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A SOCIAL ACCOUNTING MATRIX MULTIPLIER ANALYSIS OF ECONOMIC STIMULUS PROGRAMME: THE CASE FOR BOTSWANA

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ABSTRACT

Utilizing both descriptive statistics predicated mostly on a social accounting matrix (SAM) data system and a constrained SAM multiplier (SAM) construct, this paper quantitatively evaluates the potential consequences of the Economic Stimulus Programme (ESP) on economic development. The simulation results reveals that expanding livestock production potentially unleashes economic growth. By contrast, the prospects of manafacturing and arable agriculture production to propel economic development are extremely limited. Regardless of expansion anywhere in the economy, the cities/towns household group benefit relatively more than rural household group. The fact that the economic structure is predisposed to chanelling additional incomes to households in cities/towns underscores that the fiscal stimulus is likely to be less successful in reducing poverty. The differential impact across sectors highlight the importance of taking multiplier effects into consideration when designing an economic stimulus programme.

1. INTRODUCTION

In an exertion to counteract the impact of the economic slow-down, Botswana, as in elsewhere, embarked on the Economic Stimulus Programme (ESP) starting late 2015. As encapsulated in the Brochure, the primary objectives of this nationally publicised 'holistic action plan' are to stimulate economic growth and accelerate both economic diversification and job creation. Through the ESP, Botswana also intends to ncrease food security, promote inclusive growth and eradicate absolute poverty. The ESP bronchure further states that the programme encompasses "both austerity measures and mitigation interventions to cushion the effects of continued global market volatility". The 2016 Budget Speech stated that it "is aimed at supporting domestic activities in the short-run, while providing foundation for a sustainable path for the economy on long-term basis through investment in infrastructural development" (MFED, 2016: p. 2). The programme has been

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implemented over a period of three years. The approved ESP budget: for 2015/16 financial year, at P1.6 billion, was about 11 percent of this year's total development budget; for 2016/17 fiscal year was, at around P2.3 billion, 14 percent of the development budget; and, for 2017/18, at P2.7 billion, was 15.5 percent of the total development budget.

Growth of the domestic economy is expected to be re-invigorated through increased government spending in targeted sectors in the short, medium and longer-term whilst economic diversification and job creation is to be accelerated by citizen economic empowerment using the Economic Diversification Drive (EDD) and harnessing the Special Economic Zones (SEEZs). Specifically, the ESP is targetted at key areas where there is a backlog of public projects as well as labour intensive opportunities to promote local enterprise. It is envisaged that it would further focus on several key areas including: accelerated land servicing, boosting local manufacturing and services with increased citizen participation; road construction; achieving food security and job creation through improved agricultural production; kick-starting economic activities in rural areas; improved education and healthcare through the upgrading of facilities; and leveraging ICT for the creation of an e-society. The strategy is to increase public spending in agriculture, tourism, manufacturing and construction.

The paper is motivated by the assertion in the 2016 Budget Speech of Botswana that "a strategic approach was adopted in the selection of sectors for interventions, based on their potential for growth and job creation" (MFED, 2016; p. 2, par. 6). But, neither the ESP Bronchure nor the 2016 Budget Speech provided quantitative estimates indicating the potential of sectors for interventions to stimulate the economy-wide growth and accelerate economic diversification and jobs creation. Without such evidence the ESP can be viewed merely as a statement of public sector projects. Not only is an empirical analysis of the implications of the programme on economic development essential, it is also urgently required. Such information is indispensable in evidence-based policy making and serves to inform design of economic stimulus packages in future.

Because the ESP is primarily concerned with both economic growth and issues of income distribution, employment, and poverty eradication, it can be properly analyzed using a modelling approach that inherently captures these issues, i.e., economic growth, employment, income distribution and poverty reduction, simultaneously. Since the social accounting matrix (SAM) encompasses both economic and social statistics, it provides a conceptual foundation to explore growth, unemployment, income distribution and and poverty reduction within a single and logical consistent analytical framework. Indeed, SAM-based models "embrace both the traditional concerns of growth economics and the agenda of issues that follows from a

focus on income distribution, employment, and poverty alleviation" (Pyatt and Round, 1985). The SAM framework has proven to be a wieldy tool especially in simulating the impact of exogenous economic and policy shocks when the primary interest is on the impact of a shock on economic growth, unemployment and poverty reduction (Round, 2003).

SAM multiplier techniques have been extensively used to analyse a wide range of exogenous demand-side shocks. Ardnt *et al.* (2000) applied the SAM multiplier construct to Mozambican economy. Key findings of this paper are that: agriculture has relatively large linkages with rest of the economy; it is generally more effective in the use of scarce capital than other production activities; and, maize, rice and small-scale livestock and forestry commodities possess attractive features for the promotion of agriculture in the short to medium term. In his application of the SAM multiplier analysis to the Lesotho economy, Bahta (2013) also found that agriculture is of fundamental importance; it has relatively large linkages to rest of the Lesotho economy; and, expanding agricultural production benefits rural household group relatively more than urban household group. Using a constrained SAM multiplier construct to compare the impact on two household groups across three broad investment strategies for Egypt of: growth in staple crops; growth in export crops; and, growth in manufacturing, Diao et al (2007) found that agricultural growth induces higher overall growth than non-agricultural growth and accelerates poverty reduction since it generates proportionately more income for farm households who represent the bulk of the poor. In their application of the SAM multiplier model to explore the influence of economic structure in determining a country's growth-poverty nexus, Adrnt *et al.* (2012) found that structural characteristics combine such that expansion anywhere in the economy benefits urban household group relatively more than rural household in Mozambique whereas the opposite was true in Vietnam.

In Botswana, the SAM framework has served as the database and as the conceptual basis for the Macroeconomic Model for Botswana. This essentially input-output SAM multiplier was used to generate projections for the national development plans. Greenfield (1985) indicated that the primary objective of producing the 1974-75 SAM for Botswana was to embed distribution statistics as necessitated by the country's national development planning objective of social justice. Tsheko (2015) applied unconstrained SAM multiplier model with an input-output structure to explore the effects of the economic stimulus package of 2011. The main conclusion that the infrastructure programme that was undertaken to address the economic downturn did not offset the contractionary effects of the global downturn because the construction sector was unable to significantly stimulate all other production activities and households at all income levels. However, by using an unconstrained input-output SAM multiplier framework, the

paper is likely to have over-estimated the impact of the stimulus package 2011.

By contrast, this paper applies a twenty-three sector, constrained SAM multiplier model with a supply-use structure that has been parameterised to the 2011 SAM for Botswana to quantitatively explore the effects of the ESP on the national economy. Specific questions that the paper addresses are: which production sectors have potentially large linkages; and, what are the economy-wide growth and poverty-reduction prospect of the sectors. The metholodical approach adopted involves utilization of descriptive statistics predicated mostly on the SAM database and undertaking a series of comparative simulations with a SAM multiplier model parameterised to the database for Botswana.

Following this background, the SAM for the analysis and the socio-economic scene are outlined in section 2. The latter highlights the most pertinent structural features of the Botswana economy and is grounded on descriptive analysis emerging principally from the 2011 SAM database. This serves the secondary objective of ascertaining that the SAM for the analysis is a sufficient characterisation of this economy. More importantly, the analysis gives a preliminary indication of the likely effects of the economic stimulus programme. The presentation of the mathematic statement of the SAM multiplier for the analysis in section 4 focuses on providing some economic intuition that hopefully explain why the counterfactual results come out the way they do. After conversion of the SAM multiplier into an operational device capable of simulating the ESP-induced effects on the domestic economy, the ESP is translated into a myriad of comparative policy simulations in section 4. The section also reports, interprets and explains the counterfactual simulation results. Lastly, conclusions and policy implications are summarised in section 5.

2. SAM AND STRUCTURAL CHARACTERISTICS OF BOTSWANA ECONOMY

The SAM for the analysis is an aggregated Botswana SAM for the year 2011. Before outlining the social and econmic structural characteristics of this economy and constructing the SAM multiplier model, it is germane to highlight the general features of SAMs and of the specifics of the SAM for the present analysis. The purpose of the description of the SAM is to enable those unfamiliar with the SAM multiplier analysis to gain an appreciation of the crucial role played by the SAM database to in the present analysis.

2.1 What is a SAM

As exemplified in the pioneering works of Sir Richard Stone, a SAM is a framework within which current account transactions of a regional or

national accounting boundary for a given period are comprehensively, consistently and completely recorded and in an economical manner. According to Pyatt and Round (1985), it is philosophically founded on the development paradigm that perceives development as a process whose meaning and purposes is ultimately about the improvement of the standard of living. This perception of development inevitably resulted in the need for a data system that provides a comprehensive and consistent database for a base-year that captures in an explicit way "what is going on in any economy and how the living standards of different groups are related to each other and to other aspects of economic activity" (Pyatt and Thorbecke, 1976; p.5). It was, thus, developed to support the development of models that "embrace both the traditional concerns of growth economics and the agenda of issues that follows from a focus on income distribution, employment, and poverty alleviation" (Pyatt and Round, 1985). This was as a result of an acknowledgement of the fact that 'production-oriented' data furnished by national accounts and input-output tables do not adequately provide a good picture about the living standards of a country.

SAMs achieve this by generalising the input-output table to contain complete information on different institutional accounts, most notably different household groups, government, than just the income and expenditure flows of activities and commodities. By embedding the distribution statistics, SAMs trace the full circular flows of income and expenditure. An overriding feature of SAMs is that they show the links between the incomes of the households and the activities in which they are gained or between the expenditures of households and the activities which gain from them. A distinguishing property of a SAM is that it expresses the fundamental law of economics, stating that for every income there is a correponding expenditure in a simple and economical way. It does so by quantitatively recording the transactions of an economy for a reference period using a single-entry format. This is achieved by designing SAM is such that each transactor or group of transactors needing to be considered with reference to some particular issue has its own pair of row and column and these are identically ordered. Conventionally, transactor i's incomes are recorded in the i^{th} row of the SAM and its expenditures are entered in the corresponding j^{th} column. Accordingly, the SAM transaction t_{ij} is the transactor i's income received from transactor j and is equivalently transactor j's expenditure to account i during the accounting period. Therefore, a SAM is a square matrix of an n-by-n dimension. In a SAM, the row total and column total equate, implying expenditure equals income for each account.

2.2 SAM for Analysis

The SAM for the analysis is an aggregation of the more detailed SAM built by the EcoMod Network (2015) for the Ministry of Finance and Economic

Development. Apart from being the latest available, the choice of this SAM is influenced by the fact that it was constructed in consultation with the SAM officials and the Botswana Modelling and Forecasting Group. The aggregated SAM has 73 accounts. The guiding principle in aggregation was the preservation of the information about the ESP's target sectors and those industries primarily responsible for the production of inputs to sectors of interest as well as other key economic sectors.

In this SAM, there are 23 production sectors and 23 commodities. Thus, there is no one-to-one correspondence between the commodities produced and the industries that produced them. This neatly exposes the costs structure of each industry. By revealing differences in production technologies across sectors, it provides a wealth of information that is used to determine the effects of government spending on the economy. Of the 23 production activities or commodities, 3 are agriulture, namely, livestock, cro and other agriculture. There are 5 manufacturing activities or commodities: meat and meat products; textiles and leather; and, other manufacturing. Four trading activities or commodities are: wholesale; retail, hotels and restaurants; and, other trade services. The trading sector is taken as a proxy of tourism. There is only construction activity and commodity. Four activities belong to the mining sector; diamonds; copper; coal; and, other mining. The remaining seven accounts are for setrvices including for one account for general government. There are five types of labour: professionak and technical; administrative and managerial; clerical, skilled manual; and, unskilled labour. There is net operating surplus and a fixed factor. Households are aggregated into three groups, viz., households in cities/towns, households in urban villages and households in the rural areas. The scope of the distribution statistics encompassed by this SAM, therefore, sufficiently shows the links between the incomes of the households and the production sectors in which they are gained or between the expenditures of households and the activities which gain from them. To the extent that it incorporates both functional and size distrubution income statistics, it is amenable to analysis of issues of employment, income distribution and poverty reduction. Finally, there are 3 saving-investment accounts, 10 tax accounts and one account each for enterprises, general government and the rest of the world (RoW).

Despite of being considerably condensed, the SAM for the present investigation furnishes a comprehensive and consistent information on crucial variables including: (i) gross output levels and compositions of production; (ii) the factorial value added; and, (iii) the distribution of income among the different institutions, especially different household groups. It, thus, unravels a great deal about the interdependencies and structural features of Botswana's economy in the year 2011. As the ensuing analysis shows, the condensed SAM furnishes sufficient information profiling the

diversity in production sectors and the interdependencies among the various economic sectors and institutions characterising the world's largest diamond producer.

2.2 Structural Characteristics of Economy

A comprehensive evaluation of the economic stimulus programme is preceded by a solid grasp of the key economic structural characteristics of the national economy. Highlighting the structural features of the national economy as revealed by the base year data is crucially important in explaining both the economic linkages and multiplier effects. In addition, the analysis gives preliminary indications of the ESP's potential implications on the domestic economy and it shows that the current accounts for an economic system are, indeed, interconnected. This section presents the most pertinent structural features of the Botswana economy. The analysis is grounded on descriptive statistics emerging principally from the SAM for 2011.

2.2.1 Macroeconomic Features

The 2011 SAM reveals that this Southern African economy is characterised by a high degree of openness, rendering it highly susciptible to flactuations in global demand and prices. In 2011, the trade-to-GDP ratio stood at 97 percent of GDP at market prices. Total imports, at P52,423 million, were roughly 50 percent of GDP and total exports, at P48,463, were 46 percent of GDP. Current account deficit, at around P4.21 billion, was 4 percent of GDP. Contributing mostly to the deficit was under-performance of merchandise trade exports. At P3.9 billion, the merchandise trade deficit was 3.8 percent of GDP. By contrast, the recurrent fiscal performance was a surplus of 11.4 percent, which indicating that the government sector is an important part of the economy in terms of investment funding.

2.2.2 Microeconomic Characteristics

Botswana's development model has been to invest in minerals and, then, channel the profits accruing therein to developing lagging economic sectors mainly through the government's investment in infrastructure and human capital. The government sector indirectly links the mining sector to the rest of economy. The performance of this model clearly emerges in the SAM. As much as one-fifth and 15 percent of net domestic product at factor costs of P94, 737 million was accounted for by the diamond mining and the general government sector respectively. This clearly indicates that the economy is diamond and public-sector driven. Construction was the third largest contributor by 6.8 percent and was followed by hotels and restaruants, wholesale and retail and the business services. These sectors appear to be the main beneficiary of the government-induced demand. By contrast, the contribution of coal mining of 0.01 percent is strikingly the lowest relative

to the other sectors. The negiligible importance of the coal mining in the economy signifies the extent of the under-development of the domestic coal mining. Estimates show that Botswana has one of the largest, at over 212 billion tonnes, untapped coal reserves in the world. In fact, it has as much as two-thirds of coal resource found in Africa. There is, therefore, an immense potential for Botswana to be a significant producer of coal for domestic power needs and exports of coal and to become a net exporter of coal-fired power. To this end, the envisaged development of the coal mining sector, though would not be a panacea for economic diversification, for exports of coal particularly to India and surplus coal-fired power to its neighbours would potentially contribute substantially to employment, exports and government revenue and, thereby contributing to reduction in absolute poverty.

Similarly, with a mere 0.04 percent of GDP, the poor performance of arable agriculture is by far insufficient to meaningfully contribute to food security. Given Botswana's topography, the under-performance of the crop production sector in production is scarcely astonishing. Most of the country is unconducive for arable agriculture. The situation is exarcebated by the predominance of traditional crop production sector, which predominately utilises rudimentary production techniques and is subsistence-oriented. This explains the high incidence of poverty in rural areas, where many households derive their livelihoods directly from agriculture. Thus, the challenge confronting Botswana in the development of the arable agriculture sector to a stage where it can sufficiently contribute to food security, is tremendously daunting.

Most of production sectors display high capital intensity. In particular, hotels and restuarants have the highest capital intensity relative to other sectors. Around 95 percent of its value added is net operating surplus. The other sectors that display high capital-intensities are diamond mining (89), banks (85), insurance (86), household business enterprises (86), other agriculture (81) and the meat & meat products (80). Conversely, arable agriculture is the most labour-intensive sector and is followed by general government (97) and coal mining (92). With the exception of the general government sector, the labour-intensive sectors generate relatively low value added. Most of the value added of livestock farming is paid out to mixed-income. This constitutes payment to those in informal employment.

If the rate of return to capital is the same across sectors of the economy, then the figures imply that capital stocks (and the implied capital intensities in production) are relatively small in the majority of the agricultural sectors.

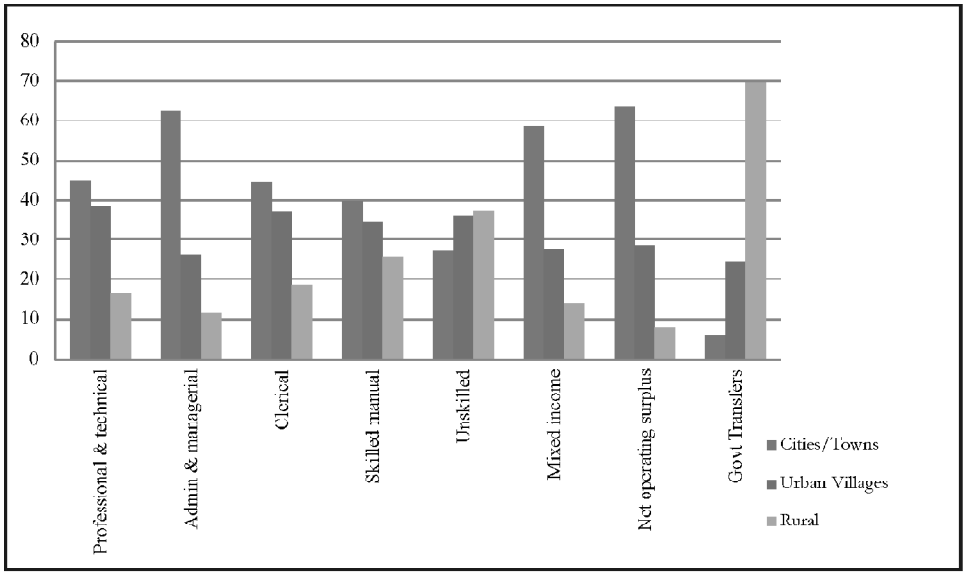
Household Incomes

Where necessary, the information on emerging in the 2011 BotsMod SAM is complemented with the data from the Botswana Core Welfare Indicators

Table 1
Number of Paid Employees by Sector in June 2011

Economic sectors	*Total*	*Sector's Share (%)*
Agriculture	6,528	1.7
Mining & Quarrying	12,201	3.1
Manufacturing	36,638	9.5
Water & Electricity	4,105	1.1
Construction	23,347	6.0
Wholesale & Retail Trade	47,436	12.2
Hotels & Restaurants	17,150	4.4
Transport	12,969	3.3
Finance	8,563	2.2
Real Est.& Business Activities	18,899	4.9
Education	10,060	2.6
Health & Social Work	2,891	0.7
Other Community Activities	4,173	1.1
Private & Parastatal	204,960	52.9
Private	187,968	91.7
Parastatal	16,992	9.0
Central Government	101,912	26.3
Local Government	80,554	20.8
All Sectors	387,426	100.0

Figure 1: Distribution of labour income by household group (percentage)



Source: Authors' Calculations

Survey 2009/10 to obtain a more detailed picture of the size distribution of income. This survey contains information on the number of households or persons to whom the incomes given by the SAM apply.

With around fifty-four percent of factor income received by households in the cities/towns and 14 percent by those in the rural areas, the distribution of factor income appears highly unequal. Yet, the majority of households and the poor people in Botswana reside in rural areas. In fact, 20.5 percent and 43 percent of total households were residing in cities/towns and rural areas respectively and roughly sixty percent and only 9 percent of the poor were residing in rural areas and cities/towns respectively (StatBot, 2013). Undoubtedly, this underscores that Botswana has high income inequality. The SAM further revealed that the main cause of the income disparity was the distribution of ownership of capital, with the households in towns/cities' receiving an overwhelmingly large share, of around 63 percent, and those in rural areas receiving only around 8 percent of net profits as shares, dividends and interest. Similarly, the distribution of total labour income is also skewed, albeit modestly. The cities/towns household group received nearly half of the total labour income (48.6) and those in rural areas and in urban villages received 20.4 and 36 percent respectively. The other noticeable feature is that, figure 1 shows, total income from each of the labour groups is disproportionately allocated to the cities/towns household group. The share of income received by the cities/towns household group ranged from a low of 40 percent of skilled manual labour income to a high 62 percent of adminstrative and managerial labour income. The only exception is unskilled labour income, which is disproportionately distributed to households in rural areas and urban villages, where each received thirty-seven and thirty-six percent respectively.

A further noticeable observation is that the towns/cities' households primarily derive the livelihoods from ownership of capital, where as much as 63 percent of their total income in 2011 was net operating surplus. Urban villages' households derive almost the same share of income from labour and capital. For 2017, 45 percent and 43 percent of total income was net operating surplus and labour income respectively. In sharp contrast, rural households are highly dependent upon government. Over 31 percent of 2017's total income for the rural areas households was government transfers.

3. MODEL SPECIFICATION AND IMPLEMENTATION

SAM multiplier models are a class of simple general equilibrium models typically used to simulate the impact of exogenous demand-side shocks. Their distinctive characteristics are that they assume that: quantities are determined independently of prices; functional relationships are taken as

linear, implying that the producers use Leontief production technologies and substitution possibilities are non-existent; and, excess capacities exist in the economy. The present analysis utilizes a constrained supply and use SAM multiplier framework that is parameterised to the SAM for the Botswana economy in 2011. By extending the input-output SAM multiplier analysis model to preserve the distinction between sectors and commodities, i.e., each activity can produce multiplier commodities and each commodity can be produced multiplier activities, the supply and use SAM multiplier analysis is cost-effective; it obviates the need to conflate the production sectors and commodities (i.e. each sector produces only a single homogeneous product, and each product is produced by only one sector) to produce a SAM with an input-output structure.

Literature is replete with detailed technical specification of fixed-price SAM multiplier models (see for instance, Subramanian and Sadoulet, 1990; Diao *et al.* 2007; Breisinger *et al.*, 2009; Pyatt and Round, 1979; Thorbecke, 1985; Roland-Holst and Sancho, 1995; Defourny and Thorbecke, 1984;). The theoretics of the constrained SAM multiplier model are encapsulated by Subramanian and Sadoulet (1990) whilst a detailed and simple technical specification of the model is presented in Bresienger *et al.* (2007). Therefore, the discussion of the model here focuses on those aspects that provide some economic intuition that helps explain why results come the way they do. Moreover, the discussion concentrates on underlining the specific assumptions that may be driving the simulation results.

3.1 Constrained SAM Multiplier Model

Throughout the BotsSAMmod application enterprises, government, investment, stock changes, taxes and the rest of the world are exogenous. Accordingly, the expenditures of these accounts are predetermined. Apart from it being based on the objectives of this paper as it enables changes in government demand to be simulated, this particular designation of the SAM accounts is consistent with the static, mainstream macroeconomic theory, where government spending is assumed to be policy-determined, the external sector is regarded as being outside the purview of domestic control, and, the exogenous determination of investment is justified on grounds that the model has no dynamic features. Moreover, crop exports and the output levels of utilities and general government are exogenous. This reflects the assumption that the activities producing these commodities are supply-constrained (Z_2). Rigidities in crop supply largely emanates from the predominance of rain-fed agriculture, soil fertility, input supply, marketing infrastructure and moisture constraints. Regarding supplies of utilities as unresponsive to exogenous demand stimulus appear plausible; visible signs of electricity and water supply constraints are the restrictions on water and electricity utilization.

Conversely, primary factors, households, production sectors and output for commodities and services that are produced by the private sector are endogenous. Endogenising the factors of production and households renders both the functional and size distribution of income to react to changes in exogenous demand. Imposing excess production capacity in the private-sector's production activity appears appropriate. As the economy is operating below its potential level, it is plausible to expect producers to have capacity under-utilisation levels due to decreases in demand for their outputs. Indeed, the Bank of Botswana's Business Expectations Survey March 2017 indicated that 80 percent of businesses expected to utilize at least half of their capacity utilization levels. This implies that these productive sectors have slack resources that can be pulled into productive activity. From a modelling perspective, the existence of slack resources that can be pulled into productive activity underscores that one of the primary conditions for applying a multiplier analysis is fulfilled. Indeed, the existence of a real multiplier hinges on the existence of excess capacity of resources (Bigsten and Collier, 1995; Haggblade et al., 1991; Diao et al., 2007). Throughout the simulations the output levels (Z_1) of endogenous production sectors, i.e., those with excess capacity, respond to exogenous demand-driven injection whereas those for the supply-constrained production sectors (Z_2) are unresponsive.

BotsSAMmod is essentially an adaptation of the Breisinger et al (2010) model to accommodate 23 production sector. Following and drawing closely from Breisinger et al (2010), the basic material balance equation[1] (1) in the constrained multiplier with a supply-use structure expresses the total demand (Z) in each sector as the sum of inter-industry input demand (AZ) and final demand (F), where final demand includes consumption by household (cY) and exogenous sources of demand (E), which include government consumption, investment, stock changes and exports:

$$\begin{aligned} Z_1 &= a_{11}X_1 + a_{12}X_2 + c_1Y + E_1 \\ Z_2 &= a_{21}X_1 + a_{22}X_2 + c_2Y + E_2 \end{aligned} \tag{1}$$

where: a is the technical coefficient, i.e., input or intermediate share in production; c is consumption share.

Gross output (X) is defined as domestic output share (b) in total demand or supply (Z), i.e.,

$$\begin{aligned} X_1 &= b_1Z_1 \\ X_2 &= b_2Z_2 \end{aligned}. \tag{2}$$

Moreover, household income (Y) is given by the share each factor earns in each sector, i.e.,

$$Y = v_1 X_1 + v_2 X_2 , \tag{3}$$

Equations (2) and (3) imply that household income from factors can be re-written as,

$$Y = v_1 b_1 Z_1 + v_2 b_2 Z_2 , \tag{4}$$

Defining gross output and household income as in equations (2) and (4) means that total demand in equation is rewritten as,

$$\begin{aligned} Z_1 &= a_{11} b_1 Z_1 + a_{12} b_2 Z_2 + c_1 \left[v_1 b_1 Z_1 + v_2 b_2 Z_2 \right] + E_1 \\ Z_2 &= a_{21} b_1 Z_1 + a_{22} b_2 Z_2 + c_2 \left[v_1 b_1 Z_1 + v_2 b_2 Z_2 \right] + E_2 \end{aligned} \tag{5}$$

A general equilibrium model rests explicitly on the fact that a payment from one agent to another affects the budget of the recipent, who, in turn, spends the additional income according to some behavioural rule. This means that the SAM accounts must remain balanced. The model uses the Subramanian and Sadoulet (1990) closure rule that preserves a balanced SAM.

Re-arranging equation (5) such that all exogenous components are on the right-hand side, factorising and, then expressing the resultant expression in matrix format yields a modified material balance equation (6A) as,

$$\begin{bmatrix} 1 - a_{11} b_1 & -c_1 v_1 b_1 & 0 \\ -a_{21} b_1 & -c_2 v_1 b_1 & -1 \end{bmatrix} \begin{bmatrix} Z_1 \\ E_2 \end{bmatrix} = \begin{bmatrix} 1 + a_{12} b_2 + c_1 v_2 b_2 \\ 0 \quad -1 + a_{22} b_2 + c_2 v_2 b_2 \end{bmatrix} \begin{bmatrix} E_1 \\ Z_2 \end{bmatrix}. \tag{6A}$$

Noting that the first term on the left-hand side is identity matrix (I) less the adjusted coefficient matrix (A*) and denoting the first term on the right-hand side by B, the modified material balance equation (6A) is re-expressed in simple format (6B):

$$\left(I - M^* \right) \begin{pmatrix} Z_1 \\ E_2 \end{pmatrix} = B \begin{bmatrix} E_1 \\ Z_2 \end{bmatrix}, \tag{6B}$$

solving for the two unknown terms, which are the supply-responsive sectors/output (Z_1) and net exports (E_2) in supply-constrained sectors yields the constrained, static SAM multiplier equation (7) as

$$\begin{pmatrix} Z_1 \\ E_2 \end{pmatrix} = \left[I - M^* \right]^{-1} B \begin{bmatrix} E_1 \\ Z_2 \end{bmatrix} . \tag{7}$$

Equation (7) indicates that the total outputs of supply-responsive sectors (Z_1), incomes of endogenous sectors and total net exports of supply constrained-sectors are determined by the level of exogenous demand (E_1) and output of exogenous sectors (Z_2) and a matrix of adjusted multipliers (M*). In fact, the equation underlines that the constrained SAM multiplier permits output responses only in the supply-responsive sectors (Z_1). For supply-constrained sector, only net exports responses are permitted. Note that the constrained SAM multiplier technique (6B) embodies the information on the linkage effects from the SAM mostly through the adjusted coefficient matrix (M*). The multiplier matrix transmit any demand stimulus arising in any of the exogenous demand accounts (sectors) to endogenous accounts, most notably production sectors, factors and household groups.

3.2 Model Implementation

The model represented by equation (7) is programmed in Microsoft Excel and the core code structure derives from Breisinger et al (2009). BotsSAMmod has been parameterized to the twenty-three sector 2011 SAM for Botswana. The explict presumption is that the 2011 SAM captures the Botswana economy in long-term equilibrium. Accordingly, the 2011 SAM transaction values are taken as realizations of the BotsSAMmod variables and are, thus, the reference values.

BotsSAMmod solves for the structure of production, the level and distribution of income in the economy simultaneously. This underlines that both the production structure and income distribution react to changes in exogenous demand of commodity output. By design, the twenty-three sector BotsSAMmod in Excel with a supply-use structure calculates and reports four types of multipliers including:

a) an output multiplier – this captures both the consumption and production linkages and measures the final increase in gross output of all production activities. Output multipliers add up all linkage effects to estimate the overall increase in gross output for each sector;

b) the value added multiplier - this indicates the incremental value added in each sector in response to a stimulus, i.e., total additional incomes of factors of production. As value added truly captures a sector's contribution to an economy than gross output since as it indicates value addition of a sector in engaging in production, value added multiplier is the reference indicator of domestic production throughout the analysis. For instance, it used to compare potential growth-inducing power of economic sectors; and,

c) an income multiplier – it indicates the additional incomes generated by households, i.e., households in cities/towns, urban villages and rural areas.

The effects of an exogenous injection in demand for output produced by a production sector on gross output of each production sector and incomes of production factors and various household groups are, thus, measured by total output multipliers, value added multipliers and income multipliers respectively. Value added and income multipliers reveal important distributional impact from an exogenous demand shock and are determined by the structural characteristics of the economy in question. By solving for the structure of production, the level and distribution of income in the economy simultaneously, BotsSAMmod facilitates economic growth and issues of employment, income disparity and poverty reduction to be analyzed simultaneously.

4. SIMULATIONS DESIGNS AND RESULTS

The realization of the primary objectives of the present paper relies upon undertaking a series of simulations. Before presenting and analyzing the results, it is informative to document the design of the simulations.

4.1 Simulations Design

In order to achieve the objectives, it is imperative to conduct a series of simulations. The motivation for these simulations is the assertion that the production sectors of interventions were selected based on their potential to elicit economic growth and accelerate economic diversification as well as employment creation. In this set of twenty-three simulations, the ESP is modelled as a targeted sector development strategy. For comparative purposes, the ESP is introduced as a once-off increase in government demand of a one-million Pula for output of a production sector. For instance, an exogenous demand stimulus of P1 million is directed to: (i) livestock output in the simulation in which the economic stimulus programme is considered as a livestock-led development strategy; and, (ii) to tourism output in the simulation where the ESP is regarded as a tourism-driven development strategy.

Simulation exercises 1-3 consider the potential of agricuture to induce economywide growth, creation of employment, reduction in income inequality and an increase in food security. Under the ESP, significant growth in agricultural production is expected to be achieved through numerous agriculture development initiatives including: (i) commercialization of agriculture; (ii) implementation of the sector's strategies such as of dairy, beef, horticulture, fodder production and dry land farming; (iii) facilitation of processing, packaging and marketing of agriculture produce; (iv) formation of production clusters and agricultural service centers for increased production; (v) optimal use of grey and raw water for agricultural production; (vi) mandating that public institutions procure from local food producers;

and, (vii) provision of infrastructure in production areas, most notably power, water and road insfrastructure. Not only is implementation of the agriculture development projects expected to increase agricultural-sector productivity, it is also expected to reduce marketing margins. In turn, these are expected to increase both agricultural production and access to markets of agriculture output. The latter will obviate deterioration of the terms of trade of agriculture sector's that typically accompanies an increase in agricultural output. Note that these experiments represent the ESP as an agricultural-demand-led industrialization strategy.

The fourth-seventh policy experiments represent the programme as a tourism-driven development strategy. Tourism sector emerges in the ESP agenda among the sectors with the most potential for inducing economy-wide growth and job creation. It is viewed as a highly labour-intensive sector. Numerous tourism initiatives envisaged to increase the sector's competitiveness and, thereby boost economywide growth and creation of employment opportunities include the expansion of both the geographic areas of the country's tourism and provision of tailored business support services. In fact, the initiatives to grow tourism in the country resulted in Botswana being voted the best destination country to visit in 2016 by Lonely Planet Publication, which is a global travel and tourism publication.

Experiments 8 and 9 characterises the stimulus programme as a manufacturing-led industrialisation strategy. The manufacturing sector is one of those sectors earmarked for propelling economic growth and citizen empowerment. In the ESP, the focus is on stimulating local manufacturing for domestic consumption and import-substitution through increased commitment to EDD by both public and private sectors. Moreover, the initiative is aimed at promoting citizen empowerment through a preference margin provided for local firms in public procurement while at the same time, arguably, ensuring competitiveness among suppliers of goods and services. These two experiments generate quantitative estimates of the import-substitution or domestic-oriented manufacturing strategy on key economic indicators.

The ESP further plans to unleash both economic growth and diversification as well as job creation through public investment in infrastructure development. In this connection, the government is, through the ESP, fast-tracking the eradication of backlog of social and economic infrastructure that include maintenance and construction of new facilities. Infrastructure projects earmarked for implementation under the ESP are meant to: (i) provide quality teaching environment through accelerated maintenance and construction of educational facilities such as classrooms and staff quarters so as to achieve inclusive growth, empower individuals to make informed choices in life and to contribute to sustainable economic

growth through improved productivity of the labour force as well as the ability to adopt technology; (ii) improve health care through construction and upgrading of facilities including hospitals and clinics, etc., in order not only to raise the standard of living in the country, but also to raise the productivity of the workforce; (iii) create new business opportunities through accelerated land servicing of industrial, commercial and residential plots, identification of land banks for ease of allocation to different economic and to provide decent shelter by accelerated construction of new housing units through various ways including the Self Help Housing Agency Turnkey project and Instalment Purchase Scheme Housing; and, (iv) improve transport and communications by decongesting traffic along the A1 highway through the construction of additional feed roads and bypasses, access roads across the country in order to stimulate local economic activities, and, increase efficiency in transport and communications by fast-tracking the extension of broadband connectivity to all villages of 5,000 or more inhabitants as well as to 1,293 schools across the country by drawing from the Universal Access Fund. Implementation of maintenance and construction projects for health and education, roads and ICT infrastructure is expected to boost domestic economic growth and employment opportunities by increasing both the level of productivity of workforce and efficiency in transport and communications. In order to furnish the implications of infrastructure development, the tenth policy experiment models the stimulus programme as an infrastructural-development-led strategy. Specifically, the ESP is an exogenous demand-driven injection in the construction sector, which is a proxy for infrastructure development.

Running these simulations with the BotsSAMmod in Microsoft Excel yields the differential impact on gross output of each of the twenty-three production sectors, factor incomes and household incomes arising from the posited alternative development strategies.

4.2 Simulation Results

The results reported in this sub-section are derived from the two groups of simulations described above. When the twenty-three production sector BotsSAMmod with a supply-use structure that has been parameterised to the 2011 SAM for Botswana is run in Microsoft Excel, a series of total mulitplier effects for the twenty-three production activities, total value added multiplier effects for the eight factors of production and total income multiplier effects for the three household groups under the alternative growth strategies are calculated and reported. As the model solves for the structure of production and income distribution simultaneously, the model results facilitate a comparative analysis of the effects of alternative growth strategies on economy-wide growth, employment creation and income distribution and, thereby to draw inferences on their likely impact on poverty eradication.

Table 2 presents the results from the comparative simulations undertaken with the twenty-three sector BotsSAMmod. Four types of multiplier effects are reported:

a) GDP multiplier in column 1 is the measure of the impact of a demand-side shock on domestic production or economy-wide growth. It is calculated in parsimonious way by adding up all the value added multiplier components, i.e., it sums up all the total incremental incomes to six types of labour, total operating surplus, mixed income and natural resource factor generated by all the economic sectors. For example, a one million Pula initial injection in demand for livestock output generates P1.18 million in GDP at factor costs as table 5 shows;

b) household income multiplier in column 2 measures the effects on total household income ensuing from growth of commodity output stemming from a shock and it is computed similarly as the sum of all the total change in incomes of the three household groups. An initial injection of one million Pula in demand for livestock output, for example, leads to an increase of P1.17 million in total household income as shown in table 2.

c) aggregate multiplier effects in column 3 of domestic activity output measures the impact of growth of commodity output on domestic production and is obtained by summing the total changes in gross output levels of the twenty-three production sectors stemming from a shock. For instance, a million Pula in demand for the livestock commodity elicit an increase in domestic production of P2.15 million as table 2 shows; and,

d) aggregate demand multiplier in column 4 is obtained by summing all the total increase in demand for commodities following from a demand-side shock. For instance, a one million Pula growth in livestock output leads to a P2.54 million total incremental demand for all commodities.

From a policy standpoint, large multipliers are desirable since they indicate that the expansionary effects of the policy initiative are quite large. Sectors with large multipliers tend to have relatively large linkages with other sectors and other parts of the economy. For instance, a million Pula injection in exogenous demand for commodity output of a production sector with relatively large economic linkages to other domestic sectors stimulates domestic production and generates factor and household incomes the most. On the basis of the SAM multiplier analysis, economic sectors that should be promoted are those that have largest economic linkages with other economic sectors as they potentially elecit economy-wide growth, employment and incomes the most.

Economic intuition suggests that an additional government spending should be directed to stimulating growth of output of domestic production in sectors that have relatively large linkages to domestic production and household income. The repercussions of an exogenous injection in demand for output of such a production sector ripple throughout a domestic economy via both production and consuption linkages. For example, when livestock production expands: (i) it demands additional intermediate goods like transport services, fodder and this demand, in turn, stimulates production in downstream activities/sectors to supply these intermediate goods; (ii) it supplies more output to upstream industries such as the meat and product processing industry and, thereby stimulating production in upstream industries; and, (iii) it generates additional incomes for factors and households, especially for farmers and farm workers, which are then used to purchase consumption goods.

4.2.1 Impact on Economic Growth

The simulation results in table 2 facilitate comparison across the twenty-three alternative development strategies: growth in livestock production; growth of other agriculture production; etc. Analysis of these comparative simulation results enable one to address the fundamental question of: does the ESP's targetted production sectors, indeed, potentially elicit economy-wide growth and accelerate economic diversification and job creation as well as induce a more equitable distribution of income the most? Following the custormary approach in the SAM multiplier modelling (see for instance, Ardnt et al., 2000; Breisinger et al., 2009; Diao et al., 2007), the total GDP multiplier is used to identify production sectors that potentially stimulate economic growth. As it measures a sectors' contribution to the overall increase in total value added following from a shock, it is a better indicator of domestic production than the aggregate output multiplier. A comparison of the GDP multiplier effects in column 2 reveals where additional spending potentially have the greatest impact in terms of domestic production.

Even a cursory analysis of the comparative simulation results in table 2 will immediately reveal the importance of the livestock production in Botswan's development strategy. With a GDP multiplier of 1.18, livestock production has the largest linkages to the rest of the economy. Banks emerges as the second most important in terms of expanding national GDP, with a GDP multiplier of 1.09. Wholesale ranks third, with a GDP multiplier of 1.02, and other trade, general government and real estate, with GDP multiplier of 1.00 each, ranks fourth in terms of economic-wide growth-inducing power. These comparative results imply that a one million Pula rise in the output of the livestock commodity potentially increases GDP at factor cost by P1.18 million. The analogous change in GDP are P1.09 million for banks, P1.04 million for wholesale and about P1.00 million for each of

the other trade, general government and real estate. Thus, an additional one million Pula of government spending potentially has the greatest impact in terms of growth in GDP when channeled to expansion of livestock production. Expansion in any of banks, wholesale, other trade, general government and real estate is almost as effective as in livestock production

The multiplier effects of retail, other agriculture, construction and hotels and restaurants are relatively modest and are as comparable to most of the remaining non-ESP targetted sectors, but larger than the multiplier effects of the mining industries. Retail sector (0.97) ranks seventh, other agriculture (0.89) tenth, construction (0.85) eleventh and hotels and restaurants (0.72) fourteeth in terms of generating additional GDP. The results imply that an expansion of one million Pula in demand for retail services generates additional P0.97 million in the GDP at factor costs, as expansion of the retail sector stimulates the demand for both intermediate and final consumption goods and services in the national economy. An identical expansion in other agricuture raises GDP by P0.89 million, in construction increases GDP by P0.85 million and in hotels & restaurants raises domestic production by P0.74 million.

The relatively modest multipliers are indicative of high leakages resulting from high import intensities of construction and hotels & restaurants. The difference in aggregate output multipliers and aggregate demand multipliers as shown in columns 4 and 5 respectively in table 5 indicate that much of the additional demand stemming from expansion of output in each of these production sectors is met by imports. This is especially the case for the hotels & restaurants, where demand increases by P2.18 million, but domestic gross output only grows by P1.66 million, reflecting that hotels & restaurants in Botswana are highly import intensive. Similarly, expanding construction leads to greater demand for imported intermediates, particularly refined petroleum products. In fact, the 2011 SAM shows that petroleum was over 21 percent of construction expenditure. Large leakages result in weaker production and consumption linkages in construction. The important point that the BotsSAMmod simulations underscores is that reducing large leakages in the construction and hotels & restaurants is critical to the success of the ESP, in particular, and Botswana's development strategy, in general.

By contrast, crop production and all the manufacturing sub-sectors have the weakest linkages to the rest of the economy. The GDP multipliers are 0.20 for arable agriculture, 0.23 for beverages, 0.30 for textiles and leather and 0.62 for meat and meat products. These GDP multipliers imply that one million Pula increase in crop production potentially generates P0.20 million increase in GDP at factor costs. The analogous change in GDP are P0.23 million for beverages, P0.23 million for beverages, P0.30 million for textiles & leather and P0.62 for meat and meat products. These sub-sectors

have the largest import intensities, especially beverages, textiles & leather and arable agriculture. Consequently, an overwhelmingly large share of the increase in demand for output of any of these production activities is supplied by imported goods and services. Thus, the sectors have extremely large leakages. To the extent that growth in arable agriculture, beverages, or textiles & leather production would generate a disproportionately small increase in national GDP, pursuing an arable-agriculture-led development or manufacturing-led development strategy is highly unlikely to be successful in Botswana, unless strategies are put in place to reduce the leakages. This can be done through supply-side initiatives targeted at increasing productivities in those sectors.

On the basis of GDP multiplier alone and if stimulating economy-wide growth had been the exclusive focus of the ESP's agenda, the quantitative

Table 2
Commodity Output Multiplier for comparative simulations

Sector	*Output*	*Value Added*	*Income*	*Value Added Ranking*	*Output Ranking*	*Value Added/ Output ratio*
Livestock	2.15	1.18	1.17	1	10	0.55
Other agriculture	1.68	0.89	0.88	10	15	0.53
Banks	2.05	1.09	1.07	2	12	0.53
Diamonds	1.19	0.60	0.23	18	19	0.50
Real estate	2.10	1.00	0.98	6	11	0.47
Other Mining	1.39	0.65	0.56	15	18	0.47
General government	2.19	1.00	0.99	5	8	0.46
Hotels & restaurants	1.66	0.74	0.72	14	16	0.44
Crops	0.46	0.20	0.20	23	23	0.44
Other trade	2.30	1.01	1.00	4	6	0.44
social services	2.16	0.95	0.93	8	9	0.44
Wholesale	2.43	1.04	1.02	3	4	0.43
Meat Processing	1.48	0.63	0.62	16	17	0.43
Insurance	2.33	0.94	0.93	9	5	0.41
Retail	2.48	0.97	0.95	7	3	0.39
Copper	2.25	0.84	0.83	12	7	0.37
Transport	1.78	0.62	0.61	17	14	0.35
Textiles & Leather	0.88	0.30	0.30	20	21	0.34
Construction	2.68	0.85	0.84	11	2	0.32
Beverages	0.73	0.23	0.22	22	22	0.31
Other	0.98	0.29	0.28	21	20	0.29
Business services	2.88	0.83	0.81	13	1	0.29
Coal	1.88	0.42	0.41	19	13	0.22

Authors': Model Simulations

insights derived from BotsSAMmod's comparative simulations suggest that it would be reasonable to allocate all the additional government spending to the development of livestock production. Increasing livestock production appears attractive because the sector has the largest linkages to the rest of the domestic economy in terms of domestic production.

4.2.2 Growth in Household Income

Table 2 sheds light on the impact of the alternative expansion scenarios on household welfare. The household income multiplier effects in column 3 further underlines the fundamental importance of the livestock sector in economic development of Botswana. Expansion of livestock production has the highest linkages with respect to generation of household income. A one million increase in livestock output potentially generates P1.17 million additional total household income. In contrast, the changes in total household income are only P0.20 million, P0.23 million and P0.30 million for an identical expansion in output of arable agriculture, beverages and textiles & leather respectively. The results imply that arable agriculture and manafucturing sub-sectors generally have relatively weak linkages with respect to total household income. Thus, expanding the arable agriculture and manufacturing is not an attractive policy option in terms of housheold welfare improvement.

4.2.3 Income Distributional Impact

As the ESP agenda is as equally focused on stimulating economy-wide growth as in accelerating economic diversification and job creation and poverty eradication, it is instructive to consider the likely distributional impact of this policy intervention. It is often argued that policy makers are likely to be interested in the impact of a policy intervention on households' welfare. In fact, the International Monetary Fund (2007), in its Manual on Fiscal Transparency, advocates for inclusion of some simple analysis of the differential impact of new policies and measures on household groups in the budget documentation.

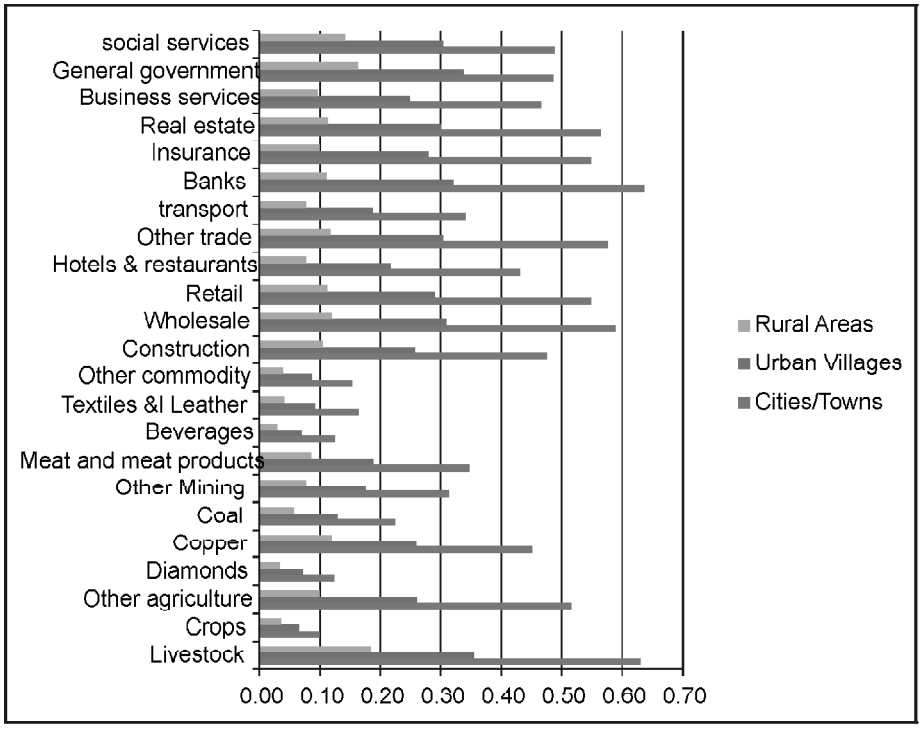
Figure 2 visually portrays the income multipliers for rural, urban villages and cities/towns household groups. The 'comparative results illuminate how the household welfare gains of the twenty-three alternative growth strategies are distributed across the three household groups. Differences in household income multiplier estimates indicate changes in income inequality.

The most striking result is that the rural household group have consistently lowest income multipliers whilst the cities/towns household group have invariably highest income multiplier effects. For instance, in the case of livestock, the ratio of the rural to the cities/towns multiplier is

0.29. The results imply that the cities/towns households, therefore, benefit relatively more than households in both urban villages and rural areas. In light of the fact that 20.5 percent and 43 percent of total households reside in cities/towns and rural areas respectively and roughly sixty percent and only 9 percent of the poor are residing in rural areas and cities/towns respectively (Stat Bot, 2013), the results imply that the economic stimulus package cannot be relied upon to reduce income inequality and, thereby substantially contribute to absolute poverty eradication. These results reinforce the evidence from both the descriptive analysis in section 2 showing that for Botswana the indirect or 'trickle-down' effects of economic growth cannot be relied upon to either substantially reduce income inequality or poverty in the poorest household group. The results[2] of the Macroeconomic Policy Section Staff of the Ministry of Finance and Economic Development (2016) of simulating the likely economy-wide impact of the Economic Stimulus Programme on the economy of Botswana with the aim of informing decision making undertaken with a recursive, dynamic multi-sectoral General Equilibrium Model for Botswana (BotsMod) also indicated that the household welfare gain would be distributed disproportionately to households in cities/towns. Rural households would need to be directly targeted if inclusive growth is also truly the principal objective of the ESP. That the economic structure is less naturally amenable to generating broad-based growth explains the finding of the Botswana Core Welfare indicator Survey 2009/10 of a disconnect between poverty reduction and economic growth in Botswana.

Descriptive analysis in section 2 reveals that the main cause of the income disparity is the distribution of operating surplus, i.e., income to capital. The households in towns/cities receive an overwhelmingly large share, of around 63 percent, of capita income whilst household in rural areas receive only around 8 percent of profits as shares, dividends and interest. If the rate of return to capital is the same across the production sectors, then the figures imply that most of the capital is owned by households group in cities/towns. The value added multipliers in table 3 indicate that expansion originating anywhere in the economy invariably benefit capital disproportionately more than labour. However, the disparity in the distribution of income in favour of households in cities/towns is lowest for crops, general government and livestock. The ratio of the rural to the cities/towns multiplier is 0.36 for crops, 0.33 for general government and 0.29 for livestock. The lowest corresponding ratios are for banks (0.17), for hotels & restaurants (0.18), insurance (0.18), other agriculture (0.19) and for wholesale and retail sectors ecah at 0.20. The results mean that growth of livestock and general government would lead to relatively less slow poverty eradication. By way of comparison, growth of banks and hotels & restaurants would lead to slowest povery reduction.

Figure 2: Income multipliers for Households



Source: Authors' Model Simulations

Table 3
Value Added Multipliers

Sector	*Professional & technical*	*Admin & managerial*	*Clerical*	*Skilled manual*	*Unskilled*	*Mixed income*	*Net operating surplus*
Livestock	0.06	0.02	0.05	0.12	0.09	0.53	0.29
Crops	0.02	0.01	0.02	0.04	0.03	0.01	0.08
Other agriculture	0.04	0.01	0.03	0.04	0.03	0.12	0.62
Diamonds	0.02	0.01	0.02	0.03	0.02	0.00	0.14
Copper	0.06	0.02	0.05	0.11	0.08	0.01	0.51
Coal	0.04	0.02	0.03	0.04	0.03	0.01	0.24
Other Mining	0.04	0.01	0.03	0.07	0.05	0.01	0.37
Meat & meat products	0.03	0.02	0.03	0.06	0.04	0.15	0.31
Beverages	0.02	0.01	0.02	0.02	0.01	0.00	0.14
Textiles & Leather	0.02	0.01	0.02	0.05	0.01	0.01	0.18
Other commodity	0.03	0.01	0.02	0.03	0.01	0.01	0.16
Construction	0.07	0.03	0.05	0.07	0.04	0.01	0.57
Wholesale	0.05	0.04	0.09	0.05	0.04	0.01	0.74
Retail	0.05	0.04	0.09	0.05	0.04	0.01	0.69
Hotels & restaurants	0.03	0.02	0.04	0.02	0.02	0.01	0.59

contd. table 3

Sector	*Prof-essional & technical*	*Admin & mana-gerial*	*Cleri-cal*	*Skilled manual*	*Un-skilled*	*Mixed income*	*Net opera-ting surplus*
Other trade	0.05	0.04	0.09	0.05	0.04	0.01	0.73
transport	0.05	0.03	0.05	0.06	0.03	0.01	0.39
Banks	0.07	0.04	0.06	0.03	0.02	0.01	0.85
Insurance	0.07	0.03	0.06	0.03	0.02	0.01	0.72
Real estate	0.10	0.04	0.09	0.04	0.03	0.01	0.69
Business services	0.07	0.03	0.06	0.04	0.03	0.01	0.58
General government	0.35	0.03	0.12	0.09	0.08	0.02	0.31
social services	0.20	0.02	0.08	0.06	0.10	0.03	0.45

Source: Authors' Model Simulations

5. CONCLUSION

This paper sought to quantitatively explore the prospects of the economic stimulus programme to unlock economic development in Botswana. The programme was instituted intentionally to address the challenges of stimulating a more broad-based economic growth and accelerate both economic diversification and job creation and, thereby eradicate persistent absolute poverty. Specific questions that the present paper has sought to address were: which production activities potentially have large linkages with the rest of the national economy; and, what are the economy-wide growth and poverty-reduction prospects of the production sectors? The metholodical approach adopted relied on descriptive statistics gounded on the SAM data base and undertaking a myriad of comparative static simulations with a constrained SAM multiplier model that has been parameterised to the Botswana data base.

The main findings of the present papers are as follows. Firstly, the livestock sector has the largest prospective linkages with the rest of the domestic economy. Expanding livestock production induces higher overall economic growth, but has relatively less prospect for job creation than other production sectors. Construction and hotels & restaurants, which are proxies for infrastructure development and tourism respectively, have modest linkages with rest of domestic economy and are comparable to those of most non-targetted production sectors. Reduction of high import intensities in these production sectors can substantially unlock their overall economic growth and job creation. Most importantly, both construction and hotels & restaurants emerge important in terms of their potential for job creation than most sectors. Conversely, arable agriculture and manufacturing sub-sectors have the weakest linkages with the rest of the national economy. The sectors have the highest leakages owing to import intensities. These exttremely limit their growth prospects, especially for crop production. However, manufacturing is relatively important in terms of job creation than most non-targetted sectors. And secondly, irrespective of expansion

anywhere in the economy, households in cities/towns benefit relatively more than households in urban villages and rural areas. This happens because the economic structure is predisposed to chanelling additional incomes to households in cities/towns than to rural households. The skewness in the dsitribution of income towards cities/towns household group is, however, lowest for arable agriculture, followed by general government and livestock in that order.

The important point that the present paper draws attention to is that designing an economic stimulus programme that exploits the prospective growth linkages towards economic diversification and poverty eradication is predicated, in a fundamentally sense, on a diversified growth strategy that encompasses livestock production, tourism and construction. As expansion of manafacturing and arable agriculture production are least ineffective in stimulating the economy, it appears that they are targetted for political economy considerations, especially social justice. Arable agriculture, in particular, appears to be targetted on grounds of social justice as most of the poor derive their livelihood directly from arable agriculture. It appears that the design of the ESP is based on prior knowledge of multiplier effects. Another main message of the present analysis is that the ESP is unlikely to be a strong driver of inclusive growth and poverty reduction. For Botswana, economic growth needs to be accompanied by a policy package that is targetted directly to the poorest households. Overall, the paper concludes that the ESP's sectors of inteventions appears to have been selected either for their potential to stimulate growth, for job creation or for social justice.

Caution needs to be duly exercised when utilising these results. One must constantly bear in mind that the results and their associated policy implications emanated from analysis of simple descriptive statistics and comparative static SAM multiplier model simulations, both of which are grounded on the 2011 SAM for Botswana. Therefore, the policy implications are based on the income and exependiture shares as well as the production technology that prevailed in 2011 as reflected in the Botswana SAM.

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A1:BotsSAMmod SAM accounts

Endogenous accounts

Commodities	*Activities*	*Factors*
Livestock	Livestock	Professional & technical
Crops	Crops	Admin & managerial
Other agriculture	Other agriculture	Clerical
Diamonds	Diamonds	Skilled manual
Copper	Copper	Unskilled
Coal	Coal	Mixed income
Other Mining	Other Mining	Operating surplus
Meat and meat products	Meat and Meat Products	Natural resource
Beverages	Beverages	
Textiles &l Leather	Tanning & Leather prod	Households
Other commodity	Other sectors	Households - Cities/Towns
Construction	Construction	Households - Urban Villages
Wholesale	Wholesale	Households - Rural
Retail	Retail	
Hotels & restaurants	Hotels & Restaurants	
Other trade	Other trade	
transport	Transport	
Banks	Banks	
Insurance	Insurance	
Real estate	Real estate	
Business services	Business services	
General government	General government	
social services	Social services	
Exogenous		
Enterprises	Taxes on income	
General government	Mineral Tax	
Customs & Excise Revenue	Taxes on Property	
Taxes on Motor Vehicle	Subsidies on production	
VAT on households from Cities	Private saving	
VAT on households from urban villages	Government saving	
VAT on households from rural areas	Stock changes	
Business and Professional License	Rest of world	