The Impact of Property Rights Imperfections on Resource Allocation and Market Development: Co-ownership of Land in Bulgaria

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Introduction

There is a large literature on the impact of property rights on efficient resource use and the development of markets. One of the most dramatic examples of property rights reforms to enhance efficiency are the land reform processes which have been implemented 'from Prague to Beijing' and which have radically changed the rural areas of the transition world – and the livelihoods of hundreds of millions of poor households (Deininger, 2003; Rozelle and Swinnen, 2004). However, the effect of these land rights reforms has been mixed (Lerman *et al.,* 2004). The negative experiences in some countries, such as Russia in the 1990s, have caused a debate with some arguing that the reforms went too fast, while others argued that they did not go fast enough and that the lack of clear and well defined property rights is a key impediment to growth and recovery.

While perfect property rights are ultimately desirable, moving towards better but still imperfect property rights may yield important gains in efficiency of resource use and market development (see eg McMillan, 2002). In the case of China, where land rights reforms induced enormous gains in efficiency and reductions in poverty, it is argued that dramatic effects have resulted from more efficient, but still imperfect, property rights of land (Li *et al*., 1998). Similarly, studies on land use and investment incentives in Africa, Asia and Europe indicate that secure land use rights may be sufficient conditions for efficient land use and investments by farmers (Brasselle *et al.*, 2002; Feder and Feeny, 1991; Swinnen, 2002).

In this paper we use data from a recent survey on land use and allocation in Bulgaria to analyse the development of land markets and how imperfections in land rights affect both the allocation and exchange of land. The development of land markets is not only important from an efficiency point of view, but also for equity reasons (Deininger and Feder, 2002; Swinnen, 2001).

Land sales have generally been disappointing in transition countries. This is also the case in Bulgaria where very little land was sold in the first decade of transition. In contrast, land rental markets have developed fast and extensively. In an environment with large uncertainties and high transaction costs, where credit markets and insurance markets are imperfect, land rental markets can play an important role in improving efficiency and possibly equity in land use and access (Deininger and Jin, 2003; Sadoulet et al., 2001; Vranken and Swinnen, 2003).

However, relatively little is known about the behaviour of rental markets in these economies either theoretically or empirically. There is an extensive literature on land rights and how transaction costs affect land use and property rights and farm organizations more generally (Allen and Lueck, 1998; Barzel, 1997; Coase, 1960; Demsetz, 1976; Hyami and Otsuka, 1993; Schmitt, 1991). However in order to understand the functioning of land

markets in transition it is essential to integrate transition specific features. Elsewhere we have developed a theoretical model of land markets in transition (Vranken and Swinnen, 2003). In this paper we use empirical evidence to get a better understanding of the development and functioning of land rental and sales markets in transition by studying the development of land markets in Bulgaria, using a unique survey dataset.

The paper is organized as follows. The next sections discuss the data, the land reform processes in Bulgaria, and the changes in land use and exchange during transition. Then we identify several problems with the land market, and we assess quantitatively which factors are affecting land use and the development of the land markets. The final section concludes.

Data

Our analysis is based on survey data collected in 2003 in three Bulgarian regions[1]. The North-East region embraces the administrative divisions Dobrich and Varna, the North-Central region holds Veliko Tarnovo and the South-Central region holds Plovdiv, Stara Zagora and Sliven.

The data include general plot level information on land ownership and exchange and household level information on general characteristics, capital endowment, experienced problems in accessing land. Our data set holds information about 3,849 plots and 642 households.

The survey was designed specifically to study the rental market, using an indirect survey approach following Macours et al. (2001). This indirect survey approach is designed to obtain data on both partners in rental activities. The idea behind the indirect approach is that a lot of private information is public at the level of the community. Selected informants can be used to answer questions about individual community members on matters that are locally public. To avoid potential problems of selection and information bias, we complemented the indirect survey work with targeted survey interviews with the households themselves.

A brief history of land reform, use, and ownership in Bulgaria

The collectivisation of Bulgarian agriculture started in the late 1940s. Initially, three types of farm structures were created: collective farms, state farms and machinery and tractor stations. In the early 1970s these were unified into a small number of Agro-Industrial Complexes (AICs). Within the AICs there were four main forms, Labour agricultural co-operatives (TKZSs), State agricultural farms (SAFs), Machine and tractor stations (MTS) and brigades (Davidova et al., 1997). Two thirds of the AICs land was farmed in TKZSs and SAFs. Brigades were sub-units within AICs with their own balance sheets, who specialised on a single crop or livestock production. Machine and tractor services had no land and provided mechanisation services to TKZSs and SAFs. The second group of pre-reform farm structures were private household plots. Table 2.1 illustrates the importance of the farm structures. A third group, 'other organisations', includes farms attached to research stations, schools and forest enterprises, and also auxiliary farms which were part of industrial enterprises and the armed forces.

[1] The regions were selected to reflect important variations in the rural economy, agricultural structure, property rights (if important), geographical conditions, etc.

All this changed dramatically after 1989. First, former communist co-operatives (TKZS) were liquidated in the early 1990s and their assets were transferred to a variety of new farm organisations, including limited liability companies, share holding company, joint stock companies and new agricultural cooperatives .

Second, a land reform restituted effective land property rights to former landowners. In the first transition years, farm restructuring and land reform were subject to intense political debate, which had a strong impact on the reforms (Swinnen, 1997). As a result of political changes in the government, the Law for Agricultural Land Ownership and Land Use (LALOU) has changed more than 20 times since its adoption. Continuous changes in legislation created an uncertain environment.

Land restitution lasted on average 4-5 years, although the speed of the restitution process differed throughout the country. Land restitution was slowed by poor evidence on former land ownership. In many villages, former registers with land ownership information of the pre- collectivisation period were missing (burned, disappeared, etc.). This forced the Land Commissions (LCs) responsible for land restitution to accept all kind of evidence that might prove land ownership prior to 1948. As a result, LCs' decisions were contested and land reallocation plans were rejected. Court appeals arose and suspended the market reallocation of land. In a few cases, the LC used air photos to prove the pre-collectivisation boundaries.

There were many land conflicts in the villages during the land restitution process also because of people's attachment to pre-collectivisation land plots and because of alleged power abuse by LC members. First, land was generally not restituted in historical boundaries but often in comparable boundaries, meaning the physical location is not necessarily in exactly the same location as the pre-collectivisation ownership. This caused many conflicts between landowners among each other and between land owners and the LC.

Second, land conflicts emerged because members of the LCs received consolidated parcels of land which were easily accessible from the main road or located in the most fertile areas of the territory belonging to the settlement (TBS), while people without decision power received fragmented parcels with inferior location or quality. This holds for almost all areas that were surveyed during the project and has been a serious source of conflict during the restitution process and even after its official ending.

At the end of the 1990s, more than 80% of agricultural land titles were restituted to individuals. The land restitution process resulted in a strong fragmentation of land ownership. On average, land owning households own 3.9 ha of land which are divided into 6 plots with each an average size of 0.6 hectares.

There is regional variation in land fragmentation (figure 2.1 and table 2.4). In the North-East region, land owning households own on average 2.4 plots with an average size of 1.9 ha. In the South- and North-Central region a household owns on average respectively 7.5 and 6.7 plots. The average plot size in both regions is 0.5ha.

The post-transition land market in Bulgaria

The existence of such a highly fragmented ownership situation increases the need for an efficient exchange of land between owners and users of land. Land is *used* by four types of farms: co-operatives, state farms, farming companies and individual farms. The share of arable land used by cooperatives and their average size declined since the start of transition. In 2001, their share had fallen to 51% of the agricultural land. Individual farmers and farming

companies grew in importance. In 2001, both individual farmes and companies cultivated approximately one quarter of agricultural land.

The land sales market in rural Bulgaria is not well developed. Selling of agricultural land is very limited. Our survey data show that by 2003 only 3% of rural households own land that they have bought since the start of transition. The reason for this is a combination of factors. In general land sales markets tend to work imperfectly due to imperfections in other markets such as the credit market (Binswanger *et al.*, 1995; Sadoulet *et al.*, 2001; Platteau, 2000). In transition countries land sales are further restricted, or absent, due to large uncertainties, missing legislation or the unwillingness of many owners to part with their newly acquired land. Vranken and Swinnen (2003) using survey data from Hungary find that liquidity constraints in the presence of important credit market imperfections restricts buying as a strategy to enlarge farms, and that labour market constraints induce inefficient producers to hold on to their land. These constraints are likely to be even more important in Bulgaria given the slower progress of economic and institutional reforms, compared to Hungary.

The main form of land exchange in Bulgaria is through the rental market. 78% of all land owning households in our survey rent land out and 35% of the land cultivating households are renting in land. Around 40% of the parcels which are owned by the surveyed households are rented out to a cooperative and 16% is rented out to a farming company (table 2.3)[2]. This means that more than half of the parcels owned by rural households are rented out to a farm enterprise. Exchanging land among households occurs less frequently. Only two percent of the parcels owned by rural households are exchanged with other households. 18% of the parcels are cultivated by the owner.

Land abandonment is widespread. More than 40% of all land owning households in our 2003 survey leave land abandoned, and 23% of the total number of plots owned by rural households are left abandoned. However, there is wide regional variation on this: 67% of all land owning households leave land abandoned in the North-Central region, 57% in South-Central and only 3% in the North-East region.

Co-ownership and property rights

Besides land fragmentation and abandonment, the Bulgarian land market is affected by another problem which is that half of the parcels are co-owned by more than one owner. Land "co-ownership" results from a combination of four factors: (a) the way land was restituted; (b) the current inheritance law; (c) the fragmented 1946 ownership structure; (d) the absence of a land market during communism. During the land restitution process, land was normally given back to owners prior to 1946. A large part of these owners are no longer alive so that the land was given to their heirs. According to the Bulgarian Inheritance Law, every heir gets an equal share of the property when the owner dies. If the pre-1946 land owner had died, land was divided among the heirs (sometimes even the second generation). If during the land reform process X parcels had to be divided among Y owners, then each owner received 1/Y share of each of these X parcels. In this way, an equal treatment of heirs was assured.

A similar inheritance law exists in several Western-European countries, but co-ownership problems are not observed because land has always been divided among heirs

[2] If we look at the household level, we see that 50% of all land owning households is renting out land to a cooperative and 29% to a farming company. Further, 9% of the land owning households are renting out land to another household

immediately after the owner died. Parcels did not stay fragmented in the hands of the heirs, but they were often consolidated through land swaps or rental and sales after the division. In Bulgaria, land markets were missing during communism and finding all entitled heirs later was difficult, and even if all heirs are identified, reaching an agreement on the division of the land is often even more complicated.

However a similar situation existed in other transition countries where co-ownership is not such a problem. The main cause appears to be a Bulgarian law, which sets a legal minimum size for a land parcel. To prevent excessive fragmentation of land, a law was introduced which states that a plot cannot get a separate ownership title if it is smaller than 0.3 ha[3]. Vineyards and pastures need to have a minimum size of respectively 0.1 ha and 0.2 ha. Hence, a parcel cannot be divided among heirs if the size of the newly created plots falls below these levels, a situation referred to with the term "forced" co-ownership. According to our survey, more than 40% of the parcels owned by rural households are in co-ownership and can not be divided among the owners by law.

So far, the issue has received very little attention. However, the magnitude of the problem seems to have been vastly underestimated. Our survey shows that rural areas of Bulgaria are burdened with co-ownership problems. According to our survey, 51% of all parcels owned by rural households are in "co-ownership". One-fifth of the parcels are owned by two persons, another 14% has three co-owners and around 16% of the parcels are owned by at least 4 persons.

The magnitude of the co-ownership problem differs regionally (figure 2.2 and table 2.4). In the North-East region, only 11% of the parcels are in co-ownership and the average number of owners per parcel is 1.3. However, in the South-Central and in the North-Central region, almost 60% of all parcels are in co-ownership and the average number of owners per plot is 2.5 and 2.3 respectively. The North-East region differs from the other regions since it has been part of Romania between the two world wars. Prior to the collectivisation in 1946, the area was characterised by larger parcels (of more consolidated land). Moreover, in that area, the restitution process ended between 1993 and 1995 which gave owners more time to trace all owners and to settle disputes.

Paradoxically, the official reason for the land legislation which causes co-ownership was to prevent inefficient land use by avoiding excessive land ownership fragmentation. However, the impact may well have been opposite, i.e. that it has constrained efficient land use and market development. Before somebody can rent out or sell the land to somebody else, they have to agree with all owners. Obviously, this increases transaction costs in land allocation, which is likely to hamper exchange and efficient use of land.

In the survey, land owners where asked whether they had "effective decision power" on land plots. There is clearly regional variation in the share of plots over which the owner has effective decision rights. In the North-East, owners have effective decision power on more than 70% of the owned parcels, while in the North-Central and South Central, where the majority of plots are co-owned, land owners declare to have effective decision power on only 38% and 54% of the plots they own. Thus in regions where land fragmentation and land co-ownership are widespread, fewer owners have effective decision power on their plots.

[3] This legislation was part of the Law for Agricultural Land Ownership and Use (LALOU) and the Regulation for Application of the Law for Agricultural Land Ownership and Use (RALALOU), both introduced in 1991. These laws have been changed many times since then (in fact more than 30 times for the LALOU). Moreover, the articles relevant for our discussion on the minimum size have been modified only slightly in 1996, 1997 and 2002, and none of these changes affected the minimum size.

Co-ownership is likely to increase the transaction costs in land decision-making and allocation, and therefore lead to imperfect property rights, which may result in suboptimal land allocation, use and exchange (Barzel, 1997).

Decision-making with co-owners is likely to be more costly than without co-ownership, depending on the relationship of the various co-owners and their intensity of interacting. For example, if there are few co-owners and they are close family members living in the same village, co-ownership may not have much additional decision-making costs. However, if there are more co-owners and/or if they are living far apart with few interactions, additional costs of coordination, supervision and enforcing agreements may be substantial. The dataset includes a variety of relationships between co-owners.

If decision-making on land use is too costly, relative to the potential benefits of land use or land renting out, these additional decision-making costs will make it more likely that the "default option" will prevail. This default option may be either not using the land, hence leaving land abandoned, or leaving land with the traditional user of the land, which is the former collective or state farm, which are now mostly organized as cooperative farms. Hence, if co-ownership significantly increases the transaction costs in (re-) allocating land, then we should expect co-owned land plots to be left more abandoned and to be used more by cooperatives, ceteris paribus.

In the rest of the paper we use the survey data to estimate how these property right imperfections affect land use and land rental activities.

Empirical Model

Our model incorporates 4 different allocations of owned land: 1) owner-cultivation; 2) renting out to another farming household; 3) renting out to a cooperative (which are mostly successor organisation of a former collective farm); 4) renting out to a company; 5) abandoning. We apply an empirical model which is based on an unordered choice model where the household has to make a single decision among several alternatives. The utility derived by household *i* from land allocation *j* is

$$U_{ij} = \beta_j' x_i + \varepsilon_{ij} \tag{1}$$

where x_i is a vector of household and plot characteristics which are the same for all allocations. β_j is a vector of coefficients that determines the utility that a household derives from allocation *j*.

Which allocation is chosen by a household depends on the utility it derives from a certain allocation. Suppose we have J allocation choices, a household will choose allocation *j* if

$$Prob(U_j > U_h) \text{ for all } k \neq j \tag{2}$$

If Y_i is a variable that indicates the allocation choice, and the J disturbances are independent and identically distributed,

$$Prob(Y_i = j) = \frac{e^{\beta_j' x_i}}{\sum_{k=0}^{J} e^{\beta_k' x_i}} \text{ for j=0,1,2,…J} \tag{3}$$

Equation (3) describes a multinomial logit model. Since the model given by equation (3) is unidentified (i.e. we have more than one solution for β_j that leads to $Y_i = j$), we have to apply a normalization. By assuming that $\beta_0 = 0$, the probabilities are given by

$$Prob(Y_i = j) = \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \text{ for j=1,2,...,J}$$
$$Prob(Y_i = 0) = \frac{1}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \quad (4)$$

In that case the remaining coefficients β_j for *j*=1,2,…J will measure the change relative to the $Y_i = 0$ group. Hence, the estimated coefficients in a multinomial logit model depend on the base category, but the estimated probabilities for $Y_i = j$ with *j*=0,1,2…,J will be the same.

The choice model estimation incorporates the same 4 allocations of owned land as described before.

We use indicator variables to test the impact of property rights imperfections on the land allocation decision, while controlling for a variety of differences in plot, household, and regional characteristics which may also affect the land allocation decision. The choice of the control variables is based on a model of household land rental decision-making in transition countries, developed in Vranken and Swinnen (2003).

Property right imperfections

The variable NONDIV is a dummy variable that equals one if a plot is in co-ownership and cannot be divided among owners due to the legal imposed minimum size. We expect co-ownership to lead to decision-making problems, which increase the costs of both *using* the land and of *changing* the land allocation. Since land was initially used by collective and state farms, in many cases the default allocation of land for households was to rent the land to cooperative farms and farm companies which emerged from the restructuring of the collective and state farms or to leave it abandoned when the farm enterprise ended the rental agreement. If a plot cannot be divided among co-owners because of legal impediments, decision making becomes more costly. Hence, the probability of the default option increases. It becomes more likely that the plot owner is either not using the land, hence leaving land abandoned, or leaving land with the traditional user of the land, which is the former collective or state farm, which are now mostly organized as cooperative farms.

The variable NRCOOWN measures the number of co-owners per plot that cannot be divided among owners due to the legal imposed minimum size. We expect that the decision-problems and inherent transaction costs increase with the number of co-owners. We would therefore expect that the number of co-owners is positively related with land renting to collective farms and with abandoning of land.

Some of the co-owners live in the village, while others live outside the village, sometimes far away. The co-ordination problems are likely to be larger when co-owners live outside the village because interaction is, on average, more complicated and less frequent, and monitoring by co-owners is more costly. Therefore we would expect the impact of the previous effects to be stronger when co-owners do not live in the village, compared to when they do. To estimate whether the location of the co-owners matters, we distinguish for the

plots which can not be divided by law between the number of co-owners living in the village (NRCOOWNERIN) and the number of co-owners not living in the village (NRCOOWNEROUT).

Plot characteristics

The variable QUALITY is an indicator of land quality based on the Bulgarian land classification system and assigns to each plot a score between 1 and 10. A high quality parcel gets value one, a low quality parcel gets value ten. A high quality land plot is more likely to be used by either a household farm or a farm enterprise, and we expect it to be negatively correlated with abandonment.

The cost of using a parcel of land increases with the distance of the plot. The variable DISTANCE measures the distance in kilometres of the plot to the house of the owner, and we expect a negative impact on owner-cultivation.

We include the variable PLOTSIZE which equals the size of the plot. We expect that larger plots are more suitable for cultivation and expect that this variable is negatively correlated with the probability of not using the land. Further, large farming enterprises are often relying on more mechanized production techniques so that they are particularly keen in cultivated larger plots.

Household and Regional Characteristics

The variable LANDOWNED gives the total amount of land owned by a household. The effect of this variable is ambiguous ex ante. In the presence of credit market imperfections, owned land, as collateral, can affect access to credit for households. In such circumstances, we expect that the variable LANDOWNED will have a positive impact on the probability of owner-cultivation. On the other hand, a household with more land, ceteris paribus, is more likely is to rent out land.

We include two sets of indicators of managerial capacity of the household: age (AGEHH) and education (EDUHH) of the household head. Other studies (e.g. Rizov *et al*., 2001) typically show a non-linear effect of these variables. Therefore, we also include the square terms, AGEHH2 and EDUHH2. The impact of both variables is not obvious ex ante. Concerning age, the older a household head, the more experience he has to farm, but younger persons may be less risk averse and therefore more likely to use the land themselves. More educated household heads may be better managers, but are also likely to have more off-farm opportunities.

Finally, we control for regional differences by including the variable NORTH-EAST and SOUTH-EAST, two dummy variables who equal one if the plot is located respectively in Dobrich and Varna, or in Veliko Tarnovo. The default region is the south-central region which holds Plovdiv and Stara Zagora.

Results

The multinomial regression results with owner-cultivation as base category are given in table 5. Table 6 gives the regression results with renting out to farming enterprises as base category. Since our prime interest in this paper is the impact of property rights imperfections, we focus mostly on these findings.

First, the estimation results show that property right imperfections under the form of co-ownership have a strong impact on the allocation of land in Bulgaria. Land is more likely to be rented out to a cooperative if the parcel is in co-ownership and undividable by law, i.e. if the parcel is in "forced" co-ownership. In that case, owner-cultivation, renting out to a farming company and land abandonment become less likely.

Second, the multinomial logit regression indicate that the probability to rent out land to a cooperative or leaving land abandoned relative to owner-cultivation increases with the number of owners. An increase in the number of coowners decreases the likelihood of owner-cultivation, renting out to a company or households, and abandonment relative to relative to renting out to a cooperative. The strong positive impact of "forced" co-ownership on renting out to a cooperative and negative impact on owner-cultivation indicates that the law concerning the minimum plot size strongly favours large scale farming organisations at the disadvantage of individual farmers.

Third, our estimations further show that the impact of the number of co-owners does depend on whether they are living in or outside the village. The probability to leave the plot abandoned relative to owner-cultivation increases with the number of co-owners that are living outside the village, but the number of co-owners living inside the village does not affect the probability of abandonment. Clearly, co-ordination problems are higher when co-owners are living farther away.

Other plot characteristics have also important effects on the allocation decision: land quality, and distance all have a significant impact on the likelihood of abandoning the plot, and the impacts are as hypothesized. As expected, increased distance of the plot to the house decreases the likelihood of owner-cultivation and increases the likelihood of land abandonment.

Characteristics of the household also have an impact. There is a significant impact of the variable AGEHH. The probability that a land owner leaves its plot abandoned first decreases with age. However, at the pension entitled age, the relation reverses and the likelihood of land abandonment increases.

Welfare implications

An important question related to imperfect property rights relates to the impact on household welfare. Therefore, we calculated for each household a welfare index based on the ownership of certain assets/items as a small, medium or large house, TV, car, telephone, etc. We aggregated these various indicators using principal component analysis (Finan et al., 2003). We run an ordinary least square regression with the welfare index as dependent variables and land endowment and human capital characteristics as regressors. Plot level characteristics are excluded because welfare is analysed at household level. We distinguish between the amount of land owned solely by the household (OWNSOLE) and the amount of land owned but in co-ownership (COOWN). We include the variable DCULT, a dummy that equals one if the household is cultivating land. If this variable has a positive impact on housheold's welfare, policies to improve household's access to land for cultivation are desirable.

As human capital variables we include age and education level of the household head (AGEHH and EDUHH). Further we include current households size (HHSIZE) as this also influences the amount of money disposable to acquire certain assets or items. Finally we take regional fixed effects into account by including regional dummy variables.

We can assume that, in Bulgaria, the amount of land owned is not affected by the welfare level because rural households could hardly influence the amount of land they received through the restitution process and, since the start of transition, hardly any agricultural land has been bought or sold according to our survey data. Hence, it is reasonable to assume that the amount of land owned affects the household's welfare as it is a mean to generate income. However, due to the absence of land sales, we can not assume that land ownership is an expression of a household's wealth.

Our results confirm that the amount of land owned solely by one household increases welfare significantly (table 7). The amount of land in co-ownership has hardly any impact. If we look at the elasticity of welfare for land, we see that, at the mean of the independent variables, an increase of 1 hectare in the amount of land owned solely by one household increases their welfare with 91%. An increase of 1 hectare in the amount of land in co-ownership increases welfare with only 38%. Our results indicate that co-ownership of land is not only discouraging owner-cultivation, but it also mitigates the positive impact of land ownership on welfare.

Further, our results indicate that households who are cultivating at least one parcel of land are wealthier. Stimulating access to land for rural households would clearly be beneficial.

Conclusion

This study used a unique 2003 survey dataset to analyse the developments in land use and exchange in Bulgaria. The survey and analysis yields several results.

Land is highly fragmented in Bulgaria. Rural households own on average 6 plots of land. Such a highly fragmented ownership structure increases the need for an efficient exchange of land between owners and users of land.

However, the land sales market is not well developed. Land sales are very rare. As in many other transition countries, a variety of factors have constrained the development of the land sales market.

In contrast, land rental agreements are very widespread. Land rental is widely used to exchange land between owners and users of the land. The users include a variety of farm types, including cooperatives, farming companies, and individual farms.

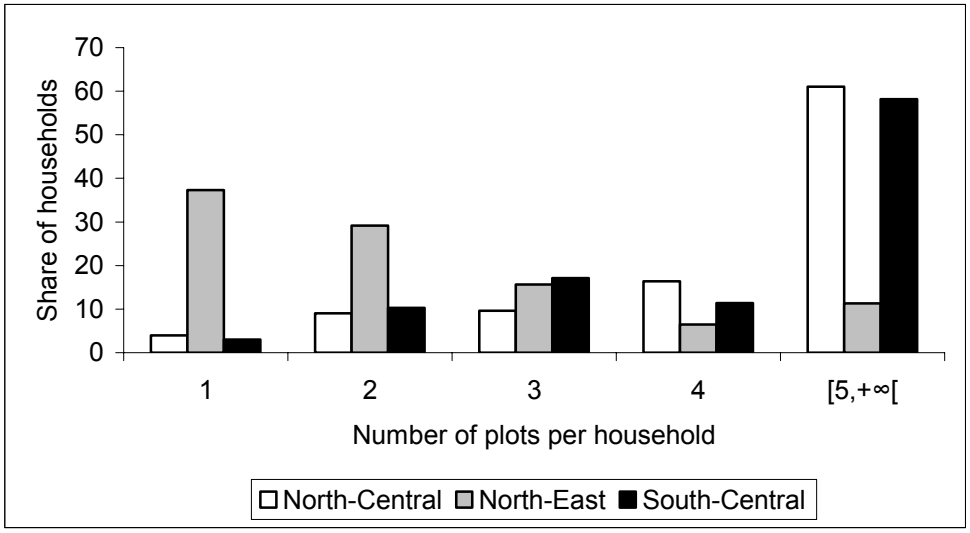
While land titles are distributed and land plots clearly defined and delineated, an important property rights problem that affects land allocation exists under the form of so-called "co-ownership". Due to a combination of historical factors, many plots have more than one owner and in some cases many more. By law certain plots are undividable among heirs because the plot size after division would fall under the imposed minimum plot size. Co-ownership on agricultural land is widespread in Bulgaria: half of the plots in our sample are owned by more than one person.

Our estimation results show that co-ownership has a major, impact on land use and allocation. It affects both use and exchange of land. Land under co-ownership and which is undividable by law, is more likely to be left abandoned or to be used by large enterprises – the default users of lands given the history of land use in Bulgaria – compared to owner-cultivation or renting out to an other household.

Paradoxically, these effects result from a legislation which was intended to prevent fragmentation of land and inefficient land use. The legislation is a prime cause of the co-ownership situation and strongly affects efficient land use and allocation.

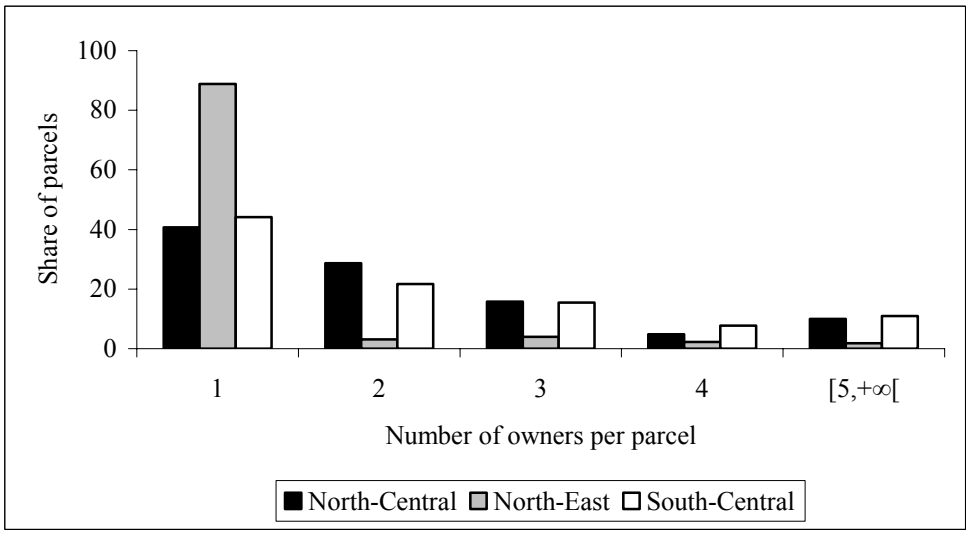
Our analysis shows that solving co-ownership problems would not only stimulate efficient land allocation, but it would also increase the possibility to use land as a means of generating income and hence to improve welfare. Land owned solely by one household has a significantly positive influence on the household's welfare. However, land in co-ownership contributes hardly anything to the welfare of the household.

Figure 1 Number of plots owned per household – regional variations



Source: Own calculations

Figure 2 Number of owners per parcel-regional variations



Source: Own calculations

Table 1 Pre-reform agricultural structures in Bulgaria, 1985

	Share of arable land (%)	Average size (ha)
AICs comprising of	80.7	12 600
TKZS	58.3	4 000
SAFs	8.8	2 100
MTS	0	0
Brigades	13.6	na
Other agricultural organisations	6.2	1 215
Private plots	13.1	0.38
Total	100	

Source: NSI

Table 2 Post-reform agricultural structures in Bulgaria, 1995-1999

	1995		1999	
	Share of arable land (%)	Average size (ha)	Share of arable land (%)	Average size (ha)
State farms	6.5	310.9	1.6	241.2
Municipality farms	-	-	2.0	n.a.
Organisations under liquidation	-	-	0	0
Co-operatives	40.8	815.3	36.8	482.5
Individual farms	52.5	1.4	56.0	2.6*
Farming companies	0.7	283.5	3.6	378.6
Total	100.0		100.0	

Source: NSI

Table 3 Destination/origin of the land owned/cultivated by Bulgarian rural households, 2003

Land cultivating by rural households

	Share of parcels			
	North-Central	North-East	South-Central	Total
Used by owner	90.36	29.94	91.43	78.2
Rented in from other household	6.6	7.91	6.42	6.8
Rented in from institution	0.51	62.15	0.64	13.6
Rented in from enterprise	2.54		1.5	1.4
	Share of households			
	North-Central	North-East	South-Central	Total
Used by owner	93.3	30.9	97.0	76.2
Rented in from other household	8.9	4.5	7.9	7.1
Rented in from institution	1.1	82.7	1.8	26.0
Rented in from enterprise	5.6	0.0	1.8	2.2

Land owning rural households

	Share of parcels			
	North-Central	North-East	South-Central	Total
Used by the owner	15.0	11.8	21.6	18.2
Rented out to an other household	2.7	7.4	0.8	2.2
Rented out to a cooperative	29.0	52.1	43.7	39.9
Rented out to company	29.0	27.4	5.8	16.1
Abandoned	24.3	1.3	28.2	23.6
	Share of households			
	North-Central	North-East	South-Central	Total
Used by the owner	47.5	18.4	60.8	44.5
Rented out to an other household	13.6	10.3	4.9	9.0
Rented out to a cooperative	24.3	55.7	60.1	48.6
Rented out to company	50.3	36.8	8.7	28.8
Abandoned	67.2	2.7	56.7	43.7

Source: Own calculations

Table 4 Regional variation in land use and ownership of Bulgarian households in 2003

		North-Central	North-East	South-Central	Test for equality of means among regions	Total
Land owning rural households						
Area owned per household	ha	3.7	4.6	3.5	**	3.9
Area used by owner		0.3	0.5	1.0		0.6
Number of plots owned per household		6.7	2.4	7.5	***	5.8
Average plot size	ha	0.5	1.9	0.5	***	0.7
Share of co-owned parcels	%	59.3	11.1	55.9	***	51.4
Average number of owners per plot		2.3	1.3	2.4	***	2.2
Share of plots over which the owner declares to have effective decision power	%	38.0	72.4	53.9	***	51.0
Land cultivating households						
Share of households that cultivate land	%	50.0	56.4	61.8	*	56.9
Area cultivated per household	ha	0.7	1.6	1.7		1.5
Rural households						
Age household head	years	67.5	63.1	66.5	***	65.8
Education household head	years	9.1	8.2	9.3	***	8.9

*, ***, *** indicates that the null hypothesis of equality of means among regions is rejected at a 10%, 5%, 1% significance level

Source: Own calculations

Table 5: Multinomial regression result with owner-cultivation as base category

	Rent to hh	Rent to coop	Rent to comp	Abandon ment	Rent to hh	Rent to coop	Rent to comp	Abandon ment	Rent to hh	Rent to coop	Rent to comp	Abandon ment
NONDIV	0.224 (0.485)	0.726 (0.000) ***	-0.139 (0.345)	0.086 (0.502)								
NRCOOWNER					0.023 (0.848)	0.338 (0.000) ***	0.073 (0.154)	0.128 (0.003) ***				
NRCOOWNEROUT									-0.021 (0.902)	0.303 (0.000) ***	0.020 (0.781)	0.173 (0.001) ***
NRCOOWNERIN									0.093 (0.644)	0.419 (0.000) ***	0.153 (0.106)	0.007 (0.937)
QUALITY	0.138 (0.116)	0.092 (0.005) ***	-0.457 (0.000) ***	0.451 (0.000) ***	0.139 (0.111)	0.089 (0.007) ***	-0.470 (0.000) ***	0.446 (0.000) ***	0.140 (0.109)	0.091 (0.006) ***	-0.468 (0.000) ***	0.445 (0.000) ***
DISTANCE	0.349 (0.000) ***	0.345 (0.000) ***	0.317 (0.000) ***	0.368 (0.000) ***	0.340 (0.000) ***	0.334 (0.000) ***	0.308 (0.000) ***	0.358 (0.000) ***	0.339 (0.000) ***	0.334 (0.000) ***	0.308 (0.000) ***	0.357 (0.000) ***
PLOTSIZE	-0.002 (0.849)	-0.002 (0.500)	-0.000 (0.995)	-0.086 (0.000) ***	-0.004 (0.759)	-0.002 (0.578)	0.001 (0.724)	-0.078 (0.000) ***	-0.003 (0.776)	-0.002 (0.612)	0.001 (0.701)	-0.080 (0.000) ***

Table 5: Multinomial regression result with owner-cultivation as base category (continued)

	Rent to hh	Rent to coop	Rent to comp	Abandonment	Rent to hh	Rent to coop	Rent to comp	Abandonment	Rent to hh	Rent to coop	Rent to comp	Abandonment
LANDOWNED	-0.008 (0.079) *	0.003 (0.004) ***	0.003 (0.007) ***	0.003 (0.005) ***	-0.007 (0.087) *	0.003 (0.008) ***	0.002 (0.027) **	0.003 (0.014) **	-0.007 (0.081) *	0.002 (0.013) **	0.002 (0.035) **	0.003 (0.009) ***
AGEHH	-0.010 (0.911)	-0.017 (0.690)	0.069 (0.219)	-0.208 (0.000) ***	-0.001 (0.995)	0.030 (0.487)	0.085 (0.132)	-0.196 (0.000) ***	0.005 (0.955)	0.033 (0.444)	0.091 (0.108)	-0.207 (0.000) ***
AGEHH2	0.000 (0.732)	0.000 (0.334)	-0.000 (0.557)	0.002 (0.000) ***	0.000 (0.820)	-0.000 (0.951)	-0.000 (0.406)	0.002 (0.000) ***	0.000 (0.869)	-0.000 (0.896)	-0.000 (0.347)	0.002 (0.000) ***
EDUHH	-0.268 (0.110)	0.125 (0.154)	0.075 (0.479)	-0.014 (0.889)	-0.254 (0.128)	0.141 (0.110)	0.097 (0.358)	-0.005 (0.960)	-0.261 (0.119)	0.133 (0.132)	0.089 (0.402)	0.006 (0.955)
EDUHH2	0.017 (0.055) *	-0.009 (0.035) **	0.001 (0.873)	0.003 (0.590)	0.016 (0.069) *	-0.010 (0.023) **	0.000 (0.982)	0.002 (0.623)	0.016 (0.064) *	-0.010 (0.030) **	0.001 (0.914)	0.002 (0.711)
NORTH-EAST	1.463 (0.000) ***	0.872 (0.000) ***	0.148 (0.494)	-2.226 (0.002) ***	1.416 (0.000) ***	0.915 (0.000) ***	0.237 (0.268)	-2.238 (0.002) ***	1.430 (0.000) ***	0.956 (0.000) ***	0.254 (0.235)	-2.267 (0.001) ***
SOUTH-CENTRAL	-1.974 (0.000) ***	-0.032 (0.800)	-1.398 (0.000) ***	-1.135 (0.000) ***	-1.973 (0.000) ***	-0.041 (0.752)	-1.392 (0.000) ***	-1.132 (0.000) ***	-1.955 (0.000) ***	0.004 (0.976)	-1.370 (0.000) ***	-1.200 (0.000) ***
Constant	-2.239 (0.457)	-1.577 (0.249)	-2.647 (0.148)	2.746 (0.075) *	-2.475 (0.415)	-3.170 (0.026) **	-3.357 (0.069) *	2.212 (0.164)	-2.627 (0.388)	-3.278 (0.021) **	-3.521 (0.057) *	2.590 (0.104)

Source: Own calculations

Table 6: Multinomial regression result with renting out to cooperative as base category

	Owner-cultivation	Rent to hh	Rent to comp	Abandonment	Owner-cultivation	Rent to hh	Rent to comp	Abandonment	Owner-cultivation	Rent to hh	Rent to comp	Abandonment
NONDIV	-0.726 (0.000) ***	-0.501 (0.110)	-0.864 (0.000) ***	-0.640 (0.000) ***								
NRCOOWNER					-0.338 (0.000) ***	-0.315 (0.008) ***	-0.265 (0.000) ***	-0.210 (0.000) ***				
NRCOOWNEROUT									-0.303 (0.000) ***	-0.324 (0.049) **	-0.283 (0.000) ***	-0.130 (0.000) ***
NRCOOWNERIN									-0.419 (0.000) ***	-0.326 (0.087) *	-0.266 (0.000) ***	-0.412 (0.000) ***
QUALITY	-0.092 (0.005) ***	0.046 (0.593)	-0.549 (0.000) ***	0.358 (0.000) ***	-0.089 (0.007) ***	0.050 (0.556)	-0.559 (0.000) ***	0.357 (0.000) ***	-0.091 (0.006) ***	0.049 (0.563)	-0.559 (0.000) ***	0.354 (0.000) ***
DISTANCE	-0.345 (0.000) ***	0.004 (0.616)	-0.028 (0.051) *	0.023 (0.000) ***	-0.334 (0.000) ***	0.006 (0.500)	-0.025 (0.076) *	0.024 (0.000) ***	-0.334 (0.000) ***	0.005 (0.554)	-0.026 (0.072) *	0.023 (0.000) ***
PLOTSIZE	0.002 (0.500)	-0.000 (0.986)	0.002 (0.300)	-0.084 (0.000) ***	0.002 (0.578)	-0.002 (0.862)	0.003 (0.170)	-0.076 (0.000) ***	0.002 (0.612)	-0.002 (0.871)	0.003 (0.175)	-0.078 (0.000) ***

Table 6: Multinomial regression result with renting out to cooperative as base category (continued)

	Owner-cultivation	Rent to hh	Rent to comp	Abandonment	Owner-cultivation	Rent to hh	Rent to comp	Abandonment	Owner-cultivation	Rent to hh	Rent to comp	Abandonment
LANDOWNED	-0.003 (0.004) ***	-0.011 (0.011) **	-0.000 (0.960)	0.000 (0.974)	-0.003 (0.008) ***	-0.010 (0.019) **	-0.000 (0.716)	-0.000 (0.889)	-0.002 (0.013) **	-0.010 (0.019) **	-0.000 (0.750)	0.000 (0.683)
AGEHH	0.017 (0.690)	0.006 (0.942)	0.085 (0.093) *	-0.191 (0.000) ***	-0.030 (0.487)	-0.031 (0.731)	0.055 (0.287)	-0.226 (0.000) ***	-0.033 (0.444)	-0.028 (0.755)	0.058 (0.263)	-0.240 (0.000) ***
AGEHH2	-0.000 (0.334)	-0.000 (0.922)	-0.001 (0.143)	0.002 (0.000) ***	0.000 (0.951)	0.000 (0.790)	-0.000 (0.387)	0.002 (0.000) ***	0.000 (0.896)	0.000 (0.815)	-0.000 (0.354)	0.002 (0.000) ***
EDUHH	-0.125 (0.154)	-0.393 (0.013) **	-0.049 (0.596)	-0.139 (0.106)	-0.141 (0.110)	-0.395 (0.012) **	-0.044 (0.639)	-0.146 (0.091) *	-0.133 (0.132)	-0.394 (0.013) **	-0.044 (0.636)	-0.127 (0.142)
EDUHH2	0.009 (0.035) **	0.026 (0.002) ***	0.010 (0.032) **	0.012 (0.005) ***	0.010 (0.023) **	0.026 (0.002) ***	0.010 (0.032) **	0.012 (0.004) ***	0.010 (0.030) **	0.026 (0.002) ***	0.010 (0.033) **	0.011 (0.008) ***
NORTH-EAST	-0.872 (0.000) ***	0.590 (0.092) *	-0.724 (0.000) ***	-3.098 (0.000) ***	-0.915 (0.000) ***	0.501 (0.144)	-0.678 (0.000) ***	-3.153 (0.000) ***	-0.956 (0.000) ***	0.474 (0.169)	-0.702 (0.000) ***	-3.223 (0.000) ***
SOUTH-CENTRAL	0.032 (0.800)	-1.942 (0.000) ***	-1.366 (0.000) ***	-1.102 (0.000) ***	0.041 (0.752)	-1.932 (0.000) ***	-1.351 (0.000) ***	-1.091 (0.000) ***	-0.004 (0.976)	-1.959 (0.000) ***	-1.374 (0.000) ***	-1.203 (0.000) ***
Constant	1.577 (0.249)	-0.662 (0.819)	-1.070 (0.522)	4.324 (0.001) ***	3.170 (0.026) **	0.695 (0.813)	-0.188 (0.912)	5.381 (0.000) ***	3.278 (0.021) **	0.651 (0.825)	-0.243 (0.886)	5.868 (0.000) ***

Table 7 OLS regression with welfare index as dependent variable

	Coefficient	t-value	Welfare change [a]	Mean	
ONWSOLE	0.12	6.650 ***	91.2	2.0	ha
COOWN	0.05	1.650	38.2	0.6	ha
AGEHH	-0.034	-6.810 ***	-25.6	65.4	years
EDUHH	0.078	4.260 ***	59.5	8.9	years
HHSIZE	0.019	1.000	14.1	2.2	members
DCULT	0.201	1.860 *	153.2		
Intercept	1.950	4.610 ***			

[a] Percent change in welfare due to a one unit increase in the independent variable at its mean value. For the dummy variable DCULT, the welfare change gives the percent change in welfare due to a discrete change of the dummy variable from 0 to 1.
Source: Own calculations