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Farm Output, Non-Farm Income, and Commercialization in Rural Georgia

by

Iddo Kan, Ayal Kimhi and Zvi Lerman

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P.O. Box 12, Rehovot 76100

ת.ד. 12, רחובות 76100

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by

Iddo Kan
Haifa University
kan@nrem.haifa.ac.il

Ayal Kimhi
The Hebrew University
kimhi@agri.huji.ac.il

Zvi Lerman
The Hebrew University
lerman@agri.huji.ac.il

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Abstract

This article examines the decision of farmers to sell part of their farm output on the market, using data from the Republic of Georgia. A two-level empirical model is used, in which endowments and resource allocation decisions determine farm output and non-farm income, and these in turn determine market participation. We found, as expected, that farm output affects market participation positively, while non-farm income affects it negatively. Landholdings have an indirect positive effect on market participation, through its positive effect on farm output. Education has a negative effect on market participation, mainly through its positive effect on non-farm income.

Key words: commercialization; market participation; farm output; non-farm income; resource allocation;

***JEL* codes**: O12; P23; P25.

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Introduction

Economies in transition are gradually shifting towards a market economy, and this shift has been driven in part by land reforms that distribute land from large corporations or cooperatives to individual farmers. Yet, many of these farmers do not produce to the market, and hence cannot enjoy the benefits of the market economy. As a result, the farm sector has a dual structure, with subsistence farmers, who produce for own consumption only, at one end, and commercial farmers, who sell at least part of their output in the market, at the opposite end. Increased farm commercialization is expected to lead to higher average farm incomes and lower farm income inequality. In addition, market participation impacts farmers' supply responses and hence is important for agricultural policy analysis (Key, Sadoulet and de-Janvry 2000). This is why the issue of farm commercialization in transition economies received some, although not sufficient, attention in the literature. For example, Lerman (2004) focused on the role of landholdings, and concluded that farm enlargement is the most important factor to achieve greater commercialization. Mathijs and Noev (2004) also found that land is important, and showed that ownership of machinery and livestock are important as well. Balint and Wobst (2006) emphasized the combined role of endowments (land, capital and family labor) and transaction costs in determining market participation. Lerman (2005) showed that an increase of farm size leads to higher household incomes and greater readiness to engage in sale of the farm products, while commercialization of farm activity in turn generates higher household incomes. Kostov and Lingard (2004) claimed that subsistence agriculture could be an advantage under certain conditions, in the presence of risk. They too emphasized the need for more research into the determinants of subsistence versus commercialization of agriculture in transition economies.

The positive effect of farm size on market participation shown in the studies mentioned above is in essence a partial equilibrium result. The relatively small average farm size in transition countries is mostly due to the equal allocation of farmland through land reforms. If post-reform land transactions are possible, increasing farmland of some farms necessarily comes at the expense of other farms. While market participation could increase among farms that gain land, it is likely to decrease among farms that lose land. In addition, the positive effect of land on market participation is a reduced-form effect, since land increases farm output on one hand, but this leads to a higher household income, which increases the demand for food on the other hand.

In this article we offer a more structural analysis of market participation by rural households in the Republic of Georgia. In particular, we use both farm output and non-farm income to explain market participation. We also instrument output and income in order to avoid potential endogeneity. Our results illustrate the dual impact of household income: farm output increases market participation while non-farm income, which has only an income effect on food consumption, decreases market participation.

In the next section we provide some background on the situation of individual farms in Georgia. Then we describe the conceptual framework on which we base our empirical analysis. After that we describe the data set that we use in the empirical analysis. We then present the empirical model and discuss the empirical results. The last section includes a summary and some concluding remarks.

Background

Georgia is a small mountainous country in the Southern Caucasus, with climate ranging from warm, almost Mediterranean, in the Black Sea coastal plain and in the valleys, to severe in the snow-bound mountains. Nearly 50% of its total population of 5 million lives in rural agricultural areas. A large part of the agricultural land in Georgia is in green mountain pastures, and only 40% is suitable for cultivation. The large size of the rural population and the relative scarcity of cultivable land combine to produce a high population density per hectare of good productive land: the average land endowment is 0.5 hectares of arable land per capita in rural areas. The agrarian nature of Georgia is underscored by the high share of agriculture in GDP (20%) and in total employment (47%).

During the Soviet era, agriculture was characterized by absolute state ownership of all agricultural land and concentration of production in large-scale collective farms. When Georgia became independent after the dissolution of the Soviet Union in the end of 1991, the entire country was in total disarray facing a bitter civil war. Georgian agriculture collapsed, and the land held by large collective farms was quickly distributed to rural households in an attempt to avoid famine. This desperate goal was achieved as Georgian agriculture quickly recovered in 1993-95. The recovery raised the volume of agricultural production in recent years by 25%-30% above its lowest level in 1993, yet the initial collapse was so dramatic that the agricultural output today is still 40% below what it was in 1990.

Georgia completely individualized its agriculture as early as 1992-93. The individual sector in Georgia currently produces almost 100% of agricultural output, up from 40% before 1990. The shift of production to the individual sector is a reflection of the dramatic increase in the land holdings of rural households. Prior to 1990, only 7% of agricultural land was individual use. A decade later, in 2000, 37% of agricultural land (or more than 70% of arable land) is used by individual farmers.

The universality of land distribution to rural families produced relatively small holdings. Thus, the average size of an individual farm in Georgia is 0.96 hectares and only 5% of farms are larger than 2 hectares (figure 1).

Figure 1. Text here

Conceptual framework

Key, Sadoulet and de-Janvry (2000) present a farm-household utility maximization model that allows farmers to be net buyers or net sellers of each commodity. Commodities include consumption goods, farm output, and time. They allow for both fixed and proportional transaction costs that affect the market participation decisions. They solve the model conditional on market participation, and derive indirect utility functions for each regime defined by a particular market participation rule. Then, market participation can be determined by comparing these indirect utilities. Renkow, Hallstrom and Karanja (2004) illustrate this graphically, by noting that market participation occurs if the supply of a commodity by the farm is greater than the household demand for this same commodity, and if the gains from trade in that commodity are larger than the associated fixed transaction cost. This implies that the participation decision is not independent of the quantities produced and consumed. On the other hand, Bellemare and Barrett (2006) show that the actual volume of transactions also depends on information that is only revealed in the market, i.e. after the participation decision has been made.

This theoretical apparatus lies behind our empirical application as well. However, our empirical application is somewhat different. Instead of estimating reduced-form market participation equations, we condition the participation decision on farm output and non-farm income. However, we still want to allow feedback effects from market participation to output and income. This is because information on market prospects can affect household decisions

on resource allocation between farming and non-farm income-generating activities. Hence, we allow the output and income variables to be endogenous and use instrumental variables to identify their effects on the participation decision.

More specifically, we view the household as making decisions on resource allocation between farming and non-farm activities. The resources involved could be most naturally household labor, but also other productive assets, excluding land. The resource allocation decision could be influenced by the prospects of output market participation. The aim of the household is to maximize utility over consumption of farm products as well as non-farm products and leisure. Purchase of non-farm products can be paid from proceeds of sales of farm products and/or non-farm income. Income effects increase consumption of both farm products and non-farm products, and also leisure. An increase in non-farm income, holding farm output constant, has a negative net effect on market participation, since the household demand for farm products increases. On the other hand, holding non-farm income constant, an increase in farm output has a positive direct effect on market participation but also a negative indirect effect resulting from the income effect on consumption. Our hypothesis is that, in accordance with the existing reduced-form empirical evidence, the positive direct effect of farm output dominates the negative indirect effect.

Data

The data used in this research were collected by means of an Individual Farm Owners' Survey carried out in 2003, in four rural regions of Georgia: Dusheti, Mtskheta, Sagarejo, and Gardabani. The survey included 2520 individual farms. Sampling was performed as a two-stage procedure. Sakrebulos (villages) were sampled on the first stage and individual farms – on the second. The survey questionnaire included questions on the demographic profile of the household, land resources and land tenure, farm production, sale of farm products, purchase of farm inputs, farm labor, finances and credit, income from different sources, and social aspects. More details about the data collection can be found in Gogodze, Kan and Kimhi (2005).

The value of farm output was computed by adding the imputed value of self-consumption and stored output to the reported value of sales. The value was imputed using average prices in the region. The data reveals that about 28% of the farms did not participate in the output market (table 1). These are denoted as subsistence farms, while those who participated are

denoted as commercial farms. Table 1 shows that subsistence farms and commercial farms differ by several key variables. The value of farm output in commercial farms is almost three times larger than in subsistence farms, on average, while non-farm income is roughly the same in the two types of farms. Commercial farms and subsistence farms have about the same size of owned land, but commercial farms have much more rented land than subsistence farms. This suggests that a functioning land rental market is a key to the commercialization process. Land quality, irrigation, livestock and assets are also somewhat higher in commercial farms. All this implies that endowments are important in determining market participation. However, household members in subsistence farms are more educated than in commercial farms, suggesting that subsistence farming is at least in part a choice made by household members rather than a result of constraints. We also observe some regional variation in market participation, with higher participation in Gardabani region and lower participation in Mzskheta region.

Table 1. Text here

The positive association between farm attributes such as landholdings, land quality, irrigation and livestock on one hand and output market participation on the other hand are clearly part of the positive effect of farm output, since they are not supposed to affect market participation directly. Assets can be productive both in farming and in non-farm activities, hence their observed association with market participation is the balance of the effects of farm output and non-farm income, which are likely to be opposite in sign as explained above. The purpose of the subsequent empirical analysis is to separate these direct and indirect effects.

Empirical model and results

We use a sequential simultaneous equations model, where endowments and household decisions on resource allocation determine farm output and non-farm income, and these in turn, in addition to other variables, affect market participation. We specify the participation equation as a linear probability model in order to simplify the estimation procedure. This also has the advantage of not having to assume a particular distribution function for the unobserved component in that equation. In order to identify the effect of farm output, we use as instruments farm attributes such as landholdings, productive assets and livestock ownership. In the non-farm income equation, we use the value of productive assets as a single

instrument. We allow demographic variables to affect all three endogenous variables, but apply some common sense in deciding which demographic variables to include in each equation. Specifically, we exclude education from the farm output equation, because numerous earlier studies showed that the effect of education on farm output is negligible relative to its effect on non-farm income. We also include the number of children between 7 and 14 years of age in the farm output equation, but not in the non-farm income equation. The number of younger children is excluded from both equations.

Table 2 shows the estimation results. In the first column we observe that farm attributes, with the exception of the irrigation variables, have positive effects on farm output. The output elasticity of owned land is larger than that of rented land. The positive effect of the number of plot perhaps indicates advantages of diversification. The mean age and number of adult family members also have positive effects on farm output. This is also true for non-farm income (second column), which is also affected positively by higher education. The third column shows the coefficients of the linear probability model of output market participation. We find, as expected, that farm output and non-farm income have positive and negative effects, respectively, on market participation. The positive effect of farm output implies that the propensity to consume out of farm output is less than unity. We also find that schooling has a negative effect on market participation, holding farm output and non-farm income constant. This result does not have a straightforward explanation, and deserves further examination in future research. The number of adults in the household increases market participation. This implies that the consumption of adults is more intensive in market-purchased goods relative to the consumption of children.

Table 2. Text here

Summary and concluding remarks

We have examined the decision of Georgian farmers to sell part of their farm output on the market. We adopted a two-level empirical model, in which endowments and resource allocation decisions determine farm output and non-farm income, and these in turn determine market participation. We found, as expected, that farm output affects market participation positively, while non-farm income affects it negatively. Landholdings have an indirect positive effect on market participation, through its positive effect on farm output. Education has a negative effect on market participation, which is composed of an indirect effect through

its positive effect on non-farm income (resource allocation), and a direct effect which we find difficult to explain.

This research can be extended in several ways. First, a more structural modeling approach can be adopted, where the allocation of resources between farming and non-farm activities is explicitly incorporated. Second, we could study the volume of sales on the market in addition to the participation decision. Finally, the role of education needs to be explored further.

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Table 1: Comparison of subsistence and commercial farms

Variable	Subsistence	Commercial
Farm output (Lari/year)*	1422	3987
Non-farm income (Lari/year)	1135	1095
Land owned (Ha)	0.85	0.82
Land rented (Ha)*	0.12	1.05
Land quality index*	3.06	3.21
Number of plots	2.45	2.45
Fraction of land fully irrigated*	0.35	0.41
Fraction of land partly irrigated	0.10	0.10
Livestock ownership(dummy)*	0.72	0.84
Value of fixed assets (Lari)	15562	17792
Mean age of adults	45.52	44.96
Fraction of adult females	0.50	0.48
Fraction of adults with no schooling	0.08	0.08
Fraction of adults with elementary school education*	0.07	0.10
Fraction of adults with high school education*	0.42	0.50
Fraction of adults with higher professional education*	0.21	0.17
Fraction of adults with higher academic education*	0.22	0.15
Number of children 0 to 6 years of age	0.28	0.26
Number of children 7 to 14 years of age	0.51	0.48
Number of adults 15 years of age and above	3.15	3.23
Fraction of households in Mtskheta region*	0.38	0.20
Fraction of households in Dusheti region*	0.21	0.26
Fraction of households in Sagarejo region	0.26	0.25
Fraction of households in Gardabani region*	0.16	0.29
Number of households	687	1776

* difference significant at 5%.

Table 2: Empirical results

Variable	ln (Farm output)	ln (Non-farm income)	Market participation
ln (Farm output)			0.176 (11.5)**
ln (Non-farm income)			-0.129 (-4.70)**
Land owned	0.066 (5.78)**		
Land rented	0.012 (6.48)**		
Land quality	0.156 (4.69)**		
Number of plots	0.202 (11.3)**		
Land fully irrigated	-0.055 (-1.01)		
Land partly irrigated	0.061 (0.77)		
Livestock ownership	1.273 (23.7)**		
ln (Assets)	0.044 (7.27)**	-0.001 (-0.05)	
Mean age of adults	0.006 (2.90)**	0.034 (7.88)**	0.001 (0.88)
Fraction of females	-0.011 (-0.11)	-0.090 (-0.42)	-0.017 (-0.40)
High school		-0.352 (-1.87)	-0.112 (-2.90)**
Higher professional		0.826 (3.67)**	-0.125 (-2.66)**
Higher academic		0.971 (4.35)**	-0.182 (-3.74)**
Children 0 to 6			-0.011 (-0.77)
Children 7 to 14	0.048 (1.80)		-0.07 (-0.56)
Adults 15 and above	0.097 (4.80)**	0.405 (9.31)**	0.031 (2.38)*
Dusheti region	0.063 (1.06)	-0.479 (-3.79)**	0.064 (2.25)*
Sagarejo region	-0.076 (-1.33)	-0.299 (-2.35)*	0.066 (2.57)**
Gardabani region	0.698 (11.7)**	-1.194 (-9.49)**	0.028 (0.66)
Intercept	4.152 (22.4)**	3.389 (9.50)**	0.122 (1.07)

Notes:

Excluded categories: less than high school education, Mtskheta region.

t-statistics in parentheses.

* coefficient significant at the 5% level.

** coefficient significant at the 1% level.

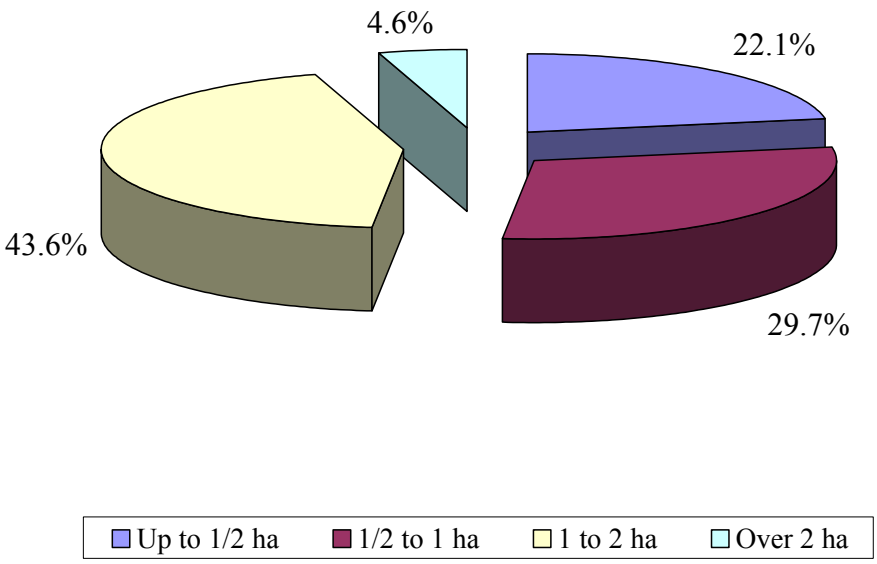

Figure 1: Size distribution of individual farms in Georgia

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