TECHNICAL CHANGE, MARKET INCENTIVES AND RURAL INCOMES: A CGE ANALYSIS OF UGANDA'S AGRICULTURE

Paul Dorosh[1], Moataz El-Said[2] and Hans Lofgren[2]

[1]Markets and Structural Studies Division, IFPRI
[2]Trade and Macroeconomics Division, IFPRI

ABSTRACT

In Uganda, as in much of sub-Saharan Africa, poverty is concentrated in rural areas. Because agriculture accounts for a large share of incomes for these households, policies and external shocks that affect agriculture, including shifts in world prices, changes in agricultural productivity, and reductions in marketing costs, may have significant effects on rural poverty. In this paper, we use a Computable General Equilibrium (CGE) model of the Ugandan economy, explicitly designed to capture regional variations in agricultural production and household incomes, to examine the implications of these policy changes and shocks.

Simulation results suggest that a doubling of area planted to coffee (the government's target) would increase rural consumption by less than 2.0 percent, because of an estimated 10 percent decline in the world price of robusta coffee and an 11.3 percent real exchange rate appreciation of the Ugandan shilling. Smaller productivity increases in food crops may have greater potential to raise rural incomes, provided that markets perform well and producer incentives are maintained. A five percent increase in agricultural productivity raises consumption by 1.3 to 2.1 percent among rural households and lowers food prices by 3.4 to 3.8 percent relative to the CPI, thus benefiting households with high food consumption shares. Reducing agricultural marketing margins by 30 percent leads to increases of 2.3 to 4.1 percent in consumption of farm households, with the largest gains in regions where consumption out of own production is lower.

INTRODUCTION

In Uganda, as in much of sub-Saharan Africa, poverty is concentrated in rural areas. 86 percent of the population lives in rural areas, and farm households comprise two-thirds of the population. Average monthly per capita household expenditures of these farm households was only 20 thousand Ugandan shillings (about $14) according to the 1999 Uganda Household Survey, about one-third the per capita household incomes of the urban population. Given the large share of agriculture in rural incomes, policies and external shocks that affect agriculture, including shifts in agricultural terms of trade, increased agricultural productivity, and reductions in marketing costs, may have significant effects on rural poverty.

Constraints to agricultural development vary sharply across regions because of marked differences in agro-ecologies, infrastructure, and cropping patterns (Pender et. al, 2001). Robusta coffee, grown mainly in the southeast of the country, remains the major export crop, but has suffered steep declines in export prices in recent years. Increases in production and quality are possible, but these may lead to lower export prices (You and Bolwig, 2002). Improved varieties of maize and cassava have enabled increases in food production that made significant contributions to poverty reduction, particularly in the northern regions (Mosley, 2002).[1] Without a marketing outlet for these crops, however, further increases in production may result in sharp declines in prices that reduce rural incomes.

1 Using various partial equilibrium approaches including calculations of income changes of adopter households, labor market effects, changes in consumer prices and off-farm linkages, as well as multi-market analysis, Mosley calculates that approximately one-tenth of the total 6 percentage point reduction in the poverty headcount index is due to technical change in maize and cassava (Mosely, 2002; p. 712.)

In this paper, we examine the impacts of alternative growth strategies in the agriculture sector, including expanding coffee production and improving quality, raising yields of food crops, and reducing marketing costs. Our analysis uses a Computable General Equilibrium (CGE) model of the Ugandan economy, explicitly focused on regional variations in agricultural production and household incomes. Section 2 of this paper presents a brief description of the Uganda economy, making use of the 1999 Uganda Social Accounting Matrix (SAM) that describes the economic flows involving production activities, household incomes, and consumption in a consistent framework. Section 3 describes the structure and equations of the computable general equilibrium model for Uganda[2] that explicitly takes into account key features of the Ugandan economy, including a high degree of own consumption of agricultural production and differences in cropping patterns across regions. Results from policy simulations are presented in Section 4; concluding observations are given in Chapter 5.

THE 1999 UGANDA SOCIAL ACCOUNTING MATRIX

The 1999 Uganda SAM was constructed using data on macro-economic aggregates, external trade flows and value added by sector from 1999, the 1999/2000 Uganda National Household Survey, and the 1992 input-output table (Uganda Bureau of Statistics, 1999, 2000; Government of Uganda, 2000; IMF, 1999). The SAM specifies 25 production activities, each producing a single unique commodity. Given the objective of examining the impact of various agricultural investments and policies on production, incomes, prices and consumption, the SAM has a more detailed treatment of agriculture. It includes twelve agricultural activities (coffee, other cash crops, maize, sorghum/millet, cassava, sweet potatoes, matooke (cooking bananas), horticulture, other agriculture, livestock, forestry, and fishing). Each of these agricultural is split into separate accounts for production in each of the six rural zones of the country. Seven industrial activities are included: meat and dairy processing, coffee processing, grain milling, other beverages, textiles and leather, manufacturing, and petroleum and chemicals). The service sector activities are utilities, construction, transport, private services, and public services. A 26th commodity, Agricultural Chemicals, is also included in the SAM, for which there is no domestic production activity; (commodity supply derives solely from imports).

The SAM includes nine factors of production: capital, skilled and unskilled labor, and six types of land, corresponding to the agro-climatic zones listed at the bottom of Table 1 as defined in Pender et. al. (2001), (p. 16).[3] Households are disaggregated into nine household groups. Urban households are split into poor and non-poor according to their 1999/2000 per capita household expenditures (based on the 1999/2000 National Household Survey), with poor households defined as the poorest 30 percent, approximately equal to the estimated percentage of poor households out of total urban households (28 percent) using data from the 1992 Integrated Household Survey (Appleton et. al., 1999). Rural farm households, (classified according to occupation of the head of household) are split according to the six agro-climatic zones listed above. Non-farm rural households form the last household group, accounting for 19.8 percent of total population.

Per capita incomes of farmer household groups range from 219.2 shillings/year for farm households in zone 5 (high potential unimodal rainfall, mainly in the Eastern highlands) to 352.2 thousand shillings/year for farmers in zone 3 (low potential bimodal rainfall in the southwest). Per capita incomes of the urban non-poor (968.1 thousand shillings/year) are 4.4 times higher than those of the poorest farmer household group (Zone 5).

MODEL STRUCTURE

This analysis is based on the neo-classical structuralist CGE model of Lofgren et. al. (2001), with closure rules and model parameters set to reflect behavior of the Uganda economy.[4] Production technology is represented by a constant elasticity of substitution (CES) production function in primary factors.

---

2 The model is developed from the IFPRI standard CGE model (Lofgren et al., 2001).

3 Zone 6 comprises two zones from Pender et. al. (2001): the medium- and low-potential, unimodal, rainfall regions at moderate elevation in northern Uganda.

4 A detailed description of the general model can be found in Lofgren et al. (2001). This class of models has developed from the neoclassical modeling tradition presented in Dervis, de Melo and Robinson (1982).

These factors are combined with fixed-share intermediates using a Leontief specification. Producers are assumed to maximize profits, with primary factors of production paid according to the value of their marginal products.

Imported goods are modeled as imperfect substitutes for domestically produced commodities, using a Constant Elasticity of Substitution (CES) Armington specification (both in final and intermediates usage). Similarly, we assume imperfect transformability between exported commodities and home goods (goods both domestically produced and consumed) using a constant elasticity of transformation (CET) function. World prices of export and import goods are assumed to be exogenous.

In addition to the nine representative households discussed above, two other domestic institutions (enterprises and the government) are modeled. Households and enterprises receive income in payment for producers' use of their factors of production, pay direct taxes to government (based on fixed tax rates) and save. Enterprises pay their remaining income (dividends) to households and the rest of the world are exogenous. Government revenues derive from tax receipts (sales taxes, direct taxes and import tariffs) and transfers. Government consumption is fixed in real terms.

In the simulations in this paper, total investment and foreign savings (in foreign currency) are constant.[5] Savings rates of households adjust to balance total savings and investment. The consumer price index is fixed, acting as the numéraire of the model. Thus, the nominal exchange rate (which is here also a measure of the real exchange rate since the domestic price level is fixed) adjusts to bring about equilibrium in the foreign exchange market.

The simulations assume fixed total supplies of land and labor, with flexible wages (and land rents). This closure is designed to capture tight labor constraints in agricultural production. apital stock in each activity is fixed in these short-run simulations. We also conducted sensitivity analysis with an alternative labor market closure with perfectly elastic labor supplies and fixed real wages. Elasticities of substitution between land and labor in production activities were set so as to model relatively inelastic implicit partial equilibrium own-price elasticities of supply of 0.1 for coffee, 0.2 for other export crops and 0.3 for other agricultural crops. Similarly, parameters of the linear expenditure system (LES) used to model consumer demand are set to give own-price elasticities equal to –0.6 for the urban non-poor and –0.3 for all other households.[6]

SIMULATION RESULTS

Uganda's coffee export revenues have declined steeply in recent years, as world coffee prices have plummeted. The average price of Uganda's robusta coffee exports, (which accounted for 74 percent of coffee exports in 1998/99) fell by 60.8 percent from 1998/99 to 2000/01. Similarly, the price of arabica coffee, fell by 44.6 percent. Nonetheless, programs to increase the volume and quality of coffee exports of robusta coffee cultivated in southern Uganda (zones 1-4) and arabica coffee (cultivated only in zone 2 and the northern zones 5 and 6) are a major thrust of Uganda's rural development strategy.

In simulation 1, we model the effects of a 60 percent decline in the world price of coffee (both robusta and arabica), along with a 20 percent decline in coffee production, (approximating the actual robusta export price and quantity change in from 1998/99 to 2000/01.)[7] Coffee exports fall by 68.3 percent in dollar terms, reducing real incomes and consumption demand, and leading to a decrease in the price of non-traded goods (most agricultural crops) relative to traded goods (industrial products), (Table 2). The real exchange rate depreciates by 11.3 percent, reducing import demand, but increasing incentives for non-coffee exports. Real producer prices of most crops fall (relative to the CPI) by 4.0 to 5.0 percent. Among agricultural crops, value added of other cash crops, maize, and other agriculture (relatively more tradable agricultural sectors) increases; value added of other crop sectors falls by 0.5 to 3.9 percent.

5 Other model closures are also possible, and are described in detail in Lofgren et. al. (2001).
6 See Appendix Table 1 for values of selected other parameters.
7 In this simulation, we reduce coffee production in each zone by 20 percent, allowing the rates of return to labor in coffee production in each region to vary from the average rates of return to labor by endogenizing the *wdist* parameter.

Real incomes of farmers fall in all agricultural zones, with the largest declines in major coffee producing zones (7.9 percent in the Lake Victoria region), but with a –2.9 percent decline in the northern zone, as well, because of the fall in prices of non-traded food crops. Real consumption of the urban non-poor actually increases, however, as the real exchange rate depreciation tends to raise the producer prices and output of textiles and manufactured goods, leading to increased returns to capital and to skilled labor.

Simulation 2 models a doubling of area planted to coffee, a development goal of the Ugandan government, holding total area planted to other crops constant. Since Uganda is a major exporter of robusta coffee (with about 10 percent of the world market), we also model a decline in the world price of coffee (of 10 percent).[8] Although area cultivated doubles, coffee exports (in dollar terms) and production increase by only 66.9 and 84.9 percent, respectively, because the export increase leads to a real appreciation of the Ugandan shilling by 10.3 percent that exacerbates the effect of the 11 percent world price decline for coffee producers. In spite of the large gain in production, real incomes of farmers increase by only 0.2 to 1.9 percent, as tradable agricultural products suffer from the real exchange rate appreciation of lower prices, while production of non-tradable crops rise by only 0.5 to 0.6 percent. Incomes of the urban non-poor decline as total returns to skilled labor and capital fall along with the output of industrial sectors.

In simulation 3, total factor productivity of crop agriculture is increased by 5 percent. Production of most commodities increases by less than 5 percent however, as increased supply leads to declines in market prices. Market prices of maize, sorghum/millet, cassava, sweet potatoes and matooke and horticultural products all fall by about 3.2 to 3.6 percent, so that production increases are limited to 2.0 to 3.4 percent for these crops. Coffee production increases by 5.2 percent, however, as coffee prices, closely linked to world prices, fall by only 0.1 percent. (Compared to the base simulation, coffee production thus becomes relatively more profitable relative to the other crops and draws more labor resources for production.)

Real consumption among farmers rises by 1.2 to 2.1 percent; consumption of urban groups rises even more (2.4 to 2.7 percent) as these households benefit not only from reduced real prices of agricultural products, but also higher returns to capital. Returns to capital rise because increases in demand for non-agricultural commodities boost their prices by 1 to 3 percent. Thus, the gains in agricultural productivity have significant benefits for households throughout the economy.

Gains in total factor productivity of a single crop have much smaller impacts on incomes and consumption (Simulation 4). Increasing total factor productivity of maize only results in an increase in maize production by about 1.3 percent, but other commodities are affected only slightly. Given the inelastic supply and demand for maize, consumers reap most of the benefits of the productivity gain as maize consumer prices decline by 4.0 percent (and producer prices fall by 4.7 percent). Farm households consumption increases by 0.1 percent; consumption by the urban poor and non-poor increases by 0.2 and 0.3 percent, respectively.

Simulation 5 models a 30 percent reduction in all agricultural marketing margins (for both exports and domestic sales), implicitly brought about through investments in marketing infrastructure (roads, communications networks, storage facilities, etc.) or marketing institutions (e.g. trader associations and market information systems). The producer prices of all agricultural rise in real terms. Production rises in all sectors except commerce (which falls by 10.4 percent), transport, and public services.[9] Production of major food crops (maize, sorghum/millet, cassava, sweet potatoes, matooke) all rise between 1.7 and 2.1 percent. Value added in the fishing sub-sector, increases by 4.1 as its large marketing margins are reduced.

In this simulation, rural households gain while urban households lose. This is mainly because overall returns to land (including agricultural capital) contribute to income gains for farmers. Returns to capital and labor actually fall slightly in this scenario because of the large decline in value added in the commerce sector. Nonetheless, real consumption rises for all rural households, with the largest gains for farm households in zones 1, 3, and 6 (4.1, 3.8, and 3.8 percent respectively). For the urban non-poor, consumption declines by 0.9 percent. Given lower initial per-capital incomes and consumption in rural areas, over-all inequality declines in this scenario.

8 This decline in world prices is based on a price elasticity of world robusta coffee import demand of –1.0, following You and Bolwig (2002).

9 Production in the public services sector is exogenous.

CONCLUDING OBSERVATIONS

The model simulations presented in this paper highlight important linkages between the macro-economy, sectoral output, and household incomes and consumption in Uganda. The sharp decline in the world price of coffee has had wide-ranging effects, leading to a real exchange rate depreciation, discouraging production of non-tradable agriculture, but spurring production of industrial tradables (textiles and manufactured goods). Even with world coffee prices at their 1999 levels, however, a doubling of production would have relatively limited income effects, increasing average farm household consumption by less than 2.0 percent.

Broader increases in agricultural productivity and reductions in marketing costs have more potential to raise rural incomes in Uganda. A five percent increase in agricultural productivity could raise consumption by 1.2 to 2.1 percent among rural households. Price effects are important, as food prices fall by 3.2 to 3.6 percent relative to the CPI, benefiting urban households whose total consumption increases by 2.4 to 2.7 percent. The simulations of maize productivity increases further highlight the role of price effects and the importance of market outlets for crops. In this simulation, a 5 percent increase in productivity leads to only a 1.3 increase in production, as producer prices fall by 4.7 percent in real terms. Total consumption by farmer household groups rises by 0.1 percent or less. Major reductions in marketing costs, however, can significantly benefit rural producers and consumers. Reducing agricultural marketing margins by 30 percent leads to increases of 2.3 to 4.1 percent in real consumption of farmer households, with the largest gains in regions where consumption out of own production is lower. Productivity increases with reductions in marketing costs offer the highest potential for income gains, however, suggesting that agricultural growth has potential to significantly raise rural incomes in Uganda provided that markets perform well and producer incentives are maintained.

ACKNOWLEDGEMENTS

We wish to thank Weibo Li, Ephraim Nkonya, and Shahidur Rashid for their assistance with the Uganda household survey data; and John Pender and Sherman Robinson for helpful comments and suggestions.

REFERENCES

Appleton, Simon, with Tom Emwanu, Johnson Kagugube and James Muwonge (1999). *Changes in Poverty in Uganda*. Working Paper WPS/99.22. University of Oxford: Centre for the Study of African Economies.

Dervis, K., J. de Melo and S. Robinson (1982). *General Equilibrium Models for Development Policy*. New York: Cambridge University Press.

Government of Uganda (2000). *Background to the Budget 2000/01*. Kampala: Ministry of Finance, Planning and Economic Development.

International Monetary Fund (IMF) (1999). *Uganda: Selected Issues and Statistical Appendix*. IMF Staff Country Report No. 99/116. Washington D.C.: International Monetary Fund.

Löfgren, H., R.Harris, and S. Robinson with the assistance of M. Thomas and M. El-Said (2001). "A Standard CGE Model in GAMS." TMD Discussion Paper No. 75, International Food Policy Research Institute (IFPRI), Washington, D.C.

Mosely, Paul. (2002). "The African Green Revolution as a Pro-Poor Policy Instrument," Journal of International Development. 14: 695-724.

Pender, John, Pamela Jagger, Ephraim Nkonya, and Dick Sserunkuuma (2001). *Development Pathways and Land Management in Uganda: Causes and Implications*. EPTD Discussion Paper no. 85, International Food Policy Research Institute (IFPRI), Washington, D.C.

Uganda Bureau of Statistics (1999). *Uganda National Household Survey 1999*. Computer files. Kampala. (2000). *2000 Statistical Abstract*. Kampala.

You, Liangzhi and Simon Bolwig. (2002). Alternative Growth Scenarios for Uganda Coffee to 2020. International Food Policy Research Institute (mimeo).

Table 1. Uganda: Factor Shares of Agricultural Value Added, 1999 (percent)

	Coffee	Other Cash Crops	*Maize*	Sorghum	Cassava	Sweet Potatoes	Matooke	Horti-culture	Other Crops	Livestock	Forestry	Fishing	Total
Unskilled Labor	4.0	1.7	7.4	9.0	6.9	6.6	16.6	17.7	14.3	9.5	2.0	4.5	100.0
Skilled Labor													
Capital													
Land Zone 1	15.4	6.8	6.7	2.3	2.3	5.8	7.8	20.0	7.2	11.4	3.7	10.6	100.0
Land Zone 2	8.0	3.2	6.0	7.4	9.2	5.9	8.6	10.5	11.7	19.3	5.4	4.8	100.0
Land Zone 3	8.6	3.4	2.5	5.9	2.5	2.2	24.6	11.3	11.2	24.2	3.7	0.0	100.0
Land Zone 4	6.6	2.6	2.1	15.5	1.5	5.7	21.3	8.7	14.2	16.4	5.3	0.0	100.0
Land Zone 5	11.2	4.4	11.9	1.8	0.6	1.8	18.5	14.8	13.1	17.3	4.7	0.0	100.0
Land Zone 6	0.2	0.1	2.0	9.0	8.8	1.5	0.4	0.2	7.2	64.0	6.7	0.0	100.0
Total Value Added	6.7	2.8	6.3	7.6	5.8	5.6	14.0	15.1	12.1	16.1	3.3	4.6	100.0

Source: Uganda 1999 SAM.

Zone 1: High potential, bimodal rainfall, moderate elevation (Lake Victoria crescent)
Zone 2: Medium potential, bimodal rainfall, moderate elevation
Zone 3: Low potential, bimodal rainfall, moderate elevation (southwest Uganda)
Zone 4: High potential, bimodal rainfall, southwestern highlands
Zone 5: High Potential, unimodal rainfall, (mostly eastern highlands)
Zone 6: Low and medium potential, unimodal rainfall, moderate elevation (northern Uganda)

Table 2. Selected Results for Model Simulation.

	Population share	Base*	-1- 60% decrease in coffee export prices	-2- 100% increase in coffee land, 10% decrease in coffee export prices	-3- 5% increase in agriculture factor productivity	-4- 5% increase in maize factor productivity	-5- 30% decrease in agriculture marketing margins
			Percent change from base				
Household consumption**							
UrbanPoor	1.9	361.0	-2.1	3.2	2.4	0.2	0.0
Urban Non-Poor	11.3	933.7	2.2	-0.1	2.7	0.3	-0.9
Farmers Zone 1	17.3	371.7	-7.9	0.2	1.2	0.1	4.1
Farmers Zone 2	19.6	315.0	-5.0	1.5	1.6	0.1	3.1
Farmers Zone 3	8.2	374.8	-5.7	0.7	1.5	0.1	3.8
Farmers Zone 4	7.0	334.6	-4.4	1.6	2.1	0.1	2.3
Farmers Zone 5	3.2	330.5	-6.1	0.8	1.3	0.1	3.5
Farmers Zone 6	12.3	218.0	-2.9	1.9	1.7	0.1	3.8
Rural Non-Farm	19.2	368.0	-3.7	1.8	1.9	0.2	1.8
Total household consumption	100.0	400.6	-3.5	1.0	1.9	0.2	2.1
Real Absorption***	—	10,611.7	-2.6	0.7	1.4	0.1	1.6
Exports (dollar value)	—	1,064.2	-12.7	15.6	2.7	0.2	1.9
Coffee processing	—	446.0	-68.2	66.9	5.2	0.0	0.2
Agriculture	—	88.1	76.1	-41.6	12.4	2.2	9.1
Imports (dollar value)	—	2,593.7	-5.2	6.4	1.1	0.1	0.8
Value added	—	8,338.9	-0.3	1.9	1.7	0.1	-0.1
Agriculture	—	3,818.1	-1.5	4.5	2.8	0.2	1.9
Coffee	—	254.8	-20.0	84.9	5.2	0.0	0.2
Maize	—	238.3	2.0	-2.4	2.1	1.3	1.8
Exchange rate	—	100.0	11.3	-10.3	0.8	0.1	0.6

Source: Model Simulations

* In the base column, aggregate real indicators are measured at base-year (1999) values.

** The figures for household consumption in the base column show per capita income in thousand Ugandan shillings.

***Among the components of absorption, only household consumption (75% of base-year absorption) changes. Government consumption and investment (10% and 15% of base-year absorption, respectively) are fixed in real terms as part of the macro closure rule.

Appendix Table 1. Structure of the Economy, Uganda 1999

Sector	Output (X)	Value added (VA)	Exports (E)	Imports (M)	Export/ Output (E/X)	Import/ final demand (M/Q)	Elasticity CET	Elasticity Armington
Agriculture				(%)				
Coffee	2.56	3.06	–	–	–	–	–	–
Other Cash Crops	1.28	1.30	–	–	–	0.02	–	–
Maize	1.94	2.86	0.87	–	3.55	–	3.0	–
Sorghum/millet	2.36	3.48	–	–	–	–	–	–
Cassava	1.81	2.67	–	–	–	–	–	–
Sweet Potatoes	1.73	2.55	–	–	–	–	–	–
Matooke	4.35	6.41	–	–	–	–	–	–
Horticulture	4.68	6.89	1.21	–	1.72	–	3.0	–
Other agriculture	3.75	5.52	2.09	0.84	5.90	6.52	3.0	3.0
Livestock	5.03	7.34	–	0.13	–	0.54	–	3.0
Forestry	1.35	1.51	–	0.02	–	0.36	–	3.0
Fishing	1.73	2.20	4.11	0.01	15.87	0.22	3.0	3.0
Total	32.56	45.79	8.27	1.00				
Industry								
Meat and dairy	0.93	0.42	–	2.24	–	33.99	–	1.5
Coffee processing	3.13	0.33	41.92	–	98.43	1.89	2.5	–
Grain milling	0.59	0.26	–	0.67	–	19.60	–	1.5
Other beverages	8.38	4.73	8.36	1.85	6.86	4.86	2.5	1.5
Textiles and leather	0.94	0.59	0.46	9.22	3.33	68.47	2.5	1.5
Manufacturing	4.75	3.22	15.75	48.39	23.36	75.28	2.5	1.5
Agric. chemicals	–	–	–	1.37	–	100.00	–	1.5
Petroleum and	1.00	0.44	–	20.07	–	84.61	–	1.5
Total	19.73	9.98	66.48	83.82				
Services								
Utility	1.05	1.31	1.81	0.18	14.46	4.21	2.5	1.5
Construction	10.52	8.00	–	0.17	–	0.34	–	1.5
Trade	10.60	12.24	–	0.69	–	1.39	–	1.5
Transportation	7.56	4.95	8.31	6.73	9.16	17.50	2.5	1.5
Private services	12.32	13.94	15.12	7.41	10.23	12.67	2.5	1.5
Public services	5.66	3.79	–	–	–	–	–	–
Total	47.71	44.23	25.24	15.18				
Total	100.0	100.0	100.0	100.0				
Agriculture	33.65	44.44	6.87	1.01				
Non-agriculture	66.35	55.56	93.13	98.99				

Source: Uganda 1999 SAM.