The welfare implications of public healthcare financing: A Macro-Micro simulation analysis of Uganda

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Abstract

Studies on global health and development suggest that there is a strong correlation between the burden of disease and a country's level of income. Poorer countries tend to suffer more deaths from preventable causes such as communicable, maternal, perinatal and nutritional conditions, compared to high-income countries. In low-income countries the government health expenditure share in the general government budget is low and out-of-pocket payments for healthcare relatively high. They also rely heavily on external resources for health funding, yet sustainability of external resource flows is not guaranteed. This paper explores increasing public healthcare funding from domestic resources mobilisation, and evaluates the impact of measures to achieve this on sectoral growth and poverty reduction rates in Uganda using a dynamic computable general equilibrium model. The paper shows that increasing the government health budget share, facilitates expanded healthcare services, improved population health, higher sectoral growth and reduced poverty. The agricultural sector is predicted to post the highest growth when compared to services and industry sectors under both domestic taxation and aid funding scenarios, while national poverty is predicted to decline from 31% to 12% of the population by 2020. The paper demonstrates that the most effective measure is to frontload investment in healthcare and generate additional domestic funding for health from a household tax earmarked for health.

Keywords: Health financing, Macroeconomy, Development, Poverty, Uganda

Key messages:

- Increasing public healthcare funding potentially generates higher sectoral growth rates and reduces poverty relative to the baseline
- Taxation is a potential source for additional and sustainable funding for healthcare in Uganda
- A macro-micro simulation analysis approach is necessary for evaluation of healthcare financing policies on growth and poverty reduction

1 Introduction

Poverty and ill-health are inextricably linked. Although the direction of the causal link may be debated, global health estimates suggest a strong correlation between disease burden and national income (World Health Organisation, 2014a). For example, while communicable, maternal, perinatal and nutritional conditions contributed 53% of all-cause of deaths in low-income-countries (LICs) in 2012, only 6.8% of deaths were attributed to the same causes in high-income-countries. This could reflect the impact of inability to afford prevention and treatment, and/or where the presence of such illnesses affects population, capacity to actively participate in productive activities. Nonetheless, a vicious circle of poverty and ill-health is seen, where disease and ill-health are both a cause and effect of poverty. One way to break this circle is to invest in services to prevent and treat disease in order to generate a higher productivity and reverse the trend. Yet, such investment is problematic for LICs.

Statistics show that total health expenditure share in GDP and government health expenditure share in general government expenditure, are low for LICs (World Health Organisation, 2014b). Total health expenditure comprises of both public sources of finance (government general taxation, mandatory insurance contributions and external grants and loans) and private sources (private insurance premiums, prepaid schemes, not-for-profit health expenditures and out-of-pocket (OOP) payments). For most countries in Sub-Saharan Africa health expenditure is lower than the $86 per capita (in 2012 terms) suggested minimum required to provide key health services (McIntyre, Meheus, 2014). Statistics also show that countries with lower per capita income have considerably higher proportions of private expenditures on health, particularly OOP payment, and greater exposure to 'catastrophic health expenditure' as a result.

Although public health expenditure contributes more than half of the total health expenditure in Uganda, the private sector share is significant; a trend that has persisted as indicated in Figure 1. National Health Accounts expenditure tracking shows that public expenditure contributes 58% of the national health expenditure, of which 17% is government and 41% is external donor funding, while the private sector contributes 42%, of which 40% is OOP spending by households (MoH - Uganda Ministry of Health, 2016). While acknowledging that Uganda's OOP payments share is high when compared to the WHO recommended maximum of 15%, this paper focuses on increasing public healthcare expenditure, particularly the government share.

(Insert Figure 1 here)

Critically, there is a high reliance on external resources for public health funding, with the sustainability of external resource flows not guaranteed, creating a precarious context for health services delivery. Yet there has been little work that evaluates the possibility of domestic resources mobilisation for funding public healthcare, and their impact on sectoral growth and poverty reduction. This paper fills this gap in the literature through such an evaluation, based on an analysis of public healthcare financing in Uganda.

2 Background

Although synergistic, it is clear better population health supports welfare and economic benefit (Mushkin, 1962, Bleakley, 2003, Miguel, Kremer, 2004, Psacharopoulos, Patrinos, 2004, Alderman et al., 2006, Cai, Kalb, 2006, Dunkelberg, Spiess, 2007, Clarke et al., 2008, Hum et al., 2008, Frijters et al., 2008, Maluccio et al., 2009, Cai, 2010, Feyrer et al., 2011, Baird et al., 2015). Key mechanisms include improved nutrition, eradication of disease and availability of medical care, which have positive impacts on education outcomes, wages, labour participation rates, household living standards and life expectancy.

Such microeconomic estimates have been used to calibrate macroeconomic effects, suggesting that differences in health contribute to differences in economic growth and wellbeing between countries (Hurd et al., 1998, Lee et al., 2000, Bloom, Canning, 2000, Shastry, Weil, 2003, Bloom et al., 2004, Fogel, 2004, Bloom, Canning, 2005, Marcella et al., 2007, Weil, 2007, Bloom et al., 2014). These studies argue that healthier workers work harder, longer and smarter, and become more prolific consumers, benefiting themselves and the economy at large.

However, micro- and macro-economic studies tend to use partial equilibrium estimates, which reflect the direct impact of health and healthcare policies on wider welfare and the economy, but ignore indirect effects. For example, regression studies do not account for the health impact on household incomes and consumption levels transmitted through factor prices and sectoral production dynamics. Others have argued that the causal link between health, economic growth and welfare is unclear (Filmer, Pritchett, 1999, Acemoglu, Johnson, 2007, Acemoglu, Johnson, 2014). However, it is clear that the economy-wide impact of health and healthcare is likely to be complex, non-linear and bidirectional, requiring a general equilibrium approach to capture the direct and indirect effects in a dynamic iterative manner over time.

Some studies have used the computable general equilibrium (CGE) technique to assess the impact of health and healthcare policies on economic growth and employed the "representative household" model to assess health policy impact on household welfare (Kambou et al., 1992, Arndt, Lewis, 2000, Arndt, Lewis, 2001, Rutten, 2004, Dixon et al., 2004, Chou et al., 2004, Smith et al., 2005, Thurlow, 2007, Rutten, Reed, 2009, Keogh-Brown et al., 2009, Smith et al., 2009, Verikios et al., 2010, Lock et al., 2010, Smith et al., 2011, Smith, Keogh-Brown, 2013, Verikios et al., 2013, Jensen et al., 2013, Kabajulizi, Ncube, 2015). However, the representative household approach employed by these studies ignores the actual changes incurred by individual households in the group and hence does not effectively measure the impact of a given healthcare policy shock on poverty levels. For instance, any factor income gains or losses from a policy shock are distributed to the household groups according to the proportions specified by the functional distribution of factor income in the social accounting matrix (SAM). Hence we use the household microsimulation approach to better reflect the impact of policy changes on household welfare.

Microsimulation models have been applied broadly in trade policy and a few in health (Robilliard et al., 2001, Cockburn, 2002, Cororaton, 2003, Savard, 2003, Cororaton, Cockburn, 2005, Herault, 2005, Thurlow, 2007, Thurlow, 2008b, Pauw, 2009, Brown et al., 2009). Household microsimulation models incorporate the heterogeneity of household income sources and consumption patterns directly in the model, capturing the impact of a policy shock on each household. No study has used a disaggregated dynamic model with a microsimulation model to measure poverty effects of public healthcare financing policies.

This study addresses the gap by adopting a disaggregated dynamic CGE model combined with a household microsimulation model to assess the impact of public healthcare financing options on the level and structure of growth, and poverty, set in the context of an analysis of Uganda. The rest of this paper is organised as follows. Section 3 describes the model including parameters representing the health effects and the data for model calibration. Section 4 discusses the simulation results for the dynamic baseline and the impact of alternative financing scenarios. Section 5 presents key conclusions and policy implications.

3 Methodology

We employ a recursive dynamic CGE model, based on the standard CGE model developed by the International Food Policy Research Institute (IFPRI) but extended to dynamics (Lofgren et al., 2002, Thurlow, 2004, Thurlow, 2005). The CGE model is linked to the Uganda household microsimulation model and programmed to run the poverty module.

3.1 Description of the model

The model distinguishes production across nine sectors (activities) purposefully aggregated from the Uganda micro SAM into agriculture and non-agriculture (industry and services) sectors. The sectoral distinction allows for the capture of sector growth impacts resulting from healthcare financing policies. Production technology is a nested structure which is particularly useful in this analysis for two reasons. First, the technologies of the component processes are different; while it is possible to substitute within the value-added bundle, such as between healthcare labour and capital in the healthcare value-added bundle, it is not possible to substitute between the value-added and the intermediate bundle, such as between healthcare labour and medicines for curing a particular ailment. Second, the nested production structure allows for the distinction of different subsets of input combinations in the production process.

Factors are assumed to be fully employed and labour is mobile across sectors with flexible wages. Although the full employment of labour is more consistent with skilled categories, the existence of a large informal sector[1] absorbs the unemployed who are laid-off by contracting sectors so that the full employment condition is maintained.

Each activity (sector) produces one or more outputs and any commodity may be produced and marketed by more than one activity. In the commodity market the supply-side domestic output is allocated between exports and domestic sales according to a constant elasticity of transformation function. On the demand-side total consumption is made up of domestic demand and final imports determined by constant-elasticity-of-substitution function between imports and the corresponding composite domestic goods.

Household income comprises factor income redistributed according to the value shares, given the factor endowment shares for each household, and transfers from other households, the government and the rest of the world. Households use their income to pay taxes, for consumption expenditure and for saving, according to their marginal propensities to save. Government income is derived from tax revenue and transfers from the rest of the world while government (re)current revenue is used for expenditure on commodity consumption (service provision such as healthcare), transfers to households and the budget balance is a flexible residual.

3.1.1 Recursive dynamics

The intertemporal and lagged effects of health and healthcare investments are captured in a dynamic set up over the model horizon. The model solves for a single period and the solution for that period forms the basis for the next model run, and the process continues, forming a recursive dynamic model. The between-period adjustments include capital accumulation, health effects, and government consumption expenditure.

3.1.2 Health effects

Improved population health –reflected in morbidity and mortality rates, and life expectancy – improves labour supply, labour productivity and total factor productivity. Healthier people are better workers (they work harder, longer and more productively) and are likely to be more prolific consumers. Additionally, a higher life expectancy suggests that, as people expect to live longer, they may be encouraged to save and invest for later years, thereby increasing the stock of investment and physical capital per worker. The impact of changes in morbidity, mortality and life expectancy is captured in the model by specifying growth rates for labour supply, labour productivity and total factor productivity.

Evidence of the link between these health indicators on the one hand, and labour and total factor productivity, on the other, is not readily available in Uganda. Nor is there evidence of a correlation between public health expenditure and health outcomes. However, there are studies indicating that: health status has a positive and significant effect on labour force participation and labour productivity (Bleakley, 2003, Case et al., 2005, Cai, Kalb, 2006, Hum et al., 2008, Cai, 2010, Baird et al., 2015); poor child-health lowers labour participation rates for women (Dunkelberg, Spiess, 2007); expanded healthcare coverage through higher levels of publicly funded health expenditure leads to lower child and adult mortality, with a more significant impact among the poor (Anand, Ravallion, 1993, Bidani, Ravallion, 1997, Anyanwu, Erhijakpor, 2007, Bokhari et al., 2007, Cevik, Tasar, 2013, Moreno-Serra, Smith, 2015, Maruthappu et al., 2015); and a positive association between rising life expectancy and increased savings (Hurd et al., 1998, Lee et al., 2000, Bloom, Canning, 2000, Bloom et al., 2004, Bloom, Canning, 2005, Marcella et al., 2007, Weil, 2007). Consequently parameter values for labour supply, labour productivity and total factor productivity growth are computed from these studies for simulations in the Ugandan model. For the dynamic baseline, the fixed level of labour supply adjusts exogenously from a linked demographic model for Uganda. It is also assumed that increasing public health spending and expanding health services generates: (i) services that are effective in treating and curing the people, (ii) increases in the total amount of effective services consumed by the people and, (iii) the services consumed are cost-effective in improving health.

3.1.3 The Top-Down CGE-Micro-simulation model

Poverty in Uganda is multi-dimensional and its measurement has evolved to include both income and expenditure, and non-monetary dimensions. This model is built on the income and expenditure-based measures of poverty. The poverty module is programmed with the household microsimulation of the top-down macro-micro 'incidence' model[2]. It links household income changes at the aggregate level as reported in the CGE model to individual households in the micro-model. The household micro-model is embedded in the Uganda national household survey (UNHS) 2005/2006 data, which underlies the 2007 SAM data, from which the CGE model is initially calibrated. The modelling in this paper focuses on 'income poverty' as the aim is to capture the healthcare financing policy impact on household consumption expenditure and report on the deviations from the established minimum standard (poverty line).

The CGE model and the poverty microsimulation module are implemented sequentially. Each of the households in the UNHS 2005/2006 is linked directly to their corresponding household category in the CGE model. The CGE model is implemented first and generates changes in representative households' consumption and prices which are then passed on to the microsimulation model. The micro-simulation model is implemented next, incorporating the changes from the CGE households' category and passed on to the corresponding individual households in the household survey, where total consumption expenditures are recalculated. A new level of per capita expenditure for each household in the survey is generated and compared to the official poverty line. This measure of poverty is the same as the official poverty estimates.

We use the Foster-Greer-Thorbecke (FGT) poverty indices embedded in the microsimulation poverty module to analyse the healthcare financing policy impact on poverty P_0 reports the incidence of poverty and P_1 the depth of poverty (Foster et al., 1984). The FGT indices measure by how much households are better- or worse-off in terms of changes in consumption expenditure relative to an established minimum requirement (the official poverty line).

3.2 The data

The model is calibrated from an updated Uganda SAM, originally constructed in 2007 (Thurlow, 2008a). A SAM is a comprehensive, economy-wide data framework representing the economy by capturing the financial value of transactions and transfers between all economic agents in the system, for a year. It is a square matrix with each account represented by a row (income) and a column (expenditure) i.e. the double entry system of accounting. The Uganda SAM is a 122x122 matrix representing 50 sectors including the health sector, factors of production –(land, capital and labour disaggregated into self-employed, unskilled, and skilled workers), and institutions, – enterprises, households, government and the rest of the world.

The SAM captures the households' various functions: they receive income, consume goods and services, save and invest, and pay taxes. The proposed tax in this model applies to those households already eligible to pay tax, as per the benchmark data (SAM 2007). Households are categorised by residence (rural/urban) and by the primary income earner's main economic activity (farming/non-farming). This enables us to trace the effects of the healthcare financing policy shock through the various household income and consumption patterns and the relationship to poverty levels.

This study disaggregated the SAM health account into three new accounts – government primary health, government other health, and private health – because the resource claims differ by type (public/private) and level of care. For instance, private health is paid for at the point of consumption while government healthcare is (mostly) free of charge to the consumer, and inputs and costs are different for the production of government primary health and government other-health. Consequently the economy-wide adjustment mechanisms from a healthcare financing policy shock are likely to generate different impacts on the level and structure of growth and poverty. The microsimulation model is updated to incorporate the newly created health sector accounts and all the linked activity, commodity, factor and institutional accounts in the SAM.

Data for updating the SAM was obtained from various sources, including national accounts, UNHS 2005/2006 and 2009/2010, the government health expenditure data 2007/2008 collected by Uganda Bureau of Statistics and the government medium-term expenditure framework (MTEF) 2013/2014. Given the various sources of data and different time periods the SAM is balanced using the cross entropy method in a GAMS program for balancing a SAM (Robinson et al., 2000, Fofana et al., 2005).

3.3 Model simulations scenarios

The modelling approach uses a series of simulations to establish different trajectories, starting with a predicted baseline and then implementing various scenarios to generate counterfactuals. While acknowledging that the private sector contribution to total health expenditure is significant, this paper focuses on evaluating public health expenditure and explores alternative sources of funding public health expenditure. The counterfactual simulations do not include any specific changes in private sources of health funding, such as insurance and OOP payments. For each of the public healthcare financing alternatives, the model is set to a path that achieves the Abuja Declaration target on health financing which requires African governments to increase the health budget share in the general government budget to at least 15% (African Union, 2001).

3.3.1 The baseline scenario

The baseline simulation assumes the healthcare financing status quo prevails portraying the performance of the economy and poverty rates from 2008 to 2020 in the absence of effects accruing from alternative public healthcare financing proposals. It acts as a benchmark against which the sectoral and welfare impacts of the healthcare financing proposals are measured. This baseline level of health financing also generates some improvement in population health and hence growth in labour force participation which is captured in the dynamic baseline using parameter values computed from UNHS 2005/2006 and 2009/2010 labour survey modules. The model is calibrated with a capital growth rate so that it generates a GDP growth rate that emulates the historical growth rate which has averaged 6.5% since 2000 (Uganda Bureau of Statistics, 2013).

3.3.2 Prioritisation of the health budget

This simulation increases the health sector share in the government budget while taxes remain unchanged and government expenditure is fixed in real terms. The immediate effect of this government action is to reduce resources available to other government functions. The government demand scaling factor for health is increased annually by 10% for government primary healthcare and 5% for government other-healthcare in order to achieve the targeted 15% government health budget share. Since the government health demand scaling factor is exogenous while the government health (functional) share is endogenously determined, the model produces the annual growth rate in government healthcare spending necessary to achieve the desired 15% health budget share by 2020.

3.3.3 Earmarked taxes for health

This simulation aims to increase the health sector budget funded by additional tax revenue earmarked for healthcare. There is no readily available data on earmarking taxes in Uganda. Lessons can be drawn from experiences of similar schemes in countries such as South Africa, Ghana, Tanzania and Australia (Carling, 2007, McIntyre et al., 2008, Ataguba, Akazili, 2010). The growth in direct tax revenue required to meet the 15% health budget share is achieved by setting the households' direct tax adjustment factor at 11% annually. Consequently the model endogenously generates tax rates for each household category in such a way that tax rates increase in proportion to the initial rate. The tax adjustment rate is applied uniformly to all the households eligible to pay income taxes as defined by the SAM; tax exempt households are thus not impacted by the proposed tax.

3.3.4 Foreign Aid for health

This simulation increases the health budget through increased foreign aid; modelled as an increase in the inflow of foreign savings designated as grants for budget support. The assumption is that additional aid grants beyond the historical trend depicted in the national accounts go to the health sector; the government does not withdraw its share of health sector budget contribution from general taxation revenue, and aid resources are effectively used by government according to the health sector strategic plan (HSSP). The foreign savings growth parameter is set to 5% per annum in order for the model to generate absolute foreign savings inflow to meet the desired 15% health sector budget share by 2020.

4 Results and discussion

4.1 The baseline scenario

The poverty impacts from the baseline simulation are presented in Table 1. Poverty is predicted to decline with the absolute number of poor people falling from 8.46 to 4.87 million by 2020. In the baseline, all households benefit from higher factor returns because sectoral production and consequently factor demand and payments, are predicted to rise over the period 2008 to 2020 (Table 2). National farming household poverty, initially high, is predicted to decline considerably faster when compared to non-farming household poverty. This is explained in part by the shares of sources of household income in the SAM where more than 50% of farming households' income is derived from labour and land compared to 30% for non-farming households. Hence the total benefit from returns to growth in labour force participation rates, as modelled in the baseline, is likely to be proportionately higher for farming households. Ultimately, household income poverty reduces faster among farming households compared to non-farming households.

(Insert Tables 1 and 2 here)

Although absolute poverty declines in the baseline scenario, it fails to meet the Social Development Goals target on poverty: eradicate extreme poverty by 2030. The predicted absolute number of poor people by 2020 is still high and poverty remains a challenge in Uganda.

4.2 Impact of alternative healthcare financing scenarios on growth and poverty levels 4.2.1 Impact on sector value-added

Results for the predicted change in sector value-added by 2020 are presented in Table 2. The relatively high growth predicted in health sector value-added is attributed to growth in both the quantity and quality (value) of the factors demanded because it is intensive in the use of skilled workers whose value is relatively higher. The government both demands and produces the health commodity. As the government health expenditure increases, health sector production increases to meet the increasing government health consumption demand.

The agricultural sector directly benefits from the health-induced growth in labour force supply and labour productivity because agriculture employs 67% of the total Ugandan labour force. Through forward linkages the predicted expansion in the agricultural sector provides inputs and spurs growth in the food-processing segment of manufacturing. As the food-processing sector expands, it creates markets by increasing demand for the manufactured goods that it uses as inputs. This in turn posits higher growth rates in the input supply sectors, such as chemicals and utilities. Additionally, the expanding labour force increases effective demand and markets for manufactured goods which results in further growth for the manufacturing sectors.

Although not explicit, the predicted lower sectoral growth rates for agriculture, industry, machinery and construction under the aid scenario when compared to the tax scenario, point to structural bottlenecks that exist in the country. This suggests that continuous additional foreign aid inflow channelled to a service sector becomes less effective without commensurate expansion in enabling economy-wide infrastructure networks. It is important to bear in mind that while investing in the health sector is crucial, it is also necessary to invest in infrastructure networks so that producers and consumers are better integrated into national and international markets, thus expanding opportunities and accelerating growth (Wiebelt et al., 2011). The development of enabling infrastructure networks, such as roads and energy, is essential to harness the productivity gains produced by the improvement in population health.

4.2.2 Impact on national poverty

Figure 2 illustrates the change in national poverty rates when compared to baseline levels, distinguishing the analysis between Panel 1 – without health – and Panel 2 –with health – effects. A negative plot means that, for a given scenario, the proportion of people in poverty is predicted to be lower when compared to the baseline rate while a positive plot implies the proportion of poor people is predicted to be higher. Consequently, poverty is predicted to increase under the prioritisation and tax scenarios in Panel 1 while it is predicted to decline by different magnitudes under all scenarios in Panel 2.

Excluding health effects from the analysis may be misleading for policy advice because Panel 1 shows that increasing the health budget could have negative implications for poverty reduction. Given the modelled 3% annual population growth and the proposed healthcare financing, the model predicts a larger absolute number of poor people under the prioritisation scenario: 4.94 million compared to 4.86 million for the baseline and 4.83 and 4.66 million poor people under the tax and aid scenarios respectively.

When health effects are excluded from the analysis the impact on poverty is consistent with the theoretical "factor-bias effect" of expanding a non-tradable health sector in production equilibrium, depicted in column three in Table 2. The factor-bias effect postulates that, given a fixed endowment of labour, expanding the non-tradable health sector will reduce the quantity of labour available to the tradable sectors and their output will fall. The tradable sectors eventually contract and demand less of the factors of production which may translate into lower factor returns for the factor owners and declining household incomes hence the increase in household poverty rates compared to the baseline. The factor-bias effect is compounded by the constrained government resources when, under a fixed budget, the government reallocates resources to the health sector so that there are less resources available to other growth-enabling sectors, such as energy and construction.

(Insert Figure 2 here)

Alternatively, accounting for health effects in the analysis shows that the healthcare investments lead to a “scale-effect” of an expanding health sector –treating and curing people generates growing effective labour supplies for all sectors in the economy. The scale-effect of an expanding health sector is a compensating impact which counteracts the contracting consequence of constrained government funding and the factor-bias effect on all-sector production under the prioritisation scenario. And if government raises additional healthcare funding from either taxation or foreign aid, the scale-effect of an expanding health sector is much greater. The economy-wide sector expansion provides avenues for households to sell their factors, and hence higher household income earnings. Since sectors are interlinked, as suppliers or demanders, the expansion in the production output reverberates throughout the economy so that all categories of labour are able to find some form of employment, both in the formal and informal sectors.

The sector expansion is particularly beneficial to the informal sector given that an estimated 67% of the working persons in the non-agricultural sector were reportedly in informal employment (Uganda Bureau of Statistics, 2010). Although informal sector wages are relatively low, the sector is expanding and absorbing all labour categories that are, nevertheless, engaged in productive activities therefore earning income so that households are relatively better-off.

4.2.3 Impact on rural versus urban poverty

In Uganda, poverty is a rural phenomenon hence it is imperative to delve into the healthcare policy impact on poverty dynamics by population residence.

(Insert Figure 3 here)

The trend in rural poverty reduction is a confirmation of the capacity of the majority of rural inhabitants who are mainly self-employed in the agricultural sector to benefit from any improvement in land and labour productivity. The distribution of factor payments to households in the benchmark database shows the shares for rural households to be: 95% for self-employed, 59% for unskilled and 41% for skilled labour and 96% for land. Thus growth in labour factor productivity and, consequently, total factor productivity, translates into higher returns to the factor owners, according to their shares, hence more income for rural households. These results demonstrate that investment in health improvement activities has the potential to boost productivity and output in the agricultural sector which, in turn, spurs economic growth and accelerates poverty reduction. This result is consistent with other Ugandan studies which find that accelerating growth in agriculture productivity and the spill-over effects could increase rural households' consumption expenditure and reduce poverty significantly (Dorosh et al., 2002, Benin et al., 2008)

Urban poverty is reduced because the urban-poor mainly engage in the informal sector, largely preoccupied with casual labour activities. Therefore, any measure that improves the health and productivity of this category of the population directly impacts on their ability to increase their earnings, particularly selling their labour.

Furthermore, the trend in poverty reduction rates in rural and urban areas and farming and non-farming households is also explained by the incidence of poverty in Uganda; highest among the working population engaged in primary sector activities followed by the manufacturing sector, while poverty is least likely for those in the service sector (Uganda Bureau of Statistics, 2012). Primary sector activities are mainly rural, while manufacturing sector activities are mainly among the urban informal sector. These sectors are labour intensive and the majority of workers are self-employed and/or unskilled. Therefore, an increase in healthcare investment that improves health outcomes and translates into growth in labour and total factor productivity is likely to increase labour earnings and income levels of households engaged in primary and manufacturing sectors.

The shares for sources of household income in the benchmark data set further explains the distinction in poverty rates between farming and non-farming households. Farming households derive 50% of their income from labour and land compared to only 31% for non-farming households. This means the share of labour returns due to rising labour productivity is likely to be proportionately higher for farming households hence reducing income poverty faster. Additionally, 85% of the population is rural based, of which 70% is engaged in agriculture. Consequently health status improvement which increases labour productivity and participation rates is likely to reduce income poverty for all households through the inter-linkages between agriculture, manufacturing and services sectors.

The predicted household tax rates illustrate the impact of the proposed tax on inter-household equity. For Kampala, the capital city with a proportionately high concentration of high-income households, the tax rate is predicted to increase to 21% by 2020 compared to 7% for other urban households and 1.7% - 3.9% for rural households. The proposed tax places a proportionately bigger burden of healthcare financing on higher income households. Tax exempt households, as per the SAM, would not be burdened by the proposed tax because the tax adjustment in the model is applied to households that are already eligible to pay income taxes in the SAM. Tax exempt households can be identified by mapping the UNHS data since the SAM household income and expenditure values are computed from the UNHS. The current model set up, however, is not suited to address the policy impact on intra-household equity. A behavioural micro-simulation model that first estimates individual behaviour econometrically would better capture the intra-household tax policy impact.

5 Conclusions and Policy implications

Domestic resource mobilisation for healthcare could be stepped up, particularly as regards expanding the tax base. Although there is a value-added tax (18%), fees, licences, and permits that many individuals and small businesses pay in the informal sector, a relatively large proportion of households are not appropriately taxed. The existence of a large informal sector complicates the ability to collect direct taxes as most of the individuals and businesses in informal sector activities are not registered, and if registered they do not keep good records. It is not uncommon for a teacher who earns a monthly salary of four hundred thousand shillings to be taxed at source while a sole proprietor with an informal sector business making a monthly profit of one million shillings goes untaxed, or at best pays a presumptive tax, which is not progressive. However, with the recently established

National Identity registration and data bank, if updated regularly, individuals and businesses can be tracked relatively easily.

The proposed household health tax could take the positives from the abolished graduated-tax (G-Tax) formerly levied on the majority of adult Ugandans and a major source of revenue for rural and town councils. A study on rural taxation in Uganda showed that by 2003, the G-Tax bands in the government personal income had been greatly simplified to a progressive schedule and despite the politicization of the tax it did not pose a significant burden on households, rich or poor (Bahiigwa et al., 2004). The G-tax was a form of bringing into the system income that was not covered by the pay-as-you-earn tax that is deducted at source. Given the politicisation of taxes in Uganda, it is highly desirable that a positive relationship between taxation and service delivery is explicitly established and essential that both the quantity and quality of healthcare services are seen to then improve.

Although aid-for-health is projected as a good source of fiscal space for health in Uganda, in terms of improving welfare, there is a challenge of sustainability. As rich countries grapple with financial crises and austerity, there is a growing worry as to whether these countries will continue to meet their foreign aid commitments while making major domestic budget cuts. Moreover, foreign aid sustainability in the recipient countries has been criticised for trapping developing countries in a vicious cycle of "aid dependency" and leaving countries in need of more aid as opposed to being "weaned off aid" (Moyo, 2009). Therefore, it is imperative that consideration be made for the policy options that propose creating fiscal space for health premised on domestic resources mobilisation.

The conclusions from this study ought to be taken within the context of the assumptions in the modelling exercise. There are structural bottlenecks that may prevent absorption and efficient use of additional health funding, particularly in the short-term, so that the full benefits from expanding the health sector predicted by the model are not realised. For instance, factor demand by an expanding health sector may not be met in the short-term because it takes time to train healthcare workers and to construct and equip health facilities. However, the mid- to long- term (as assumed in this model) offers flexibility in availability of healthcare labour. Moreover, shortage of healthcare labour could be overcome by a deliberate government policy to attract foreign healthcare workers. Evaluation of the economy-wide impact of importing healthcare labour is a topic for future study. Additionally, the factor market closure assumed full employment of factors, which is plausible for skilled labour, but may not be the case for all factors. Underemployment of unskilled labour and land is possible which means results could be different from those predicted here.

NOTES

1 Informal sector employment in Uganda refers to persons who are in precarious employment situations irrespective of whether or not the entity for which they work is in the formal or informal sector. Persons in informal employment therefore consist of all those in the informal sector; employees in the formal sector; and persons working in private households who are not entitled to basic benefits such as pension/retirement fund, paid leave, medical benefits, deduction of income tax from wages and whose employment agreement is verbal (Uganda Bureau of Statistics, 2010).

2 There are variants of microsimulation approaches including the top-down macro-micro 'incidence' models and the top-down macro-micro 'simulation (behavioural)' models. For a comprehensive discussion of the advantages and shortcomings of these approaches see (Savard, 2003, Pauw, 2009).

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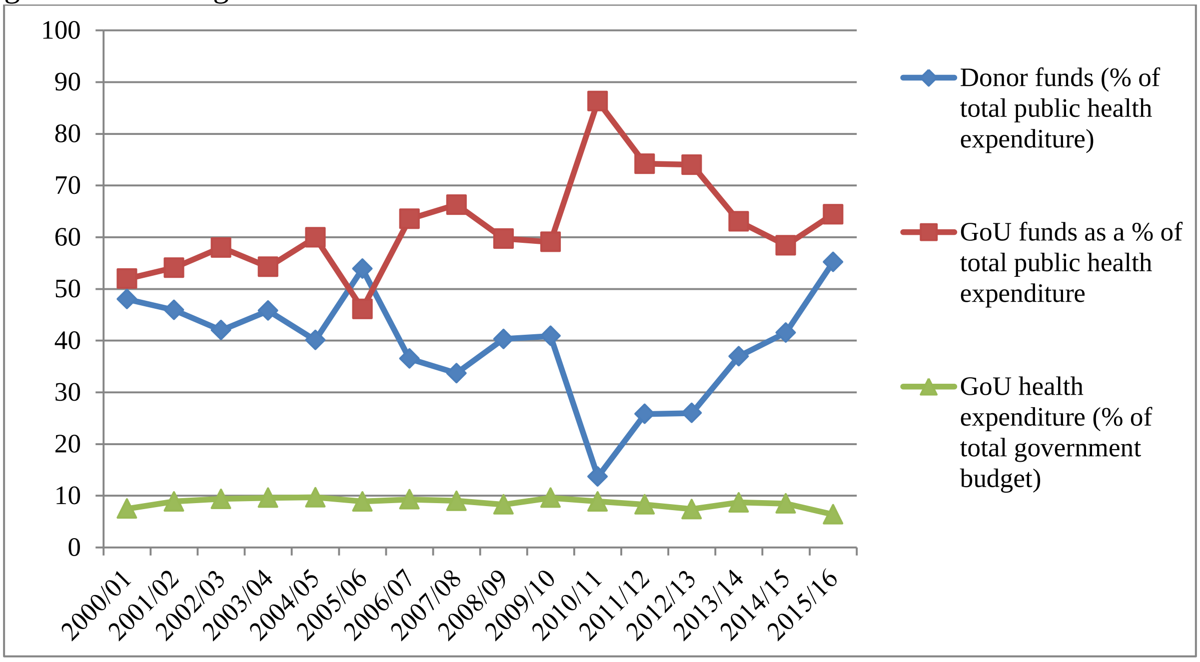
Figures and tables

Figure 1 Uganda's public health expenditure funding sources and health budget share in total government budget: 2000-2016



GoU = Government of Uganda

Table 1 The dynamic baseline scenario poverty indicators: 2008 – 2020 (percentage of total population)

	P0	P1	P0	P1	P0	P1
	National, total		National farm		National non-farm	
2008	31.1	8.8	32.3	8.7	26.2	9.4
2009	29.2	8.1	30.2	7.9	25.2	8.8
2010	26.8	7.3	27.4	7.1	24.3	8.2
2011	25.3	6.7	25.7	6.5	23.6	7.6
2012	23.2	6.1	23.4	5.8	22.3	7.1
2013	21.5	5.6	21.7	5.3	20.9	6.6
2014	20.1	5.1	20.1	4.8	19.9	6.2
2015	18.9	4.6	19.0	4.3	18.5	5.7
2016	17.3	4.2	17.2	3.9	17.8	5.3
2017	15.9	3.8	15.6	3.5	17.2	5.0
2018	14.6	3.5	14.3	3.2	16.1	4.6
2019	13.4	3.2	12.9	2.9	15.6	4.3
2020	12.6	2.9	12.0	2.6	14.9	4.0
	Rural, total		Rural, farm		Rural, non-farm	
2008	34.3	9.8	33.2	8.9	42.6	16.3
2009	32.2	8.9	31.0	8.1	41.9	15.4
2010	29.5	8.1	28.1	7.3	40.7	14.4
2011	27.8	7.4	26.3	6.6	39.4	13.5
2012	25.6	6.8	24.0	6.0	38.4	12.6
2013	23.8	6.2	22.3	5.5	36.0	11.8
2014	22.3	5.6	20.7	4.9	34.7	11.0
2015	21.0	5.1	19.6	4.5	32.2	10.3
2016	19.2	4.7	17.7	4.0	31.0	9.6
2017	17.6	4.2	16.0	3.6	30.2	9.0
2018	16.2	3.9	14.7	3.3	28.1	8.4
2019	14.8	3.5	13.2	3.0	27.3	7.8
2020	13.9	3.2	12.3	2.7	26.5	7.3
	Urban, total		Urban, farm		Urban, non-farm	
2008	13.8	3.7	19.7	5.5	10.4	2.7
2009	12.4	3.3	18.1	5.0	9.1	2.4
2010	11.7	3.0	17.4	4.5	8.5	2.2
2011	11.3	2.7	16.7	4.0	8.3	2.0
2012	9.7	2.4	15.0	3.6	6.8	1.8
2013	8.9	2.2	13.7	3.3	6.3	1.6
2014	8.1	2.0	12.6	2.9	5.6	1.5
2015	7.7	1.8	12.0	2.7	5.3	1.3
2016	7.2	1.6	11.0	2.4	5.0	1.2
2017	6.5	1.5	10.1	2.1	4.5	1.1
2018	6.2	1.3	9.3	1.9	4.4	1.0
2019	5.9	1.2	8.8	1.7	4.2	0.9
2020	5.3	1.1	8.2	1.5	3.6	0.8

Source: CGE-Micro simulation model results

Table 2 Percentage change in sector value-added: 2020 relative to 2008, for different scenarios

	Baseline health budshr: baseline gov budget	Prioritisation: Proposed health budshr -fixed gov budget (without health effects)	Prioritisation: Proposed health budshr - fixed gov budget (with health effects)	Taxation: Proposed health budshr - new tax (without health effects)	Taxation: Proposed budshr - new tax (with health effects)	Foreign Aid: Proposed health budshr - new aid (without health effects)	Foreign Aid: Proposed health budshr - new aid (with health effects)
Overall GDP	109.9	108.3	194.0	113.5	209.2	112.2	206.9
Agriculture	100.1	99.9	201.9	99.0	219.3	100.0	218.4
Industry, Total	86.9	81.8	170.0	98.7	199.9	93.5	190.0
Mining	93.2	88.5	175.0	104.3	202.8	99.2	193.5
Food processing	110.5	109.5	208.3	106.5	217.9	111.6	222.6
Non Food processing	99.6	96.3	192.4	107.0	215.5	104.5	210.1
Fuel	114.1	114.4	198.7	113.2	205.7	117.2	210.1
Machinery	93.7	87.1	207.4	107.6	248.2	97.6	230.9
Chemicals	111.0	113.9	205.1	114.2	214.0	118.1	218.4
Utilities	113.0	111.5	195.3	109.2	199.7	116.2	207.4
Construction	68.9	61.1	145.7	91.0	191.1	78.4	170.5
Services, Total	126.8	126.4	203.6	128.2	209.7	127.8	210.8
Trade	106.5	106.1	203.9	106.9	218.7	109.1	219.0
Transport	116.3	115.2	195.4	115.0	202.6	119.0	206.4
Communication	109.4	107.8	200.8	104.8	205.9	111.4	214.5
Private healthcare	106.6	103.8	234.0	103.4	249.5	106.4	253.8
Government services	103.8	109.0	156.7	107.7	160.4	109.7	164.0
Education	104.1	103.2	179.8	101.0	185.8	104.2	191.6
Public Primary healthcare	103.3	346.8	347.1	346.8	347.1	346.8	347.1
Public Other healthcare	104.5	149.5	161.0	149.4	161.7	150.2	162.7

Note: budshr = budget share, gov = government

Figure 2 Change in national poverty rates under the proposed health budget share: 2008 -2020

Panel 1 Analysis without health effects

Panel 2 Analysis with health effects

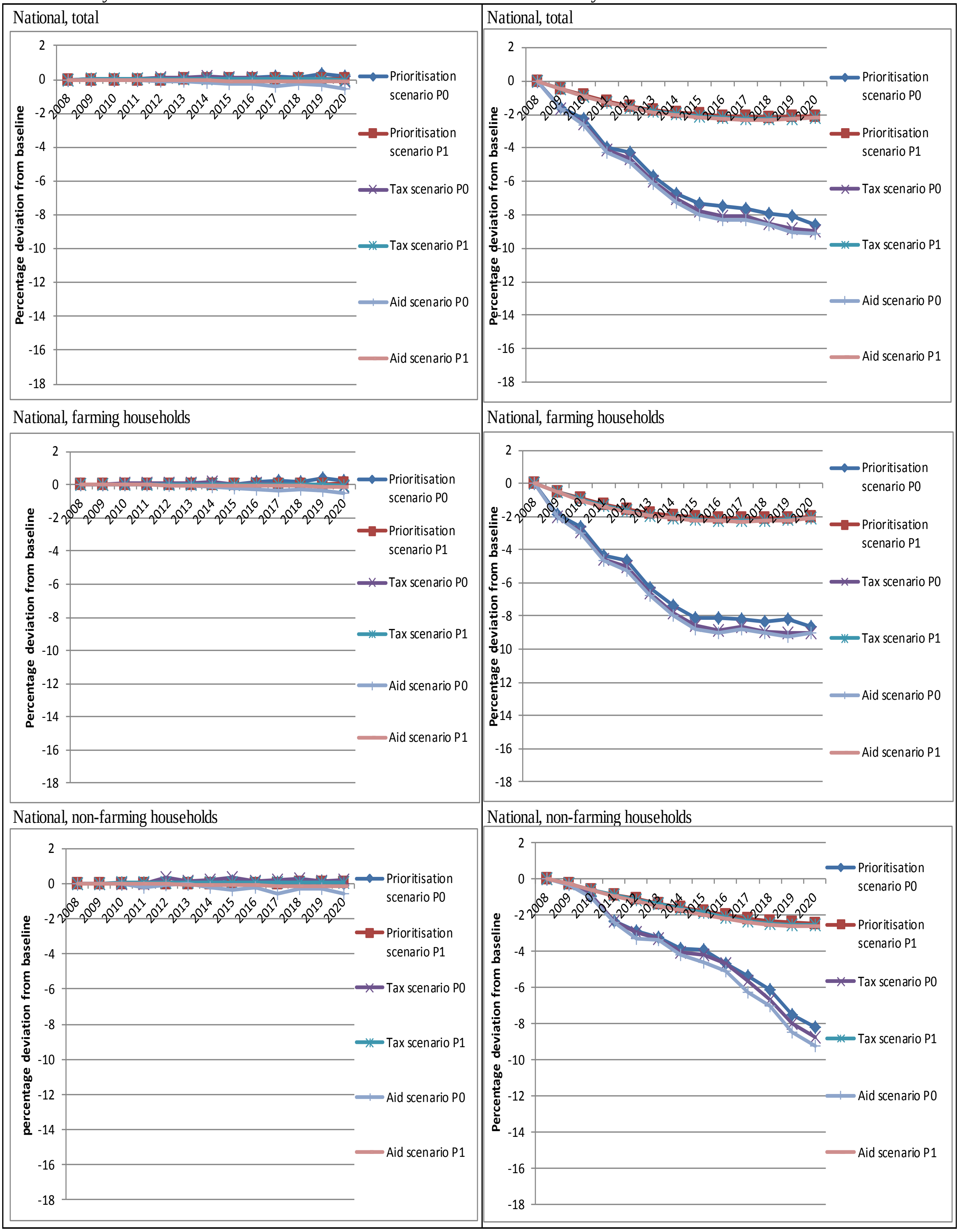


Figure 3 Change in rural and urban poverty rates under the proposed health budget share with health effects: 2008 – 2020