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Hernán A. Urcola, Xavier Arnauld de Sartre, Iran Veiga, Julio Elverdín, Christophe Albaladejo

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Hernán A. URCOLA[a], Xavier ARNAULD DE SARTRE[b], Iran VEIGA[c], Julio ELVERDIN[a], Christophe Albaladejo[d]

a. Instituto Nacional de Tecnología Agropecuaria (INTA),
Laboratoire AGRITERRIS, Economía y Sociología Rural
INTA, Ruta 226, Km 73,5
(7620) Balcarce, Buenos Aires,
Argentina.
Te: +54-2266-439105, int 221
Fax: +54-2266-439101
Email:
hurcola@balcarce.inta.gov.ar
jelverdin@balcarce.inta.gov.ar

b. UMR Société environnement territoire
Centre national de la recherche scientifique / Université de Pau et des Pays de l'Adour
Domaine universitaire
BP 576
64012 Pau
France
Tel: (33) 559407262
Fax: (33) 559407255
Email: xavier.arnauld@cnrs.fr

c. Iran Veiga Jr
Department of Agricultural Science and Rural Development, Federal University of Pará, Brazil
iveiga@ufpa.br

d. INRA - Centre de Recherches de Toulouse - UMR 1248 AGIR (Agrosystèmes et développement territorial)
B.P. 52627 Auzeville 31326 Castanet Tolosan France - Fax: +33 (0) 561732077
Universidad Nacional de La Plata, Facultad de Ciencias Agrarias y Forestales - Departamento Desarrollo Rural
Calle 60 y 119 - CC31 (1900) La Plata (Provincia de Buenos Aires) Argentina
albaladejo@toulouse.inra.fr

Abstract

In Argentina, the recent expansion of agriculture has turned into an extreme process almost completely dominated by soybean. The magnitude and speed of soybean expansion are

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believed to be the main drivers behind social, organizational and economic changes, including the displacement of small-scale producers out of agriculture. Under these transformations, land leasing is a critical management practice and constitutes a link among agricultural actors. This study analyzes changes in land tenancy patterns considering the recent *agriculturization* process but also older drivers of change. Our results indicate that the expansion of agriculture affects small- and large-scale farms differently, as land renting practices and productive orientation show clear differences by size. In the land leasing market, local producers are the main tenants while sowing pools rent about one quarter of the leased land. The competition for leasing farmland appears to operate within farm sizes. Small- and medium-scale producers compete among them for land, while large-scale local producers compete with sowing pools for the larger plots. Sowing pools do not appear to be the main drivers of land tenancy changes as they are no more relevant than local actors in the land leasing market. However, results suggest that small-scale landowners renting out their land for several years are the ones with higher probabilities of selling their lands. This segment of producers appears to be the one most negatively affected by *soybeanization*.

Key words: Land tenancy, soybean, transformations, technological innovation, agricultural actors

1. Introduction

Since the 1930's, the Argentine Pampas have been experiencing an *agriculturization* process. In the Pampas, the term *agriculturization* is usually used to define the continuing and growing use of land for large-scale cultivation, in the detriment of the other main production alternative, cattle production. This process has not been linear, but rather followed ups and downs according to factors such as relative profitability, technological changes, and policy incentives. The evolution of the planted area and production of the main crops shows the *agriculturization* process and highlights the importance of the recent soybean boom (Fig. 1). Indeed, in the past fifteen years, *agriculturization* has turned into an extreme process almost completely dominated by soybean; such new process is now called *soybeanization*. From a land use perspective, *soybeanization* can be thought as a continuing expansion of the soybean crop, not only through the Pampas and Argentina, but also through neighboring countries as well. In Argentina, the area planted with soybean has almost tripled in the last fifteen years, making Argentina the third top soybean-producing country in the world. The *soybeanization* process has been facilitated in part by a unique combination of technological innovations that save cost, time and labor during the production process. The typical production package includes no-till seeding, glyphosate-resistant transgenic seeds, and glyphosate as the main herbicide.

The *soybeanization* process has taken such dimension that many believe it to be the main cause of social, organizational and financial transformations throughout Argentina's agriculture. Several studies argue that the expansion of soybean increases the practice of tenant farming, driving small-scale producers out of agriculture and replacing them with large-scale producers. Typically, the displaced farmers become custom-farming contractors (Albaladejo and Bustos Cara, 1997; Barsky and Gelman, 2009; Martinelli de, 2008). Indeed, given the recent boom in commodity prices, substantial amounts of investment funds have been directed into crop production, especially soybean, promoting the creation of large-scale producers, organized as sowing pools. These pools are firms that work like investment funds that develop a business plan and offer it to potential shareholders. Sowing pools are normally organized by agricultural consultants who gather investors and manage the logistics of the production process by hiring land and custom farm labor.

The discussion above suggests that *soybeanization* constitutes the modern most extreme form of *agriculturization*, transforming land tenancy structures, displacing certain agricultural actors and creating new others, and ultimately changing the relation between agriculture and the rest of the society and the territory (Hernandez, 2007; Albaladejo and Arnauld de Sartre, 2012). Understanding these transformations is key not only to provide a critical point of view about the impacts of technological innovations, but also to define development policies for the diversity of agricultural actors. Therefore, the objective of this article is to analyze the dynamics of land tenancy in Balcarce, a district of Buenos Aires province, and to understand the different rationales leading to land leasing. Land leasing constitutes the link among peer land owners, and between land owners, tenants and sowing pool managers. This analysis will allow understanding the relationships and actors that characterize the new agriculture.

2. Latest Changes in Argentina's Agrarian Structure

In most countries, agriculture is currently dominated by family-based farms - relatively small pieces of land operated by families that own most production means. As of 2009, only seven farming companies had been publicly listed worldwide, contrasting with agricultural processing and input providing industries characterized by large public corporations, often

highly concentrated (World Bank 2007). Three main reasons are cited to explain the persistence of the family farm in both developed and developing economies (Binswanger and Deininger, 1997; Allen and Lueck, 1998). First, it is argued that family work is of superior quality than hired labor because family members are the residual claimants to profits. This difference in labor quality is important in agriculture because production is spatially dispersed, making worker supervision costly. Second, family members are thought to have a superior knowledge of local soil and climate conditions, often accumulated through generations, which allows them a better agronomic management. Finally, families are considered to have higher flexibility than firms to adjust labor supply to seasonal demands because family labor can be reallocated more easily within the farm or be diverged to off-farm employment.

The importance of a large number of small- to medium-scale farms to foster agricultural growth and local development has been long recognized. In the 1960's, Schultz's seminal study detailed the rationale and objectives of family-based farms and showed their ability to increase productivity and adopt technologies under appropriate conditions. More recent analyses have shown the ability of agricultural growth to reduce poverty not only of rural populations, but also of urban populations (de Janvry and Sadoulet 2010). Because of its higher use of unskilled labor relative to other sectors of the economy, agriculture is the most effective sector in reducing poverty (Loayza and Raddatz, 2010). The importance of numerous smallholders for economic growth remains even in developed countries, such as the United States. Galor et al. (2009) showed that differences in land ownership between North and South America are associated with differences in human capital formation and economic growth. Analyzing data from the United States, the authors concluded that counties with highly unequal land ownership structures reduce educational expenses due to the effects on the county's tax collection.

Despite the benefits of small family farms for local development, an increase in the presence of large-scale corporate farms is being observed in different parts of the world, including Argentina. Motivated by growing food demand, increased market integration and technological innovations, abundant investment funds have been directed to large-scale corporate-type farming in different parts of the world. Across different regions, these large operations share common features including of farming units in excess of 10,000 ha, being vertically and/or horizontally integrated and generating sales exceeding $1 billion annually (Deininger and Byerlee, 2012). However, corporate farms also exhibit differences between countries. In Argentina, these corporations are commonly organized as sowing pools. Motivated by high commodity prices and inexpensive financing, sowing pools started operating during the early 1990's as a way to capture investment funds mainly from urban residents. However, by the year 2000, commodity prices had declined substantially and, with lower economic margins, most sowing pools either stopped farming or reduced operations to a minimum (Barsky and Gelman, 2009). Nonetheless, Argentina's 2001 crisis brought a redefinition of the main macroeconomic policies, creating strong incentives for the reappearance of sowing pools. Accompanied by a sustained increase in international commodity prices, domestic changes included the depreciation of the Argentinean currency - which increased the competitiveness of farming - a sharp reduction in the availability of bank loans for agriculture and a government decision to convert existing debts originally assumed in dollars into pesos. With debts converted into pesos and commodities priced in dollars, many agricultural producers avoided bankruptcy and increased their margins. Another key change was that the macroeconomic crisis almost completely destroyed the trust of the population in the banking system, which, coupled with low interest rates and high inflation, made bank deposits unattractive. Therefore, personal savings were directed towards a new and promising investment: soybean farming through sowing pools. Manciana, Trucco and Pineiro (2009) estimate that soybean pools farm about 12% of the cultivated land of Argentina.

3. The Expansion of Soybean

With recent innovations that allow efficient labor supervision and reduce diseconomies of scale, soybean has been the crop of choice for sowing pools. Zero tillage reduces the need of expert supervision during planting, and information technologies that can guide machinery through GPS and remotely sense field conditions make labor supervision less relevant, reducing the value of traditional knowledge (Deininger and Byerlee, 2012). However, because of unmatched profitability, wide ecological adaptation and simple agronomic management, the oilseed has also been chosen by small-scale farms in Argentina. Producers saw in the soybean returns an opportunity to recover the profitability levels that had been largely eroded by the 1990's macroeconomic policies and by the subsequent economic collapse of 2001. After the crisis, domestic and international changes resulted in a significant increase in the economic margins of most Pampean crops and of soybean in particular. Another factor contributing to the competitiveness of soybean has been direct investments by large companies, which integrated their supply chains quite efficiently. Reca (2006) showed that the production costs for soybean in Argentina are lower than those in Brazil and the United States, mainly due to the lower cost of chemicals and fertilizers, and that export costs (port services and freights to Rotterdam) are also lower.

Under such a favorable scenario, Argentina became the largest exporter of soybean oil and the third largest exporter of soybeans, pushing the boundaries of the soybean area out of the Pampas and into more fragile environments. The continuous spread of no-till genetically-modified soybean and the associated use of glyphosate created widespread worries about the long-term effects of these practices on the soil, water streams, biodiversity, and about the social effects on rural communities (Tomei and Upham, 2009). As such, the expansion of agriculture has been the main driver behind deforestation and habitat loss in Argentina (Zak et al. 2008).

The new soybean technology does not always favor smaller farmers and appears to be changing traditional land tenancy patterns (Manuel-Navarrete et al., 2005). The substantial investment needed for a no-till sowing machine is not profitable for areas smaller than 200 ha. Nonetheless, no-till seeding is able to reduce planting cost by about 20%. Therefore, producers or custom farming providers that are able to adopt no-till planters can lower their costs have an edge in competing with other producers not using this technology, and are in a position to increase the scale of their operation. Given the minimum scale required to adopt no-till planters, it has become unprofitable for farmers to own their own machinery, reinforcing the old practice of custom farming service providers. The existence of these providers allows farmers to produce without the need to own expensive no-till machinery. However, resorting to custom farming increases the initial cash outlay required at the beginning of the season and, for logistic reasons, custom farming contractors prefer to work on large plots. It is not always easy to find a contractor available to plant on small plots at the right time. Thus, small farms usually end up planting late, which further reduces their productive and economic performance.

These economies of scale increase the costs of smaller farms, creating incentives for small-scale farmers to stop managing production themselves, rent out their land and make a living out of rental fees. In a study of the Pampas region, Bert et al. (2011) showed that farms under 100 ha cannot accumulate enough capital to be permanently viable – that is, to accumulate enough capital in high-yield years to compensate for low-yield years. Eventually, these farmers end up renting out their entire farms and living off the rental fee income. In a study of Balcarce, Mosciaro et al. (2012) estimated that with rental fees of about 1 ton of soybean per hectare, landowners owning less than 200 ha would be better off renting out their land than farming themselves. Several authors have concluded that small-scale producers renting out significant portions of their land are at risk of having to sell their entire property, and have thus argued that renting out is the step preceding the exiting of farming (Manuel-Navarrete et al., 2005; Teubal, 2006; Pengue, 2007). In Argentina, this risk has been increased

by the recurrent economic crises (Joensen et al. 2005). Such conclusions are consistent with the events observed during the 1990's, when the number of farms decreased by 60,000, or a 20% reduction in comparison to the 1988 National Agricultural Census (NAC), with the largest decrease occurring among the smaller farms (NAC 1988; NAC 2002).

Through the transformations described above, soybean production has altered traditional land tenancy patterns in Argentina, as the area operated by tenants has continued to increase, reaching more than 50% of the total area planted to soybean, by 2005 (Reboratti, 2005). This trend, combined with a sustained increase in the value of farmland, has led to the development of a well-functioning competitive land leasing market with a clear structure of land property rights and formal contracts. Although land leasing is an old practice in the country, it has been exacerbated by the recent expansion of soybean production. Property rights enable land owners to capture significant portions of the tenant's profits through rental fees, and current rental fees allow for a comfortable standard of living for a typical family, even those owning small plots, which was not previously possible. This process means that land ownership has changed slightly while production has become highly concentrated (Manciana, Trucco and Pineiro 2009).

Land leasing remains as fundamental as ever to the new *agriculturization* of the Pampas. The increase in land leasing developed around soybean expansion is creating a class of absentee landowners, and some authors argue that the changes described have resulted in a loss of cultural knowledge, migration of the rural population to urban centers, and a reduction in food sovereignty (Tomei and Upham, 2009). Rapid concentration processes in land tenancy, crop production, and in agriculture-related industries are also thought to be the main drivers of a substantial decrease in the number of medium- and small-scale farmers (Teubal, 2006).

4. Materials and methods

The analysis presented in this paper focuses on land tenancy dynamics in the district of Balcarce (Buenos Aires, Argentina) between 2000 and 2010, with secondary information also used to consider transformations taking place before 2000. Located in the south-east of Buenos Aires province (Fig. 2), Balcarce has not historically been a soybean-producing district, but with *soybeanization* it is quickly becoming one. During the 1990's and up to 2002, the area planted with soybean was expanded at the expense of the area dedicated to competing summer crops including sunflower and corn, but the area planted with wheat also increased. However, since 2002, soybean displaced wheat as well. In 2000, the proportions of the area planted with soybean, sunflower plus corn, and wheat were 9%, 37% and 54%, respectively. By 2002, these percentages were 10%, 30% and 60%, respectively (SIIA, 2012) and by 2011, they had changed dramatically to 43%, 30% and 27% respectively.

Historically, Balcarce had been a potato-producing district, however potato farming is volatile, with substantial price swings and high upfront costs turning some producers rich and many others bankrupt. Given these costs and risks, potato farming constitutes a very specialized production and accordingly, potatoes are now grown in a very small area and by only few farms. During the last 10 years, an average of 3.8% (about 6,000 ha) of the farming area of the district has been planted with potatoes (Argenpapa, 2012).

Balcarce is an appropriate study site in which to analyze the dynamics of land use and land tenancy and the new relationships between the actors that are evolving around the soybean expansion, not only because of its agricultural history but also because of the timing, extent and speed of these transformations, which are generally less dramatic than in the central districts of the farming belt. For example, by 2002 only 5.8% of farms in Balcarce were being operated under short-term cash leases, compared with 11.2% of farms in Pergamino, at the core of the soybean belt (NAC 2002). This situation allows intermediate steps in the transformation

process to be observed, and for a better understanding the expected impacts of *agriculturization* on various types of producers to be gained.

4.1 Data and Analysis

Two main sources of data were used: farm level data and semi-directive interviews. These sources complement each other to describe the recent transformations experienced by local actors. The quantitative data from the selected farms selected provide information about the agronomic and management decisions made by the producers, while the semi-directive interviews allow the rationales and motivations behind these decisions to be explored. The farm level data include five variables describing the production and management practices and the relationships between owners and tenants of 247 farms of Balcarce. To ensure the representativeness of the sample, we collected general information of a relatively large number of farms, rather than more detailed information of a smaller number of farms. The 247 farms constitute 45% of the total number of farms of Balcarce according to the 2002 National Agricultural Census (NAC) and cover 37.8% of the land area of the district. Data from the 1988 and 2000 NACs were used to describe the evolution of local agrarian structure, including size and number of farms. The National Censuses define a farm unit as all agricultural land owned by a proprietor, wherever located, and thus figures for Balcarce include land owned by local farmers but located outside the district. In contrast, in our 2010 farm survey we defined a farm only as the land within Balcarce owned by the same proprietor. However, only 24 of the farms in the survey (less than 10% of the sample) have plots outside Balcarce and the main plot of most of them is located in Balcarce. Therefore, inconsistences in comparing data from the census and the survey should be small.

Farm level information was collected by interviewing agronomic consultants and using the cadastral map of the district. Data regarding farm size and ownership (name and residence of the owner) were taken directly from the cadastral map. Information regarding management decisions such as productive orientation, whether the farmer rents additional land, the percentage of the farm let out to tenants, and the type of tenant (i.e., neighbor, an individual from the area but not a neighbor, a sowing pool, an individual from outside the area, or unknown) was taken from the interviews. The consultants were selected for having worked in specific parts of the district for several years and for participating actively in the local socio-technical networks. As the consultants interviewed work and live in the district, they visit grain elevators, input retailers and cooperatives frequently and know land owners, tenants and the productive orientation of farms. In only a few cases (less than 15%), the consultants were not able to provide the requested information about the selected farm. In these cases, another neighboring farm, for which the data were known, was selected. This lack of information is more frequent for highly detailed information, but consultants were well informed about the general information requested here.

The farms sampled are highlighted in gray in Figure 2, showing the Balcarce district. As this study focuses on farming-derived transformations, a random sample of farms located in the area of the district where both crops and livestock are produced (mainly the NW and SW sectors) was selected. Farms located in the area where only cattle are produced (mainly the NE and SE sectors) were excluded from the sampling. Descriptive statistics for the farms sampled are provided first, and then Multiple Correspondence Analysis (MCA) is used to describe the pattern of relationships of the variables and to identify a typology of farms. MCA is one of the most commonly used techniques for data description and reduction and is specially suited to accommodate nominal and categorical variables, although quantitative variables can also be included by recoding them in bins. MCA groups the observed variables in linear combinations, called factors, which explain the largest possible amount of variability. The factors yield groups of observations (i.e., farms) that share common factors and that can be classified in

groups that share similar characteristics. To identify the typology, a small number of key variables were selected following Kostrowicki (1977). The Ward algorithm was used to form the groups, and then the optimal number of groups was selected by analyzing the dendrogram and R^2, which quantifies the proportion of between-groups variability as a function of the number of groups. The principle of parsimony is applied when deciding on the optimal number of groups, which is kept to the minimum number possible that provides a comprehensive description of the farms. To implement the analysis, the packages FactoMineR (Husson et al., 2010) and ADE4 (Chessel et al., 2004) of the statistics software R version 2.11.1 (Venables and Ripley, 2002) were used. Readers interested in a more comprehensive and technical description of MCA are encouraged to consult Greenacre (2007) or Abdi and Valentin (2007).

The second stage of the analysis was based on eleven semi-directive interviews with seven farmers belonging to each of the seven groups identified in the typology, and four additional producers owning no land but renting the entire area that they farm. The interviews aimed to understand the rationales behind land leasing.

5. Results and Discussion

5.1 The Agriculturization of Balcarce

Data from the NACs provide an overview of the direction and speed of changes experienced by the local agriculture. The 1988 and 2002 NACs and the data of Balcarce indicate a tendency towards concentration of farm size, as the number of and area occupied by small farms decreases overtime and the number of and area occupied by medium- and large-size farms tends to increase (Table 1). Regarding land tenancy, Table 1 shows a decrease in the number of farms operated under pure ownership, and an increase in the number of farms operated under partial and total leasing. Partial leasing increased sharply between 1988 and 2002, while pure leasing grew constantly overtime. The percentage of farms under total leasing has doubled since 1988, whereas their total area has only increased by 2%, showing that it is mainly the smaller farms that are being rented out entirely. Census information shows that the transformations described started before 2002, under a rather different socio-economic scenario.

While numerous factors contributed, the sustained increase in tenant farming and the concentration of production can be explained mainly by the following factors. First, computer-based systems have made farming equipment both more advanced and more expensive, thus increasing its obsolescence risks. Higher cost and risks made more difficult the adoption of the latest farm machinery. Second, innovations such as glyphosate-resistant seeds, zero-tillage, and information technologies have simplified the production process, reduced the value of traditional knowledge and allowed efficient production over large dispersed areas. With higher costs and risks to adopt the latest technology, many small-scale landowners realized that it is better for them to stop farming, avoid production and technology risks, and make a living out of land rental fees. The sustained increase in commodity prices and the lack of alternative investment opportunities also fuelled land tenancy changes. High commodity prices increased the financial returns from farming encouraging substantial amounts of non-agricultural funds (including personal savings from urban centers) to be directed into farming. With higher crop profits, farmland rental fees also increased, leading to the development of a well-functioning land leasing market and to an increase in tenant farming.

The barriers for technology adoption and economies of scale appear to affect small-scale producers more than larger-scale producers. Such a differential effect becomes evident when comparing the small- and large-farms leasing practices. The data from Balcarce show that smaller farms tend to be rented out entirely, while medium- and large-size farms are either

rented out partially or not rented out at all (Fig. 3a). Farm size appears as a key variable related to land tenancy strategies and type of tenant, suggesting that motivations and rationales also vary by size.

The concentration of land tenure and of production has occurred both in developed and in developing economies, albeit at different rates (Perrier-Cornet and Aubert, 2009; Deininger and Byerlee, 2012). In Argentina, it is often argued that sowing pools are the main drivers behind land tenure changes. However, the survey results indicate a somewhat different picture. In Balcarce, sowing pools rent the larger plots and producers residing in the area and neighbors rent medium- and small-size plots, respectively (Fig. 3b). Sowing pools rent 27% of the leased land (5% of the farmland of the district), while the remaining 73% is being leased by local actors, such as neighbors or area residents. These results indicate that sowing pools constitute one actor renting land, but by no means dominate the land leasing market in Balcarce. In contrast, farm neighbors and area residents are the main tenants. Small- and medium-size local producers do not appear to compete with sowing pools for farmland (Fig. 3a). Instead, the competition for land appears to be within each scale of producers. It is worth noting that the presence of sowing pools in the land leasing market may vary across subregions of the Pampas. Fernandez (2010) found that the main production areas of large sowing pools are located in the west/northwest areas of the Buenos Aires province and in the south of Santa Fé and Entre Ríos provinces. To better understand which features structure leasing practices, productive orientation and competition among actors in Balcarce, a typology of farms was developed.

5.2 Structure of Land Tenancy and Land Use

The variables used in the MCA and the axes obtained are presented in Table 2. The variables used structure each axis of the MCA according to their modality weights (last three columns of Table 2). Extreme weights, either positive or negative, indicate associations among the modalities. Axis 1 is composed mainly of the productive specialization of the farm (weight: 0.705), the fact of renting land out (weight: 0.545) and the size of the farm (weight: 0.500). The most positive modality weights of axis 1 discriminate the largest plots worked mostly by the owners and used for mixed production – i.e., annual crops and cattle breeding (Table 2). These plots are discriminated from the smaller ones, which are being rented out entirely for crop production and exhibiting the most negative modality weights of axis 1.

Axis 2 is composed mainly of the fact of renting land out (weight: 0.553), the fact of renting in land (weight: 0.351) and farm size (weight: 0.349). The positive values of Axis 2 show that the smallest plots are associated with both the fact of renting other plots and the fact of not renting one's plot. This seeming contradiction can be explained by the existence of two types of small-scale farms: (a) the ones renting out their own land almost entirely (indicated by the negative values of axis 1) – these producers found the risk of farming themselves too high (43% of small-scale farm owners); (b) the ones who increased their production scale by renting in more land (20% of small-scale producers). Sometimes, this is associated with small landowners that work also as custom farming providers. A usual strategy of small landowners is to acquire an oversized set of machinery, with a working capacity that exceeds the demand from his/her farm, and to use that extra capacity to work on other producers' farms for a fee. On the other hand, the negative values of weight modalities in axis 2 associate the intermediary size plots with the fact of renting part of the farm.

There are no definite rules to determine the optimal number of types of a typology (Greenacre, 2007). However, R^2 (i.e., the proportion of total variation among cases explained by types) shows a clear break point in the explained variability at seven types. Including more types would only complicate the interpretation of the analysis without substantially increasing the explained variability (Fig. 4). The main characteristics of each farm type are summarized in Table 3. Types 1 and 2 are the only groups that rent out very small portions of the land.

Although variable in size, farms in type 1 appear as thriving diversified firms operated by their owners who are trying to increase their scale by renting in additional land. Type 2 is composed mainly of large farms –the smallest being of 1022 ha- that do not seem to be deeply affected by latest changes, as all are operated by their owners and combine both crop and cattle production. In contrast, types 3 and 6 are experiencing the effects of *agriculturization* and tenant farming more intensively. Both farm types exhibit similar behaviors but differ in size. Type 3 is composed of medium- to small-scale farms and type 6 is composed of small-scale farms, but farms in both types rent out considerable portions of their land to tenants and most of them specialize in farming. Types 4 and 5 also behave similarly with type 4 exhibiting larger farms and renting out slightly less land to tenants than type 5 (37 versus 42% respectively). Type 6 farms show the most extreme signs of *agriculturization* among all seven types. This group of small farms rent out 55% of their land to tenants, on average, and almost 80% of them grow annual crops only (Table 3).

Finally, all type 7 farms specialize in cattle breeding exclusively but present some distinctive features that have allowed this group to survive during times of low and variable cattle prices. Type 7 is variable in size and strategies and includes a subgroup of nine small farms whose owners live on the farm, grow vegetables for their own consumption and raise small animals. One case in this subgroup maintains a small herd of dairy cows and produces and sells cheese at the farm gate. These practices allow these producers to maintain a low-cost lifestyle, avoiding the higher expenditures of the urban way of life. Four other cases in group 7 have off-farm incomes because their owners conduct other commercial activities. Landowners in this subgroup include a lawyer, a physician, an owner of a downtown business and a cattle breeder that sells purebred bulls and heifers. The rest of type 7 is composed of large farms that are able to compensate low incomes with scale of production. With different strategies and capital endowments, producers in type 7 have managed to stay out of the *agriculturization* and *soybeanization* processes and maintain cattle-only farms.

Across types, smaller farms tend to specialize in agriculture and to rent out most of the farm area to tenants (Fig. 5), whereas larger farms tend to combine cattle production and agriculture and the production is under the control of the owners. This result suggests that the *agriculturization* process is more extreme for smaller farms and highlights the importance of land leasing, as producers in all seven types rent out some land.

5.3 Who Rents What and Why?

Results presented here indicate that there is specialization in leasing arrangements that is stratified by size. For logistical reasons, sowing pools prefer larger plots, while neighbors and local producers rent intermediate and small plots. The survey of Balcarce farms shows statistically significant associations between type of farm and type of tenant. Local tenants (farm neighbors or area residents) tend to rent land of types 4 and 6 (Table 5). Because of resource endowments, small-scale local tenants tend to rent the plots of type 6 ranging from 14 to 80 ha in size, while medium-scale tenants tend to rent the larger type 4 plots ranging from 503 to 980 ha in size. As a group, local tenants rent plots with a mean size of 120 ha. In contrast, sowing pools tend to rent land of types 2 and 3, but especially of type 4. However, sowing pools seldom rent plots of types 1, 6 or 7. The size of the farm and the production scale of the tenant determine the land leasing practices. Type 1 is composed of farms operated mostly by their owners, type 6 is composed of farms that are too small to be efficiently operated by a pool, and type 7 is composed of farms with soil types that tend to be appropriate for livestock production, but not for grain production – the main production activity of pools. Sowing pools rent some land from the large farms of type 2, but mostly of types 3, 4 and 5, all of which rent out significant portions of their lands and feature intermediate to large size farms (Table 5).

Interviews conducted with landowners of the different types indicate three main motivations for renting land out. Often, land is rented out after a farmer retires and the heirs are not active in agriculture (Mascali et al., 1992, Albaladejo et al., 2010). The land is leased and the money earned is kept by the retired person or shared by his/her heirs. In this case, the whole farm is put to rent. Examples of this rationale are found across types 3 to 7 of the typology, but it is more frequent among medium- and small-scale producers of types 3, 6 and 7 (Table 3).

Another important motivation for renting land out is risk management. Two different motivations related to risk management are distinguished according to the scale of producers. First, in Argentina, agricultural production features substantial economics of scale and high levels of uncertainty. Renting land out provides small-scale producers with a fixed income that is high-enough to maintain their standard of living in the nearby city or town. This practice is illustrated by the small-scale landowners of type 6, where 25 of the 48 cases rent out their entire land. Second, medium and large scale producers in types 3, 4, and 7 rent out portions of their farms to obtain a steady and guaranteed income. This income is then used to purchase inputs or pay for custom farming services for the remainder of their land.

Specialization in production is the third motivation to rent out land. The farmers interviewed, belonging to types 4, 5 and 7, rent out the land for crop production while they run the cattle breeding operations. These producers either dislike crop production or believe that they do not have the expertise for arable farming. A similar motivation drives producers in types 1 and 2 to rent small portions of their land for potato production. Potato farming requires highly specialized knowledge, a substantial cash outlay, and top quality soils. Therefore, potato production is carried out by a specialized segment of producers. Land suitable for potato cultivation has a high rental value and constitutes a good source of income for the land owners. This latter rationale is illustrated by producers of types 1 and 2.

The results indicate that competition for farmland is between specific types of tenants, rather than all against all. For instance, sowing pools compete with large-scale local producer for the large type 4 plots, whereas neighbors and small-scale tenants from the area compete for the smaller type 6 plots. The concentration process described forces producers to increase the area they operate. Small-scale producers would not face the direct competition of sowing pools but the competition of medium-scale local tenants. Medium- and large-scale producers would face competition of sowing pools to rent land and increase their size. However, data from Balcarce show that sowing pools do not have a preferential access to land. As a consequence, the displacement of small-scale producers would be related to a long-term concentration process rather to an uneven competition with pools. It is worth noting that while concentration is not a new phenomenon, it is being reinforced by the recent technological innovations and the privatization and professionalization of agriculture. The results presented here indicate that given the relative small participation of sowing pools in the land leasing market, these actors do not constitute the main drivers behind land tenure changes in Balcarce.

Additionally, information from the qualitative interviews indicates that networks play a critical role in spotting the renting opportunity, and that the type of tenant often determines the kind of network used to access the land. Local tenants usually rent land from family members or acquaintances from the city, while sowing pools tend to spot leasing opportunities through agricultural unions, rural societies, cooperatives, elevators and land-leasing brokers. These brokers receive orders from tenants and offers from owners and match the conditions of both parties while offering security for the transactions.

While sowing pools are highly sophisticated firms operating in several countries and often being vertically integrated, they need to access the local technical and commercial networks. In order to access land, purchase inputs and contract farming services, sowing pools usually hire representatives from the area that are well inserted in local networks. Sowing pools often form partnerships with local producers or consultants, in which the latter provide specific services to the pool, but more importantly access to the local networks.

6. Conclusions

It has often been argued that technological innovations related to the soybean crop create economies of scale that promote the concentration of production (Manuel-Navarrete et al., 2005). It has also been proposed that the increase in land values creates incentives for small landowners to stop farming and become rentiers. This article has analyzed changes in the traditional land tenancy patterns of the Pampas in light of these transformations but also considering other long-term trends of change. The rationales leading to land leasing and the connections between tenants and landowners have also been studied.

The results presented here indicate that the expansion of agriculture affects the small-scale farms more intensively than large-scale farms, as land renting practices and orientation of commodity production show clear differences by size. Small-scale farms tend to be rented out entirely and to produce annual crops only, while medium- and large-scale farms tend to be managed by their owners and to combine crops and cattle production. Three main rationales for land leasing were identified. First, land is often leased after the retirement of farmers whose heirs are not active in or not interested in agriculture. Second, another important motivation for leasing land is risk management, which is typical for small-scale landowners. Finally, some land is rented out to outsource a type of production that the landowner prefers not to undertake.

In Balcarce, the main tenants are local producers while soybean pools rent about one quarter of the leased land, especially the large-size plots. This suggests that competition for farmland operates within size bands. Small- and medium-scale producers seem to compete among themselves for leasing land, while large-scale local producers seem to compete with sowing pools for renting the larger plots. The new *agriculturization* stresses the use of capital over other production factors in a scenario where State regulations have been progressively reduced. This context seems to have favored the appearance of sowing pools and the disappearance of traditional small-scale farmers. However, a causal relation between these two processes is not evident because sowing pools are no more relevant than other local actors in the land leasing market. According to the differential effect of *soybeanization* on small and large farms, our results suggest that small-scale landowners renting out their land for several years also have a higher probability of selling their lands to expanding producers. This segment of small-scale producers therefore appears to be the one most negatively affected by *soybeanization*.

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Table 1: Evolution of farm sizes and land tenancy forms for Balcarce district (Buenos Aires province, Argentina), 1988 - 2010.

		NAC 1988		NAC 2002		2010 survey	
		% of farms	% Area	% of farms	% Area	% of farms	% Area
Farm size distribution	< 50 ha	41	3	26	0.8	10	0.4
	50-500 ha	43	28	45	17	55	18
	> 500 ha	15	70	39	82	34	81
Land produced under:	Pure ownership	66	58	57	49	48	58
	Partial leasing	19	30	26	41	22	29
	Pure leasing	15	11	16	10	30	13

NAC: National Agricultural Census

Table 2: Variables, modalities and modality weights by axis included in the farm typology.

Description	Modalities	Number of cases	Multivariate analysis		
			Axis 1 (33.7%)	**Axis 2 (15.4%)**	**Axis.3 (11.0%)**
Farm Size	< 90 ha	58	-0.69	0.53	<0.01
	90-200 ha	47	-0.36	-0.17	0.46
	200-500 ha	58	<0.01	-0.12	-0.31
	500-1000 ha	43	0.38	-0.40	<0.01
	> 1000 ha	41	0.66	0.16	<0.01
The owner rents other plots	Yes	24	0.39	0.56	-0.13
	No	223	-0.39	-0.56	0.13
The owner rents out a portion of the farm	<5%	118	0.33	0.52	0.14
	5.1% - 75%	54	0.40	-0.52	<0.01
	> 75%	75	-0.73	<0.01	<0.01
Productive orientation of the farm	Annual crops	87	-0.70	<0.01	-051
	Cattle	23	0.18	<0.01	1.02
	Mixed	137	0.52	<0.01	-050

Table 3: Main features of the farm types defined in the typology

	Number of farms	Farm size			Perc. rented out	Productive specialization (Perc. of farms)			Farms renting in (Perc. of farms)	
		Mean	Min	Max	Mean	Cattle only	Crops only	Mixed	No	Yes
Type 1	22	823	18	3888	2	0	9	91	0	100
Type 2	28	2601	1022	10962	4	0	0	100	100	0
Type 3	43	285	92	1519	62	0	53	47	98	2
Type 4	36	687	503	980	37	0	11	89	100	0
Type 5	47	332	215	481	42	0	43	57	100	0
Type 6	48	51	2	90	55	0	79	21	100	0
Type 7	23	425	0.25	1814	24	100	0	0	96	4
Whole sample	247	630	0.25	10962	38	9	35	55	90	10

Table 5: Association between type of tenant and type of landowners for land leasing

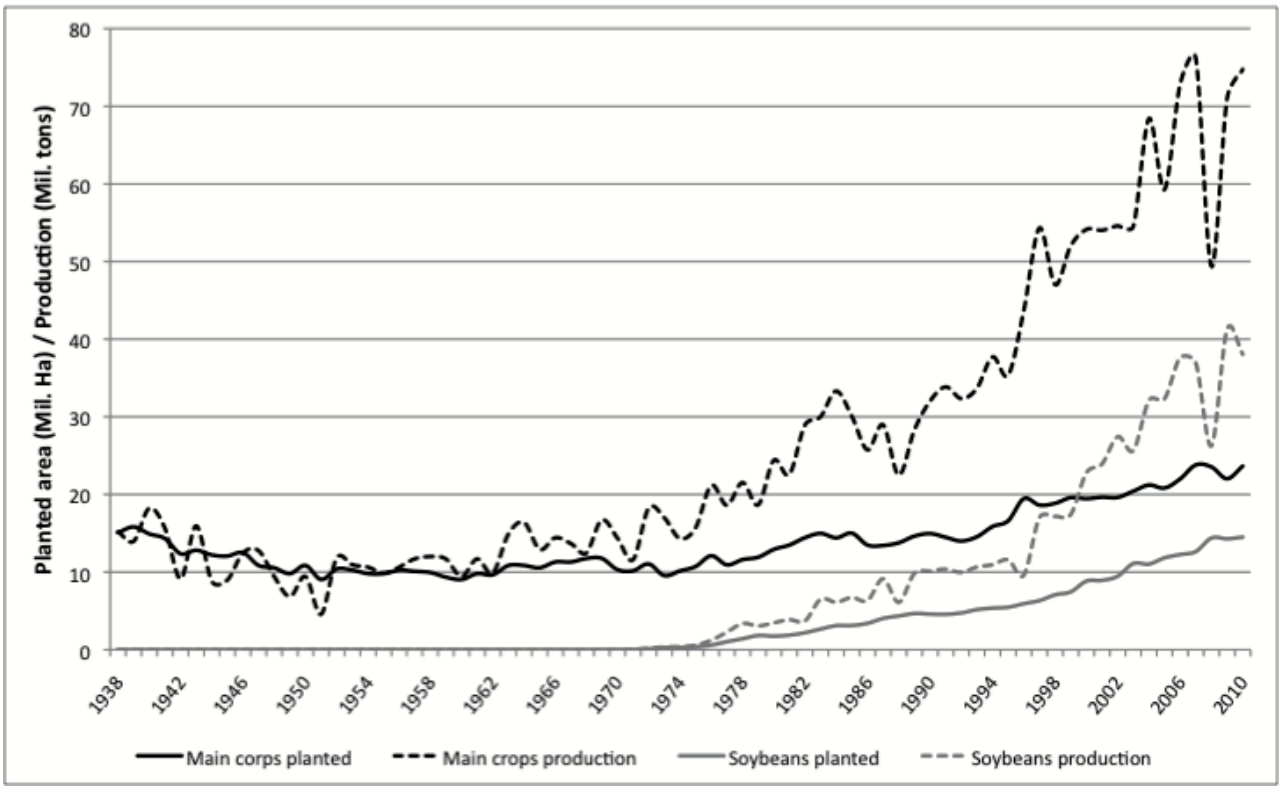
		Type of tenant			
		Neighbor	Someone from the area	Sowing pool	Total by type
Farm type renting out	Type 1	1	3	1	5
	Type 2	0*	2	2**	4
	Type 3	5	20	3*	28
	Type 4	4	6**	8***	18
	Type 5	5	17	5	27
	Type 6	9*	20	0**	29
	Type 7	2	6	1	9
Total farms renting out		26	74	20	120

Pearson's χ^2 test: statistic = 22.2 p-value = 0.03526

Squared differences of the most contributing cells:
* Squared differences from 0.6 to 1.17
** Squared differences from 1.18 to 4.83
*** Squared differences larger than 4.83

For 24 farms, the type of tenant was unknown. Those cases were removed from the chi-square analysis. However, the same qualitative results can be obtained including those farms in the test.

Fig. 1: Evolution of planted area (million hectares) and production (million tons) for the main crops in the Pampas region



Main crops include wheat, corn, linseed, sunflower, barley and soybean grown in the Provinces of Buenos Aires, Córdoba, La Pampa and Santa Fé. Built based on Balsa (1968) and Agricultural Estimates Department – SIIAP (2011)

Fig. 2: Location of Balcarce district and the farms sampled

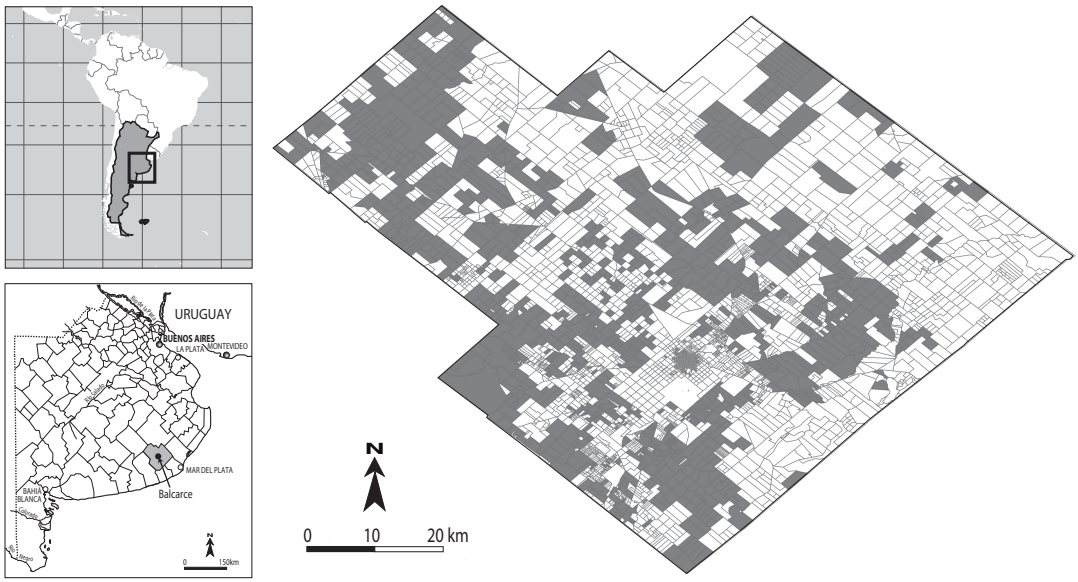
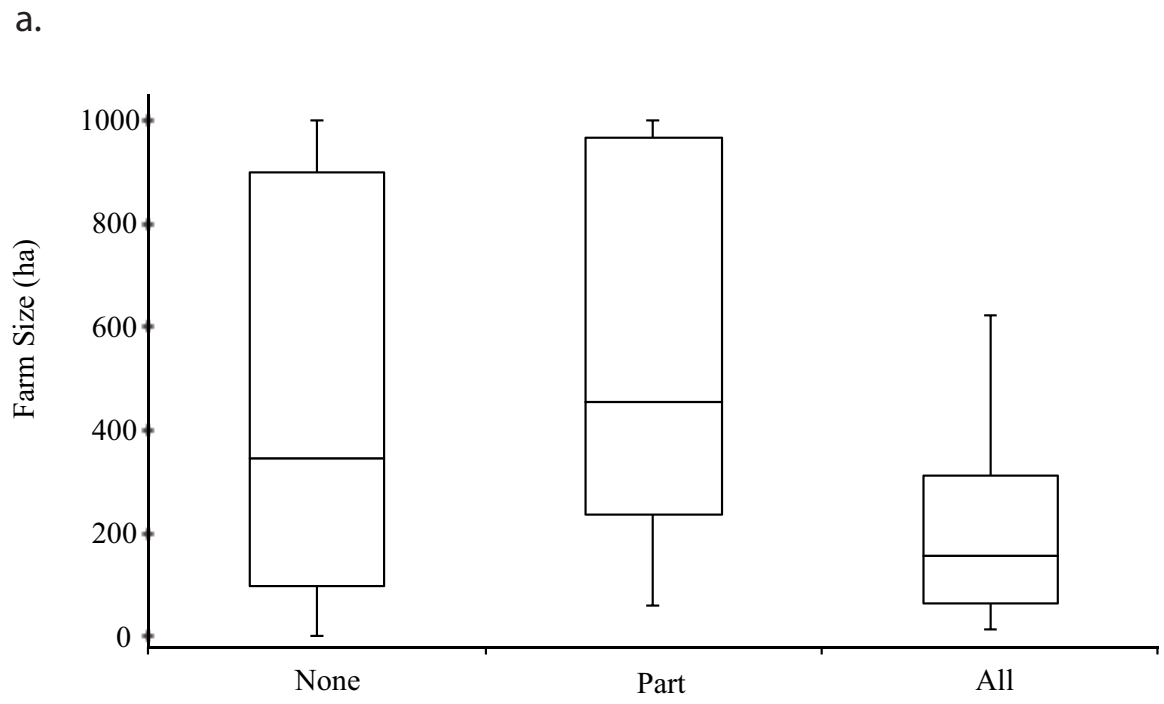


Fig. 3: Farm size and proportion of the farm rented out (a) and size of the rented plots by type of tenant (b).

(a)
Percentage of the farm rented out
(b)
Type of tenant

(To facilitate the reading, farms of over 1000 ha were given the maximum value of 1000 ha in panel (a).)



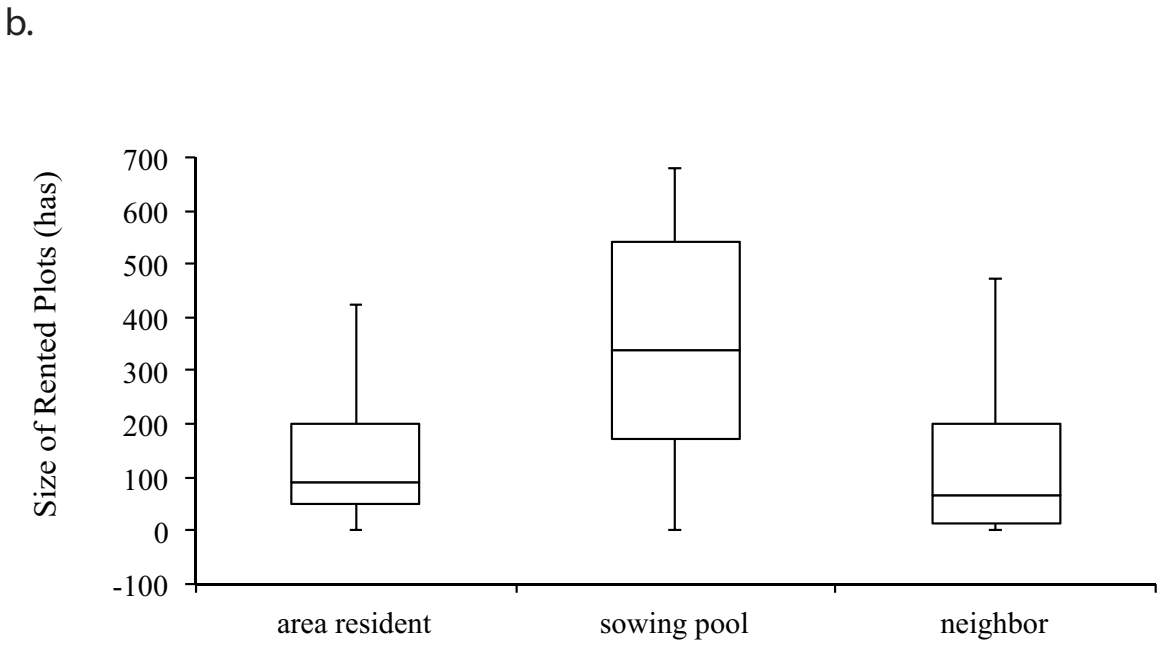


Fig. 4: Proportion of explained variability, R^2, according to the number of types defined in the typology.

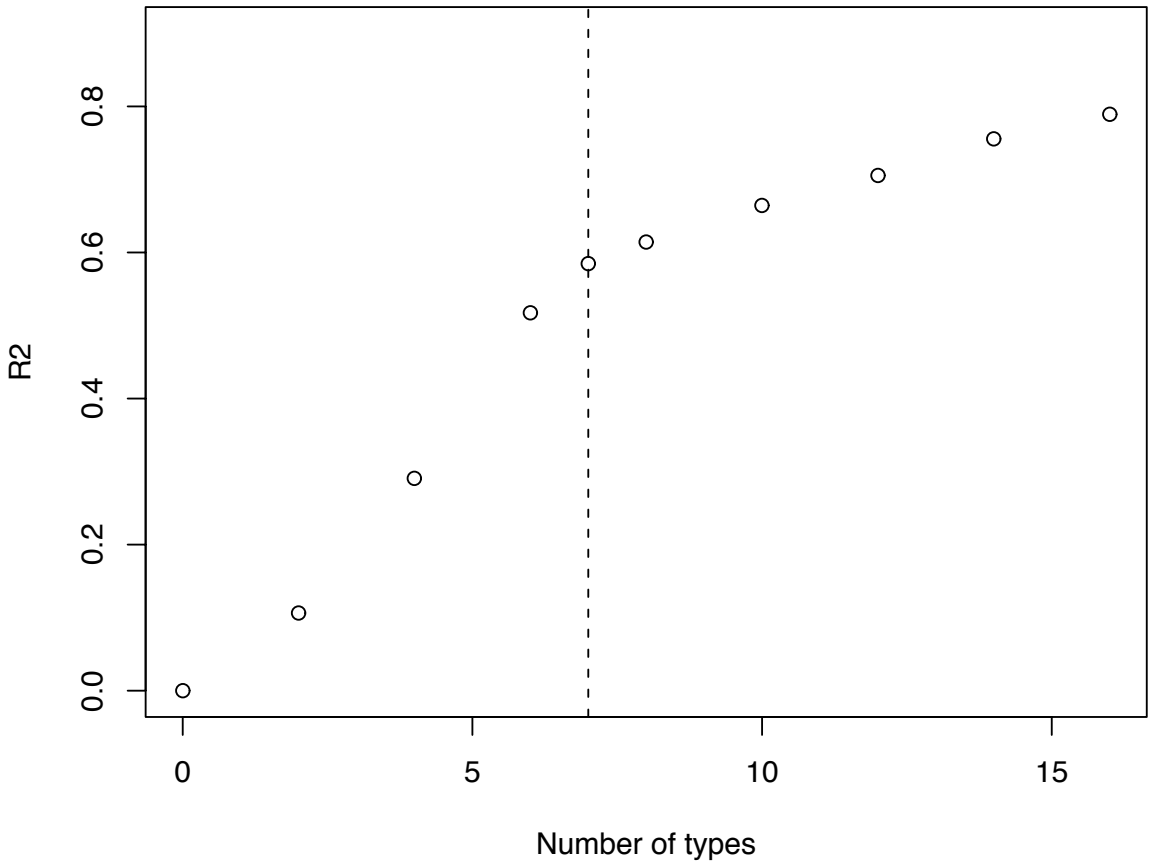


Fig. 5: Percentage of agriculture-only farms and percentage of the farm rented out by type.

The diameter of the bubble represents the average size of the farms in each type. The first number inside the square bracket is the type number whereas the second one is the average size of the farms in each type.