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Empirical Assessment of Agricultural Development in Manzini Region, Swaziland

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Abstract
Agricultural development strategy should be directed towards the shaping of the agricultural sector, by increasing the number of both small-scale and large farmers, adoption of incentives and increased yield/ha. The aim of this study was to assess the performance of both small-scale and large scale maize farmers in Manzini region, Swaziland. Both secondary and primary data sources were used from a sample of 170 farmers. Two Ordinary Least Square regression models (OLS) were used to analyse both farmers'

characteristics influencing maize outputs, based on cross-sectional data collected in the study area. The model predicted about 71.17% of the sample. The results suggested that small scale farmers maize output differed from that of large farmers' maize output. In fact, the estimated coefficients of yield/ha, input price, area of land and rainfall were the significant determinants of small-scale farmers' maize output, while the coefficients of area of land, fertilizer, input price, labour, yield/ha, as well as technology and rainfall were the significant determinants of maize output of the large farmers. The difference in maize production was mainly caused by technology of production and know-how.

Introduction

Agricultural development and other policy instruments adopted by Swaziland in the past have had little effects on development of agricultural sector and the farming population as a whole. The performance of agricultural sector declined, with sharp fluctuations in food supply and prices, with negative impact on economic growth and development. These factors have been some of the symptoms observed in this sector (Dube, 2006). The country's recent national development strategy emphasises the role of agricultural and rural development in promoting growth and alleviating absolute poverty. In response to the major structural constraints identified, the pillars of this strategy are the enhancement of agricultural productivity and improvement of transportation infrastructure (Alasia & Philips, 2002). Swaziland should be happy about this turn-around in events given that the agricultural sector has been one of the main sources of employment, providing jobs to almost 75% of the population (Central Bank of Swaziland, 2010). About 80% of the country's population live in rural areas where they have their livelihoods from agricultural and related activities. It is estimated that five out of ten Swazis live in poverty (FAO and Government of Swaziland, 2006). Co-operation between Swaziland and USAID for led to increased rural household income by making a significant contribution to agricultural sector of about 38.6% to the country's gross domestic product growth in 2001. During the same period both commercial and family agriculture grew by 11, 7% and 15, 5% respectively (USAID, 2002). Agricultural sector not only contributes to the production of food for all, but also to both growths in gross domestic product and foreign exchange earnings in large proportions (Tshibaka, 1986; Kongolo, 1994). The services which supply inputs, capital and credits to farmers, purchases and stores, processes and sells the products, as well as the economic and fiscal regulations, all these work sufficiently and

they cannot be taken for granted. Yields that have been limited on many holdings following the traditional agricultural practices have improved and agricultural outputs have increased (Fenyes, 1982).

The Swazi economy is strongly export oriented. In 1995, about 79% of GDP was generated by exports, with the farm sector responsible for more than 32%. However, even these figures understate the real value of agriculture in the economy. Manufacturing, for instance, contributes about 34% of GDP, but in recent years, more than three quarters of industrial output has involved adding value to farm products. The agricultural economy is characterized by dualism. Commercial arable estates generate more than 81% of the value of all agricultural output (and 8.6% of GDP). By contrast, traditional farming accounts for some 11% of the value of agricultural output, not exceeding than 1.2% of GDP (SADC, 2007). The commercial sector consisting of large sugar estates on Title Deed Land (TDL) and some smallholder farmers on Swazi Nation Land (SNL) predominantly cultivates irrigated sugar, citrus and pineapple while on the major part of Swazi Nation Land; the agriculture is overwhelmingly geared to rainfed subsistence farming with maize as the predominant crop. A major constraint for the development of the resource poor SNL farmers is the non-availability of irrigation water which could enable them to increase their productivity. The only cash crop of any significance is cotton (Nzibandze, 2007). Generally, the modern TDL sector, with less than 40% of the cultivated land, accounts for most of the agricultural output - more than two thirds. SNL agriculture, with more than 60% of the cultivated land, contributes 22% of crop production and livestock the rest.

Given the above background, the main purpose of this study was to assess the impact of alternative agricultural and rural development policy options that have instrumental influence on the agricultural sector in the country (Government of Swaziland, 1999). The study focuses on growth and development of the agricultural sector in Swaziland from 2000 to 2008. The worthwhileness of its recent development policy is also examined from the two different perspectives. The first was to provide the contribution of the agricultural sector to GDP and the second was to analyse, interpret and evaluate the overall technical impact and distributional aspects associated with the output of the main crop, maize, by both small and large farmers in the country. This study is organized as follows: section 2 presents a review of agricultural situation in Swaziland, section 3 discusses research methods, section 4 presents results and discussions, and section 5 concludes.

Review of agricultural situation in Swaziland

For over a third of century, a paper entitled "The Mechanics of Economic Development:

A Quantitative Model Approach", was published with the aim of explaining the basic and simple calculations needed to start a development process (Wadsted, 1993). The emphasis put on long-term evaluation of the economy dates back to Adam Smith, Ricardo, Keynes and even some of the earlier economists and writers. But the gap between rich and poor countries, its causes and the means to remedy this situation became the subject of more continuous, systematic studies and understanding of the development process and its policy implications (Todaro, 2000). However, development economics has evolved in the direction of finer and finer specialisation (Nafziger, 1997). The formulation of development policy should be to meet the meta-theoretical criteria that determine the ability of framework to effectively guide research and ultimately the development policies to achieve a set of objectives (Van Zyl & Vink, 1992). This approach includes rigorous and analytical definition of the objectives and concepts formulated to meet them (Thirlwall, 1999; Todaro, 2000).

Complementary policies such as investments, credit facilities and price control were not instituted in favour of all farmers, co-ordinated and directed to assist both small, medium and large farmers in the past (Addington,1994). In some cases, only some few small farmers were assisted by the government (Ministry of Agriculture, 2004). Despite a lack of co-ordination, the proportion of operational budget accounted for about 60% as against 40% for development. In addition to the decline in crop production and the producer prices, there was a failure to fully control agricultural activities, especially crops and livestock production. In addition, there was also a decline in net capital inflows and natural disasters (floods and droughts) which also contributed to the poor performance of the agricultural sector (Ministry of Agriculture, 2004).

Agricultural policy such as substantial liberalization and simplification of the agricultural production systems through a comprehensive revision of credit system, income distribution, price control and interest rates were not effectively instituted (Addington, 1994; Ministry of Agriculture, 2004). Changes in agricultural policies and other related development policy instruments were highly erratic, creating uncertainty not only in the agricultural development policy formulation and implementation processes,

but also in the development of the agricultural sector as a whole. These policy instruments could have been utilized to help shape the structure of incentives for both farm and non - farm sector in the country (FAO, 2001). The government has always attempted to control agricultural prices, a policy that was found to be relevant for both farmers and con summers. This approach helped to protect and assist both farmers and consumers against unscrupulous middlemen (Central Bank of Swaziland, 2010). Official producer prices for most major crops have been low, but nothing could influence this policy since the government was the sole statutory monopoly controller of the producer price in the country.

The country expenditure and credit were increasingly financed by income received SACU and some economic activities, and were supplemented by large amounts from donors. The average share of the agricultural earnings in the government budget exceeded about 15% during 1998/99 financial year. This has not been a small amount compared to the size of the farm population and its contribution to agricultural productivity. However, the overall yields and output were always below the average and the contribution of agriculture to GDP continued to decline (FAO, 2004). The decline in percentage of the agricultural sector's contribution to GDP was mostly attributed to the deterioration in the basic infrastructure conditions. Much of the existing rural roads network were destroyed by rendering transportation costly, a fact which could have contributed to the declining output in agriculture vis-a-vis the non-agricultural products. Further more, efforts to raise output among farmers and to improve and develop human resource serving the farm community in terms of training, research, extension and provision of support services both were limited and were also not well co-ordinated (FAO, 2009). The agricultural knowledge systems requires the involvement of both producers and consumers, not merely as the targets of advisory services and exhortations, but as pupils at farming training centers, who are not as the passive victims of development done to them by a remote government from afar (Cox,1985). These are the people who have much to tell about their soils, weather, crops, animals, diseases and pests, as well as about own purposes, progress and difficulties they have (Bunting, 1985).

Agricultural development strategy should be directed towards the shaping of the agricultural sector, by increasing the number of both small-scale and large farmers, adoption of incentives and increased yield/ha (USAID, 2002). Swaziland recent agricultural development strategy was aimed at cutting hunger in order to advance the role of agricultural-related policy and

investment. This initiative has assisted private and public actors to jointly implement strategies that increase investment, strengthen the competitiveness of the country's farmers and related businesses in the global economy (Government of Swaziland,1999), and by expanding the benefits of agricultural research and extension (Ministry of Agriculture, 2004). Overall, the agricultural sector has been able to improve since the beginning of 1998 as a result of investment brought into the country by foreign investors/ producers and other agricultural incentives from the government (Central Bank of Swaziland, 2009).

Methodology

The study was conducted in Manzini region of Swaziland. Manzini region was selected because it has been the centre of many agricultural development activities in recent years. Manzini is Swaziland's largest urban centre, known as "The Hub" of Swaziland. Swaziland's primary industrial site at Matsapha lies near the town's western border. Manzini region has a population of about 319,530 (Sorin Cosoveanu, 2007). Known as Bremersdorp until 1960, it is the capital of the Manzini Region. A commercial centre from the time a trading post was opened in 1885, Bremersdrop was designated a township in 1898. British Colonial authorities, who had administered Swaziland since 1894 as their national administrative headquarters, stipulated that the settlement would bear his name. "Dorp", an Afrikaans word for "small town." The name reverted to its original Swazi name, Manzini, in 1960. The town was a British colonial headquarters from 1890 but was destroyed in 1902 amid the Anglo-Boer War, when the administrative centre was transferred to Mbabane. However, Bremersdorp (later Manzini) subsequently remained the commercial, agricultural and transportation heart of Swaziland, earning the town the nickname "The Hub." Since its inception in the 1920s, the Agricultural Show (name later changed to the Swaziland International Trade Fair) has been the country's largest and best-attended annual event. Residential areas radiate outward from the Central Business District. At the western terminous of the city on the highway to Mbabane is KaKhoza Township, a poor neighborhood with the appearance of an informal settlement. North of downtown beyond the Mavuso International Trade Fair, along a bypass road was rebuilt for the opening of the Mavuso Trade Fair, is Helemesi Estates. Until the 1960s Swazi business proprietors used Europeans as fronts in order to operate "Native Eating Houses" and other establishments (Swaziland Discovery, 2011)

The data collection begun with the literature review of both small and large scale farmers in general and of the Swaziland agricultural sector in particular. The first step taken in planning for data collection was to visit the study area during January – February 2011. The study was based on both secondary and primary data. The sources of secondary data include government departments, FAO reports, SADC reports as well as news papers and magazines. A brief structured and open ended questionnaire was also used for data collection through personal interviews with some respondents (Behr, 1993). A total of 170 farmers were selected to constitute the study sample of which 67 were small and 103 large farmers. The data collected was cross checked for possible discrepancies that could be rectified (Ray, 1989). The data was then analysed using Excel Program for Windows.

The model specification

The model specification to capture the effects of agricultural development policy in this study has some degree of flexibility in data (Fernandez-Cornejo, 1998). It assumed that farmer's choices among alternative productive activities are influenced not only by customs and habits, but also by the incentives and opportunities given to them to increase their income and social status, including the risks associated to these opportunities as they confront them. Strategy leading to improvement in incentives can reduce risks and exert the pull on by farmer (Cox, 1985). The development of appropriate model assumes that farmers are likely to be different in many aspects. Of course such differences could be manifested in the process of evaluating the two groups of farmers following the selected variables in the model. The differences between farmers could also be heightened when there are significant differences in the endogenous variables of the model (Green, 1993). Understandably, farmer's decisions to produce were also influenced by the extent of development policy based on alternative choices that maximize their perceived production function, known also as their socio-economic function.

The OLS regression specification

The Ordinary Least Squares (OLS) regression was used to identify the socio-economic effects of development strategy on the farmers. This technique is discussed in many statistical and econometric texts (Berndt, 1991; Madalla, 1992; Gujarati,2006). This econometric technique is suited to regression models where a continuous variable is linearly dependent upon a set of independent explanatory variables, and it can be generally expressed as follows:

$$Yi = \beta o + \beta X1i + \beta X2i + \beta X3i + \mu i \quad (1)$$

where

Yi = dependent variable

X'i = independent variables

β'i = regression coefficients;and

μ'i = stochastic term

One of the assumptions when using this model is that the explanatory variables are not linearly correlated, that is there is no multicollinearity (Gujarati,2006). If they are correlated one of the remedial measures is to apply the principal component analysis to the explanatory variables that are correlated (Kennedy, 1992).

Results and discussion

The regression coefficients for the two groups of farmers are presented in Table 1 and Table 2 respectively and are helpful in comparing the performance of both farmers. The results suggest that recent agricultural development strategy has a major impact on both small-scale and large farmers. This has been attributed mainly to the implementation of the current co-operation for national agricultural development, with the aim of promoting growth by alleviating poverty. Overall the results of the small-farmers' model suggest that estimated coefficients of yield/ha (YLD), input price (INPP), area of land (LND); and rainfall (RNFL) variables were significant at 1% ($P < 0,01$), 5% ($P < 0,05$) and 10% ($P < 0,10$) probability levels respectively. However, variables such as fertiliser (FRT), labour (LBR) and technology (TCHN) were not significant (Table 1).

Based on the model expectations, the regression coefficients for fertilizer (FRT), rainfall (RNFL), labour (LBR), and technology (TCHN) displayed unexpected negative sign while yield/ha displayed a positive sign. The standard errors of the small farmers were bigger; they therefore suggest that the earning capacity of the small farmers was less compared to the large farmer's income earnings. The coefficient of determination R^2 of 78% suggests a good for the model used (Gujarati, 2006). Estimated coefficients of the large farmers suggested that the area of land (LND), quantity of fertilizer (FRT), input price (INPP), labour (LBR), and yield per hectare (YLD) were all significant at the 1% ($P < 0,01$), while the coefficients of technology (TCHN) and rainfall variables (RNFL) were significant at the 5%

($P < 0,05$). The regression coefficients for fertilizer (FRT) and technology (TCHN) variables displayed unexpected negative signs. This could be perhaps attributed to a lack of the ability to innovate and as a result, it will take some time for them to be able to innovate new technologies of production (Table 2).

The estimates of own price elasticities of maize supply were about -0.138 and 0.326 for both small scale and large farmers respectively. The negative sign of the price elasticity of small farmers is an indication that their outputs were still less in quantities compared to the higher production price. According to the regression coefficients of the models, it can be argued that the explanatory variables were the main determinants of maize output for both small and large farmers in Manzini region. Tshibaka (1986), estimated the own-price elasticity coefficient of sesame supply in Zaire of about 0,121; while Oyejide (1986), estimated the own price elasticity coefficient of sesame supply in Nigeria of about 0,251. Agricultural intervention price policy measures have been the main policy devices used by most governments to introduce changes in the agricultural sector because they are the main determinants of crop output. They determine not only the intra-and intersectoral movements of the resources, but they also affect the availability of resources such as foreign exchange earnings (Oyejide, 1986). Any change of official policies on agriculture will impact on production, consumption and labour supply in this sector. Policies such as credit, limited interest rates and tax breaks can be used to improve the conditions of small farmers (Tshibaka, 1986).

The estimate of own-price elasticity coefficients of maize in this study provides some useful indications of the positive impact on farmers' conditions. A comparison of own-price elasticity estimates of maize output from the other studies with those estimated in this study could be misleading. However, the own-price elasticity estimates in this study of about 0.326 and -0.138 for both large and small farmers in Manzini region could be seen as acceptable. Generally, it can be hypothesised that the expected input prices, weather conditions and technology of production were the main determinants of output response in agriculture (Bond, 1985; Tshibaka, 1986). This general formulation was considered as the basis for estimating the own-price elasticity of maize output in this study, by taking into consideration the peculiarities of the Swaziland agricultural sector. The empirical evidence on the determinants of crop output response was an important approach in identifying major factors affecting the performance of crop production in

particular and the performance of the agricultural development policy (Cleasby et al, 1994).

Finally, the coefficients of determination (R^2) for both small and large farmers were 0, 78 and 0, 87 respectively. This suggests an overall measure of goodness of fit of the model, or the models seem to fit the data reasonably well. It also indicates that about 78% and 87% of variability in the models of both small and large farmers could be attributed to explanatory variables included in the models. The Durbin Watson statistic (DW) for both farmers was about 0,257 and 0,213 respectively, suggesting the absence of autocorrelation in explanatory variables (Gujarati, 2006).

Conclusion

The importance of technical task and policy-makers in the country's development seem not so much to do yesterday's work better, but to prepare realistic package of technology, policy measures and other strategies that enable the country to work for a very different future. Development strategy has given a boost to income of both small and large farmers in the region. Several studies have indicated that development policies have strong and lasting effects on the agricultural sector through their impact on relative prices and production incentives. They have also indicated that parts of the farm population (mostly small farmers) have been substantially forgotten in the process of policy formulation and implementation, both explicitly and implicitly. The regression coefficients for both farmers were quite different in nature, suggesting differences in productivity and income earnings. The statistic R^2 suggested a good fit of the data while the low coefficient of DW indicated an absence of autocorrelation. Agricultural development policy measures should focus more on how to improve the social and economic conditions of both rural and semi-urban communities, and by imparting development incentives to all small and large producers. The focus should be especially on small producers with potential capacity to produce and to invest in the agriculturally related activities, because they are the backbone of all food produced and consumed in rural areas.

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Table 1: Estimated Regression Coefficients with Output as dependent variable, Small Farmers, Manzini Region, Swaziland, 2000 – 2008

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Dependent variable is OUT: N = 15

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Regressor	**Coefficients**	**Standard Error**	**T – Ratio [Prob]**
CONST	-146. 10	0.88231	6.3421 [0.065]
LND	0.10561*	0.45383	0.02384 [0.000]
FRT	-0.12930	0.77445	- 0.01124 [0.001]
INPP	0.1387**	0.59734	1.5768 [0.002]
YLD	1.4451**	0.25873	0.32678 [0.004]
RNFL	-0.34672***	0.01675	- 0.01976 [0.000]
LBR	-0.25148	0.00037	-0.01462 [0.458]
TCHN	-0.00941	0.09873	-0.02354 [0.009]

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R–Squared	0.78002	R-Adjusted	0.63112
S . E. of Regression	0.012638	F-Stat.	4,2157
Mean of Dependent Variable	4.2873	Log Likelihood	108.3760
Residual Sum of Squares	0.13347	DW-Statistics	0.25724
DW – Statistic	0.25724		

*, **, and *** are significance levels at the 10%, 5% and 1% probability respectively.

Table 2: Estimated Regression Coefficients with Output as dependent variable, Large Farmers, Manzini Region, Swaziland, 2000-2008

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Dependent variable is OUT: N = 15

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Regressor	Coefficients	Standard Error	T – Ratio [Prob]
CONST	235. 2043	0.81674	31. 2177 [0.560]
LND	0.5692***	0.06537	6.2384 [0.003]
FRT	-3.5363***	0.14286	21.4829 [0.120]
INPP	2.6364***	0.08964	5.7538 [0.002]
YLD	1.4451***	0.04532	-3.6673 [0.104]
RNFL	0.5874**	0.04967	1.4980 [0.000]
LBR	3.4211***	0.15083	-4.5432 [0.458]
TCHN	-0.3694**	0.08857	6.1996 [0.009]

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R – Squared	0.87064	R- Adjusted	0.83807
S . E. of Regression	0.066782	F-Stat.	4.215
Mean of Dependent Variable	7.4876	Log Likelihood	214.421
Residual Sum of Squares	0.2793	DW- Statistic	0.21373
Akaike Info. Criterion			

*, **, and ***: Level of significance at the 10%, 5% and 1% probability respectively.