-effective health and education services.

5 METHODOLOGY AND DATA

For the purposes of the analysis we are using a CGE model for Uganda based on the 2007 Social Accounting Matrix (SAM). We draw on a number of strengths from the CGE modeling framework in our analysis. Firstly, the model simulates the functioning of the economy as a whole and track how changes in economic conditions are transmitted through price and quantity adjustments on a range of markets. Secondly, since the basis of the CGE model is a Social Accounting Matrix we are able to discern the effects of the changes in economic conditions on individual sectors of the economy. Thirdly, the link of the model to household survey data enables an assessment of the impacts on the welfare of households, which is particularly interesting since this is where the most important policy implications are likely to be found. Finally, the recursive dynamic nature of our model implies that the behavior of its agents is based on adaptive expectations, rather than on the forward looking expectations that underlie inter-temporal optimization models. Since a recursive model is solved one period at a time, it is possible to separate the *within-period* component from the *between-period* component, where the latter governs the dynamics of the model. The CGE model used in the present study is based on a standard CGE model developed by Lofgren, Harris, and Robinson (2002) and adopted to Uganda by EPRC. This is a real model without the financial or banking system (See Table A1). GAMS software is used to calibrate the model and perform the simulations.

Social Accounting Matrix

Like other conventional SAM, the Uganda SAM is based on a block of production activities, involving factors of production, households, government, stocks and the rest of the world. The Uganda SAM is a 120 by 120 matrix. The various commodities (domestic production) supplied are purchased and used by households for final consumption (42 per cent of the total), but also a considerable proportion (34 per cent) is demanded and used by producers as intermediate inputs. Only 7 per cent of domestic production is exported, while 11 per cent is used for investment and stocks and the remaining 7 per cent is used by government for final consumption. Households derive 64 per cent of their income from factor income payments, while the rest accrues from government, inter-household transfers, corporations and the rest of the world. The government earns 32 per cent of its income from import tariffs – a relatively high proportion, but a characteristic typical of developing countries. It derives 42 per cent of its income from the ROW, which includes international aid and interest. The remainder of government's income is derived from taxes on products (14 per cent), income taxes paid by households (6 per cent) and corporate taxes (5 per cent).

Investment finance is sourced more or less equally from government (26 per cent), domestic producers (27 per cent) and households (26 per cent), with enterprises providing only 21 per cent. Imports of goods and services account for 87% of total expenditure to the ROW. The rest is paid to ROW by domestic household sectors in form of remittances; wage labour from domestic production activity; domestic corporations payments of dividends; income transfers paid by government; and net lending and external debt related payments.

The extent of household aggregation is very important for policy analysis, and involves representative household groups as opposed to individual households. Pyatt and Thorbecke (1976) argue for a household aggregation that minimizes within-group heterogeneity. This is achieved in the Uganda SAM through disaggregating of households by rural and urban, and whether households are involved in farming or non-farming activities. Moreover, the Uganda SAM identifies three labour categories disaggregated by

skilled, unskilled and self employed. Land and capital are distributed accordingly to the various household groups.

Productions and commodities

For all activities, producers maximize profits given their technology and the prices of inputs and outputs. The production technology is a two-step nested structure. At the bottom level, primary inputs are combined to produce value-added output using a CES (constant elasticity of substitution) function. At the top level, aggregated value added is then combined with intermediate input within a fixed coefficient (Leontief) function to give the output. The profit maximization gives the demand for intermediate goods, labour and capital demand. The detailed disaggregation of production activities captures the changing structure of growth due to the pandemic.

The allocation of domestic output between exports and domestic sales is determined using the assumption that domestic producers maximize profits subject to imperfect transformability between these two alternatives. The production possibility frontier of the economy is defined by a constant elasticity of transformation (CET) function between domestic supply and export.

On the demand side, a composite commodity is made up of domestic demand and final imports and it is consumed by households, enterprises, and government. The Armington assumption is used here to distinguish between domestically produced goods and imports. For each good, the model assumes imperfect substitutability (CES function) between imports and the corresponding composite domestic goods. The parameter for CET and CES elasticity used to calibrate the functions used in the CGE model are exogenously determined.

Factor of production

There are 6 primary inputs: 3 labour types, capital, cattle and land. Wages and returns to capital are assumed to adjust so as to clear all the factor markets. Unskilled and self-

employed labor is mobile across sectors while capital is assumed to be sector-specific. Within the model, producers instantly adjust to changes in rates of returns for factors of production for each sector. The model does not take into account adjustment costs of switching resources between sectors.

Institutions

There are three institutions in the model: households, enterprises and government. Households receive their income from primary factor payments. They also receive transfers from government and the rest of the world. Households pay income taxes and these are proportional to their incomes. Savings and total consumption are assumed to be a fixed proportion of household's disposable income (income after income taxes). Consumption demand is determined by a Linear Expenditure System (LES) function. Firms receive their income from remuneration of capital; transfers from government and the rest of the world; and net capital transfers from households. Firms pay corporate tax to government and these are proportional to their incomes.

Government revenue is composed of direct taxes collected from households and firms, indirect taxes on domestic activities, domestic value added tax, tariff revenue on imports, factor income to the government, and transfers from the rest of the world. The government also saves and consumes.

Macro closure

Equilibrium in a CGE model is captured by a set of macro closures in a model. Aside from the supply-demand balances in product and factor markets, three macroeconomic balances are specified in the model: (i) fiscal balance, (ii) the external trade balance, and (iii) savings-investment balance. For fiscal balance, government savings is assumed to adjust to equate the different between government revenue and spending. For external balance, foreign savings are fixed with exchange rate adjustment to clear foreign exchange markets. For savings-investment balance, the model assumes that savings are investment driven and adjust through flexible saving rate for firms.

Recursive dynamics

To appropriately capture the dynamic aspects of aid on the economy, this model is extended by building some recursive dynamics by adopting the methodology used in previous studies on Botswana and South Africa (Thurlow, 2007). The dynamics is captured by assuming that investments in the current period are used to build on the new capital stock for the next period. The new capital is allocated across sectors according to the profitability of the various sectors. The labour supply path under different policy scenarios is exogenously provided from a demographic model. The model is initially solved to replicate the SAM of 2007.

Limitations of the model

CGE modeling is an important tool for policy-analysis given that it is able to isolate the effects of individual policies, while explicitly specifying the causal mechanisms through which policies influence the economy. The sectoral and institutional detail of the CGE model allows for a more detailed analysis of policies than is typically possible with macro-econometric models. Finally, CGE models have an advantage over partial equilibrium analysis in that they offer an economy-wide assessment of policies, including the concurrent effects of policy-changes on production, employment, and poverty and inequality. However, as well documented in the literature CGE models have also some weaknesses (Thurlow, 2008). The main criticism of the static model is that its core formulation is closely tied to the Walrasian ideal of equilibrium (Dervis *et al*, 1982). In a pure neoclassical setting, producers and consumers react passively to prices in order to determine their demand and supply schedules. Markets are therefore assumed to clear through the interaction of relative prices, such that equilibrium is achieved in both goods and factor markets. The model accommodates prices in relative terms and therefore cannot adequately address issues related to inflation. In addition, this model does not include the banking sector. However, the channels through which the global crisis is affecting developing countries is not through commercial banks exposure—rather, it's mainly through reductions in financial inflows and depreciating local currencies. Another

limitation to the analysis is that in modelling the micro linkages we are not distinguishing between households that are net-buyers or net-sellers of various food crops, which is a weakness in terms of the assessment of welfare effects.

Simulations

Our analysis is based on a series of scenarios each representing an exogenous change in economic conditions and are compared to a baseline scenario of business as usual. Running scenarios allows us to conduct a sort of controlled experiment of various types of impacts. These impacts are then ascertained in terms of average sectoral growth patterns and changes in poverty rates and compared to the baseline.

This baseline scenario assumes that business continues as usual with no specific changes made to policy. The baseline simulation assumes that the government would continue with the current budget allocations. We calibrate the model to generate about 6.6% for real GDP growth under the baseline for the simulation period. The government finances its activities from domestic and foreign sources in a manner that is designed to be compatible with macroeconomic stability.

We compare the baseline to a simulation where we allocate resources between sectors from the non-productive sectors to the productive sectors. We also run another simulation where we assume that there is improved efficiency in the use of resources coupled with the reallocation of resources.

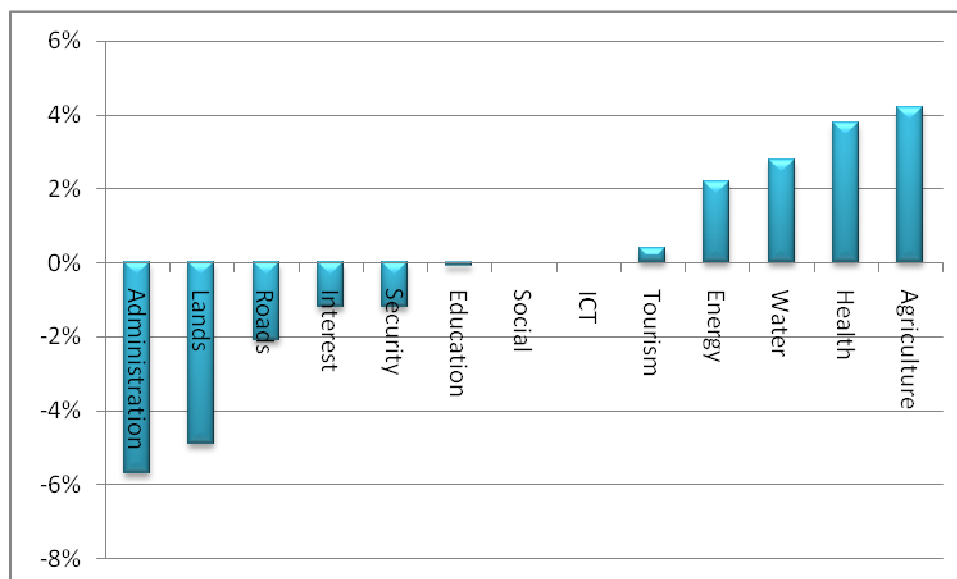
6.0 FINDINGS

Actual versus Proposed Allocation and Efficiency of the Public Sector

The primary objective of this paper is to investigate the interrelationships between public spending composition in Uganda's and her development outcomes. The approach taken here is to re-allocate public expenditures away from the unproductive sectors including public administration (without compromising the quality of service delivery) and security

to the more productive ones such as agriculture, water, energy, and tourism⁶. Fig. 2 shows percentage changes in sector budget shares following this re-allocation. In addition, we model improved efficiency in the public sector. Improved efficiency is interpreted broadly here to include several aspects such as improved absorptive capacity of public resources within the public sector, use of resources for the planned uses, improved transparency in public spending, timeliness in implementation of government projects and improved governance within the public sector. The approach taken in this paper to is to assume that addressing the afore-mentioned bottlenecks in Uganda’s public sector will increase the total factor productivity within the public sector by 1 per cent⁷.

Fig. 2 FY 2009/10 Budget Allocations Vs Proposed Budget Allocations (percent)



Effects on GDP Growth

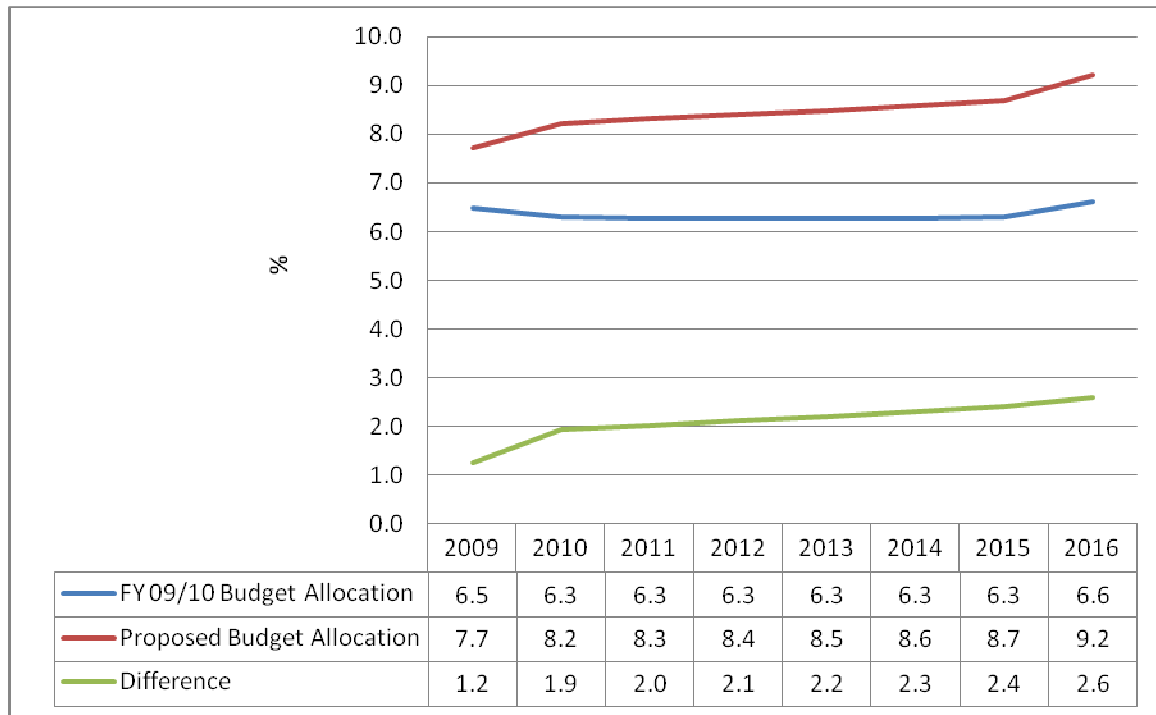
As shown in Fig. 3, our proposed budget allocations coupled with improved efficiency in public sector spending lead to higher GDP growth rates compared to what would have been achieved if the FY 2009/10 budget allocations had been maintained. Note also that

⁶ The National Development Plan identifies agriculture, water, energy, and tourism as some of the key growth generating sectors. However, estimating the productivity of each sector will allow for the identification of sectors with the highest potential in terms of contributing to GDP—sectors which should be given emphasis when determining budget allocations. This empirical exercise is left for future research.

⁷ A more rigorous approach to linking improved public sector efficiency to changes in total factor productivity would comprise estimating the effects of enhanced public sector efficiency via the various channels on public sector productivity. Due to data limitations, this is left for future research.

the difference between the two GDP growth rates increases overtime suggesting that effect of improved efficiency in the public sector and the associated increase in total factor productivity is cumulative, with initial gains in total factor productivity contributing to further increases.

Fig. 3 GDP Growth: FY 2009/10 Budget Allocation Vs. Proposed Budget Allocation



To better understand the basis of the observed differences in GDP growth rates, we examine the growth rates of the various sectors. Table 1 shows the average growth rates by sector for the period 2008-2010 for three scenarios: the FY 2008/09 budget allocation or the “Base” scenario, the FY 2009/10 budget allocation or the “Budget” scenario, and the “Efficient” scenario which results from the spending re-allocation depicted in Fig. 1 above and improved efficiency in the public sector. As shown in Table 1, the average growth rates for the agriculture, industry, utilities, and service sectors are higher in the “Efficient” scenario than in the “Budget” scenario. Moreover, the growth rate in the agriculture sector is 1.9 percentage points higher in the “Efficient” scenario compared this sector’s growth rate in the “Budget” scenario. The growth rate in the manufacturing sector is 0.4

percentage points higher in the “Efficient” versus the “Budget” scenario. Further, increased budget allocations to some of the sectors appears to contribute to higher growth rates in other sectors, underscoring the dynamic interrelationships associated with public spending composition. For instance, increasing the budget allocation to the agriculture sector stimulates growth in the food-processing sub-sector which then results in higher growth rates in the manufacturing sector (see Table 1). As indicated in Table 1, the construction and services sectors also post higher growth rates in the “Efficient” scenario due the increased budget allocations to infrastructure and improved public sector efficiency. The efficient scenario comprises both reallocation and improvement in efficiency of the public sector.

Table 1. Average Growth Rate of Sector by Budget Allocation Scenarios(2008-2010)

	FY 2008/09 Budget Allocation	FY 2009/10 Budget Allocation	Proposed Budget Allocation and Efficiency in Public Sector “Efficient”
	“Base”	“Budget”	
Overall GDP	6.6	6.4	8.0
Agriculture	3.9	3.4	5.3
<i>Of which</i>			
Cereals	2.0	3.4	5.3
Root Crops	4.2	2.4	4.2
Pulses	2.1	8.1	10.4
Matooke	4.4	2.7	4.5
Horticulture	4.9	3.6	5.4
Export Crops	2.5	-3.0	-1.2
Livestock	3.6	3.8	5.7
Forestry	4.6	5.1	6.7
Fishing	6.2	2.3	4.7
Industry	6.5	5.0	5.8
<i>Of which</i>			
Mining	6.9	5.8	5.5
Manufacturing	6.5	5.7	6.1
Food Processing	6.2	6.0	7.6
Meat Processing	3.5	3.8	5.8
Fish Processing	6.2	2.3	4.7
Grain Processing	6.3	6.3	7.0
Feed Processing	3.9	4.1	6.0
Other Food Processing	5.7	5.3	7.1
Beverages and Tobacco	7.0	6.9	8.2
Non-Food Processing	6.8	5.5	4.5
Textiles and Clothing	6.6	6.3	5.8

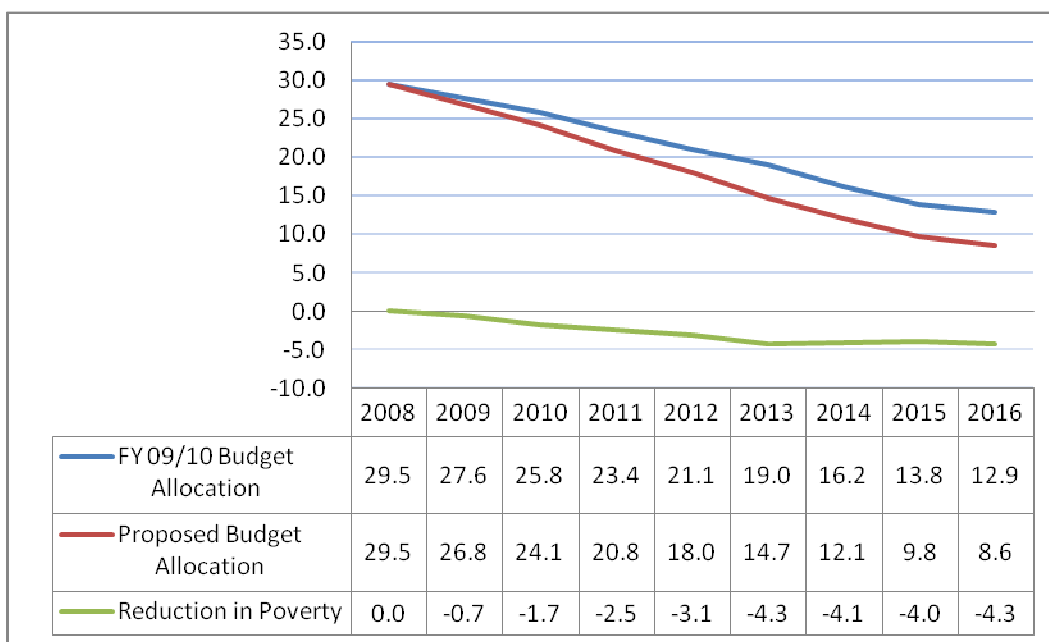
Wood and Paper	4.5	3.4	3.2
Fertilizer	5.1	2.2	2.5
Other chemicals	7.1	7.1	7.3
Machinery & equipment	6.9	4.2	0.8
Furniture	6.3	5.2	6.7
Other manufacturing	7.2	5.2	3.7
Utilities	7.7	7.9	7.8
Construction	6.0	3.5	5.0
Services	7.8	8.3	10.2
Private	9.6	10.3	12.5
Trade	5.9	5.7	7.1
Hotels & catering	4.9	8.3	12.7
Transport	7.2	5.9	3.1
Communications	6.5	6.5	8.0
Banking	5.7	5.7	7.2
Real estate	8.0	8.0	9.7
Community services	6.3	6.6	8.4
Public	2.3	2.2	2.9

Source: Authors' computations

Effects on Household Welfare

The increased sectoral growth rates and the associated increase in economic activity is expected to translate into improved wellbeing. A measure of welfare used here is the income poverty head count which measures the number of people—as a percent of the entire population using Uganda's official poverty line. The poverty analysis is done at the household level. Fig. 4 compares the poverty incidence trends in the “Budget” versus the “Efficient” scenarios during the period FY 2009/10 to FY 2016/17.

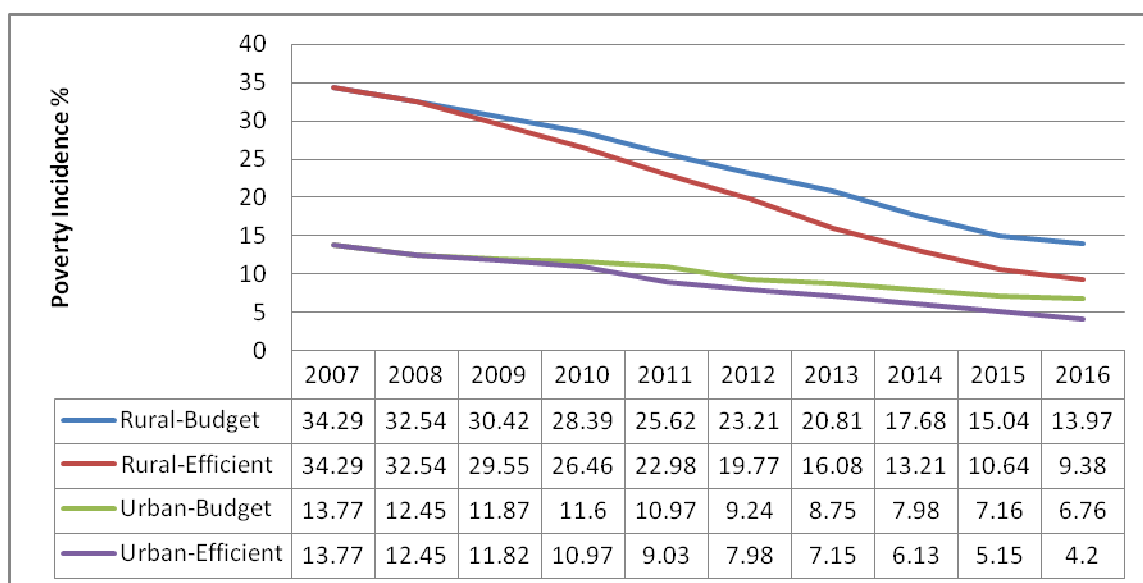
Fig. 4. Impact on Income Poverty Head Count Index by Budget Scenario (Percent): FY 2009/10—FY 2016/17



In particular, Fig. 3 shows that the incidence of poverty will be lower under the “Efficient” scenario than in the “Budget” scenario and this difference becomes more pronounced in the later years. Poverty in Uganda has been described as a rural phenomenon with the majority of poor Ugandans residing in the rural areas. To examine whether the increased public spending on the agriculture sector in particular and infrastructure in general trickles down to the poor, we disaggregate the households into rural and urban and further into farm and non-farm.

Fig. 5 shows the poverty trends under the “Budget” and “Efficient” scenarios for both rural and urban households. Two key themes are illustrated in Fig. 4: (i) the “Efficient” scenario leads to a faster decline in poverty incidence in both the rural and urban areas compared to the “Budget” scenario, and (ii) rural poverty falls at a much faster rate compared to urban poverty under the “Efficient” scenario. These findings underscore the impact of interventions that target the majority of Uganda’s population in combating poverty and contributing to socio-economic transformation.

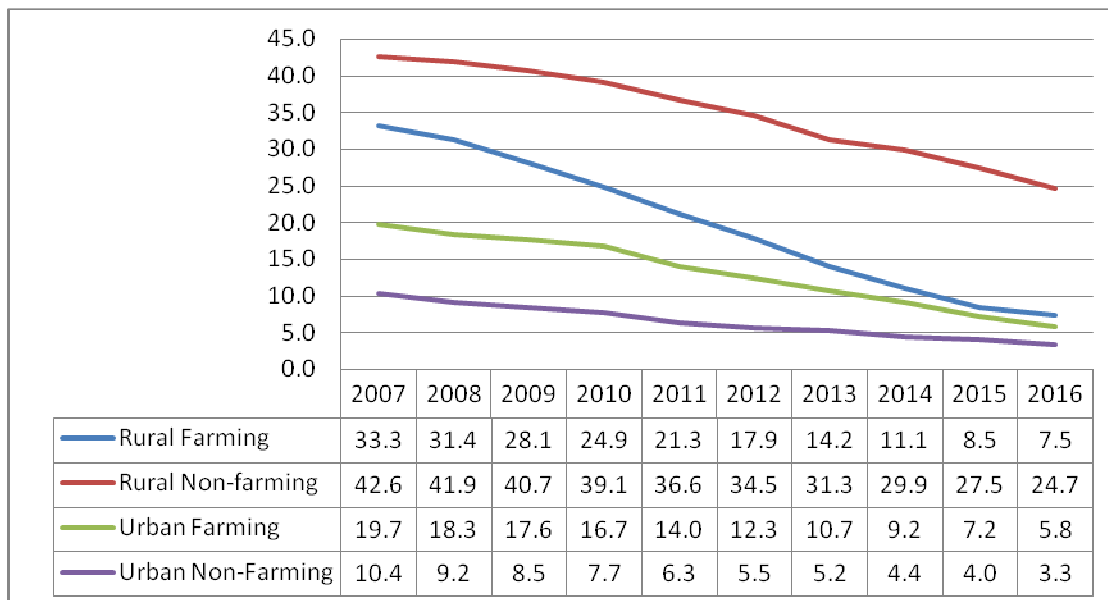
Fig. 5 Rural vs Urban Poverty Head Count under the “Efficient” Scenario: FY 2009/10—FY 2016/17



As shown in Fig. 4, our findings reveal that the incidence of poverty declines at a faster rate in the rural versus urban areas under the “Efficient” scenario. This is due to at least two reasons. First, as shown in Table 1, the agriculture sector posted the biggest gain in sectoral growth following the spending re-allocations and increased efficiency in the public sector. To the extent that over 90 percent of all rural households are engaged in agriculture, increased growth in this sector should imply higher incomes for the rural households. Second, the increased spending on infrastructure and health, among others, increases access to markets and other services and contributes to increased agricultural productivity due to reduced disease incidence, respectively.

To further tease out the contribution of the increased public spending on the agriculture sector under the “Efficient” scenario, we examine the poverty trends across the farming and non-farming households for both the rural and urban households. These findings are illustrated in Fig. 6. As shown in Fig. 5, poverty amongst rural and urban farming households falls at a faster rate compared to the non-farming households in both the rural and urban areas.

Fig. 6 Farming Vs. Non-farming Poverty in Rural and Urban Areas under the “Efficient” Scenario (Percent)



In summary, we demonstrate here that investments in agriculture particularly with a view to promoting value addition and also investing in complementary infrastructure including roads and affordable energy have the potential to increase economic growth and accelerate the rate of poverty reduction. Another implication of these findings is that the non-farming households will necessitate quite a different set of policy interventions so as to achieve comparable reductions in poverty as the farming households.

7.0 CONCLUSIONS

The objective of this paper has been to investigate the dynamic interrelationships between public spending composition and Uganda’s development goals including sustaining the current growth rate, creating employment and reducing poverty. We utilize a dynamic CGE model to study these interrelationships and also model the effects of the global financial crisis on Uganda’s economy particularly via the reduction in foreign inflows, depreciation of the shilling, and changes in commodity prices. This paper demonstrates that public spending composition does indeed influence economic growth and poverty reduction. In particular, this study shows that the re-allocation of public expenditure away from the unproductive sectors such as public administration and security to the productive sectors

including agriculture, energy, water, and health leads to higher GDP growth rates and accelerates poverty reduction. Moreover, the agriculture sector posts higher growth rates with this spending re-allocation which positively affects growth rates in other sectors including manufacturing. To the extent that the majority of Ugandans reside in the rural areas, these developments also contribute to lower incidence of poverty in rural compared to the urban households. In particular, our findings reveal that poverty amongst rural and urban farming households falls at faster rate compared to the non-farming households in both the rural and urban areas. A key outcome of this paper is that investments in agriculture particularly with a view to promoting value addition and also investing in complementary infrastructure including roads and affordable energy have the potential to increase economic growth and accelerate the rate of poverty reduction in Uganda. Besides reallocation, the paper also demonstrates that there are significant gains that could be attained by focusing more on the efficiency of spending.

Our analysis should be of interest to policy-makers in developing countries who are concerned about re-focusing the spending of meager public resources on the growth generating sectors, particularly in light of the global financial crisis. For Uganda the analysis is especially important as it comes at a time when authorities are in the process of designing a five-year National Development Plan that focuses on sustaining economic growth and providing “prosperity for all”. While the country’s future growth process is likely to benefit from continued economic liberalization and increased stability in the north of the country and the rest of the region, this paper shows that reallocating expenditures away from the unproductive to the growth generating sectors will contribute to the achievement of lasting gains in economic growth, socio-economic transformation, and poverty reduction.

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