

**Decision-Environment and Land Tenure:
A Comparison of Argentina and the U.S.**

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INTRODUCTION

Land tenure issues have attracted attention from economists. This is especially true in developing countries, where the agricultural sector is of considerable importance. Land rental has been viewed both as a efficiency-increasing and efficiency reducing institution. Aldo Ferrer, in his volume on Argentine economic development suggests that "the characteristics of the tenure regime [existing in Argentina in the first half of the XX century] reduced the possibilities of growth of agricultural production" (Ferrer, 1965 page 114). According to Ferrer, one of the reasons why land rental reduces agricultural growth is "the lack of interest of tenants in making fixed investments in lands that were not their own" (our translation).

In Latin America, from the 1960's to the late 1970's opinions such as Ferrer's were widespread. Indeed, in this period the reforma agraria movements gathered momentum in countries such as Chile and Perú. The slogan "la tierra para el que la trabaja" (land for he who works it) implicitly acknowledges the superiority of land ownership over land rental by tenants, or agricultural labor hiring by large (and sometimes "abstentee") landowners. Although faith in land reform waned in the 1980's and 1990s, land tenure is still an issue. In Brazil for example, the "Sin Tierra" (without land) political movement has gathered considerable impetus, leading in some cases to occupation of private lands by landless farmers and agricultural workers. This movement has spilled over to bordering areas in north-east Argentina, where important fractions of private land have been occupied.

A comparison of tenure patterns between countries with similar agronomic characteristics can shed light on decision-making at the farm level. It

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can also suggest how land rental may enhance or hinder production efficiency. The contrast between Argentina and the U.S. may be used to explore these issues. Agriculture in both countries shares many similarities. This is particularly true for farms in the main grain, export-oriented production areas. Indeed, in both countries four crops (wheat, corn, soybeans and sunflower) account for the major portion of agricultural output. Production technology is quite similar: market-oriented, family-type farms and a high degree of mechanization. Also, in both cases production technology flows both from public as well as private sector sources. TFP growth levels during the last decades of 2 percent in Argentina (Lema, 2000) and 1.94 percent in the U.S. (Ahearn and others, 1998) suggest similar efficiency-enhancing opportunities have been made use of.

The objective of this paper is to explain differences in land tenure patterns between comparable production regions of Argentina and the U.S. The focus is placed on current (1990 - 2000) land use systems. Simple economics is used to relate land tenure decisions with differences in the decision-making environment faced by farmers in both countries. The paper attempts to understand possible changes in land use patterns in Argentina if policies result in a more rapid pace of economic development.

GRAIN PRODUCTION: ARGENTINA AND THE U.S.

Observers of the agricultural development process have pointed out that in Argentina the pattern of land occupation that started in the XIX century resulted in larger landholdings than in comparable producing regions of the U.S., where government policy (the "Homestead Act") explicitly favored 160-acre family farms. Research comparing Iowa with the central Argentine corn region (Azcuay Ameghino, 1997) finds that in Argentina the larger farm size accounts for a greater portion of land-use than the smaller and medium-sized classes. In contrast, in Iowa some 2/3 of land in farms is accounted for by the two "medium" sized categories (Figure 1). Economic and historical forces have thus favored medium-sized enterprises in the U.S., and larger (at least measured in hectares) farms in Argentina. At the risk of excessive simplification, in the U.S. corn belt farms rely mostly on family labor, while in Argentina many farms make use of hired labor. An average "medium" farmer in Argentina

seldom engages in non-skilled work (driving a tractor, for example). In the U.S. he frequently does so.

Similarities in production conditions should not obscure differences in economic incentives that have been faced by farmers. This was particularly so before the 1990's, moment in which increased opening of the economy resulted in convergence of prices of fertilizers, ag-chemicals and farm machinery to values similar to those found in the U.S. and other important grain exporters. During the 1970's and 1980's fertilizer/grain and ag-chemical/grain price ratios were much higher (more than double) in Argentina as compared to the U.S. (Cirio, Danelotti and White, 1980). This led to very low use of these inputs. In the 1990's, elimination of import tariffs on agricultural inputs result in lower input/output relative price ratios. As a result, between the mid 1980's and the late 1990's fertilizer use increased eightfold, and ag-chemical used quadrupled. High prices of fertilizers prevalent in the 1970's and 1980's implied reliance in alternative methods of increasing soil fertility (for example, crop-pasture rotation). This resulted, in Argentina, in the prevalence of relatively complex grain-beef production systems. In comparable areas of the U.S., in contrast, continuous crop production was more important. As is argued below, more complex production systems possibly hinder land rental.

The U.S. midwest and the north of the Argentine "pampa húmeda" region are superbly adapted to corn and soybean production. In the fringes of the "prime" agricultural areas of both countries wheat and sunflower dominate. Among "non-agricultural" variables the wage rate, the cost of capital services, credit availability (all a function of overall economic development) play a prominent role in farmer decisions.

Resource-use patterns in agriculture (including land tenure arrangements) result from an interplay of "agricultural" as well as "non-agricultural" variables. A comparison of the U.S. and Argentina suggests that the most important differences in the decision-environment result from "non-agricultural" factors. A farmer transported from Ames (Iowa) to Pergamino (Argentine corn region) would probably find adaptation to "agronomic" conditions fairly easy. He would, however, need quite some time in understanding constraints to the functioning of credit, labor, commodity and technology markets. Differences in land use patterns between Ames and

Pergamino should therefore be explained by differences in the way these markets function.

Three organizational forms characterize agriculture in the grain producing regions of Argentina. These forms differ in the type of resources owned by the farm entrepreneur. Farm type I ("non-specialized") is characterized by joint provision of management, labor, capital and land services. In farm type II ("custom-hiring") management owns land, but hires labor and capital services. Capital services are supplied to him by a contratista (machinery services contractor). The contratista is himself an entrepreneur with income proportional to services sold, and costs a function of the efficiency he is able to achieve. For larger contratistas, labor supervision is an important task that has to be carried out. Lastly, in firm type III ("land-hiring"), management and capital services are jointly supplied and land services and unskilled labor are hired. That is, a machinery-owning entrepreneur in this case acts as a tenant (hires land) instead of supplying machinery services.

If the non-specialized and the custom-hiring organizational forms prevail, most land is controlled by landowners. In contrast, tenant-controlled land results if the land-hiring form is more important than the other two. Table 1 summarizes the impact of organizational form on selected aspects of the firm's decision process. A first issue is whether separation of land ownership and land use results in a reduction in farm-specific investment (for example a barn or a fence). If the investment is to be made by a tenant, costly contracts or self-enforcing arrangements are required. This could lead to sub-optimal investment levels. However, these costs can be eliminated if the landowner makes the investment himself (thus increasing land productivity), capturing investment costs through higher rental values. Thus, organizational form should not be expected to have an impact on the level of farm-specific investments.

The non-specialized organizational form implies greater difficulty in achieving a cost-minimizing output level than the custom-hiring (and especially) the land-hiring form. Indeed, land ownership requires financial resources that could be employed in land rental and/or the purchase of movable capital such as tractors. The potential for achieving an "adequate" scale of production is thus maximized by the organizational form that relies in renting instead of owning land. However, in developing countries land ownership provides better access

to institutional credit than ownership of other kinds of capital. Using Oliver Williamson's term (Williamson, p.1985) land is a more attractive "hostage" for lenders than a tractor or a planter. Investment in land therefore has two opposing effects: on the one hand it "freezes" assets that could be allocated to size-increasing strategies (land rental, labor hiring and capital inputs purchase or hiring); however it also increases access to debt capital. Under landownership (imputed) land rent represents a substantial portion of costs; in contrast under the land-hiring form cash rental (or in some cases share-rent) replaces imputed costs. Cash-flow variability (and hence financial risk) is therefore larger.

The land-hiring strategy involves labor supervision if - as is frequently the case - the entrepreneur is also the owner of a stock of agricultural machinery. Increased labor supervision, coupled with greater cash-flow variability, and the need to continually search for and evaluate land; as well as contract with landowners implies greater management requirements of this form of organization as compared with the non-specialized and labor-hiring form.

Entrepreneurs whose wealth is insufficient for purchasing land choose to purchase agricultural machinery. They subsequently must choose between: (a) selling machinery services to custom-hiring firms or (b) renting land, thus transforming themselves into a land-hiring firm. Sale of machinery services reduces risk to a minimum: payments are made for services rendered. In the main agricultural areas, the market for machinery services approximates perfect competition; profits therefore tend to zero. Strategy (b), on the other hand, requires the entrepreneur to bear a substantial part of the production risk: inputs have to be deployed and paid for in period t_0 , while (random) outputs result in period t_1 . Randomness results both from production as well as market risk.

Table 2 and 3 show, for Argentina and the U.S., the extent to which land is controlled by landowners as opposed to non-owners (tenants).² Clearly, in the corn and wheat producing areas of the U.S. non-owners control a substantial portion (some 50 - 60 percent) of total land. On contrast, in similar areas of Argentina only 10-25 percent of land is controlled by non-owners. In Argentina

² For Argentina only data for the Province of Buenos Aires (the most important producer of grains) are presented.

landowners therefore choose either the non-specialized or the custom-hiring strategies, instead of renting their land to a land-hiring firm.

AN EXPLANATION FOR LAND-USE DIFFERENCES

Table 4 summarizes forces leading to a different land-use pattern in Argentina as compared to the U.S. These are discussed in turn. Slow economic development implies that in Argentina management returns to landowners compare favorably with non-agricultural employment opportunities. "Management returns" are defined here as the differential rent resulting from a landowner contracting all inputs and bearing risks as opposed to renting his land to outsiders. In contrast, in the U.S. rapid growth in non-farm activities results in (pure) management returns in agriculture being lower than non-agricultural wages. Therefore the cost - for a landowner - of specializing in pure managerial work increases.

Land prices for "prime" agricultural land in the U.S. corn belt averaged, in the mid-1990's, some US\$ 3900 - 4200 per hectare. In Argentina, prices in the same period were approximately US\$ 3500 per hectare. Assuming a GDP/capita of US\$ 35.000 for the U.S. and US\$ 7.000 for Argentina, the ratio per-capita GDP/land price is more than 8 in the U.S. and 2 in Argentina -- an enormous difference. Clearly, differences in agricultural productivity are relatively small, but differences in overall productivity of the economy are large. Land is "relatively affordable" for the average U.S. citizen, but is very expensive for his Argentine counterpart. Higher land price implies a high - relative to wages - land rent. This fact probably explains why - in Argentina - landowners choose to control land themselves instead of renting this resource to machinery-owning entrepreneurs, as is frequently done in the U.S.

The land-hiring type of organization prevalent in the U.S. allows separation between land ownership and land control. It leads to increased specialization and presumably efficiency: the fact that landownership is not as important a constraint in the U.S. as compared to Argentina results in increased competition for land.

In Argentina, high interest rates as well as high price for capital inputs results in high prices for capital service flows. Factor proportions in Argentina as

compared to the U.S. thus favor lower capital/land and capital/labor ratios. Achieving a low capital/land ratio is easier for entrepreneurs selling custom services than either the non-specialized or the land-hiring firm. Indeed, the non-specialized firm owns all of the land used in the production process. Given the "lumpiness" of many farm machinery items, a low capital/land ratio can be achieved in this type of firm only by using relatively large amounts of land. However, this requires considerable wealth. The land-hiring organizational form also has difficulties in achieving a low capital/land ratio: financial risk increases as enterprise size (associated with land under cultivation) increases. Thus, in Argentina machinery-owning entrepreneurs choose to sell custom services to custom-hiring firms instead of hiring land themselves.

A less developed financial system in Argentina as compared to the U.S. results in landowners having advantage over other entrepreneurs in accessing funds. Command over funds results in owners of land hiring owners of tractors for fixed fees. Land is therefore controlled by landowners and not machinery-owning entrepreneurs. In contrast, in the U.S., improved supply of financial resources results in pure agricultural entrepreneurs gaining control over land.

Price risk is larger in Argentina than in the U.S. due to two reasons. First, decades of high inflation resulted in weak development of futures and options markets. This is true even considering the growth experienced by these markets in Argentina during the 1990's. Second, in the U.S. agricultural policy results in effective price floors for many commodities. No such policies exist in Argentina. High price risk requires specialization in risk-bearing. This is easier for landowners given their improved access to credit and the non-cash nature of a substantial part of their costs. Risk-bearing, in turn, implies decision-control (Jensen, page 1998); thus land is controlled by landowners.

Price risk has a further - and indirect - effect on organizational form. This acts through the need for diversification, carried out by the inclusion of livestock activities ("mixed" farming). In particular, crop rotation not only reduces income variance, but also has positive effects on crop productivity. However, valuation of the "fertility" transferred from pastures to annual crops is easier for the landlord, who made the investment in pastures in the first place, than for the potential tenant. A "lemons" (Akerloff, 1970) problem arises: land benefiting

from past rotation is not "marketed" (rented) due to information asymmetries between landowner and potential tenant. Land is therefore used "internally".

CONCLUSION

Agriculture provides a wealth of opportunities for studying decision-making processes of entrepreneurs. A comparison of countries sharing similar production conditions, but differing in overall economic development sheds light on determinants of structural change in the agricultural sector. The contrast between Argentina and the U.S. constitutes an interesting case-study for exploring these issues.

Land rental is considerably more important in the U.S. than in similar production areas of Argentina. This finding suggests that "modernization" of agriculture does not necessarily imply a reduction in the importance of land rental: the opposite seems to be the case.

In a developing country such as Argentina landowners enjoy advantages in the market for land control. In particular, they have better access to credit, and thus face less binding capital constraints. They can also better bear risks involved in a production process characterized by high output and price variability. Furthermore, lower off-farm opportunity costs in a developing country-setting imply that the "pure management" function engaged by landowners survives. In contrast, an increase in opportunity costs would imply that landowners would find it to their advantage to rent land to individuals specializing in "pure farming" via land rental.

Increased land rental is associated with separation of land ownership and land control. This separation should potentially increase competition for land and therefore production efficiency. Factor (capital, labor and management) mobility between farms and production regions is probably higher in countries where land rental is prevalent. A higher factor mobility is important for equalizing marginal returns, thus resulting in an efficient allocation of production resources.

Having said this, the U.S.-Argentina comparison shows that during the last decades both countries have experiences similar growth in Total Factor

Productivity. If this is so, the very different land tenure arrangements described in this paper possibly result, in the end, in a similar overall performance.

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Table I: Characteristics of Organizational Forms

	Non-Specialized	Custom-Hiring	Land-Hiring
Investments in Site-Specific Capital	=	=	=
Size Efficiency	-	+	++
Credit Constraints	-	--	+
Management Constraints	-	-	+
Labor supervision	+	-	++
Cash-flow variability	-	+	++

Table 2: Land Tenure in Argentina (1988 - 2001)
(Own Land/Total Land in %)

Production Area	1988	1993	1995	2001
Corn/Soybean 1	72	80	81	73
Corn/Soybean 2	82	82	92	86
Wheat/Sunflower 1	72	82	81	82
Wheat/Sunflower 2	76	71	77	87

Corn/Soybean 1 = North of Buenos Aires, Corn/Soybean 2 = Center-North of Buenos Aires, Wheat/Sunflower 1 = South-Southeast of Buenos Aires, Wheat/Sunflower 2 = South of Buenos Aires.

Source: Calculations based on the *Censo Nacional Agropecuario* and the *Encuesta Nacional Agropecuaria*. Ministerio de Economía, INDEC.

Table 3: Land Tenure in the U.S. (1997)
(Own Land/Total Land in %)

State	Own Land/Total Land (%)
Illinois	40
Indiana	48
Iowa	46
Three Corn Belt States	46
Kansas	45
North Dakota	49
South Dakota	62
Three Wheat Belt States	46

Source: USDA NASS 1997 Census of Agriculture
State Data

Table 4: Forces Determining Contractual Forms
("Pampean Prairie" in Argentina)

Decision-making environment:	Impact on Contract:
Relatively high returns to pure management	Landowners choose to be pure managers instead of employees in non-agricultural sector
High costs of capital	Pressure to maximize efficiency of capital stock. Outside contracting of capital services.
Limited access to ST credit	Land ownership eases credit constraint. A wedge in cost of funds between landowners and agricultural contractors. Contractors work for fees and exceptionally rent land themselves.
Risky prices (I)	Landowners and non-farm investors specialize in risk-bearing.
Risky prices (II)	Trend towards "mixed" farming (grain/livestock rotation). Complex production system implies a premium on owner-management as opposed to pure land rental by tenants.

Figure 1: Land Use by Farm Size