# Economic Growth, sectoral linkages and poverty reduction in Tanzania

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Background Paper for the Tanzania CEM

We would like to thank Peter Wobst and Hans Löfgren for providing us with models and advice. We would also like to thank all members of the CEM country team and participants at a consultative meeting in Dar es Salaam.

## Executive summary

The Tanzanian government has outlined a comprehensive strategy to tackle poverty and other development problems. One of the key objectives of the poverty reduction strategy is to promote accelerated and equitable growth. This report highlights inter-sectoral linkages and the prospects of growth and poverty reduction.

In the static multiplier analysis we found that the agriculture sector followed by public administration, building & construction and manufacturing has the largest impact on employment. From a poverty perspective the agriculture sector has the highest multiplier. Interesting though from a gender perspective, the highest male labour multiplier is in building & construction followed by public administration while for female labour it is highest in agriculture followed by public administration. Thus, employment generation in the agricultural sector would benefit women more than men.

A more detailed analysis of the agricultural sector shows that there are differences between male and female labour demand depending on where the expansion occur. Increased production of beans, cereals and sugar has the largest impact on female employment while men benefits most from production increases in fishing, wheat and cashew-nuts. However, from a poverty perspective the largest multiplier can be found in sugar, tea, fishing, cashew-nuts, sisal, cereals, oil-seeds and livestock in that order. Looking at the total employment multiplier shows that cashew-nuts, fishing, sugar, livestock and cereals generates more employment given a certain increase in production.

Introducing general equilibrium features into our analysis a balanced development strategy seems to be the most appropriate. Agricultural support policies can be an important element towards agricultural and overall economic growth and development and, however, a policy supporting the agriculture sector has focus on a broad package of reforms also in the non-agricultural sectors. Higher incomes and increased demand of agricultural products from urban areas is important as they increase demand and counteract falling prices when productivity increases in the agriculture sector.

In the longer term is it possible to achieve the ambitious targets of reducing poverty by half? Yes, the best outcome in terms of poverty reduction seems to be a strategy focusing where productivity gains can be achieved in staple-food sectors. Moreover, from a gender perspective supporting staple-food sector seems to be the best alternative. Urban poverty is also reduced by an agricultural-led strategy. Even it is possible to achieve the poverty target all growth scenarios see a worsening distribution of incomes. The staple-crop scenario seems to be the scenario where income distribution is worsening less than the others. This is the case both for male and female-headed households as well as the rural region.

Since the 1990s the change in poverty conceals large regional differences in levels of poverty. Projecting growth and poverty at regional level show that a strategy supporting staple-food crops would reduce poverty in most cases across the different regions. Still it is only four regions (Kilimanjaro, Tanga, Iringa and Tabora) in which poverty is reduced by half. Interestingly, even if poverty in Dar es Salaam has fallen dramatically since the early 1990s the projections show a modest decline.

In the final section of the report two cases of increased spending are discussed. Increased public spending on education leads to a moderate acceleration in GDP growth. A scenario where additional spending in the sector is financed by foreign aid has the largest impact. The aid-financed scenario also seems to benefit the poorer households

more. The impact of a HIV/AIDS treatment scenario increases GDP growth slightly and again the largest increase is when the program is financed by aid. The impact is, however, not that large and part of the reason is that population growth is increasing counteracting the gains in productivity from a more healthy population. The additional inflows of aid appreciate the exchange rate but as the additional aid is financing a program which boosts productivity the Dutch disease effects are modest.

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## 1. Introduction

In order to achieve the Millennium goal of reducing poverty by half, an appropriate agricultural development strategy continues to be among Tanzania's main development challenges. The agricultural sector has been mainstay of the Tanzanian economy over the entire post-war period and remains so at the beginning of the new millennium. Still over 80% of the total population in Tanzania depends on agricultural production for their living.

In the mid 1980s, economic performance in Tanzania faltered and persuaded Tanzania to reconsider its existing inward-looking, interventionist, and non-market-based policies. The rate of inflation increased and the budgetary resources gradually failed to cover the financing requirements of the government to run the economy. Monetary accommodation of public sector financial losses also added to inflationary pressures. As in many other developing countries, the government of Tanzania was pressurized by the donor community to adopt structural adjustment policies (SAPs) in the mid 1980s, in an effort to deal with the lingering economic crisis.

During the 1990s the Tanzanian government paid only modest attention to sectoral policies, while it rather concentrated on macro policies to provide an impetus towards a free market economy. Sectoral policies in this decade focused mainly on safeguarding government expenditures and promoting more participation of the private sector in almost all spheres of the economy. The government endeavoured towards privatization of all state enterprises and gradually withdrew from the role of providing most of the basic services to the agricultural sector. The results of the economic reforms in Tanzania are, however, far from satisfactory. For example, Ponte (2001) argues that poor infrastructure and dispersed settlements have limited the capability of the private sector to cover the ground left by state withdrawal and private traders have not shown great interest in operating in remote areas. Furthermore, agricultural productivity has remained stagnant (Mhamba and Wobst, 2003).

To meet the growing demand for food, as well as of cash incomes, yields of staple food and traditional export crops must increase in order to maintain or improve current per capita consumption. Yields must increase even more if we are to make progress overcoming malnutrition and poverty in Tanzania. This therefore calls for supported efforts to change the economic and social context within which agricultural production and marketing takes place: by adoption of agricultural policies specifically aimed at altering the price of farm inputs and outputs, and by promoting new technologies in agriculture. However, the agriculture sector cannot be seen in isolation an important lesson from the past is that inter-sectoral linkages play an important role.

The Tanzanian government has outlined a comprehensive strategy to tackle poverty and other development problems. Currently there are four important strategy papers that form the basis of an overall strategy to improve the situation for the less fortunate. Vision 2025 lays out the long-term development goals and perspectives, against which the national strategy for poverty eradication (NPES) alleviation was formulated. The Tanzania Assistance Strategy (TAS) is an attempt by the government and its international partners to co-ordinate and discuss ongoing activities in a comprehensive development framework. The Poverty Reduction Strategy Paper (PRSP) is an integral part of the Highly Indebted Poor Countries (HIPC) process, focusing mainly on strategies to alleviate poverty including broad consultations among various stakeholders. Altogether the planning process tries to improve co-ordination between the

government and the donors in order to increase efficiency of government spending and donor funds in reaching the poor.

One of the key objectives of the poverty reduction strategy is to promote accelerated and equitable growth. According to the Medium Term Plan for Growth and Poverty Reduction GDP growth is targeted to accelerate 6% during 2006 and onwards. Moreover, if the targets are achieved the government anticipate that poverty will be reduced from 36% in 2001 to 30% in 2003 and 17.8% in 2010.

The purpose of this study is to shed some light on inter-sectoral linkages and the prospects of growth and poverty reduction in the longer term. In the next chapter we describe the structure of the Tanzanian economy using the latest Social Accounting Matrix (SAM). In the report chapter three a static SAM-based framework is used to assess whether economic growth can be pro-poor. Employment multipliers are derived to identify sectors with potential high capacity to absorb labour. In the third chapter we also discuss the impact of productivity changes on output, producer prices and household welfare. The fourth chapter introduces a longer time horizon and looks into some dynamic aspects of growth and poverty reduction. Here alternative strategies are discussed and their impact on growth and poverty reduction. Moreover, the final chapter also discuss the impact of increased educational spending and HIV/AIDS treatment on growth and poverty.

## 2. Structure of the Tanzanian Economy

In this section we discuss the structure of the Tanzanian economy using the latest Social Accounting Matrix (SAM) from 2001. A social accounting matrix (SAM) is an efficient way to represent the fundamental law of economics: for every income there is a corresponding outlay of expenditure is. It is important to realize that while the definitions of the accounts in a SAM can vary, all SAMs satisfy certain conventions. First, a SAM is a square matrix designed to provide a record of transactions. Second, for any given account the entries in the row are to be read as receipts for that account. The entries in the corresponding column represent outlays or the expenditure side of the account. Third, the rows and columns must always balance. Fourth, the principle of double-entry bookkeeping guarantees that there will be no leakages or injections into the system and every flow must go from some actor to another actor.

Altogether, this is what King (1981) describes as the first objective of a SAM; organization of information. The second objective of a SAM, following de Melo (1988) and Pyatt (1988), is that a SAM can be intimately related to a model and therefore useful for model construction and analysis. A SAM-based (or CGE) model therefore enable us to explore the impact of exogenous changes in such variables as production, government expenditures, trade, and investments on three important aspects related to poverty alleviation i.e. the economic structure (production structure), primary factor earnings, and household income distribution.

The foundation of analysis in this report is the Tanzania 2001 Social Accounting Matrix (SAM). The micro-SAM contains 43 production sectors of which 21 are in agriculture.[1] The remaining sectors are split between mining (1), manufacturing (13), the rest of the secondary sector (2), and the tertiary sector (6). The same disaggregation applies for the commodities accounts. The SAM also constitutes of 13 accounts categorized into 1 subsistence factor[2] 9 accounts for factor labour (1 child labour, 4 female labour and 4 male labour); 12 household accounts categorized in accordance to poverty status and rural-urban divide. The SAM also constitutes 9 other institutions accounts i.e. 6 taxes accounts and 3 others institutions (i.e. government, rest of the world ROW and the S-I accounts).

The services a sector is currently leading in terms of share of total value of goods and services produced for the domestic and export markets (54% and 60% respectively). The structural adjustment and economic liberalization policies adopted since the mid 1980s provided more growth incentives in the service sectors than in the primary economic activities and in the industrial sector.

There has been a shift on primary commodities export dependence to services export dependence. Supply-side trade dependence, as measured by export share, indicates services are contributing the largest export share in the overall economy. Within the services activities, transport services contribute the largest share followed by private services and public administration. Primary activities also are still contributing a significant share of exports (33%). Within the primary economic activities, coffee production, cashew nuts production and fishing contribute the largest share. Tanzania is yet to capture the export potential from other industries generally and more specifically

1 Later we use abbreviations for different sectors, factors and households in the SAM, see appendix 1 for explanations of these abbreviations.

2 The first factor is the composite subsistence land, labour and capital factor used in the production of own household consumption. Since it is not possible to determine the shares of each of the factor types in this factor category, they are combined into a single factor called subsistence factor. Assuming that subsistence production uses the same technology as non-subsistence production, the share of subsistence labour value-added in total subsistence value-added is 36.2 percent (Thurlow and Wobst 2003:26).

the manufacturing sector. Manufactured exports constitutes only (4.5%) of commodity exports from Tanzania. Relatively higher export shares within the industrial sectors are contributed by mining activities and production of clothing.

We analyse the export orientation of the different economic activities in the economy by examining the export to domestic supply ratio (Table 2.1). Export orientation production in the agricultural sector has shifted from cash crops to food crops i.e. cassava, maize, sorghum, other roots and other crops, and fruits and vegetables. Though largest export orientation are observed in the food production activities, the Tanzanian economy shows great potentials for external supply orientation in almost all the sectors of the economy i.e. primary activities, industry and services.

Private consumption in Tanzania is still concentrated on raw and processed food products and clothing, which constitutes over half of private consumption demand (67%) followed by services consumption (24%). Consumption of other manufactures constitutes only (8.6%). This indicates that the internal market is currently not able to sustain rapid investments in growth-oriented sectors such as consumer durables or household/business/personal technology. Tanzania could benefit more by adopting an export oriented investment and industrial policy or strategy.

Investment patterns in Tanzania revels that more than half of the capital outlays are concentrated in the construction sector (36%) and equipments (36%). A further increase in the share of capital outlays in production of equipments would be required to facilitate further expansion and diversification of the economy.

Thought Tanzania is almost self-sufficient in food requirement, with most food demand met by domestic sources, still the economy is vulnerable to shocks in the global commodity market. This is due to the fact that imported manufactured goods still constitute the largest share of imported goods and services (69%). This is an indication of the relatively underdeveloped manufacturing sector, which still is incapable of meeting the domestic demand for manufacturers and modern technology.

The agricultural sector still contributes the largest share of value added in the economy (46%) followed by the services sector (40%). The industrial sector accounts for only about (13%) of value added. Besides trade, which contributes (10.5%) of value added, a significant share of value added is contributed by maize (10%) and fruits and vegetable production (6.6%). A significant share of value added is also contributed by public administration, real estate and transport which all contribute around (6%) of value added respectively.

The contribution of various sources of income i.e. labour, capital and land across all the sectors are detailed in column 11-14 of Table 2.1. The largest share of labour value added is contributed by the agricultural sector (58%). Within the agricultural sector, food crops production, which also contributes a significant share of capital value added in the economy contribute the largest share of labour value added. Maize production contributes the largest share of labour value added (15%) within the primary sector activities, and in the entire economy.

Within the industrial sectors, the processing of products from the primary activities contributes the largest share of labour value added. This includes meat processing (3.7%); clothing (2.8%) and food processing (1.1%). In the services sector, public administration (10.6%); real estate (9.4%) and construction (5.5%) contributes the largest shares of labour value added.

A significant share of labour value added is therefore contributed by four important activities in the economy i.e. maize production (15%); public administration (10.6%), real estate (9.4%), fruits and other vegetables (8.4%). The labour to capital

output ratio shows that the labour compensation is still the principal determinant of private domestic incomes in the agricultural sector in Tanzania. Relative higher labour intensity is observed in the primary sectors generally and particularly in the production of Maize (8.1); cassava (13.9); root crops (4.7); fruits and vegetables, (3.6); other crops (3.7).

Though a higher labour intensity may be desirable in enhancement of labour factor income, nevertheless, reduction in labour intensity through investments in labour serving technologies is crucial for increasing productivity and output in the agricultural sector. This is particularly so in the expansion of activities targeted for the export market particularly coffee, cashew nuts, maize production and the production of fruits and other vegetables. Increasing the capital intensity is also crucial in the industrial sector in view of the fact that, higher returns to capital are indicators of both the incentives and progress towards higher levels of technology, and ultimately, labour productivity (Tarp et al. 2003:861).

Relative income distribution by sector Table 2.1 shows that the largest proportion of labour value added in the primary sectors is generated by subsistence factors (40%). Besides, female labour (not finished secondary school) (LNFSF) also contributes a significant share of labour value added in the primary sectors (11.4%). In general (70.5%) of total factor income is earned by labour and the remaining (20.7%) by capital and (8.9%) by land.

There is generally very law share of value added accruing to educated labour (finished secondary education and higher) in the economy. Only (0.5%) of value added by labour accrues to educated labour in the primary activities, (6%) in the industrial activities and (16.3%) in the services sector. The realization of Tanzania's economic potential could be enhanced by investing more in education to enhance the country's human resources capacity. This could also enhance Tanzania's competitiveness in the knowledge based high technology development trends in the global economy.

Subsistence factor also earns a significant share of factor income in the industrial sectors (18.3%) and male labour (not finished secondary school) LNFSM. General factor incomes accruing to labour constitutes (43%) and capital (57%). Subsistence factor earnings also constitute a significant share of factor income earnings in the services sector (26%). Factor income accruing to labour constitutes (56%) of the value added in the services sector and (30%) accruing to capital. The diversity in the composition of factor earnings accruing to labour, capital and land is due to the diversity in the technologies used in delivering the services. However, generally, the Tanzanian economy is moving towards a capital and technology intensive service sector e.g. in wholesale and retail trade (92%); Transport and communication (87%).

The implication of the above analysis indicates great scope for Tanzania to befit by increasing investments in capital and modern technologies in the Transport and communication sector. Tanzania enjoys a comparative advantage to other east African countries in transport and communication as it is surrounded by 6 landlocked countries i.e. Uganda, Rwanda, Burundi, the Democratic Republic of Congo; Zambia and Malawi. Further improvements in airports; cargo handling facilities at the ports and improvements in roads and railways connecting to these countries could enhance earnings to the economy. This could also stimulate further increase in factors earnings from the primary sectors generally and more specifically maize production, which seems to enjoys a significant export share; wholesale and retail trade as well as in the hotels and restaurants activities.

Table 2.1: Structure of Supply, Demand, and Value Added for Tanzania, 2001 (All figures in Percentages except for the E/Sd; M/Dd; and LVA/KVA)

| | | X | Sd | E | E/Sd | C | I | Dd | M | M/Dd | VA | LVA | AG-C | NAG-C | LdVA | LVA/KVA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AMAIZE | 6.1 | 3.4 | 0.1 | 2.1 | 8.3 | 0.0 | 4.7 | 0.8 | 0.0 | 9.9 | 15.0 | 10.9 | 0.0 | 10.9 | 8.1 |
| 2 | APADDY | 2.9 | 2.8 | 0.2 | 1.2 | 1.4 | 0.0 | 2.8 | 1.1 | 0.0 | 3.7 | 4.2 | 10.2 | 0.0 | 10.2 | 2.4 |
| 3 | ASORGH | 0.9 | 0.5 | 0.0 | 2.0 | 1.1 | 0.0 | 0.7 | 0.0 | 0.0 | 1.3 | 2.0 | 1.6 | 0.0 | 1.6 | 7.1 |
| 4 | AWHEAT | 0.2 | 0.2 | 0.0 | 1.1 | 0.1 | 0.0 | 0.3 | 0.9 | 0.3 | 0.2 | 0.2 | 0.8 | 0.0 | 0.8 | 1.6 |
| 5 | ABEANS | 1.5 | 1.3 | 0.1 | 1.4 | 2.4 | 0.0 | 1.4 | 0.0 | 0.0 | 2.3 | 2.8 | 5.9 | 0.0 | 5.9 | 2.7 |
| 6 | ACASSA | 1.1 | 0.4 | 0.0 | 3.3 | 2.1 | 0.0 | 0.8 | 0.0 | 0.0 | 2.0 | 3.2 | 1.4 | 0.0 | 1.4 | 13.9 |
| 7 | ACEREA | 0.2 | 0.3 | 0.0 | 1.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 0.3 | 1.1 | 0.0 | 1.1 | 1.8 |
| 8 | AOILSE | 0.9 | 0.8 | 0.3 | 1.3 | 1.4 | 0.0 | 0.8 | 0.0 | 0.0 | 1.5 | 1.7 | 4.0 | 0.0 | 4.0 | 2.5 |
| 9 | AROOTS | 0.9 | 0.6 | 0.0 | 1.9 | 1.7 | 0.0 | 0.7 | 0.0 | 0.0 | 1.6 | 2.2 | 2.7 | 0.0 | 2.7 | 4.7 |
| 10 | ACOTTO | 0.7 | 0.8 | 3.2 | 1.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.6 | 0.6 | 2.3 | 0.0 | 2.3 | 1.4 |
| 11 | ACOFFE | 0.6 | 0.7 | 7.3 | 1.0 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.8 | 0.7 | 2.5 | 0.0 | 2.5 | 1.7 |
| 12 | ATOBAC | 0.5 | 0.6 | 3.7 | 1.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.5 | 0.5 | 2.0 | 0.0 | 2.0 | 1.4 |
| 13 | ATEAGR | 0.3 | 0.3 | 2.0 | 1.0 | 0.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 0.2 | 1.0 | 0.0 | 1.0 | 1.5 |
| 14 | ACASHE | 0.6 | 0.7 | 7.2 | 1.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 1.0 | 0.9 | 3.8 | 0.0 | 3.8 | 1.4 |
| 15 | ASISAL | 0.1 | 0.1 | 0.0 | 1.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.0 | 0.3 | 1.4 |
| 16 | ASUGAR | 1.1 | 1.3 | 1.0 | 1.0 | 0.2 | 0.0 | 1.4 | 2.5 | 0.1 | 1.6 | 1.5 | 5.6 | 0.0 | 5.6 | 1.5 |
| 17 | AOFRVE | 3.8 | 2.9 | 2.1 | 1.5 | 6.9 | 0.0 | 3.2 | 0.4 | 0.0 | 6.6 | 8.4 | 13.8 | 0.0 | 13.8 | 3.6 |
| 18 | AOCROP | 0.5 | 0.3 | 0.3 | 1.7 | 0.8 | 0.0 | 0.4 | 0.0 | 0.0 | 0.8 | 1.0 | 1.6 | 0.0 | 1.6 | 3.7 |
| 19 | ALIVES | 2.1 | 2.0 | 0.5 | 1.2 | 2.1 | 0.0 | 2.0 | 0.1 | 0.0 | 3.3 | 3.5 | 9.6 | 0.0 | 9.6 | 2.1 |
| 20 | AFISHI | 2.4 | 2.7 | 5.0 | 1.0 | 3.8 | 0.0 | 2.2 | 0.0 | 0.0 | 4.0 | 3.8 | 13.6 | 0.0 | 13.6 | 1.6 |
| 21 | AHUFOR | 2.1 | 1.4 | 0.4 | 1.8 | 3.6 | 0.0 | 1.7 | 0.0 | 0.0 | 3.7 | 5.3 | 5.3 | 0.0 | 5.3 | 5.8 |
| | **All Primary** | **29.5** | **24.0** | **33.4** | **1.4** | **36.4** | **0.0** | **25.5** | **5.9** | **0.0** | **46.2** | **58.0** | **100.0** | **0.0** | **100.0** | **3.4** |
| 22 | AMININ | 0.9 | 1.1 | 1.5 | 1.0 | 0.0 | 0.0 | 1.0 | 0.7 | 0.1 | 1.5 | 0.0 | 0.0 | 4.7 | 0.0 | 0.0 |
| 23 | AMEATD | 2.3 | 2.0 | 0.0 | 1.3 | 5.0 | 0.0 | 2.2 | 0.2 | 0.0 | 2.3 | 3.7 | 0.0 | 0.9 | 0.0 | 7.5 |
| 24 | AGRAIN | 4.6 | 5.3 | 0.5 | 1.0 | 8.8 | 0.0 | 4.8 | 0.8 | 0.0 | 0.7 | 0.9 | 0.0 | 0.5 | 0.0 | 3.3 |
| 25 | APFOOD | 3.0 | 3.4 | 0.5 | 1.0 | 7.2 | 0.0 | 3.5 | 3.7 | 0.1 | 2.0 | 1.1 | 0.0 | 4.6 | 0.0 | 0.4 |
| 26 | ABEVER | 1.2 | 1.4 | 0.1 | 1.0 | 2.7 | 0.0 | 1.5 | 0.8 | 0.0 | 0.9 | 0.5 | 0.0 | 2.0 | 0.0 | 0.4 |
| 27 | ACLOTH | 2.9 | 3.4 | 1.3 | 1.0 | 7.2 | 0.3 | 3.6 | 3.8 | 0.1 | 3.0 | 2.8 | 0.0 | 4.8 | 0.0 | 1.1 |
| 28 | AWOODP | 1.0 | 1.2 | 0.4 | 1.0 | 0.5 | 2.1 | 1.4 | 3.4 | 0.2 | 0.9 | 0.4 | 0.0 | 2.4 | 0.0 | 0.3 |
| 29 | ACHEMI | 0.5 | 0.5 | 0.2 | 1.0 | 2.4 | 0.0 | 1.0 | 5.6 | 0.4 | 0.2 | 0.3 | 0.0 | 0.1 | 0.0 | 4.4 |
| 30 | AFERTI | 0.1 | 0.1 | 0.0 | 1.0 | 0.0 | 0.0 | 0.1 | 0.6 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 |
| 31 | APETRO | 0.2 | 0.2 | 0.0 | 1.0 | 3.0 | 0.0 | 1.1 | 12.0 | 0.8 | 0.2 | 0.1 | 0.0 | 0.4 | 0.0 | 0.4 |
| 32 | ARUPLA | 0.4 | 0.4 | 0.1 | 1.0 | 0.9 | 2.2 | 0.7 | 3.0 | 0.3 | 0.2 | 0.1 | 0.0 | 0.6 | 0.0 | 0.3 |
| 33 | AGLASS | 0.6 | 0.7 | 0.5 | 1.0 | 0.2 | 0.1 | 0.7 | 0.3 | 0.0 | 0.4 | 0.2 | 0.0 | 1.0 | 0.0 | 0.3 |
| 34 | AMETAL | 0.9 | 1.1 | 0.1 | 1.0 | 0.9 | 2.3 | 1.5 | 6.2 | 0.3 | 0.6 | 0.2 | 0.0 | 1.4 | 0.0 | 0.3 |
| 35 | AEQUIP | 0.8 | 0.9 | 0.6 | 1.0 | 0.7 | 35.9 | 3.0 | 27.7 | 0.7 | 0.6 | 0.1 | 0.0 | 1.9 | 0.0 | 0.1 |
| | **All Industry** | **19.6** | **21.9** | **6.0** | **1.0** | **39.5** | **43.0** | **26.0** | **68.8** | **0.2** | **13.5** | **10.4** | **0.0** | **25.4** | **0.0** | **0.8** |
| 36 | AUTILI | 1.5 | 1.8 | 0.0 | 1.0 | 0.9 | 0.0 | 1.6 | 0.0 | 0.0 | 1.7 | 0.6 | 0.0 | 4.6 | 0.0 | 0.3 |
| 37 | ACONST | 5.5 | 6.4 | 0.0 | 1.0 | 0.0 | 36.0 | 5.6 | 0.1 | 0.0 | 4.5 | 5.5 | 0.0 | 4.8 | 0.0 | 2.1 |
| 38 | ATRADE | 7.2 | 8.4 | 0.0 | 1.0 | 0.0 | 17.3 | 7.3 | 0.0 | 0.0 | 10.5 | 1.5 | 0.0 | 31.9 | 0.0 | 0.1 |
| 39 | AHOTEL | 3.2 | 3.7 | 0.0 | 1.0 | 3.8 | 0.0 | 3.3 | 0.0 | 0.0 | 2.6 | 1.1 | 0.0 | 6.6 | 0.0 | 0.3 |
| 40 | ATRANS | 4.9 | 5.7 | 44.3 | 1.0 | 2.0 | 3.8 | 4.3 | 19.5 | 0.3 | 5.8 | 1.3 | 0.0 | 16.7 | 0.0 | 0.1 |
| 41 | AESTAT | 14.4 | 11.7 | 0.0 | 1.4 | 8.4 | 0.0 | 12.5 | 0.0 | 0.0 | 6.0 | 9.4 | 0.0 | 2.4 | 0.0 | 7.3 |
| 42 | AADMIN | 11.3 | 13.1 | 5.5 | 1.0 | 7.7 | 0.0 | 11.3 | 0.9 | 0.0 | 6.2 | 10.6 | 0.0 | 0.8 | 0.0 | 23.4 |
| 43 | APRIVS | 2.9 | 3.3 | 10.9 | 1.0 | 1.4 | 0.0 | 2.7 | 4.7 | 0.1 | 3.0 | 1.7 | 0.0 | 6.8 | 0.0 | 0.5 |
| | **All Services** | **50.9** | **54.1** | **60.6** | **1.1** | **24.1** | **57.0** | **48.5** | **25.2** | **0.0** | **40.3** | **31.6** | **0.0** | **74.6** | **0.0** | **0.8** |
| | **All Economy** | **100.0** | **100.0** | **100.0** | **1.2** | **100.0** | **100.0** | **100.0** | **100.0** | **0.1** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **0.0** |

Notes: (i) Abbreviations represents the following: X: Output, Sd: Supply for domestic market, E: Export, C: consumption, I: investment, Dd: demand for domestically produced goods, M: import, VA: value added, LVA: labour value added, AGCV: agriculture capital value added, NAGCV: non-agricultural capital value added, and LdVA: land value added.

(ii) The Export to domestic supply, Import to domestic demand and the labour to capital figures are provided as ratios

Table 2.2: Factor income distribution by sector (all figures in percentages)

| | FSUB | LCHILD | LNONF | LNFPF | LNFSF | LSECF | LNONM | LNFPM | LNFSM | LSECM | Total Skilled Labour | Total Labour | CAPAG | CAPNAG | LAND | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maize | 68.3 | 0.2 | 1.8 | 1.2 | 7.9 | 0.0 | 0.8 | 2.2 | 2.5 | 0.2 | 0.2 | 85.0 | 10.5 | 0.0 | 4.5 | 100.0 |
| Paddy | 23.1 | 0.2 | 1.9 | 2.1 | 18.7 | 0.1 | 1.1 | 6.3 | 8.4 | 0.8 | 0.9 | 62.7 | 26.1 | 0.0 | 11.2 | 100.0 |
| Sorghum or millets | 66.5 | 0.4 | 3.9 | 0.6 | 5.1 | 0.0 | 1.8 | 2.0 | 2.9 | 0.1 | 0.1 | 83.3 | 11.7 | 0.0 | 5.0 | 100.0 |
| Wheat | 5.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.4 | 0.0 | 0 | 52.8 | 33.0 | 0.0 | 14.2 | 100.0 |
| Beans | 30.5 | 0.0 | 3.8 | 2.5 | 20.3 | 0.1 | 1.0 | 4.0 | 3.3 | 0.2 | 0.3 | 65.8 | 24.0 | 0.0 | 10.3 | 100.0 |
| Cassava | 81.2 | 0.1 | 1.1 | 0.6 | 3.4 | 0.0 | 0.6 | 2.0 | 1.6 | 0.2 | 0.2 | 90.7 | 6.5 | 0.0 | 2.8 | 100.0 |
| Other cereals | 12.2 | 0.5 | 5.5 | 2.3 | 19.4 | 0.1 | 2.7 | 6.3 | 6.9 | 0.4 | 0.5 | 56.2 | 30.7 | 0.0 | 13.1 | 100.0 |
| Oil seeds | 27.1 | 0.6 | 3.4 | 1.6 | 17.0 | 0.0 | 2.3 | 6.7 | 5.0 | 0.2 | 0.2 | 63.8 | 25.3 | 0.0 | 10.9 | 100.0 |
| Other roots and tubes | 53.2 | 0.8 | 1.6 | 1.3 | 11.9 | 0.0 | 0.0 | 4.2 | 3.6 | 0.2 | 0.2 | 76.8 | 16.2 | 0.0 | 6.9 | 100.0 |
| Cotton | 0.0 | 5.2 | 1.1 | 3.1 | 12.2 | 0.0 | 3.0 | 11.4 | 14.0 | 0.2 | 0.2 | 50.3 | 34.8 | 0.0 | 14.9 | 100.0 |
| Coffee | 8.4 | 0.0 | 2.1 | 1.2 | 15.4 | 0.0 | 2.3 | 8.9 | 15.4 | 0.6 | 0.6 | 54.4 | 31.9 | 0.0 | 13.7 | 100.0 |
| Tobacco | 0.0 | 0.0 | 2.8 | 2.3 | 14.9 | 0.2 | 3.4 | 10.4 | 14.0 | 2.2 | 2.4 | 50.2 | 34.8 | 0.0 | 14.9 | 100.0 |
| Tea | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 49.2 | 0.0 | 0.0 | 0 | 50.8 | 34.4 | 0.0 | 14.8 | 100.0 |
| Cashew nuts | 0.0 | 1.0 | 3.1 | 0.7 | 10.5 | 0.0 | 5.5 | 12.3 | 17.2 | 0.0 | 0 | 50.2 | 34.9 | 0.0 | 14.9 | 100.0 |
| Sisal fiber | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 | 13.7 | 11.0 | 16.7 | 3.2 | 3.2 | 50.0 | 35.0 | 0.0 | 15.0 | 100.0 |
| Sugar | 1.5 | 0.0 | 0.0 | 27.4 | 0.0 | 0.0 | 0.0 | 22.8 | 0.0 | 0.0 | 0 | 51.7 | 33.8 | 0.0 | 14.5 | 100.0 |
| Fruits and vegetables | 40.5 | 0.7 | 1.2 | 1.0 | 16.4 | 0.3 | 1.7 | 3.8 | 5.2 | 0.4 | 0.7 | 71.3 | 20.1 | 0.0 | 8.6 | 100.0 |
| Other crops | 44.4 | 1.1 | 1.0 | 0.0 | 12.0 | 0.1 | 3.6 | 7.0 | 2.9 | 0.2 | 0.3 | 72.3 | 19.4 | 0.0 | 8.3 | 100.0 |
| Poultry and livestock | 18.5 | 3.9 | 2.4 | 1.0 | 17.7 | 0.8 | 3.5 | 5.5 | 5.9 | 0.7 | 1.5 | 60.0 | 28.0 | 0.0 | 12.0 | 100.0 |
| Fishing and fish farms | 6.2 | 0.0 | 2.0 | 0.0 | 3.4 | 0.0 | 6.8 | 15.6 | 19.5 | 0.0 | 0 | 53.5 | 32.5 | 0.0 | 13.9 | 100.0 |
| Hunting and forestry | 59.7 | 0.0 | 0.0 | 0.0 | 11.1 | 0.0 | 1.1 | 0.0 | 7.6 | 0.8 | 0.8 | 80.3 | 13.8 | 0.0 | 5.9 | 100.0 |
| **Average Primary** | 39.6 | 0.6 | 1.8 | 2.0 | 11.4 | 0.1 | 2.0 | 5.9 | 6.6 | 0.4 | 0.5 | 70.5 | 20.7 | 0.0 | 8.9 | 100.0 |

Notes: Abbreviations represents the following: FSUB: Subsistence Factor, LCHILD: Child labour (age 10 to 14), LNONF: Female labour (no formal education), LNFPF: Female labour (not finished primary school), LNFSF: Female labour (not finished secondary school), LSECF: Female labour (secondary or higher education), LNONM: Male labour (no formal education), LNFPM: Male labour (not finished primary school), LNFSM: Male labour (not finished secondary school), LSECM: Male labour (secondary or higher education), CAPAG: Agricultural capital, CAPNAG: Non-agricultural capital, LAND: Agricultural land Skilled labour: all labour with secondary or higher education.

Table 2.2: Continues

| | FSUB | LCHILD | LNONF | LNFPF | LNFSF | LSECF | LNONM | LNFPM | LNFSM | LSECM | Total Skilled Labour | Total Labour | CAPAG | CAPNAG | LAND | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mining and quarrying | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 1.3 | 0.1 | 0.2 | 1.8 | 0.0 | 98.2 | 0.0 | 100.0 |
| Processing of meat and dairy products | 87.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.2 | 0.5 | 0.0 | 0.2 | 88.3 | 0.0 | 11.7 | 0.0 | 100.0 |
| Grain milling | 0.0 | 0.3 | 0.5 | 3.6 | 25.5 | 0.0 | 1.7 | 2.3 | 35.2 | 7.8 | 7.8 | 76.7 | 0.0 | 23.3 | 0.0 | 100.0 |
| Processed food | 16.5 | 0.0 | 0.2 | 0.1 | 0.7 | 4.1 | 0.3 | 0.5 | 4.8 | 3.2 | 7.3 | 30.5 | 0.0 | 69.5 | 0.0 | 100.0 |
| Beverages and tobacco products | 13.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 1.1 | 16.0 | 16.4 | 30.8 | 0.0 | 69.2 | 0.0 | 100.0 |
| Textile and leather products | 0.0 | 0.2 | 0.8 | 0.8 | 14.4 | 4.8 | 0.4 | 4.0 | 21.7 | 5.4 | 10.2 | 52.5 | 0.0 | 47.5 | 0.0 | 100.0 |
| Wood paper printing | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.6 | 1.4 | 1.0 | 16.0 | 4.0 | 4.6 | 23.3 | 0.0 | 76.7 | 0.0 | 100.0 |
| Manufacture of basic and industrial chemicals | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 81.5 | 0.0 | 0 | 81.5 | 0.0 | 18.5 | 0.0 | 100.0 |
| Manufacture of fertilizers and pesticides | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 70.7 | 0.0 | 0 | 70.7 | 0.0 | 29.3 | 0.0 | 100.0 |
| Petroleum refineries | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 24.5 | 3.0 | 3 | 27.5 | 0.0 | 72.5 | 0.0 | 100.0 |
| Rubber, plastic, and other manufacturing | 0.0 | 0.0 | 0.0 | 0.0 | 4.1 | 2.2 | 0.0 | 0.3 | 11.2 | 4.0 | 6.2 | 21.8 | 0.0 | 78.2 | 0.0 | 100.0 |
| Glass and cement | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 18.6 | 3.6 | 3.6 | 22.9 | 0.0 | 77.1 | 0.0 | 100.0 |
| Iron, steel, and metal products | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.2 | 3.0 | 10.5 | 8.2 | 8.7 | 23.3 | 0.0 | 76.7 | 0.0 | 100.0 |
| Manufacture all equipment | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.2 | 0.0 | 2.2 | 2.7 | 3.5 | 3.7 | 9.1 | 0.0 | 90.9 | 0.0 | 100.0 |
| **Average Industry** | **18.3** | **0.1** | **0.3** | **0.4** | **4.7** | **1.9** | **0.4** | **1.4** | **11.8** | **4.1** | **6** | **43.3** | **0.0** | **56.7** | **0.0** | **100.0** |
| | | | | | | | | | | | | | | | | |
| Utilities | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.4 | 1.1 | 0.8 | 7.9 | 9.7 | 10.1 | 20.3 | 0.0 | 79.7 | 0.0 | 100.0 |
| Construction | 0.0 | 0.2 | 0.1 | 0.0 | 0.3 | 0.7 | 1.3 | 7.4 | 46.5 | 11.4 | 12.1 | 67.9 | 0.0 | 32.1 | 0.0 | 100.0 |
| Wholesale and retail trade | 0.0 | 0.0 | 0.1 | 0.2 | 1.3 | 0.4 | 0.2 | 0.5 | 3.0 | 2.2 | 2.6 | 7.9 | 0.0 | 92.1 | 0.0 | 100.0 |
| Hotels and restaurants | 0.0 | 0.0 | 1.2 | 1.8 | 9.0 | 0.8 | 0.1 | 0.3 | 7.0 | 3.3 | 4.1 | 23.5 | 0.0 | 76.5 | 0.0 | 100.0 |
| Transport and communication | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 1.2 | 0.1 | 0.3 | 4.3 | 6.3 | 7.5 | 12.7 | 0.0 | 87.3 | 0.0 | 100.0 |
| Real estate | 82.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.7 | 4.4 | 5 | 88.0 | 0.0 | 12.0 | 0.0 | 100.0 |
| Public administration, health, and education | 0.0 | 0.0 | 0.1 | 0.4 | 8.7 | 23.2 | 0.1 | 1.3 | 14.5 | 47.5 | 70.7 | 95.9 | 0.0 | 4.1 | 0.0 | 100.0 |
| Business and other services | 0.0 | 0.1 | 0.1 | 0.5 | 3.8 | 3.4 | 0.4 | 2.4 | 12.7 | 8.7 | 12.1 | 32.1 | 0.0 | 67.9 | 0.0 | 100.0 |
| **Average Services** | **12.2** | **0.0** | **0.1** | **0.3** | **2.7** | **4.3** | **0.3** | **1.4** | **10.7** | **12.0** | **16.3** | **44.1** | **0.0** | **55.9** | **0.0** | **100.0** |
| **Average Economy** | **25.7** | **0.3** | **0.9** | **1.1** | **7.0** | **2.1** | **1.1** | **3.5** | **9.0** | **5.6** | **7.7** | **56.2** | **9.6** | **30.2** | **4.1** | **100.0** |

Notes: Abbreviations represents the following: FSUB: Subsistence Factor, LCHILD: Child labour (age 10 to 14), LNONF: Female labour (no formal education), LNFPF: Female labour (not finished primary school), LNFSF: Female labour (not finished secondary school), LSECF: Female labour (secondary or higher education), LNONM: Male labour (no formal education), LNFPM: Male labour (not finished primary school), LNFSM: Male labour (not finished secondary school), LSECM: Male labour (secondary or higher education), CAPAG: Agricultural capital, CAPNAG: Non-agricultural capital, LAND: Agricultural land. Skilled labour: all labour with secondary or higher education.

Table 2.3: Total Value Added Share by Main Categories of Primary Factors

| | FSUB | LCHILD | Female Labour | **Male Labour** | **Total Labour Value Added** | CAPAG | CAPNAG | LAND | Total |
|---|---|---|---|---|---|---|---|---|---|
| AMAIZE | 6.8 | 0.0 | **1.1** | 0.6 | **8.4** | 1.0 | 0.0 | 0.4 | 9.9 |
| APADDY | 0.9 | 0.0 | **0.9** | 0.6 | **2.3** | 1.0 | 0.0 | 0.4 | 3.7 |
| ASORGH | 0.9 | 0.0 | **0.1** | 0.1 | **1.1** | 0.2 | 0.0 | 0.1 | 1.3 |
| AWHEAT | 0.0 | 0.0 | **0.0** | 0.1 | **0.1** | 0.1 | 0.0 | 0.0 | 0.2 |
| ABEANS | 0.7 | 0.0 | **0.6** | 0.2 | **1.5** | 0.6 | 0.0 | 0.2 | 2.3 |
| ACASSA | 1.6 | 0.0 | **0.1** | 0.1 | **1.8** | 0.1 | 0.0 | 0.1 | 2.0 |
| ACEREA | 0.0 | 0.0 | **0.1** | 0.1 | **0.2** | 0.1 | 0.0 | 0.0 | 0.3 |
| AOILSE | 0.4 | 0.0 | **0.3** | 0.2 | **1.0** | 0.4 | 0.0 | 0.2 | 1.5 |
| AROOTS | 0.9 | 0.0 | **0.2** | 0.1 | **1.2** | 0.3 | 0.0 | 0.1 | 1.6 |
| ACOTTO | 0.0 | 0.0 | **0.1** | 0.2 | **0.3** | 0.2 | 0.0 | 0.1 | 0.6 |
| ACOFFE | 0.1 | 0.0 | **0.1** | 0.2 | **0.4** | 0.2 | 0.0 | 0.1 | 0.8 |
| ATOBAC | 0.0 | 0.0 | **0.1** | 0.2 | **0.3** | 0.2 | 0.0 | 0.1 | 0.5 |
| ATEAGR | 0.0 | 0.0 | **0.0** | 0.1 | **0.1** | 0.1 | 0.0 | 0.0 | 0.3 |
| ACASHE | 0.0 | 0.0 | **0.1** | 0.4 | **0.5** | 0.4 | 0.0 | 0.2 | 1.0 |
| ASISAL | 0.0 | 0.0 | **0.0** | 0.0 | **0.0** | 0.0 | 0.0 | 0.0 | 0.1 |
| ASUGAR | 0.0 | 0.0 | **0.4** | 0.4 | **0.8** | 0.5 | 0.0 | 0.2 | 1.6 |
| AOFRVE | 2.7 | 0.0 | **1.2** | 0.7 | **4.7** | 1.3 | 0.0 | 0.6 | 6.6 |
| AOCROP | 0.4 | 0.0 | **0.1** | 0.1 | **0.6** | 0.2 | 0.0 | 0.1 | 0.8 |
| ALIVES | 0.6 | 0.1 | **0.7** | 0.5 | **2.0** | 0.9 | 0.0 | 0.4 | 3.3 |
| AFISHI | 0.2 | 0.0 | **0.2** | 1.7 | **2.1** | 1.3 | 0.0 | 0.6 | 4.0 |
| AHUFOR | 2.2 | 0.0 | **0.4** | 0.4 | **3.0** | 0.5 | 0.0 | 0.2 | 3.7 |
| **Average Primary** | **18.3** | **0.3** | **7.1** | **6.9** | **32.6** | **9.6** | **0.0** | **4.1** | **46.2** |
| AMININ | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 0.0 | 1.4 | 0.0 | 1.5 |
| AMEATD | 2.0 | 0.0 | 0.0 | 0.0 | **2.1** | 0.0 | 0.3 | 0.0 | 2.3 |
| AGRAIN | 0.0 | 0.0 | 0.2 | 0.3 | **0.5** | 0.0 | 0.2 | 0.0 | 0.7 |
| APFOOD | 0.3 | 0.0 | 0.1 | 0.2 | **0.6** | 0.0 | 1.4 | 0.0 | 2.0 |
| ABEVER | 0.1 | 0.0 | 0.0 | 0.1 | **0.3** | 0.0 | 0.6 | 0.0 | 0.9 |
| ACLOTH | 0.0 | 0.0 | 0.6 | 1.0 | **1.6** | 0.0 | 1.4 | 0.0 | 3.0 |
| AWOODP | 0.0 | 0.0 | 0.0 | 0.2 | **0.2** | 0.0 | 0.7 | 0.0 | 0.9 |
| ACHEMI | 0.0 | 0.0 | 0.0 | 0.2 | **0.2** | 0.0 | 0.0 | 0.0 | 0.2 |
| AFERTI | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 0.0 | 0.0 | 0.0 | 0.0 |
| APETRO | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 0.0 | 0.1 | 0.0 | 0.2 |
| ARUPLA | 0.0 | 0.0 | 0.0 | 0.0 | **0.1** | 0.0 | 0.2 | 0.0 | 0.2 |
| AGLASS | 0.0 | 0.0 | 0.0 | 0.1 | **0.1** | 0.0 | 0.3 | 0.0 | 0.4 |
| AMETAL | 0.0 | 0.0 | 0.0 | 0.1 | **0.1** | 0.0 | 0.4 | 0.0 | 0.6 |
| AEQUIP | 0.0 | 0.0 | 0.0 | 0.1 | **0.1** | 0.0 | 0.6 | 0.0 | 0.6 |
| Average Industry | **2.5** | **0.0** | 1.0 | **2.4** | **5.8** | **0.0** | **7.7** | **0.0** | **13.5** |
| AUTILI | 0.0 | 0.0 | 0.0 | 0.3 | **0.4** | 0.0 | 1.4 | 0.0 | 1.7 |
| ACONST | 0.0 | 0.0 | 0.0 | 3.0 | **3.1** | 0.0 | 1.4 | 0.0 | 4.5 |
| ATRADE | 0.0 | 0.0 | 0.2 | 0.6 | **0.8** | 0.0 | 9.6 | 0.0 | 10.5 |
| AHOTEL | 0.0 | 0.0 | 0.3 | 0.3 | **0.6** | 0.0 | 2.0 | 0.0 | 2.6 |
| ATRANS | 0.0 | 0.0 | 0.1 | 0.6 | **0.7** | 0.0 | 5.0 | 0.0 | 5.8 |
| AESTAT | 4.9 | 0.0 | 0.0 | 0.3 | **5.3** | 0.0 | 0.7 | 0.0 | 6.0 |
| AADMIN | 0.0 | 0.0 | 2.0 | 3.9 | **5.9** | 0.0 | 0.3 | 0.0 | 6.2 |
| APRIVS | 0.0 | 0.0 | 0.2 | 0.7 | **1.0** | 0.0 | 2.0 | 0.0 | 3.0 |
| Average Services | **4.9** | **0.0** | 3.0 | **9.8** | **17.8** | **0.0** | **22.5** | **0.0** | **40.3** |
| **Average Economy** | **25.7** | **0.3** | **11.1** | **19.1** | **56.2** | **9.6** | **30.2** | **4.1** | **100.0** |

# 3. Linkages and pro-poor growth in the Tanzanian Economy

There has been some concern that the recent surge in economic growth has not benefited the poor as much as the non-poor. In order to make the current strategy more pro-poor, agriculture and small and medium-sized enterprises (SME) have been targeted to be the primary means through which accelerated poverty reduction can be achieved. In this chapter we outline and discuss an approach, which assess the likely impact of growth on poverty. Analyses of linkages in the economy typically depend on input-output and social accounting matrices and in this chapter the analysis is based on the 2001 Tanzania SAM discussed in the previous chapter. A three-step approach is used; first we discuss backward and forward linkages in the economy; second, we discuss the linkages between production activities and the factor market. In particularly we are interested in identifying those sectors which has, potentially, a large employment effect, particularly among the poor. Third, we also discuss how increased production impact on household incomes. In the final part of this chapter general equilibrium aspects are included in the analysis and productivity changes in agriculture are discussed.

## 3.1 Linkages and development

The dual economy models of Lewis (1954) and Fei and Ranis (1964) provided a first attempt to understand the role of inter-sectoral linkages, which have been considered important when formulating development strategies. Hirschman (1958) distinguished between backward and forward linkages. A forward linkage affects the ease of supply of another product. On the other hand a backward linkage will create demand for another product. Thus backward linkages are like “pulls” and forward linkages are like “pushes”. How should policies be formulated to achieve accelerated and sustained growth? Rosenstein-Rodan introduced the idea of the big-push, a policy that simultaneously creates a coordinated investment in many different sectors of the economy (balanced growth).

One major problem is that this particular strategy requires a lot of resources and a second more important problem is all the informational requirements of such an exercise. Alternatively we can rely on the market to correct this coordination failure. Selectively promote a few key sectors in the economy which would through the linkages with the rest of the economy stimulate other sectors as well (unbalanced growth). How do we choose such key sectors? The following are the key determining factors; first, the number of linkages a certain sector possesses and the characteristics of the economy are important; second, the strength of each linkage matters as well. Does it matter if forward or backward linkages are promoted? It does matter: from the point of view the sector that benefits from the linkage, a backward linkage directly raises the price of its output and a forward linkage reduces the price on one of its inputs of production. The overall effect is difficult to estimate, as there are many inputs in the production process. Forward linkage has international implications as well; and third it is also important to look at the “intrinsic profitability” in each sector. It might be the case that the government maximizes the chances of overcoming coordination failure by investing in the least profitable activity.

## 3.2 Backward and forward linkages

Previous analyses of agriculture's linkages with other sectors of the economy in Tanzania came up with different conclusions. One study argues that agriculture has large spin-off effects on the non-farm sector, mainly through forward linkages to agro-processing and consumption (World Bank, 2001). A one shilling increase of household income from export crop sales leads to two shillings worth of additional local employment in the production of non-tradable goods and services. Wobst (1999) found that an additional shilling of income from export agriculture generates 1.80 shillings increase in overall GDP. Agriculture is still the dominant source of employment in Tanzania and Kweka (2001) found that agriculture, while having low output multiplier and backward and forward linkages, has the largest employment multiplier and employment linkages. However, as the study also found weak linkages between agricultural and other sectors, employment generation in the agricultural sector can be mostly enhanced by direct investment in that sector itself. As in Kweka's (2001) study we also found that there are low backward linkages between the agricultural sector and industries. However, the forward linkage is relatively higher.

The production of maize and paddy indicates relatively higher forward linkages to the rest of the economy than the other food crops (Figure 3.1). Higher forward linkages of agriculture to rest of the economy are also observed in the production of fruits and vegetable (Figure 3.2). Significant forward linkages are also observed in hunting and production of forestry products, fishing and livestock keeping (Figure 3.3). In all figures the horizontal axis shows sectors where an expenditure injection is assumed and the correspondent impact is shown on the vertical axis. For example, a one percent increases in expenditure in the grain sector (third column) increases demand for maize by approximately 0.6%.

Looking first at forward linkages it seems that an injection in any sector (horizontal axis) do generate a rather similar pattern response. The multipliers do not vary that much across sectors and products. For example, maize has the highest multiplier and this is of course because maize is an important commodity for consumers. An increase of expenditures in a certain sector increases demand for labour and household incomes, which translates to increased demand for maize. We do observe peaks in some sectors and this is a reflection of additional demand for intermediate inputs. Those sectors where we see a strong effect of additional input demand is the grain, food, beverage, clothing, meat processing and wood sectors. Thus, an injection of additional expenditures in a certain sector increases the demand for inputs as well as for consumption goods. It seems that the consumption side has a stronger impact than the inputs side reflecting relatively poor inter-industry linkages in the Tanzanian economy.

What about backward linkages? What is the impact of an injection of expenditures into the agricultural sector on other sectors in the economy? The highest agricultural sector backward linkages are exhibited in the food grain processing activities. Relatively higher backward linkages are also observed in clothing, food and meet processing activities (Figure 3.4). Furthermore, in the services sector, higher backward linkages to the agricultural sector are revealed in the real estate activities; wholesale and retail trade; hotels, restaurants; and public administration. For example, a one percent increase in exogenous expenditure in the agricultural sector leads to a 0.6 percent increase in the demand for real estate activities in the agricultural sector, which basically includes construction of own dwelling houses. Thus, again it seems that the important linkage is on the consumption side and not on the production side.

In the next section we look more carefully into the linkages between production activities and the factor market in the economy and in particular on the linkages between pro-poor employment and growth.

Figure 3.1: Food Crops Forward Linkages to Industrial Sectors

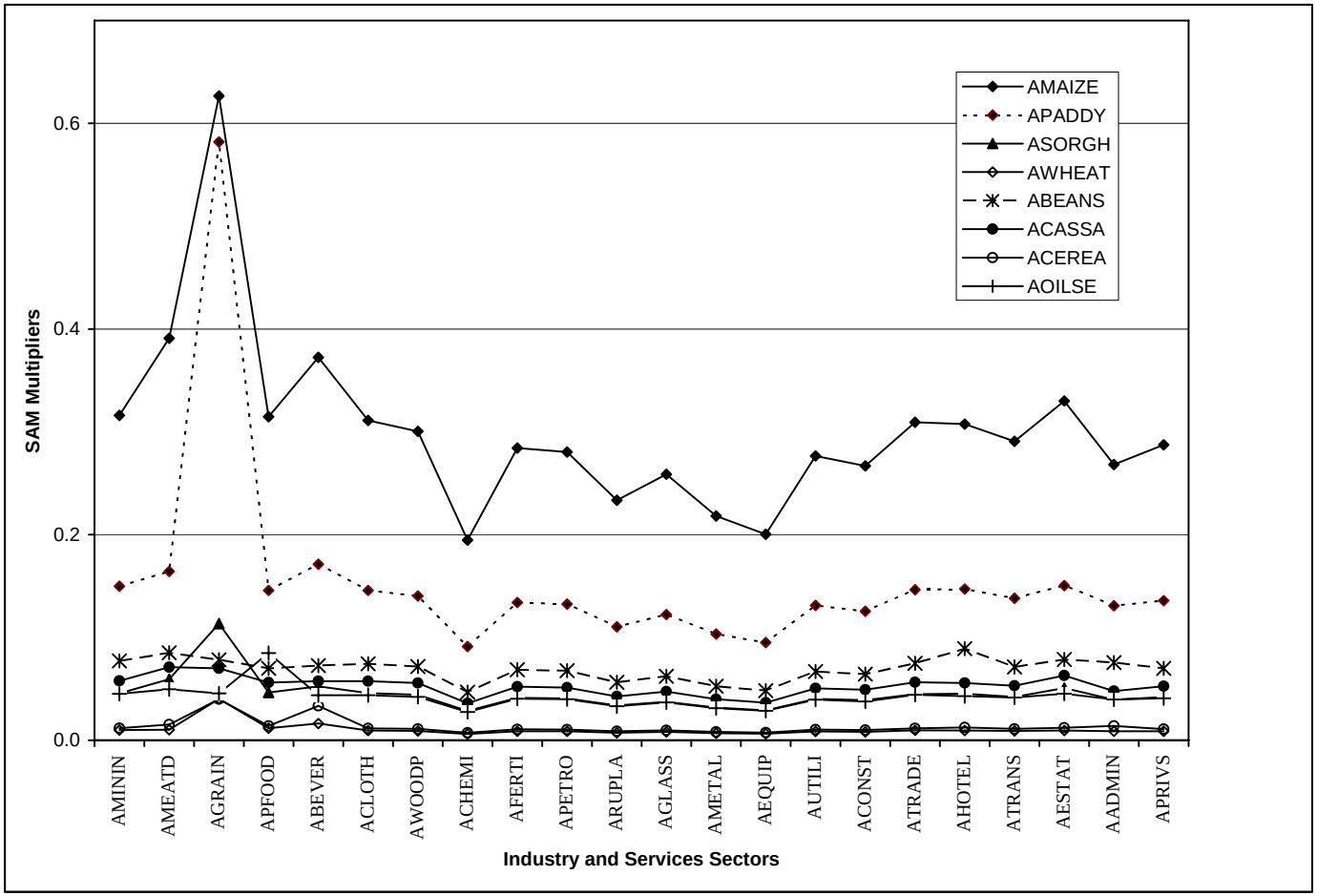


Figure 3.2: Other Crops Forward Linkages to the Non-Agricultural Sector

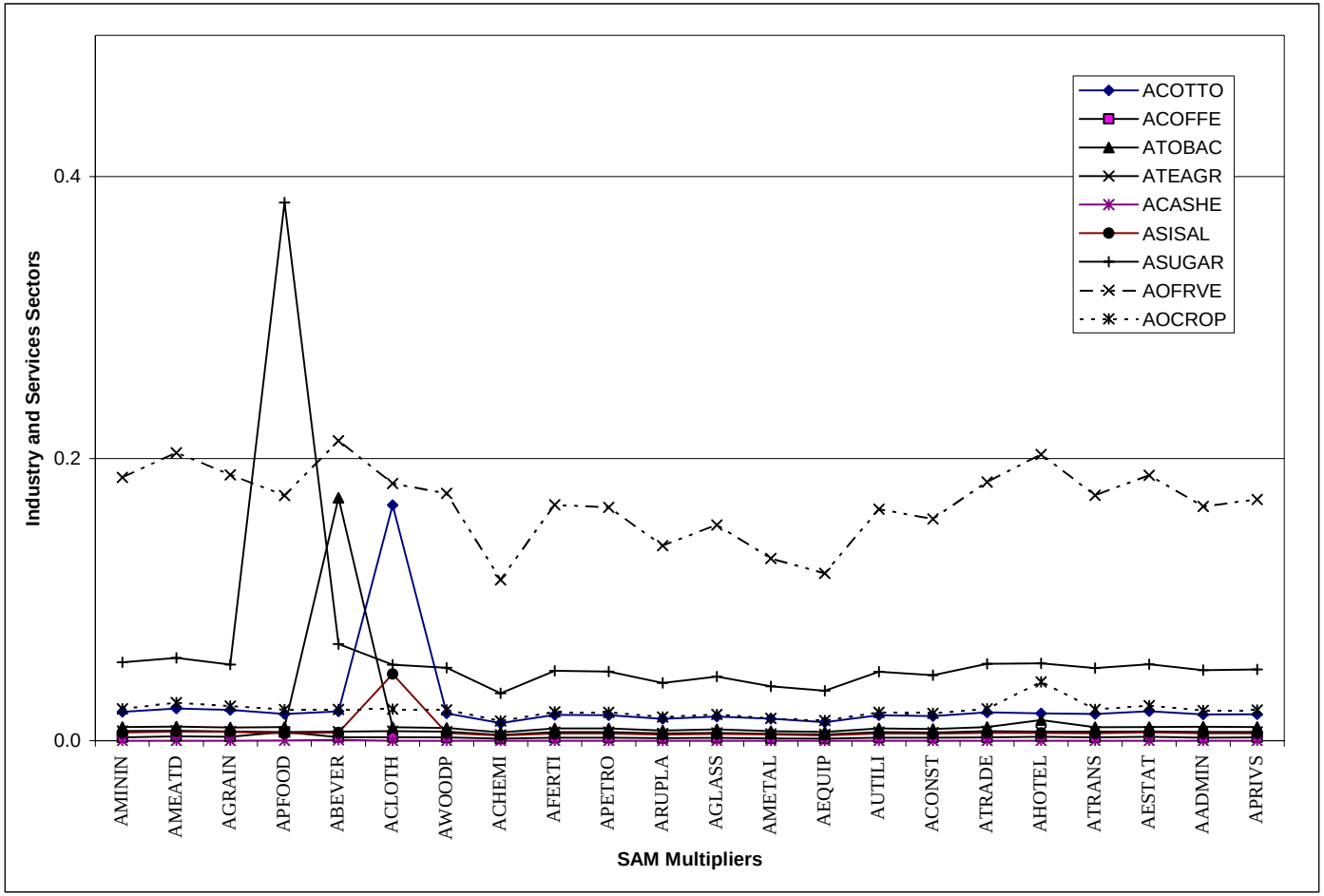


Figure 3.3: Livestock, Fishing, Hunting and Forestry Forward Linkages to the Non-Agricultural Sector

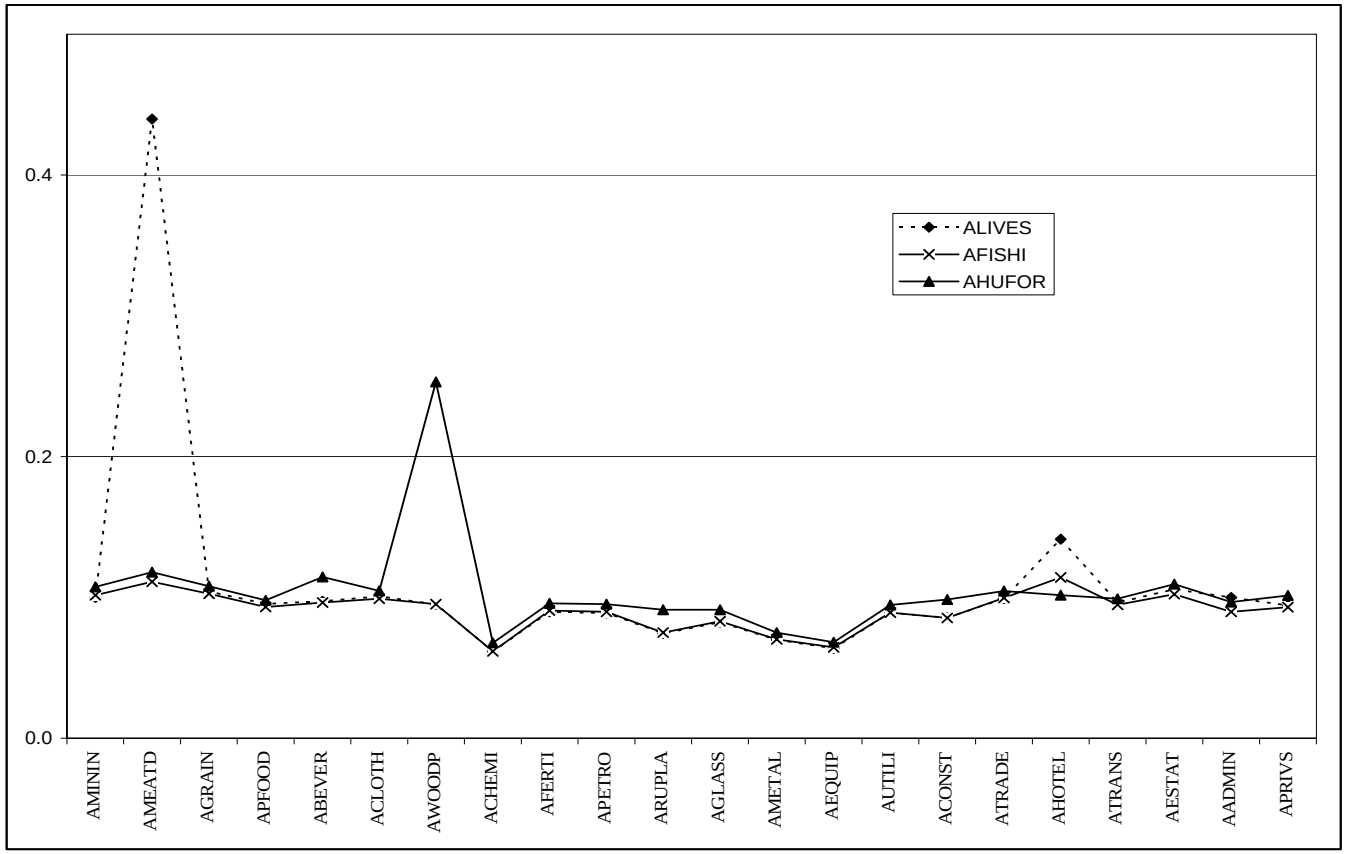


Figure 3.4: Industrial Activities Backward linkages to the Agricultural Sector

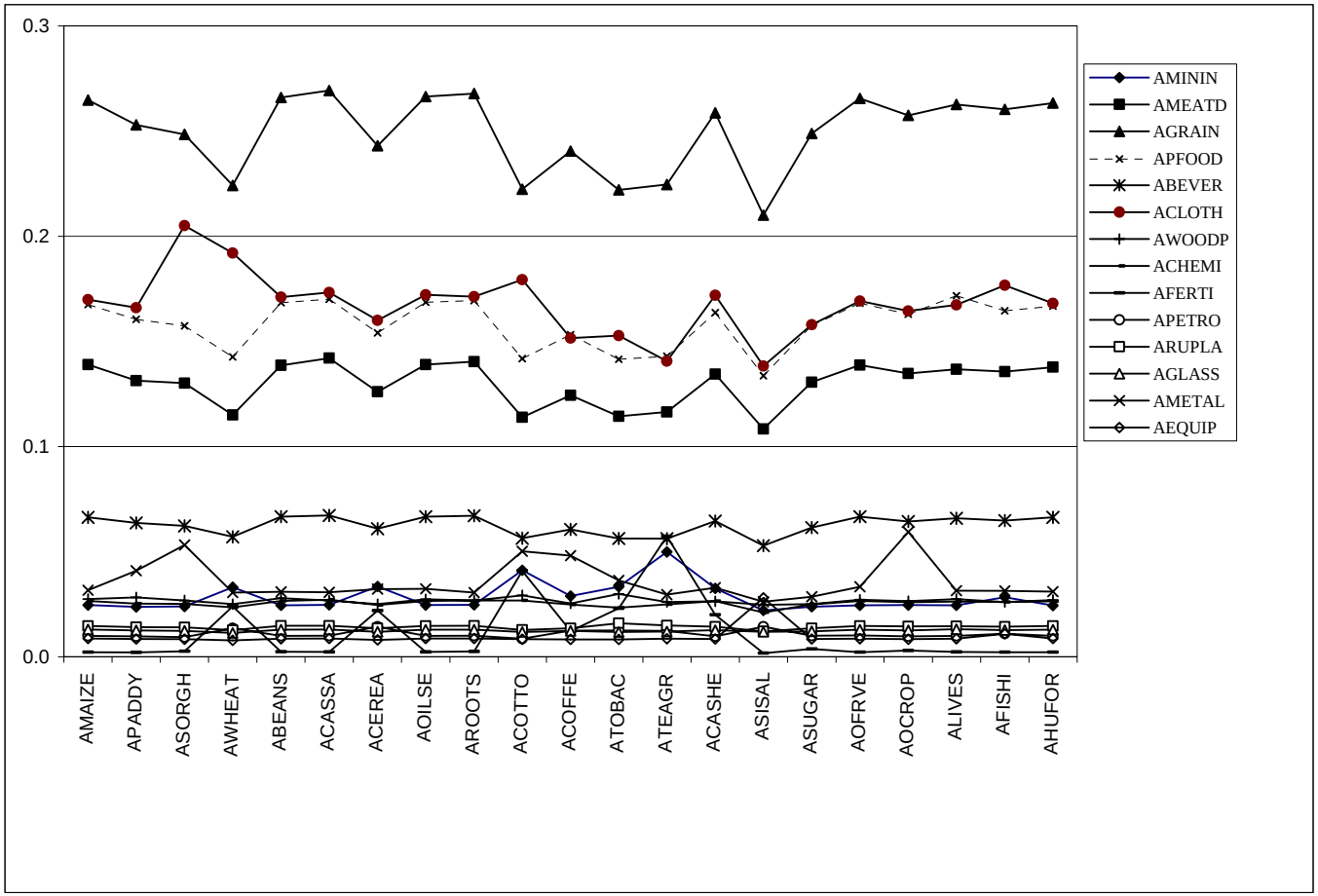
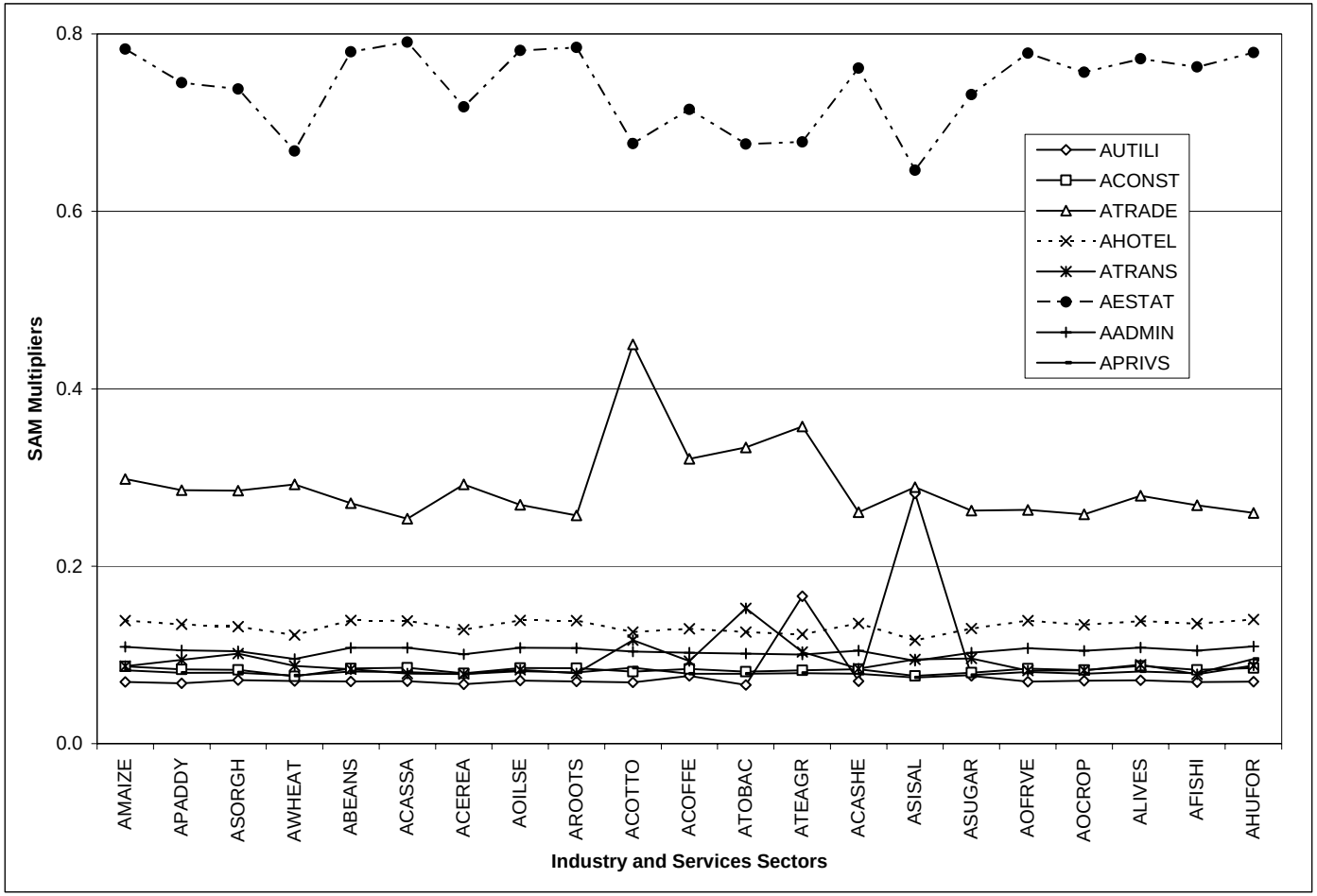


Figure 3.5: Services Activities linkages to the Agricultural Sector



## 3.3 Employment and welfare - Structural Path Analysis[3]

The government of Tanzania is currently endeavouring with the implementation of the economic growth and poverty alleviation strategy "MKUKUTA". Poverty alleviation in the economy will by and large depend on how the economic growth performance is transmitted into changes in employment, factor earnings and consequently households' incomes. It is therefore important to examine in which sectors potential employment opportunities exist and at the same time consider employment for the poor and gender aspects. The analysis also examines the linkage between production activities and households welfare i.e. we examine the impact of an increase of output from the primary, industry and services sectors on household incomes.

### 3.3.1 Pro-poor employment

As far as poverty alleviation efforts in the economy are concerned, benefits are generated in terms of creation of new jobs if backward and forward linkages are pro-poor. If these linkages generate additional income for households who, without them, would otherwise have been poor, then the linkages can be said to be pro-poor. It has been in tourism and mining where the fastest rates of economic growth have occurred in recent years in Tanzania. We therefore attempt to determine the extent, to which growth in these sectors has contributed to poverty reduction, and the extent to which they are pro-poor, by assessing their linkages with other sectors and the extent to which these linkages may be of benefit to poor households.

To examine the influence on the primary of an exogenous stimulus on activities, we first analyse an aggregated SAM. Table 3.1 shows that the largest impact on employment is in the agriculture sector followed by public administration, building & construction and manufacturing. The multiplier for mining is rather small, which as many has observed reveal the low employment generation from the sector. A bit surprising though is also that the tourism sector has a rather low multiplier. In both cases it reflects the capital intensity in both sectors. While a good performance in both mining and tourism is something good for the economy, it is however, not the sectors where targeted intervention should be encouraged to achieve a boost in employment to reduce poverty. This is clearly the agriculture sector both from a poverty and a gender perspective.[4] Interesting though from a gender perspective, the highest male labour multiplier is in building & construction followed by public administration while for female labour it is highest in agriculture followed by public administration. Thus, employment generation in the agricultural sector would benefit women more than men. There is a difference in ranking of sectors with regard to the impact of female versus male labour demand. Employment for women would increase most in agriculture followed by tourism/hotels and public administration while men would benefit most from agricultural followed by

[3] Structural path analysis provides an interesting complement to standard multiplier analysis. The results of multiplier analysis provide us with some quantitative reference and the mechanism of interactions remains a "black box", since the decision, makers cannot find out that, along what paths do the influences among accounts transmit and which paths are better than the others in transmitting influences. All these are usually necessary for decision-making. Based on multiplier decomposition, structural path analysis further reveals the transmission mechanism of the interactions among accounts, thus opens the "black box". See appendix 2 for technical details.

[4] Pro-poor employment is here defined as those workers with no education or not finished primary education.

building and construction and public administration. However, from a poverty perspective the ranking would be agriculture followed by building/construction and manufacturing.

Looking into the some details of the agricultural sector, Table 3.2 and Table 3.3 shows the impact on factor demand for a specific increase of production in a particular sector. The largest impact, in quite a number of sectors is to increase demand for the subsistence factor. Labour demand goes up as well and here there seems to be some difference between male and female labour depending on where the expansion occur. Increased production of beans, cereals and sugar has the largest impact on female employment while men benefits most from production increases in fishing, wheat and cashew-nuts. However, from a poverty perspective the largest multiplier can be found in sugar, tea, fishing, cashew-nuts, sisal, cereals, oil-seeds and livestock in that order. Perhaps a bit surprising is that sectors that rank at the bottom are cassava, maize, roots, sorghum and fruit and vegetables. Looking at the total employment multiplier shows that cashew-nuts, fishing, sugar, livestock and cereals generates more employment given a certain increase in production.

Table 3.1: Employment multipliers – aggregated SAM

| | Agriculture | Mining | Manufacturing | Building & construction | Tourism and hotels | Public administration | Private Services |
|---|---|---|---|---|---|---|---|
| FSUB | 0.178 | 0.004 | 0.055 | 0.006 | 0.012 | 0.003 | 0.052 |
| LCHILD | 0.003 | 0 | 0 | 0 | | | |
| LNONF | 0.008 | 0 | 0.001 | 0 | 0.003 | 0 | 0 |
| LNFPF | 0.009 | | 0.002 | | 0.004 | 0.001 | 0.001 |
| LNFSF | 0.051 | 0.001 | 0.015 | 0.002 | 0.023 | 0.016 | 0.004 |
| LSECF | 0.001 | 0.001 | 0.004 | 0.002 | 0.002 | 0.04 | 0.003 |
| LNONM | 0.009 | | 0.002 | 0.003 | 0.001 | 0 | |
| LNFPM | 0.026 | 0.001 | 0.006 | 0.014 | 0.002 | 0.003 | 0.002 |
| LNFSM | 0.03 | 0.008 | 0.028 | 0.09 | 0.019 | 0.026 | 0.012 |
| LSECM | 0.002 | 0.001 | 0.009 | 0.028 | 0.009 | 0.082 | 0.012 |
| CAPAG | 0.092 | | 0.009 | 0.002 | 0.004 | 0.001 | |
| CAPNAG | 0.007 | 0.043 | 0.1 | 0.128 | 0.181 | 0.015 | 0.182 |
| LAND | 0.039 | | | | 0.002 | | |
| Pro-poor labour demand | 0.052 | 0.001 | 0.011 | 0.017 | 0.01 | 0.004 | 0.003 |
| Female labour demand | 0.069 | 0.002 | 0.022 | 0.004 | 0.032 | 0.057 | 0.008 |
| Male labour demand | 0.067 | 0.01 | 0.045 | 0.135 | 0.031 | 0.111 | 0.026 |
| Total labour demand | 0.317 | 0.016 | 0.122 | 0.145 | 0.075 | 0.171 | 0.086 |
| Total capital and land demand | 0.138 | 0.043 | 0.109 | 0.13 | 0.187 | 0.016 | 0.182 |
| Total factor demand | 0.455 | 0.059 | 0.231 | 0.275 | 0.262 | 0.187 | 0.268 |
| Rank by Size of Total Multiplier | 1 | 7 | 5 | 2 | 4 | 6 | 3 |
| Rank by Size of Pro-Poor Multiplier | 1 | 7 | 3 | 2 | 4 | 5 | 6 |

Table 3.2: Employment multipliers in agriculture

| | AMAIZE | APADDY | ASORGH | AWHEAT | ABEANS | ACASSA | ACEREA | AOILSE | AROOTS | ACOTTO |
|---|---|---|---|---|---|---|---|---|---|---|
| CAPAG | 0.050 | 0.098 | 0.049 | 0.113 | 0.107 | 0.035 | 0.119 | 0.119 | 0.08 | 0.089 |
| FSUB | 0.314 | 0.093 | 0.274 | 0.025 | 0.142 | 0.409 | 0.055 | 0.134 | 0.263 | 0.006 |
| LAND | 0.021 | 0.042 | 0.021 | 0.048 | 0.046 | 0.015 | 0.051 | 0.051 | 0.034 | 0.038 |
| LCHILD | 0.001 | 0.001 | 0.002 | | | 0.001 | 0.002 | 0.003 | 0.004 | 0.013 |
| LNFPF | 0.006 | 0.008 | 0.003 | | 0.011 | 0.003 | 0.009 | 0.007 | 0.006 | 0.008 |
| LNFPM | 0.011 | 0.024 | 0.009 | | 0.018 | 0.01 | 0.025 | 0.031 | 0.021 | 0.029 |
| LNFSF | 0.037 | 0.07 | 0.023 | | 0.09 | 0.019 | 0.076 | 0.08 | 0.059 | 0.033 |
| LNFSM | 0.013 | 0.032 | 0.014 | 0.161 | 0.016 | 0.009 | 0.028 | 0.025 | 0.019 | 0.039 |
| LNONF | 0.008 | 0.007 | 0.016 | | 0.017 | 0.006 | 0.021 | 0.016 | 0.008 | 0.003 |
| LNONM | 0.004 | 0.004 | 0.008 | | 0.005 | 0.003 | 0.011 | 0.011 | | 0.008 |
| LSECF | | 0.001 | | | 0.001 | | 0 | | | |
| LSECM | 0.001 | 0.003 | 0.001 | | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.002 |
| Pro-poor labour demand | 0.029 | 0.043 | 0.036 | 0 | 0.051 | 0.022 | 0.066 | 0.065 | 0.035 | 0.048 |
| Female labour demand | 0.051 | 0.086 | 0.042 | 0 | 0.119 | 0.028 | 0.106 | 0.103 | 0.073 | 0.044 |
| Malel labour demand | 0.029 | 0.063 | 0.032 | 0.161 | 0.04 | 0.023 | 0.066 | 0.068 | 0.041 | 0.078 |
| Total labour demand | 0.081 | 0.15 | 0.076 | 0.161 | 0.159 | 0.052 | 0.174 | 0.174 | 0.118 | 0.135 |
| Total capital and land demand | 0.385 | 0.233 | 0.344 | 0.186 | 0.295 | 0.459 | 0.225 | 0.304 | 0.377 | 0.133 |
| Total factor demand | 0.466 | 0.383 | 0.42 | 0.347 | 0.454 | 0.511 | 0.399 | 0.478 | 0.495 | 0.268 |
| Rank by size of pro-poor multiplier | 18 | 14 | 16 | 10 | 11 | 19 | 6 | 6 | 17 | 13 |

Table 3.2: continued

| | ACOFFE | ATOBAC | ATEAGR | ACASHE | ASISAL | ASUGAR | AOFRVE | AOCROP | ALIVES | AFISHI | AHUFOR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CAPAG | 0,111 | 0,099 | 0,095 | 0,16 | 0,08 | 0,133 | 0,098 | 0,091 | 0,122 | 0,15 | 0,067 |
| FSUB | 0,037 | 0,006 | 0,011 | 0,01 | 0,005 | 0,014 | 0,203 | 0,211 | 0,094 | 0,039 | 0,287 |
| LAND | 0,048 | 0,043 | 0,041 | 0,068 | 0,034 | 0,057 | 0,042 | 0,039 | 0,052 | 0,064 | 0,029 |
| LCHILD | | | | 0,005 | | | 0,004 | 0,005 | 0,017 | | |
| LNFPF | 0,004 | 0,007 | | 0,003 | | 0,106 | 0,005 | | 0,004 | | |
| LNFPM | 0,031 | 0,03 | 0,134 | 0,056 | 0,025 | 0,089 | 0,019 | 0,033 | 0,024 | 0,071 | |
| LNFSF | 0,054 | 0,043 | | 0,049 | | | 0,08 | 0,056 | 0,078 | 0,018 | 0,054 |
| LNFSM | 0,054 | 0,042 | | 0,079 | 0,04 | | 0,027 | 0,015 | 0,027 | 0,09 | 0,037 |
| LNONF | 0,008 | 0,008 | | 0,014 | 0,012 | | 0,006 | 0,005 | 0,011 | 0,009 | |
| LNONM | 0,008 | 0,01 | | 0,025 | 0,031 | | 0,008 | 0,016 | 0,015 | 0,031 | 0,006 |
| LSECF | | 0,001 | | | | | 0,002 | 0,001 | 0,004 | | |
| LSECM | 0,003 | 0,007 | | | 0,009 | | 0,003 | 0,002 | 0,004 | | 0,005 |
| Pro-poor labour demand | 0,051 | 0,055 | 0,134 | 0,098 | 0,068 | 0,195 | 0,038 | 0,054 | 0,054 | 0,111 | 0,006 |
| Female labour demand | 0,066 | 0,059 | 0 | 0,066 | 0,012 | 0,106 | 0,093 | 0,062 | 0,097 | 0,027 | 0,054 |
| Malel labour demand | 0,096 | 0,089 | 0,134 | 0,16 | 0,105 | 0,089 | 0,057 | 0,066 | 0,07 | 0,192 | 0,048 |
| Total labour demand | 0,162 | 0,148 | 0,134 | 0,231 | 0,117 | 0,195 | 0,154 | 0,133 | 0,184 | 0,219 | 0,102 |
| Total capital and land demand | 0,196 | 0,148 | 0,147 | 0,238 | 0,119 | 0,204 | 0,343 | 0,341 | 0,268 | 0,253 | 0,383 |
| Total factor demand | 0,358 | 0,296 | 0,281 | 0,469 | 0,236 | 0,399 | 0,497 | 0,474 | 0,452 | 0,472 | 0,485 |
| Rank by size of pro-poor multiplier | 11 | 8 | 2 | 4 | 5 | 1 | 15 | 9 | 9 | 3 | 20 |

### 3.3.2 The Influence of Activities on Households

Different households experience a different impact from a change in output in the production activities. Table 3.2 and 3.3 shows linkages between changes in level of activities and household incomes. The agricultural sector has the largest multiplier followed by mining, manufacturing, private services, building & construction, tourism and public administration. For example, in the case of agriculture a 100 million Tshs. increase of agricultural output increases households' incomes by 24 million Tshs. The bulk of this increase goes to rural households (80%) and around (60%) of the total households' income change occurs to non-poor rural households (Table 3.3). The implication here is that policies that increase the demand for agricultural output may not necessarily address poverty in rural Tanzania. Additional measures will be required to address the rural poverty problem.

In addition, more than (50%) of the increase in households' income due to increase in output in other sectors (with an exception of the public administration sector). accrues to rural households and mostly the non-poor rural households. In urban areas likewise, increase in income as a result of increase of production of goods and services benefits more the non-poor households than the poor households.

Generally, an increase in output in various activities generates more increase in rural households' incomes than that of urban households. In both rural and urban areas, the increase in income takes place in the non-poor urban households. Consequently, addressing poverty in both rural and urban areas may require additional measures other than policies, which stimulates production of goods and services.

Table 3.3: Activities to Households Global Multipliers

| | Agriculture | Mining | Manufacturing | Building and Construction | Tourism and Hotels | Public Administration | Private Services |
|---|---|---|---|---|---|---|---|
| Rural (below food poverty line) | 0.02 | 0.001 | 0.004 | 0.003 | 0.002 | 0.001 | 0.003 |
| Rural (between food and basic needs poverty lines) | 0.03 | 0.002 | 0.006 | 0.004 | 0.003 | 0.002 | 0.005 |
| Rural (non-poor – head with no education) | 0.04 | 0.003 | 0.009 | 0.003 | 0.004 | 0.001 | 0.007 |
| Rural (non-poor – head not finished primary school) | 0.04 | 0.003 | 0.01 | 0.01 | 0.005 | 0.003 | 0.007 |
| Rural (non-poor – head not finished secondary school) | 0.06 | 0.04 | 0.03 | 0.04 | 0.03 | 0.01 | 0.03 |
| Rural (non-poor – head finished secondary school) | 0.003 | 0.019 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 |
| Urban (below food poverty line) | 0.002 | 0.003 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Urban (between food and basic needs poverty lines) | 0.002 | 0.007 | 0.002 | 0.003 | 0.003 | 0.001 | 0.003 |
| Urban (non-poor – head with no education) | 0.003 | 0.006 | 0.002 | 0.002 | 0.003 | 0.001 | 0.003 |
| Urban (non-poor – head not finished primary school) | 0.01 | 0.006 | 0.003 | 0.004 | 0.004 | 0.001 | 0.003 |
| Urban (non-poor – head not finished secondary school) | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.01 | 0.02 |
| Urban (non-poor – head finished secondary school) | 0.01 | 0.003 | 0.007 | 0.01 | 0.01 | 0.04 | 0.01 |
| **Total** | **0.24** | **0.123** | **0.104** | **0.12** | **0.095** | **0.091** | **0.102** |
| **Rank by Size of Total Multiplier** | **1** | **2** | **3** | **5** | **6** | **7** | **4** |

Table 3.4: Activities to Households Global Multipliers (Percentage of Total Global Multiplier by Sector)

| | Agriculture | Mining | Manufacturing | Building and Construction | Tourism and Hotels | Public Administration | Private Services |
|---|---|---|---|---|---|---|---|
| Rural (below food poverty line) | 8.3 | 0.8 | 3.8 | 2.5 | 2.1 | 1.1 | 2.9 |
| Rural (between food and basic needs poverty lines) | 12.5 | 1.6 | 5.8 | 3.3 | 3.2 | 2.2 | 4.9 |
| Rural (non-poor – head with no education) | 16.7 | 2.4 | 8.7 | 2.5 | 4.2 | 1.1 | 6.9 |
| Rural (non-poor – head not finished primary school) | 16.7 | 2.4 | 9.6 | 8.3 | 5.3 | 3.3 | 6.9 |
| Rural (non-poor – head not finished secondary school) | 25.0 | 32.5 | 28.8 | 33.3 | 31.6 | 11.0 | 29.4 |
| Rural (non-poor – head finished secondary school) | 1.3 | 15.4 | 9.6 | 8.3 | 10.5 | 22.0 | 9.8 |
| ***RURAL*** | ***80.4*** | ***55.3*** | ***66.3*** | ***58.3*** | ***56.8*** | ***40.7*** | ***60.8*** |
| Urban (below food poverty line) | 0.8 | 2.4 | 1.0 | 0.8 | 1.1 | 1.1 | 1.0 |
| Urban (between food and basic needs poverty lines) | 0.8 | 5.7 | 1.9 | 2.5 | 3.2 | 1.1 | 2.9 |
| Urban (non-poor – head with no education) | 1.3 | 4.9 | 1.9 | 1.7 | 3.2 | 1.1 | 2.9 |
| Urban (non-poor – head not finished primary school) | 4.2 | 4.9 | 2.9 | 3.3 | 4.2 | 1.1 | 2.9 |
| Urban (non-poor – head not finished secondary school) | 8.3 | 24.4 | 19.2 | 25.0 | 21.1 | 11.0 | 19.6 |
| Urban (non-poor – head finished secondary school) | 4.2 | 2.4 | 6.7 | 8.3 | 10.5 | 44.0 | 9.8 |
| ***URBAN*** | ***19.6*** | ***44.7*** | ***33.7*** | ***41.7*** | ***43.2*** | ***59.3*** | ***39.2*** |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

## 3.4 Productivity changes – a general equilibrium analysis

In the previous section we argued that performance in the agriculture sector significantly determines the overall improvement in people's living standards. A major challenge in the current poverty reduction strategy is to boost productivity in the agricultural sector. Two issues explored in this section are; first whether a productivity shock generates similar results across sectors with regard to changes in output, prices and poverty; second, what is the impact of productivity changes combined with other policies on the development in the agriculture sector?

We use a static computable general equilibrium (CGE) framework to address alternative policy measures aiming at agricultural growth and poverty alleviation in Tanzania.[5] The CGE model used follows the neoclassical modelling tradition, but incorporates additional structuralist features, which are of particular importance in developing countries, such as own-household consumption and marketing margins. Since prices are signals for the allocation of resources and generation of incomes in the agricultural sector, we particularly focus on policies that alter the prices of inputs and outputs in the agricultural sector.

In the model we have aggregated the initial 41 sectors to a 15 sector model where we distinguish the following three agricultural sectors; agricultural export products, agricultural food products and other agriculture products.

Our first simulations look at the impact of a 2 percentage TFP increase sector by sector, which is close to recent findings in the Tanzanian economy (see Utz, 2005). Table 3.6 shows how production respond by assuming that TFP increases by 2%. The third column shows that output of agricultural export products increase by 2.6% when TFP is increased by 2%. Production increases in all sectors but there are some variations between the different sectors. The largest increase can be found in those sectors which have a larger share of exports in total production.

Increased supply has, however, a negative impact on producer prices (see Table 3.6). We note that prices changes are larger for relatively less traded goods. Comparing agricultural food products and agricultural export products we see that prices drops significantly more in the food sector compared to the export sector. This follows as output expansion in the traded sector leads to increased exports and hence less output expansion on the domestic market. Later we discuss some of the implications of this result.

[5] The model is described in section 4.1.

Table 3.5: Real output (% changes from the base)

| | BASE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aagrexpo (1) | 258.4 | **2.6** | 0.2 | -0.3 | -0.1 | -0.2 | | 0.1 | -0.1 | | | -0.1 | 0.7 | | 0.2 | -0.1 |
| Aagrfood (2) | 2026.8 | -0.1 | **0.6** | 0.2 | | 0.1 | | | | | 0.1 | | 0.1 | 0.1 | 0.2 | 0.2 |
| Aagrothe (3) | 628.6 | -0.1 | 0.8 | **0.5** | | 0.1 | | | | | 0.1 | | 0.2 | 0.1 | 0.3 | 0.2 |
| Amining (4) | 86.3 | -0.2 | 0.3 | | **0.4** | 0.1 | | | 0.1 | | 0.2 | | 0.3 | 0.1 | 0.2 | 0.4 |
| Amfood (5) | 711.1 | -0.2 | 1.3 | 0.3 | | **0.2** | | | | | 0.1 | | | | 0.3 | 0.2 |
| Ampetro (6) | 16.4 | -0.1 | | -0.1 | 0.2 | 0.1 | **0.4** | | 0.1 | 0.1 | 0.1 | | 0.3 | 0.2 | 0.2 | 0.5 |
| Amcons (7) | 248.5 | 0.1 | -0.4 | -0.1 | | 0.1 | | **0.8** | | 0.1 | 0.1 | | 0.7 | 0.1 | 0.2 | 0.4 |
| Amother (8) | 256.3 | -0.3 | -0.6 | -0.3 | 0.1 | 0.1 | | | **0.6** | 0.1 | 0.1 | | 0.6 | 0.2 | 0.1 | 0.5 |
| Aelewat (9) | 143.0 | | 0.5 | 0.1 | | 0.1 | | 0.1 | 0.1 | **0.1** | 0.1 | | 0.3 | 0.1 | 0.2 | 0.3 |
| Abuico (10) | 666.0 | | 1.0 | 0.3 | | | | | | | **0.2** | | | | 0.2 | |
| Atouhot (11) | 235.7 | -0.4 | 0.6 | 0.4 | | 0.2 | | | | | 0.1 | **0.4** | 0.2 | 0.1 | 0.1 | 0.4 |
| Atrad (12) | 695.8 | 0.3 | 0.4 | 0.2 | | | | 0.1 | | | 0.1 | | **0.4** | 0.1 | 0.2 | 0.2 |
| Atransp (13) | 387.4 | | 0.1 | | | 0.1 | | | | | 0.1 | | 0.3 | **0.5** | 0.1 | 0.4 |
| Apubadm (14) | 1514.1 | | 0.6 | 0.2 | | 0.1 | | | | | 0.1 | | 0.2 | 0.1 | **0.1** | 0.3 |
| Aothserv (15) | 1773.1 | | 0.8 | 0.3 | | 0.1 | | | | | 0.1 | | 0.3 | 0.1 | 0.3 | **0.6** |

Note:
Aagrexpo includes the following sectors (see appendix 1 for full description):´ASISAL, ACASHE, ATEAGR, ACOFFE, ATOBAC, ACOTTO
Aagrfood includes the following sectors: AMAIZE,AWHEAT,APADDY,ASORGH,ACEREA,ABEANS,ACASSA,AROOTS,AOILSE,AOFRVE
Aagrothe includes the following sectors: AOCROP,ALIVES,AFISHI,AHUFOR
Amining includes the following sectors: AMININ
Amfood includes the following sectors: AMEATD,APFOOD,AGRAIN,ABEVER
Ampetro includes the following sectors: APETRO
Amcons includes the following sectors: ACLOTH,AWOODP
Amother includes the following sectors: ACHEMI,AFERTI,ARUPLA,AGLASS,AMETAL,AEQUIP
Aelewat includes the following sectors: AUTILI
Abuico includes the following sectors: ACONST
Atouhot includes the following sectors: AHOTEL
Atrad includes the following sectors: ATRADE
Atransp includes the following sectors: ATRANS
Apubadm includes the following sectors: AADMIN
Aothserv includes the following sectors: AESTA

Table 3.6: Producer prices (% changes from the base)

| | BASE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aagrexpo (1) | 100.0 | **-1.1** | 0.1 | -0.1 | | 0.1 | | | | | 0.1 | | 0.3 | | 0.2 | 0.5 |
| Aagrfood (2) | 100.0 | | **-2.8** | -0.2 | 0.1 | 0.3 | | | | 0.1 | 0.2 | 0.1 | 0.6 | 0.2 | 0.1 | 0.8 |
| Aagrothe (3) | 100.0 | -0.1 | -0.6 | **-2.4** | 0.1 | 0.3 | | | | 0.1 | 0.2 | 0.1 | 0.7 | 0.2 | 0.2 | 0.9 |
| Amining (4) | 100.0 | 0.2 | 2.5 | 0.8 | **-1.7** | -0.2 | | | | -0.1 | | | -0.6 | -0.2 | 0.4 | -0.4 |
| Amfood (5) | 100.0 | | -0.5 | | | **-0.4** | | | | | 0.1 | | 0.1 | 0.1 | 0.2 | 0.4 |
| Ampetro (6) | 100.0 | 0.1 | 2.1 | 0.6 | -0.5 | -0.1 | **-1.0** | | | -0.1 | | | -0.5 | -0.2 | 0.3 | -0.3 |
| Amcons (7) | 100.0 | -0.5 | 1.0 | 0.1 | | | | **-0.6** | | | | | -0.2 | | 0.2 | 0.2 |
| Amother (8) | 100.0 | | 1.7 | 0.5 | -0.1 | -0.1 | | | **-0.7** | -0.1 | | | -0.6 | -0.2 | 0.3 | -0.1 |
| Aelewat (9) | 100.0 | 0.1 | 1.9 | 0.6 | | -0.1 | | | | **-1.2** | | | -0.6 | -0.2 | 0.3 | -0.3 |
| Abuico (10) | 100.0 | | 1.3 | 0.3 | -0.1 | | | | | | **-0.9** | | -0.3 | -0.1 | 0.1 | |
| Atouhot (11) | 100.0 | | 0.6 | -0.2 | | -0.1 | | | | | 0.1 | **-0.5** | -0.2 | | 0.2 | 0.1 |
| Atrad (12) | 100.0 | 0.2 | 2.5 | 0.8 | -0.1 | -0.1 | | | | -0.1 | | | **-2.2** | -0.3 | 0.3 | -0.4 |
| Atransp (13) | 100.0 | 0.1 | 2.1 | 0.6 | | -0.1 | | | | -0.1 | | -0.1 | -0.5 | **-1.5** | 0.3 | -0.4 |
| Apubadm (14) | 100.0 | | 0.8 | 0.2 | | | | | | | | -0.1 | -0.1 | -0.1 | **-0.9** | 0.2 |
| Aothserv (15) | 100.0 | 0.1 | 2.0 | 0.6 | -0.1 | -0.1 | | | | -0.1 | | -0.1 | -0.5 | -0.2 | 0.3 | **-1.6** |

Note:
Aagrexpo includes the following sectors (see appendix 1 for full description):´ASISAL, ACASHE, ATEAGR, ACOFFE, ATOBAC, ACOTTO
Aagrfood includes the following sectors: AMAIZE,AWHEAT,APADDY,ASORGH,ACEREA,ABEANS,ACASSA,AROOTS,AOILSE,AOFRVE
Aagrothe includes the following sectors: AOCROP,ALIVES,AFISHI,AHUFOR
Amining includes the following sectors: AMININ
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Ampetro includes the following sectors: APETRO
Amcons includes the following sectors: ACLOTH,AWOODP
Amother includes the following sectors: ACHEMI,AFERTI,ARUPLA,AGLASS,AMETAL,AEQUIP
Aelewat includes the following sectors: AUTILI
Abuico includes the following sectors: ACONST
Atouhot includes the following sectors: AHOTEL
Atrad includes the following sectors: ATRADE
Atransp includes the following sectors: ATRANS
Apubadm includes the following sectors: AADMIN
Aothserv includes the following sectors: AESTA

Table 3.7: Labour demand (% changes from the base)

| | BASE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aagrexpo (1) | 58.5 | **0.8** | -0.6 | -0.6 | -0.1 | -0.2 | 0.0 | 0.1 | -0.1 | 0.0 | 0.1 | -0.1 | 1.1 | 0.1 | 0.5 | 0.1 |
| Aagrfood (2) | 639.3 | -0.1 | **-2.6** | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | 0.3 | 0.1 | 0.6 | 0.5 |
| Aagrothe (3) | 211.6 | -0.2 | 0.2 | **-2.2** | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.1 | 0.4 | 0.1 | 0.6 | 0.5 |
| Amining (4) | 1.2 | -0.1 | 1.5 | 0.4 | **-1.6** | -0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | -0.3 | -0.1 | 0.5 | -0.2 |
| Amfood (5) | 35.1 | 0.1 | 4.5 | 1.3 | -0.1 | **-2.2** | 0.0 | 0.0 | 0.0 | -0.2 | 0.1 | -0.1 | -1.5 | -0.4 | 1.2 | -1.1 |
| Ampetro (6) | 2.2 | 0.0 | 0.9 | 0.2 | 0.2 | 0.0 | **-1.5** | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | -0.2 | 0.0 | 0.4 | 0.1 |
| Amcons (7) | 25.2 | 0.2 | 0.4 | 0.1 | 0.0 | -0.1 | 0.0 | **-1.2** | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 | 0.0 | 0.4 | 0.1 |
| Amother (8) | 16.7 | -0.2 | 0.4 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | **-1.4** | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.4 | 0.0 |
| Aelewat (9) | 14.7 | 0.2 | 3.7 | 1.1 | -0.1 | -0.4 | 0.0 | 0.0 | 0.0 | **-2.4** | 0.1 | -0.1 | -1.2 | -0.4 | 1.1 | -1.0 |
| Abuico (10) | 181.8 | 0.1 | 2.2 | 0.7 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | -0.1 | **-1.8** | 0.0 | -0.6 | -0.2 | 0.5 | -0.5 |
| Atouhot (11) | 12.2 | -0.2 | 3.1 | 1.2 | -0.1 | -0.2 | 0.0 | -0.1 | 0.0 | -0.1 | 0.1 | **-1.6** | -1.0 | -0.3 | 0.8 | -0.6 |
| Atrad (12) | 29.6 | 0.5 | 3.4 | 1.1 | -0.1 | -0.4 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | -0.1 | **-3.0** | -0.4 | 1.0 | -1.0 |
| Atransp (13) | 22.6 | 0.2 | 3.0 | 0.9 | -0.1 | -0.3 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | -0.1 | -1.0 | **-1.9** | 0.9 | -0.8 |
| Apubadm (14) | 484.4 | 0.0 | 0.9 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | **-1.8** | 0.2 |
| Aothserv (15) | 119.4 | 0.2 | 3.4 | 1.1 | -0.1 | -0.3 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | 0.0 | -1.0 | -0.3 | 1.0 | **-2.5** |

Note:
Aagrexpo includes the following sectors (see appendix 1 for full description):´ASISAL, ACASHE, ATEAGR, ACOFFE, ATOBAC, ACOTTO
Aagrfood includes the following sectors: AMAIZE,AWHEAT,APADDY,ASORGH,ACEREA,ABEANS,ACASSA,AROOTS,AOILSE,AOFRVE
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Table 3.8: Real per capita consumption (% changes from the base)

| | HHUAB | HHUAW | HHUAA | HHUNB | HHUNW | HHUNA | HHRAB | HHRAW | HHRAA | HHRNB | HHRNW | HHRNA | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BASE | 146.9 | 97.6 | 625.8 | 32.2 | 66.5 | 660.8 | 328.3 | 813.9 | 1164.4 | 5.6 | 2.7 | 42.7 | 3987.4 |
| Aagrexpo (1) | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | -0.1 | 0.1 | | -0.1 | 0.2 | 0.2 | 0.1 |
| Aagrfood (2) | 1.3 | 1.0 | 0.9 | 2.5 | 1.6 | 2.6 | -2.0 | 0.7 | 0.6 | -0.1 | 3.5 | 3.00 | 0.9 |
| Aagrothe (3) | 0.5 | 0.4 | 0.2 | 0.9 | 0.6 | 0.9 | -0.6 | 0.3 | 0.2 | -0.3 | 1.1 | 0.9 | 0.3 |
| Amining (4) | 0.1 | | | | | | 0.1 | | | | | | |
| Amfood (5) | -0.1 | 0.1 | 0.1 | -0.1 | | -0.1 | 0.4 | | 0.1 | 0.3 | | | 0.1 |
| Ampetro (6) | | | | | | | | | | | | | |
| Amcons (7) | | | | | | | 0.1 | | | | | | |
| Amother (8) | 0.1 | | | | | | 0.1 | | | | | | |
| Aelewat (9) | | | | | | | 0.1 | | 0.1 | 0.1 | | | |
| Abuico (10) | 0.5 | 0.1 | 0.1 | 0.2 | -0.2 | | 0.3 | 0.1 | 0.2 | 0.2 | -0.4 | -0.3 | 0.1 |
| Atouhot (11) | | | | | | | 0.1 | | | | | | |
| Atrad (12) | | 0.2 | 0.3 | -0.4 | 0.1 | -0.4 | 1.2 | 0.2 | 0.4 | 0.7 | -0.1 | -0.1 | 0.2 |
| Atransp (13) | | 0.1 | 0.1 | -0.1 | 0.1 | -0.1 | 0.4 | 0.1 | 0.2 | 0.2 | | | 0.1 |
| Apubadm (14) | 0.1 | 0.3 | 0.3 | | -0.6 | 0.2 | 0.6 | 0.2 | 0.4 | 0.2 | -0.8 | -0.7 | 0.3 |
| Aothserv (15) | -0.2 | | 0.2 | -0.5 | 0.5 | -0.4 | 1.3 | 0.8 | 0.3 | 0.5 | -0.4 | -0.2 | 0.3 |

Note:
Aagrexpo includes the following sectors (see appendix 1 for full description):´ASISAL, ACASHE, ATEAGR, ACOFFE, ATOBAC, ACOTTO
Aagrfood includes the following sectors: AMAIZE,AWHEAT,APADDY,ASORGH,ACEREA,ABEANS,ACASSA,AROOTS,AOILSE,AOFRVE
Aagrothe includes the following sectors: AOCROP,ALIVES,AFISHI,AHUFOR
Amining includes the following sectors: AMININ
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Ampetro includes the following sectors: APETRO
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Amother includes the following sectors: ACHEMI,AFERTI,ARUPLA,AGLASS,AMETAL,AEQUIP
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A productivity increase in a specific sector could result in reduced demand for labour. As demand falls and factor prices decline this encourage workers to migrate from the agricultural sectors to the non-agricultural sectors. Particular serious seems productivity increases in the food sector. A 2% TFP increase implies that 170.000 workers will migrate to the non-agricultural sector. The reverse holds for productivity increases in the non-agriculture sectors, workers will migrate back to the agricultural sector as labour demand is reduced in the non-agricultural sector. The policy implication is that focusing on a specific sector can lead to effects not intended by the policy.

Looking at welfare (here approximated as changes in real per capita consumption) we see that incomes are declining for rural households below the poverty line and increasing for the urban poor when productivity increases in the agriculture sectors. Specifically, real per capita consumption is reduced by 2% for rural households below the poverty line. For those rural poor that is above the food poverty line but below the basic needs poverty line poverty is declining. In the case of the rural food poor they are actually better off when productivity increases in non-agriculture sectors, particularly in the service sector.

Column 3 also shows the indirect impact of a productivity change in the agricultural export sector. When production increases in the agricultural export sector other agriculture sectors see a decline. Partly this is a result of factor movements where increased production implies that demand for agricultural labour and capital increases, which is reallocated from other agriculture sectors and hence reducing output in those sectors. However, in most cases increased productivity reduces the demand for labour and capital utilization resulting into a shift in labour utilization from agriculture to non-agricultural activities.

The last section of this chapter addresses some more specific agricultural policy issues. Mhamba and Wobst (2003) suggest different areas where directed government intervention can support agricultural growth strategy. One policy option often considered is to increase investment in infrastructure that is supposed to improve marketing conditions in the agricultural sector. We look at the impact of a 50% decrease of domestic and export agricultural marketing margins. This results in an improvement of agricultural producer prices, which motivates farmers to increase agricultural production. Significant increase is observed in the production of export crops (Table 3.9).

Improved efficiency in the marketing sector also results in an increase in the production of food and other agricultural crops. However, production in these sectors increased less compared to agricultural export products. A relatively larger increase in the production of export crops as compared to food crops is due to the fact that food crops are mostly traded domestically and their domestic marketing margins are relatively small (around 3%) compared to the export marketing margins (around 30 percent). Therefore, a 50% decrease in domestic and export margin is bound to have a significantly higher impact on the agricultural export sector. Thus, apart from benefiting from the decrease in domestic marketing margins, export crops also enjoyed price improvements as a result of decrease in agricultural export marketing margins. An increase in the level of activity in the production of agricultural products entailed an increase in the demand for factors of production in that sector. Demand for agricultural labour in the production of food crops increased by 2.5%, while that in the main cash crops increased by between 25.4%. This resulted into labour migration from the non-agricultural sector to the agricultural sector.

Factor incomes in the agricultural sector also increased for labour, land and capital respectively, while non-agriculture factor income for labour and capital decreased. The increase in factor incomes contributed to an increase in incomes among households

endowed with these factors of production. The income of rural agricultural households and rural non-agricultural households below food poverty line increases by 10.2% and 5.5%, respectively. Moreover, the incomes of rural agricultural households and urban agricultural households above basic needs poverty lines increased by 2.8% and 1.85; while the income of the urban (rural) agricultural households within food poverty line and basic needs poverty line increased by 1.4% (0.5%). However, the income of all other categories of households decreased. Changes in household expenditures followed the same pattern: households that experienced an increase in income increased their expenditures by the same proportion, while those that experience a decrease in income decreased their expenditures by the same proportion.

Table 3.9: Combined simulations

| | % changes in output | | | | % changes in prices | | | |
|---|---|---|---|---|---|---|---|---|
| | MMDECR | PTACUTA | COMBI | COMBI2 | MMDECR | PTACUTA | COMBI | COMBI2 |
| AAgrexpo | 17.0 | 0.8 | 22.0 | 21.7 | 6.5 | -0.4 | 5.3 | 6.4 |
| AAgrfood | 0.4 | | 1.2 | 2.0 | 5.7 | -0.2 | 2.6 | 5.0 |
| AAgrothe | 1.3 | | 2.5 | 3.5 | 6.4 | -0.1 | 3.4 | 6.0 |
| AMining | -0.2 | -0.1 | -0.3 | 1.6 | -5.1 | 0.1 | -1.8 | -4.4 |
| AMfood | -1.6 | | -0.3 | 0.8 | 0.6 | -0.1 | 0.1 | 0.5 |
| AMpetro | 0.4 | -0.1 | | 2.3 | -3.8 | 0.1 | -1.0 | -3.2 |
| AMcons | -2.5 | -0.1 | -3.1 | -0.7 | -1.9 | -0.1 | -1.5 | -1.9 |
| AMother | 0.3 | -0.2 | -1.1 | 1.3 | -4.0 | 0.1 | -2.0 | -3.5 |
| AElewat | 0.2 | | 0.8 | 2.3 | -3.9 | 0.1 | -1.3 | -3.6 |
| ABuico | -1.0 | | 0.2 | 0.8 | -1.8 | 0.1 | -0.1 | -1.4 |
| ATouhot | -2.5 | -0.1 | -2.2 | -0.4 | -0.9 | | -0.4 | -0.8 |
| ATrad | -6.9 | 0.1 | -6.2 | -5.1 | -4.8 | 0.2 | -1.4 | -4.1 |
| ATransp | -0.4 | | -0.3 | 1.3 | -4.2 | 0.1 | -1.3 | -3.6 |
| APubadm | 1.0 | | 1.9 | 3.0 | 0.1 | 0.2 | 1.3 | 0.3 |
| AOthserv | 0.3 | -0.1 | 1.3 | 3.0 | -3.7 | 0.1 | -0.9 | -3.1 |

Note:
MMDECR: Marketing margins reduced
PTACUTA: Producer taxes in agriculture sector removed
COMBI: MMDECR+PTACUTA+ 2% producitivty increase in TFP in agricultural sectors
COMBI2: MMDECR+PTACUTA+ 2% producitivty increase in TFP in all sectors

Another policy option would be to remove of all kinds of taxes on goods and services related to agriculture production. In our model the agriculture producer tax ranges from 0.2% to 1.1%. Eliminating such taxes may seem to be like imposing an insignificant policy stimulus. However, the elimination of these taxes resulted into minor changes in output and prices.

Results show that a decrease in marketing margins through investment in infrastructure improves agricultural output, employment of factors of production and incomes in the sector. The elimination of producer taxes in agriculture improves agricultural producer prices and farmers respond by increasing cash crop production. Consequently, agricultural incomes improve through increased employment of factors of production.

The last simulation combines the above package of reforms with productivity changes. The first simulation assumes productivity increases in the three agricultural sectors only. The second simulation adds productivity increases in the non-agricultural sectors as well. The adoption of the entire policy package results into more efficient allocation of factors of production in the entire economy in general and between food and

cash crops production in particular. As a result of the increase in factor earnings household incomes improve in the entire economy. The policy implication emanating from our analysis is that adoption of the agricultural support policies can be an important element towards agricultural and overall economic growth and development and, consequently, support the national strategy for poverty alleviation. However, policies supporting the agriculture sector have focus on a broad package of reforms also in the non-agricultural sectors. Higher incomes and increased demand of agricultural products from urban areas is also important as they increase demand and hence counteract falling prices when productivity increases. In the next section we look into the dynamic issues of alternative development strategies and how government spending can support such strategies.

# 4. Economic Growth and Millennium Development Goals

Fulfilling the Millennium Development Goals (MDGs) is one of the major challenges facing policymakers and donor agencies in the developing world. In this chapter we discuss one of the targets, namely reducing poverty by half. In a number of developing countries Poverty Reduction Strategy Papers (PRSP) are now being formulated and implemented. The PRSPs outline broad strategies to foster growth and reduce poverty through economic programs that include macroeconomic, structural, and social policies.

While all researchers agree that poverty should be seen as a multidimensional concept, the poverty measure in this report is the income poverty measure. The defence of income poverty- measures is that income is a means by which other needs are satisfied. Moreover income or consumption is bound to be an important part of any discussion of the consequences of economic policies and reforms on the poor. Economic reforms will be judged *inter alia* on their effect on gross domestic product, and since both GDP and household income (consumption) are measured in monetary terms, income (consumption) poverty-measures will provide a useful starting point for poverty analysis.

A pro-poor growth strategy does not have to only focus on economic growth, but could also be combined with an active policy of income redistribution. However, there may be a trade-off: If more rapid reduction in poverty can be achieved through reductions in inequalities, then distributional policy takes on a greater priority; but on the other hand, if greater levels of inequality appear to secure rapid growth leading to faster poverty reduction, then there may well be greater tolerance of inequalities. Thus, the relationship between growth and inequality are important from a policy perspective. Even if economic growth is necessary to reduce poverty, the orientation of the growth process is also important. A central question is what sectors should be given priority in a poverty oriented growth strategy.

Tanzania's PRSP has ambitious goals for poverty reduction, which will require sustained levels of high growth. The target GDP growth rate for the NSGRP is estimated to be 6-8 percent per annum over the period 2005-2010. However, policies will be required to ensure that the pattern of growth and benefits at the macro-level are translated into micro-level welfare outcomes. This section looks at different strategies to achieve the growth target and discuss how different strategies translate into changes in poverty both at the household level and at the regional level.

The outline of this section is as follows: First, we analyze the implications of macroeconomic projections for Tanzania's economic performance, with an emphasis on sectoral growth and poverty. The focus is on whether it is possible to attain the NSGRP basic needs poverty target of 24% by 2010. Second, we assess the implications of accelerated growth in the agricultural sector and how it can contribute to reduced poverty. Third, we analyze the potential roles of selected policies in accelerating growth, improving household welfare and reducing poverty. The policies that we consider include increased health spending (HIV/AIDS treatment) and increased public spending in education.

## 4.1 Methodology and modelling framework[6]

The PRSP process and the millennium goals have created new demands on how to model the impacts of macroeconomic reforms, such as fiscal reform on income distribution and poverty. However, the PRSP process makes it also important to monitor changes in

[6] The description of the model draws on Lövgren, Robinson and Thurlow (2003).

poverty. While there are different approaches on how to monitor poverty a major difference is whether changes in poverty should be based on a "theoretical approach" or on a statistical approach. With regard to the "theoretical approach" computable general equilibrium models have been a popular tool in analysing the impact of economic policies and shocks on income distribution and poverty. Households have typically been grouped into a small number of representative household groups assuming that within-group distribution is fixed. This is a drawback as there is increasing evidence that households within a given category may be affected quite differently according to their asset profiles, location, household composition, education etc. (Cockburn, 2003).

Lofgren et al (2002) discuss different approaches on how to link a micro-simulation module to a CGE model analysing the impact of an external shock on income distribution and poverty. A micro-simulation module may be fully integrated with a CGE model, permitting full interaction between the two levels of analysis. In this approach, the representative households of a conventional CGE model are replaced by a nationally representative sample of actual households. In the second sequential approach the CGE model supplies a separate micro-simulation module with data on employment, wages and consumer prices.

Following the second approach Coady and Harris (2001) analysed the impact of transfers on household welfare in Mexico. A CGE model with representative households generated information on changes in income and commodity prices, which were superimposed on the household survey data to generate the total impact on household real incomes, poverty and inequality. Devarajan and Go (2002) describes a technique following the second approach linking the FPM with a growth model which in turn is linked to a general equilibrium model which finally is linked to a household survey.

In this chapter we use a dynamic computable general equilibrium model incorporating a micro-simulation module. Micro-simulation models play an important role in policy analysis, particularly in connection with the distributional impact of tax and benefit reforms. The models begin with a household data set, which is broadly representative of the population at large, and then try to simulate the consequences of tax and benefit changes, taking account where possible of the behavioural responses of individuals. The objective is to show how the changes affect different types of households in different ways, and to assess the overall impact on individual living standards, poverty rates, and other indicators of household well-being. The advantage of micro-simulation models is that they pay explicit attention to heterogeneity of experience across the population. The drawback is usually that behavioural response is modelled in a rudimentary manner.

The dynamic Tanzania model described briefly below represents an extension of the standard static CGE model developed at the International Food Policy Research Institute as described in Lofgren *et al.* (2002). The model is a recursive dynamic model, which implies that the behaviour of its agents is based on current and past conditions as opposed to future conditions.

Following the Tanzania 2001 SAM described above, the model identifies 43 productive sectors or activities that combine primary factors with intermediate commodities to produce output. The thirteen factors of production identified in the model include: (i) nine types of labour distinguished according to maximum education attained and gender (uneducated, primary, secondary, and post-secondary); (ii) two types of capital (agricultural and non-agricultural); and (iii) agricultural land.

Producers make decisions in order to maximize profits with the choice between factors being governed by a constant elasticity of substitution (CES) production function.

This specification allows producers to respond to changes in relative factor returns by smoothly substituting between available factors so as to derive a final value-added composite. Profit maximization implies that the factors receive income where marginal revenue equals marginal cost based on endogenous relative prices. Once determined, these factors are combined with fixed-share intermediates using a Leontief specification. The use of fixed shares reflects the belief that the required combination of intermediates per unit of output, and the ratio of intermediates to value-added, is determined by technology rather than by the decision-making of producers. The final price of an activity‘s output is derived from the price of value-added and intermediates, together with any producer taxes or subsidies that may be imposed by the government per unit of output.

In addition to its multi-sector specification, the model also distinguishes between activities and the commodities that these activities produce. This distinction allows individual activities to produce more than a single commodity and conversely, for a single commodity to be produced by more than one activity. Fixed-shares govern the disaggregation of activity output into commodities since it is assumed that technology largely determines the production of secondary products. These commodities are supplied to the market.

Substitution possibilities exist between production for the domestic and the foreign markets. This decision of producers is governed by a constant elasticity of transformation (CET) function, which distinguishes between exported and domestic goods, and by doing so, captures any quality differences between the two products. Profit maximization drives producers to sell in those markets where they can achieve the highest returns. These returns are based on domestic and export prices (where the latter is determined by the world price times the exchange rate adjusted for any taxes or subsidies). Under the small-country assumption, Tanzania is assumed to face a perfectly elastic world demand at a fixed world price. The final ratio of exports to domestic goods is determined by the endogenous interaction of relative prices for these two commodity types.

Domestically produced commodities that are not exported are supplied to the domestic market. Substitution possibilities exist between imported and domestic goods under a CES Armington specification. Such substitution can take place both in final and intermediates usage. Again under the small country assumption, Tanzania is assumed to face infinitely elastic world supply at fixed world prices. The final ratio of imports to domestic goods is determined by the cost minimizing decision-making of domestic demanders based on the relative prices of imports and domestic goods (both of which include relevant taxes).

Transaction costs are incurred when commodities are traded in markets. Demand for trade and transportation services is a fixed coefficient per unit sold. The coefficient is disaggregated by type of commodity and trade (export, import, or domestic sale). The final composite good, containing a combination of imported and domestic goods, is supplied to both final and intermediate demand. Intermediate demand, as described above, is determined by Leontief technology and by the composition of sectoral production. Final demand is dependent on institutional incomes and the composition of aggregate demand.

The model distinguishes between various institutions within the Tanzanian economy, including enterprises, the government, and 12 types of households. The household categories are initially separated into rural and urban. The remaining disaggregation is based on the income level of the household and on the education of the head of the household. In terms of adult equivalent income levels, the poorest households are those below the food poverty line, followed by households who fall between the food and basic needs poverty lines. The remaining households that do not fall into either of these

categories (approximately 60 percent of the population) are divided according to the highest educational attainment of the head of the household (see Thurlow and Wobst, 2003 for details).

The primary source of income for households and enterprises are factor returns generated during production. For each factor, the supply is fixed within a given time period. Capital is immobile across sectors and fully employed; earning a flexible return that reflects its sector-specific scarcity value. The non-capital factors are mobile across sectors and fully-employed, with an economy-wide wage clearing each market. For the non-capital factors, each activity pays an activity-specific wage that is the product of this economy-wide wage and a fixed activity-specific wage distortion term. Final factor incomes also include remittances received from and paid to the rest of the world.

Households and enterprises earn factor incomes in proportion to the share that they control of each factor. Enterprises or firms are the sole recipient of non-agricultural capital income, which they transfer to households after having paid corporate taxes (based on fixed tax rates), saved (based on fixed savings rates), and remitted profits to the rest of the world. Households within each of the 12 representative groups are assumed to have identical preferences, and are therefore modelled as ”representative‘ consumers. In addition to factor returns, which represent the bulk of household incomes, households also receive transfers from the government, other domestic institutions, and the rest of the world. Household disposable income is net of personal income tax (based on fixed tax rates), savings (based on fixed savings rates), and remittances to the rest of the world. Consumer preferences are represented by a linear expenditure system (LES) of demand, which is derived from the maximization of a Stone-Geary utility function subject to a household budget constraint. Given prices and incomes, these demand functions define households‘ real consumption of each commodity. The LES specification allows for the identification of supernumerary household income that ensures a minimum level of consumption.

The government earns most of its income from direct and indirect taxes, and then spends it on consumption and transfers to households. Both of these payments are fixed in real terms. The difference between revenues and expenditures is the budget deficit, which is primarily financed through borrowing (or dis-saving) from the domestic capital market.

Savings by households and enterprises are collected into a savings pool from which investment is financed. This supply of loanable funds is diminished by government borrowing (or dis-saving) and augmented by capital inflows from the rest of the world. There is no explicit modelling of the investment decision or the financial sector within a particular time-period, but aggregate savings-investment equality is required. One possible mechanism through which this balance is achieved is via adjustment in the interest rate (which may affect savings and/or investment). The disaggregation of investment into demand for final commodities is done assuming a fixed bundle of investment commodities with changes in aggregate investment leading to proportional increases in the demand for individual commodities.

Production is linked to demand through the generation of factor incomes and the payment of these incomes to domestic institutions, including households. Balance between demand and supply for both commodities and factors are necessary in order for the model to reach equilibrium. This balance is imposed on the model through a series of system constraints.

The model includes three broad macroeconomic accounts: the government balance, the current account, and the savings and investment account. In order to bring about balance in the macro accounts, it is necessary to specify a set of mechanisms or macro ”closure‘ rules.

For the government, consumption is fixed in real terms. For most simulations, all tax rates are also fixed, with savings (showing the difference between current revenue and current spending) clearing the government account. For the current account of the balance of payments (the rest of the world account), a flexible exchange adjusts to maintain a fixed level of foreign savings. In other words the external balance is held fixed in foreign currency. Nominal investment is a fixed share of nominal absorption – other things being equal, real investment will respond positively (negatively) to decreases (increases) in the prices of investment commodities relative to other commodities. Adjustments in household savings rates assure that savings and investment values are equal (i.e., savings is driven by investment). Finally, the consumer price index was chosen as the numéraire.

The static model described above is extended to a recursive dynamic model. Selected parameters are updated based on the modelling of inter-temporal behaviour and results from previous periods. Current economic conditions, such as the availability of capital, are thus endogenously dependent on past outcomes. The dynamic model is also exogenously updated to reflect demographic and technological changes that are based on projected trends. The process of capital accumulation is modelled endogenously, with previous period investment generating new capital stock for the subsequent period. Although the allocation of new capital across sectors is influenced by each sector‘s initial share of aggregate capital income, the final sectoral allocation of capital in the current period is dependent on the capital depreciation rate and on sectoral profit-rate differentials from the previous period. Sectors with above-average capital returns receive a larger share of investible funds than their share in capital income. The converse is true for sectors where capital returns are below average.

Population, labour force and productivity growth are exogenously imposed on the model based on separately calculated growth projections. It is assumed that a growing population generates a higher level of consumption demand and therefore raises the supernumerary income level of household consumption. Projected changes in the current account balance are exogenously accounted for. Mining production is assumed to be predominantly driven by a combination of changes in world demand and prices, and other factors external to the model. Accordingly, the value-added growth of these sectors and the world price of exports are updated exogenously between periods.

The Tanzanian dynamic model is solved as a series of within-period equilibria, each one representing a single year. By imposing the above policy-independent dynamic adjustments, the model produces a projected or counterfactual growth path. Policy changes can then be expressed in terms of changes in relevant exogenous parameters and the model is re-solved for a new series of equilibria. For policy shifts that involve additional government spending, we increase real government consumption, thereby the main burden of these policies, the diversion of resources from private consumption and investment in non-government production. Differences between the policy-influenced growth path and that of the counterfactual can then be interpreted as the economy-wide impact of the simulated policy.

The poverty and distributional impact of policy changes are modelled inside the same 2001 Household Budget Survey that was used to construct SAM. Each representative household in the CGE model is linked to its corresponding household within the survey. Each household is an average representative of a larger number of households within the greater population. Since poverty in this study is defined according to per capita real expenditure, changes in household expenditure from the CGE model are passed down to the survey, where poverty and inequality are calculated.

## 4.2 Alternative growth scenarios

The analysis presented in this section focuses on the prospect for the future and whether the ambitious goal of reducing poverty by half can be met. Does it make a difference if the growth pattern is biased towards the agriculture sector or towards the manufacturing sector? As we are focusing on different growth scenarios the assumptions regarding total factor productivity is of crucial importance.[7] Two recent studies found that recent growth performance in Tanzania has been driven by improvements in TFP (Utz, 2005 and Treichel, 2005). While in the early 1990s, the contribution of TFP was negative its contribution since then has gradually increased, possibly reflecting the positive effects of economic reforms. The improvement in TFP in Tanzania augurs well for the possibility of strong growth in the future and an important question is what is a reasonable to expect? Treichel (2005) projected growth over the next 10 years assuming a growth rate of the labour force and capital stock of 2% and 4.7%, respectively. Moreover, TFP is assumed to grow by 2.5% a year contributing 2.7% to the overall projected growth rate of 5.25 during 2004-2013.

In the next sections we present the results of four broad different policy scenarios. First, according to the Medium Term Plan for Growth and Poverty Reduction the model has been calibrated to generate a 6% growth path in the base simulation.[8] The motivation for this simulation is that there is no information on trends in household income poverty since 2000 and estimates of household consumption levels are not produced annually. Hence, we use the model to project changes in household incomes over the period 2001-2010. Second, still assuming a 6% growth path we look into alternative strategies to achieve the target. An industry-led and six alternative strategies in the agriculture sectors are considered. The third set of scenarios looks at accelerated development in the agriculture sectors through additional changes in TFP. The fourth scenario looks at the impact of increased public educational spending. The impact of HIV/AIDS on economic performance is of serious concern and the final set of scenarios look into the broad impact of HIV/AIDS treatment.

### 4.2.1 Growth and poverty reduction – baseline scenario

Table 4.1-4.4 reports macroeconomic variables and poverty indicators of the baseline scenario and alternative scenarios. In our baseline scenario TFP is assumed to contribute by 2% to the overall growth rate of 6% (Base column in Table 4.1). In the baseline scenario it is assumed that the mining sector continue to grow at high rates over the whole period (2001-2010). The annual average growth rate of the other sectors in the economy also reflects some of their more recent performance. In the alternative scenarios TFP has been reduced in non-agricultural sectors and increased in agricultural sectors in order to achieve the same overall growth rate.

Agriculture is assumed to grow at 5.4%, other industrial activities at 6.7%, while private service is assumed to grow at 6.3% over the period.[9] Government real current expenditure is assumed to grow by 3% (Base growth path column in Table 4.2). Total investment is assumed to be growing at around 11% where private investment is assumed

[7] Recall that the production structure is a set of nested CES functions, which include production factors and intermediate inputs. Sectoral growth in the model is driven by factor accumulation and productivity changes.
[8] The model has been calibrated according to the actual growth rate during 2001-2003.
[9] Although the model reports annual changes in a number of variables we report only the average annual change for the whole period.

to grow faster than public investment. Additional public spending increases occur in later simulations as new government policies are implemented. Export volume is assumed to grow by 8.2 percent while imports are growing by 6.9 percent.

Table 4.1: Sectoral growth rates and contribution to GDP (%)

| | Base | Industry | Agric/1 | Agric/2 | Agric/3 | Agric/4 | Agric/5 | Agric/6 |
|---|---|---|---|---|---|---|---|---|
| Agriculture | 5.4 | 5.1 | 5.7 | 5.5 | 5.8 | 5.6 | 6.0 | 5.7 |
| Mining | 15.5 | 17.2 | 13.4 | 14.9 | 12.6 | 14.3 | 10.7 | 13.8 |
| Industry | 6.7 | 6.9 | 6.4 | 6.7 | 6.4 | 6.4 | 6.3 | 6.5 |
| Public service | 4.0 | 4.1 | 3.9 | 4.0 | 3.9 | 4.0 | 3.8 | 4.0 |
| Private service | 6.3 | 6.4 | 6.2 | 6.2 | 6.1 | 6.2 | 6.0 | 6.1 |
| GDP | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Factor use | 4.0 | 4.2 | 3.8 | 3.9 | 3.7 | 3.7 | 3.8 | 3.8 |
| TFP | 2.0 | 1.8 | 2.2 | 2.1 | 2.3 | 2.3 | 2.2 | 2.2 |

Note:
Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry

Assuming that the Tanzanian economy can sustain its recent growth performance what is the prospects of achieving the goal of reducing poverty by half? Looking at the impact on the different households specified in the model we note that growth in household consumption exceeds population growth. The growth pattern is pro-urban: per-capita consumption grows more rapidly for urban households than for their rural counterparts (Table 4.2). However, looking at households below the poverty line (bold in Table 4.3) per capita consumption is increasing for rural groups while the urban food poor see a decline. A bit surprising is that even urban households are better off with an alternative agricultural-led strategy. One important factor, discussed in chapter three, is that increased productivity may lead to reduced prices on food which would benefit the urban households as consumers.

Table 4.2: Poverty – alternative strategies

| | Total | Female-headed households | Male-headed households | Urban | Rural |
|---|---|---|---|---|---|
| Poverty level 2001 | 35.8 | 35.2 | 36.0 | 23.2 | 38.8 |
| Base growth path | 25.6 | 25.7 | 25.5 | 21.5 | 26.6 |
| Industry-led growth | 26.5 | 26.9 | 26.4 | 22.7 | 27.4 |
| Agriculture-led growth/1 | 23.9 | 23.2 | 24.1 | 19.6 | 24.9 |
| Agriculture-led growth/2 | 25.1 | 24.6 | 25.1 | 20.9 | 26.0 |
| Agriculture-led growth/3 | 23.2 | 22.7 | 23.4 | 19.3 | 24.2 |
| Agriculture-led growth/4 | 22.7 | 22.5 | 22.8 | 20.0 | 23.4 |
| Agriculture-led growth/5 | 24.9 | 25.1 | 24.9 | 19.0 | 26.3 |
| Agriculture-led growth/6 | 24.7 | 24.3 | 24.8 | 20.3 | 25.8 |

Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry

However, in a dynamic economy where other sectors are growing as well it seems that prices decline less compared to the comparative static analysis in chapter three. What does this mean in terms of poverty? Attaining the NSGRP target of 24 percent (for basic needs) by 2010 seems to be possible in three of the scenarios. The best outcome in terms of poverty reduction seems to be a strategy focusing where productivity gains can be achieved in the staple-food sectors. Moreover, from a gender perspective supporting staple-food sector seems to be the best alternative.

Table 4.3: Base projection and simulation results

| | Initial conditions | Base growth path | Industry-led growth | Agriculture-led growth/1 | Agriculture-led growth/2 | Agriculture-led growth/3 | Agriculture-led growth/4 | Agriculture-led growth/5 | Agriculture-led growth/6 |
|---|---|---|---|---|---|---|---|---|---|
| Real GDP growth | 7576.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Total real household consumption | 6949.3 | 5.2 | 5.1 | 5.4 | 5.3 | 5.5 | 5.5 | 5.4 | 5.3 |
| Real consumption, rural households | 4826.8 | 4.6 | 4.3 | 4.8 | 4.6 | 4.9 | 4.9 | 4.7 | 4.7 |
| Real consumption, urban households | 2122.5 | 6.7 | 6.6 | 6.8 | 6.7 | 6.8 | 6.6 | 6.9 | 6.7 |
| Real investment | 1286.5 | 11.5 | 12.2 | 10.6 | 11.3 | 10.3 | 10.4 | 10.6 | 10.7 |
| Real private investment | 861.9 | 9.0 | 9.6 | 8.3 | 8.9 | 8.1 | 8.2 | 8.3 | 8.4 |
| Real public investment | 424.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Real government consumption | 513.3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Total real exports | 1298.5 | 8.2 | 8.2 | 8.2 | 8.1 | 8.3 | 8.0 | 8.9 | 8.2 |
| Total real imports | 2002.2 | 6.9 | 6.9 | 6.9 | 6.8 | 6.9 | 6.8 | 7.1 | 6.8 |
| Real exchange rate | 100.0 | 2.6 | 3.0 | 1.8 | 2.3 | 1.4 | 2.3 | -0.4 | 1.9 |
| Investment (% of nominal GDP) | 16.0 | 8.2 | 8.5 | 7.6 | 8.1 | 7.4 | 8.3 | 5.6 | 7.7 |
| Private savings (% of nominal GDP) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 |
| Government savings (% of nominal GDP) | 1.2 | 3.1 | 3.2 | 3.1 | 3.1 | 3.1 | 3.3 | 2.6 | 3.1 |
| Foreign savings (% of nominal GDP) | 4.0 | 5.0 | 5.3 | 4.5 | 4.9 | 4.2 | 4.9 | 3.0 | 4.6 |

Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry

Table 4.4: Per-capita real consumption across household groups (% average annual change)

| | Initial conditions | Base growth path | Industry-led growth | Agriculture-led growth/1 | Agriculture-led growth/2 | Agriculture-led growth/3 | Agriculture-led growth/4 | Agriculture-led growth/5 | Agriculture-led growth/6 |
|---|---|---|---|---|---|---|---|---|---|
| **HRBFPL** | | 0.12 | -0.22 | 0.51 | 0.25 | 0.65 | 0.71 | 0.37 | 0.28 |
| **HRFBPL** | | 2.12 | 1.84 | 2.47 | 2.25 | 2.59 | 2.75 | 2.18 | 2.31 |
| HRNOED | | 1.18 | 0.97 | 1.38 | 1.29 | 1.45 | 1.56 | 1.15 | 1.21 |
| HRNFPS | | 0.36 | 0.11 | 0.61 | 0.43 | 0.68 | 0.67 | 0.55 | 0.46 |
| HRNFSS | | 2.86 | 2.64 | 3.10 | 2.93 | 3.18 | 3.19 | 2.97 | 2.98 |
| HRSECP | | 4.46 | 4.26 | 4.70 | 4.52 | 4.69 | 4.53 | 4.88 | 4.78 |
| **HUBFPL** | | -0.37 | -0.63 | -0.08 | -0.29 | 0.00 | -0.13 | 0.06 | -0.23 |
| **HUFBPL** | | 0.37 | 0.09 | 0.68 | 0.47 | 0.78 | 0.60 | 0.85 | 0.54 |
| HUNOED | | 0.06 | -0.14 | 0.25 | 0.12 | 0.27 | 0.18 | 0.27 | 0.15 |
| HUNFPS | | 1.38 | 1.24 | 1.50 | 1.41 | 1.51 | 1.38 | 1.54 | 1.46 |
| HUNFSS | | 4.91 | 4.84 | 4.95 | 4.87 | 4.96 | 4.79 | 5.14 | 4.94 |
| HUSECP | | 5.79 | 5.75 | 5.79 | 5.71 | 5.76 | 5.65 | 5.84 | 5.83 |
| TOTAL | | 2.67 | 2.49 | 2.87 | 2.72 | 2.92 | 2.89 | 2.83 | 2.78 |

HRBFPL: Rural (below food poverty line), HRFBPL: Rural (between food and basic needs poverty lines), HRNOED: Rural (non-poor – head with no education), HRNFPS: Rural (non-poor – head not finished primary school), HRNFSS: Rural (non-poor – head not finished secondary school), HRSECP: Rural (non-poor – head finished secondary school), HUBFPL: Urban (below food poverty line), HUFBPL: Urban (between food and basic needs poverty lines), HUNOED: Urban (non-poor – head with no education), HUNFPS: Urban (non-poor – head not finished primary school), HUNFSS: Urban (non-poor – head not finished secondary school), HUSECP: Urban (non-poor – head finished secondary school)

Table 4.5: Growth and poverty reduction a regional perspective (Head-count ratios)

| | Region 1 | Region 2 | Region 3 | Region 4 | Region 5 | Region 6 | Region 7 | Region 8 | Region 9 | Region 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Poverty level 2001 | 20.5 | 38.8 | 32.0 | 36.5 | 29.6 | 46.3 | 17.6 | 53.1 | 38.2 | 41.3 |
| Base growth path | 20.5 | 29.2 | 20.0 | 16.4 | 20.6 | 35.6 | 16.2 | 40.2 | 24.4 | 33.4 |
| Industry-led growth | 20.8 | 30.4 | 21.2 | 18.0 | 21.6 | 36.4 | 17.2 | 41.6 | 25.4 | 35.6 |
| Agriculture-led growth/1 | 17.9 | 27.1 | 16.5 | 14.6 | 18.7 | **34.6** | 12.4 | 39.1 | 23.1 | 32.9 |
| Agriculture-led growth/2 | 18.9 | 29.0 | 19.9 | 15.9 | 19.8 | 35.2 | 14.9 | 40.1 | 24.4 | 33.4 |
| Agriculture-led growth/3 | 17.5 | **26.8** | **15.3** | 14.1 | **18.2** | **34.6** | 12.4 | 38.4 | 22.0 | 32.6 |
| Agriculture-led growth/4 | **17.0** | 27.0 | 15.4 | **13.9** | 18.4 | **34.6** | 13.1 | **36.9** | **20.9** | **31.1** |
| Agriculture-led growth/5 | 18.8 | 28.6 | 19.6 | 16.3 | 20.2 | 35.0 | **12.3** | 39.8 | 24.0 | 32.9 |
| Agriculture-led growth/6 | 18.6 | 29.0 | 19.7 | 15.5 | 19.5 | 35.2 | 13.3 | 39.8 | 23.8 | 33.3 |

Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry
Regions: Dodoma = 1, Arusha = 2, Kilimanjaro = 3, Tanga = 4, Morogoro = 5, Pwani = 6, Dar es Salaam = 7, Lindi = 8, Mtwara = 9, Ruvuma=10

Table 4.5: Growth and poverty reduction a regional perspective (Head-count ratios)

| | Region 11 | Region 12 | Region 13 | Region 14 | Region 15 | Region 16 | Region 17 | Region 18 | Region 19 | Region 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Poverty level 2001 | 29.0 | 20.7 | 55.2 | 26.0 | 31.1 | 37.5 | 42.0 | 28.8 | 48.0 | 45.8 |
| Base growth path | 15.6 | 14.7 | 44.2 | 15.0 | 18.1 | 26.2 | 29.4 | 20.7 | 39.2 | 40.4 |
| Industry-led growth | 16.3 | 15.1 | 45.1 | 15.8 | 18.7 | 27.4 | 30.2 | 21.2 | 40.3 | 41.8 |
| Agriculture-led growth/1 | 13.4 | 13.3 | 40.7 | 14.2 | 17.4 | 23.9 | 28.2 | 20.4 | 37.9 | 40.1 |
| Agriculture-led growth/2 | 14.9 | 13.5 | 43.4 | 14.6 | 17.8 | 25.8 | 29.1 | 20.7 | 38.7 | 40.3 |
| Agriculture-led growth/3 | 13.2 | 12.7 | 38.9 | **11.3** | **17.3** | **23.3** | 27.8 | 20.4 | 36.6 | 40.1 |
| Agriculture-led growth/4 | **12.9** | **11.8** | **33.6** | **11.3** | **17.3** | 23.5 | **27.7** | **19.6** | **36.0** | **39.6** |
| Agriculture-led growth/5 | 15.3 | 14.3 | 44.0 | 14.5 | 17.7 | 25.8 | 29.1 | 20.6 | 38.7 | 40.1 |
| Agriculture-led growth/6 | 14.7 | 13.5 | 41.2 | 14.4 | 17.6 | 25.8 | 29.0 | 20.7 | 38.6 | 40.3 |

Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry
Regions: Iringa = 11, Mbeya = 12, Singida = 13, Tabora = 14, Rukwa = 15, Kigoma = 16, Shinyanga = 17, Kagera = 18, Mwanza = 19, Mara = 20

Table 4.6: Growth and inequality (Gini coefficients)

| | Initial conditions | Base growth path | Industry-led growth | Agriculture-led growth/1 | Agriculture-led growth/2 | Agriculture-led growth/3 | Agriculture-led growth/4 | Agriculture-led growth/5 | Agriculture-led growth/6 |
|---|---|---|---|---|---|---|---|---|---|
| Total | 0.336 | 0.382 | 0.384 | 0.378 | 0.379 | 0.376 | 0.374 | 0.381 | 0.381 |
| Female | 0.335 | 0.376 | 0.377 | 0.371 | 0.373 | 0.370 | 0.368 | 0.374 | 0.375 |
| Male | 0.337 | 0.383 | 0.385 | 0.379 | 0.381 | 0.377 | 0.375 | 0.382 | 0.383 |
| Urban | 0.350 | 0.397 | 0.406 | 0.401 | 0.402 | 0.400 | 0.400 | 0.400 | 0.407 |
| Rural | 0.320 | 0.345 | 0.345 | 0.342 | 0.343 | 0.341 | 0.339 | 0.344 | 0.344 |

Industry led growth: TFP up in industrial sectors and down in agricultural.
1/Agriculture-led growth: TFP up in all agricultural sectors and down in industry
2/Agriculture-led growth: TFP up in all agricultural sectors and down in services
3/Agriculture-led growth: TFP up in all agricultural crop sectors and down in industry
4/Agriculture-led growth: TFP up in all agricultural staple sectors and down in industry
5/Agriculture-led growth: TFP up in all agricultural traditional exports sectors and down in industry
6/Agriculture-led growth: TFP up in all agricultural livestock sectors and down in industry

Major strides in economic growth and poverty reduction in Tanzania over the late 1990s seem to have occurred in regions that managed to attract more investment, and those regions that have relatively more developed transport, communication and financial infrastructure, as well as better social services. Nevertheless, the change in poverty conceals large regional differences in levels of poverty. Significant declines in poverty are observed in the Southern Highlands and Dar es Salaam whereas the Northern Highlands has experienced a significant increase in poverty. Interestingly, the Southern Highlands were one of the poorest zones and the Northern Highlands was the most well-off zone in 1991/1992.[10] The current absolute number of poor differs quite dramatic between the regions in Tanzania (Table 4.5). Table 4.5 also reports changes in poverty according to the different scenarios discussed above. The results show that a strategy supporting staple-food crops would reduce poverty in most cases across the different regions. Still it is only four regions (Kilimanjaro, Tanga, Iringa and Tabora) in which poverty is reduced by half.[11] Interestingly, even if poverty in Dar es Salaam has fallen dramatically since the early 1990s the projections show a modest decline.

Even it is possible to achieve the poverty target all growth scenarios lead to higher inequality. Table 4.7 reports changes in the Gini-coefficient for the different scenarios. Although there are no dramatic changes between the various scenarios the staple-crop scenario seems to be one where income distribution is worsening less than the others. This is the case both for male and female-headed households as well as the rural region.

## 4.3 Accelerated growth scenarios

In this section we look into the impact of additional (additional to those assumed in the previous section) productivity gains. The purpose of these simulations is to identify the poverty reduction potential across agricultural sectors as well as the industrial and service sectors. There is no attempt to account for the costs of raising TFP under these scenarios. In order to make these simulations comparable, the rate of additional TFP growth is scaled in inverse proportion to the size of the targeted sector relative to all of agriculture.

The general effect of increasing TFP growth is to raise the level of production in the targeted sectors. Increased supply lowers the price which increases demand for agricultural products in both urban and rural areas. Part of the additional output is exported. As long as the demand elasticities are sufficiently high, incomes and consumption will tend to increase for both agricultural and non-agricultural households, with a fall in poverty and more rapid growth as important consequences. The results from the accelerated growth simulations are presented in Tables 4.7-4.9 below. Compared to the previous scenarios there are additional gain in terms of growth and poverty reduction. However, there are considerable differences between the different scenarios. For example, in the first scenario, where the industrial sector, including the mining sector is targeted, growth increases the most.

Even if productivity changes in the industrial sector lead to higher growth the impact on poverty is less compared to the alternative scenarios. In the industrial scenario richer households, both urban and rural, are gaining more than other household groups; inequality is worsening. The gains from the agricultural scenarios are also spread unevenly across all household groups. An important difference, however, is that rural food poor households gain more in all agricultural scenarios. Income distribution is becoming more unequal but less than the previous scenario. Even if growth is lower poverty is falling more.

[10] Classification according to 7 regional zones: Coastal (Tanga, Morogoro, Pwani), Northern Highlands (Arusha, Kilimanjaro), Lake (Tabora, Rukwa, Kigoma, Shinyanga, Kagera, Mwanza, Mara), Central (Dodoma, Singida), Southern Highlands (Iringa, Mbeya, Rukwa), South (Lindi, Mtwara, Ruvuma), and Dar es Salaam.

[11] The regional results should be interpreted with care as they are in some cases derived from a small subset of the HBS2000 and model generated changes in real per-capita consumption.

Table 4.7: Sectoral growth rates and contribution to GDP

| | Base | Agric. | Industry | Services | Crop | Staple | Horticulture | Export crops |
|---|---|---|---|---|---|---|---|---|
| Agriculture | 5.4 | 5.5 | 5.9 | 5.4 | 5.8 | 5.8 | 7.6 | 6.4 |
| Mining | 15.5 | 15.4 | 18.1 | 15.7 | 15.0 | 16.0 | 13.1 | 11.5 |
| Industry | 6.7 | 6.8 | 7.8 | 6.8 | 6.9 | 7.0 | 7.0 | 6.9 |
| Public service | 4.0 | 4.0 | 4.3 | 4.1 | 4.1 | 4.1 | 4.0 | 3.9 |
| Private service | 6.3 | 6.4 | 7.0 | 6.4 | 6.5 | 6.6 | 6.5 | 6.4 |
| GDP | 6.0 | 6.1 | 6.8 | 6.1 | 6.3 | 6.4 | 7.1 | 6.4 |
| Factor use | 4.0 | 4.0 | 4.4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| TFP | 2.0 | 2.1 | 2.4 | 2.1 | 2.3 | 2.4 | 3.1 | 2.4 |

Note:
Agric: TFP increased across all agricultural sectors
Industry: TFP increase in industrial sectors
Services: TFP increased in (private) service sectors
Crops: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots, Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar, Other fruit and vegetables, other crops.
Staples: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots and other crops
Horticulture: other fruit and vegetables
Export crops: Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar

In the different agricultural scenarios increased productivity in the staple food sector reduce poverty faster than the other scenarios. Unlike Lövgren et al. (2004) report for Zambia where an increase in TFP growth marginally increases poverty in rural areas, here it reduces poverty in both urban and rural areas. In recent years an increasing share of staple food has been exported (increased exports to Zambia and Democratic Republic of Congo). Domestic markets are therefore not flooded by increased supply and even if prices fall it falls less than output. The result is that rural poor producing staple food increase their incomes and at the same time urban poor households benefit from lower food prices.

Table 4.8: Poverty and accelerated growth

| | Total | Female | Male | Urban | Rural | Gini |
|---|---|---|---|---|---|---|
| Poverty level 2001 | 35.8 | 35.2 | 36.0 | 23.2 | 38.8 | 0.336 |
| Base growth path | 25.6 | 25.7 | 25.5 | 21.5 | 26.6 | 0.382 |
| Crops | 23.8 | 22.9 | 24.0 | 19.6 | 24.8 | 0.379 |
| Horticulture | 22.6 | 22.2 | 22.7 | 18.7 | 23.6 | 0.383 |
| Agriculture | 25.1 | 24.7 | 25.2 | 21.5 | 26.0 | 0.380 |
| Staple crops | 22.5 | 22.4 | 22.5 | 19.6 | 23.2 | 0.376 |
| Export crops | 23.7 | 22.9 | 23.8 | 18.5 | 24.9 | 0.382 |
| Industry | 23.3 | 22.7 | 23.5 | 19.6 | 24.2 | 0.383 |
| Services | 25.4 | 25.4 | 25.4 | 21.4 | 26.3 | 0.381 |

Crops include: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots, Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar, Other fruit and vegetables, other crops.
Staples includes: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots and other crops
Horticulture included other fruit and vegetables
Traditional exports includes: Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar
Livestock includes livestock, fishing and hunting and forest

In the export crop scenario increased exports appreciate the exchange rate. Urban households are better off due to cheaper imports from the appreciated real exchange rate. Although rural households are better off compared to the base scenario the poorer households benefit more from the staple scenario. The overall conclusion from these simulations is that higher

productivity in industrial sectors has a stronger impact on growth but in terms of poverty reduction improved productivity in agricultural sectors seems to have a stronger impact and in particular in the staple-food sector.

Table 4.9: Accelerated growth

| | Initial conditions | Base-growth path | Agriculture/1 | Industry/2 | Service sector/2 | Crops | Staple | Traditional exports |
|---|---|---|---|---|---|---|---|---|
| Real GDP growth | 7576.0 | 6.0 | 6.1 | 6.8 | 6.1 | 6.3 | 6.4 | 6.4 |
| Total real household consumption | 6949.3 | 5.2 | 5.4 | 5.7 | 5.3 | 5.6 | 5.7 | 5.7 |
| Real consumption, rural households | 4826.8 | 4.6 | 4.7 | 5.0 | 4.6 | 4.9 | 5.1 | 5.0 |
| Real consumption, urban households | 2122.5 | 6.7 | 6.8 | 7.2 | 6.8 | 6.9 | 6.9 | 7.2 |
| Real investment | 1286.5 | 9.0 | 9.0 | 10.3 | 9.2 | 9.0 | 9.1 | 9.0 |
| Real private investment | 861.9 | 11.5 | 11.5 | 13.0 | 11.6 | 11.5 | 11.5 | 11.4 |
| Real public investment | 424.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Real government consumption | 513.3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Total real exports | 1298.5 | 8.2 | 8.3 | 9.1 | 8.3 | 8.5 | 8.5 | 9.5 |
| Total real imports | 2002.2 | 6.9 | 6.9 | 7.5 | 7.0 | 7.1 | 7.1 | 7.5 |
| Real exchange rate | 100.0 | 2.6 | 2.5 | 3.5 | 2.7 | 2.4 | 2.9 | 0.0 |
| Investment (% of nominal GDP) | 8.2 | 8.1 | 8.5 | 8.2 | 8.0 | 8.5 | 7.1 | 7.7 |
| Private savings (% of nominal GDP) | 10.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Government savings (% of nominal GDP) | 3.1 | 3.2 | 3.3 | 3.2 | 3.2 | 3.4 | 3.1 | 3.1 |
| Foreign savings (% of nominal GDP) | 5.0 | 4.9 | 5.2 | 4.9 | 4.7 | 5.1 | 3.9 | 4.6 |

Note: Accelerated growth in various sectors.
Crops include: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots, Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar, Other fruit and vegetables, other crops.
Staples includes: Maize, paddy, Sorghum, Wheat, Beans, Cassava, Cereals, Oil-seeds, roots and other crops
Horticulture included other fruit and vegetables
Traditional exports includes: Cotton, Coffee, Tobacco, Tea, Cashew-nuts, Sisal, Sugar
Livestock includes livestock, fishing and hunting and forest

Table 4.10: Accelerated growth and per-capita real consumption across household groups (% average annual change)

| | Base growth path | Agriculture/1 | Industry/2 | Service sector/2 | Crops | Staple | Export crops |
|---|---|---|---|---|---|---|---|
| **HRBFPL** | 0.12 | 0.25 | 0.44 | 0.19 | 0.50 | 0.72 | 0.57 |
| **HRFBPL** | 2.12 | 2.26 | 2.60 | 2.19 | 2.52 | 2.79 | 2.48 |
| HRNOED | 1.18 | 1.30 | 1.72 | 1.24 | 1.52 | 1.75 | 1.48 |
| HRNFPS | 0.36 | 0.47 | 0.73 | 0.44 | 0.67 | 0.81 | 0.79 |
| HRNFSS | 2.86 | 2.98 | 3.34 | 2.94 | 3.19 | 3.35 | 3.28 |
| HRSECP | 4.46 | 4.56 | 4.85 | 4.53 | 4.71 | 4.73 | 5.11 |
| **HUBFPL** | -0.37 | -0.26 | -0.05 | -0.29 | -0.06 | 0.0 | 0.30 |
| **HUFBPL** | 0.37 | 0.48 | 0.69 | 0.43 | 0.69 | 0.73 | 1.05 |
| HUNOED | 0.06 | 0.16 | 0.43 | 0.14 | 0.32 | 0.39 | 0.49 |
| HUNFPS | 1.38 | 1.48 | 1.86 | 1.47 | 1.63 | 1.67 | 1.82 |
| HUNFSS | 4.91 | 5.00 | 5.49 | 5.02 | 5.16 | 5.15 | 5.53 |
| HUSECP | 5.79 | 5.86 | 6.36 | 5.91 | 5.99 | 6.00 | 6.22 |
| TOTAL | 2.67 | 2.78 | 3.15 | 2.76 | 2.98 | 3.09 | 3.14 |

HRBFPL: Rural (below food poverty line), HRFBPL: Rural (between food and basic needs poverty lines), HRNOED: Rural (non-poor – head with no education), HRNFPS: Rural (non-poor – head not finished primary school), HRNFSS: Rural (non-poor – head not finished secondary school), HRSECP: Rural (non-poor – head finished secondary school), HUBFPL: Urban (below food poverty line), HUFBPL: Urban (between food and basic needs poverty lines), HUNOED: Urban (non-poor – head with no education), HUNFPS: Urban (non-poor – head not finished primary school), HUNFSS: Urban (non-poor – head not finished secondary school), HUSECP: Urban (non-poor – head finished secondary school)

## 4.4 Public spending - education and HIV/AIDS scenarios

Composition of public spending is a key issue when discussing growth and poverty. In this section we look at the impact of government policies on long-run growth and poverty in Tanzania. In particular, the focus is at the impact of increased public spending on education and HIV/AIDS treatment.

### 4.4.1 Education scenario

Even if most indicators in education have registered improvement as a result of implementing the Primary Education Development Programme (PEDP), the pace of transition to secondary schools is low. There are also large gender disparities in enrolment at secondary and tertiary levels. Public spending on education is expected to increase further. ESRF (2004) estimated that it will cost around USD 500 million per year during 2005-2015 to reach the Millennium educational goal. If this is additional resource required, this would be equivalent to twice the current budgetary resources targeted to the education sector.

Four different educational scenarios are explored in this section. In the first scenario increased spending is non-financed. The second scenario assumes that additional spending is financed by increased taxes. The third is financed by foreign aid. In addition, the fourth scenario looks at the outcome of a larger productivity impact following increased spending on education. In all scenarios government spending on education is almost doubled, the annual average growth of real government expenditures 5.4 percent (compared to 3.0% in the baseline scenario).

Increased spending has a positive impact on productivity growth. The results from the two Education scenarios are shown in Tables 4.11 and 4.12. Both scenarios lead to a moderate acceleration in GDP growth.

Table 4.11: Sectoral growth rates and contribution to GDP

| | Base | Educ1 | Educ-t | Educ-f | Educ2 |
|---|---|---|---|---|---|
| Agriculture | 5.4 | 5.7 | 5.7 | 5.7 | 5.9 |
| Mining | 15.5 | 15.1 | 15.9 | 14.7 | 15.9 |
| Industry | 6.7 | 6.9 | 7.1 | 7.3 | 7.3 |
| Public service | 4.0 | 6.0 | 6.0 | 6.0 | 6.1 |
| Private service | 6.3 | 6.5 | 6.7 | 6.7 | 6.9 |
| GDP | 6.02 | 6.38 | 6.46 | 6.49 | 6.68 |
| Factor use | 4.03 | 3.70 | 3.98 | 4.08 | 3.95 |
| TFP | 2.00 | 2.67 | 2.48 | 2.40 | 2.73 |

Note:
Educ1: Increase education spending
Educ-t: Increase education spending with flexible direct tax rate
Educ-f: Increase education spending financed with foreign aid
Educ2: Increase education spending with higher TFP elasticity with respect to education

There is a slight increase in aggregate household consumption, and the aid-financed scenario show the largest impact. The aid-financed scenario also seems to be the scenario benefiting poorer households (Table 4.12).

Table 4.12: Household impact of educational scenarios

| | Base growth path | Educ1 | Educ-t | Educ-f | Educ2 |
|---|---|---|---|---|---|
| **HRBFPL** | 0.12 | 0.63 | 0.32 | 0.56 | 0.65 |
| **HRFBPL** | 2.12 | 2.36 | 2.31 | 2.58 | 2.64 |
| HRNOED | 1.18 | 1.42 | 1.32 | 1.55 | 1.64 |
| HRNFPS | 0.36 | 0.84 | 0.53 | 0.78 | 0.84 |
| HRNFSS | 2.86 | 3.05 | 3.03 | 3.34 | 3.32 |
| HRSECP | 4.46 | 5.21 | 4.80 | 5.18 | 5.00 |
| **HUBFPL** | -0.37 | 0.04 | -0.17 | 0.14 | 0.09 |
| **HUFBPL** | 0.37 | 0.94 | 0.56 | 0.87 | 0.83 |
| HUNOED | 0.06 | 0.56 | 0.20 | 0.43 | 0.48 |
| HUNFPS | 1.38 | 1.87 | 1.54 | 1.79 | 1.82 |
| HUNFSS | 4.91 | 5.02 | 5.04 | 5.44 | 5.27 |
| HUSECP | 5.79 | 6.20 | 6.20 | 6.59 | 6.35 |
| TOTAL | 2.67 | 2.98 | 2.87 | 3.19 | 3.14 |

Note:
Educ1: Increase education spending
Educ-t: Increase education spending with flexible direct tax rate
Educ-f: Increase education spending financed with foreign aid
Educ2: Increase education spending with higher TFP elasticity with respect to education

### 4.4.2 HIV/AIDS

Increases in HIV and AIDS prevalence undermine the foundations of development and attainment of the Millennium Development Goals and national targets. As a final application three different scenarios is undertaken in order to analyse the macro- as well household impact of HIV/AIDS treatment. Introducing HIV/AIDS into the modelling framework raises a number of questions but the immediate and rather straightforward application would be to focus on the labour market. Arndt and Wobst (2002) provide a static analysis on the impact of HIV/AIDS in the Tanzanian economy and argue that in the absence of HIV/AIDS the labour force would have been more skilled, HIV/AIDS lower skill accumulation.

Table 4.13: Derived Cost of AIDS Treatment Program

| | | |
|---|---|---|
| Total population | 34,600,00 | Amani et al. (2004) |
| Adult share of population (%) | 56% | Household Budget Survey 2001 |
| Adult population | 19,040,000 | |
| Per capita cost of ARV (Tsh) | 480,000 | ESRF 2003 |
| Infection rate (%) | 9,6% | ESRF 2003 |
| Number of adult infections | 1,827,480 | |
| Total cost of ARV treatment (Tsh million) | 877,363 | |
| Health budget 2001/2002 (Tsh. Million) | 97,800 | Economic Survey 2003 |
| Treatment costs as percentage of health budget (total budget) | 897% (52%) | |
| Share of infections to be treated (%) | 30% | |
| Total cost of treatment (Tsh billion) | 263,209 | |
| Treatment costs as percentage of health budget (total budget) | 269% (16%) | |

The main calculation necessary for the AIDS simulations is the estimation of the total cost of the government treatment programs. Here we only consider the cost of Antiretroviral Therapy. Using information from various sources we estimate the amount of additional resources required for ARV treatment. The estimated cost of treatment is nine times the health budget or half of the total government budget. Still with an assumption of an 30% coverage the costs would be around 50% of the total budget (in 2001). The underlying assumptions in the analysis is that the impact of a HIV/AIDS treatment program will increase population, labour force, and total factor productivity (TFP) growth rates.

Table 4.14: Sectoral growth rates and contribution to GDP

| | Base | Anti-aids | Antiaids-t | Anti-aids-f |
|---|---|---|---|---|
| Agriculture | 5.4 | 5.5 | 5.6 | 5.6 |
| Mining | 15.5 | 8.1 | 8.3 | 8.2 |
| Industry | 6.7 | 6.7 | 6.8 | 6.9 |
| Public service | 4.0 | 5.3 | 5.3 | 5.3 |
| Private service | 6.3 | 6.6 | 6.7 | 6.7 |
| GDP | 6.0 | 6.1 | 6.2 | 6.2 |
| Factor use | 4.0 | 3.7 | 4.0 | 4.0 |
| TFP | 2.0 | 2.3 | 2.2 | 2.2 |

Note:
Anti-aids: Anti-aids policy scenario
Anti-aids-t: Anti-aids policy scenario, tax financed
Anti-aids-f: Anti-aids policy scenario, aid financed

Table 4.15: Household impact of HIV/AIDS treatment

| | Base growth path | Anti-aids | Antiaids-t | Anti-aids-f |
|---|---|---|---|---|
| **HRBFPL** | 0.12 | 0.36 | 0.22 | 0.31 |
| **HRFBPL** | 2.12 | 2.08 | 2.16 | 2.26 |
| HRNOED | 1.18 | 1.09 | 1.15 | 1.23 |
| HRNFPS | 0.36 | 0.63 | 0.51 | 0.60 |
| HRNFSS | 2.86 | 2.89 | 3.01 | 3.12 |
| HRSECP | 4.46 | 4.99 | 4.75 | 4.89 |
| **HUBFPL** | -0.37 | -0.14 | -0.18 | -0.07 |
| **HUFBPL** | 0.37 | 0.69 | 0.50 | 0.61 |
| HUNOED | 0.06 | 0.35 | 0.17 | 0.25 |
| HUNFPS | 1.38 | 1.72 | 1.58 | 1.67 |
| HUNFSS | 4.91 | 4.96 | 5.13 | 5.28 |
| HUSECP | 5.79 | 6.18 | 6.34 | 6.48 |
| TOTAL | 2.67 | 2.82 | 2.86 | 2.97 |

Note:
Anti-aids: Anti-aids policy scenario
Anti-aids: Anti-aids policy scenario, tax financed
Anti-aids: Anti-aids policy scenario, aid financed

The impact of a HIV/AIDS treatment scenario increases GDP growth slightly and again the largest increase is when the program is financed by aid. The impact is, however, not that large and part of the reason is that population growth is increasing counteracting the gains in productivity from a more healthy population. The additional inflows of aid does appreciate the real exchange rate but rather modest and as the additional aid is financing a program which boosts productivity (as is also the case in the education scenario) the Dutch disease effects are modest.

## Conclusions

The Tanzanian government has outlined a comprehensive strategy to tackle poverty and other development problems. One of the key objectives of the poverty reduction strategy is to promote accelerated and equitable growth. In order to achieve the Millennium goal of reducing poverty by half, an appropriate agricultural development strategy continues to be among Tanzania's main development challenges. There has been some concern that the recent surge in economic growth has not benefited the poor as much as the non-poor.

In the static multiplier analysis we found that the agriculture sector followed by public administration, building & construction and manufacturing has the largest impact on employment. From a poverty perspective the agriculture sector has the highest multiplier. Interesting though from a gender perspective, the highest male labour multiplier is in building & construction followed by public administration while for female labour it is highest in agriculture followed by public administration. Thus, employment generation in the agricultural sector would benefit women more than men.

A more detailed analysis of the agricultural sector shows that there are differences between male and female labour demand depending on where the expansion occur. Increased production of beans, cereals and sugar has the largest impact on female employment while men benefits most from production increases in fishing, wheat and cashew-nuts. However, from a poverty perspective the largest multiplier can be found in sugar, tea, fishing, cashew-nuts, sisal, cereals, oil-seeds and livestock in that order. Looking at the total employment multiplier shows that cashew-nuts, fishing, sugar, livestock and cereals generates more employment given a certain increase in production.

Introducing general equilibrium features into our analysis a balanced development strategy seems to be the most appropriate. Agricultural support policies can be an important element towards agricultural and overall economic growth and development and, however, a policy supporting the agriculture sector has focus on a broad package of reforms also in the non-agricultural sectors. Higher incomes and increased demand of agricultural products from urban areas is important as they increase demand and counteract falling prices when productivity increases in the agriculture sector.

In the longer term is it possible to achieve the ambitious targets of reducing poverty by half. Yes, if GDP growth can be sustained at an annual average of 6% up to 2010 the target of 24 percent (for basic needs) by 2010 is possible. The best outcome in terms of poverty reduction seems to be a strategy focusing where productivity gains can be achieved in the staple-food sectors. Moreover, from a gender perspective supporting staple-food sector seems to be the best alternative. Urban poverty is also reduced by an agricultural-led strategy. Even it is possible to achieve the poverty target all growth scenarios see a worsening distribution of incomes. The staple-crop scenario seems to be the scenario where income distribution is worsening less than the others. This is the case both for male and female-headed households as well as the rural region.

Looking at additional productivity changes in the economy growth would be faster in the industrial sector compared to other sectors. However, poverty reduction will be faster in agriculture despite lower GDP growth. Although the growth impact is less a more equal distribution leads to a faster reduction in poverty.

Since the 1990s the change in poverty conceals large regional differences in levels of poverty. Projecting growth and poverty at regional level show that a strategy

supporting staple-food crops would reduce poverty in most cases across the different regions. Still it is only four regions (Kilimanjaro, Tanga, Iringa and Tabora) in which poverty is reduced by half. Interestingly, even if poverty in Dar es Salaam has fallen dramatically since the early 1990s the projections show a modest decline.

In the final section of the report two cases of increased spending are discussed. Increased public spending on education leads to a moderate acceleration in GDP growth. A scenario where additional spending in the sector is financed by foreign aid has the largest impact. The aid-financed scenario also seems to benefit the poorer households more. The impact of a HIV/AIDS treatment scenario increases GDP growth slightly and again the largest increase is when the program is financed by aid. The impact is, however, not that large and part of the reason is that population growth is increasing counteracting the gains in productivity from a more healthy population. The additional inflows of aid appreciate the exchange rate but as the additional aid is financing a program which boosts productivity the Dutch disease effects are modest.

This report has discussed a number of policy issues and the interaction between public spending, growth and poverty reduction, which touch upon briefly, needs to be developed further. A major advantage with the modelling framework used in this report is that it can be used as a monitoring device, not only in monitoring the actual poverty reducing strategy but also evaluate alternative strategies. In order to further improve the modelling framework additional work is required to track the actual changes in more details. In particular to include more detailed accounts on public spending. Detailed accounts on public spending and aid-flows would allow a more careful treatment of the impact of foreign aid on growth and poverty reduction. Finally, the discussion touched upon the impact of growth on poverty in different regions in Tanzania. As regional issues are becoming more important the analysis could be substantially improved if the current SAM is developed to include a regional dimension.

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**Appendix 1:** SAM Account Descriptions

| Group | Account | Description |
|---|---|---|
| Agricultural Sectors (Activities) | AMAIZE | Growing of maize |
| | APADDY | Growing of paddy |
| | ASORGH | Growing of sorghum or millets |
| | AWHEAT | Growing of wheat |
| | ABEANS | Growing of beans |
| | ACASSA | Growing of cassava |
| | ACEREA | Growing of other cereals |
| | AOILSE | Growing of oil seeds |
| | AROOTS | Growing of other roots and tubes |
| | ACOTTO | Growing of cotton |
| | ACOFFE | Growing of coffee |
| | ATOBAC | Growing of tobacco |
| | ATEAGR | Growing of tea |
| | ACASHE | Growing of cashew nuts |
| | ASISAL | Growing of sisal fiber |
| | ASUGAR | Growing of sugar |
| | AOFRVE | Growing of fruits and vegetables |
| | AOCROP | Growing of other crops |
| | ALIVES | Operation of poultry and livestock |
| | AFISHI | Fishing and fish farms |
| | AHUFOR | Hunting and forestry |
| Non-agricultural Sectors (Activities) | AMININ | Mining and quarrying |
| | AMEATD | Processing of meat and dairy products |
| | AGRAIN | Grain milling |
| | APFOOD | Processed food |
| | ABEVER | Beverages and tobacco products |
| | ACLOTH | Textile and leather products |
| | AWOODP | Wood paper printing |
| | ACHEMI | Manufacture of basic and industrial chemicals |
| | AFERTI | Manufacture of fertilizers and pesticides |
| | APETRO | Petroleum refineries |
| | ARUPLA | Rubber, plastic, and other manufacturing |
| | AGLASS | Glass and cement |
| | AMETAL | Iron, steel, and metal products |
| | AEQUIP | Manufacture all equipment |
| Non-agricultural Sectors (Activities) | AUTILI | Utilities |
| | ACONST | Construction |
| | ATRADE | Wholesale and retail trade |
| | AHOTEL | Hotels and restaurants |
| | ATRANS | Transport and communication |
| | AESTAT | Real estate |
| | AADMIN | Public administration, health, and education |
| | APRIVS | Business and other services |
| Agricultural | CMAIZE | Maize |

Appendix continued: Micro SAM Account Descriptions

| | | |
|---|---|---|
| Factors | FSUB | Subsistence Factor |
| | LCHILD | Child labor (age 10 to 14) |
| | LNONF | Female labor (no formal education) |
| | LNFPF | Female labor (not finished primary school) |
| | LNFSF | Female labor (not finished secondary school) |
| | LSECF | Female labor (secondary or higher education) |
| | LNONM | Male labor (no formal education) |
| | LNFPM | Male labor (not finished primary school) |
| | LNFSM | Male labor (not finished secondary school) |
| | LSECM | Male labor (secondary or higher education) |

| | | |
|---|---|---|
| | CAPAG | Agricultural capital |
| | CAPNAG | Non-agricultural capital |
| | LAND | Agricultural land |
| Households | HRBFPL | Rural (below food poverty line) |
| | HRFBPL | Rural (between food and basic needs poverty lines) |
| | HRNOED | Rural (non-poor – head with no education) |
| | HRNFPS | Rural (non-poor – head not finished primary school) |
| | HRNFSS | Rural (non-poor – head not finished secondary school) |
| | HRSECP | Rural (non-poor – head finished secondary school) |
| | HUBFPL | Urban (below food poverty line) |
| | HUFBPL | Urban (between food and basic needs poverty lines) |
| | HUNOED | Urban (non-poor – head with no education) |
| | HUNFPS | Urban (non-poor – head not finished primary school) |
| | HUNFSS | Urban (non-poor – head not finished secondary school) |
| | HUSECP | Urban (non-poor – head finished secondary school) |
| Taxes | DIRTAX | Direct taxes on domestic institutions |
| | IMPTAX | Import tariffs |
| | EXPTAX | Export taxes |
| | ACTTAX | Value added or activity taxes |
| | INDTAX | Indirect or sales taxes |
| | FACTAX | Factor taxes |
| Other Institutional Accounts | GOV | Government |
| | ROW | Rest of world |
| | S-I | Savings and investment |

*Source*: Thurlow. J., and Wobst P., 2003

**Appendix 2: SAM-based analysis**

In a SAM, total output in the economy equals total demand. as shown by the following identity:

$$Y_n = A_n Y_n + x \qquad (1)$$

Where $Y_n$ equals a vector of total output. $A_n Y_n$ equals the sum of endogenous demands. and $x$ equals exogenous demands. The average expenditure propensities or coefficients matrix $A_n$ represents the endogenous production, value-added, and household expenditures as shares of total expenditure, which are obtained by dividing all element in each of the endogenous accounts by the total income for the column account in which the element occurs (column coefficients).

The exogenous accounts are government, the capital account, and domestic and foreign trade. The impact of a change (shock) in exogenous demand on total output in the economy can be determined by solving equation (1) to accounting for all changes in endogenous demand resulting from the exogenous change.

Equations (1) states that the row sums of the endogenous accounts can be obtained by multiplying the average expenditure propensities for each row by the corresponding column sum and adding exogenous income $x$.

Equation (1) can be re-written as.

$$\begin{aligned} Y_n &= (I - A_n)^{-1} x \\ &= M_a x \end{aligned} \qquad (2)$$

From equation (2). $Y_n$ (i.e. production activity income. factor incomes and institutional incomes) can be derived by multiplying injections $x$ by a multiplier matrix $M_a$. Matrix $M_a$ is referred to as the accounting multiplier matrix because it explains the results obtained in a SAM and not the process by which they are generated (Defourny and Thorbecke 1994:114. Thorbecke and Babcock 2000:19).

The matrix $M_a$ therefore represents the induced change in the endogenous production, value-added (factor incomes) and household expenditure resulting from a unitary change in exogenous demand. Each sectoral multiplier ($m_{ij}$) represents the induced income flow to account $i$ for services performed for account $j$, as a result of one unit of exogenous expenditure placed on sector $j$. If the change in exogenous demand (whether from investment demand. a government policy. or export demand) is for goods, the multiplier is a production multiplier. If the exogenous flow is directed to a household, the multiplier is an income transfer multiplier[12].

Thus, the multiplier matrix $M_a$ shows the direct and indirect effects that ripple through the economy as a result of an exogenous change. The direct multipliers lie along the diagonal of $M$, while indirect multipliers are given in the off-diagonal of $M$. An increase in

[12] Vogel 1994:140

demand for a particular sector's output for instance creates additional demand for intermediate goods produced by other firms. In turn, these other firms pay their workers additional wages to produce these goods—and the workers, as consumers, spend their additional income on goods and services Golan et. al (2000).

The *direct effects are* therefore changes in economic activity during the first round of spending. This involves the impacts on the industries themselves. The secondary effects caused by the exogenous change in demand constitute two types of changes i.e. the *indirect effects* and *induced effects*. The *indirect effects* are the changes in sales, income, or employment within the economy in backward-linked industries supplying goods and services to businesses. For example, the increased sales in agricultural inputs supply firms resulting from more agricultural products sales are an indirect effect of spending. The *induced effects* are the increased sales within the economy from household spending of the income earned in supporting industries. Employees spend the income they earn on housing, utilities, groceries, and other consumer goods and services. This generates sales, income, and employment throughout the country's economy.

The SAM multipliers can therefore be put into three main categories. i.e. the production or output multipliers, the employment multipliers and income multipliers. The production multiplier shows how much more output is produced because of change in exogenous demand. The employment multiplier, shows how much more employment is associated with the demand-induced increase in production. The income multiplier, shows how much more people are earning through the additional jobs and production increases induced by the increase in exogenous demand

Appendix 3: Structural Path Analysis

Using a topology language, the theory of structural path multiplier is described. Take every endogenous account in SAM as pole and the link between any two poles is represented by arc $(i, j)$. Then we can define the element ($a_{ij}$) in the average expenditure propensity matrix $_nA$ as the intensity of arc $(i, j)$ which reflects the magnitude of influence transmitted from pole $i$ to pole $j$. A sequence of consecutive arcs $(i,k)$ $(k,l),\bullet\bullet\bullet,(m, j)$ form a path and the number of arcs composing it is referred to as length of path. A path, which does not pass more than one time through the same pole. is called an elementary path. A path whose pole of origin coincides with its pole of destination is referred to as circuit. In Figure 3, the path $i \to x \to y \to j$ is an elementary path and $x \to y \to z$ is a circuit.

In structural path analysis. three kinds of influences between accounts are distinguished: direct influence. total influence and global influence.

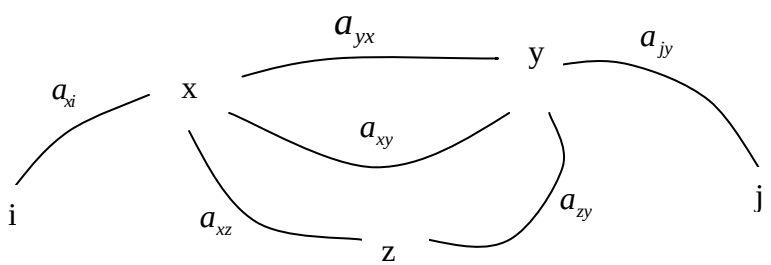
a. Direct Influence

Direct Influence refers to the influence transmitted through the elementary path. The direct influence of $i$ on $j$ transmitted through an elementary path is the change in income of $j$ induced by a unitary change in $i$, the income of all other poles except those along the selected elementary path remaining constant. In terms of numerical value, the direct influence of $i$ on $j$ is the intensity of arc $(i, j)$. i.e., the element $a_{ij}$ of the average expenditure propensity matrix $A_n$. Therefore, from the perspective of path analysis method, average expenditure propensity matrix is also called direct influence matrix. The direct influence transmitted from pole $i$ to pole $j$ of an elementary path whose two ends $i$ and $j$ passes more than two poles, is equal to the product of the intensities of the arcs constituting the path.

In figure 3, the direct influence caused by the elementary path $i \to x \to y \to j$ is

$$I^D_{i\to j} = a_{xi}a_{yx}a_{jy} \qquad (1)$$

**Figure 3: Structural Path Sketch Map**




b. The Total Influence

The total influence refers to the influence transmitted from origin to destination along the elementary path including all indirect effect within the structure imputable to the path. In other words the total influence cumulates the direct influence transmitted along the elementary path and the indirect effects induced by the circuits adjacent to that path.

In our diagram, the direct influence between pole $i$ and pole $j$ and pole j is $a_{xi}a_{yx}$. This influence transmits back to x through circuits $x \to y \to x$ and $x \to y \to z \to x$. The indirect influence is $a_{xi}a_{yx}(a_{xy} + a_{zy}a_{xz})$. (2)

This influence circulates continuously between pole $x$ and pole $y$ i.e.

$$a_{xi}a_{yx}\{1 + a_{yx}(a_{xy} + a_{zy}a_{xz}) + [a_{yx}(a_{xy} + a_{zy}a_{xz})]^2 + \cdots\} = a_{xi}a_{yx}[1 - a_{yx}(a_{xy} + a_{zy}a_{xz}]^{-1} \quad (3)$$

This influence is then transmitted to j through arc $(y, j)$.
The total influence resulted from the elementary path can therefore be expressed as follows

$$I^T_{(i \to j)} = a_{xi}a_{yx}a_{jy}[1 - a_{yx}(a_{xy} + a_{zy}a_{xz})]^{-1} \quad (4)$$

The first term on the right hand side of the above formula just represents the direct influence $I^D_{i \to j} = a_{xi}a_{yx}a_{jy}$ and the second term is defined as the path multiplier $M_p$, $M_p$ captures the extent to which the direct influence along the elementary path multiplier $M_p$ is amplified through adjacent feedback circuits. Thus, the total influence between two poles can be written in the form of the product of direct influence and path multiplier, that is:

$$I^T_{(i \to j)\,p = I^D_{(i \to j)\,p} M_p} \quad (5)$$

c. Global Influence

The global influence refers to the accounting multipliers. Global influence reflects the sum of all the total influence caused by various elementary paths between origin and destination. Therefore, suppose there are p elementary paths between the origin $i$ and the destination $j$, then the Global influence will be given by the following expression::

$$I^G_{i \to j} = m_{aji} = \sum_{p=1}^{n} I^D_{(i \to j)\,p} M_p \quad (6)$$