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Managerial form, ownership and efficiency: a case-study of Argentine agriculture

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Abstract

In agriculture, studies dealing with the separation of ownership from control have focused on sharecropping, paying little attention to the impact of management and ownership on efficiency. Using Argentine data, this study tests the hypothesis that efficiency is a function of type of management, concentration of ownership, and mechanisms for monitoring managers. Results show that management, ownership and monitoring have a greater impact on marketing efficiency than either on technical or cost efficiency.

1. Introduction

It has been argued that managerial performance is affected by the intensity of 'pressure' facing managers from shareholders and competitors. In particular, inefficiencies may be a function of the degree to which the sector in which the firm operates departs from the perfectly competitive ideal. Analysis of efficiency issues have focused on aligning the interest of managers with that of equity-holders, generally in the context of large firms operating in the manufacturing, energy or service sectors (see, e.g., Frantz, 1992; Button and Weyman-Jones, 1992). Issues raised by the separation of ownership and management in highly competitive industries, and in particular in an LDC setting, have rarely been addressed. Absentee ownership, however, has been cited as detrimental to the process of agricultural development. In some instances this organizational form is associated with sharecropping: land is provided by the landowner, labor by the sharecropper, and other inputs are shared by both parties in some proportion. Absentee ownership may also arise when professionals manage a production unit owned by individuals who do not participate in daily business decisions. This case is of interest because – among other reasons – professional managers may be needed to allow venture capitalists to access sectors in which they have not had previous experience.

This paper examines the effect of organizational form on the economic efficiency of firms operating in agriculture, a highly competitive sector. Organizational form refers both to type of management and concentration of ownership; in particular it distinguishes between farms managed by owners as opposed to professional man-

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agers, and farms owned by one person versus those with multiple owners. Pooled cross-section (25–40 farms) and time-series (7 years) data for a group of livestock farms in Argentina are used. Production systems such as those analyzed here are complex (see Dillon and Anderson, 1990) and place considerable demands on management. Complexity arises because of the need to constantly balance supply and demand of forages in situations where forage growth depends on highly variable climate. Moreover, high and variable inflation has resulted in large variation in factor/output and factor/factor price ratios, which further complicates management decision as regards to profit-maximizing input allocations.

2. Theory of the firm, management input and production efficiency

The neoclassical model of a firm consists of an objective function (profit) to be maximized by choosing levels of decision variables. The model abstracts from the possibility that: (a) decisions may be made not by the firm's owner but by professional managers and (b) transaction costs hinder information-gathering on the effort expended by managers. Microeconomic theory treats the firm as a 'black box' in which property rights, agency costs and transaction costs play no role (e.g., Cyert and Hedrick, 1972; Jensen and Meckling, 1976). Papers studying firms in an institutional context build on the work of Coase (1937) on the advantages of firms over markets for organizing transactions; of Alchian and Demsetz (1972) emphasizing the rewards to managers who are efficient at monitoring labor; and of Furubotn and Pejovich (1972) who examine how different arrangements of property rights affect firm performance. The issue of managerial discretion now constitutes the core of the theory of corporate finance, and more generally is of direct relevance for firms in which management is provided by individuals with little or no direct stake in the production outcome.

When analyzing efficiency of organizational forms, an important aspect to consider is the linkage between inputs allocated to *administration* and the overall quality of the firm's resource allocation process (Nelson, 1981). That is, the added revenues allowed by improved management have to be compared with the added costs that this management system entails. Comparisons of marginal costs and marginal revenues of organizational forms are particularly relevant in economies subject to change, where "tracking a moving target" significantly increases decision-making complexity (Nelson, 1981). In some cases this complexity may be better addressed by specialized decision-makers (professional managers) who do not have residual claims on the firms' cash flows (Fama and Jensen, 1983). Agricultural economists have attempted to improve their understanding of firms, and the impacts of alternative institutional arrangements on performance. Much effort has been aimed at analyzing the economics of sharecropping (e.g., Cheung, 1969). Less attention has been given to the management input, although the study of Roumasset and Uy (1987) provides both a taxonomy of organizational forms as well as a theoretical model that explains how these forms are chosen. However, it does not explicitly analyze efficiency aspects.

Agency theory. Agency theory provides a framework for analyzing decision-making when one or more individuals – the principal(s) – delegate authority to other individual or individuals, i.e. the agent(s). When decision-making is delegated, the unconstrained profit-maximizing model may no longer be adequate. In particular, the principal faces the problem of designing an incentive scheme that elicits optimal levels of effort from agents. The theoretical literature on agency theory (e.g., Varian, 1992, chapter 25) has emphasized the maximization problem faced by the principal, in which the *participation constraint* and the *incentive compatibility constraint* condition the choice that can be made regarding incentive systems to be offered to the agent. [1]

[1] These two constraints guarantee that (a) the agent will choose to participate in the contract and (b) that the agent's choice of effort level corresponds to the one that maximizes profits for the principal.

The incentive scheme may take different forms. Risk-neutral agents who can raise sufficient capital to control the business can become residual claimants by paying the asset owner a fixed rent, in which case no incentive problem arises. However, capital constraints or risk aversion can result in a share-rent being chosen instead of a cash-rent arrangement. For example payments could be a proportion β of profits, in which case the agent maximizes:

$$u = \beta[y(\boldsymbol{x}, e) - \boldsymbol{w}'\boldsymbol{x}] - C(e) \quad 0 < \beta < 1 \tag{1}$$

by setting

$$\partial u / \partial \boldsymbol{x} = \beta(\partial y / \partial \boldsymbol{x} - \boldsymbol{w}) = \mathbf{0} \tag{2}$$

$$\partial u / \partial e = \beta \partial y / \partial e - C'(e) = 0 \tag{3}$$

where $\boldsymbol{x}$ is a vector of variable inputs, $\boldsymbol{w}$ is a vector of input prices (normalized by product price) $y(\boldsymbol{x}, e)$ is output, a function of $\boldsymbol{x}$ and the agent's effort (e), u is the agent's utility function, and $C(e)$ is the cost to the agent of effort level e. This scheme results in sub-optimal effort levels compared to the situation where $\beta = 1$, and the agent is the residual claimant. This model constitutes the well-known Marshallian representation of the inefficiency of sharecropping systems (see Otsuka and Hayami, 1988). It also highlights issues related to delegation of decision-making to non-owner managers, as these could eventually be paid a proportion β of profits in return for their decision-making, coordination and control services.

A manager differs from a sharecropper in three respects. First, landowners may have two or more tenants, thus stimulating competition among them to elicit optimal effort (e.g., Cheung, 1969, p. 105). Given the size of most agricultural firms, however, it is generally impractical to hire more than one manager. This would suggest that managers have greater freedom than tenants in supplying sub-optimal effort. However, the market for managers may operate in such as way so as to make *reputation* a basic mechanism with which inefficient managers are weeded out. In this case, strong incentives exist for management to perform adequately.

Second, the 'sharecropper model' (1)–(3) focuses on loss of efficiency as a result of the agent's marginal product exceeding the marginal cost of effort (Eq. 3). First-order conditions for the other inputs (Eq. 2) do not depart from Pareto-optimality. However, it is more realistic to consider that optimal allocation of inputs also requires management effort. For example, let $\boldsymbol{x}^*$ and $\boldsymbol{x}^{\mathrm{A}}$ represent the cost-minimizing and the actual input vector used by the firm. [2] If $\boldsymbol{x}^* \neq \boldsymbol{x}^{\mathrm{A}}$, excess costs are incurred. As management effort increases, less allocative errors are made and $\boldsymbol{x}^{\mathrm{A}} \to \boldsymbol{x}^*$. The principals of the firm must balance increases in costs due to $\boldsymbol{x}^* \neq \boldsymbol{x}^{\mathrm{A}}$, with increases in costs necessary to increase e. If $C(e)$ is the cost of eliciting managerial effort, and $C(x)$ is the excess cost due to non-optimal combinations of the input bundle, then optimality requires that effort level be set so as to equalize:

$$C'(e) = C'(x) \partial x / \partial e \tag{4}$$

where x represents the distance $|\boldsymbol{x}^{\mathrm{A}} - \boldsymbol{x}^*|$, and $\partial x / \partial e$ the decrease in $|\boldsymbol{x}^{\mathrm{A}} - \boldsymbol{x}^*|$ resulting from increased managerial effort. Expression (4) shows the impact of managerial effort in reducing allocative inefficiencies. These will be greatest in situations in which price ratios are changing, thus requiring continual adjustment.

Third, as analyzed in the financial literature (see, e.g., Jensen and Meckling, 1976) the *agency cost of debt* increases as the ratio between equity and total assets of a firm decreases. This occurs because risky projects will be increasingly preferred by equity-holders as their stake in the project decreases, and an increasing proportion is shouldered by bondholders (see also Milgrom and Roberts, 1992, p. 173). A professional manager who has no equity stake, but whose compensation is determined according to (1), is a limiting example of an 'equity holder' with claims over uncertain risky cash flows but without having personal capital at stake. That is, a crucial distinction between a manager and a sharecropper is that the latter has a greater equity stake in the business venture.

[2] Assume furthermore that $\boldsymbol{x}$ does not include the management input.

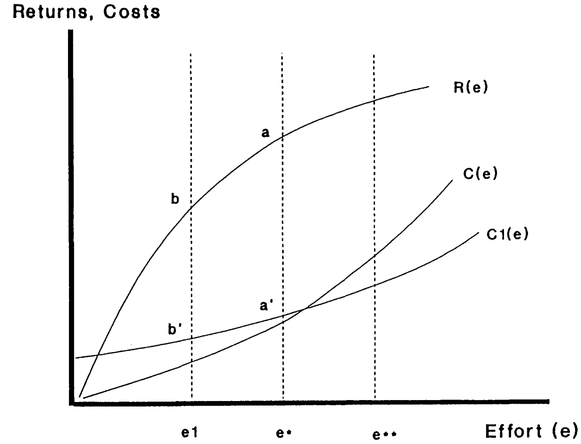

Fig. 1. Managerial effort returns and costs.

This paper focuses attention on managerial effort and not on issues related to risky choice. Fig. 1 illustrates the impact of inadequate managerial retribution. In order to increase managerial effort, increased costs have to be incurred as represented in $C(e)$. Moreover, $C''(e) > 0$. Returns to effort are an aggregate of many firm-level adjustments: reduced technical, cost or profit inefficiency, improved arbitrage in input and output markets, improved long-term investment decisions, etc. Function $R(e)$ represents these effects, and is concave-downward. Principals should aim at eliciting effort e^*, where $R'(e) = C'(e)$; however, achieving e^* may be considerably more difficult than achieving (say) an optimal application level of nitrogen fertilizer. In practice, firms may be observed with managerial effort such as e^1 ($e^1 < e^*$), and hence with profit levels below the maximum: $(a - a') > (b - b')$. In order to increase the supply of effort by managers, two mechanisms may be used. The first involves paying salaries that are higher than those prevailing in the market, thus increasing the cost of an eventual lay-off due to suboptimal performance (Shapiro and Stiglitz, 1984). For example, (suboptimal) effort level e^1 could result if market wages are paid, while e^* requires wages that exceed those obtainable in the market by a certain amount. The second mechanism involves not increasing the cost of layoff, but spending more resources on measuring managerial performance. In particular, game theorists have analyzed the role of 'tournaments' as mechanisms that allow principals to improve their evaluation of agents' performance (see Milgrom and Roberts, 1992, p. 367). In agriculture, comparative business analysis as practiced in private farm-management associations can be considered examples of tournaments: these provide equity holders benchmark performance measures (yields under specific environments, agronomic practices, etc.) that improve inference about management quality. [3] In terms of Fig. 1, membership in a farm-management association shifts the cost curve of eliciting effort from $C(e)$ to $C^1(e)$, and the optimal effort level from e^* to e^{**}. $C^1(e)$ has a fixed cost component (membership in the association requires a fee independent of managerial effort), but has lower marginal costs than $C(e)$. This fixed cost may cause membership to be more profitable for larger farms.

Agency problems resulting from management by individuals with no equity claims can also be minimized by adopting a decision structure that separates *initiation and implementation* of decisions from their *ratification and monitoring*. This separation generally provides 'checks and balances' that protect residual claimants from agency problems (Fama and Jensen, 1983). These issues are of interest especially in situations where agency problems are prevalent (agribusiness, rural finance, governance of institutions involved in research/extension, etc.). In summary, efficiency may be affected by whether management is carried out by owners or by professional managers, and by membership in associations which facilitate inter-firm comparisons of business performance. It is also reasonable to postulate that

[3] The term farm-management associations is used here for private groups of farms who collectively hire a consultant and decide to become part of a region-wide business development organization. These groups share some similarities with the farm business management groups sponsored by U.S. universities. For a review of the role of farm-management associations in Argentine agriculture, see Gallacher (1988).

efficiency will be inversely related to the number of owners of the firm, as dilution of ownership can cause free-rider situations. The following propositions result from the above arguments:

Proposition 1. Firms managed by equity holders are more efficient than those managed by individuals with no equity claims. The difference in efficiency is a function of the proportion of equity capital retained by the manager. As a corollary, firms with only one owner are more efficient than firms with several owners.

Proposition 2. Membership in farm-management associations shifts the marginal cost curve of inferring management effort downward, and leads to closer supervision by equity-holders with resulting higher level of efficiency.

3. Efficiency measures, data and econometric model

3.1. Efficiency concepts

Three measures of efficiency are used to test the previous propositions. The first two are related to the firm's production function and input use.

Technical efficiency. Technical efficiency (TE) is defined as the ratio of actual to maximum output, given the input vector used. Maximum output is calculated from a stochastic frontier using panel-data. TE reveals possibilities for increasing output without increasing cost and/or re-arranging input combinations.

Cost efficiency. Cost efficiency (CE) is defined as the ratio of actual output to output obtained with the same level of total cost but with inputs used so as to equate marginal rates of substitution with input price ratios. CE measures the degree to which the firm is operating at points other than those implied by the expansion path in factor space. It indicates whether marginal productivity and resources prices are correctly taken into account in determining patterns of resource use.

Factor price efficiency. Factor price efficiency of firm i (FPE_i) is evaluated by comparing factor prices of this firm with the average factor prices for all firms in the sample.

3.2. Data set

The theory of agency presented in the previous section is tested using 231 observations on livestock producers in the Argentine Pampa region. The Appendix summarizes characteristics of the sample. The farms under study are larger than average farms of the region: the livestock enterprise of the former average 1000–2000 ha, while most of the latter do not exceed 200–300 ha. Large farms belong to wealthy individuals or groups of investors. Moreover, all employ part-time farm management consultants while, in addition, some participate in farm-management organizations which disseminate production and financial information to members. These farms constitute the top farms in their respective areas, and differences in efficiency within this sample probably underestimates differences in efficiency between this sample and the average farms in the region. Our analysis focuses on the livestock enterprise in which steers are fattened on perennial and annual pastures. We assume that land quality is (for each of the regions analyzed) randomly distributed among farms in the sample. This assumption – though reasonable – is necessary due to the fact that the only farm-specific index of land quality available is the production area where the farm is located. Possible differences in quality of cattle are accounted for by using ratios of cattle purchase and sale prices (see Section 4).

Farms are classified according to whether they had one or more owners and whether management was provided by an equity holder or by professional management who does not hold equity claims. Farm types I and II refer to units with only one owner, managed by their owner (type I) or by a non-owner professional manager (type II). Farm types III and IV represent units with more than one owner managed by an equity holder (type III) or by an outside manager (type IV). In addition, farms were also classified according to whether they did (type B_1) or did not (type B_0) belong to a farm business-management association. Proposition (1) implies that efficiency decreases as management is turned over to outsiders, and as the portion of equity retained by the manager decreases. In turn, Proposition (2) implies that farms not belonging to farm-management associations are less efficient than those that do. Denoting by E_f the measures of farm efficiency described above, the null hypothesis states that no differences in efficiency among farm types exist, while the alternative hypothesis states that:

$$E_f(I) > E_f(II \text{ and } III) > E_f(IV)$$

$$E_f(B_1) > E_f(B_0)$$

3.3. Econometric model

TE and CE are measured using a Cobb–Douglas-type model in which output is a function of eight inputs and three dummy variables for location and climatic conditions (preliminary data analysis suggests higher-than-average productivity for 1989 due to favorable weather). Omitting subscript t for convenience:

$$y_i = A\Pi_j X_{ji}^{bj} \exp(d_2 z_{2i} + d_3 z_{3i} + eC_i + \epsilon_i) \qquad (5)$$

where y is the total output of beef (kg), and X_1 represents land area allocated to beef production (ha), X_2 overhead expenses (\$), X_3 supplementary feeding expenses (\$), X_4 veterinary expenses (\$), X_5 annual grass expenses (\$), X_6 perennial pasture expenses plus depreciation allowances (\$), X_7 labor expenses (\$), X_8 total livestock input (kg), z_2, z_3 are dummy variables for the farm's location, C is a dummy variable for exceptional climate (= 1 if 1989), and $i = 1, \ldots, N$ denotes farms.

For inputs $X_2, \ldots, X_7$, values are expressed in constant Argentine pesos (September, 1992). Two alternative specifications are used for ϵ. The first corresponds to the traditional two-sided error of production models: $\epsilon \sim N(0, \sigma_\epsilon)$. Here, estimation is done via OLS, without regard to the panel nature of the data. The second specification assumes that ϵ can be decomposed into components v and u such that:

Table 1
Estimation results

Variable	OLS	Stochastic frontier
Intercept	4.0187 **	4.4803 **
	(0.2336)	(0.4743)
X_1	0.3619 **	0.4541 **
	(0.0469)	(0.0564)
X_2	0.0813 *	0.0905 **
	(0.0369)	(0.0325)
X_3	0.0090 **	0.0064 *
	(0.0030)	(0.0031)
X_4	0.1102 **	0.0851 *
	(0.0328)	(0.0417)
X_5	0.0122 **	0.0080 **
	(0.0028)	(0.0030)
X_6	0.0025	0.0009 **
	(0.0039)	(0.0032)
X_7	0.0849 **	0.0791
	(0.0297)	(0.0519)
X_8	0.2338 **	0.1824 **
	(0.0438)	(0.0346)
Z_2	0.0034	0.0127
	(0.0529)	(0.0813)
Z_3	−0.1599 **	−0.1758 **
	(0.0397)	(0.0605)
C	0.0990 **	0.1110 *
	(0.0456)	(0.0552)
$R^2 = 0.9045$		$\sigma_v^2 = 0.03759$
* $p = 0.05$		$\sigma_u^2 = 0.06758$
** $p = 0.01$		$\lambda^2 = 1.7804$
		(1.1610)

Standard errors in parentheses.

$$\epsilon = v - u \qquad (6)$$

where

$$v \sim N(0, \sigma_v) \qquad (7)$$

$$u \sim |N(0, \sigma_u)| \qquad (8)$$

As applied here, this stochastic frontier model (Greene, 1993) corresponds to a pooled cross-section, time-series model which accounts for the panel nature of the data. The approach utilizes firm-specific information on disturbances, but neglects time-effects on inefficiency. [4] Estimation results are presented in Table 1. In the OLS

[4] The LIMDEP procedure for panel estimation of frontier models was used (Greene, 1992, p. 669).

model, seven of the eight coefficients for inputs are statistically significant ($p = 0.05$). The frontier/panel model shows six significant coefficients. Also, the R^2 of the model is high. Considering multicollinearity and measurement problems present in non-experimental data of this type, results are satisfactory. The sum of elasticities (OLS model) is 0.896, which suggests the possibility of diseconomies of scale. Given the thrust of this paper, no further analysis is made of this issue.

4. Tests of hypothesis

Bravo-Ureta and Pinheiro (1993) as well as Battese (1991) summarize studies using stochastic frontiers in which education, extension, credit and other variables determine firm efficiency. However, they do not list studies investigating the impact of management and ownership. The discussion of Fig. 1 presented in Section 2 suggests that participation in farm-management associations may be one way of eliciting higher managerial effort. There are two reasons why incentives for participation in such associations may be higher for larger than for smaller farms. First, marginal returns to effort ($R'(e)$) will be larger for larger farms; hence profit-maximization requires that higher effort levels be used. Second, membership in these associations involves both of a variable as well as a fixed cost component. The fixed cost component (not only membership fees, but also visits by advisors, time and cash expenses of travels to meetings, charges for on-farm experiments, etc.) may suggest that larger farms have larger incentives than smaller ones to join these associations (see cost function $C^1(e)$ in Fig. 1). Available data (Appendix) show that livestock enterprises of farms belonging to a farm-management association are nearly double the size of those which do not, lending some support to the arguments presented previously. In summary, institutional mechanisms exist for eliciting higher managerial effort, but these appear to have costs and returns that are not scale-neutral. [5]

Table 2
Determinants of production efficiency

Y variable	TE_1	TE_2	CE	FPE [a]
Intercept	0.8636	0.8382	0.8151	1.3955
Farms II	−0.0006	−0.0560	0.0168	0.2696 *
Farms III	−0.0137	−0.0946 *	0.0122	0.3012 **
Farms IV	−0.0055	−0.0179	−0.0018	0.3626 *
Farms B_0	−0.0297	–	−0.0822 **	0.1434

Significance levels: * $p = 0.05$, ** $p = 0.01$.
[a] w_p / w_s (see text).

Table 2 shows results of the hypothesis tests from expression (5). For TE and CE, results from regressions of the type: $E_f = f$(ORGANIZATIONAL FORM) are reported. Organizational form is represented by dummy variables corresponding to the four management–ownership combinations described above, plus an additional dummy variable for non-membership in a farm-management association (B_0, B_1). For FPE the regression takes the form: *Input Purchase Price* = f(ORGANIZATIONAL FORM).

4.1. Technical efficiency

Technical efficiency of the ith farm is defined as (Battese, 1991):

$$\begin{aligned}\text{TE}_i &= Y_i/Y_i^* \\ &= f(X_i, B)\exp(v_i - u_i)/f(X_i, B)\exp(v_i) \\ &= \exp(-u_i) \qquad (9)\end{aligned}$$

where Y_i is observed output and Y_i^* the stochastic frontier output predicted from (7) using error structure (8). Table 2 shows regression results for two TE models. The first incorporates the dummy variable for membership in a farm-management association, while the second does not. The constrained model was run because of the high correlation between Farms B_1 and Farms IV, and the small number of Farms B_0 in the sample. Although parameter estimates of both models have the expected signs, only Farms III in the con-

[5] The data analyzed here are not a random sample. However, the evidence as to the large size of farms belonging to farm management associations is quite clear.

strained model show a significant drop in TE. Thus, TE is highest for farm Type I, and significantly lower in farm Type III. The drop in TE from farm I to III is nearly 10 percentage points. These results support the hypothesis that efficiency decreases as the number of owners increases. The fact that Farms III are worse in this dimension of efficiency than Farms IV suggests that pressure on professional managers is greater than on equity holders who manage for themselves and relatives. The last section of the paper further discusses this issue.

4.2. Cost efficiency

Cost efficiency is represented by the ratio:

$$\mathrm{CE}_i = f(X_i^{\mathrm{A}}, B)/f(X^{\mathrm{O}}, B) \tag{10}$$

where X_i^{A} is the input vector used, and X_i^{O} is an input vector of equal total cost which is optimal in the sense that output is maximized. This input vector is calculated by equating the share of cost for each input with the ratio of its elasticity and the total elasticity of production, i.e. $x_i = (b_i/\Sigma b_j)(\mathrm{TC}/w_i)$. CE_i measures the extent to which input allocation departs from expansion-path input combinations. Cost of land rental was estimated by imputing a 8% charge on land values. Similarly, cost of livestock inventory was calculated as actual inventory values times an interest rate of 12%.[6] Results from the cost efficiency model do not allow rejection of the null hypothesis of equal efficiency among farm types I–IV. However, there is strong evidence in favor of higher cost efficiency in farms belonging to farm-management associations (B_1)

4.3. Factor price efficiency

The third measure of efficiency involves the marketing function, and in particular the effectiveness of the cattle procurement process. For the firms analyzed here, cattle purchases constitute 70–75% of direct costs. A 1000-ha farm, for example, incurs in annual direct costs of 260,000 US dollars. Of these, approximately 75% (US$200,000) correspond to purchases of cattle.[7] These purchases require careful attention regarding quality and type of animal, etc. Cattle purchases are intensive in managerial time; thus sub-optimal incentives in farms operated by professional managers can affect the cost of this factor of production.

Per-unit prices paid for livestock may be a biased measure of input cost if input quality varies among farms. For example, some farms may aim at producing a type of animal that will subsequently command higher prices due to improved slaughter characteristics. Quality, however, is unobservable and therefore a proxy is needed to correct for this effect. In order to minimize possible biases caused by input quality differences the price paid for livestock (PP) by the ith farm was defined as:

$$\mathrm{PP}_{it} = (w_p/w_s)_{it} \tag{11}$$

where w_{p} and w_{s} represent, respectively, the average purchase and sale price for livestock of the farm in year t. The measure PP_{it} is then a price index of cattle purchases, where the denominator acts as a correction factor for possible changes in quality.[8] The results of the Factor Price Efficiency regressions lead to rejection of the hypothesis of equal efficiency among organizational forms. In this case, PP is 1.39 for farms of Type I, and 1.75 in those of Type IV, an increase of 25%. Inefficiencies in cattle purchases lend support to the proposition that non-owner management is associated with increased agency costs. Moreover, dilution of ownership is also associated with higher relative purchase prices: farms of Type III show higher PP ratios than those of Type I. Both of these are owner-managed, which suggests that free rider problems increase as the number of owners of the farm increases.

[6] Interest rates used to calculate costs of input stocks reflect the relative riskiness of investing in land and cattle.

[7] Agromercado, Vol. 75, p. 68 (December 1992, Buenos Aires).

[8] If a high w_{p} is due to higher quality cattle, then w_{s} should also be high. If, however, increases in the price of w_{p} are not accompanied by increases in w_{s}, inefficiencies in cattle purchases can be suspected.

5. Conclusions and implications

The study of firm efficiency has implications which transcend recommendations for management. In particular, detection of low efficiency in a sample of farms suggests that increased attention should be directed towards improving extension or private consulting services, while a high and uniform efficiency among all farms indicates that opportunities for adopting new technologies are probably exhausted. Also, linking efficiency with characteristics such as size, concentration of ownership and type of management can contribute to better understanding of long-term trends in firm size, tenure and related aspects.

The results of this paper have several implications. First, there is no evidence to support the contention that farms managed by outside managers operate at lower levels of technical or cost efficiency than farms with one owner-manager. This finding is contrary to the position that asserts that household governance has important advantages for several types of business enterprises, among these farms (see Pollak, 1985). Households provide an environment in which incentives, monitoring, altruism and loyalty can be developed more fully than in organizations where workers and managers do not have a direct stake in production outcomes (see also Schmitt, 1991). However, for the sample of farms analyzed here, these advantages do not result in higher output or lower costs, although they do result in lower prices paid for inputs. Why some dimensions of efficiency are affected by organizational form while other are not is an issue that deserves further attention: one hypothesis to be tested is that efficiency gaps between organizational forms will depend on the type of compensation offered to management, as well as on the costs that management must shoulder in order to move from an inefficient to an efficient production situation. The results of this study suggest that either (a) management compensation is more contingent on production than on marketing outcomes or (b) managerial effort in achieving an adequate level of TE or CE is lower than that necessary to achieve an adequate level of FPE.

Second, farms of type III, although managed by an equity-holder, show lower technical efficiency levels than both types II and IV. In fact, professional management may be superior to management provided by a family member in multi-owner farms. Pollak's (1985, p. 587) insight that household governance can prevent major irregularities but not minor infractions and slack performance is especially relevant here. The practical implication of this finding is that multi-owner farms present challenges for efficient management, particularly when the management input is provided by equity-holders and not by professional managers who can be disciplined at a lower psychological cost for the household. The problem that has to be analyzed here is that of *horizontal agency* (between principals), and not *pure vertical agency* (between agents and principals) as is usual in most studies (some aspects of horizontal agency problems applied to subsistence agriculture are discussed in Goetz, 1993).

Third, the finding that separation of ownership and management does not result in technical or cost inefficiencies implies that flows of outside equity into agriculture are not limited by the fact that venture capitalists have to rely on outside management. These movements of capital in response to differentials in marginal rates of return contribute to long-term equilibrium between the agricultural and the non-agricultural sectors of the economy. Corporate farms can thus play a useful role in agricultural development. Similarly, absentee ownership, which has been much criticized in the development literature (and particularly in papers dealing with Latin America) need not necessarily be detrimental to efficiency.

The fourth conclusion relates to the importance of farm-management associations for agricultural development. Gallacher argued that farms belonging to farm-management associations did not show better performance than nonmembers. Findings reported here suggest some performance differences between participating and non-participating farms. It is possible that the magnitude of these differences is contingent on the nature of the management input: one hypothesis is that owner-managers obtain less advantage from belonging to a farm-management association than do owners of farms on which management is provided by an outsider. That is, farm management associations function primarily as mechanisms for monitoring performance of agents, but do not per se result in the design and subsequent adoption of improved production practices. This is a relevant topic for further research. Further research on efficiency impacts of organizational forms should also emphasize *dynamics*. In particular it should be worthwhile to test the hypothesis that alternative management systems show different agility in adapting to changing factor/output price ratios. Indeed, the litmus test of survival may involve not static measures of efficiency (as analyzed here) but how well an organization is able to adapt to changing circumstances. Analysis of dynamic efficiency, however, requires not only data on inputs and outputs, but on investments and on changes of resource stocks over time.

6. Appendix

A total of 231 observations was analyzed. These correspond to three production areas of the Province of Buenos Aires (Argentina): the central corn belt (Z1), the cattle-fattening area (Z2), and the mixed farming area (Z3). Data were gathered by a farm-records consulting firm as part of an ongoing program of business analysis. The principal characteristics of the four groups of farms analyzed were as listed in Table A.

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Table A
Characteristics for the four groups of farms

	Farm type					
	Management/Ownership				Management association	
	I	II	III	IV	B_0	B_1
Area livestock (ha)	1070	1270	1940	1730	960	1640
No. of cattle (350 kg units)	1170	1580	2020	1970	980	1800
Investment US$1000)[a]	1400	1700	2570	2350	1800	3200
No. of farms	15	5	17	9	6	40
No. of observations	71	25	89	44	32	199

[a] Approximate figures using December 1992 prices and exchange rate.
Above figures refer to the livestock enterprise, not the whole farm.

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