Patterns of Growth and Public Spending in Uganda: Alternative Scenarios for 2003-2020

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ABSTRACT

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Key words: agriculture, CGE modeling, MDGs, micro simulation, public sector, TFP growth, Uganda

We explore the effects of alternative growth patterns, domestic policies, and foreign aid in Uganda. The analysis is based on a Ugandan version of one-country CGE model MAMS of the World Bank. The results pinpoint to the importance of export market access for sectors which experience TFP growth. This is especially pertinent to agriculture. We also suggest that only marginal gains are available from reallocating government outlays. More rapid government productivity growth or increased foreign aid is required for substantial gains, including reaching other MDGs than MDG 1.

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INTRODUCTION

Uganda, a landlocked, post-conflict, largely agrarian society, has experienced 20 years of healthy economic growth, spurred initially by post-conflict reconstruction and economic rehabilitation, and later by a far-reaching program of economic policy reforms. Since 1999, however, annual GDP growth and the rate of structural transformation in the economy have slowed slightly, while some macro indicators also became temporarily volatile in 2002/03. As a response, in the ensuing period Uganda's government instituted its third Poverty Eradication Action plan and a strategy of fiscal consolidation, and has focused on analyzing an appropriate growth strategy.

In this context, Uganda's government today is facing decisions about which sectors to promote and how to allocate scarce public resources across different types of spending. This essay analyzes the long-run consequences of these choices, serving as an input into ongoing assessments of alternative strategies for Uganda. More specifically, in this essay we explore the economy-wide effects of alternative scenarios for growth patterns, domestic policies, and foreign aid during the period 2003-2020. The analysis is based on a Ugandan version of the economywide simulation model MAMS (Maquette for MDG Simulations) (Bourguignon et al. 2008; Lofgren and Diaz-Bonilla 2008).

The remainder of this essay is divided into five parts. The first presents some background on the situation in Uganda, providing the context for this analysis. The second presents the BASE scenario, a business-as-usual simulation against which all the remaining simulations are compared. The third analyzes a set of scenarios based on alternative

patterns of TFP growth in the private sector. The fourth addresses alternative government scenarios in terms of spending patterns and levels, as well as efficiency. The final section focuses on the availability of foreign aid versus domestic taxation in financing government service expansion. The Appendix describes the model in some more detail.

BACKGROUND

Recent trends in economic growth and poverty reduction

Uganda is a landlocked, post-conflict, largely agrarian society with the most youthful population in the world and the second-most `rural' economy in Africa. For 20 years Uganda's economy has been expanding healthily, with per capita income growing by 3.2 percent each year. Growth was initially spurred by post-conflict reconstruction and economic rehabilitation, as roads were rebuilt, farmers resumed production for markets, businesses, banks, and shops returned to the towns and trading resumed after many years of bad governance and war. This "rebound" growth was supplemented during the 1990s by a supply response by farms and firms to a far-reaching program of economic policy reforms. These policies stabilized the economy and the Ugandan Shilling, liberalized prices and trade, removed predatory taxation of exports through currency controls and marketing boards, and substantially trimmed the role of the state, orienting it toward the provision of public goods. Growth in Uganda in the 1990s also received the fortuitous boost of high coffee prices and low petroleum prices, which along with crop pricing reforms greatly improved the rural / urban terms of trade.

This combination of "peace and prices"[1] coupled with expanded public investment in rural feeder roads, a massive expansion in schooling with free primary education, and scaled up spending on basic health services led to a rapid improvement in expenditure and asset-based measures of poverty, and to dramatic improvements in access to basic social services for poor people. Between 1992/93 and 1999/00, the proportion of people living on less than $US 1 per day in PPP terms declined from 56 percent to 35 percent. International donors responded to these positive developments by rapidly increasing budget support for Uganda and then by granting Uganda early access to the enhanced HIPC (Heavily Indebted Poor Country) Initiative and the MDRI (Multilateral Debt Relief Initiative). The deficit before grants increased to 12.1 percent of GDP in 2002/03, with aid financing about half of the budget. Prudent budget management and a substantial aid inflow were central to the success of Uganda's macro economic stability and scaled-up development effort.

Around 2002/03 Ugandans began to suffer a lack of confidence in the policy environment that government had worked so hard to establish and maintain in the 1990s. The main impetus for this bout of nerves and for the ensuing period of policy introspection was the finding in the 2002/03 Uganda National Household Survey that the proportion of people living in poverty increased slightly to 38 percent, while inequality had widened. Additionally, between 1999/00-2003/04 annual GDP growth slowed slightly, as did the rate of structural transformation in Uganda's economy. The 2004 PEAP (Poverty Eradication Action Plan) emphasized the need to improve agricultural incomes as a driver

[1] The expression was coined by Reinikka and Collier (2001, p. 455).

of growth in the rural economy. In the run-up to elections in 2006, some circles called on the Government to take a more interventionist approach to enhancing productivity in agriculture, and to spur industrialization. On the macro management front, with what in hindsight was an inappropriate monetary policy response to a surge in aid-financed spending, some of Uganda's macro indicators (esp. the exchange rate and the short-term interest on government debt) also became temporarily volatile in 2002/03. This in turn led Government to react negatively to the aid surge for fear of "Dutch Disease" effects. In response, the third PEAP has a pillar on economic management in which the Government pronounced its intention to reduce the fiscal deficit before grants, through "fiscal consolidation." This was to be achieved by seeking efficiency savings in public spending, limiting new investments in infrastructure and by increasing tax revenue.

Context for this work

The World Bank responded to these developments with a poverty assessment (World Bank 2006), a Country Economic Memorandum (CEM; World Bank 2007),[2] and a Public Expenditure Review, "Fiscal Policy for Growth" (not yet published). The CEM analysis started with a macro-level stock-taking of growth in Uganda since the reform period began. This was followed by a review of trends in output, prices and productivity in agriculture, and third, by a growth diagnostic exercise that offered a prognosis of where Uganda's economy might run up against binding constraints to economic growth.

[2] World Bank (2007) concludes there are some encouraging signs that adjusting for the terms of trade, underlying growth in Uganda has not slowed down, exports are diversifying slowly, and imports have become more technology-rich.

The analysis of the World Bank suggested that Uganda's GDP growth in the past two decades had outstripped growth in public infrastructure and that, in the future, growth would be more rapid if the Ugandan Budget increased the space for investments in transportation and power. However, the backward-looking stock-taking and the diagnosis of present and future constraints on the economy said nothing about the feasibility of alternative future sectoral patterns of growth, and so were insufficient to advise Uganda on an appropriate growth strategy. Furthermore, having identified the need for public infrastructure investments to avoid bottlenecks to growth, the CEM team needed a tool to simulate the long-run growth and poverty reduction impacts of alternative expenditure patterns and fiscal financing scenarios. The MAMS-based analysis of this essay, responded to this need. It was an input to both the CEM and to a subsequent assessment[3] of the growth implications for Uganda of alternative fiscal strategies.

BASE SCENARIO

The main role of the BASE scenario is to provide a benchmark for comparison. Under this scenario, growth in total factor productivity (TFP) has been adjusted on the margin (reaching 1.4% per year) to generate an annual growth rate of 6.2% for real GDP, i.e. a rate that is close to the actual rate during the period 1990-2003.

The government is assumed to expand its spending according to a set of simple rules. Government service demands (or consumption) outside of education are all set to grow at

[3] World Bank (2007) "Fiscal Policy for Growth".

around 6.2% per year.[4] For primary education, government increases its demand sufficiently to permit a gradual 80% increase in total (government and non-government) resources per student, an increase that is deemed necessary to make substantial progress in reaching (geographically or socially) marginal groups and to reduce repetition and dropout rates. For secondary and tertiary education, government services will increase sufficiently to maintain unchanged resources per student.

The government finances its activities from domestic and foreign sources in a manner that is designed to be compatible with macroeconomic stability. Tax collection is increased gradually, from 11% of GDP in 2003 to 14% in 2020 via increases in the (effective) rates of domestic direct and indirect taxes; for imports tariffs, the effective rates and the GDP share are roughly unchanged.[5] Government domestic borrowing, part of which is interest-bearing, is close to 1% of GDP and grows at a rate that is close to the rate of GDP growth.[6] The trajectory of foreign government borrowing is such that the base-year foreign debt – GDP ratio (71%) is targeted until foreign debt relief sets in (a total of $109 million during the period 2006-2008). In the final year the targeted ratio is almost unchanged (70.9%) from the initial debt burden. Foreign grant aid is assumed to

[4] For the sectors where capital spending is more important than recurrent spending – water, agriculture and roads – service expansion refers to growth in the government capital stock; for the other government functions, it refers to growth in recurrent real government demand (consumption). Across all government-related functions, growth in output is proportional to growth in the government capital stock, which is determined by government investment.

[5] Changes in direct tax rates are free to adjust to balance government receipts and outlays.

[6] MAMS is a "real" model – nominal (as opposed to relative) prices do not matter and the monetary sector is not covered. In order to capture a key aspect of government financing, the ability of the government to obtain a certain amount of resources for free, it divides domestic government borrowing into two categories, interest-bearing, referred to as bond sales, and non-interest-bearing, referred to as Central Bank borrowing (providing resources to the government via money creation without any debt-servicing obligation). Bond sales are set to permit the stock of bonds to grow at the same rate as GDP. Bond sales are matched by an equal amount of Central Bank borrowing. Overall, this results in domestic borrowing growth at a rate that is close to GDP growth. Such a scenario for domestic financing should be compatible with continued macroeconomic stability.

grow at the same pace as GDP. As a result, total foreign aid (defined as the sum of government grants and borrowing, all of which is viewed as concessional) increases gradually from $700 million in 2003 to $1.8billion in 2020, i.e. at 6% per year. For the full simulation period, most of the aid (64%) is in grant form with the rest being borrowed.

The main results of the BASE scenario are summarized in Tables 1-4. Additional results and data are provided in Appendix Tables A.2-A.5. As shown in Table 1, most national account aggregates and parts of government consumption or demand grow at rates of 6-7%. Growth in private investment is determined by the availability of financing, net of government financing needs. The required annual growth rate for recurrent government demand for primary education is quite moderate (4.9% per year) due to the influence of growth in non-government spending and a gradual decline to zero for the number of out-of-cohort entrants to first grade. As a result of the increase in resources per student, the net primary completion rate (MDG 2) improves drastically, from 15.5% in 2003 to 76.4% in 2020.[7] Given very rapid enrollment growth for secondary and tertiary education (at around 8-9% per year for both levels), slower growth in non-government demands, and the policy of maintaining unchanged resources per student, government demand for secondary and tertiary education grows rapidly, at 13-14% per year.

In the labor market, real wages grow for all three labor types at rates of 0.2-1.7% per year, most strongly for workers with at the lowest education level. In conjunction with

[7] Given that the primary cycle in Uganda has 7 years, the 2003 net primary completion rate is defined as the product of the within-cohort entry rate in 1997 times the product of the primary passing rates in each grade during the period 1997-2003.

these wage developments, the rate of unemployment (which is defined broadly to include underemployment) declines for all three labor segments, signaling an over-all tightening of the labor market (Table 3).[8] Among non-labor factors, rent growth is particularly strong for land (given a rate of supply growth that, at 1%, is lower than those of other factors), while capital rents grow at the more moderate rate of 0.4% per year.[9] Aggregate real household consumption per capita grows at some 2% per year, with a moderate pro-poor and pro-rural bias, reflecting the composition of endowments for the different household types:[10] (i) the higher the quartile to which a household belongs, the larger the income shares for capital and relatively educated labor, and the smaller the importance of the least educated labor segment; and (ii) only rural households own land, with larger per-capita endowments for the upper two quartiles.

During the simulation period, the composition of the labor force and employment is changing toward a higher average level of education (Table 3). Employment for the least educated grows at 4.3% per year as opposed to 5-6% for the two more educated labor types. In terms of the labor force (as opposed to employment), the growth contrast is

[8] The model allows for the existence of labor unemployment. As long as unemployment is above the minimum level, the labor supply cure is upward-sloping: employers can hire the desired quantity at a reservation wage that is inversely related to the unemployment rate. As a result, the impact of changes in labor demand is spread across wages and employment (as opposed to formulations with a fixed unemployment rate, under which wages would fully absorb demand- [and supply-] side shocks). Reliable data for unemployment are not available; in the context of the model, unemployment should be seen as also covering underemployment. The model database assumes considerable unemployment (30%) for the least educated and largest segment of the labor force (those with less than completed secondary) and more moderate rates for those with more education (10%). The minimum rate is 5% for all segments.

[9] After consultation with experts, the total (agricultural) land supply is set to grow at an exogenous rate of 1% per year, a rate that is lower than the recorded growth rate of 2.2% for the period 1990-2004 – this reflects our assessment that land supply growth will be considerably lower in the future. Private capital growth is driven by private investment which is determined by the availability of financing (the sum of private savings and FDI), net of government borrowing.

[10] The essay uses real household consumption per capita as the indicator of consumption-related household welfare. Equivalent variation (EV) results are computed but not reported since they generate the same results in terms of rankings of welfare outcomes across simulations and household types.

sharper due to a relatively strong reduction in unemployment (or underemployment) for the least educated: annual labor force growth for this group is at 3.2% as opposed to 5.5-5.6% for labor with higher education. In the private sectors, employment of labor grows at a rate slightly below the economywide rate of 4.4%. Growth in capital use grows at around 5% per year. For government services, factor employment growth rates are 1.0-1.5 percentage points higher – in the absence of TFP growth, more rapid growth is needed to maintain real GDP growth rates that are similar to those of the private sector. The fact that private capital also is used in what is labeled as "government services," is due to that, inter alia, part of health and education is owned by the private sector.

Among the MDGs, the BASE results are sufficient to generate substantial improvements, not only for MDG 2 (the net primary school completion rate), but also for MDGs 1 (poverty)[11] and 4 (the under-five mortality rate) and, to a lesser extent, for 7a (access to safe water).[12] With the exception of MDG 1, however, the modeled MDGs are not achieved by 2020 (thus neither by 2015), reflecting the fact that the growth rates for the MDG outcome determinants (including relevant services, per-capita consumption and the availability of public infrastructure) are insufficient.[13]

At a more disaggregated level, real GDP growth is also quite uniform, in the range of 5-7% per year, with the above-mentioned exception for higher education (Table 2). Growth

[11] In our poverty and inequality analysis, we pass on selected MAMS results to a micro simulation module that uses the 2002/2003 Uganda National Household Survey as its starting point

[12] Due to data limitations, the model does not consider the MDGs for maternal mortality and sanitation (MDGs 5 and [part of] 7, respectively).

[13] For the MDGs explicitly covered in this paper, the 2015 targets (which for most indicators depend on the situation in 1990) include a headcount poverty rate of 28% (MDG 1; half of the 1990 rate), a 100% net primary completion rate (MDG 2), an under-five mortality rate of 5.3% (MDG 4; one third of the 1990 rate), a 72% rate of access to safe water (MDG 7; a cut by half for the population share without access).

in agriculture is below average due to the tendency of households to reduce the share of agricultural commodities in their consumption basket as incomes increase. GDP growth in transportation services and agriculture is influenced positively by the endogenous TFP impact of growth in government capital stocks in roads and services to agriculture – annual TFP growth in agriculture is 1.4% and as high as 8% for transportation services, as compared to 1.2% for other private sectors. For all private sectors, there is also a positive relationship between TFP and increased openness (measured by the share of the sum of exports and imports in GDP); however, under the BASE scenario, openness does not change much over time. In government sectors, TFP growth is exogenous and set at zero for the BASE scenario. The distributional consequences of alternative growth patterns in the simulations that follow are largely explained by the pattern of factor use across activities. In terms of value-added shares, land and the least educated labor segment are intensively used in agriculture, capital in industry and transportation services, and more educated labor in government services. Other private services are moderately intensive in capital and relatively educated labor. (See Table A.5. for information about factor shares within and across activities.)

Annual growth rates for real exports and imports, both aggregated and disaggregated, are in the range of 6-7%. Non-trade sources of foreign exchange earnings and outlays are either exogenous or driven by policy (including the policy of maintaining a certain foreign debt – GDP ratio), in effect defining the required trade balance (in foreign currency). The real exchange rate (which depreciates at an annual rate of 0.2%) influences export and import volumes, assuring that this trade balance is realized.

Table 4 summarizes the changes in economic structure between 2003 (according to the model database) and 2020 (according to the BASE simulation). In 2003, agriculture and private services (disaggregated into transportation and other private services) represented the largest parts of value-added (both at 32%), followed by industry (at 21%), with the remaining part of GDP (15%) represented by government services. The fact that, for industry, as opposed to the other sectors, the production share is larger than the value-added share indicates that it has stronger backward linkages to other sectors (value-added is a smaller share of its output value). Agriculture is dominant in terms of employment whereas trade (both exports and imports) is dominated by industry. Under the BASE simulation, the structure in 2020 is quite similar. The main changes are a growing share of nominal value-added for government services and a declining share for transportation, the latter a response to rapid productivity growth for a sector that is limited to selling its output in the domestic market. The changes in value-added shares are accompanied by changes in nominal output and employment shares in the same direction in the different service sectors. For agriculture, slow growth in land supply and rapid growth in land rents is behind the increase in its share in nominal value-added (relative to its nominal output value) and a switch to a larger employment share; in *real* output terms, agriculture grows more slowly than most other sectors. For industry, the relative changes in shares for nominal value-added, nominal output, and employment are the opposite due to relatively rapid supply growth and relatively slow rent growth for private capital, its only non-labor factor.

Micro simulation on the basis of these results confirms that the development under BASE is slightly pro-poor: the lower percentile income groups seem to experience higher relative income growth than the upper percentile groups (see figure 1). Also entropy-based income inequality measures like Gini coefficient and Theil measure witness a slight decrease in inequality of income distribution. However, changes are rather small. Figure 2 shows that the decrease in inequality is concentrated in the latter half of the simulation period, as the average educational level of labor force increases and unemployment decreases.

ALTERNATIVE PATTERNS FOR SECTORAL PRODUCTIVITY GROWTH

The first set of experiments (defined in Table 5) addresses the impact of alternative patterns of accelerated productivity growth for the private sector, which, as noted above, is disaggregated into agriculture, industry, transportation services, and other private services. The scenarios do not address the costs of achieving these productivity gains. To the extent that government resources are needed, it is implicitly assumed that these can be mobilized by reducing spending in non-productive areas. The results are summarized in Tables 1-3.

In the first simulation, TFP-AGR, the exogenous component of TFP growth in agriculture is increased by 1.8% per year. This is a doubling of this component relative to the BASE scenario, under which total agricultural TFP growth was slightly higher (at 2.0%) due to

some positive, endogenous developments (primarily expansion of roads and government services to agriculture).

As expected, more rapid productivity growth in agriculture has a positive impact on growth in total GDP and absorption (i.e., total domestic final use or demand; the sum of private and government consumption and investment), both of which record annual growth increases of around 0.5% (Table 1). Given minimal changes in government demand, the absorption increase benefits private consumption and investment. As a result of higher private consumption and incomes, the poverty rate declines significantly (by 3 %-age points); minor improvements are realized for other MDGs. At the sector level, agricultural growth increases by more than 0.7% per year while other private sectors see their growth increase by around 0.5% (Table 2). As a result of higher private incomes and output levels, there is also some expansion in non-government demand for "government" services (with non-government producers contributing to the supply of some of these services), complementing government spending on these sectors.[14] The initial supply increase for agriculture (due to more rapid productivity growth) puts downward pressure on agricultural output prices and value-added, reducing agricultural production incentives and factor demands. As a result, wage growth expands less rapidly or is stagnant for factors that are intensively used in agriculture, especially if they are immobile.[15] This explains why land rent growth is unchanged and why the factor with the second lowest rate of wage growth is the least educated segment of the labor force. Accordingly,

[14] On the other hand, in education, the government may also have to increase its spending to maintain targeted resource levels per student to the extent that enrollment increases. This explains the minor increase in government spending on tertiary education under the scenario TFP-AGR.
[15] See Table A.5 for data on the shares of factor payments within each production activity and, for each factor, across all production activities.

employment growth in agriculture is lower for this than for the following scenarios. Migration of agricultural workers to other sectors mitigates their wage losses – the outcome would be less favorable to the least educated workers in agriculture if such migration were not possible. Given these wage developments, welfare improvements are slightly stronger for urban and better-off households.

This outcome is conditioned on the assumption that an increase in the proportion of output that is exported leads to efficiency losses and that, given this, very strong domestic demand growth would be needed to dispose of additional output without losses in profitability.[16] Although this is not an unreasonable assumption, it may also be possible to target productivity and output gains to agricultural products that easily can be sold abroad. To test the impact of this aspect, a second simulation, TFP-AGR-PT, was designed. It is identical to TFP-AGR except that it is now assumed that agricultural output is perfectly transformable between exports and domestic sales. For this simulation, the exogenous increase in agricultural TFP growth is the same as for TFP-AGR. Compared to the results for TFP-AGR, agricultural GDP and exports expand by an additional 0.3 and 3.6 %-age points per year. At the macro level, GDP and other indicators grow slightly more rapidly. Among the factors, the strongest gain in wage growth is for land followed by the least educated labor segment. For private capital, rent growth is slower, reflecting the combined impact of expanded supplies due to more investment and the low capital-intensity in agriculture. Outside agriculture, growth declines slightly for industry (since it now faces higher labor wages and higher prices for

[16] In other words, the default assumption is that each sector with both exports and domestic sales can allocate its output between these destinations along a concave transformation or production possibility curve.

intermediate inputs from agriculture) whereas private service growth is largely unchanged. Among the households, all groups gain slightly, in particular rural and low-income households. The MDG indicators are slightly stronger with the exception of MDG 2, for the latter reflecting the fact that wage incentives for continued education (measured by changes in the ratio between wages for workers with secondary and less than secondary education) are weakened.

The next simulation, TFP-IND, boosts TFP growth in industry, a sector that accounts for a large share of total value-added of capital and, to a lesser extent, labor with secondary education. The addition to TFP growth for industry is the same as for agriculture except for a scaling factor that is designed to assure that growth in real GDP at factor cost is the same for the different TFP simulations. In this case, given that in 2003 industry had a smaller value-added share than agriculture, the adjustment factor raises the growth push. Since we consider penetration of industrial export markets more difficult, we retain the assumption that industrial output is imperfectly transformable between the domestic market and exports. Given that real GDP grows at the same rate as for TFP-AGR, the growth changes for other macro aggregates relative to BASE are very similar to those of TFP-AGR. However, among the sectors and the factors, the patterns of change are different. The acceleration in GDP growth is strongest for industry. Land and, to a lesser extent, labor with less than secondary education enjoy stronger wage growth than under TFP-AGR whereas wage growth declines significantly for private capital and moderately for the two more educated labor segments. For all household groups, the changes are similar to TFP-AGR, i.e. moderate and uniformly positive.

Under the simulation TFP-PSER, additional TFP growth is instead targeted to transportation services and other private services, the aggregate of which account for large shares of the value-added of private capital and labor with secondary and tertiary education. The macroeconomic growth changes follow the same pattern as for the previous simulations. Compared to BASE, GDP growth in the targeted private service sectors accelerates most rapidly while the growth gain are significant also for agriculture and industry GDP growth expands more in industry than in agriculture, among other things reflecting that, compared to agriculture, the industrial sector has stronger backward and forward linkages to private services, under this scenario benefiting from larger private service demand for intermediate inputs and lower prices for the private services that it itself uses as intermediate inputs.[17] Following the same pattern as before, the strongest rent gain is for land (a factor that is not used in services) whereas the weakest gain is for capital, a factor for which private services represent a relatively high demand share. Among the labor factors, the least educated segment benefits the most. At the household level, welfare changes are quite uniform also for this scenario.

The final simulation in this set, TFP-PALL, spreads the boost to productivity growth across all private sectors (agriculture, industry and services); it retains the assumption that agricultural output is perfectly transformable between exports and domestic sales. In order to generate an increase in total GDP growth that is the same as for TFP-AGR, the productivity boost for each sector is more limited. The gains in GDP growth are quite

[17] Agriculture has limited backward links to other sectors – most of the output value is value-added whereas intermediate input use is quite limited. Agriculture has relatively strong forward links to industry (processing of agricultural outputs), promoting growth in the sector under the scenario TFP-IND.

even across all private sectors except for agriculture, for which the gain is smaller. The disaggregated improvements in factor wages and household per-capita consumption are also quite uniform.

The results from micro simulation analysis show that poverty reduction is faster than under BASE for all the above scenarios. The more exportable the agricultural production is, the faster the poverty reduction. However, the largest decreases in poverty are induced by scenarios where productivity increases in other than primary sector (see figure 3). The development of income inequality differs as well according to which sector experiences the TFP growth, resulting in less equality under scenarios with TFP growth outside agriculture.(see figure 4)

In sum, the main finding of the first set of simulations is that, given the constraint imposed by limited domestic market growth, the factors that are concentrated in the sectors for which TFP growth expands see their wages improve by significantly less than other factors unless the targeted the targeted sector has easy access to export markets. This finding is particularly pertinent to agriculture since the sector suffers from the fact that, compared to other private sectors, it faces weak responses in household demand as incomes increase (due to low income elasticity for the agricultural commodity) and has the highest dependence on the domestic market. Somewhat paradoxically, unless agricultural exports easily can expand, the returns to factors that are intensively employed in agriculture (which are disproportionately owned by rural and poor people) grow considerably more rapidly if TFP grows more rapidly outside of agriculture or across all

sectors, agricultural and non-agricultural. In light of this and given the important role of agriculture for the livelihood of poor people in Uganda, a multi-pronged approach to poverty reduction may encourage growth in (i) agricultural subsectors with good export prospects; (ii) industries that use processed agricultural products; and (iii) the parts of the transportation and other services sectors that facilitate low-cost access to agricultural markets abroad and at home and to inputs used in agricultural production. In contrast to this, poverty reduction would not be served by higher productivity in the production of basic foodstuffs destined for domestic markets. For operational purposes, these general conclusions need to be complemented by more detailed analyses at a more disaggregated level.

GOVERNMENT SPENDING: ALLOCATION AND EFFICIENCY

In the second set of scenarios (defined in Table 6), we address questions regarding the consequences of (i) alternative allocations of government spending across different functions, including HD, infrastructure and non-productive activities; (ii) increased government efficiency; and (iii) scaled-up programs with and without additional foreign aid. The results are summarized in Tables 7-8.

Under the first scenario, INFCUT, government investments in the infrastructure area (agriculture and roads) are cut sufficiently to generate a 90% cut in the growth of the government capital stocks in this area starting from 2005 (to a growth rate of 0.6% per year).[18] The resources that are freed up (within fiscal space limits) are allocated to spending on MDG-related HD (primary education, health and water), via a uniform scaling up of their growth rates in each year.

The size and direction of the different effects of these changes are of interest even if many of the effects are quite limited given the fact that total spending (in the government budget) on agriculture and roads are small, just below 2% of GDP, relative to spending on MDG-related HD (5.3% of GDP). The growth rates for MDG-related HD spending increase by 0.5-0.8% per year. This reallocation of government spending priorities results in a decrease in real GDP growth of 0.4% per year (instigated by productivity loss in the agricultural and transportation sectors due to slower growth in government infrastructure capital stocks), leading to similar decreases in total absorption, private consumption, and private investment. This decline in household income and consumption growth reduces tax revenues and creates a need for a slight increase in government spending on higher education (to maintain quality in the face of less household spending on the sector), reducing the scope for increases in MDG-related HD spending. HD spending is more heavily oriented toward consumption relative to infrastructure spending. As a result, growth in total government consumption accelerates marginally compared to BASE whereas growth in total government investment slows down considerably. In factor markets, wage growth decelerates across the board (by 0.2-0.4%). Among the MDGs,

[18] For the full simulation period, the annual growth rate in these capital stocks is slightly higher, at 0.9%, due to the influence of higher investments in the base year.

progress is noticeably weaker for MDG 1 with smaller changes for the other MDGs (more progress for MDGs 2 and 7 but less for MDG 4.[19]

We further explored the trade-offs between HD and infrastructure spending in a series of simulations where we, starting from 2005, gradually varied the exogenous real growth rate for government infrastructure capital stocks between -90% and +90% compared to BASE, with endogenous adjustments in MDG HD spending within fiscal space limits, i.e. the simulation INFCUT provided the first in a series of simulations. More rapid growth in HD services has a direct and positive impact on HD MDG outcomes. On the other hand, infrastructure capital stocks raise TFP in the different production activities, with a positive impact on growth in GDP and private consumption and mitigating the negative HD impact of less direct government spending on HD services. However, the marginal returns from increased infrastructure capital stocks are also diminishing and slower growth in the more educated segments of the labor force reduces GDP growth. The results, reflecting the combined impact of these effects, are summarized in Figure 5, which shows alternative outcomes for 2020; the base scenario generates goal achievements of 139% and 73% for poverty and HD MDGs, respectively.[20] When growth in infrastructure services is increased by 90%, the degree of goal achievement is only 53% for a non-weighted average of the three HD MDGs but as high as 142% for MDG 1 (poverty). At the opposite extreme, when infrastructure growth is cut by 90%, the degree of goal achievement for the average HD MDG goal achievement reaches 75% while

[19] For MDGs 2 and 4, this reflects the combined impact of more government services, less real household spending on these services, reduced access to road infrastructure.
[20] In Figure 1, the share of goal achieved was by definition 0% in 1990 and would be 100% in 2015 for an MDG that is achieved in full. For MDG 2, defined by the net primary completion rate, the 1990 figure is not available. The computation of goal achievement in 2020 is based on the 2003 figure and the 2015 goal.

MDG 1 declines to 129%. When moving from the scenario with the lowest growth in infrastructure to the one with the highest growth, annual growth in GDP and household consumption increase by 0.5-0.6%. In Figure 1, the trade-off curve becomes horizontal (signaling no further improvements in HD) approximately when the cut in infrastructure growth reaches 45%; when shifting spending in the opposite direction, the curve becomes steeper but does not turn vertical (i.e., the marginal decline in poverty decreases but does not reach zero) within the range the current simulation.

HD and infrastructure spending may both be classified as "productive" since they contribute positively to development outcomes (albeit with scope for efficiency improvements). On the other hand, the residual government function "other government" (55% of total government spending in 2003) is in part made up of activities that are unproductive and therefore could be cut, freeing up resources for productive use elsewhere in the economy (e.g. administrators that enforce regulations without any positive impact on economic performance). However, it also includes activities that may be vital to the general well-functioning of the government administration and much of the rest of the economy (such as maintaining the judicial system and limiting the scope and incentives for corruption).

For the scenario OGOVCUT, we assume that it is possible to cut growth in the government's consumption of "other government services" by half, to 3.1% per year, without any negative repercussions, reflecting a gradual curtailment of the part of these services that are unproductive. Detailed analysis of the government administration would

be needed to identify such activities and determine whether this assumption is realistic. The resources that are released are used to expand both MDG-related HD and infrastructure services.

Annual growth rates in HD and infrastructure services increase by approximately 2-3 %-age points under OGOVCUT. Among government final demands, investment growth is boosted relative to consumption growth; this reflects that "other government," which was cut, is tilted towards recurrent spending. Annual GDP growth is 0.2% higher, primarily due to more rapid growth in infrastructure, and a similar expansion in private consumption and investment. MDG indicators improve significantly across the board.

The efficiency with which government resources are utilized has a direct influence on the achievement of economic objectives (unless foreign aid is unlimited). Under the scenario GOVEFF, we assume that government efficiency improves by 1% per year; i.e., compared to the previous year, it is in any given year possible to provide the same service level with 1% less of labor, capital, and intermediate inputs.[21] As in the preceding simulations, the savings are used to expand spending on HD and infrastructure.[22]

As expected, the effects are salubrious. Real growth in GDP increases by 0.4% per year whereas total real government consumption and investment increase by 0.8 and 2.4 %-

[21] Note that, although this has a positive impact on services produced by the government (like health, education, and infrastructure maintenance), this is not assumed to change the efficiency of investments, including the input needs when producing public infrastructure (since the production of this capital is not carried out by the general government).

[22] Under both GOVEFF and OGOVCUT, the government is able to consume and invest more in high priority areas. The main difference between the two scenarios is that, under GOVEFF, the source is increased government productivity whereas, under OGOVCUT, it is thanks to the fact that the government is able to reduce consumption and investment in unproductive areas.

age points per year, respectively. The annual growth gains in the HD and infrastructure areas are 2-3%. Growth also expands for higher levels of education as more students proceed from the primary level. For the private sector, real consumption and investment increase by around 0.1-0.2%. All MDG indicators improve with gains that are similar to those under OGOVCUT.

The main message that emerges from the simulations reported up to this point is that, within a given foreign aid envelope, switching spending between HD and infrastructure involves trade-offs, i.e. there is no scope to make progress along one dimension without hurting the other. On the other hand, if the government is able to cut down on its unproductive activities and/or raise its over-all efficiency, then it can expand in all high priority areas and make more rapid progress across the full range of MDGs, however still without fully achieving them by 2015.[23] Trade-offs are still present but it may be easier to address these in a setting where there is room for a general expansion of productive government services.

FOREIGN AID AND GOVERNMENT SERVICE EXPANSION

What are the likely effects of more rapid increases in foreign aid? In the absence of more foreign aid, what are the consequences of more rapid expansion of government spending? In order to respond to these questions, we constructed two scenarios. Under the first,

[23] Of course, the fact that across-the-board improvements are possible does not remove the need for the government to face trade-offs and identify the allocation of government spending across functions that, given its effects on different objectives, is considered "optimal."

FGEXP, we double the increase in foreign aid in each year (2004-2020). This additional foreign aid is entirely in grant form and the resources are used for HD and infrastructure spending. Under the second scenario, TAXEXP, we impose the same increases in real government service and capital stock growth but, in the absence of additional foreign aid, we finance this expansion with an increase in direct taxes.

The addition to foreign aid under FGEXP has a positive impact on all components of domestic final demand (absorption). For the government, demand growth is particularly strong for investment (increases by close to 3%) as capital stocks have to grow to accommodate increased service production in the absence of any efficiency gains (as was the case for the simulation GOVEFF). The increase in foreign aid increases the trade deficit that Uganda can accommodate, leading to exchange rate appreciation that brings about slower export growth (by 1.0 %-age points) and more rapid import growth (by 0.9 %-age points). GDP growth increases by around 0.3%, boosted by more rapid growth in private investment and more rapid expansion for the educated labor force. Together, the combined impact of increases in GDP growth and the trade deficit is an increase in absorption growth of 0.6 %-age points per year. On the private side, consumption and investment growth both expand by an additional 0.4-0.5% compared to the base scenario. The scenario has positive effects on all MDG indicators that are similar to those of the GOVEFF scenario.

Under the last scenario, TAXEXP, the same real expansion in government service demand is financed with a direct tax increase, imposed on the upper two quartiles in rural

and urban areas; foreign aid and the trade deficit are maintained at the same levels as the BASE scenario. Compared to BASE, in 2020, the required increase in the tax burden exceeds 7% of GDP. Higher taxes give rise to declines in private consumption, and investment growth by 0.5-0.7 %-age points while growth in GDP and absorption are unchanged, a reflection of that the decline in private capital stock growth is counterbalanced by positive productivity effects of government spending on HD and infrastructure.

Growth in land rents declines by 0.3 %-age points and labor wage growth by less whereas private capital returns increase by 0.4%-age points (as private capital becomes scarcer due to the slowdown in private investment). The distributional consequences for this scenario is driven by the tax policy – in per-capita terms, the bottom two quartiles register no change in consumption whereas consumption declines by 0.4 %-age points per year for the top two quartiles. Compared to FGEXP, this scenario brings about similar (but slightly weaker) improvements in water, health and education MDGs whereas the outcome for the poverty MDG is much weaker; poverty increases also compared to the BASE.

Micro simulation analysis confirms a greater spread of impacts on poverty and income discribution. In addition, scenarios that are effective in reducing headcount poverty are not necessarily the ones that even out the income distribution most. However, TAXEXP stands out as the most unsuccessful even in these terms (figures 6 and 7).

Figure 8 summarizes the poverty and income distribution effects of all the above simulations in relation to BASE. The scenarios that are successful in reducing both income inequality and poverty have in common the increase in efficiency outside agriculture: services, industry or government services. When TFP growth in concentrated in agriculture, poverty decreases more than under BASE, but inequality is marginally more pronounced.

All in all, these scenarios show that attempts to let the government grow more rapidly in the absence of a parallel increase in foreign aid brings difficult trade-offs to the fore: human development services and the stocks of public infrastructure capital increase more rapidly while the private sector is left with less resources for its consumption and investment.[24]

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[24] We carried out an additional simulation that differed from TAXEXP in that the government expansion was financed by additional domestic government borrowing (instead of direct taxes), more directly crowding out domestic private investment. Compared to the TAXEXP, the slow-down in growth is by 0.4 %-age points for GDP, 0.2 for private consumption, and 2.2 for private investment.

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APPENDIX – DESCRIPTION OF MAMS

MAMS is an economywide simulation model that the World Bank has developed to analyze development strategies in different countries with an emphasis on issues related to poverty reduction and human development, including the achievement of the Millennium Development Goals (MDGs). Strategies for poverty reduction and the achievement of the broader set of MDGs typically have strong effects throughout the economy that feed back on poverty and human development through markets for labor, goods, services and foreign exchange. Therefore, economywide strategy analysis is a necessary complement to sectoral studies.

MAMS integrates a mostly standard (recursive) dynamic computable general equilibrium (CGE) model with an additional MDG module that links specific MDG-related interventions to MDG achievements. Standard model features include production decisions are driven by profit maximization, flexible prices clearing most markets, and imperfect substitutability/transformability in foreign trade – imports are imperfect substitutes for domestic commodities on the demand side whereas, on the supply side, outputs are imperfectly transformable between domestic sales and exports. One deviation from this is that the model permits the option of unemployment, with a lower limit for the unemployment rate and a minimum (reservation) wage that is sensitive to the level of unemployment and economywide changes in factor rents and wages.

The disaggregation of the model (and its database) is relatively detailed in terms of sectors linked to MDGs. Accordingly, education is disaggregated into three cycles (or levels) and the model also includes individual sectors for health, agricultural support, roads, government water services, and a residual sector for other government services. Outside the MDG and/or government sphere (a total of 10 sectors), the model includes 9 sectors in agriculture, seven in industry, and six industry.[25] Each sector consists of an activity and a commodity, the output produced by the activity. The only exception is petroleum, which only has imports. Activities use production factors, and intermediate inputs to produce an activity-specific output (in the case of the government, different types of services). Production decisions are driven by profit maximization. The factors of production include three types of labor (disaggregated by level of educational achievement), a private capital stock and, for activities that, fully or in part, are operated by the government, function-specific government-owned capital stocks.

The government finances its activities from domestic taxes, domestic borrowing, and foreign aid (borrowing and grants). Provision of selected government services (including education and health) contribute directly to the MDGs. Changes in the capital stocks of government services in agriculture and in roads influence total factor productivity (TFP) in selected activities (all private agricultural activities and transportation services, respectively). Apart from the government, the institutions of the economy include one or more households (here disaggregated into rural and urban and by quartile in each region), the rest of the world and an NGO (representing domestic non-profit institutions).

[25] The MAMS framework permits the rest of the economy (representing agriculture, industry, and other private services) to be aggregated to a single sector or highly disaggregated. The preferred degree of disaggregation depends on the analytical context and data availability.

The model is intended to capture key interactions between the pursuit of the MDGs and economic evolution. To keep it relatively simple and given data constraints, it tries to focus on the ones with the greatest cost and the greatest interaction with the rest of the economy. In this case, the MDGs covered are universal primary school completion (MDG 2; measured by the net primary completion rate), reduced under-five (MDGs 4 and 5), and increased access to improved water sources (part of MDG 7). We also address achievements in terms of poverty reduction (MDG 1). Due to a lack of data, the current application does not explicitly address MDGs 5 (maternal mortality), 6 (HIV/AIDS and other major diseases), and sanitation access (also part of MDG 7). However, in the health area, the data are based on a comprehensive program that also yields comparable gains for other health MDGs.

These different MDGs are covered in an additional set of functions that link the level of each MDG indicator to a set of determinants. The determinants include the delivery of relevant services (in education, health, and water-sanitation) and other indicators, also allowing for the presence of synergies between MDGs, i.e. the fact that achievements in terms of one MDG can have an impact on other MDGs. Outside education, service delivery is expressed relative to the size of the population. In education, the model tracks base-year stocks of students and new entrants through the different cycles. In each year, students will successfully complete their grade, repeat it, or drop out of their cycle. Student performance depends on educational quality (quantity of services per student), household welfare (measure by per-capita household consumption), the road

infrastructure, wage incentives (expressed as the ratio between the wages for labor at the next higher and current levels of education for the student in question; an indicator of payoff from continued education), and health status (proxied by MDG 4). The achievement of MDG 2 requires that (very close to) all students in the relevant age cohort enter the primary cycle and successfully complete each year within this cycle. The functions for education and the other MDGs have been calibrated to assure that, under base-year conditions, base-year performance is replicated and that, under a set of other conditions identified by sector studies, the target is fully achieved.

At the macro level, the rest-of-world (foreign exchange) balance is invariable cleared via variations in the real exchange rate. The government balance is cleared via adjustments in one of the following variables: direct taxes, domestic borrowing, foreign borrowing, or foreign grants. In the savings – investment balance, government savings, foreign savings, and government investment are not free to vary (i.e., they are determined by policy or other relationships). The balance is either cleared by variations in private investment (if private savings are fixed or expressed as a function of per-capita incomes) or private savings (if private investment is fixed as a share of absorption).

Table 1. Summary of results - base and TFP simulations

Indicator		2003	Simulations*					
			base	tfp-agr	tfp-agr-pt	tfp-ind	tfp-pser	tfp-pall
		bn	% annual growth					
Real macro	Absorption	13,484	6.0	6.4	6.5	6.4	6.4	6.4
	Private consumption	9,232	5.7	6.2	6.3	6.2	6.2	6.2
	Government consumption	1,799	7.1	7.1	7.0	7.0	7.0	7.0
	Private investment	1,903	6.0	6.6	6.7	6.8	6.6	6.7
	Government investment	553	6.1	6.1	6.1	6.1	6.1	6.1
	Stock change	-3						
	Exports	1,463	7.0	7.7	8.0	7.7	7.6	7.5
	Imports	3,088	5.7	6.2	6.4	6.3	6.2	6.1
	GDP at factor cost	10,871	6.1	6.571	6.639	6.6	6.6	6.6
	Real exchange rate index	100	0.2	0.4	0.0	0.1	0.2	0.4
		bn	% annual growth					
Real government services	Primary education	260.2	4.9	4.7	4.7	4.7	4.7	4.7
	Secondary education	75.2	14.3	14.0	13.9	13.8	13.7	13.9
	Tertiary education	85.7	12.9	12.7	12.5	12.4	12.3	12.5
	Health	192.3	6.2	6.2	6.2	6.2	6.2	6.2
	Water	2.9	6.2	6.2	6.2	6.2	6.2	6.2
	Agriculture*	15.6	6.2	6.2	6.2	6.2	6.2	6.2
	Roads*	57.6	6.2	6.2	6.2	6.2	6.2	6.2
	Other government	1,109.6	6.2	6.2	6.2	6.2	6.2	6.2
		% of GDP	% of GDP in final year					
Government revenue	Taxes	11.3	14.4	13.5	13.4	13.0	12.8	13.0
	Foreign aid	11.3	11.0	10.9	10.5	10.6	10.7	11.1
		'000	% annual growth					
Factor wages or rents	Labor -- <secondary education	0.3	1.7	1.8	2.0	2.0	2.0	1.8
	Labor -- secondary education	2.9	0.2	0.5	0.5	0.4	0.3	0.4
	Labor -- tertiary education	9.4	0.5	1.1	1.1	0.8	0.7	0.9
	Land	0.1	5.3	5.3	5.8	6.1	6.0	5.5
	Private capital	0.2	0.4	0.9	0.7	0.1	0.4	0.6
		'000	% annual growth					
Real household consumption per capita	Rural	281.7	2.1	2.6	2.7	2.6	2.6	2.6
	Urban	901.9	1.9	2.5	2.5	2.4	2.4	2.5
	Quartiles 1-2	168.1	2.2	2.6	2.8	2.7	2.6	2.6
	Quartiles 3-4	547.5	2.0	2.5	2.6	2.5	2.5	2.5
	Total	357.8	2.1	2.6	2.7	2.6	2.6	2.6
		%	% in final year					
MDG indicators**	1 (headcount poverty	37.7	17.2	14.4	13.3	13.5	13.2	14.1
	2 (primary completion)	15.5	76.0	76.7	76.4	76.2	76.1	76.3
	4 (Under-5 mortality)	14.0	7.9	7.6	7.6	7.6	7.6	7.6
	7a (Improved water access)	56.0	64.0	64.2	64.2	64.2	64.2	64.2
		%	value					
Inequality indicators	Gini coefficient, %	42.7	41.8	42.3	42.0	41.7	41.6	42.0
	Theil measure * 100	34.9	33.4	34.1	33.7	33.2	33.1	33.7

The simulations are defined in Table 5.

*Measured by the size of the capital stock.

**The 2015 MDG targets are 28.0 for MDG 1, 100.0 for MDG 2, 5.3 for MDG 4, and 72.0 for MDG 7a.

Table 2. Sectoral growth in production and trade -base and TFP simulations

		2003	base	tfp-agr	tfp-agr-pt	tfp-ind	tfp-pser	tfp-pall
Real GDP at factor cost								
Agriculture	a-agr	3522.2	5.4	6.1	6.4	5.8	5.7	5.7
Industry	a-ind	2304.7	6.2	6.7	6.6	7.0	6.6	6.8
Transportation	a-trnsp	386.9	7.7	8.2	8.2	8.2	8.2	8.2
Other private services	a-serprv	3126.3	6.4	6.7	6.7	6.8	7.1	6.9
Primary education	a-edup	238.9	5.0	5.0	5.0	5.0	5.0	5.0
Secondary education	a-edus	190.6	9.0	9.0	9.0	9.0	8.9	9.0
Tertiary education	a-edut	197.5	8.5	8.6	8.5	8.5	8.4	8.5
Health	a-hlth	281.0	6.0	6.2	6.3	6.3	6.3	6.3
Government water services	a-watgov	1.6	6.2	6.2	6.2	6.2	6.2	6.2
Government agriculture services	a-agrgov	8.6	6.2	6.2	6.2	6.2	6.2	6.2
Government road services	a-roads	31.7	6.2	6.2	6.2	6.2	6.2	6.2
Other government services	a-ogov	581.0	6.2	6.2	6.2	6.2	6.2	6.2
Total	total	10871.0	6.1	6.6	6.6	6.6	6.6	6.6
Real exports								
Agriculture	c-agr	276.7	4.9	7.3	10.9	4.0	4.5	0.0
Industry	c-ind	818.8	7.1	7.7	6.9	8.4	7.3	8.2
Other private services	c-serprv	356.5	8.0	7.9	7.4	8.2	9.8	9.0
Other government services	c-ogov	11.0	6.4	5.9	5.3	5.8	6.3	6.3
Total	total	1463.0	7.0	7.7	8.0	7.7	7.6	7.5
Real imports								
Agriculture	c-agr	44.1	5.9	5.8	6.2	6.7	6.5	6.2
Industry	c-ind	1399.7	6.0	6.4	6.7	6.5	6.6	6.4
Petroleum	c-petro	263.9	6.5	6.9	6.9	6.9	7.0	6.9
Transportation	c-trnsp	298.9	5.5	6.1	6.4	6.2	5.7	5.9
Other private services	c-serprv	567.6	4.2	4.8	5.1	4.8	4.6	4.6
Other government services	c-ogov	22.7	6.1	6.3	6.6	6.4	6.2	6.2
Non-competitive imports	c-ncimp	491.0	6.1	6.5	6.5	6.6	6.4	6.5
Total	total	3088.0	5.7	6.2	6.4	6.3	6.2	6.1

The simulations are defined in Table 5.

Table 3. Labor employment and unemployment -- base and TFP simulations

		2003	base	tfp-agr	tfp-agr-pt	tfp-ind	tfp-pser	tfp-pall
EMPLOYMENT					% annual growth			
Labor (all)	**total**	10784.3	4.4	4.5	4.6	4.6	4.7	4.6
('000)	**agriculture**	7476.8	4.5	4.4	4.7	4.9	5.0	4.9
	industry	786.5	4.1	4.9	4.5	3.4	3.6	4.3
	non-government services	2036.2	3.6	4.2	4.0	3.7	3.6	3.4
	government services	484.8	5.5	5.7	5.6	5.4	5.4	5.4
Labor	**total**	10148.1	4.3	4.4	4.5	4.5	4.6	4.5
< Secondary	**agriculture**	7365.2	4.5	4.4	4.6	4.9	5.0	4.8
education	**industry**	738.7	4.0	4.8	4.4	3.3	3.5	4.2
('000)	**non-government services**	1709.1	3.3	3.9	3.7	3.3	3.3	3.0
	government services	335.1	4.7	5.1	4.9	4.6	4.6	4.6
Labor	**total**	377.5	5.6	5.8	5.8	5.8	5.8	5.7
Secondary	**agriculture**	80.1	6.0	5.7	6.1	6.6	6.7	6.5
education	**industry**	33.4	5.6	6.2	5.9	5.0	5.2	5.9
('000)	**non-government services**	217.7	5.2	5.7	5.6	5.4	5.4	5.1
	government services	46.2	6.3	6.4	6.4	6.3	6.3	6.3
Labor	**total**	258.8	6.0	6.0	6.0	6.0	6.0	6.0
Tertiary	**agriculture**	31.6	5.6	5.1	5.5	6.1	6.2	6.1
education	**industry**	14.4	5.2	5.5	5.3	4.5	4.7	5.5
('000)	**non-government services**	109.4	4.9	5.2	5.1	5.0	5.0	4.8
	government services	103.4	7.1	7.1	7.1	7.0	7.0	7.1
Private	**total**	19346.5	5.1	5.4	5.5	5.5	5.7	5.4
capital	**agriculture**	1300.2	5.7	5.2	5.8	6.7	6.9	6.3
(stock value)	**industry**	7609.5	5.2	5.6	5.6	5.1	5.4	5.7
	non-government services	9153.6	4.7	5.0	5.0	5.4	5.4	4.7
	government services	1283.1	6.9	7.0	7.1	7.5	7.5	7.1
Land ('000 ha)	**agriculture & total**	6554.0	1.0	1.0	1.0	1.0	1.0	1.0
UNEMPLOYMENT					% final year			
Labor (%)	**total**	29.1	15.6	14.3	12.7	12.1	12.7	13.8
	< secondary education	30.0	16.2	14.9	13.2	12.5	13.2	14.4
	secondary education	10.0	9.5	6.0	5.7	6.8	7.9	6.8
	tertiary education	10.0	5.3	5.0	5.0	5.0	5.0	5.0

The simulations are defined in Table 5.

Table 4. Structure of Uganda's economy in 2003 and 2020 (base simulation)

	Nominal share (%) of						
	value-added	prod-uction	employ-ment	exports	exports in output	imports	imports in demand
2003							
Agriculture	32.4	23.1	69.3	18.9	4.9	1.4	1.1
Industry	21.2	34.4	7.3	56.0	10.7	45.3	21.5
Petroleum						8.5	100.0
Transportation	3.6	3.1	3.6			18.4	47.6
Other private services	28.8	25.8	15.3	24.4	6.9	9.7	5.9
Primary education	2.2	1.8	1.7				
Secondary education	1.8	1.4	0.2				
Tertiary education	1.8	1.5	0.2				
Health	2.6	2.7	0.6				
Government water services	0.0	0.0	0.0				
Government agriculture services	0.1	0.1	0.0				
Government road services	0.3	0.3	0.1				
Other government services	5.3	5.7	1.7	0.8	1.0	0.7	2.0
Non-competitive imports						15.9	100.0
Total	100.0	100.0	100.0	100.0	6.6	100.0	15.9
2020							
Agriculture	33.7	23.0	71.0	13.6	4.3	1.5	1.1
Industry	20.1	34.9	7.0	56.9	12.8	47.5	21.5
Petroleum						9.6	100.0
Transportation	1.4	2.2	1.5			14.4	49.1
Other private services	27.3	24.6	15.1	28.8	10.0	9.4	5.9
Primary education	2.1	1.6	1.7				
Secondary education	3.1	2.4	0.4				
Tertiary education	3.0	2.3	0.4				
Health	2.8	2.7	0.7				
Government water services	0.0	0.0	0.0				
Government agriculture services	0.1	0.1	0.0				
Government road services	0.3	0.3	0.1				
Other government services	6.0	5.8	2.0	0.7	1.0	0.8	2.0
Non-competitive imports						16.8	100.0
Total	100.0	100.0	100.0	100.0	8.0	100.0	15.8
Difference (2020-2003)							
Agriculture	1.3	-0.1	1.7	-5.4	-0.6	0.0	0.0
Industry	-1.1	0.4	-0.3	1.0	2.1	2.2	0.0
Petroleum						1.1	0.0
Transportation	-2.1	-0.9	-2.1			-3.9	1.6
Other private services	-1.4	-1.2	-0.2	4.5	3.1	-0.3	0.1
Primary education	-0.1	-0.2	0.0				
Secondary education	1.4	1.0	0.2				
Tertiary education	1.2	0.8	0.2				
Health	0.2	0.0	0.1				
Government water services	0.0	0.0	0.0				
Government agriculture services	0.0	0.0	0.0				
Government road services	0.0	0.0	0.0				
Other government services	0.7	0.1	0.3	-0.1	0.0	0.0	0.0
Non-competitive imports						0.9	0.0
Total	0.00	0.00	0.00	0.00	1.35	0.00	-0.17

Table 5. Definitions of simulations with accelerated TFP growth

Name	Description
tfp-agr	increased TFP growth for **agriculture**
tfp-agr-pt	increased TFP growth for **agriculture + perfect transformability of agricultural output** (between exports and domestic sales)
tfp-ind	increased TFP growth for **industry**
tfp-pser	increased TFP growth for **private services** (transportation and other private services)
tfp-pall	increased TFP growth for **all private sectors** (agriculture, industry and private services) + **perfect transformability of agricultural output** (between exports and domestic sales)

Table 6. Definitions of policy, government efficiency and aid simulations

Name	Description
infcut	**90% growth cut for infrastructure** (roads and agriculture) and **expansion of MDG-related HD** within fiscal space limits.
ogovcut	**50% growth cut for other (unproductive) government** and **expansion of infrastructure and MDG-related HD** within fiscal space limits.
goveff	1**% additional growth in government efficiency** and **expansion of infrastructure and MDG-related HD** within fiscal space limits.
fgexp	**doubled foreign aid increase** and **expansion of expansion of infrastructure and MDG-related HD** within fiscal space limits.
taxexp	Same expansion of government as FGEXP and same foreign aid as BASE; **government expansion financed by extra direct taxes**.

Table 7. Summary of results - base and policy simulations

Indicator		2003	Simulations*					
			base	infcut	ogovcut	goveff	fgexp	taxexp
		bn	% annual growth					
Real macro	Absorption	13,484	6.0	5.6	6.2	6.4	6.6	5.9
	Private consumption	9,232	5.7	5.4	5.9	5.9	6.1	5.2
	Government consumption	1,799	7.1	7.2	6.9	7.9	8.2	8.4
	Private investment	1,903	6.0	5.7	6.2	6.2	6.5	5.3
	Government investment	553	6.1	4.2	8.1	8.5	9.0	9.0
	Stock change	-3						
	Exports	1,463	7.0	6.4	7.5	7.6	5.9	7.3
	Imports	3,088	5.7	5.4	6.0	6.1	6.6	5.7
	GDP at factor cost	10,871	6.1	5.8	6.3	6.5	6.5	6.2
	Real exchange rate index	100	0.2	0.1	0.4	0.5	-0.3	0.5
		bn	% annual growth					
Real government services	Primary education	260.2	4.9	5.4	6.9	6.8	7.1	7.1
	Secondary education	75.2	14.3	14.6	15.7	15.0	15.9	16.7
	Tertiary education	85.7	12.9	13.0	14.6	13.8	15.1	15.8
	Health	192.3	6.2	6.9	9.0	9.1	8.9	8.9
	Water	2.9	6.2	7.0	8.8	8.8	8.6	8.6
	Agriculture*	15.6	6.2	0.9	8.8	7.8	8.6	8.6
	Roads*	57.6	6.2	0.9	8.8	7.8	8.6	8.6
	Other government	1,109.6	6.2	6.2	3.1	6.2	6.2	6.2
		% of GDP	% of GDP in final year					
Government revenue	Taxes	11.3	14.4	14.2	14.6	14.7	14.3	21.7
	Foreign aid	11.3	11.0	11.2	11.0	11.1	15.2	10.5
		'000	% annual growth					
Factor wages or rents	Labor -- <secondary education	0.3	1.7	1.4	1.9	2.0	2.0	1.7
	Labor -- secondary education	2.9	0.2	-0.1	0.0	0.1	0.0	-0.1
	Labor -- tertiary education	9.4	0.5	0.3	0.3	0.3	0.5	0.4
	Land	0.1	5.3	4.9	5.6	5.7	5.6	5.0
	Private capital	0.2	0.4	0.2	0.5	0.6	0.4	0.8
		'000	% annual growth					
Real household consumption per capita	Rural	281.7	2.1	1.8	2.3	2.4	2.4	1.7
	Urban	901.9	1.9	1.6	2.0	2.1	2.3	1.3
	Quartiles 1-2	168.1	2.2	1.9	2.4	2.5	2.5	2.3
	Quartiles 3-4	547.5	2.0	1.7	2.1	2.2	2.3	1.3
	Total	357.8	2.1	1.7	2.2	2.3	2.4	1.6
		%	% in final year					
MDG indicators**	1 (headcount poverty	37.7	17.2	19.9	16.1	15.1	14.7	21.7
	2 (primary completion)	15.5	76.0	76.4	89.8	89.9	92.5	91.4
	4 (Under-5 mortality)	14.0	7.9	8.0	6.6	6.4	6.6	6.9
	7a (Improved water access)	56.0	64.0	65.5	73.8	74.1	73.2	72.8
		%	value					
Inequality indicators	Gini coefficient, %	42.7	41.8	41.8	41.6	41.5	41.9	42.1
	Theil measure * 100	34.9	33.4	33.3	32.8	32.6	33.3	33.8

The simulations are defined in Table 6.

*Measured by the size of the capital stock.

**The 2015 MDG targets are 28.0 for MDG 1, 100.0 for MDG 2, 5.3 for MDG 4, and 72.0 for MDG 7a.

Table 8. Sectoral growth in production and trade -base and policy simulations

		2003	base	infcut	ogovcut	goveff	fgexp	taxexp
Real GDP at factor cost								
Agriculture	a-agr	3522.2	5.4	5.0	5.6	5.6	5.5	5.2
Industry	a-ind	2304.7	6.2	5.7	6.5	6.5	6.4	6.0
Transportation	a-trnsp	386.9	7.7	6.0	8.3	8.4	8.2	7.9
Other private services	a-serprv	3126.3	6.4	6.0	6.5	6.6	6.6	6.2
Primary education	a-edup	238.9	5.0	5.3	6.5	6.6	6.7	6.5
Secondary education	a-edus	190.6	9.0	9.1	9.9	9.8	10.1	10.2
Tertiary education	a-edut	197.5	8.5	8.4	9.6	9.4	9.9	10.0
Health	a-hlth	281.0	6.0	6.0	7.3	7.6	7.2	6.8
Government water services	a-watgov	1.6	6.2	7.0	8.8	8.8	8.6	8.6
Government agriculture services	a-agrgov	8.6	6.2	0.9	8.8	7.8	8.6	8.6
Government road services	a-roads	31.7	6.2	0.9	8.8	7.8	8.6	8.6
Other government services	a-ogov	581.0	6.2	6.2	3.2	6.3	6.2	6.2
Total	total	10871.0	6.1	5.8	6.3	6.5	6.5	6.2
Real exports								
Agriculture	c-agr	276.7	4.9	4.1	5.3	5.4	3.4	5.7
Industry	c-ind	818.8	7.1	6.4	7.6	7.7	6.0	7.4
Other private services	c-serprv	356.5	8.0	7.8	8.5	8.6	7.1	8.2
Other government services	c-ogov	11.0	6.4	6.4	3.9	9.4	5.3	6.9
Total	total	1463.0	7.0	6.4	7.5	7.6	5.9	7.3
Real imports								
Agriculture	c-agr	44.1	5.9	5.6	6.0	6.0	6.6	5.3
Industry	c-ind	1399.7	6.0	5.6	6.2	6.2	6.9	5.7
Petroleum	c-petro	263.9	6.5	6.0	6.6	6.6	7.0	6.4
Transportation	c-trnsp	298.9	5.5	5.2	5.5	5.6	6.4	5.2
Other private services	c-serprv	567.6	4.2	5.0	4.0	4.1	4.4	3.7
Other government services	c-ogov	22.7	6.1	6.1	3.0	5.0	6.6	5.9
Non-competitive imports	c-ncimp	491.0	6.1	4.6	7.5	7.7	7.9	7.3
Total	total	3088.0	5.7	5.4	6.0	6.1	6.6	5.7

The simulations are defined in Table 6.

Table 9. Labor employment and unemployment -- base and policy simulations

		2003	base	infcut	ogovcut	goveff	fgexp	taxexp
EMPLOYMENT			% annual growth					
Labor (all)	**total**	10784.3	4.4	4.2	4.4	4.4	4.4	4.2
('000)	**agriculture**	7476.8	4.5	4.3	4.6	4.6	4.5	4.2
	industry	786.5	4.1	3.7	4.3	4.4	4.1	4.2
	non-government services	2036.2	3.6	3.8	3.4	3.5	3.4	3.5
	government services	484.8	5.5	5.4	5.4	5.1	6.3	6.4
Labor	**total**	10148.1	4.3	4.1	4.3	4.3	4.3	4.1
< Secondary	**agriculture**	7365.2	4.5	4.3	4.5	4.6	4.5	4.2
education	**industry**	738.7	4.0	3.6	4.1	4.2	4.0	4.1
('000)	**non-government services**	1709.1	3.3	3.6	3.0	3.1	3.0	3.0
	government services	335.1	4.7	4.7	4.5	4.3	5.4	5.6
Labor	**total**	377.5	5.6	5.5	5.9	5.9	6.1	5.9
Secondary	**agriculture**	80.1	6.0	5.9	6.5	6.5	6.5	6.1
education	**industry**	33.4	5.6	5.2	6.1	6.2	6.0	6.0
('000)	**non-government services**	217.7	5.2	5.2	5.5	5.6	5.6	5.5
	government services	46.2	6.3	6.3	6.5	6.3	7.5	7.5
Labor	**total**	258.8	6.0	5.8	6.2	6.1	6.5	6.4
Tertiary	**agriculture**	31.6	5.6	5.4	6.1	6.2	6.0	5.5
education	**industry**	14.4	5.2	4.7	5.7	5.9	5.4	5.4
('000)	**non-government services**	109.4	4.9	4.8	5.2	5.3	5.1	4.9
	government services	103.4	7.1	7.0	7.2	6.9	8.0	8.0
Private	**total**	19346.5	5.1	5.0	5.2	5.2	5.4	4.8
capital	**agriculture**	1300.2	5.7	5.5	5.9	5.8	6.0	5.0
(stock value)	**industry**	7609.5	5.2	4.8	5.5	5.5	5.5	4.9
	non-government services	9153.6	4.7	4.8	4.6	4.6	4.8	4.1
	government services	1283.1	6.9	6.9	6.6	6.3	7.8	7.3
Land ('000 ha)	**agriculture & total**	6554.0	1.0	1.0	1.0	1.0	1.0	1.0
UNEMPLOYMENT			% final year					
Labor (%)	**total**	29.1	15.6	17.4	13.6	13.0	12.8	15.7
	< secondary education	30.0	16.2	18.0	13.9	13.3	13.1	16.1
	secondary education	10.0	9.5	11.7	11.5	10.5	11.4	13.0
	tertiary education	10.0	5.3	7.3	7.6	7.4	5.8	6.7

*The simulations are defined in Table 6.

Figure 1. Growth Incidence curve for the BASE scenario year 2020

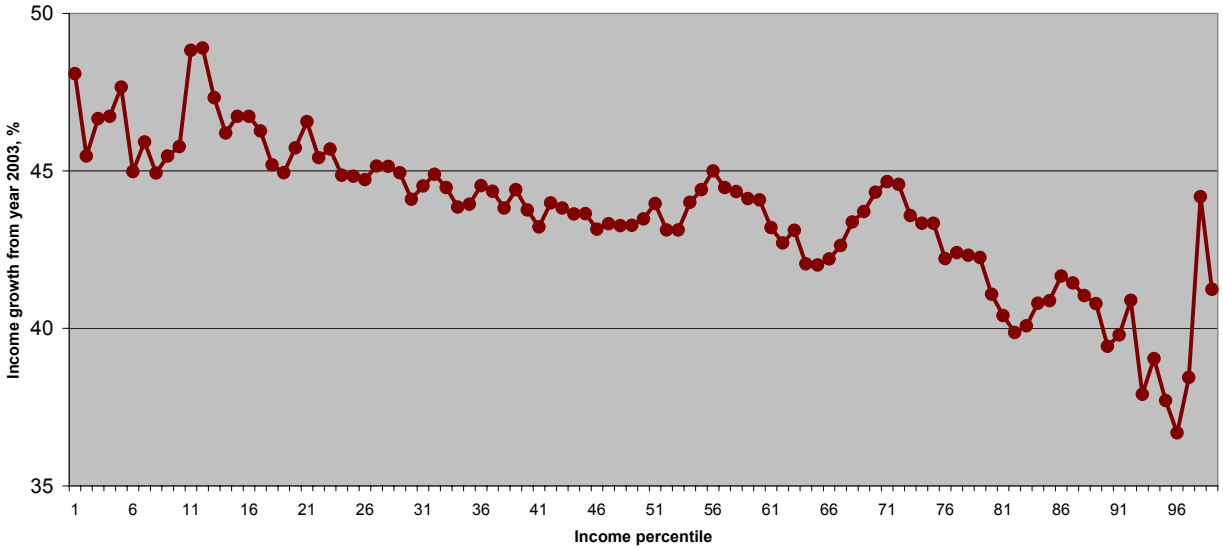


Figure 2. Development of income distribution measures under BASE

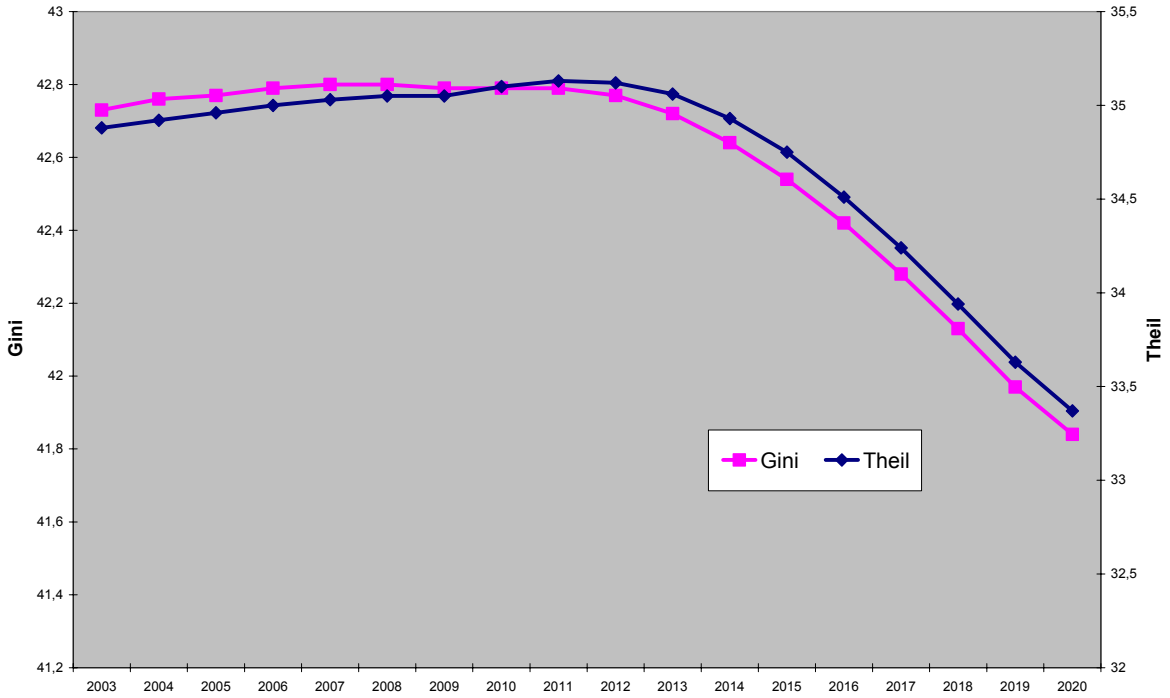


Figure 3. Headcount poverty under TFP scenarios

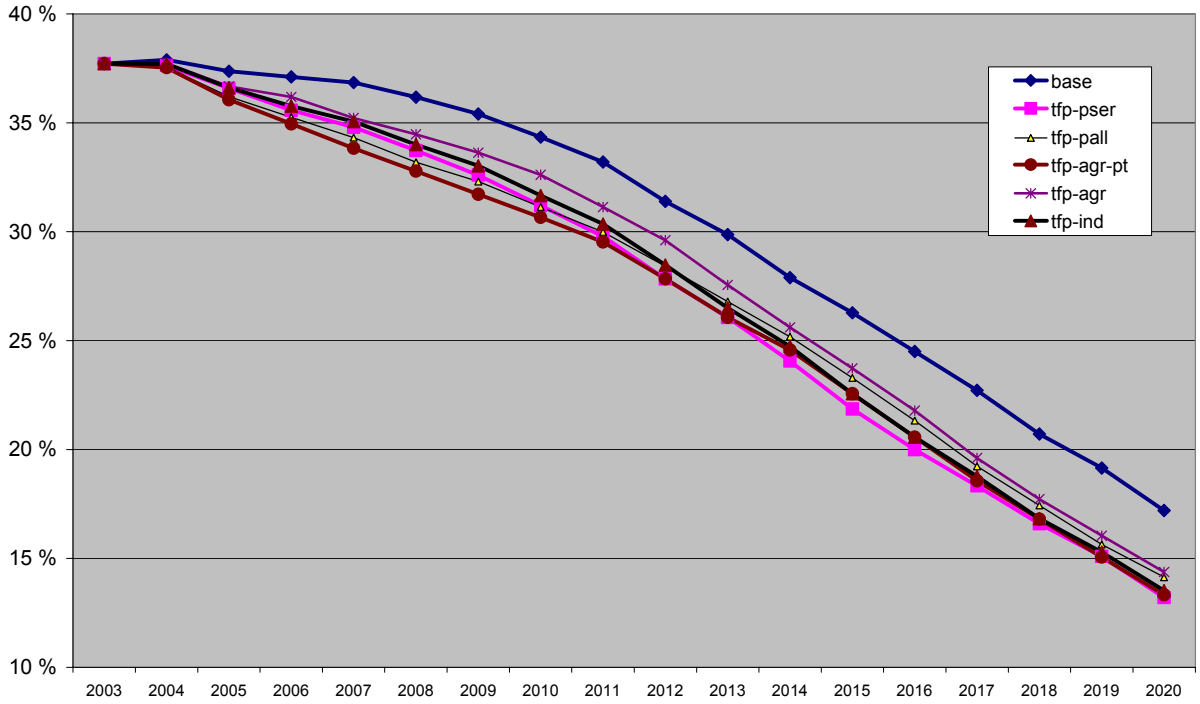


Figure 4. Gini coefficient under TFP scenarios

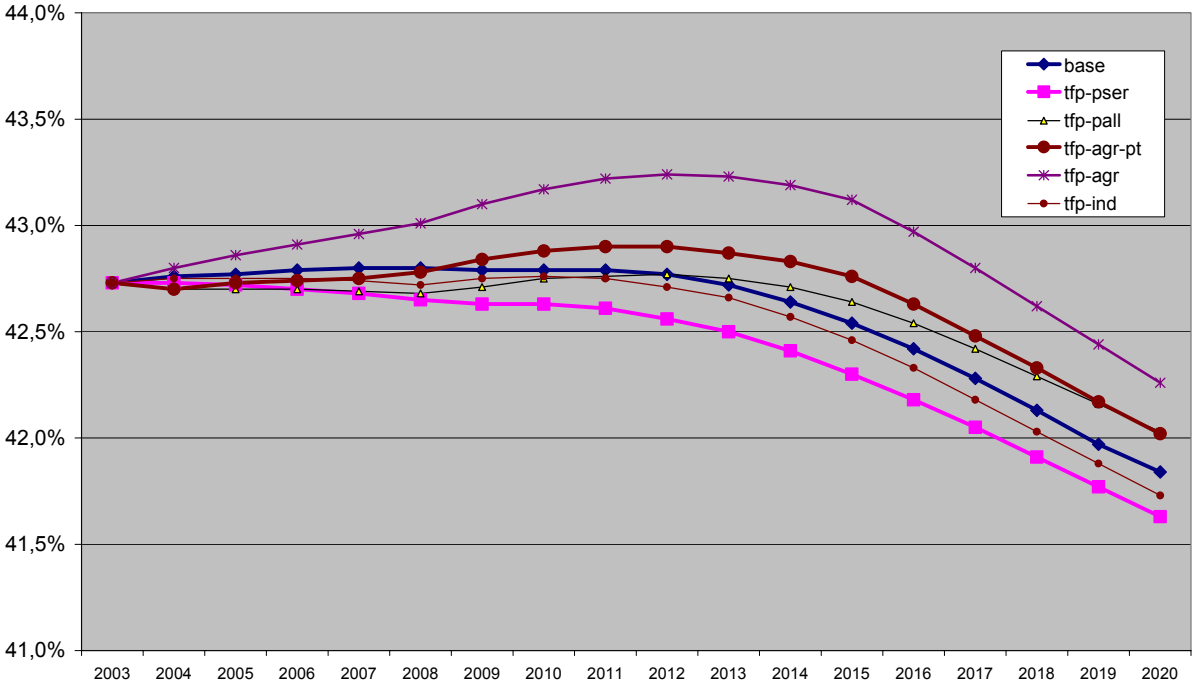
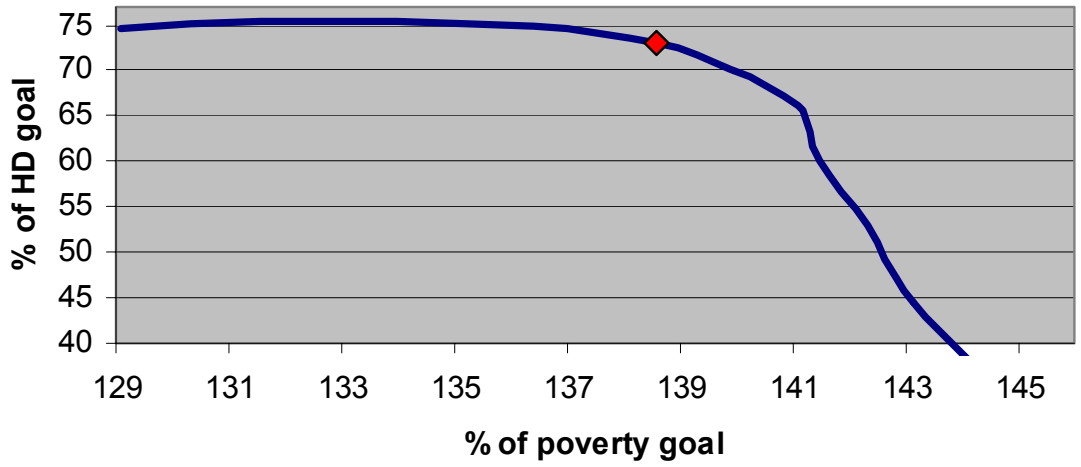


Figure 5. Poverty - Human Development Trade-Offs



Note: The diamond represents the HD and poverty results under the BASE scenario.

Figure 6. Headcount poverty under allocation and efficiency scenarios

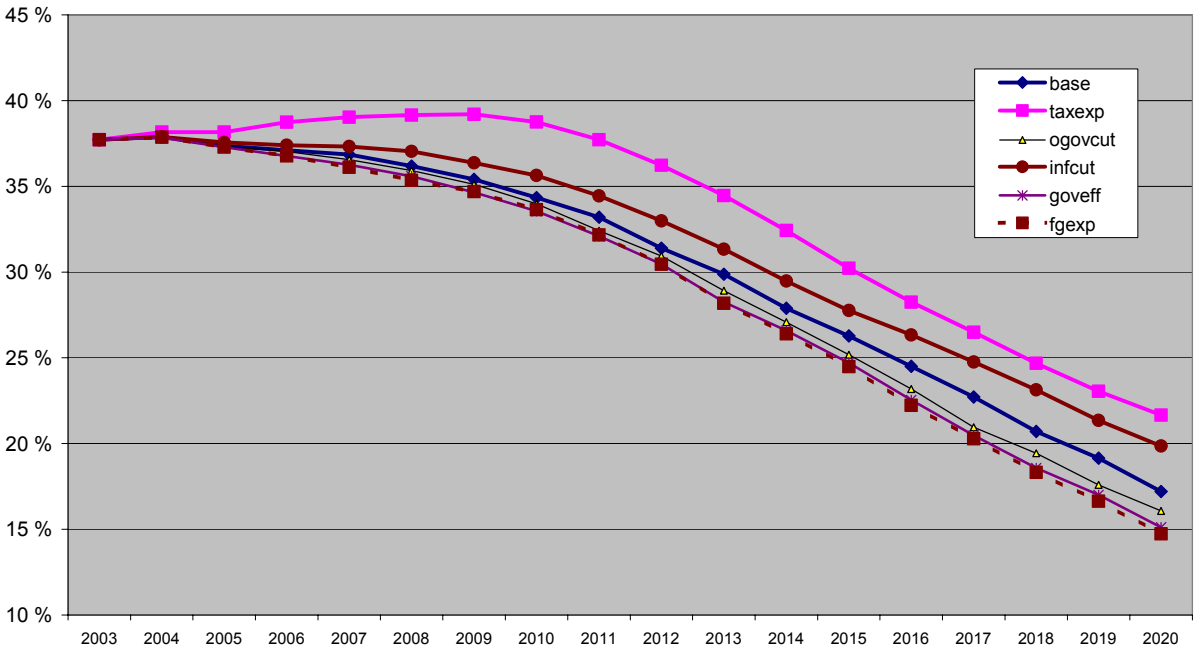


Figure 7. Gini coefficient under allocation and efficiency scenarios

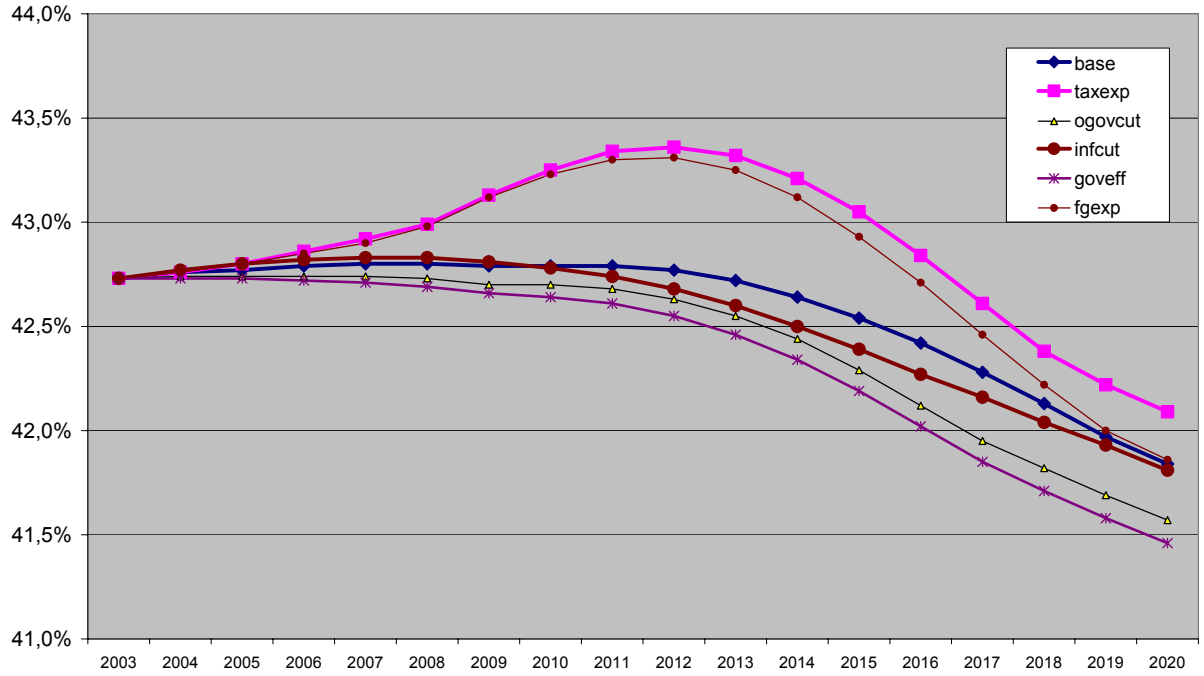


Figure 8. Inequality (Gini coeff) vs. Headcount poverty (MDG1) in 2020

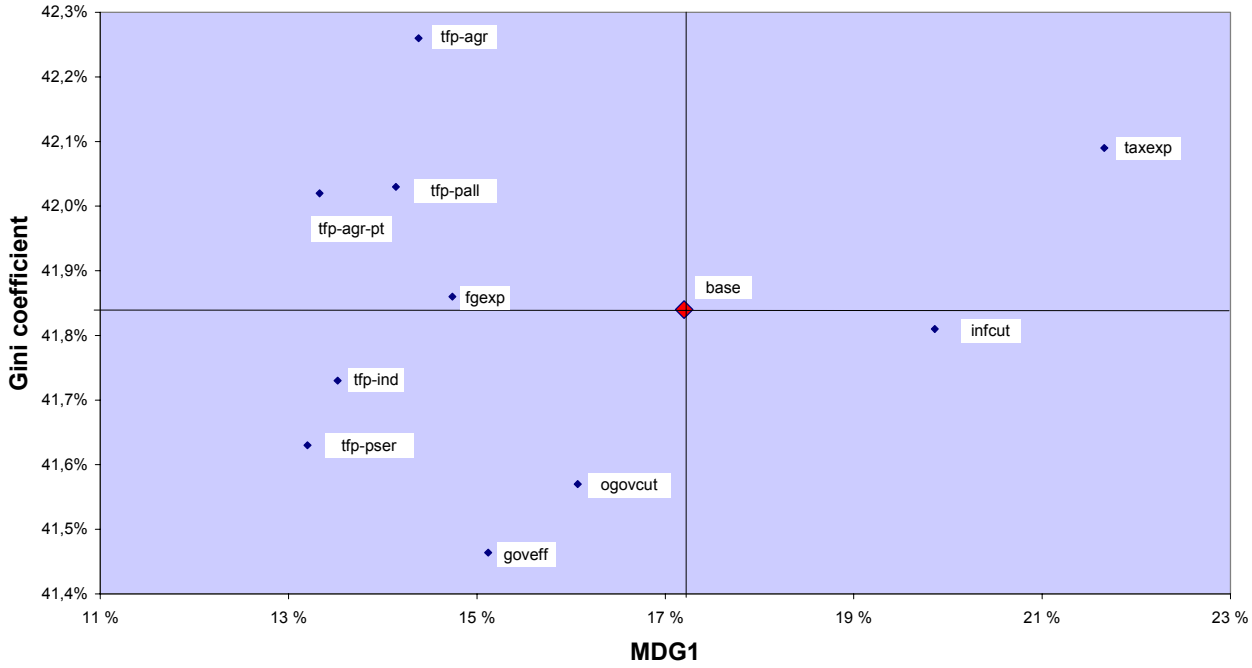


Table A-1. MAMS: Disaggregation of model and database

Factors	Labor	< completed secondary
		completed secondary, not completed tertiary
		completed tertiary
	Capital	private (non-MDG)
		primary education
		secondary education
		tertiary education
		health
		government agriculture services
		government water services
		government road services
		other government services
	Land	agricultural crop land
Activities/ Commodities	Government/MDG	primary education
		secondary education
		tertiary education
		health
		government water services
		government agricultural services
		government road services
		other government services
	Non-government/ non-MDG	agriculture
		industry
		petroleum
		transportation services
		(other) non-government services
Institutions	Households	rural - 1st-2nd quartile
		rural - 3rd-4th quartile
		urban - 1st-2nd quartile
		urban - 3rd-4th quartile
	Other	non-government (non-profit) organization
		government
		rest of world

Table A2. Macro indicators in 2003 and in final year (% of nominal GDP)

		Final year					
Indicator	**2003**	**base**	**tfp-agr**	**tfp-agr-pt**	**tfp-ind**	**tfp-pser**	**tfp-pall**
Absorption	113.7	110.6	110.2	109.7	110.1	110.2	110.5
Consumption - private	77.8	72.1	72.0	72.3	73.1	73.2	72.8
Consumption - government	15.2	18.3	17.8	17.4	17.1	16.8	17.3
Investment - private	16.0	15.6	16.0	15.9	15.7	15.9	16.1
Investment - government	4.7	4.6	4.3	4.2	4.1	4.3	4.3
Stock change	-0.025						
Exports	12.3	14.4	15.3	15.0	14.7	14.8	15.0
Imports	-26.0	-25.0	-25.4	-24.7	-24.8	-25.0	-25.5
GDP at market prices	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Net indirect taxes	8.3	10.9	11.0	10.7	10.8	10.9	11.1
GDP at factor cost	91.7	89.1	89.0	89.3	89.2	89.1	88.9
Foreign savings	7.4	6.4	6.5	6.3	6.4	6.4	6.6
Gross national savings	13.3	13.8	13.9	13.7	13.5	13.8	13.7
Gross domestic savings	7.0	9.5	10.2	10.3	9.8	10.0	9.8
Foreign government debt	71.0	70.9	70.7	70.1	70.6	70.6	69.8
Domestic government debt	8.4	8.4	8.4	8.4	8.4	8.4	8.4

The simulations are defined in Table 5.

Note: GNS (Gross national savings) = GFC (Gross Capital Formation) - Foreign Savings, where GCF = Investment + Stock Change; Gross domestic savings = GNS - Net transfers from RoW - Net factor income from RoW = GCF - Trade deficit

Table A2. cont.

		Final year					
Indicator	**2003**	**base**	**infcut**	**ogovcut**	**goveff**	**fgexp**	**taxexp**
Absorption	113.7	110.6	110.9	110.5	110.6	114.5	109.9
Consumption - private	77.8	72.1	72.6	71.8	71.8	72.0	66.2
Consumption - government	15.2	18.3	19.2	16.9	16.7	20.4	22.3
Investment - private	16.0	15.6	15.6	15.5	15.5	15.4	14.0
Investment - government	4.7	4.6	3.5	6.2	6.6	6.7	7.4
Stock change	-0.025						
Exports	12.3	14.4	13.7	15.5	15.8	10.5	15.7
Imports	-26.0	-25.0	-24.7	-26.0	-26.4	-25.1	-25.6
GDP at market prices	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Net indirect taxes	8.3	10.9	10.7	11.2	11.2	10.8	11.0
GDP at factor cost	91.7	89.1	89.3	88.8	88.8	89.2	89.0
Foreign savings	7.4	6.4	6.4	6.4	6.4	4.8	5.7
Gross national savings	13.3	13.8	12.8	15.4	15.7	17.3	15.8
Gross domestic savings	7.0	9.5	8.2	11.2	11.5	7.6	11.5
Foreign government debt	71.0	70.9	71.3	70.8	70.8	70.6	71.7
Domestic government debt	8.4	8.4	8.4	8.4	8.4	8.4	8.4

The simulations are defined in table 6.

Table A.3. Government revenue and spending in 2003 and final year (% of nominal GDP)

			Final year					
Indicator		**2003**	**base**	**tfp-agr**	**tfp-agr-pt**	**tfp-ind**	**tfp-pser**	**tfp-pall**
Revenue	**Net private sector transfers**	-1.2	-2.2	-2.0	-1.9	-2.0	-2.0	-2.0
	Net transfers from RoW	7.0	7.3	6.9	6.4	6.6	6.7	6.9
	Direct taxes	3.0	3.5	2.6	2.7	2.3	1.8	1.9
	Import tariffs	3.5	3.7	3.7	3.6	3.6	3.7	3.8
	Other indirect taxes	4.8	7.2	7.3	7.1	7.1	7.2	7.3
	Domestic borrowing	-0.2	1.0	1.0	1.0	1.0	1.0	1.0
	Foreign borrowing	4.3	3.8	4.0	4.0	4.0	4.0	4.2
	Total	21.3	24.3	23.5	22.9	22.6	22.4	23.0
Spending	**Consumption**	15.2	18.3	17.8	17.4	17.1	16.8	17.3
	Domestic interest payments	1.0	0.9	0.9	0.9	0.9	0.9	0.9
	Foreign interest payments	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Investment	4.7	4.6	4.3	4.2	4.1	4.3	4.3
	Total	21.3	24.3	23.5	22.9	22.6	22.4	23.0

The simulations are defined in table 5.

Table A.3. cont.

			Final year					
Indicator		**2003**	**base**	**infcut**	**ogovcut**	**goveff**	**fgexp**	**taxexp**
Revenue	**Net private sector transfers**	-1.2	-2.2	-2.3	-2.1	-2.1	-2.0	-2.1
	Net transfers from RoW	7.0	7.3	7.6	7.2	7.2	12.6	7.5
	Direct taxes	3.0	3.5	3.5	3.5	3.5	3.5	10.8
	Import tariffs	3.5	3.7	3.5	3.8	3.9	3.7	3.8
	Other indirect taxes	4.8	7.2	7.1	7.3	7.3	7.1	7.1
	Domestic borrowing	-0.2	1.0	1.0	1.0	1.0	1.0	1.0
	Foreign borrowing	4.3	3.8	3.6	3.8	3.9	2.6	3.0
	Total	21.3	24.3	24.1	24.6	24.7	28.4	31.1
Spending	**Consumption**	15.2	18.3	19.2	16.9	16.7	20.4	22.3
	Domestic interest payments	1.0	0.9	0.9	0.9	0.9	0.9	0.9
	Foreign interest payments	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Investment	4.7	4.6	3.5	6.2	6.6	6.7	7.4
	Total	21.3	24.3	24.1	24.6	24.7	28.4	31.1

The simulations are defined in table 6.

Table A.4. Balance of payment in 2003 and in final year (% of nominal GDP)

			Final year					
Indicator		**2003**	**base**	**tfp-agr**	**tfp-agr-pt**	**tfp-ind**	**tfp-pser**	**tfp-pall**
OUTFLOWS	**Imports**	26.0	25.0	25.4	24.7	24.8	25.0	25.5
	Net interest income of RoW	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total	26.5	25.5	25.9	25.2	25.3	25.5	26.0
INFLOWS	**Exports**	12.3	14.4	15.3	15.0	14.7	14.8	15.0
	Net capital income	-1.9	-5.6	-5.6	-5.3	-5.2	-5.3	-5.5
	Net private transfers from RoW	1.7	3.1	2.9	2.7	2.8	2.8	2.9
	Net official transfers from RoW	7.0	7.3	6.9	6.4	6.6	6.7	6.9
	Government borrowing	4.3	3.8	4.0	4.0	4.0	4.0	4.2
	FDI	3.0	2.6	2.5	2.3	2.4	2.4	2.5
	Total	26.5	25.5	25.9	25.2	25.3	25.5	26.0

The simulations are defined in table 5.

Table A.4. cont.

			Final year					
Indicator		**2003**	**base**	**infcut**	**ogovcut**	**goveff**	**fgexp**	**taxexp**
OUTFLOWS	**Imports**	26.0	25.0	24.7	26.0	26.4	25.1	25.6
	Net interest income of RoW	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Total	26.5	25.5	25.1	26.5	26.8	25.5	26.1
INFLOWS	**Exports**	12.3	14.4	13.7	15.5	15.8	10.5	15.7
	Net capital income	-1.9	-5.6	-5.7	-5.6	-5.6	-5.1	-5.9
	Net private transfers from RoW	1.7	3.1	3.2	3.0	3.0	2.7	3.2
	Net official transfers from RoW	7.0	7.3	7.6	7.2	7.2	12.6	7.5
	Government borrowing	4.3	3.8	3.6	3.8	3.9	2.6	3.0
	FDI	3.0	2.6	2.7	2.6	2.6	2.3	2.7
	Total	26.5	25.5	25.1	26.5	26.8	25.5	26.1

The simulations are defined in table 6.

Table A5. Structure of factor payments in Uganda in 2003 (%)

		Labor					
		< Secondary education	Secondary education	Tertiary education	Private Capital	Land	Total
Within sectors	Agriculture	53.83	7.12	9.51	7.57	21.97	100.00
	Industry	14.93	7.98	9.40	67.69		100.00
	Transportation	10.50	6.71	7.57	75.22		100.00
	Other private services	6.76	15.14	27.38	50.72		100.00
	Primary education	19.84	32.63	29.40	18.13		100.00
	Secondary education	0.87	1.13	79.86	18.13		100.00
	Tertiary education	0.87	1.13	79.86	18.13		100.00
	Health	3.59	7.49	75.62	13.30		100.00
	Government water services	8.90	14.93	64.22	11.95		100.00
	Government agriculture services	8.90	14.93	64.22	11.95		100.00
	Government road services	8.91	14.93	64.21	11.95		100.00
	Other government services	6.69	10.45	64.45	18.41		100.00
	Total	23.88	10.16	22.36	36.48	7.12	100.00
Across sectors	Agriculture	73.05	22.70	13.78	6.72	100.00	32.40
	Industry	13.26	16.66	8.91	39.33		21.20
	Transportation	1.57	2.35	1.20	7.34		3.56
	Other private services	8.14	42.86	35.22	39.98		28.76
	Primary education	1.83	7.06	2.89	1.09		2.20
	Secondary education	0.06	0.20	6.26	0.87		1.75
	Tertiary education	0.07	0.20	6.49	0.90		1.82
	Health	0.39	1.91	8.74	0.94		2.59
	Government water services	0.03	0.12	0.23	0.03		0.08
	Government agriculture services	0.01	0.02	0.04	0.00		0.01
	Government road services	0.11	0.43	0.84	0.10		0.29
	Other government services	1.50	5.50	15.40	2.70		5.34
	Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Uganda MAMS SAM