Factors enhancing market participation by small-scale cotton farmers

R Randela[1], ZG Alemu[2] & JA Groenewald[3]

Abstract

This paper uses data collected from 177 small-scale farming households in Mpumalanga in an effort to identify factors that significantly influence the degree of commercialisation or market participation. A logistic regression model was applied within the transaction costs framework. Results support the hypothesis that transactions costs rank among the main determinants of commercialisation. The following variables were statistically significant: age, ability to speak/understand English, region, ownership of transport, access to market information, distance to market, dependency ratio, trust, land size and ownership of livestock. Increases in the latter four have negative effects on commercialisation. The negative relationship between land size and commercialisation probably indicates that increased market participation is also a function of input (land) productivity.

Keywords: Market participation; household commercialisation; logistic regression; transaction costs

1. Introduction

The South African agricultural sector strategy aims, *inter alia*, to integrate the majority of subsistence farmers into the commercial agricultural economy. The identification of ways to increase market participation by smallholder producers requires identification of variables that influence market access. This paper is largely conducted within the transaction costs economics framework but also considers some non-transaction costs variables. The presence of transaction costs is widely used to explain observed market failures and self-sufficiency in agriculture in developing countries.

One important question in the research agenda, implicitly raised in the agricultural sector strategy, is the identification of actions that could enhance commercialisation. Addressing the determinants of commercial orientation of

[1] *PhD graduate and National Treasury (Public Finance Division), PO Box 12821, Hatfield 0028; E-mail: Rendani.Randela@Treasury.gov.za.*
[2] *Researcher, Development Bank of Southern Africa, PO Box 1234, Halfway House 1685; E-mail: alemuzg.sci@ufs.ac.za.*
[3] *Professor Extraordinary, Department of Agricultural Economics, Faculty of Natural and Agricultural Sciences, University of the Free State, PO Box 339, Bloemfontein 9300; E-mail: Groenewald@netralink.com.*

the individual farmers could shed some light on further steps to be taken by various commodity organisations, the government *and other role players* in order to promote the rural market economy (Balint, 2003). Some of these determinants are common knowledge. They incorporate factors such as political and macroeconomic stability, enforcement of property rights, and allocation of funds for agricultural research and extension. The purpose of this paper is to identify farm level factors that influence or enhance market participation; this may offer information for policy alternatives that could promote and enhance better commercial orientation, and thus lead to improved rural household incomes. Policy options for commercial orientation can be integrated in the broader framework of integrated sustainable agricultural and rural development strategy.

A logistic regression model is used as research tool. This model has the ability to determine the effect of variables on the probability of commercialisation, plus the effect of individual variables. It yields the highest predictive accuracy possible. The model specification is followed by a discussion of the main determinants of market participation. Main determinants to market participation include both transaction and transaction related variables. Section 4 provides empirical results of the logistic regression model, and this is followed by a conclusion.

2. Specification of the model

Data used in this paper was collected in two cotton growing schemes in Mpumalanga, namely Moutse and Nkomazi. A sample of 177 small-scale cotton growers was drawn from emerging cotton growers.

The model analyses the relationship between household commercialisation and transaction costs, household characteristics, assets and family endowment. A logistic regression framework model is chosen, firstly because of its ability to determine the effect of variables on the probability of commercialisation. Secondly, it yields the highest predictive accuracy possible with a given set of predictors (Aldrich & Nelson, 1984). The model can be expressed as:

$$Log\left(\frac{P_{(y=1)}}{1-P_{(y=1)}}\right)=\beta_0+\sum_{i=1}^{n}\beta_i\chi_i \;\; or\; as \;\left(\frac{P_{(y=1)}}{1-P_{(y=1)}}\right)=e^{(\beta_0+\sum_{i=1}^{n}\beta_i\chi_i)} \qquad (1)$$

Where P is the probability that y=1 and χ_i are the set of explanatory variables. In this analysis χ will contain both dichotomous and continuous variables. In

the second expression in equation (1), the left-hand side is an odds ratio and the right hand side gives the marginal effects of χ_i on the odds.

χ_i is a set of independent variables (variables such as demographics characteristics, resources (e.g. land size) and transaction costs variables (e.g. information and transport costs). The dependent variable is the household commercialisation index (HCI) which is defined as gross value of all crop sales/gross value of all crop production. HCI can take any value from zero to one and it can also be expressed in percentage terms.

Matungul *et al*. (2001) used a marketing methods index as a dependent variable reflecting the level of commercialisation. Their model was specified as follows:

> Marketing methods index = f(transaction cost, region, farmer and household characteristics)

The marketing methods index shows depth in marketing methods used by the households. The index was, *inter alia*, calculated taking into account various marketing channels used by the sampled farmers as well as different techniques to inform potential customers about their products. However, in contrast with that research, cotton producers sell their cotton to a single buyer (a ginner) and produce other crops that they hardly sell due to lack of rewarding markets.

Makhura *et al*. (1996) applied a method of qualitative choice to determine primarily the relationship mainly between socio-economic characteristics of farmers and their commercialisation. This was done by estimating logit models to identify characteristics that differentiated one commercialisation class from another namely, high agricultural commercial households, moderately commercial households and very low commercial households. Makhura *et al*. (1996) also operationalised commercialisation by developing sources of earnings from sales of agricultural products while others operationalise it by employing surplus production. The latter is somewhat flawed because marketing behaviour is a two-step decision process: firstly, the household decides whether or not to participate in the market, and secondly, it establishes how much to sell. However, marketing behaviour is somewhat more complicated especially for highly commercial farmers. To these farmers, the two steps usually follow only at harvesting time. More importantly, the choice of method is primarily dictated by the problem under evaluation and to a certain extent by the nature of data.

3. Determinants of market participation – theoretical underpinnings

Transaction costs are the embodiment of access barriers to market participation by resource-poor smallholders. Transaction costs are normally defined as all costs of entering into contracts, exchange or agreement: searching for trading partners, screening potential candidates, obtaining and verifying information, bargaining, transferring the product, and monitoring, controlling and enforcing the transaction. At best, these costs are partly observable. Several independent variables were selected to estimate the predicted values of the dependent variables. The choice of the variables used is largely based on work by Govereh and Jayne (1999), Strassberg *et al*. (1999), Heltberg and Tarp (2001) and Lapar *et al*. (2003), who extensively reviewed factors influencing farmers to participate in marketing. The explanatory variable and their expected signs are shown in Table 1. The set of independent variables potentially expected to influence market participation are grouped into the following classes: household characteristics, physical assets, social capital, transaction costs, livelihood development services and regional variables.

Table 1: Definition of variables influencing increased market participation

Variables	Variable description	Anticipated sign
Household background characteristics	Continuous	–
Age of the head (in years)	Continuous	–
Dependency ratio	Continuous	+
Education of the head	Able to speak/understand English = 1, 0 otherwise	+
Ability to understand/speak English	1 = male, 0 otherwise	+
Gender		
Household physical assets		
Livestock ownership	Own livestock = 1, 0 otherwise	+
Ownership of cultivation equipment	Own cultivation equipment = 1, 0 otherwise	+
Own Transport	Own transport = 1, 0 otherwise	+
Land size (ha)	Continuous	+
Access to non-farm income	Access to non farm income = 1, 0 otherwise	+
Social capital		
Member of farmers' organisation	Belong to farmers' organisation = 1, 0 otherwise	+
Co-operation with white commercial farmers	Cooperation with white farmers = 1 and 0 otherwise	+
Born in the community	Born in the community = 1, 0 otherwise (migrant)	+

Transaction costs		
Distance to market (km)	Continuous	–
Access to market information	Have access to market information = 1, 0 otherwise	+
General state of the road	Very poor = 0; Poor=1; Fair = 2; Good = 3 and Very good = 4	+
Access to guaranteed market	Have contract = 1, 0 otherwise	+
Proximity to towns	Closer to town = 1, 0 otherwise	+
Livelihood development services		
Access to finance	Have access to finance = 1, 0 otherwise	+
Regional variables		
	Nkomazi=1 Moutse = 0	+/- (indeterminate)

Household background characteristics are captured by age, education, ability to speak English and household size (dependency ratio). The relationship with age is expected to be negative depending on the stages of development. Younger farmers are expected to be progressive, more receptive to new ideas and to better understand the benefits of agricultural commercialisation. In addition, relatively young farmers usually have higher socio-economic status that, *inter alia*, enables them to be faced by lower transaction costs. Younger farmers also have higher levels of education and contact with the outside world. In most cases, older farmers view farming as a way of life rather than as a business and have a strong emotional or almost biological connection with farming and land. This variable was measured in number of years.

The size of the household represents the productive and consumption unit of the household (Makhura, 2001). Traditional agrarian studies show that household members represent labour resources and are hence posited to be directly related to engagement in agricultural activities. It is therefore sensible to expect that a household with large household members can produce more marketable output or store it for household consumption. Lapar *et al*. (2003) hypothesised that the propensity to participate into the market economy declines with numbers of household members. To determine the direction of the relationship between the household size and the dependent variable, this study adopted the use of the dependency ratio as a proxy for the household size and it is hypothesised that households with more dependants are likely to have a lower level of commercialisation.

Education is an important tool to escape poverty, but only if the education system reaches the right people with the right content (Heierli & Gass, 2001). Intellectual capital as captured by education is hypothesised to play a positive role in influencing market participation. Level of education gives an indication

of the household ability to process information and causes some farmers to have better access to understanding and interpretation of information than others. High education level is important, as it is likely to lead to the reduction of search, screening and information costs. However, the expectation may be reversed when there are competing and more remunerative employment opportunities available in the area that require skills that are enhanced by more education (Lapar *et al*., 2003). Closely related to the preceding variable is the respondents' ability to speak/understand English. Inability to speak/understand English prevents a resource-poor farmer from successfully engaging in trade, especially outside his/her settlement. It is likely that such farmers would face high transaction costs in both factor and product markets outside their own area (Matungul *et al*., 2001).

One of the biggest challenges to the stakeholders involved in the process of agricultural transformation in sub-Saharan Africa is the high percentage (70-80%) of women responsible for household food production. Until recently, women were usually excluded from a variety of services such as access to inputs (e.g. credit) and they were neglected by agricultural extension services (Farinde & Taiwo, 2003). In addition, some institutional arrangements such as market contractual agreements were exclusively for male-headed households. Female-headed households are therefore expected to have lower commercialisation indexes relative to their male counterparts.

The other construct of transaction costs is access to assets. Heierli and Gass (2001) argue that assets empower the rural poor by increasing their incomes, reserves against shock and choices to escape from harsh and exploitative conditions. The crux of the matter is that ownership of productive assets in particular makes a household less vulnerable to shocks and the extent of vulnerability determines household market participation. Thus, highly vulnerable households are expected to have a lower commercialisation index. In essence, it is primarily those who are relatively well endowed with agricultural capital who commercialise.

Ownership of assets has been measured in terms of ownership of livestock, cultivation equipment, transport, arable land and access to non-farm income. All these are likely to increase farmers' access to loans. Ownership of livestock is expected to exert a positive impact on both the likelihood that participation will occur and the amount of selling that will be undertaken once the decision to participate has been made. This hypothesis is supported by Heierli and Gass (2001) who argue that acquisition and ownership of productive assets (e.g. cattle) can pave the way for a family to participate in economic activities. Ownership of cultivation equipment is associated with timely planting that can lead to higher production. Households with relatively higher production

levels have a higher probability of market participation. Again, households with own transport are likely to transport their agricultural product on time to the market before losing value. It is therefore hypothesised that such households will have higher levels of commercialisation.

Access to arable land is a necessary condition for market participation. This variable is measured by the size of the arable land the household operates. The larger the size of arable land a household uses, the higher the production levels are likely to be, and the higher the probability of market participation. Non-farm activities mostly consist of non-farm employment (professional/or non-professional usually available in nearby towns). Access to non-farm income may lead to risk reduction in household decision making and, with it, increased propensity to undertake higher risk activities, notably selling crops or producing for the market (e.g. some non-edible crops such as cotton).

Social capital is another construct of transaction cost as applied in the study. There is a growing body of social science research associated with the concept of social capital. The central thesis of the social capital literature is that features of social organisation, such as networks of interaction have resource potential to individuals and groups. Social capital has been linked to a variety of outcomes, such as success in job seeking behaviour, entrepreneurism and successful community action or development. It is through networks that information and other resources can be transmitted, and the existence of trust facilitates co-operative behaviour based around these networks (Sharp & Smith, 2003).

Another explanatory variable used was "born in the community". This variable was used as a proxy for trust. In most rural areas, people born in the same community are more trusted than people who migrated into that community. Trust is hypothesised to lower transaction costs and lead to superior information sharing which improves coordination and joint efforts to minimise inefficiencies. Some scholars even claim that national economic efficiencies are highly correlated with high trust institutional environments (Dyer & Chu, 2000; North, 1990). In addition, economic success of a nation as well as its ability to compete is conditioned by the level of trust inherent in the society.

Collective action as measured by belonging to farmers' organisations strengthens farmers' bargaining and lobbying power and facilitates obtaining institutional solutions to some problems and coordination (Jones, 1996, cited in Matungul *et al*., 2001). In addition, collective action has an additional advantage of spreading fixed transaction costs. This variable is expected to impact positively on market participation. Cooperation with white commercial

farmers lowers transaction costs as it enhances opportunities for information sharing. White commercial farmers have access to services and profitable markets; this is a valuable resource that can promote market participation.

Transaction costs are hypothesised to impede market participation because they impose added cost burdens to the efficient conduct of market entry activities. The following factors were used to capture the transaction costs variable: distance to the market, access to market information, general state of roads access to a guaranteed market and proximity to towns. Distance to market is considered as a proxy for transaction costs and is hypothesised to negatively affect market participation; that is, the farther away a household is from the market, the more difficult and costly it would be to get involved. Thus, greater distance to the market increases transaction costs.

Infrastructural obstacles such as poor state of roads as well as inadequate road networks obviously hinder marketing efficiency. Remote locations of farms coupled with poor road infrastructure results in high transport costs and in cases where buyers provide transport, this further reduces the price that buyers are prepared to pay farmers. Low prices are a disincentive to market participation. Inadequate transportation infrastructure raises search and monitoring costs. In addition, inadequate and dilapidated state of the rural road network impedes the physical movements of goods and thereby the integration of rural markets. Many rural roads are impassable, except perhaps, by tractors, during the rainy season.

A guaranteed market or contract farming is one of the institutional arrangements that can promote market access to the emerging farmers. Existence of the guaranteed market is hypothesised to impact positively on the dependant variable. The expected positive relationship is based on an *a priori* expectation that there is a marginal cost associated with searching for the potential buyer. Respondents were asked whether they have any contractual agreement or guaranteed market agreement with any agribusiness companies.

All sampled farmers have access to information. Farmers were therefore asked to indicate the type of information that they get from each source. The intention was to capture market information as a closely relevant factor that can be used to predict market participation. Marketing efficiency is hindered not only by infrastructural factors but also informational bottlenecks which increase transaction costs by raising search, screening and bargaining costs. Small-scale farmers are often not aware of prices and market opportunities for their product and find it difficult to participate in alternative markets.

Another variable used as a proxy for access to information and market is proximity to towns/cities. Markets removed from major cities/towns are not well integrated and in these markets, competition is often highly imperfect. Finding a buyer in these markets is often a problem. In addition, Makhura (2001) argues that proximity to towns reflects how far farmers have to travel to reach sources of information. Such information sources are located in nearest towns where there are offices and markets. Thus, the farther a household is away from the town, the higher the transaction costs of obtaining information and market outlet.

Unavailability of credit inflates transaction costs in both input and output markets. The amount of agricultural product sold should be understood in terms of the linkages that exist between input and output market. It is hypothesised that unavailability of credit impacts negatively on farmers' ability to participate in markets. The final construct of transaction costs applied in the study is the regional variable. Geographical factors help to capture variation in the two regions particularly in terms of risk *etc*.

4. Results and discussion

4.1 Descriptive results

This section reports the descriptive results of the relationship between household commercialisation and determinants of commercialisation. Cotton experts regard a commercialisation index of at least 0.8 necessary to be acceptable in the cotton industry. This index was adopted as a cut-off point for the transformation of the observed HCI in the surveyed regions. HCI was then transformed into binary responses. Thus, households with a commercialisation index of less than 0.8 were assigned a dummy variable of 0 and 1 otherwise. Sample farmers with an HCI of less than 0.8 are referred to as aspirant commercial farmers (low commercialisation) and those with a higher HCI as commercial farmers (high commercialisation). Out of the 177 observed households, 32% and 68% are regarded as aspirant commercial (low commercialisation) and commercial farmers (high commercialisation) respectively. Table 2 highlights descriptive statistics of only the significant variables.

Table 2: Household commercialisation rates for significant variables

Variables	Low commercialisation	High commercialisation
Mean dependency ratio	4	3
Mean age	51	54
Born in the community (%)	89	78
Mean land size (ha)	7	7
Access to loan (%)	60	82
Farmers with own transport (%)	22	29
Mean distance to market (Km)	22	27
Ownership of livestock (%)	36	18
Ability to speak/understand English (%)	49	50
Access to market information (%)	51	55
Moutse (%)	51	39
Nkomazi (%)	49	61

According to Table 2, mean dependency ratio, access to loan, ownership of transport, ability to speak/understand English and access to market information are consistent with *a priori* expectations as far as the level of commercialisation is concerned. On the other hand, signs of the other variables in the table are contrary to *a priori* expectation and will be dealt with in detail in the subsequent section.

4.2 Empirical results

As explained when the model was specified, the dependent variable used in this study is HCI. Logistic regression is designed to use a mix of continuous and categorical predictor variables to predict a categorical outcome or dependent variable. This section discusses results of the significant factors determining level of market participation[4]. All variables mentioned in Table 1 were considered for the model. A step by step process of deletion of insignificant variables reduced the number of significant variables to eleven, as shown in Table 3.

The Pesaran-Timmermann test statistic shown in Table.3 was used to test for predictive efficiency of the model. According to this test, a significant association exists between the observed value and the model's prediction of a household's commercialisation status. With regard to the predictive efficacy of the model, Table 3 shows that, of the 177 sample households included in the model, 79% (139) are correctly predicted. The log likelihood value of 63, with $P < 0.001$, indicates that at least one of the parameters of the determinants of household commercialisation shown in the equation 1 is significant.

[4] *Before a logit model was fitted, a correlation matrix was computed for all explanatory variables. No severe multicollinearity problem was detected.*

Table 3: Logistic regression of factors influencing household commercialisation

Variables	Coefficient	Std. error	z-statistic	Probabilities
Constant	-3.3214	1.5480	-2.1456	0.033
Household characteristics				
Age (AGE)	0.0409	0.0189	2.1670	0.032
Dependency ratio (DEPRATIO)	-0.2499	0.1036	-2.4130	0.017
Ability to speak/understand English (ENGLISH)	0.6584	0.4447	1.4806	0.141
Regional variable				
Region (REGION)	3.5385	1.0653	3.3218	0.001
Social capital				
Born in the community (TRUST)	-1.3074	0.6672	-1.9596	0.052
Livelihood development services				
Access to loans (ACCLOAN)	0.9058	0.6302	1.4374	0.153
Household physical assets				
Land size (LSIZE)	-0.0856	0.0438	-1.9519	0.053
Ownership of livestock (LIVEOWN)	-1.0813	0.4921	-2.1975	0.029
Ownership of transport (OWNTRANS)	0.4807	0.2630	1.8280	0.069
Transaction costs				
Access to Market information (MKTINFO)	1.5896	0.5982	2.6573	0.009
Distance to market (DISTANCE)	0.0334	0.0181	1.8436	0.067
Percentage of correct prediction	0.785			
Pesaran-Timmermann test statistic	6.5070			< 0.001
Log likelihood value	63			< 0.001

Some of the transaction costs proxies influence the level of market participation significantly, and the signs of the estimated coefficients are consistent with *priori* expectations. This is particularly true of the dependency ratio, ability to speak/understand English, access to loans, ownership of transport and access to market information. A negative relationship exists between the level of commercialisation and the dependency ratio. This relationship implies that household members tend to consume more than they contribute to the sales of the crop. A positive and significant relationship was found between household commercialisation and age of the respondents. This relationship is contrary to the *a priori* expectation. A possible explanation that can be advanced for this is that older and more experienced household heads tend to have more personal contacts, allowing discovery of trading opportunities at low cost (Matungul *et al*., 2001). Moreover, Makhura (2001) argues that being older also assists farmers to overcome fixed transaction costs since some experiences about the market have been accumulated overtime. Ability to speak or understand English was found to have a positive effect on the level of commercialisation; the likelihood of commercialisation increases with farmers' ability to speak/understand English.

The regional variable of Nkomazi region has a positive coefficient and is significant (P = 0.001). These results imply that farmers in Nkomazi region are more likely to produce a greater percentage of their produce for the market. In addition, the results probably confirm that Nkomazi is not a risky region particularly for cotton production and therefore has a relatively higher potential due to a more suitable climate and soil type. Living in a risky area is clearly associated with low commercialisation. The high level of commercialisation in the region may also be ascribed to the level of support they receive relative to that in Moutse. For instance, in Nkomazi loan applications are made by ginners on behalf of the farmers unlike in Moutse where they are made individually by small-scale farmers themselves.

The variable born in the community is significant (P = 0.052) and has an unexpected negative sign. This implies that farmers born in the same community and expected to trust one another, because they have known each other since childhood, are likely to have a low level of commercialisation relative to migrant residents. This finding is puzzling and needs further investigation as trustworthiness, in particular, is capable of reducing the transaction costs, both in the inputs and output markets. It is possible that the little social support and networks that migrant residents may receive or have in the community, make them work hard to enhance their livelihood through increased market participation.

Access to loans has a positive relationship with the level of market participation. A number of theoretical studies suggest that credit indeed has a positive impact on small farm production (Spio, 2002). Furthermore, credit is also one major constraint limiting market access, participation and the competitiveness of the industry.

The size of the land is important because transaction costs are largely fixed costs that can be spread across more output on large farms. Results in Table 1.3 reveal the existence of an unexpected negative relationship between land size and level of market participation. This inverse relationship implies that farmers with relatively large land size are likely to have low levels of commercialisation. This is probably an indication that increased market participation is also a function of land productivity. Access to assets such as ownership of livestock provides households with leverage to invest in market participation. However, logistic results indicate that ownership of livestock has a negative relationship on the level of market participation. Although not expected, this finding probably supports the generally accepted livestock complex myth. According to this myth, peasant farmers would keep livestock merely for prestige and wealth. In this regard, wealth is defined by Doran *et al*. (1979: 42) as the accumulation of assets which confer among other things

prestige, emotional satisfaction and status. Ownership of transport was found to be significant and has a positive influence on the level of market participation. This implies that households that own transport are more likely to be commercial farmers than those without.

Access to market information has the expected sign and it is significant (P = 0.009). Thus, the more information the household has on marketing, the less transaction costs will be – thus increasing market participation. The other construct of transaction cost is distance to the market. The sign of the coefficient for distance to the market is positive and it is contrary to the *a priori* expectation. This implies that farmers facing relatively longer distance are more likely to be commercial farmers. A possible explanation is that agricultural output, particularly cotton bales, is not charged per distance travelled, but by the number of bales transported. In addition, cotton bales sometimes depend upon the services of the ginners which are provided at highly subsidised rates.

4.3 Determination of the partial effects and changes in probabilities for the significant variables

The marginal effects of a unit change in the continuous variables, computed at sample means, on the probability of commercialisation were estimated. Table 4 and 5 give results on the partial effects of continuous and discrete variables respectively. The partial effects of the discrete variables are calculated taking the difference of the probabilities estimated when the value of the variable is set to 1 and 0 ($X_1 = 0$, $X_1 = 1$) respectively. According to Table 4, the marginal effect of a unit change in land size, computed at sample means of holding size, on the probability of household commercialisation is -0.017. This means that the probability of commercialisation decreases by 0.017 (about 2%) for a one hectare increase in farm size. Each additional dependant in the household furthermore decreases the probability of increased market participation by 5%. A unit change in age, computed at sample means, increases the probability of increased market participation by 1% and this magnitude of change and the direction of impact is the same as a unit change of a distance travelled to the market.

Table 4: Partial effects for continuous determinants

Determinants	Partial effects
Land size	-0.017
Age	0.007
Distance	0.007
Dependency ratio	-0.05

Table 5 shows discrete variables found to have a significant impact on household commercialisation. For instance, a positive and significant relationship was found between access to loans and the probability of being a commercial farmer; the likelihood of commercialisation increases with farmer access to loans. According to Table 5, a shift from having no access to loans ($X_i = 0$) to access to loans ($X_i = 1$) increases the probability of commercial farming from 0.552 to 0.711, i.e. by 16%. Owning livestock and being born in that community decrease the probability of being a commercial farmer by 19% and 25% respectively. Similarly, the probability that those who do not own livestock and are migrants become commercial farmers is higher by 19% and 25% respectively.

Table 5: Change in probabilities between $X_i = 0$ & $X_i = 1$ for the significant discrete determinants

Determinants	Probabilities	Change in probabilities
Access to loans		
No access	0.552	
Access	0.711	0.159
Born in the community		
Migrant	0.890	
Born	0.636	-0.254
Ability to speak/understand English		
Inability	0.619	
Ability	0.722	0.104
Ownership of livestock		
No livestock	0.716	
Own livestock	0.524	-0.191
Ownership of transport		
No transport	0.627	
Own transport	0.707	0.080
Access to market information		
No access	0.440	
Access	0.720	0.281
Region		
Moutse	0.327	
Nkomazi	0.826	0.500

Finally, the probability of commercial farming is also observed to increase with having access to market information (28%), ability to speak/understand English (10%), ownership of transport (8%) and farming in Nkomazi instead of in Moutse (50%).

4.4 Impact on commercialisation of major determinants of market participation

This section reports simulation results for the levels of change in the conditional probability of being high commercial following improvement in

any of the significant factors. Simulations were conducted with reference to a base group of households representing aspirant commercial farmers. The base group represents aspirant commercial farmers (low commercialisation) with mean values for continuous variables as those mentioned in Table 2. In addition, the dummy variables for other discrete variables were set to zero.

Table 6: Simulated impacts of determinants on the probability of increased market participation

Variables	Predicted probabilities
Base	0.109
If the household owns transport (vehicle)	0.160
If number of dependants is reduced by one	0.136
If household understanding/ability to speak English improves	0.191
Move to farm in Nkomazi instead of in Moutse	0.808
Being a migrant resident instead of being born in that community	0.032
If household access to loan status improves	0.233
Land size increased by 23 hectares	0.017
If household owns livestock	0.040
If access to market information improves	0.375
If distance to market increases by 5 km	0.126

According to Table 6, the conditional probability of increased market participation for the base group of households is 0.109. This means that, of 100 households, 11 are commercial farmers. If a group of households with characteristics similar to that of the base group of farmers own transport, the number of commercial farmers will increase by 16%. A unit decrease in the number of dependants (from 4 to 3) will lead to an increase in the probability of commercial farming from 11% to 14%. An interesting point to note is that ownership of livestock by sample households' result in a decrease in the probability of being a commercial farmer from 11% to 4%. This probably applies in cases where resources used for livestock maintenance (e.g. acaricides) get redeployed and are utilised in other productive activities that influence household agricultural production. Other decreases in the probability of being commercial farmers are observed with regard to an increase in land size and born in that community as shown in Table 6.

It is also shown in Table 6 that a move from farming in Moutse to Nkomazi considerably increases the probability of commercial farming, from 11% to 81%. This analysis probably confirms the general knowledge within the cotton industry that Moutse is marginal as a cotton producing area.

5. Discussion and conclusion

This paper provides empirical evidence of the statistically significant factors influencing commercialisation. The hypothesis that transaction costs and other closely related factors influence commercialisation was tested using the logistic regression model. It should be acknowledged that transaction costs are not easy to measure. Empirical analysis supports the hypothesis that transaction cost is one of the main determinants of commercialisation. The statistically most significant factors are age, ability to speak/understand English, region, ownership of transport, access to market information, distance to market, dependency ratio, trust, land size and livestock ownership. The last four variables influence commercialisation negatively. These findings suggest, *inter alia,* that pro-active marketing support services in the form of information, accessible markets and transport means can help farmers to perform much better in household commercialisation.

Logistic results confirmed the existence of a negative relationship between household size (as represented by the dependency ratio) and household commercialisation. This finding brings to the fore the importance of a demographic policy which takes into account the composition of the households. For a commercialisation process to be successful it is pertinent to determine the role of different household members in household market participation. For example, consideration should be given on how to make youth contribute to market participation process, in contrast to being dependent (Makhura, 2001). This therefore calls for the consolidation of government efforts (e.g. Umsobomvu) to promote the development of young farmers.

However, a finding worth noting is the effect of land size towards household commercialisation. The direction of the impact of land size is probably an indication that increased market participation is also a function of land productivity. If this holds true, it therefore implies that any initiative in the cotton industry to increase land size must be preceded with efforts to increase the productivity of the land currently under cultivation. Partial effects, computed at sample means, indicate that the probability of commercialisation decreases by 2% for a one hectare increase in farm size. In addition, simulation results show a decrease in the probability of commercialisation if land size increases. Evidence from other countries (e.g. Zimbabwe) as presented by Govereh and Jayne (1999) indicated that in these studies household commercialisation was indeed positively related to land holding size. The extent to which these results can be generalised do not yet seem to be clear.

Moreover, the direction of the impact of land size on household commercialisation has certain implications for the South African land reform programme. As Cotton South Africa and other commodity organisations aim to revive their respective industries, study findings seem to suggest that various tenure reform arrangements need to be explored. A notable one is the introduction of a land rental market (including hire purchase with an option to buy). This arrangement will ensure that productive and efficient farmers capable of operating large viable land sizes do expand or have access to an additional land. That is, farmers will farm on land sizes that match their productive capacity. It is therefore recommended that institutions that promote efficient use of land should receive priority attention in policy making

These research results shed light on the main determinants to increased market participation which can enable cotton stakeholders configure their operation in the post-market liberalisation environment to promote smallholder agricultural commercialisation. It is however, important to note that the study uses cross sectional data that do not capture changes over time. A longitudinal study is needed to capture changes over time with regard to small-scale commercialisation.

References

Aldrich JH & Nelson FD (1984). *Linear probability logit and probit models.* Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-045. Beverley Hills, CA: Sage.

Balint BE (2003). *Determinants of commercial orientation and sustainability of agricultural production of the individual farms in Romania*. Department of Economics and Technological Change, University of Bonn.

Doran MH, Low ARC & KEMP RL (1979). Cattle as a store of wealth in Swaziland. *American Journal of Agricultural Economics* 61(1):41-47.

Dyer JH & Chu W (2000). *The role of trustworthiness in reducing transaction costs and improving performance: empirical evidence from the United States, Japan and Korea* [online] www.extenza-eps.com/extenza/loadHTML (Accessed 21/07/2002).

Farinde AJ & Taiwo KA (2003). *Moving women from subsistence to commercialisation: issues and policy imperatives*. Paper presented at the Workshop Organised by FAO/IITA on "The Gender Impact of the Commercialisation of

Smallholder Agriculture". Institute for International Tropical Agriculture, Ibadan, May 14-16.

Govereh J & Jayne TS (1999). *Effects of cash crops production on food crops productivity in Zimbabwe: synergies or trade-offs.* MSU International Development Working Papers no 74. Department of Agricultural Economics. Michigan State University, East Lansing, Michigan.

Heierli U & Gass T (2001). *Enhancing employment and income generation in rural areas*. Paper submitted to the Operations Committee of the Swiss Agency for Development and Cooperation (DEZA) on 11 October 2001 [online]. www.deza.admin/themen (Accessed 17/02/2003).

Heltberg R & Tarp I (2001). *Agricultural supply response and poverty in Mozambique.* Paper Presented at the Conference on Growth and Poverty at WIDER, Institute of Economics, University of Copenhagen.

Lapar ML, Holloway G & Ehui S (2003). Policy options promoting market participation among smallholder livestock producers: a case study from the Philippines. *Food Policy* 28:187-211.

Makhura MT, Coetzee GK & Goode FM (1996). Commercialisation as a strategy for reconstruction in agriculture. *Agrekon* 35(1):35-40.

Makhura MT (2001). Overcoming transaction costs barriers to market participation of smallholder farmers in the Northern Province of South Africa. PhD dissertation, University of Pretoria, Pretoria.

Matungul PM, Lyne MC & Ortmann GF (2001). Transaction costs and crop marketing in the communal areas of Impendle and Swayimana, KwaZulu Natal. *Development Southern Africa* 18(3):347-363.

North DC (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.

Sharp JS & Smith MB (2003). Social capital and farming at the rural-urban interface: the importance of non-farmer and farmer relations. *Agricultural Systems* 76:913-927.

Spio K (2002). The impact and accessibility of agricultural credit: a case study of small-scale farmers in the Limpopo Province of South Africa. PhD dissertation, University of Pretoria, Pretoria.

Strassberg PJ, Jayne TS, Yamano T, Nyoro J, Karanja D & Strauss J (1999). *Effects of agricultural commercialisation on food crop input use and productivity in Kenya*. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan.