



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

MODELLING THE LESOTHO ECONOMY: A SOCIAL ACCOUNTING MATRIX APPROACH¹

Yonas Tesfamariam Bahta

University of the Free State, Department of Agricultural Economics

Bloemfontein 9300, South Africa, E-mail: Yonas204@yahoo.com

Abstract

Using a 2000 Social Accounting Matrix (SAM) for Lesotho, this paper investigates the key features of the Lesotho economy and the role played by the agricultural sector. A novel feature of the SAM is the elaborate disaggregation of the agricultural sector into finer subcategories. The fundamental importance of agriculture development emerges clearly from a descriptive review and from SAM multiplier analysis. It is dominant with respect to income generation and value of production. It contributes 23 percent of gross domestic product and 12 percent of the total value of production. It employs 26 percent of labour and 24 percent of capital. The construction sector has the highest open SAM output multiplier (1,588) and SAM output multiplier (1.767). The household multipliers indicate that in the rural and urban areas, agriculture and mining respectively generate most household income. Agriculture has the highest employment coefficient. Agriculture and mining sectors also have the largest employment multipliers in Lesotho.

Key Words: SAM, Lesotho economy, Agricultural sector, Multiplier analysis

1. Introduction

Lesotho is a small Southern African country covering about 30 000 square kilometers, completely landlocked and uniquely surrounded by only one country, namely the Republic of South Africa. According to government sources, the country's population was approximately 2.2 million in 2000, including about 100 000 migrants working mostly in the South African mining industry (UNDP, 2000). Lesotho is a poor country in the sense that more than half of the population lives below the poverty line. Based on an absolute poverty line equivalent to the international threshold of 2200 kilogram calories needed for a healthy and active life, Chandra et al. (2002) reported that approximately 58 per cent of the population could be classified as poor in 1986. This proportion was virtually unchanged in 1994 (Nganou, 2004).

According to Van Schalkwyk and Jooste (2002), Lesotho imports up to 95 per cent of its domestic food requirements. This indicates that domestic agricultural production has not been sufficient to contribute meaningfully to food security. The potential for development in the agricultural sector is small, as only 13 per cent of Lesotho's land is arable. Agriculture is however an important economic sector. Up to 80 per cent of the population live in rural areas, 60 per cent work in this sector, 50 per cent derive their livelihood off the land, and agriculture is the largest contributor to gross domestic product (GDP). The government has instituted a series of market-oriented reforms to encourage

¹ Some part of this article is derived from PhD thesis of 'The potential impact of trade on the economy of lesotho (2007).'

private sector investment in agriculture. The main crops are maize and wheat, although there has been a move towards diversifying into high value, high yield crops. Lesotho is currently exporting quality asparagus, peaches, and strawberries. Livestock production is a substantial contributor to rural income. Much of Lesotho's terrain is suited only for animal production. Cattle, wool and mohair are the major exports of this sector.

Remittances from Lesotho citizens working on particularly gold mines in South Africa have for long been a major source of sustenance for many families. Large reductions in gold mine employment of Lesotho citizens brought the realization that Lesotho must increasingly look internally for solutions of its economic problems. It is widely accepted that Lesotho agriculture underperforms in production and that marketing structures for agricultural products are underdeveloped (Integrated Framework, 2003).

Lesotho's macroeconomic policy is circumscribed because of its membership in the Common Monetary Area (CMA). Under CMA, currencies are pegged at parity with the South African Rand. This largely eliminates monetary policy autonomy. Fiscal policy is thus the main macroeconomic policy instrument at Lesotho's disposal (Integrated Framework, 2003). Neither can Lesotho, as a member of the Southern African Custom Union (SACU), be independent in terms of trade policy. SACU members use a Common External Tariff (CET), determined by a separate Tariff Setting Board for products imported from outside (Integrated Framework, 2003). The country's investment climate offers some attractive features, such as some favourable regulations and a relatively stable democracy. The country has gone through a veritable economic boom, largely driven by foreign investments in the massive Lesotho Highlands Water Project (LHWP), a surge in export manufactures and receipts from the Southern African Custom Union (UNDP, 2000; Integrated Framework, 2003).

The agricultural sector provides jobs and income for Lesotho's citizens and tax revenue for the government in the process of producing and delivering agricultural output. The impacts transcend the agriculture sector because of system linkages, including upstream and downstream activities, which affect the economy, as well. This creates additional jobs and income which set in motion further production with additional benefits to the rest of the economy. This is known as the economic multiplier effect and it takes into account all the effects of spending and income working through a complex chain of market activity. There have been a variety of techniques developed to model such interlinkages in an economy.

The most widely used have been sectoral multiplier effects estimated through input-output (IO) analysis and related models like the social accounting matrix (SAM) and computable general equilibrium (CGE). The advantage of these models is that they calculate not just the direct effects but also the general equilibrium effects to give a more detailed view of an intervention. This paper provides estimates of the agricultural sector's economic impact based on a detailed SAM of Lesotho. The SAM is benchmarked to the year 2000. The methodological approach relies partly on a descriptive analysis grounded in this SAM and a series of multipliers derived from the SAM and a structural decomposition of these. This type of analysis should be useful in the choice of appropriate development strategy for the Lesotho economy.

2. Methodology

A SAM is a single entry accounting system whereby each macroeconomic account is represented by a column for outgoings and a row for incomings (Round, 1981). Taylor (1983) views a SAM as a tabular presentation of the accounting identities, stating that incomings must be equal to outgoings for all sectors of the economy. The SAM is usually represented in the form of a square matrix with rows and columns, which bring together

data on production and income generation as generated by different institutional groups and classes on the one hand, and data about expenditure of these entities by them on the other. In a SAM, incomings are indicated as receipts for the row accounts in which they are located and outgoings are indicated as expenditure for their column accounts. Since all incomings must be accounted for by total outgoings, the total of rows and columns must be equal for a given account.

A SAM provides a conceptual basis to analyze both distributional and growth issues within a single framework. For instance, a SAM shows the distribution of factor incomes of both domestic and foreign origin, over institutional classes and re-distribution of income over these classes. In addition, it shows the expenditure of these classes on consumption, investment and savings. King (1988) and Sen (1996) point out that a SAM has two main objectives: first, organizing information about the economic and social structure of a country over a period of time and second, providing the statistical basis for the creation of a plausible model capable of presenting a static image of the economy along with simulating the effects of policy interventions in the economy. It can be used to improve the capabilities of countries to obtain descriptive analysis of the economy, indicating its income distribution picture, institutional and industrial structure.

A SAM can therefore be used as a database for macroeconomic policy modelling. Its framework may contribute to arrangement of different sources of data in a consistent manner. Different sources of data, such as national accounts, taxation data, household surveys, input-output tables, can be arranged into an economy-wide data framework. In most developing countries economic planning suffers from a number of problems such as insufficient, unreliable and poor quality data. Therefore, the best use of available information becomes increasingly important.

A number of SAMs were developed for a number of developing countries in the 1970s, and since the 1980s there has been increasing interest in the design, construction and use of SAMs in these countries (Sen, 1996). Townsend and McDonald (1998) used a SAM approach to analyze effects of changes in agricultural policies on income distribution in South Africa. Nielson (2002) used multiplier analysis to analyse the economic implications of Vietnam domestic and trade policy reform (from a centrally-planned to a market-based economy), thereby requiring the construction of social accounting matrices as the core database. As far as the author is aware, published applications for Lesotho did not exist at the time of writing.

SAM based multiplier models belong to the classical fixed-price general equilibrium models used to assess the economic effect of exogenous changes in income and demand. Arndt et al. (2000) suggest that SAM analysis is underpinned by three basic sets of assumptions. First, since prices are fixed, conclusions are drawn about quantities on the basis of value shares. Second, functional relationships are taken as linear in the SAM-columns. This implies, inter alia, that Leontief production functions are relied on in the activity columns, and there is no substitution between imports and domestic production in the commodity columns (Leontief production functions are characterized by constant returns to scale as well as the absence of substitution in factor and intermediate inputs). Third, multiplier models are demand-driven, and price effects are not captured as in a CGE model.

The matrices that can be derived from a SAM are used as instruments for economic analysis. This is done by means of the technical input coefficients and the Leontief inverse matrix (multiplier matrix). A technical coefficient (in monetary unit) is defined as the quantity of intermediate inputs which a particular sector requires from another sector in order to supply a Maloti (Lesotho currency) unit of output.

Formally
$$\frac{X_{ij}}{X_j} = a_{ij} \quad (i=1 \dots n) \text{ and } (j=1 \dots n).$$

Where “ a_{ij} ” is a production coefficient indicating the amount of sectors i 's product needed to produce one unit of sector j 's product; “ X_{ij} ” is the delivery of intermediate goods from sector i to sector j ; “ X_j ” is total gross input (output of the different sectors). For specific elements in a transaction table, we have the following:

$$a_{11} = \frac{X_{11}}{X_1}; a_{12} = \frac{X_{12}}{X_2}; X_{1n} = \frac{X_{1n}}{X_n}$$

The technical coefficients matrix is a collection of technical coefficients and is often indicated by a capital letter “ A ”:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \cdot & \cdot & \cdot & a_{1n} \\ a_{21} & a_{22} & & & & a_{2n} \\ \cdot & & & & & \cdot \\ \cdot & & & & & \cdot \\ \cdot & & & & & \cdot \\ a_{n1} & a_{n2} & & & & a_{nn} \end{bmatrix} \quad \text{Where } (i= \dots n) \text{ and } (j= \dots n)$$

Output needed to satisfy a given level of gross output can be shown to be:

$$O = A * X$$

Where “ X ” denotes a vector of activity levels (in value terms) in an economy; “ A ” denotes the amounts of each activity used by each other activity, at rates which are assumed to be independent of the levels of activity in “ X ” (constant returns to scale) and “ O ” is a vector containing the intermediate demand for its output and the total final demand for its input. Total activity “ X ” satisfies endogenous (“ AX ”) and exogenous (“ D ”) uses. Assuming “ A ” is parametric, then any change in D must be accommodated by a corresponding change in “ X ”.

$$X = AX + D$$

Solving for X , the relationship between D and activity vector X is easily shown to be:

$$A * X + D = X; D = X - A * X$$

Rearranging the above equation, we get:

$$D = (I - A) * X$$

Thus,

$$X = (I - A)^{-1} * D \text{ or } M_a * D$$

The term $(I - A)^{-1}$ or M_a is known as the multiplier matrix or Leontief Inverse. Several types of multipliers were calculated for this study using similar logic:

- *Open SAM or Type 1 output multipliers* measure the effect of a change in final demand (e.g. an increase in export demand) for one sector on the output of the whole economy, taking into account the inter-sectoral purchases of input goods and services.
- *SAM output multipliers* in addition take into account the distribution of income and the spending behaviour of local households as more (or less) income is available as a result of the initial injection.

- *SAM household multipliers* measure the total effect of a unit change in income of a particular household type on the incomes of all households in the economy.
- *Employment coefficients* measure the amount of employment (measured in full-time equivalents (FTEs)) required per unit output of each sector.
- *Employment multipliers* measure the total number of jobs created in the economy as a result of an increase of employment in one sector.

Although the SAM approach has enabled a wide-ranging analysis to be pursued within a comprehensive and internally consistent economic framework, its limitations should also be recognized. In particular, it does not account for new technologies, new products and market pressures that may come about as a result of the policy intervention.

3. The Lesotho Economy and The SAM

The Lesotho SAM was constructed with a base year of 2000 by the World Bank & Conningarth Economists (2002). The SAM has 53 activities, 57 commodities, 10 labour categories, 6 capital categories, 6 enterprises, 10 household types, a capital account (savings and investment), a government sector and a rest of the world sector. For the purpose of this study, the SAM is aggregated into a standard form of 9 activities and 9 commodities as follows: agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity and water; construction; wholesale and retail trade; transport, storage and communication; financial and business service and lastly community services. Households are aggregated by income and agro-ecological zone (urban high income; urban low income; rural high income and rural low income).

Table 1: Saving and investment balance

		Maloti million	%
Saving	General government	489.00	17.53
	Lesotho high land water project	685.79	24.58
	Private sector & parastatals	1615.05	57.89
	Total	2789.84	100.00
Investment	General government	800.00	28.67
	Lesotho high land water project	550.58	19.73
	Private sector & parastatals	1439.42	51.59
	Total	2790.00	100.00

Source: Derived from a 2000 SAM of Lesotho

Table 2: Government income patterns

	Maloti million	%
Direct taxes	824.34	31.55
Indirect taxes	329.87	12.62
Customs (SACU)	1156.99	44.28
Water royalties	68.32	2.61
Subsidies	-81.90	-3.13
Transfers	262.80	10.06
Other national government income	52.57	2.01
Total	2612.99	100.00

Source: Derived from a 2000 SAM of Lesotho

A coherent 2000 macroeconomic profile of the Lesotho economy can be derived from the SAM. From the SAM can discern that GDP (from expenditure side) is Maloti 5534 at 2000 market prices. The proportion of household consumption to GDP is 0.86 (Maloti 4736), that of total investment is 0.45 (Maloti 2479), total government expenditure 0.23 (Maloti 1288), export 0.32 (Maloti 1776) and import 0.86 (Maloti 4745). According to Table 1, the private sector and parastatals account for the bulk of savings (57.89 per cent) and investment (51.59 per cent) respectively.

The government income pattern is shown in Table 2. Custom (SACU) taxes (44.28 per cent) form the largest source of government income, followed by direct taxes (31.55 per cent).

Government expenditure patterns are shown in consolidated form in Table 3. The largest expenditure payment (27.74 per cent) is on the general public service. This includes commodities, factor payments (labour) and government capital account. Education services received 22.44 per cent and other economic services accounts for 11.02 per cent of total government expenditure.

Table 3: Government expenditure pattern per function (Maloti million, 2000 price)

	Maloti millions	%
General public service	720.38	27.74
Public order and safety	305.88	11.78
Education service	582.68	22.44
Health service	213.62	8.23
Social community	177.29	6.83
Other economic service	286.14	11.02
Rural development service	0.00	0.00
Public debt	311.00	11.98
Total	2596.99	100.00

Source: Derived from a 2000 SAM for Lesotho.

Table 4 shows the sectoral contributions to employment, value added and output in 2000. As in many other developing countries, the agricultural sector holds a dominant position both in terms of income generation and production value. Agriculture contributes about 23 per cent to GDP at factor cost (almost M938.21 million), and 12 per cent of the total value of production (Table 4). Food processing is also important and makes up 8 per cent of the total value of production. The manufacturing sectors makes up 11 per cent of total GDP and 20 per cent of total value of production.

Although a large share of the labour force is employed in the agricultural sector (7.61 per cent of skilled and 62.60 per cent of unskilled labour) it contributes only 26 per cent of total labour value-added, due to the low wages in this sector. This also reflects the poverty incidence, particularly rural areas, where many people rely on subsistence practices for survival. Table 4 also shows the estimates of skilled and unskilled labour demand in 2000. Manufacturing and construction are the second and third largest

Table 4: Sectoral contributions to value added, production, employment, capital and material inputs

	Value added (GDP) in production		Production		Labour				Capital	Intermediates
	Value (M mill)	Share of total (%)	Value (M mill)	Share of total (%)	Share of skilled (%)	Share of unskilled (%)	Value of total, labour (M mill)	Total share of labour (%)	Share of total (%)	Share of total (%)
Primary Agriculture	938.21	23.26	1167.99	12.18	7.61	62.60	563.00	25.83	24.01	4.11
Forestry	8.25	0.21	12.08	0.13	0.30	0.11	5.52	0.23	0.16	0.07
Fisheries	2.89	0.71	4.03	0.04	0.02	0.00	0.26	0.01	0.14	0.02
Mining	6.56	0.16	8.10	0.08	0.18	0.13	3.66	0.17	0.15	0.03
Food processing	275.70	5.02	960.80	7.81	5.13	4.37	106.33	4.01	6.04	12.30
Manufacturing	381.64	11.28	1731.88	20.26	10.10	12.36	236.49	11.72	10.48	24.20
Electricity and water	292.21	7.24	424.60	4.43	6.77	0.98	105.84	4.86	9.79	2.37
Construction	621.68	15.41	2509.80	26.16	21.37	6.61	359.35	16.48	13.78	33.77
Trade and transport service	783.68	19.84	1450.20	15.12	27.89	5.09	443.31	20.34	17.88	11.92
Other services	692.23	16.87	1326.50	13.80	20.63	7.74	356.61	16.36	17.57	11.31
Total	4002.05	100.00	9595.98	100.00	100.00	100.00	2179.97	100.00	100.00	

Source: Derived from a 2000 SAM for Lesotho

employers of unskilled labour (12 per cent and 7 per cent respectively). More skilled labour is used in trade and transport services (28 per cent), construction (21 per cent) and other services such as finance, business and insurance service (21 per cent).

The capital column of Table 4 shows the distribution of the capital stock. Agriculture dominates with 24 per cent of capital stock, followed by trade and transport services (18 per cent), other services (finance, insurance and business) (17 per cent) and construction (16 per cent). Manufacturing industry and electricity and water rank fifth and sixth respectively. Finally, it can be seen in the last column that about 34 per cent of the construction industry's costs are on intermediate inputs. Manufacturing is responsible for 24 per cent of intermediate input costs. The service industries use proportionately less intermediate commodities in the production process than construction, manufacturing and other goods producers.

The households were first disaggregated into five groups: (i) the urban areas, (ii) the rural lowlands, (iii) the rural foothills, (iv) the rural mountains and (v) the rural Senqu River Valley (SRV). The disparities do not only exist between urban and rural, and between regions, but also between different income groups. To account for this, the households' classifications were further disaggregated into low and high-income groups. The threshold levels used were taken from the Consumer Price Index Report (BOS (2001)) and were based on the 1994/95 Household Budget Survey. Low-income households comprise all households with a monthly income of less than 500 Maloti, while high-income households have a monthly income equal to 500 Maloti or above.

The household expenditure pattern for each household group distinguished in the SAM is given in Table 5. Based on the expenditure shares, spending on consumption is 88 per cent of total households' expenditure for urban households (high and low income), 94 per cent for rural lowlands (high and low income) households, 93 per cent for rural foothills (both low and high), 96 per cent for rural mountain households and 94 per cent for the rural Senqu River Valley households.

Table 5: Consolidated household expenditure patterns (%)

	Urban household		Rural Lowlands		Rural Foothills		Rural mountain		Rural SRV	
	High	Low	High	Low	High	Low	High	Low	High	Low
Income group										
Consumption	0.88	0.88	0.94	0.94	0.93	0.93	0.96	0.96	0.94	0.94
Household transfers	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.02	0.02
Direct tax	0.07	0.07	0.05	0.05	0.04	0.04	0.01	0.01	0.04	0.04
Savings	0.04	0.04	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
Foreign transfers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note: high income group where income \geq 500, low income group where income $<$ 500, and SRV= Senqu River Valley

Source: Derived from a 2000 SAM for Lesotho.

As shown in Table 5, urban households pay disproportionately more direct taxes than other households. They spend 7 per cent of their income on direct taxes while rural lowland households spend 5 per cent of their income on direct taxes and rural foothills

and Senqu River Valley households devote 4 per cent of their income towards taxes. Rural mountain households spend only 1 per cent of their income in direct taxes. Rural mountain households spend the most amount on transfers to other households (3 per cent) followed by Senqu River Valley households (2 per cent). All the remaining households spend only 1% of their income on household transfers. Foreign transfers constitute an insignificant part of all household expenditures. Finally, urban households contribute the most to savings (4 per cent of their income) followed by rural foothills households (2 per cent). The remaining households save very little or zero proportion of their income.

An important piece of information relates to the sources of household income. Table 6 summarises this information on household income sources.

Table 6: Source of household income (%)

Income group	Urban households		Rural Lowlands		Rural Foothills		Rural mountains		Rural SRV	
	High	Low	High	Low	High	Low	High	Low	High	Low
High Skilled labour	62.40	5.10	44.40	0.30	45.30	0.30	31.80	0.30	32.20	0.30
Low skilled labour	29.10	73.40	34.00	86.00	33.00	84.40	46.20	79.20	46.00	79.10
Enterprise profit	8.20	0.00	21.10	0.00	21.20	0.00	21.10	0.00	21.10	0.00
Household transfer	0.00	12.50	0.20	4.70	0.20	6.30	0.60	11.50	0.40	11.60
Government transfer	0.00	8.70	0.00	8.70	0.00	8.70	0.00	8.70	0.00	8.70
Foreign transfer	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100	100	100	100	100	100

Source: A 2000 SAM for Lesotho

As Table 6 indicates, low-income households receive the bulk of their income from unskilled labour wages. This is followed by household transfers and government transfers for low income urban households, low income rural mountain households and low income rural SRV households. For the low income rural lowland and rural foothills households, the second most important source of income is government transfers, followed by household transfers. For all the low income households, foreign transfers and enterprise profits contribute a negligible amount to income. The income sources for rich households display some variation. High income urban, rural lowlands and rural foothills households derive most of their income from skilled labour wages, followed by low skilled wages. On the other hand, high income rural mountains and rural SRV households derive most of their income from low skilled labour wages, followed by high skilled labour earnings. Unlike their low income counterparts, high income households derive a significant amount of income from enterprise profit, which is the third most important source of income. Transfers form an insignificant part of high income households.

4. Multiplier Analysis

4.1 Open SAM or Type 1 output multipliers and SAM output multipliers

Table 7 reports on the results of open SAM and SAM output multipliers for Lesotho. Industries are subsequently ranked according to the magnitude of these multipliers. In the calculation of Type 1 multipliers, only the industry accounts are treated as endogenous while the behaviour households, firms, government and the rest of the world are treated as exogenous and independent of industrial activity levels. These multipliers therefore include the direct and indirect effects but not induced effects. When computing the SAM output multipliers, the factors, accounts and household groups are treated as endogenous to the system. Thus SAM output multipliers allow for induced feed-backs as re-spending of incomes occurs. The model solves for the structure of production, the distribution and level of income in the economy simultaneously.

Table 7: Open SAM and SAM output multiplier

	Open SAM Multiplier	Rank	SAM Output Multiplier	Rank
Agr. Forestry & fishing	1.115	9	1.592	7
Mining & quarrying	1.143	7	1.548	8
Manufacturing	1.474	2	1.722	3
Electricity & water	1.288	6	1.596	5
Construction	1.558	1	1.767	1
Wholesale & retail trade	1.290	5	1.621	4
Transport,stor.& communication	1.295	4	1.594	6
Finance and business service	1.119	8	1.476	9
Community service	1.473	3	1.763	2

Source: Author's calculation

The first column in Table 7 shows that the largest open SAM multiplier effect in the Lesotho economy is that of construction (1.558) followed by manufacturing (1.474), community service (1.473), transport, storage and communication (1.295), wholesale and retail trade (1.290), electricity and water (1.288), mining and quarrying (1.143), finance and business service (1.119) and agricultural, forestry and fishing (1.115). In the case of construction, the results imply that an increase of Maloti 100 in demand for construction output generates an additional Maloti 55.8 in the output of the local economy, as construction expansion increases the demand for inputs and services in the Lesotho economy. The relatively low multipliers for agriculture, forestry and fishing indicate that this sector purchases few inputs. This is indicative of a low degree of commercialization in the sector. However, in general the multipliers are all fairly low, as would be expected given the open nature of the Lesotho economy which implies higher leakages.

The third column in Table 7 shows SAM output multipliers. Construction again has the highest value at 1.767, followed by community service (1.736), manufacturing (1.722), wholesale and retail trade (1.621), electricity and water (1.596), transport, storage and communication (1.594), agricultural, forestry and fishing (1.592), and mining and quarrying (1.548). The lowest SAM output multiplier is that of finance and business service (1.476). Thus, re-spending by households whose income comes mainly from these sectors helps to generate additional output effects over and above those relating to inter-industry dependencies.

It is interesting to note that agriculture improves in its ranking from being last for Type 1 multipliers to being 7th for output multipliers. This is reflective of the sector's importance in terms of income generation for the economy. In general however, although all the SAM output multipliers exceed the open SAM values (because income-related expenditure changes are allowed for), few sectors change rank significantly. Transport, storage and communication slips from 4th to 6th place, mining and quarrying from 7th to 8th place, manufacturing from 2nd to 3rd place and finance and business service from 8th to 9th place, suggesting that the induced effects in these sectors are relatively small in magnitude. This, in turn, can be traced back to the low factor earnings associated with these sectors in the base year of the model.

4.2 SAM household multipliers

Household multipliers measure the total effect of a unit change in income of a particular household group on the incomes of all households in the economy. This effect might be brought about by, for example, a change in the income tax regime, or a change in value of transfer earnings (social security payments, pensions, etc.) from outside the region. One interpretation of these multipliers is that they measure the "trickle-down" effect of changed income or wealth in one group on society in general. The results are shown in Table 8.

Table 8: SAM household multipliers

	Total HH Multiplier	Urban	Rural
Agr. Forestry & fishing	0.73	0.17	0.60
Mining & quarrying	0.70	0.42	0.28
Manufacturing	0.42	0.21	0.21
Electricity & water	0.54	0.32	0.22
Construction	0.36	0.20	0.16
Wholesale & retail trade	0.57	0.38	0.20
Transport, stor. & communication	0.52	0.34	0.16
Finance and business service	0.62	0.34	0.15
Community service	0.45	0.34	0.11

Source: Author's calculation

A distinction is made between urban and rural households. Results show a limited "trickle-down" effect. Increasing incomes of the urban population is a less efficient way of increasing incomes across the board than increasing those of rural households. This result can be explained by the earlier observation that higher income households have higher leakages in the form of higher saving and import consumption propensities.

Agriculture exhibits the highest household multiplier, both for the aggregate and the disaggregated household groups. This reinforces the important role of agriculture for household consumption. Mining has the second highest multiplier in the economy.

4.3 Employment coefficients or direct labour multipliers

Employment coefficients (direct labour multipliers) measure the amount of employment FTEs (full-time equivalent) required per unit output of each sector. As shown in Table 9, the highest coefficient is that of agriculture, forestry and fishing (377.33 FTE jobs required per million Maloti of own output). Mining and quarrying,

leads the rest of the sectors, with 370.74 FTEs per million Maloti of output, followed by community services.

Table 9: Employment coefficient and multipliers

	employment	Output (Million Maloti)	Employment coefficient*		Employment multiplier**	
			value	rank	value	rank
Agr. Forestry & fishing	446804.00	1184.11	377.33	1.00	448.90	1.00
Mining & quarrying	3003.00	8.10	370.74	2.00	424.40	2.00
Manufacturing	21796.00	2692.69	8.09	8.00	119.90	4.00
Electricity & water	3263.00	424.60	7.68	9.00	50.10	9.00
Construction	29495.00	2509.80	11.75	7.00	56.60	7.00
Wholesale & retail trade	33461.00	1076.30	31.09	4.00	82.90	5.00
Transport,stor.&com munication	10670.00	373.90	28.54	5.00	74.10	6.00
Finance and business service	7288.00	614.30	11.86	6.00	59.90	8.00
Community service	61786.00	709.20	87.12	3.00	133.60	3.00

Notes: * and ** FTEs per Million Maloti change in final demand and output per FTE (Million Maloti) respectively.

Source: Author's calculation

Employment multipliers measure the increase in total employment resulting from a unit increase in employment in one particular sector. Table 9 shows that the highest values, with over 4 FTE jobs generated for everyone in the initial sector are those of agriculture, forestry and fishing and of mining and quarrying. These results confirm the importance of primary sectors in Lesotho employment generation.

5. Conclusion

Agriculture is the backbone of the economy of Lesotho, contributing significantly to GDP, value of production and employment generation. However, the potential for development in agriculture is small due to scarcity of arable land. Yet despite this, agricultural development is the main way of providing a livelihood for the majority of the population. This paper has used a SAM of 2000 to analyse the structure of the Lesotho economy and the respective contribution of agriculture.

SAM multiplier analysis clearly establishes the critical role of agriculture in the economy. Agriculture has the highest employment coefficient. The employment multiplier analysis indicated that agriculture, forestry and fisheries as well as mining and quarrying generate 4 FTE jobs per million Maloti increase in production. The SAM household multipliers also indicated that in rural and urban areas, increases in the agricultural and mining sectors respectively generate the largest increases in household incomes. Construction sector has the highest open SAM and SAM output multiplier.

The important role of agriculture is reinforced by the SAM structure and multiplier analysis. The analysis further provides empirical support for the development of an agriculture-based strategy that encourages labour-intensive agricultural production. Such

a development strategy will require a reorientation of government policies towards the immediate objective of improving agricultural productivity. The study provides clear example to other developing economies, especially in Sub Saharan Africa, to encourage the improvement of agricultural productivity as a prerequisite for improving rural livelihoods and reduction of poverty.

However it is important to keep in mind some of the limitations of the approach. Importantly, SAM analysis does not allow for the incorporation of effect from new technologies, new products and market pressures which are all extremely important. This suggests that the results need to be interpreted and used cautiously. Using a SAM and its multipliers to analyze and assess the outcome of agricultural sector of the Lesotho economy has been based on simple assumptions about economic behaviour by sectors and households, such as linear production relationships and unlimited supplies. This meant that relative prices did not play a big role and the entire model was demand-driven. An important area for future study would therefore be modelling a more complex economic behaviour and price formation through a technique such as a Computable General Equilibrium (CGE) model.

References

- Ardnt, C., Jensen, H.T. & Tarp, F. (2000). Structural characteristics of the economy of Mozambique: A SAM based analysis. *Review of Development Economics* 4(3):292-306.
- BOS (2001). Bureau of statistics Consumer Price Index. Statistical Report, Maseru.
- Chandra, V., Jock, A., Shashi, K. & Naganou, JP. (2002). Lesotho: Sources of growth and employment options study: Background Papers: Recent Economic Developments 1980-2002. *Mimeo*, Southern Africa Department, the World Bank.
- Integrated Framework (2003). Lesotho: Diagnostic trade integration study, Volume 1, Integration into the World Trading Environment, mimeo.
- King, B. (1988). 'What is SAM?' quoted In: SEN, H. (1996). Social Accounting Matrix (SAM) and its implication for macroeconomic planning. *Unpublished Assessed Article*, Bradford University, Development Project Planning Centre (DPPC), Bradford, UK.
- Nganou, JP. (2004). Estimating the key parameters of the Lesotho CGE model. American University. Paper prepared for the International Conference "Input-Output and General Equilibrium: Data, Modelling, and policy Analysis", Brussels (Belgium).
- Nielson, CP. (2002). Social Accounting Matrix for Vietnam 1996 and 1997. Danish Research Institute of Food Economics (FOI), Trade and Microeconomics Division. International Food Policy Research Institute.
- Round, J. (1981). Income distribution within a Social Accounting Matrix: A review of some experience in Malaysia and other L.D.C.'s. Development Economics Research Centre-University of Warwick, Discussion Paper No, 3.
- Sen, H. (1996). Social Accounting Matrix (SAM) and its implication for macroeconomic planning. *Unpublished Assessed Article*, Bradford University, Development Project Planning Centre (DPPC), Bradford, UK.
- Taylor, L. (1983). *Structuralist macroeconomics: Applicable models for the Third world*. New York: Basic Books Inc.
- Townsend, RF. & Mcdonald, S. (1998). Biased policies, agriculture and income distribution in South Africa: A Social Accounting Matrix approach, *Studies in Economics and Econometrics* 21(2): 91-114.

- UNDP (2000). Common country assessment, Lesotho, United Nations.
www.undp.org.ls/Publications%20and%20Reports/cca.pdf.
- Van Schalkwayk, HD. and Jooste, A. (2002). The External Agricultural Trade Environment of Lesotho with Specific Reference to Trade Agreements. Compiled as part of a larger Study investigating reforms to Lesotho's Agricultural marketing Act., Maseru, Ministry of Trade, Industry and Cooperation.
- World Bank & Conningarth Economist (2002). Notes on the methodologies and data used for compiling a Social Accounting Matrix (SAM) for Lesotho for 2000. Final Report.