The Efficiency of Small-Scale Agriculture in Limpopo Province of South Africa

By

Meliko , Majory O.; Phinea, K. Chauke; and Oni, Stephen A.

Poster presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19-23, 2010

The Efficiency of Small-Scale Agriculture in Limpopo Province of South Africa

Majory O. Meliko[1], Phinea, K. Chauke[2] and Stephen A. Oni[3]

Address for correspondence

Majory Ongie Meliko

Department of Agricultural Economics

School of Agriculture, Rural Development and Forestry

University Of Venda

Thohoyandou, 0950

Tel: +27 72 325 2733(Cell),

Email: melikiomo@yahoo.com

The Efficiency of Small-Scale Agriculture in Limpopo Province of South Africa

[1] PhD Student, Department of Agricultural Economics and Agribusiness, University of Venda, Thohoyandou

[2] HOD: Department of Agricultural Economics and Agribusiness, University of Venda, Thohoyandou

[3] Professor Emeitus: Department of Agricultural Economics and Agribusiness, University of Venda, Thohoyandou

Abstract

The aim of this study is to evaluate the efficiency of the small scale farmers for the production year 2006/2007 in Limpopo province using policy analysis matrix. A total of twelve production systems were selected. Result shows that all were profitable under market condition with existing policies and all except Dry land maize had comparative advantage suggesting efficiency in the systems. Ranking the systems in term of PRC and DRC, irrigated vegetables like Potatoes, cabbages and tomatoes had higher profitability and comparative advantages than field crops like both dry and irrigated maize, Peanut and Beans. Despite competiveness in all and comparative advantage in most systems, these was not due to policy intervention as incentive indicators, e.g. SRP, shows that all production systems are being taxed indicating little motivation from policies for small scale farmers to production.

1. Introduction

South Africa has undergone immense social and economic change over the last 10 years led by the abolition of apartheid. An underlying principle for virtually all government policies is to bring the previously excluded black community into the mainstream economy through job creation and entrepreneurship (OECD, 2006). As part of the South African agricultural policy, the government intends to increase the income of the poorest group in the society by making small-scale agriculture more efficient and internationally competitive, so as stimulate increase in number of small-scale and medium-scale farmers and conserve agricultural natural resources (IPTRID, 2000; NDA, 1998).

South Africa is however, a water scarce country with very low rainfall at an average of about 500mm per annum which is strongly seasonal and highly irregular in occurrence (Oosthuizen,

2005). Irrigation is an important factor in the production of permanent crops or in obtaining high yield from field crops, where water availability is an important limiting factor in agricultural production especially under South Africa situation (Oosthuizen, 2005).

South Africa has about 1.3 million hectares under irrigation. However, with limited opportunity for large scale expansion due to limited water availability, smallholder irrigation is envisioned to play a vital role in South Africa in achieving household food security and improving the livelihood of the country's rural population (IMWI, 2007).

Since government finance is a limited resource with conflicting needs, its efficient allocation should be paramount to any policy objective. Therefore a comprehensive assessment of small-scale agriculture system is essential to see if the government's intervention is worthwhile.

1.1. Objective of the Study

The main objective of the study is to determine the efficiency of the small-scale irrigation sector of Limpopo Province.

The specific objectives of the study are

- To assess the Profitability of the small-scale farmers
- To assess the comparative advantage of the Small Scale farmers
- To determine policy divergence in the sector

2. Literature Review on Market and Efficiency

Agricultural policy is a critical element in determining the rate and pattern of economic growth (Monke and Pearson 1989). The importance of food as a basic need and in providing cheap food to keep wages low in the process of economic development has caused governments to intervene in food market in various ways (Najafi, 2005).

Many governments intervene directly in agricultural product markets, with the objectives to redistribute income, generate public revenues, correct market failures and provide incentives to producers (Braverman, et al., 1983). These policies influencing the agricultural sector fall into one of three categories – agricultural price policies, macro-economic policies, or public investment policies.

Economic theories hold that markets are fundamental to the operation of an economy, as movements in supply and demand send signals to economic actors through changes in prices, and these guide the actions of individuals (Dorward et al. 2004a). Where markets are ‘efficient’, supply and demand interact without impediment or distortion, and prices move quickly to reflect changes in the demand or supply of any good or service. From the theoretical perspective, when markets are efficient and fully coordinated, economies will be at their most efficient level and this will stimulate growth. Productive resources such as land, labour and capital will be allocated effectively between alternative and competing uses, specialisation will occur according to the principle of comparative advantage and the benefits of growth in one area of the economy will be effectively translated to other parts (Dorward et al. 2004b).

However, markets rarely, if ever, work in the perfect stylised manner described above. In many situations, markets are said to 'fail' (Dorward et al. 2004b). According to Pearson et al. (2003), a market fails if it does not generate competitive prices that reflect social opportunity costs and lead to an efficient allocation of products or factors. They gave three basic types of market failures that create divergences. The first is monopoly (seller controls over market prices) or monopsony (buyer controls over market prices). The second are negative externalities (costs for which the imposer cannot be charged) or positive externalities (benefits for which the provider cannot receive compensation). The third are factor market imperfections (inadequate development of institutions to provide competitive services and full information or asymmetric information). Such failures often motivate government intervention in markets, although interventions have often done more harm than good, either by distorting incentives or by creating public sector market power. The state therefore needs intervene to correct these market failures, as it was believed that the private sector was either too weak or too poorly motivated to act in the national interest (DFID, 2004). Government intervention plays a critical role in 'kick starting' markets by establishing coordinated exchange systems at a critical time (Dorward et al. 2004b).

It has been demonstrated historically that almost all successful countries have built up their industries through some form of selective sheltering of domestic producers. Protection of infant industries enables domestic companies to get established and to acquire the scale, knowledge, and technology to compete with already established international competitors **(**Legrain, 2006). According to Dorward et al. (2004b), markets will fail in poor economies, if states do not coordinate them beyond a narrow range of public goods interventions. This implies that state involvement, of some sort, is a necessary condition for markets to work. For instant, Owuor,

(1998) agues that poor households in Kenyan generally perceive market to be too risky for the purchase of their food needs. Therefore these households cannot rely on the market to obtain their food needs. He suggested policy intervention to reduce costs in the food system so that households may be able to shift into higher-valued crops and increase their agricultural income without putting their families in jeopardy of acquiring food. Also**,** public investments in rural sectors does not only contribute to growth, employment, and wages in rural areas as investments in infrastructure can raise returns to agricultural producers or lower agricultural costs of production, but also help the development of the national economy by providing labour, human and physical capital, cheaper food, and markets for urban industrial and service development (Fan et al., 2004, and Pearson et al. 2003).

According to Ahmad and Martini (2000), provision of the public goods, correction for imperfect markets like rural credit and externalities are efficiency corrections, while issues like income distribution and price stabilization are normative.

Anderson et al., (2006) argued that despite the strong case in economic theory for governments in developing countries to implement sizeable public investment programmes to raise the rate of economic growth, empirical evidence on the links between public investment and economic growth is somewhat inconclusive and that although there is more evidence that public capital is productive, in the sense that it complements private capital and other factors of production, there is a clear need for caution with the choice of the optimal investment level and allocation across sectors. The case for a rise in public investment needs to be assessed on a country-by-country basis, according to the structure of its economy and its initial physical public capital stock.

Tariffs also have a disproportionate effect on the poor. While farmers and landowners are better off in terms of access to local food and potentially higher incomes, they are still worse off because of higher prices and limited access to imported food in times of domestic shortfall. However, the effectiveness of border measures also depends on whether or not the higher prices actually reach poor farmers in rural areas (Tutwiler and Straub, 2005).

In their assessment of the competitiveness of Indian cotton production Mohanty et al., (2002) concluded that trade liberalization and domestic policy reforms that alter the current levels of effective protection could significantly affect the collection of crops produced in different regions of the country

However, Arndt and Tyner (2000) stated that there are available evidences to indicate that decreases in protection rates for agricultural products tend strongly to increase the welfare of urban households and may or may not harm farm households.

In terms of economic concept of a perfectly competitive market**,** policies influencing the agricultural sector can be broadly partitioned into three categories: market distorting (Restrictions on investment, imports and exports, production and distribution, and price controls), market correcting (Examples are subsidies for the production/supply of infrastructure services, e.g. water, roads, highways, electricity, telecom connectivity) and market creating policies (an important subcategory of market correcting policies. An example of this would be a subsidy on issue of and/or holding of debt of higher tenure that leads to the creation of a long term debt market)

Virmani (2004). However, a given policy may traverse the spectrum from market creating to market distorting over a period of time depending on the economic environment and the evolution of market institutions and the quality of governance. An example is a study carried in Malawi by Nakhumwal, et al. (1999), who found out that despite scrapping of most price-distorting policies, the Malawian agriculture is still haunted by distortions created by previous policies. Lack of serious and aggressive private sector participation suggests that it will take some time before the benefits of market liberalisation may be realised and appreciated.

Kirsten, et al. (1998) stated that protection usually creates a wedge between market (private) prices of commodities and their economic (social) prices. They argued that whenever discrepancies exist between private and social prices, the interest of the farmers and that of the state diverge. On the one hand, a crop can be profitable to farmers (e.g. because of input or output subsidies), but its production may not represent efficient use of resources from the point of view of the nation. On the other hand, a crop can be unprofitable to farmers (e.g. due to taxes imposed on output or input prices), however its production may represent an efficient use of the nation's resources**.** Hence, by comparing private profitability with social profitability not only can the overall effect of government policies be measured, but the influence of individual policies can be quantified by disaggregating the overall discrepancy into its constituent parts Nakhumwal, et al. (1999)

Distortions in the context of production and marketing of agricultural commodities can be defined as those interventions, which lead to price alterations that farmers face i.e. if prices are higher or lower and quantities produced, bought, and sold are also higher or lower than the levels that would usually exist in a competitive market, therefore affecting their incomes and welfare. Distortions

create incentives or disincentives for production systems and the long-term environment for the development and sustainability of the markets, and of agricultural production, hence directly having impacts on poverty alleviation initiatives (Rweyemamu and Kimaro, 2006).

Agricultural markets can be distorted or prevented from working efficiently in many ways. One obvious hindrance is that of national or regional borders, including tariff and nontariff barriers which discourage imports. Another, are subsidies or other aids which encourage exports. Another form of hindrance are domestic policies, including price supports, production-distorting income supports, production quotas or restraints, and input subsidies, all of which can distort production or marketing patterns. All such interferences with agricultural markets represent heavy costs for global commerce, national economic growth, farmers, consumers and the environment (IPC, 1999). For instant, the fixing of commodity prices below market levels inevitably created a disincentive for agricultural producers. By the late 1970s, low producer prices had led to the stagnation of production and exports and to increased parallel market activity, including cross-border smuggling, in many developing countries, especially in those areas of Africa and Central America (Barrett and Mutambatsere, 2005)

Policy distortions is a problem faced in most of the developing countries and in some developed countries as is indicated by the major effort that has been undertaken in recent years to measure the distortions in the agriculture sector, by the several studies have sought to evaluate the costs of such trade distortions (Rweyemamu and Kimaro, 2006).

Goldin and Knudsen (1990) stated that many studies of agricultural protectionism have revealed a fairly consistent pattern of protection across countries and time, with such protection of agricultural producers severely distorting national and international resource use, as well as agricultural markets and trade, particularly in the developed countries**.** The late 1970s and early 1980s saw several less developed countries raising producer prices for cereals relative to other competing opportunities, thus increasing incentives for food production (Rweyemamu and Kimaro, 2006).

To evaluate the effect of policies on producers' behaviour and incentives, various criteria are used; the protective criteria, measured by protective and effective nominal coefficients, measure the deviation of domestic from international prices. "Comparative criteria" measures government protection on the economic efficiency on the factors of production, measured by domestic resource cost ratio (DRC), social cost-benefit ratio (SCB) and social cost-benefit ratio without land (LSB). Najafi, 2005

The ability of an agricultural system to compete without distorting government policies can be strengthened or eroded by changes in economic conditions. Comparative advantage is an indicator of economical efficient production of a commodity. Comparative advantage refers to competitiveness that occurs in three categories of economic parameters –world prices of tradable outputs and inputs; social opportunity costs of domestic factors of production (labour, capital and land); and production technologies used in farming or marketing. Collectively, these three parameters determine comparative advantage (Aji, 2003).

According to Virmani (2004), it is therefore necessary to be aware of the history of market distortions and their consequences, as these are an important input into the process of determining the timing and phasing of particular reforms.

3. Methodology

3.1. Study Area

The study was carried out in Limpopo Province, one of South Africa's nine provinces found in the northernmost part of the country. It covers an area of 12.46 million hectares accounting for 10.2 per cent of the total area of South Africa. The provincial population of 5.56 million is divided into five districts of Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg. The population is predominantly rural consisting of about 89 per cent of the total with the main occupation of the people being agriculture. It has a dual agricultural system consisting 5000 large-scale commercial farmers who occupied 70 percent of the prime land and 273000 small-scale farmers occupying the remaining 30 percent of the land. Most of these small-scale farmers are in the former homeland majority of who are women (PROVIDE, 2005; Nesamvuni et. al., 2003; LDA, 2006). Limpopo is one of the richest agricultural regions of the country noted for its production of fruits and vegetables, cereals, tea and sugar with agriculture playing a major role in its economic growth and development (M'Marete, 2003).

Bembridge (2002) identifies 167 existing irrigation schemes in the Province with small-scale farmers found operating on 117 of these. The small-scale irrigation schemes have about 10,150 farmers with an average individual land holding of about 1.5 hectare per farmer.

3.2. Data Collection

400 farmers were randomly selected from 15 active irrigation schemes and 10 non-active irrigation schemes or dry-land schemes found in the province. A semi structured questionnaire was issued for production information of 2006. Information was further gathered from extension officers. Price information was obtained form local shops and also from the internet. This information was used for the estimation of farm budgets that represent the costs and returns to production activities.

3.3. Data Analysis

Policy Analysis Matrix (PAM) was used to assess the efficiency of small-scale agriculture in Limpopo Province. PAM measures the competitiveness and the comparative advantage of existing systems and also the impact of policy on these systems

PAM is a computational framework, developed by Monke and Pearson (1989) for measuring input use efficiency in production, comparative advantage, and the degree of government interventions.

The primary strength of the PAM is that it allows desegregations of the production activities, assessment of the effects of policy induced transfers, and individual and net effects of seemingly conflicting sets of policies, therefore making it usage very straightforward (Nelson and Panggabean, 1991).

PAM suffers a weakness of the assumption of fixed input-output coefficients. Nevertheless, it can readily accommodate such parameter changes using sensitivity analysis (simulation). Also PAM can not be constructed for a crop without an international price.

The basic format of the PAM as shown in Table 1 is a two-way accounting identities. The PAM table consists of private and social profitability in its first and second rows and divergences in its third row. The private profits evaluated at market prices and social profits evaluated at social or efficiency prices. If there are no market distortions, the two are often the same. If, however, there are market failures or distortions then the two would diverge from one another. Their divergence acts as a signal for policy intervention.

Table 1: The Framework of the Policy Analysis Matrix

	Revenue	Cost		Profit
		Tradable	Non Tradable	
Private Price	A	B	C	D
Social Price	E	F	G	H
Divergence	I	J	K	L

The symbols (capital letters) are defined as follows:

A Revenues in private prices (market prevailing prices, also called accounting prices).

B Costs of tradable inputs (such as fertilisers, seeds, plastic mulch, etc.) in private prices.

C Costs of domestic factors (such as labour, capital, etc.) in private prices.

D Private Profits (D=A-B-C).

E Revenues in social prices (economic efficiency prices or shadow prices).

F Costs of tradable inputs (such as fertilisers, seeds, plastic mulch, etc.) in social prices.

G Costs of domestic factors such as (labour, capital, etc.) in social prices.

H Social profits (H = E-F-G).

I Output Transfers (I = A-E)

J Input Transfers (J=B-F)

K Factor Transfers (K=C-G)

L Net Transfers (L=D-H or L=I-J-K)

3.4. Data Modelling

Twelve production systems (Dry land Maize and Sorghum, and drip irrigation systems for maize, tomatoes, Onion, Peanut, Potatoes, Beans, Green beans Chillies and Sweet potatoes) were selected. Production factors were broken down into tradable outputs and inputs, factor or domestic inputs for the construction of the PAM model was constructed.

Tradable Inputs and Outputs

For all inputs and outputs except pesticides, fuel and electricity, c.i.f. prices obtained from the department of trade and industry were used as social prices while the actual market prices were regarded as private prices. For pesticide and fuel, the social price was determined by tax on pesticides deducted from the market (private price). As for electricity, the tax intricacy could not

be determined thus the same price was used for both private and social prices assuming no distortion.

Production Factors

Labour

Minimum labour wage for rural farm workers was used as private labour cost while the competitive price paid by the local farmers to labour was used for social price.

Tractor, Pumps and drip pipes

The Social costs of tractor pump and drip pipes were derived from deduction taxes from the private costs and were then discounted (cost of recovery). Their contribution per hectare productivity was determined and used as social prices.

Land, Water, and Management skill

The value of agricultural land, for example is determined by the land's worth in growing alternate crops. However, due to lack specialization these valuation will be difficult to determine, therefore crop profits interpret the will be as rent to land and other fixed factors (e.g. management and ability to bear risk) per hectare of land used. Small scale irrigation farmer are not charged for water use, resulting to no private value for their usage. Therefore like land and management, profit will be interpreted as return to these factors.

4. Results

All crops had positive private and social profits except Dry land Maize, with negative social profitability (See Table 2). Positives private profitability for all crops indicates that, they are profitable under present policies. This profit indicates return to factor of production (Land, management and water) Therefore, there exits opportunities for their expansion. Positive social profit implies that even without distorting policies in place, all crops except Sorghum is profitable. Indicating that with the exception of sorghum, it may be more profitable to produce the crops than to import. In terms of Net transfer, Dry land maize and Dry land Sorghum had positive values which indicate that resources are transferred from other sector of the economy in to them. As concern the other production systems, the net policy effects showed that there were transfers of income from the farmers to the state.

Table 2: Private prices, social prices and net divergence for all crops

Crops	**Private Profit**	**Social Profit**	**Net Divergence**
Tomatoes	54435.20	150198.75	-95763.55
Dry Maize	1026.20	-278.15	1304.35
Irrigated Maize	2949.70	7427.69	-4477.99
Sorghum	3469.20	2523.25	945.95
Onion	36274.20	100671.22	-64397.02
Cabbage	58771.70	100215.04	-41443.34
Peanut	3038.20	9705.50	-6667.30

Beans	539.95	6588.15	-6048.20
Green Beans	16988.70	64992.39	-48003.69
Potatoes	49456.60	175144.92	-125688.32
Chillies	13834.00	38983.93	-25149.93
Sweet Potatoes	14918.80	72522.59	-57603.79

According to the calculated incentive indicators of SRP, EPC, NPCI and NPCO, government policies offered little or no protection to producers for majority of the systems. For instance all production systems apart of dry land maize were implicitly taxed. This is as indicated by the negative SRPs. Dry land maize alone was implicitly subsidized. Also looking the combine incentive of inputs and outputs as measured by the EPC, only for dry land maize, irrigated maize and dry land sorghum do policies intervention in form of protection provided incentives to produce; the rest of the systems were not protected. The most protected was the dry land maize (EPC= 1.3398) while the least motivated is sweet potatoes (EPC= 0.2092). The result on Table 3,

NPCO > 1 of both dry land maize and irrigated maize showing that there was incentive for their production (i.e. what they get for their production is more than as reflected by the world price). On the other hand, NPCI > 1 for all production systems showed disincentive in their production. It showed that they pay more for their inputs as compared with the world price.

Due to the fact that the values of PCR for all production systems were less than 1, it is an indication that the entire production systems were profitable under existing market prices. However as shown by Table 4, Cabbage (0.0741), tomatoes (0.0931) and potatoes (0.1109) were the most profitable crop to produce respectively, while Beans (0.8956), Irrigated maize (0.7018) and Peanut (0.6310) were the least profitable respectively.

Table 3: Incentive and comparative advantage Indicators

Crops	**PCR**	**DRC**	**NPCO**	**NPCI**	**EPC**	**SRP**
Tomatoes	0.0931	0.0132	0.4106	1.0812	0.3944	-0.6143
Dry Maize	0.4408	1.1407	1.0121	1.0792	0.9284	0.2934
Irrigated Maize	0.7018	0.2529	1.0121	1.0624	0.9950	-0.3357
Sorghum	0.1351	0.4327	0.9088	1.2533	0.9018	0.2084
Onion	0.2108	0.0283	0.4654	1.0528	0.4436	-0.5994
Cabbage	0.0741	0.0155	0.6363	1.0634	0.6236	-0.3955
Peanut	0.6311	0.1535	0.7473	1.0560	0.7183	-0.5315
Beans	0.8956	0.2010	0.7303	1.0762	0.6275	-0.5654
Green Beans	0.1547	0.0186	0.3436	1.0793	0.3035	-0.6873
Potatoes	0.1109	0.0114	0.3406	1.0850	0.3140	-0.6849

Chillies	0.2286	0.0380	0.4839	1.0661	0.4426	-0.5795
Sweet Potatoes	0.3064	0.0284	0.3208	1.0588	0.2882	-0.7391

For all production systems except dry land maize, the DRC that measures comparative advantage of alternative systems were less than 1 as can be seen also in table 4. However Potatoes had the highest comparative advantage (0.0114) followed by tomatoes (0.0132) and Cabbage (0.0155) as shown by the raking. Therefore it will profit the state more to produce these crops domestically. On the other hand, dry land maize, suffers from comparative disadvantage (1.1407), the system is costing the economy. Sorghum (0.4327), irrigated maize system (0.2529), beans with (0.2010), and peanut with (0.1535) had the least comparative advantage.

Table 4: Crops ranking by PCR and DRC

Crops	**PCR**	**Rank**	**DRC**	**Rank**
Cabbage	0.0741	1	0.0155	3
Tomatoes	0.0931	2	0.0132	2
Potatoes	0.1109	3	0.0114	1
Sorghum	0.1351	4	0.4327	11
Green Beans	0.1547	5	0.0186	4
Onion	0.2108	6	0.0283	5
Chillies	0.2286	7	0.0380	7
Sweet Potatoes	0.3064	8	0.0284	6
Dry Maize	0.4408	9	1.1407	12
Peanut	0.6311	10	0.1535	8
Irrigated Maize	0.7018	11	0.2529	10

Beans	0.8956	12	0.2010	9

5. Conclusion

PAM has been used in the study to analyse the competitiveness and comparative advantage of various crops under small-scale irrigation and dry land farming systems in Limpopo Province using the 2006/2007 production data.

For the twelve crops production systems analysed, all the crops were found to be privately profitable; while dry land maize was found not to be socially profitable with other crops being socially profitable. Majority of the production systems where however, not protected in term of SPR, EPC and NPC. This indicated that most small scale productive systems are not being given any incentive to produce.

Despite positive profitability for all systems and positive social profitability from most production systems, the research shows that vegetables especially Potatoes, tomatoes and cabbage have the highest profitability and comparative advantage over field crops like Dry land maize, peanut and beans production systems. It is there recommended that more efforts should be put in place to encourage small-scale irrigators to expand their production of these vegetables in the Limpopo Province to increase their competitiveness.

As shown by the result, government intervention in the small-scale agricultural sector through price policy is not necessary. However, some public policy interventions may be necessary to create greater market access.

References

Ahmad S, Martini RP (2000). Agricultural Policy Analysis in Pakistan: illustrations in the use of the policy Analysis Matrix. CMRR Working Paper Series. Working Paper No. 00-27. CMER, Lahore.

Aji JMM (2003). Analysis of Efficiency and Competition of Soyabean Farming System in Jember. Faculty of Agriculture of Jember http://espace.library.uq.edu.au/eserv/UQ:8502/soybean-jon.pdf.

Anderson E, Renzio de P, Levy S (2006). The Role of Public Investment in Poverty Reduction: Theories, Evidence and Methods. Working Paper 263. Overseas Development Institute, London.

Barret CB, Mutambatsere E (2005). “Agricultural Markets in Developing Countries.” Final Version Entry. In Lawrence E. Blume and Steven N. Durlauf, ed, The *New Palgrave Dictionary of Economics*, 2nd Edition (London: Palgrave Macmillan, forthcoming),

Bembridge TJ (2000). Guidelines for Rehabilitation of Small-Scale Farmers Schemes in South Africa. Water Research Commission, Pretoria.

Braverman A, Ahn CY, Hammer JS (1983). Alternative Agricultural Pricing Policies in the Republic of Korea: Their Implications for Government Deficits, Income Distribution, and Balance of Payments. World Bank Staff Working Papers, No. 621, World Bank, Washington, D.C.

DFID (2004). Making Markets Work for the Poor, Working paper for the Renewable Natural resources and Agricultural team, Policy Division, DFID, London.

Dorward A, Fan S, Kydd J, Lofgren H, Morrison J, Poulton C, Rao N, Smith L, Tchale H, Thorat S, Urey I, Wobst P (2004). Institutions and Policies for Pro-poor Agricultural Growth. Development Policy Review, 22 (6): 611-622.

Dorward A, Fan S, Kydd J, Lofgren A, Morrison J, Poulton C, Rao N, Smith L, Tchale H, Thorat S, Urey I, and Wobst, P. (2004). Rethinking Agricultural Policies for Pro-Poor Growth. Natural Resource perspectives Number 94, September 2004 Overseas Development Institute, London.

Fan S, Jitsuchon S, Methakunnavut N (2004). The importance of Public investment for reducing Rural Poverty in Middle-Income Countries: The Case of Thialand. DSGD Discussion Paper No. 7. IFPRI, Washington DC.

Goldin I, Knudsen O (Eds) 1990. Agricultural Trade Liberalization: Implications for Developing Countries Organization for Economic Co-operation and Development / The World Bank. http://www.wto.org/English/thewto_e/whatis_e/tif_e/org6_e.htm. (Accessed, April 2008)

IPC (International Policy Centre) (1999). State trading and the WTO: reforming the Rules for Agriculture. IPC. Washington DC.

IPTRID (International Programme for Technology and Research in Irrigation and Drainage) (2000). South Africa. Affordable Irrigation Technologies for Small-Scale: Opportunities for Technology Adaptation and Capacity Building IPTRID, Rome

IWMI (International Water Management) (2007). Putting Research Knowledge into Action, Policy Brief No 28. IWMI, Colombo, Sri Lanka

Kirsten JF, Ohene-Anyans E, Van Rooyen J (1998). An analysis of the Comparative Advantage and Policy Incentives of Commercial Wheat Production in South Africa. Agrekon, vol. 37. No. 4. Pp 538-549

LDA (Limpopo Department of Agriculture) (2006). Background. Online. Available at Http://www.lda.gov.za (Accessed March 2007)

Legrain, P (2006). Why NAMA Liberalisation is good for Developing Countries. World Economy, Vol. 29, No. 10(October 2006):1349-1362.

M'Marete CK (2003). Climate and Water Resources in the limpopo Province. In: Nesamvuni E, Oni SA, Odhiambo JJ, Nthakheni N D (eds) Agriculture a Corner Stone of the Economy of the Limpopo Province. Limpopo Department of Agriculture, Polokwane.

Mohanty S, Fang C, Chaudhary J (2002). Assessing the Competitive of Indian Cotton Production. A Policy Analysis Matrix Approach. Working Paper 02-wp 301. Centre for Agricultural and Rural Development, Iowa State University.

Monke EA, Pearson SR (1989). The Policy Analysis Matrix for Agricultural Development. Cornell University Press, Ithaca and London.

Najafi B (2005). Effects of government policies on Wheat Production in Iran: The Application of Policy Matrix Analysis. Economic Research Forum, 12th annual Conference, 19th – 21st December 2005, Grand Hyatt, Cairo, Egypt.

Nakhumwal TO, Hassan RM, Kirsten JF, Ng'ong'ala DH (1999). Policy Incentives and the Comparative Economic Advantage in Malawi Agriculture. *Agrekon,* Vol. 38, No. 3 (1999): 356-373

National Department of Agriculture, South AfricA NDA 1998, Agricultural policy in South Africa: A Discussion Document. Available online at, Http://www.nda.agric.za/docs/policy98.htm#fourone. (Accessed March 2008).

Nelson CG, Panggabean M (1991). The Costs of Indonesian Sugar Policy: A Policy Analysis Matrix Approach. American Journal of Agricultural Economics 73(August): 703-12.

Nesamvuni E, Oni SA, Odhiambo JJ, Nthakheni ND, (2003)(eds). Agriculture: a Corner Stone of the Economy of the Limpopo Province. Limpopo Department of Agriculture, Polokwane.

OECD (Organisation for Economic Co-operation and Development) (2006). Agricultural Policy Reform in South Africa. Policy Brief, OECD, Paris.

Oosthezen LK (2005). Land and Water Resource Management in South Africa, Water Resource Commission

Owuor J (1998), Determinants of Agricultural Productivity in Kenya. Conference on Strategies for Raising Productivity in Agriculture, Egerton University/Tegemeo Institute of Agricultural Policy and Development, May 12, 1998, Nairobi, Kenya.

Pearson S, Gotsch C, Bahri S (2003). Application of the Analysis Matrix in Indonesian Agriculture. Working Paper 2001-15, FAO, Rome.

PROVIDE (The Provincial Decision-making Enabling Project) (2005). "A Profile of the Limpopo Province: Demographics, poverty, inequality and unemployment." Background paper vol1, No.9. Background Paper Series, PROVIDE, Elsenburg.

Rweyemamu D, Kimaro M (2006). Assessing Market Distortions Affecting Poverty Reduction Efforts on Smallholder Tobacco Production in Tanzania. Research Report 06.1 Mkuki na Nyota Publish for Research on Poverty Alleviation (REPOA) Dar es Salaam, Tanzania

Tutwiler AM, Straub M (2005). Making Agricultural Trade Reform Work for the Poor. International Food and Agricultural Trade Policy Council: An IPC Position Paper, Washington, D.C.

Virmani A (2004). Economic Reforms: Policy and institution. Some lessons from Idian Reforms. Indian Council for Research on International Economic Relations, New Delhi.