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Perpetuation of subsistence farming in Western Balkans:
the role of factor market imperfections

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Abstract

The paper analyses the imperfections in output and factor markets in Kosovo that act as a barrier to farm commercialisation. On the one hand, agricultural households may not have access to output market due to an underdeveloped downstream sector. On the other, local producers might not be preferred to importers as their production level is small with a variable quality due to constraints in factor markets.

Data from the Agricultural Household Survey 2005 are used. A conceptual framework is developed on the basis of a household model where non-separability results from a "wedge" between purchase and sale prices due to transaction costs. The share of the output sold in the total value of output is regressed over a set of explanatory variables. A truncated regression is employed due to the high percentage of the dependent variable having the value of zero. Many of the observations do not contain all three factor prices - land rent, wages and interest. For this reason three separate regressions are run, each containing one of the prices.

The model including wages is non-separable. Households with more members sell less as they have preferences for household needs. This calls for active rural development and educational policy which can create labour opportunities for agricultural households.

Keywords
subsistence farming, agricultural households, separability, market imperfections, Kosovo

JEL Classification Q12

1. Introduction

Several papers have investigated the issue of subsistence farming in transition countries. In general, studies agree that subsistence farming has expanded during the transition period due to macroeconomic instability and a high general economic risk, but several authors underline that transaction costs are crucial determinants (e.g. Kostov and Lingard, 2004; Mathijs and Noev, 2002). Transforming agricultural households into more commercialised farm operations would help generate income in rural areas.

The prevalence of subsistence farming in Western Balkans makes the region an interesting case study from a development point of view. Although covering 60 percent of the population, rural areas in Kosovo do not contribute much to the economic growth. One of the reasons for this situation is that agriculture is stagnating because most of the farms produce for self-consumption. Imports are thus required to meet the urban demand, particularly of wheat, milk and dairy products (Lingard, 2003).

This paper focuses on imperfections in input and output markets. On the one hand, agricultural households may not have access to output market due to an underdeveloped downstream sector. On the other, local producers might not be preferred to importers as their production level is small with a variable quality due to constraints in factor markets. It is assumed that this is the case in Western Balkans due to, for example, a lack of off-farm opportunities and safety net that will allow labour mobility, a limited access to credit (resulting in underinvestment and low quality of inputs used), a high level of land fragmentation and missing institutions for land consolidation.

The paper is structured as follows. The next section presents the conceptual framework, while the following section describes the data and the methodology used. The fourth section presents the results and the final section provides some interpretation and concludes.

2. Conceptual framework

A large body of literature employs household modelling under market imperfections based on the concept of non-separability in household production and consumption decisions (Singh *et al.*, 1986). Various factors can influence this non-separability. In respect to output markets, Lofgren and Robinson (1999) mention at least three cases, i.e. the household is not a price taker in at least one market (for one production-consumption good); it does not treat sold/purchased products and products produced and consumed on farm as perfect substitutes;

there is a "wedge" between purchase and sale prices due to transaction costs. This paper develops the conceptual framework around the latter – the existence of transaction costs.

Starting from the perfect inputs and outputs market, the household model can be written based on Sadoulet and de Janvry (1995) as follows:

$$\underset{c_a,c_m,l}{\text{Max}}\, U\left(c_a,c_m,l,z\right) \tag{1}$$

subject to production (2), income (3), and time (4) constraints

$$q_a = f\left(L,X\right) \tag{2}$$

$$p_x X + p_m c_m = p_a\left(q_a - c_a\right) + w\left(L_F - L\right) \tag{3}$$

$$l + L_F = T \tag{4}$$

with $U(.)$ utility function; c_a household consumption of agricultural products; c_m consumption of other goods bought in the market; l leisure; z household's characteristics influencing the marginal utilities of U with respect to c_a, c_m and l. The production constraint includes: q_a quantity of agricultural output; $f(.)$ production function; L total labour and X other inputs used to produce agricultural output. p_a, p_m, w, p_x, are prices of c_a, c_m, L and X respectively; L_F is family labour input and T total time endowment. All standard economic assumptions about utility and production function apply to the model (Taylor and Adelman, 2003). In the case of perfect market, the model is recursive, implying that consumption does not influence production activities. Decisions are separable; the optimal household consumption of agricultural products being:

$$c_a* = c_a\left(p_a, p_m, w, p_x, L*, X*\right) \tag{5}$$

where $L*, X*$ are the optimal input levels.

The household consumption thus depends exclusively on the market prices; the household's preferences play no role. In this case, self-consumption is a rational response when household's asset and time endowment give the household a comparative advantage over the goods and factors exchanged on the market.

In the case of deficient or missing markets, however, it might be more beneficial for the household not to participate in the market and to be fully, or close to fully, self-sufficient, if their shadow prices are higher or lower than the market prices they would face depending on whether output or input markets are concerned and whether households are buyers or sellers of

outputs and factors. Under market imperfections, decisions are not separable and the consumption of agricultural goods depends on the household's characteristics and not on the market prices.

In this study market imperfections related to positive transaction costs are investigated only in the cases when a household is a seller in the output markets and buyer in the factor markets. The two cases of imperfections are presented in turn.

1) If the output market is imperfect, the following constraint is added to the household model:

$$p_a \leq \overline{p}_a \tag{6}$$

with $\overline{p}_a$ the shadow output price and p_a the maximum price that the household can receive selling their output (the difference approximates the transaction costs).

The optimal household consumption is then:

$$c_a{}^* = c_a\left(p_m, w, p_x, L^*, X^*, z\right) \tag{7}$$

2) If the input markets are imperfect, the following constraints are added to the model:

$$w \geq \overline{w} \tag{8}$$

$$p_x \geq \overline{p}_x \tag{9}$$

with $\overline{w}$ and $\overline{p}_x$ the shadow prices and w and p_x the minimum prices the household must pay to purchase factors in the markets. The difference between w and p_x, on the one hand, and $\overline{w}$ and $\overline{p}_x$ on the other hand, approximates the transaction costs on the input side.

The optimal home consumption is then:

$$c_a{}^* = c_a\left(p_a, p_m, L^*, X^*, z\right). \tag{10}$$

3. Data and methodology

3.1. Data

The empirical analysis focuses on Kosovo due to relatively good quality household data from

the foreign donor supported Agricultural Household Survey (AHS) of 2005 (SOK, 2005).[1] The survey sample is stratified by municipality and village size and thus has a good geographical coverage and village representation. Data were collected with face to face interviews. The useable records cover 4,187 agricultural households. The survey provides data on demographic characteristics of agricultural households; land use and farm structure; sub-sectoral production data for crop, livestock and forestry; variable inputs; machinery, labour and farm expenditure.

Table 1 provides some descriptive statistics of the sample used. Households are large, with an average of 9 members, but farm a small Utilised Agricultural Area (UAA) of 2.4 ha on average out of which 50 percent is arable.[2] The land area is very fragmented (6.6 plots on average). Twenty percent of the land area is irrigated. A large number of different crops are cultivated per farm (8.3 on average). Grain yields (3.9 t/ha) are much lower than in Western Europe but not too far from the yields recorded in some neighbouring countries during the period of transition (e.g. Bulgaria). Households almost do not use external factors of production: only 1.8 percent of the total labour is hired and 4.6 percent of the UAA is rented from private landowners or from the State. This suggests that agricultural households are not integrated in the factor markets. As presented in Table 2, the share of the output sold in the total value of output is also low, 13.5 percent, while 83.7 percent are used for human consumption or for animal feed and around 3 percent are wasted. This indicates a low level of integration in the output markets as well. To the extent that output sold is concerned, it has a slightly higher share in fruit and vegetables, and forage crops, while grains are mostly used for self-consumption.

In 2005 around 8 percent of the land was left fallow and around one fourth of households had some area left fallow. Table 3 presents that the survey respondents identified the lack of production factors (variable inputs, labour and equipment) as the main reason for leaving land fallow (48 percent of the cases), followed by a low profitability (34 percent of the cases). This

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[1] The survey was carried out by the Statistical Office of Kosovo (SOK) with the technical assistance of the European Agency for Reconstruction project 'Agricultural Statistics and Policy Analysis Unit for Kosovo' (ASPAUK).

[2] According to the survey, a household is defined as people living under the same roof and pooling their income. Kosovo still maintains the traditional style of living and extended families live together. In order to be classified as agricultural, the household should possess and cultivate more than 0.1 ha of arable land, or less than 0.1 ha of arable land but have at least 1 cattle and a calf, or 1 cattle and 2 sheep or goats, or 4 sheep or goats, or 50 poultry, or 20 beehives, or more than 20 m^2 of fish pond (SOK, 2005).

illustrates that some agricultural households in Kosovo may face constraints in both input and output markets. Table 3 shows that 14 percent of the fallow plots were not cultivated due to the lack of labour. At first glance, this is counter intuitive bearing in mind the excess labour in Kosovo agriculture. However, the averages may hide particular cases when labour is a constraint.

Table 1: Descriptive statistics of the sample used; sample averages

	Number of observations	Mean
Household size	4,187	8.9
Members' average age in the household	4,187	29.8
UAA (ha)	4,187	2.4
Arable land area (ha)	4,187	1.2
Grassland area (ha)	4,187	0.9
Fallow land area (ha)	4,187	0.2
Total number of plots	4,187	6.6
Average size of arable plot (ha)	3,813	0.45
Average size of grassland plots (ha)	3,337	0.65
Share of irrigated land (%)	4,128	20.4
Share of rented UAA (%)	4,173	4.6
Average rental (euros/ha)	234	122.8
Total number of different crops	4,187	8.3
Grain yield (t/ha)	2,951	3.9
Number of livestock units	4,187	2.7
Labour (AWU)	4,187	1.96
Share of hired labour (%)	3,916	1.8
Average wage (euro/day)	815	12.6
Value of equipment owned (euro)	4,187	2,943
Total interest / Total equipment value	2,469	0.001

Table 2: Use of agricultural output (%); sample averages

Share of total output sold	13.5
Share of total output used for household needs or on-farm, including:	83.7
used for household needs	38.1
used on-farm (animal feed)	45.6
Share of grains sold	6.4
Share of fruit and vegetables sold	12.5
Share of fodder crops sold	11.7

Table 3: Reasons for leaving some land fallow; shares of plots left fallow (%)

Crop rotation	2
Lack of inputs	23
Lack of labour	14
Lack of equipment	11
Low economic profitability	34
Land mines	1
Lack of security	9
Other reasons	6

3.2. Methodology

This is a work in progress and in the study presented in this paper only a global test for non-separability is applied without accounting for heterogeneity in the sample of households. Similarly to some other studies, the ex-post observations of market participation by the sub-sample of households that participate in market transaction is tested to understand whether they behave according to the rules of separability (Vakis *et al*., 2004). The share of output sold in the total value of output is regressed over a set of explanatory variables. Several variables have been tested to investigate which market is primarily deficient. They include households' characteristics z (such as household size, average household's age), proxies for output and input prices p_a, w, p_x (such as location, wages, rentals, interest) as derived from equations (7)

and (10), and other farm characteristics (such as size, irrigated land). Output prices are not available in the database. As a proxi the distance from the market is used, approximated by a dummy equal to 1 if the household lives in a municipality (i.e. county) that is crossed by the major road connecting Serbia to FYR Macedonia, and equal to 0 if not. Input prices are proxied by land rent per ha (p_x), daily wages (w) and interest rate as a ratio of the value of agricultural equipment (p_x).

Many of the observations in the data set do not contain prices either because households did not respond to the questions during the survey or did not have any rented land, hired labour or loans. If only the observations that recorded all three - land rents, wages and interest - are selected, the sample size is reduced to 56 observations. For this reason, three separate regressions are run, each containing one of the input prices, either rent, wage or interest. Therefore, each regression is run with a different sub-sample, and the sub-samples have different sizes as presented in Table 4. The table also shows some average farm and production characteristics for each sub-sample and compares those to the characteristics of the farms which do not use external loans, labour or land. Table 4 indicates that, overall, AHS is constituted of several groups:

i) Households integrated in the credit market who have some interest to repay (these are the 2,386 observations in the regression including capital price).

ii) Households integrated in the labour market, i.e. paying wages to hired labour (these are the 813 observations in the regression including labour price).

iii) Households integrated in the land market paying some rentals (these are the 226 observations in the regression including land price).

Two issues have to be considered in regard to the estimations. First, 34 percent of the sample consists of fully subsistence farms and none of their production is sold. This high percentage of the dependent variable having the value zero has led to the decision to use a truncated regression. Second, prices p_a, w, p_x may be endogenous to the regression. Households' behaviour in the output market might influence the prices they face in both output and input markets (for example, banks may charge a higher interest rate to semi-subsistence households than to market-integrated households). This causes a potential issue of simultaneity between the share of output sold and the prices. For this reason, exogeneity is tested, using a Hausman test. Following Smith and Blundell (1986) and Newey (1987), in the case of the truncated regression the Hausman test relies on two stages as in the case of standard regressions.

Table 4: Characteristics of the regression samples; averages and ANOVA (F-tests)

	Regression with capital price		Regression with labour price		Regression with land price	
	Households in the regression (2,386)	Households not in the regression	Households in the regression (813)	Households not in the regression	Households in the regression (226)	Households not in the regression
Share of total production sold (%)	12.1	15.5	15.8	13.0	25.8	12.8
F-test	16.5 ***		7.9 ***		54.8 ***	
UAA (ha)	3.2	1.5	3.7	2.1	5.5	2.3
F-test	488.7 ***		256.3 ***		343.7 ***	
Livestock units	3.5	1.6	3.9	2.4	5.6	2.5
F-test	260.6 ***		93.4 ***		136.8 ***	
Plot size (ha)	0.43	0.27	0.47	0.34	0.64	0.34
F-test	254.4 ***		111.8 ***		188.3 ***	
Capital to labour ratio (euros / labour unit)	3,222	57	3,436	1,645	4,335	1,875
F-test	651.4 ***		126.0 ***		86.7 ***	

*, **, ***: significant at 10, 5, 1 percent

4. Results

The Hausman test using instruments such as household's human capital characteristics and farm characteristics does not reject the null hypothesis of exogeneity. Thus, the model has been estimated with the standard truncated regression method.

Results from the three regressions are presented in Table 5. The number of members in the household (household characteristics z) has a negative impact on the share of output sold in the case of the regression including the labour price. This suggests that large families prefer to use their production to provide for household needs. It indicates that in this case the model is non-separable and households included in this sub-sample appear to face market imperfections that force them to sell less than what they would have done in the case of a well developed labour market. By contrast, for farms that pay rentals or interest the household model is separable, i.e. production and consumption decisions are not linked.

In the regression including labour price, the share of hired workers has a positive impact on the share of output sold, suggesting that hired labour enables households to market their output due to, for example, specific skills not acquired by the family labour. Two variables have a significant coefficient in the regressions including the capital price and the labour price: the number of different crops produced by the household and the share of rented land. The former has a negative coefficient indicating that the higher the number of different crops cultivated, the lower the household integration in the output markets. This suggests that the households have been diversifying their agricultural production in order to cover the variety of food household and farm needs and not in response to market demand. Rented land has a positive impact on the share of sold output, indicating that the availability of land may be a constraint to farms' integration in the downstream markets.

The three remaining explanatory variables that are not prices, namely the location close to main roads, the UAA and the share of irrigated land, have a positive and significant effect in all three regressions. The positive coefficient of the location variable indicates that transportation infrastructures are crucial to sell the output. This is important as most of the farmers use direct sales and only about 3 percent of farmers sell through an association or cooperative. Farm size in terms of UAA has a positive effect on the share of production sold, confirming the intuition that larger farms face lower transaction costs when selling their output. This is consistent with the impact of rented land as in Kosovo households' own land area is very small. Finally, farms with a high share of irrigated land and those that use more fertilisers per ha sell more of their

production. One possible explanation is that such farms can achieve larger quantities, and a higher and more consistent quality output which is easier to sell.

Table 5: Truncated regression results (dependent variable: share of total production sold)

| | Regression including | | |
	Capital price	Labour price	Land price
Constant	-209.2 **	-416.0 ***	-210.4
Household size	-0.24	-1.45 ***	-0.177
Dummy = 1 if municipality with highway	23.3 ***	34.8 ***	20.8 ***
UAA	2.28 ***	3.00 ***	1.62 ***
Share of irrigated land	0.286 ***	0.276 ***	0.289 ***
Number of different crops cultivated	-2.74 ***	-2.06 ***	-0.92
Share of rented land	2.44 ***	4.86 ***	2.40
Share of hired labour	0.112	0.169 *	0.47
Interest per equipment value	51.8		
Wages per day		-2.14 **	
Rentals per hectare			0.029 ***
Number of observations	2,386	813	226
Wald test	114.6 ***	55.9 ***	61.5 ***

*, **, ***: significant at 10, 5, 1 percent

5. Interpretation of results and conclusions

On the basis of the results reported in the previous section several conclusions could be drawn. First, for households that use hired labour, the non-separability of the household model, the positive influence of hired labour and the negative effect of wages suggest that the subsistence character of this group is (at least, partly) a response to imperfections present in the labour market. Farms would benefit from hiring more labour but prices of external labour constrain them. As shown in Table 4 presenting the farm characteristics in each regression sub-sample, farms in this group are larger (3.7 ha and 3.9 livestock units, significantly different from 2.1 ha

and 2.4 livestock units for the rest of the farms which do not use hired labour) and with more favourable production characteristics (larger individual plots, higher capital to labour ratio).

Second, the analysis of the sub-sample of households who use production loans does not indicate major imperfections in the credit market. This corroborates with a small study of credit market in Kosovo carried out by Davidova (2006) which concluded that there were several positive developments in the credit market in comparison with the early transition experiences in other countries in Central and Eastern Europe. In Kosovo there are lending institutions with a credit resource which are interested in lending to agriculture to the extent that there are bankable projects. There are also banks established with foreign capital which bring know-how. Farmers have a positive attitude towards banks and do not see them as a source of last resort. The loan repayment rate is high. In addition, there are well performing micro-finance institutions which fill the gap left by commercial banks for small loans to household farms.

Third, concerning households who rent land, as the land price positively affects the share of production sold (providing incentives for output sales), it may be concluded that the imperfections are not in terms of price, but in terms of access to land and/or land availability. Table 4 indicates that farms integrated in the land rental market are larger and with better productive assets than farms operating on their own land only.

Overall, farms operating in all three factor markets (capital, labour, land) are larger in terms of UAA or livestock units, less fragmented (larger plot size) and have a larger capital to labour ratio. This sheds light on issues that policies need to address in order to increase integration in the output markets. In particular, land and labour seem to be a major problem. Enabling farmers to access additional land and hired labour may boost commercialisation. Ethnic conflicts have made people reluctant to rent out or sell land as they see it as a means for survival. This is consistent with the assessment in the Green Book that, in view of the social situation and traditions in Kosovo, the increase in farm size will be a difficult and long-lasting process (UNMIK, 2003). There is a lack of social policy that can provide a safety net. The extended families locked in subsistence agriculture have been substituting for the lack of food security and social policies. The lack of institutions facilitating rural labour mobility have impeded structural change and farm commercialisation. All this calls for active rural development and educational policy which can create labour opportunities for agricultural households.

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