Debt Financing and Efficiency in Agricultural Firms

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ABSTRACT In this work the effects of large- and short-term debts on efficiency are tested on a set of agricultural firms. Accounting data of crop, livestock, mixed and service firms are used. First, the efficiencies of the farms are obtained by using nonparametric methods (input-oriented DEA). Then, in a second stage, censored regressions are run with different kinds of explicative variables, including financial ratios. The results show a significative and positive relationship between short-term indebtedness and efficiency, which would be agree with some theories positing that firms with higher short-run obligations make additional efforts to satisfy their payments, and this leads to an improvement of efficiency.

KEYWORDS Debt financing; Efficiency; Agricultural sector; Nonparametric methods.

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1 Introduction

An interesting and frequent issue of economic research is the study of economic growth, and related problems such as productivity, efficiency and profitability. Their importance arise from the fact that deepening in the factors that boost them contributes to their improvement in the long run. In the last years, the Spanish economy has experienced a continuous and lengthy growth, which has not been accompanied by a rise in productivity. This explains the growing interest in analysing the causes of that deterioration of productivity (Cuadrado and Maroto, 2006, Pérez *et al.*, 2006, Segura, 2006). This work focus on one of these causes, the access to debt financing, in the agricultural sector, which is one with the lowest productivity.

Although different opinions can be found on the linkages between financial development and economic growth, it seems that theories and empirics indicating positive relationships prevail. Specifically, areas with more dynamic bank and stock market environments enjoy accelerated growths, and industries and firms with a large dependence on debt financing grow faster in countries that have developed powerful bank systems (Levine, 1997, 2005). The financial market, its institutions and instruments provide several functions (mobilize savings, allocate resources, exert corporate control, facilitate risk management and ease trading) that improve saving and investment decisions and, in turn, economic growth.

Nonetheless, at a microeconomic level there are issues left to be resolved, since neither all kinds of financing have the same effects, nor all activities have the same access to the financial system, nor the institutions are similar in each country. And this information can be useful for public and private agents. On the one hand, recommendations on the regulation of the financial market can be obtained. On the other, disaggregated studies can shed light on internal financial politics of the firms, which could be ameliorated if the effects of different sources are known. Furthermore, in agricultural firms, with usually long production cycles, there is a special interest in knowing the consequences of short-run financing.

The aim of this work is double. First, to study the efficiency of the agricultural sector, comparing different subsectors and analysing their temporal evolution. Second, to provide evidence on the relationships between the level of efficiency and the financing structure of the firms. In order to do this, balance sheets obtained from mercantile registers have been used. The methodology is a procedure in two stages, which combine the calculus of nonparametric efficiencies with tobit regressions. The results show a significant and positive link between short-run debts and efficiency. The remain of this work is organised as follows. Section 2 summarises theoretic and empirical background, sections 3 and 4 show, respectively, the methodology and data used, and finally, sections 5 and 6 present the results and conclusions.

2 Background

2.1 Theoretical proposals

Several proposal have tried to explain the positive relationship between efficiency and indebtness. The free cash flow theory (Jensen, 1986) suggests that agency costs could arise from the conflict of interest between shareholders and managers, and these latter can have their own objectives rather than increasing firm value. Managers with excess of liquidity can be less efficient since they could invest in less profitable projects and carry out unnecessary expenses. So, debt raise the pressure of managers and incentive to be more efficient in order to pay their financial obligations.

Other authors (Stiglitz and Weiss, 1981) based their arguments on the existence of asymmetric information between lenders and borrowers: the difficulty of establishing different prices according to the quality of the borrowers leads to a problem of adverse selection, as it is the credit rationing. In this way, financial institutions will prefer lend money to more profitable and efficient firms. Furthermore, these latter will tend to use their debts as a signal of quality to obtain new credits, since less efficient firms seldom will be able to show this indicator (Ross, 1977).

Within agricultural economics, some theories point out that banks evaluate firms using measures of efficiency and financial ratios, so lenders will prefer to finance more efficient farms (Ellinger *et al.*, 1992) or asset-generating or self-liquidating investments (Baker, 1968, Barry *et al.*, 1981) as they imply lower credit risks.

Negative effects of debts on efficiency have also been explained within agency theory (Jensen and Meckling, 1976), taking into account the conflicts of interests between shareholders and debtholders. Monitoring activities of banks to obtain information about loan repayment generate costs that are passed to borrowers. On the other hand, the obligation of these latter to present indicators that persuade lenders that their credit risks are acceptable also increase their costs. The efficiency of firms can be negatively influenced by these rises. Furthermore, banks will prefer to finance less risky project as they assure the loan repayment, meanwhile firms will tend to choice risker investments with larger expectation of profits.

Other points of view (Morrison-Paul *et al.*, 2000) indicate that under reforms and transition economies, firms with less debts could better adjust their production process and, in turn, may be more efficient.

In spite of the lack of unanimity of these proposal, an argument that reconcile, at least partly, these theories is to consider that a positive relationship between debts and efficiency is not rejected, both as a consequence of the pressure of debts on managers or due to a better access of the more efficient firms to the capital market; however, certain adverse circumstances could turn negative this relationship, such as economic instability, industries in crisis or immature financial systems with costly lender-borrower operations.

2.2 Short review of empirical works

Next the more frequent methodologies used in the empirical literature to test the previous theories are summarized and the main results of recent studies are also shown, with special reference to the agrarian ones. Both parametric and nonparametric approaches are rather usual in applications.

Some parametric works specify augmented production functions that are estimated using the generalized method of moments (GMM). In this way Nickell *et al.* (1993) relies on the Cobb-Douglas function, where the dependent variable is value-added and the set of regressors includes, the lagged dependent variable (to capture adjustment costs), employment, capital and furthermore other factors influencing productivity: a cyclical factor based on hours worked, the degree of unionisation within each firm, the debt ratio and a measure of large adverse shocks. They use accounts of U.K. companies over the period 1972-1986, and the results reveal that firms with higher debt ratios are associated with higher levels and growth rates of productivity (similar empirical studies are Hernando and Vallés, 1994, Schiantarelli and Sembenelli, 1997, Nickell and Nicolitsas, 1999). In regard to agricultural activities, Bezlepina and Oude Lansink (2003), using information on more then 24.000 Russian farms over the period 1996-2000, conclude that subsidies and short-run debts are significantly and positively linked with productivity.

Other empirical studies use a stochastic parametric function, being the most frequent the proposal of (Battese and Coelli, 1995) that include explicative variables to model the error term and it is estimated in one stage by using maximum likelihood techniques. Within agricultural economics, Morrison-Paul *et al.* (2000) employ a translog distance function representing multiple output (wood and several kinds of meat) and multiple input (land, labour, livestock, physical capital, materials and purchased services) to study the efficiency of an unbalanced panel of 32 farms in New Zealand over the period 1969-1991. As determinants of technical inefficiency are incorporated a debt/equity ratio, a regulatory variable and a time trend. The results point out that inefficiency and debt/equity levels are associated in periods of regulatory reforms (another applications to agriculture with the same methodology are Sotnikov, 1998, Iraizoz and Atance, 2004).

There are also two-stage procedures with the parametric approach. For example, Weill (2003) first obtain efficiency scores by estimating a cost stochastic frontier and then these scores are regressed on a set of variables including a ratio of total liabilities to total assets. He uses data data of manufacturing companies from seven European countries. The results indicate that the previous financial ratio is significantly positive for five countries (Belgium, France, Germany, Norway and Spain), however it is positive but not significant for Portugal, and significantly negative for Italy. He concludes that institutional factors influence the relationship between leverage and performance. Similarly, Hailu *et al.* (2005) employ a cost stochastic function estimated by random coefficients techniques in the first stage and a tobit regression in the second to study the efficiency of 54 fruit and vegetable co-operative in Canada over the period 1984-2001. They found that financial leverage has a negative impact on cost efficiency.

Finally, the last group of applications use nonparametric methods to calculate efficiency of firms, and then these values are regressed on various explicative variables. The most frequent is to use tobit regression in this second stage. In this line, Chavas and Aliber (1993) use information on 545 Wisconsin farms (two output and seven inputs in 1987) and run different nonparametric models to obtain technical, allocative, scale and scope efficiency scores. The tobit regression indicate that intermediate and long-run debt-to-asset ratios present positive and significant effects on efficiency. The study of Nasr *et al.* (1998) is based on a sample of 154 Illinois farms and the results suggest a positive relationship between short-run and the efficiency measures. Bezlepina *et al.* (2004) also found a positive effect on managerial performance using a panel of 144 dairy farms in the Moscow region over the period 1996-2000.

The divergences found in these empirical applications can be due to the different variables used (factors of production or financial ratios) or to the distinct methodologies employed, as well as the dissimilar conditions of access to credit as mentioned by (Weill, 2003).

3 Methodology

Two stage are implemented. Firstly, the efficiency of each firm is estimated using non-parapetric methods. Secondly, the previous values are explained using a set of explicative variables through appropriate regression techniques.

In the first stage, the efficiency of each firm is obtained as the distance to the production frontier given by a set of firms with homogeneous technology. For each firm n and for each year t a data envelopment analysis (DEA) program is formulated. Its solution by linear programming gives the efficiency score of firm n with respect to the set. The input-oriented model DEA can be expressed as (Charnes *et al.*, 1978):

$$\begin{array}{ll} e_{n,t}^{crs} = min_{\theta,\lambda} & \theta \\ sujeto\ a & \theta x_{nt} - X_t\lambda \geq 0 \\ & -y_{nt} + Y_t\lambda \geq 0 \\ & \lambda \geq 0 \end{array} \tag{1}$$

where x_{nt} is a vector $J \times 1$ of the input quantities used by firm n in year t, $X_t = [x_{1t}, \ldots, x_{Nt}]$ is a matrix $J \times N$ containing the factors of production used by every firms in year t, y_{nt} $(I \times 1)$, $Y_t = [y_{1t}, \ldots, y_{Nt}]$ $(I \times N)$ are outputs obtained in year t, λ is a vector $N \times 1$ of variables giving the maximum radial contraction of x_{nt} restricted to the set of feasible inputs and θ is a value between 0 and 1 that provides the efficiency score of firm n. The linear programming of the model (1) calculates an efficiency index considering an assumption of constant returns to scale. If a convexity constraint is introduced,

$$e\lambda = 1 \tag{2}$$

where e is a vector of ones of size $1 \times N$, it is obtained the efficiency under a less restrictive premise of variable returns to scale, $e_{n,t}^{vrs}$ (Banker *et al.*, 1984). The scale efficiency can be also determined by the quotient between foregoing measures :

$$e_{n,t}^{es} = \frac{e_{n,t}^{crs}}{e_{n,t}^{vrs}} \tag{3}$$

In the second stage, ordinary least squares are inconsistent as the values of the dependent variable (efficiency scores) lie in the interval $(0, 1]$. A censored regression or tobit model can be used to get consistent estimation. The model is defiend in terms of a index function:

$$e_{n,t} = \begin{cases} 1 & \text{si} \quad X_i\beta + \epsilon_i \geq 1 \\ X_i\beta + \epsilon_i & \text{si} \quad 0 < X_i\beta + \epsilon_i < 1 \end{cases} \tag{4}$$

being $e_{n,t}$ the efficiency measure and X_i the explicative variable. The estimation is carried out by minimising a loglikelihood function with a part corresponding to not censored observations and other for the values equal to one.

4 Data

The information used in this work was taken from provincial mercantile registers. Companies with code 01 CNAE-93, including crop, livestock, related service activities, from INE (National Statistics Institute of Spain) were selected over the period 1995-2002. Some firms presenting certain anomalies were eliminated, such as excessive annual increases in the level of employment or fixed assets. The final sample is formed by 460 firms with data of 8 consecutive years, and it can be divide in four groups: crop production (code 011), livestock (012), mixed crop and livestock activity (013) and services to agriculture (014). Within the two first group can be identified more homogeneous subgroups (4 digit codes according to CNAE-93 classification) as it is shown in Table 1. The bulk of firms of the sample are joint-stock (anonymous) societies (218) or limited societies (215), being very low the number of co-operatives (27).

In the first stage, the output is defined as the sales from continuing operations (Y) deflated by the consumer price index. Labour, capital and materials are the three inputs considered for analysis. Labour (L) is measured by the number of employees, capital (K) by the book value of fixed assets less accumulated amortization deflated by an index of durable industrial goods, and materials (M) by material purchases also converted into constant values using the consumer price index. In the second stage, the main regressors are the long-run debt-to-asset ($\frac{LR}{A}$) and short-run debt-to-asset ($\frac{SR}{A}$) ratios. Mean values and coefficients of variation of these variables are shown in Table 1.

The largest farms are livestock, specially pork and poultry, with both sales and materials higher than other groups. The value-added is also greater in these two groups (the mean is 1410.8 –10^3€– in poultry and 1016.7 in pork) than in bovine (314.58) or ovine (202.56). In crop production, the value-added is larger in vegetable (716.84) and fruit (595.48) and smaller in cereals (409.65) and general crop production (610.9).

More differences are found looking at partial productivities. So, in crop productions the value-added per worker varies from 18.015 $\frac{€}{year}$ in fruit to 26.816 in cereals, whereas in livestock productions these values are doubled, from 36.620 $\frac{€}{year}$ in ovine to 64.404 in pork. On the other hand, if value-added per capital is considered it can be seen that less capital intensive firms are mixed crop and livestock ones, and in the opposite side are livestock (except ovine) and vegetable and services firms.

The mean level of debts represent almost fifty per cent of total asset, being the major part short-run liabilities 37, 31%. The average of the long-run debt-to-asset is 12, 44%,

Table 1: Mean values of the main variables (average annual coefficient of variation in brackets).

Group code	Firms number	Y $10^3€$	L n°	K $10^3€$	M $10^3€$	Financial ratios $\frac{LR}{A}$	$\frac{SR}{A}$
General†	61	1280.85	25.95	1433.06	669.95	0.11	0.34
011		(1.72)	(1.57)	(1.83)	(2.30)	(1.44)	(0.92)
Cereals	80	780.62	15.28	1419.70	370.97	0.09	0.31
0111		(1.06)	(0.99)	(1.12)	(1.33)	(1.65)	(0.92)
Vegetable	40	1287.66	28.76	796.33	570.82	0.16	0.47
0112		(1.12)	(1.22)	(1.54)	(1.35)	(1.27)	(0.51)
Fruit	30	967.46	33.05	1863.94	371.97	0.15	0.35
0113		(1.39)	(1.49)	(1.70)	(1.95)	(1.33)	(0.97)
Bovine	24	1225.56	7.59	996.82	910.98	0.16	0.34
0121		(1.37)	(1.38)	(1.77)	(1.45)	(1.25)	(0.76)
Ovine	4	2636.14	5.53	272.77	2433.58	0.02	0.32
0122		(1.55)	(0.93)	(0.66)	(1.59)	(2.16)	(0.86)
Pork	49	4942.03	15.79	1296.92	3925.37	0.14	0.44
0123		(1.65)	(1.22)	(1.84)	(1.75)	(1.15)	(0.51)
Poultry	36	5839.42	31.90	1686.61	4428.60	0.12	0.46
0124		(1.30)	(1.21)	(1.74)	(1.39)	(1.26)	(0.55)
Mixed‡	75	1106.14	20.46	2131.74	664.58	0.12	0.27
013		(1.90)	(1.69)	(1.77)	(2.74)	(1.68)	(1.00)
Services	61	1223.14	16.48	496.44	741.64	0.14	0.47
014		(1.19)	(1.45)	(1.62)	(1.57)	(1.42)	(0.63)

Mean values of Y, K y M at constant prices of 1995
† General crop production
‡ Mixed crop and livestock productions

and apart from ovine the remaining groups present values between 9 y el 16%. The short-run debt-to-asset ratio shows larger differences, with the ratio in some groups being higher than 40% (vegetable, pork, poultry and services).

5 Results

5.1 First stage

The constant returns to scale model 1 has been resolved for each year and for each group of farms, and the annual mean values of efficiency, in percentages, are presented in Table 2. Due to the scarce number within ovine and bovine categories they are treated as a single group. The proportion of efficient firms ($e^{crs}_{n,t} = 1$) is $19,32\%$. The highest mean efficiency is in pork farms (88.29%), followed by poultry (85.40%), bovine y ovine (84.19%), and also vegetable (79.92%) and fruit (76.57%). Both pork and poultry farms, in addition to a higher efficiency than other groups, they have a lower dispersion around their means,

Table 2: Efficiency (constant returns to scale): annual mean values (%) and standard error

Group	1995	1996	1997	1998	1999	2000	2001	2002	media	σ
General	68.02	72.13	67.47	59.81	57.93	64.03	71.06	65.14	65.70	24.78
Cereals	58.55	69.63	67.97	62.13	57.45	55.14	58.12	69.11	62.26	26.69
Vegetable	74.96	79.42	79.41	79.24	83.86	80.88	80.80	80.76	79.92	18.11
Fruit	75.97	88.05	74.08	72.31	69.93	75.49	80.45	76.30	76.57	24.01
Bov. & Ovine	86.17	85.61	84.56	86.17	86.49	83.39	78.16	83.00	84.19	21.14
Pork	92.10	91.17	89.42	87.19	88.92	88.00	81.47	88.04	88.29	9.13
Poultry	81.49	85.28	87.92	87.66	82.00	89.34	83.79	85.70	85.40	12.07
Mixed	62.47	71.48	65.86	67.55	59.86	62.01	62.95	67.73	64.99	26.47
Services	69.23	66.21	63.18	74.53	70.19	66.34	69.61	67.56	68.36	23.10

differently from bovine and ovine kind that with similar mean efficiency has a higher stantard error. The remaining farms, cereals, mixed, general crops and services, reach lower mean values of efficiency and larger variability. The results for 2002, for example, show that the general crop production farms, the least efficient, could have reduced, on average, their inputs until almost a 35% without modifying their output level, unlike the pork ones where the reduction would be only 12%.

The results of the constant return to scale model (program 1 adding the restriction 2) are shown in Table 3. The proportion of efficient firms ($e_{n,t}^{vrs} = 1$) is now $37,39\%$. The pure technical efficiency present a similar beheaviour to the constant returns one, that is, higher values for livestock and intensive crop production. The annual mean values of scale efficiency (expression 3, Table 4) indicate the existence of larger scale problems in services, mixed, cereals, general crop and fruit farms. The firms with less problems seem to be pork, poultry and vegetable ones.

With respect to the temporal evolution of annual mean efficiencies (constant returns to scale, Cuadro 2), it is appreciated that maximum values appear at the beginning of the period, meanwhile minimum values are common between 1998 and 2001. But different patterns can be identified (Figure 1). In general crops, cereals, fruit and mixed farms the efficiency increases from 1995 to 1996, decreases up to 1999 or 2000, and then comes back to go up. In bovine and ovine, and also in pork ones, there is a fall of mean efficiency from 1995 to 2001, and only in the last year an important increase occurs. Vegetable, on the other hand, experiences a rise from 1995 to 1999, and lowers lightly in the subsequent years.

The relationship between efficiency and size has been analysed through grouping the sample by the number of employees. The mean values of each quartile are rather similar: the 25 percent of smallest firms a have pure mean efficiency of $81,94\%$, the middle ones $82,32\%$ and $82,05\%$, and the 25 percent of largest firms $81,87\%$. Nonparametric tests (Kruskal-Wallis, Wilcoxon) have also been performed both in the whole sample and in each of the nine groups. In all cases the null hypothesis of no significant difference among mean values of the quartiles is not rejected.

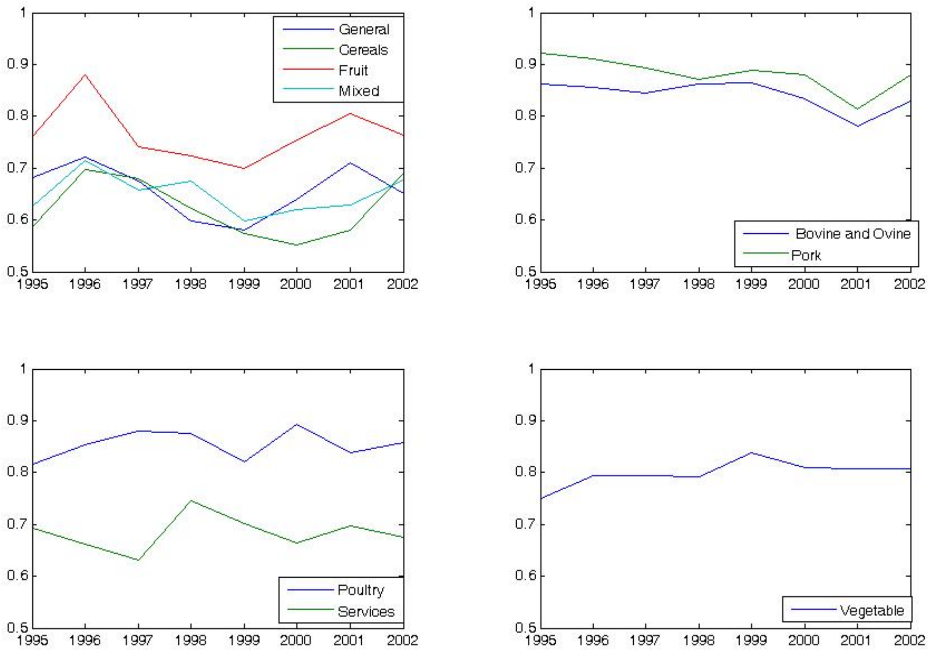
Table 3: Efficiency (variable returns to scale): annual mean values(%)

Group	1995	1996	1997	1998	1999	2000	2001	2002	media
General	78.40	82.48	79.71	73.21	71.08	72.95	80.11	78.78	77.09
Cereals	75.95	77.95	75.57	71.14	66.88	69.81	72.48	77.64	73.43
Vegetable	80.04	84.40	84.93	84.01	87.41	86.97	87.53	89.07	85.54
Fruit	94.17	94.66	91.05	88.12	87.94	84.88	91.46	87.33	89.95
Bov. & Ovine	96.24	94.26	94.45	95.51	93.37	91.14	90.45	92.27	93.46
Pork	94.61	93.65	91.82	90.30	92.32	91.85	88.89	91.95	91.92
Poultry	88.94	91.27	92.12	90.93	88.82	93.13	88.99	91.23	90.68
Mixed	71.85	79.48	75.91	79.06	74.85	74.97	74.91	78.93	76.25
Services	81.95	80.04	78.93	86.02	80.81	80.35	81.74	79.35	81.15

Table 4: Scale Efficiency: annual mean values

Group	1995	1996	1997	1998	1999	2000	2001	2002	media
General	84.48	87.13	84.47	83.08	81.18	86.69	88.44	83.24	84.84
Cereals	78.01	89.25	89.15	86.25	84.68	79.31	79.86	88.62	84.39
Vegetable	92.66	94.02	93.45	94.46	95.87	92.55	92.38	90.93	93.29
Fruit	81.43	92.85	82.55	82.59	79.80	89.09	88.29	86.59	85.40
Bov. & Ovine	89.37	90.71	89.86	89.98	92.65	91.02	85.93	88.77	89.79
Pork	97.31	97.38	97.45	96.68	96.46	95.83	91.72	95.77	96.07
Poultry	91.84	93.80	95.63	96.51	92.67	96.04	93.87	93.87	94.28
Mixed	86.04	89.88	85.80	85.04	78.30	80.68	84.13	85.17	84.38
Services	85.00	83.21	80.05	86.24	86.50	82.25	85.28	84.91	84.18

Figure 1: Temporal evolution of annual mean values of efficiency (constant returns to scale), 1995-2002



5.2 Second stage

In addition to long-run-to-asset and short-run-to-asset financial ratios, other explicative variables have been considered. The life variable expresses the years running the company and was calculated as the constitution year minus 2002. Several dummies have been introduced to include the type of society (joint-stock, limited or co-operative), the geographic area (four big regions, North, Centre, East and South), year (1995-2002) and the kind of activity (the mentioned 9 groups). The dummy variables corresponding to co-operative society, North region and South were eliminated to avoid singular matrix. The Table 5 presents the results of the second stage obtained by tobit regression of the efficiency measures (constant and variable returns to scales) on the explicative variable.

The short-run debts are significant and positive in both regressions. The coefficient of the ratio $\frac{SR}{A}$ is 0.203 with constant returns and 0.157 with variable returns. This result supports the hypothesis that the increase of financial obligations raises the efficiency of the firms (Jensen, 1986).

The relationship between long-run debts and efficiency seems not to exist, since the coefficients of the $\frac{LR}{A}$ variable are not significant neither for constant nor for variable returns efficiencies. When a total debt-to-asset ratio ($\frac{D}{A}$) is included as regressor, instead of two ratios, it is always significantly positive, which could mean that financial institutions would prefer lend more funds to more efficient firms (Stiglitz and Weiss, 1981).

The effect of life variable on efficiency is not significant either. Regarding to the type of society, the coefficient of joint-stock variable is significantly positive in both regressions, which indicates they are lightly more efficient (the value is 0.034 for constant returns and 0.038 variable returns) than co-operatives. However, there is no evidence that limited societies are more efficient than co-operatives, as their coefficient are not significant.

The remaining explicative variables show that the geographic area, the time and the activity have a statistical significant effect on efficiency. The region with the most efficient firms is North (excluded of the analysis), followed by East, Centre and South. The coefficients of the temporal dummies diminish from 1996 to 1998 and increase within the 1999-2002 period. By activity, the highest values are those of livestock and fruit and vegetable farms.

6 Conclusions

Half of the resources used by the farms of the sample are debt financing, being the bulk short-run debts (37,3%). The more intensive in factors of production are the firms, the highest are the current debt-to-asset ratio. A detailed analysis, first obtaining efficiency scores by nonparametric methods, and then regressing these values on a set of explicative variables, confirms a significantly positive relationship between short-run debts and efficiency. These results support the free cash flow (Jensen, 1986) and credit rationing theories (Stiglitz and Weiss, 1981). In other words, those farms with more short-run debts do their best in an attempt to pay their financial obligations and improve, in this way, their efficiencies. On the other hand, these firms have more possibilities of access to credit as they present less risk.

Long-run debts have a lower weight in the financial structure, so on average they represent a bit more than 12 percent of total assets. There is no empirical evidence on their effects on efficiency.

The influence of the size of the firm on efficiency is also rejected, from a statistical point of view. Likewise, the effect of the life of the firms are not clear.

The highest values of mean efficiency are obtained by the farms more intensive in input use, such as pork, poultry, bovine and ovine, vegetable and fruit farms. General crop production and mixed livestock and crop production present the lowest values of mean efficiency and the highest dispersion.

Table 5: Second stage: tobit regressions

	Returns to scale							
	constant				variable			
Variable	e^{crs}		e^{crs}		e^{vrs}		e^{vrs}	
	coef.	ratio t	coef.	ratio t	coef.	ratio t	coef.	ratio t
$\frac{LR}{A}$	-0.011	-0.479			-0.018	-0.749		
$\frac{SR}{A}$	0.203	12.827			0.157	9.550		
$\frac{D}{A}$			0.140	10.162			0.104	7.289
Life	-0.000	-1.156	-0.000	-1.003	-0.000	-0.199	-0.000	-0.034
Joint-Stock	0.034	1.829	0.035	1.843	0.038	1.953	0.038	1.942
Limited	0.015	0.795	0.023	1.220	0.009	0.487	0.016	0.819
Centre	-0.098	-5.610	-0.101	-5.754	-0.102	-5.443	-0.106	-5.585
East	-0.047	-2.528	-0.044	-2.357	-0.045	-2.294	-0.044	-2.229
South	-0.132	-7.200	-0.133	-7.150	-0.140	-7.099	-0.141	-7.088
1995	0.672	23.260	0.672	23.061	0.832	26.828	0.833	26.557
1996	0.728	25.280	0.728	25.078	0.862	27.883	0.865	27.616
1997	0.694	24.152	0.694	23.964	0.835	27.184	0.837	26.918
1998	0.690	24.033	0.690	23.844	0.834	27.072	0.836	26.819
1999	0.657	22.923	0.656	22.716	0.804	26.187	0.806	25.919
2000	0.664	23.142	0.662	22.889	0.816	26.520	0.816	26.196
2001	0.676	23.588	0.673	23.315	0.826	26.914	0.826	26.583
2002	0.702	24.406	0.699	24.127	0.851	27.549	0.851	27.204
Cereals	-0.029	-1.910	-0.026	-1.670	-0.037	-2.359	-0.034	-2.172
Vegetable	0.105	5.691	0.105	5.628	0.065	3.442	0.065	3.401
Fruit	0.125	6.231	0.120	5.964	0.180	8.537	0.175	8.223
Bov. & Ovine	0.180	8.614	0.176	8.368	0.212	9.537	0.211	9.356
Pork	0.189	10.895	0.193	11.025	0.117	6.562	0.120	6.674
Poultry	0.172	8.905	0.180	9.232	0.128	6.398	0.134	6.634
Mixed	0.008	0.496	0.005	0.346	0.000	0.003	-0.001	-0.091
Services	-0.009	-0.546	-0.004	-0.227	0.015	0.909	0.020	1.150
LogLikelihood	-588.281		-619.486		-915.108		-934.739	

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