Martin, Carmen Lopez; Hernandez, Pedro Pablo Perez; Berjillos, Araceli Rios

Conference Paper

Olive Tree Farming in Jaen: Situation With the New Cap and Comparison With the Province Income Per Capita

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

Provided in Cooperation with:
European Regional Science Association (ERSA)

Suggested Citation: Martin, Carmen Lopez; Hernandez, Pedro Pablo Perez; Berjillos, Araceli Rios (2006) : Olive Tree Farming in Jaen: Situation With the New Cap and Comparison With the Province Income Per Capita, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:
https://hdl.handle.net/10419/118461

OLIVE TREE FARMING IN JAEN: SITUATION WITH THE NEW CAP AND COMPARISON WITH THE PROVINCE INCOME PER CAPITA.

Pedro Pablo Pérez Hernández
e-mail: ppperez@etea.com
Mª. Carmen López Martín
e-mail: mclopez@etea.com
Araceli de los Ríos Berjillos
e-mail: arios@etea.com
Facultad de Cc. Ec. y Empresariales-ETEA
Universidad de Córdoba
c/ Escritor Castilla Aguayo, 4
14004 – Córdoba - SPAIN

Key words: olive tree farming, 2003 CAP Reform, Jaén province, subsidies, average per capita income.

Abstract

Jaén (province belonging to European Union) represents more than 15% of the Spanish production of olive oil, around 7% of European Union olive oil and more than 5% of the world production. Olive oil represents more than 90% of the income in Jaen agricultural sector and agricultural sector contributed with 15% of GDP province in 2003.
The aims of this paper is to show the evolution of the main socioeconomic variables of these farms during the nineties in one province belonging to the most significant region in the world and compare during the nineties the income per capita in this province with the income in the olive oil.
The variables analysed in each plantation are: productivity or cultivation yield on Hectare; labour work; cultivation expenses without including labour work; Agriculture Common Policy subventions; standard gross margin (according to directions of the European Union Agriculture General Board) and net margin. On the other hand, the main macroeconomics variables used are: Gross Internal Product, Population, Labour work and Land Productivity.
The information farms reflected in this paper is based upon four researchs and previous research carried out by the same authors. The secondary data has been got from Institutions and Public Statistics from Andalusian Regional Government.
The original researchs were funded by the Department of Agriculture of the Andalusian Regional Government -Consejería de Agricultura y Pesca de la Junta de Andalucía- and La General (one of the savings bank in Spain). It has consisted in four surveys during the years 1991, 1994, 1999 and 2000. The first step in the methodology has been to design the sample and questionaires, after that, field camp was implemented and data processing, creating for that purpose an information system pattern (simulator-programme). Results files, ordered according to user's likes, can be incorporated to other systems or be analysed with conventional statistics software (SPSS for instance). Main results are shown in charts and tables.
After getting results we project the predictable Common Organisation of the Market (CMO) reform on olive tree farming. The recent reform of olive oil will reduce the subventions and the income of the farmer. And we also show the impact of that reduction on farm margins and the consecuences in the income per capita province.

OLIVE TREE FARMING IN JAEN: SITUATION WITH THE NEW CAP AND COMPARISON WITH THE PROVINCE INCOME PER CAPITA.

1. INTRODUCTION

Jaén (province belonging to European Union) represents more than 15% of the Spanish production of olive oil, around 7% of European Union olive oil and more than 5% of the world production. Olive oil represents more than 90% of the income in Jaen agricultural sector and agricultural sector contributes with 15% of GDP province in 2003.

CAP reform has contributed to modify farmers' behaviour in Andalusia and, specially, farmers in Jaen along the nineties and the first years of the new century. However, olive tree farming was the less affected type of farming by the 1992 reform. Even the same CMO reform kept the system of delivering aids considering the crop as it was conceived in the origin of CMO. It introduced important limits to get subsidies for produced oil. Intermediate reform has sustantially modified the farms status quo. On the contrary, CAP intermediate reform has sustantially modified the farming status quo. Farming aid decopling and the establishment of a right for a single payment according to the average received subsidies in the reference crop years will provoke important changes in the structure of many olive oil farms.

2. OBJETIVES

The aims seek in this research are the following:

Our first aim is to know the evolution of the olive oil farms in the province of Jaén in the nineties through data obtained by four surveys.

Secondly, we will introduce in the data analysis the impact of the new CAP reform done in 2003. Then, we will measure the effects that the new single payment system could have on the margin of agrarian farms.

And finally, we will compare these farms income with the average per capita income in the province of Jaén.

With these objectives we would like to show the differences between different types of farms, the different evolution they have had during those years and take under consideration the fact that many olive tree farms bring owners in an extra income but they are never the main income for the families.

3. MATERIALS AND METHODS

3.1. Material

This paper is based on:

- ✓ Four researchs and previous research carried out by the same authors (J. Loring et al, 1993, C.R. García et al. 1997, L. Fernández et al., 2003 and Perez, P.P. et at. 2003)
- ✓ The design of an information system.

The first three researchs were funded by the Department of Agriculture of the Andalusian Regional Government -Consejería de Agricultura y Pesca de la Junta de Andalucía-, consisting in three big surveys during the years 1991, 1994 and 1999 (the latest one has been realized with the Instituto de Estadística de Andalucía). In the first one, 1,527 farms were surveyed, 1,530 in the second one and 2,018 in the third and last one. With these surveys we get data of all types of farming and livestock.

The fourth one was funded by La General (one of the savings bank in Spain). The survey was made only in Jaen province[1] and 392 farms were surveyed corresponding to 2000 crop year.

The questionaires were designed to reflect a clear image of the financial and economic situation of each farm, considering the results account. With the information obtained we are able to describe quite accurate and valid images of the socioeconomic structure of the olive trees plantations in Andalusia in the nineties.

The first of these projects set the bases for the following ones, defining terms as important as the elemental structure of sampling design in the different polls and the basic survey. In the second project a precursor information system, AGRO, was designed and developed, where normalized tables for data base were designed and developed and socioeconomic principles of the agrarian farms surveyed were established. At the same time, the strengths and debilities of the sample design were outlined as well as of the survey form, of the quality criteria of the answers and of the computer system. Starting with this information it has been created AGROS, a new information system, a computer tool that can determine the compared evolution of the socioeconomic structure of real agrarian farms surveyed at different moments since 1991. This comaparative analysis can be carried out considering activities, yield and with the province as the geographical base. It is also useful in the design and table settings

[1] Pérez, P.P. (2003), I Anuario Agrario de la provincia de Jaén.

or computer files, in the appropriate format. These files are used to develop the input-output tables of the Andalusian Agrarian Sector.

The main purpose of the operative system AGROS is to get any type of analysis results in a format compatible with most current computer PC systems. AGROS file can be loaded by statistic and calculation programs, graphic systems, word processors, other data bases, and so on.

Design and further development of the AGROS system were based on an entity –relation model that allows progressive data incorporation and, at the same time, forecast projection. This is the most solid and universal representation for the design of relational data bases.

In relation to the CAP and olive oil here are the most important aspects of CMO of this product throughout the nineties until the present.

Olive oil regulation in the European Union started in 1966. In that CMO there were two different market organizations: one related to olive oil and another one related to oil seeds. Each organization had a different basic instrument of organization, guarantee price plus production subsidy for olive oil and deficiency payment to the farmer for oil seeds.

Most of the agrarian products regulated in any of the common market organizations defined by CAP, have suffered some kind of modification. However, for olive farming the first great reform comes in June 1998 with a deep modification in its CMO. That change modified to a great degree the different types of prices, subsidies and public intervention till the 1997/1998 crop year and it has been applied till the 2004/2005 crop year.

The second main CAP reform has been introduced in September 2003. With that reform subsidies to production disappear in almost all types of cultivation. It is evident that this new CAP reform will result in (as the 1992 reform did), a deep change in the European agriculture policy. The first one, in 1992, introduced the concept of ruralism in the agriculture sector and this one puts an end to the productivist policy in this sector financed by community funds. As a matter of fact, the new CAP born in the intermediate reform in 2003 means producing according to market demand and not producing to get more public funds.

In order to understand olive farming situation, and that of the CMO and get a better view of the changes that olive farmers will have to contend with from 2005/2006 crop year in which the single payment is introduced, we will show the mechanisms used throughout the nineties, including the 1998 reform. After that, we will describe the new situation for olive farming within the intermediate CAP reform in 2003. The mechanisms were the following:

Price regimen

According to the 136/66/EC Regulation three types of prices have been considered related to olive oil: indicative price to production, intervention price and representative market price. Each of these prices had a special objective defined as follows in the base regulation:

The indicative price to production, unique prevailing price after 1998 reform, was fixed in an equitative level to productors, having into account the necessity of maintaining the volume of necessary production in the EC. This price tried to keep farmers' income.

Representative market price was fixed in a level allowing olive oil production a normal exit to the market, considering competitive products and its evolution perspectives during the crop year. It was the olive oil market price wished. It was established in a way that between olive oil price in European Community consumer market and sustitutives vegetals oil prices there was a determined prices relation.

Intervention price was the price paid by intervention organism. It was equivalent to the indicative production price minus production aid and minus an amount of money considering market variations and olive oil transport costs from production areas to consuming areas. In Spain this intervention price was aproximating to the EC price in tenths (from 1986/1987 crop year to 1995/96 crop year). Both intervention and representative prices stopped being in force during 1998/1999 crop year.

Subsidies Mechanism

Production subsidy was the only one given by European Agricultural Guidance and Guarantee Fund (EAGGF) to olive oil farmers since 1997/1998 reform till the implementation of the CAP intermedia reform in 2005/2006 crop year. However, till 1997/98 crop year there was a consuming aid to bottling enterprises.

In the article number five of 136/66/EC regulation it was established a subsidy to olive oil production. This subsidy was destined to contribute to establish an equitative income for farmers. The subsidy was given to olive oil farmers according to the amount of olive oil produced.

Maximun Guaranteed Quantity versus Nacional Guaranteed Quantity

In 1987/88 crop year the European Commision invented a mechanism to limitate olive oil production and to shorten production peaks of a crop year with respect to the previous one (due to the olive tree biennial phenomena in this farming). This mechanism was name stabilizing an it was fixed in 1,350,000 tons for the whole EC. That quantity was in force till 1997/1998 crop year. However, with the CMO reform in 1998 for the concession of production subsidy the maximun

guaranteed quantity became national for each productor Member State. So, olive oil aids for countries were limited to: Spain 760,027 tons, Italy 543,164 tons, Greece 419,529 tons, Portugal 51,244 tons and France 3,297 tons every single year. The application of this stabilizer reduced subsidies in the following way: a) If the real quantity produced is less than nacional guaranteed quantity, the amount of subsidy was determined by the Council for the present crop year. The 80% of the difference betweeen the nacional guaranteed quantity and the produced quantity will be transferred to the following crop year to be taking into account in order to calculate the aplicable subsidy; b) If the real quantity produced, taking into account the previous crop year, is above the nacional guaranteed quantity, the amount of subsidy is modulated by a coefficient obtained by the result of dividing national guaranteed quantity between the real quantity produced in that crop year.

After the intermedia CAP reform this system is no more implemented.

Intervention and storage

Intervention system and public olive oil storage disappeared with the 1998 reform and it also disappeared the possibility of productors selling olive oil to community interventionist organisms. However, market behaviour has made possible the existence of an elevated level of autorregulation on behalf of cooperatives and oil mills.

On the other hand, with 1998 reform there was the possibility to help private storage whenever the price of the olive oil was situated under 95% of the intervention price in 1997/1998 crop year (approximately 229.5 euros/100 kilogrammes. The Council could even constitute, after a Commision proposal a level of olive oil regulatory existences whenever irregularities in crops were detected[2].

2003 Intermediate Reform

In 2003, European Commission introduced a new Common Agriculture Policy. This reform means the avoidance of production subsidies and the introduction of a new subsidies system of single payment (income support) and cuts the link between support and production (decoupling). The majority of common market organisations will become subject to this new system in 2005 or 2006 (with the exception of the new Member States). Direct aids may continue until 2012, subject to certain conditions (cross-compliance), but they will be gradually reduced. Certain crops are eligible for additional support to compensate for the loss of income resulting from modulation and the transition to the single farm payment.

---

[2] This situation has been modified by CAP intermediate reform. See Council Regulation (EC) No 2153/2005 of 23 December 2005.

Although with some reduction and whenever requisites are fulfilled[3], olive oil farmers will receive an equivalent aid to the one they used to receive in the reference period from 1999 to 2003 (four commercialization crop years).

On the other hand, for olive oil farmings with a lower extension to 0.3 hectare, payments will be totally dissociated from production after 2006.

Agriculture Ministry of Spain has proposed a decoupling of 93.61%[4]. The main objetive of this subsidy is to keep olive tree as a social and enviromental interest farming. The rest of percentage till 100% of subsidy is destined by Agriculture Ministry to national endowment in order to give an extra payment per olive tree farming, for farmer associations, quality improvement, and so on. To simplify, there will not be payments per olive tree farmings samaller than 50 euros per subsidy application.

On the other hand, to prevent market unbalances, the access to single farm payment will be limited to olive tree farming existing before first May 1998[5] and new farming foreseen in approved programmes by the European Commision.

3.2. Methods

Methodology used to reach the aims of this research is shown in the following schema (J.M. Martin, 1998):

Phase 1. Survey process

To get agrarian sector information we choose the survey method, because we believe it is the most effective although it is not easy to get information from this sector. The method used has been the sampling survey (L. Festinger & L. Katz, 1998), where a representative part of the total population (universe) was interviewed. As everybody knows, it is only possible to make this type of survey when people selected to this purpose want to give the information requested. We believe that this method is completely valid and possible in the agrarian sector even when people surveyed tries to repress or distort information. Our experience corroborate that. The sampling design was made, as it has already said with 1,527 farms surveys in the first studio, 1,530 in the second, 2,018 in the third and 392 in the last one. Within the sampling techniques we opted for one of the most wellknown: the proportional sampling of elements (L. Kish, 1990).

[3] Council Regulation (EC) No 1782/2003 of 29 September 2003. For Spain the definitive amount of funds were passed in a Cabinet Meeting of April 2004.
[4] See REAL DECRETO 1617/2005, of 30 December 2005
[5] Council Regulation (EC) No 1638/98

Phase 2. Data processing.

AGROS system allows, first of all the recruitment of data belonging to the first polls and the recording of the last surveys to the poll. From that moment there is a general data base fed with elaborated information from data obtained in surveys taken during the crop years 1990/91, 1993/94, 1999/2000 and 2000/2001. Its structure is normalized in a conventional way according to international rules to optimize the software output.

Phase 3. AGROS system implementation.

To design the system it was selected the method known as: pattern development. This way to operate warrants quick results that user can handle in a very short period of time. To make operative this design strategy it is needed a tool which allows Rapid Application Development –RAD-, in this case *Microsoft FoxPro 6.2*© was selected. It is a tool always considered strong, reliable and qualified to manage great quantity of data (much more than data bases of AGROS system) with great efficiency in the consumptiom of computer resources.

AGROS system implementation help us:

- To generate a new data base containing socioeconomic situation of Andalusian farms in the four crop years investigated and evolutive analysis of them.
- To estimate future scenaries with new situations of socioeconomic structure of these farms if changes that could affect them were produced (changes in the Common Agrarian Policy, for example in the olive oil common market organisation; changes in the consumption of different inputs; changes in prices and so on). Once changes paramenters are estimated, the system takes them and simulates the new socioeconomic situation of the farms according to the changes that have taken place.
- To establish *theoretical comparison horizons*. The system makes possible to generate a data base that can design, develop and analyse theoretical agrarian farms, or based in the knowledge, with a structure according to the specific wishes of the user of AGROS system. It is conditioned by its aim. It has been created to make technical-theoretical horizons –no real farms whose operations are described by the user- that allow the comparison with a real structures obtained from the surveys analysis.

Phase 4. Evolutions and simulation results.

This system creates files with results that allow the socioeconomic analysis of olive tree farmings during the four years studied (that corresponds to the first part of the results of this paper). Results files, were analysed with conventional statistics software (SPSS). It also makes possible to measure the effects of the new common market organisation (CMO) of olive oil over

socioeconomic structure of analysed farms. These aspects will be analized in the second part of this work: the simulation process.

Simulation is a method very usefull in agriculture sector to measure the impact of a new agriculture policy or new agriculture changes in the foreign market. Some works were made in the CMO reform olive oil from 1998 in olive oil farming (P.P. Pérez et al., 1997 and F. Fuentes, 1999).

For the second part it has been considered first of all the latest CMO reform to the olive oil. It is proposed that the existing production-linked payments in the olive oil sector be converted into direct income support, through the creation of new entitlements to the single farm payment for farmers (also named decoupling of the aids), in addition to those arising from the June 2003 CAP reform. It means that 93.60% of the production-linked payments in the olive oil sector (for the reference period, 1999 to 2003 crop years), should be converted into entitlements to the single farm payment for farms larger than 0.3 ha. Member States would retain the 6.70% of the payments in the olive oil sector, for the reference period, as national envelopes, for the granting to producers of an additional olive grove payment.. This payment is not linked to production but it is intended for keeping the olive trees, preserving the soil and the environment while taking into consideration the local traditions and culture. The purpose of this additional payment would be to ensure the permanence of olive trees in marginal areas or low-output olive groves by contributing significantly to the maintenance cost of olive groves in those areas. Member States will identify those zones according to objective sustainable development criteria, within a common EU framework. This should include landscape preservation, environmental, social and cultural concerns.

We have considered that farmers will perceive the average aids in the reference period (from 1999 to 2003 crop years). The average aid in those four years for Spain was 0.9785 euros/kilo and in every crop year has been the follow: 1.304 euros/kilo in 1999-2000, 0.939 euros/kilo in 2000-2001, 0.637 euros/kilo in 2001-2002 and 1.0343 euros/kilo in 2002-2003. Spanish Goverment has situated single payment aid in 93.6% of the average, which means that from 2005-2006 until 2012-2013 the aid will be 0.916 euros/kilo.

4. RESULTS AND DISCUSSION

First results are presented in Tables 1, 2, 3 and 4 where it is shown the information of the main socio-economic variables in the farms and the four analysed years. Three types of land have been considered to study this farming taking into account production per hectare (F. Fuentes 1999): 1) Marginal olive farm (production per hectare less than 1,200 kg.); 2) Dry olive farm (production per hectare above 1,200 kg) and 3) Irrigate olive farm (production per hectare superior to 2,400 kg.). We have not labour work information in the crop year 1991 what makes it imposssible to compare this year with the other three crop year with respect to the variables of total expenses and gross margin.

Data show a high production increase (even considering the negative effect of the deep dry period during the year 1994, specially in irrigate olive farm). However, in 1999 and 2000 production increased significantly, in dry and irrigated lands and even in marginal olive farm. Possibly the reason for this increase along the nineties, belongs to the farmers' implementation of new investments (using the subsidies to fund them in the majority of the cases) in order to get more production per hectare and also more subsidies in the future. Most common investments are: renewal of the all trees or the scarcely productive ones for new ones (this happens about 1990 or even at the end of 80s) which are in full production in the two last analysed years, introduction of water in more lands and adoption of new technology in the olive tree farming. As a consequence of everything mentioned above we can observe that production in marginal, dry and irrigated lands goes from 624; 3,017 and 4,805 kg/Ha in 1991 to 824; 4,152 and 5,822 kg/Ha respectively in 2000.

It is also important to observe the great increase of subventions received in that decade. In 1986 Spain was added to European Community and it was fixed a transitory period of 10 years for olive oil, till 1996. That meant that each of those years Spanish farmers could get 10% of the subsidies any other European country received. This is the main reason of differences, appart from production. On the other side, in 1998 there was a reform of the CMO olive oil which puts a limit to the posibilities to get subventions for production of olive oil in Spain (fixed in a National Guaranteed Quantity (NGQ) of 760.027 tons, that is, 1.005 millions euros) as we already mentioned. In spite of that limitation spanish farmers kept on investment, so the national olive oil production moved from a average of 650.000 tons in the period 1990-95 to almost reach 1 million tons in the period 1998-2005. Along this period, agrarian surface dedicated to olive tree farming increased 17% whilst production increased 70%.

Table 1. Main social-economic variables in Jaén olive tree farming in 1991. (Euros. Reference year 2000=100)

	Marginal (7)		Dry land (127)		Irrigate land (15)	
	Average	Stand. Dev.	Average	Stand. Dev.	Average	Stand. Dev.
Farming Area (Ha)	18.79	17.67	25.56	25.48	76.35	94.51
Crop Yield (kg/Ha)	624.75	526.88	3,017.31	1,076.09	4,805.38	1,856.09
Labour work (working-days/Ha)	n. d.	n. d.	n. d.	n. d.	n. d.	n. d.
Total Expenditure (Euros/Ha)	72.41	22.38	217.18	131.72	188.67	114.65
Subsidies (Euros/Ha)	27.87	43.06	291.94	139.81	363.96	243.51
Total Revenue (Euros/Ha)	414.89	354.03	2,221.79	821.36	3,469.95	1,535.55
Direct Gross Margin (Euros/Ha)	329.81	367.76	2.012.30	768.57	3.296.83	1.540.49

Note: observations in every type of olive farm are in brackets.

Table 2. Main social-economic variables in Jaén olive tree farming in 1994. (Euros. Reference year 2000=100)

	Marginal (24)		Dry land (83)		Irrigate land (41)	
	Average	Stand. Dev.	Average	Stand. Dev.	Average	Stand. Dev.
Farming Area (Ha)	36.98	66.81	19.52	24.87	15.20	18.11
Crop Yield (kg/Ha)	785.62	306.70	2,591.99	1,086.07	3,908.92	1,165.77
Labour work (working-days/Ha)	9.47	5.21	16.52	8.08	20.98	10.45
Total Expenditure (Euros/Ha)	571.49	234.96	944.16	439.43	1,187.49	479.60
Subsidies (Euros/Ha)	227.77	160.46	606.88	345.01	851.23	459.58
Total Revenue (Euros/Ha)	757.73	352.38	2,361.41	1,114.87	3,357.07	1,134.36
Direct Gross Margin (Euros/Ha)	193.68	446.31	1,432.74	1,048.90	2,187.78	1,075.08

Note: observations in every type of olive farm are in brackets.

Table 3. Main social-economic variables in Jaén olive tree farming in 1999. (Euros. Reference year 2000=100)

	Marginal (5)		Dry land (47)		Irrigate land (39)	
	Average	Stand. Dev.	Average	Stand. Dev.	Average	Stand. Dev.
Farming Area (Ha)	67.30	48.82	13.18	13.03	45.46	53.97
Crop Yield (kg/Ha)	796.36	239.78	5,440.74	3,948.93	5,730.14	2,108.61
Labour work (working-days/Ha)	5.02	5.40	23.56	18.47	15.89	10.41
Total Expenditure (Euros/Ha)	687.23	294.52	1.301.04	869.23	954.13	613.10
Subsidies (Euros/Ha)	510.04	347.61	1.222.43	1.091.83	1.185.87	574.25
Total Revenue (Euros/Ha)	1,592.87	963.10	3,723.10	3,012.74	3,447.52	1,317.24
Direct Gross Margin (Euros/Ha)	856.93	776.08	2,436.89	2,643.85	2,474.36	1,280.41

Note: observations in every type of olive farm are in brackets.

Table 4. Main social-economic variables in Jaén olive tree farming in 2000

	Marginal (7)		Dry land (145)		Irrigate land (110)	
	Average	Stand. Dev.	Average	Stand. Dev.	Average	Stand. Dev.
Farming Area (Ha)	52.27	47.44	20.52	26.38	36.97	46.42
Crop Yield (kg/Ha)	824.00	216.05	4,152.37	2,323.97	5,822.36	2,033.03
Labour work (working-days/Ha)	4.64	4.50	15.70	15.28	14.27	9.71
Total Expenditure (Euros/Ha)	619.85	254.81	935.57	799.47	1,065.70	593.99
Subsidies (Euros/Ha)	403.56	314.55	832.94	703.18	1,174.70	590.20
Total Revenue (Euros/Ha)	1,209.44	936.42	2,476.01	1,951.32	3,290.09	1,299.31
Direct Gross Margin (Euros/Ha)	589.59	745.49	1,540.44	1,758.89	2,229.39	1,247.42

Note: observations in every type of olive farm are in brackets.

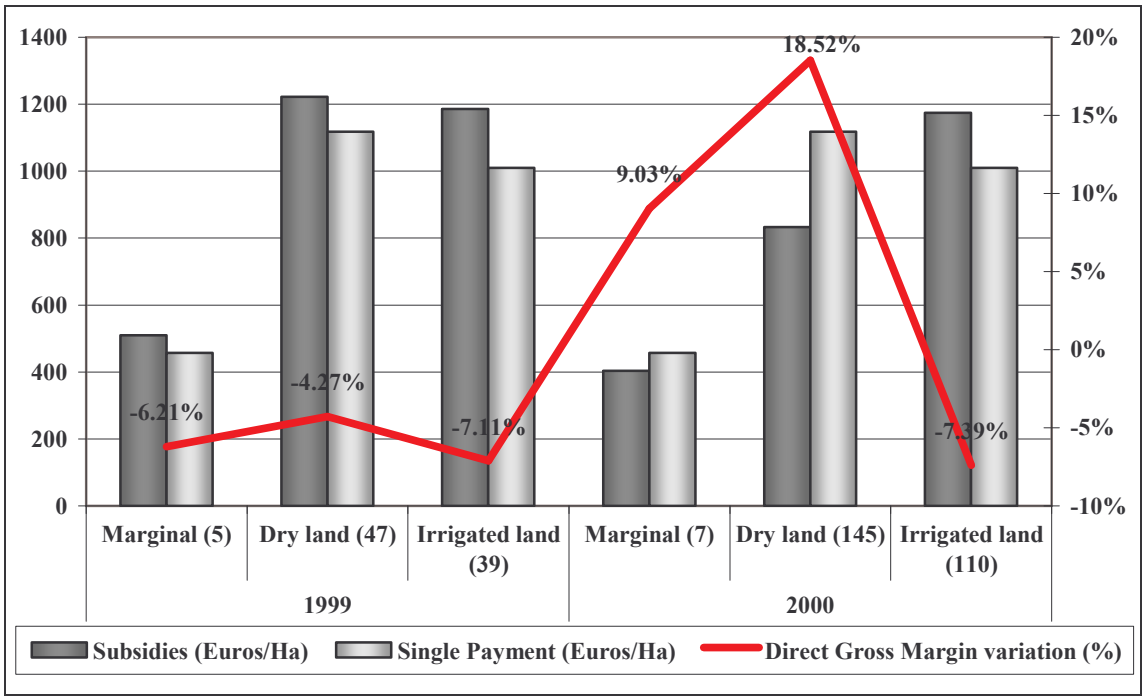
Another relevant aspect to be mentioned is labour work which is very abundant in this sector (D. Barranco et al. 2001) in spite of the slow but progressive substitution of labour work per capital. Observing number of working-days per kilograme produced, we find that there is small difference in this relation from 1994 to 2000. The working-days are in 1994 9.47, 16.52 and 20.98 for marginal, dry and irrigated lands and in 2000 are 4.64, 15.7 and 14.27 for marginal, dry and irrigated land respectively. These figures show that only marginal olive farm has increased the use of labour work while in the other two it has been reduced by the effect of crop increase and part of it by capital increment.

Finally, it is observable than direct gross margin has sensibly been decreased in years 1994, 1999 and 2000 versus 1991 as the effect of labour work (we lack of labour work data and labor work expenditure). However, total expenditure and revenue have been increased in these years and there is a tendency to continue like that. In fact, if we observe the years 1994 and 1999 the expenditure and revenue are higher than 1991, but in 2000 crop year two variables are reduced as a result of scarce rainfall the year before and feature olive tree biennial in two successive years. In the case of irrigated lands, subventions increase, but expenditures increase even more. That is the reason why the result for this farm type is inferior to the one obtained in 1994.

The second part of the results belongs to the simulation process. Once the modifications of the variables have been introduced within AGROS programme and considering data taken from crop years 1999 and 2000 (real data from the first two reference crop years taken from the recent CMO reform to the olive farming) the results got were presented in Figure 1. Simulation

results obtained within the CMO reform offer a substantial change with respect to margins obtained without reform.

Figure 1. Real Subsidies and simulation single payment in 1999 and 2000 crop year.



To make the simulation it has been considered the average of subsidies obtained in the two crop years belonging to the reference period (1999-2003). Data obtained have been introduced in the AGROS system to get subsidies in the original survey, single payment estimation and direct gross margin variation as shown in figure 1. As it can be observed the average subsidy and single payment aid for these two crop years does not affect in the same way the analysed farms. In 1999 there was a reduction in the direct gross margin in all types of land, which is normal as the subsidies were more elevated in that year than in the average of the two crop years. However, the margins of marginal land and dry land increase in 9% and 18.5% whilst the margin of irrigated land is reduced in a 7.4%.

The third part of our analysis corresponds with the comparison between the average income obtained per type of farm and average per capita income in the province of Jaén. The farms income comes from paid salaries and direct gross margin cultivation management.

It has only been chosen 1994 and 1999 crop years because both of them present disintegrated information about salaries and wages paid to workers, whilst in 1991 crop year there was not information about employment and salary costs and in 2000 there was not data

about disintegrated salaries. Comparison has been done taking information about dry land and irrigated land[6]. Results are shown on tables 5 to 8.

Table 5. Analysis of main social-economic variables in Jaén olive tree dry land in 1994 comparing the original survey with new data income per cápita. (Euros. Reference year 2000=100)

	Survey	One Income/capita	Doubled Income/capita	Tripled Income/capita	Quadrupled Income/capita
Cross-section Data	83	63	43	34	28
Farming Area (Ha)	19.52	24.68	33.49	38.13	43.3
Crop Yield (kg/Ha)	2,591.99	2,756.49	2,570.69	2,606.14	2,557.28
Labour work (working-days/Ha)	16.52	15.83	13.79	12.79	12.78
AWU[1]	1.09	1.35	1.77	1.94	2.19
Total Expenditure (Euros/Ha)	944.16	856.92	761.06	725.12	712.95
Subsidies (Euros/Ha)	606.88	626.89	596.07	624.2	596.86
Total Revenue (Euros/Ha)	2,361.41	2,418.10	2,270.77	2,357.80	2,297.26
Direct Gross Margin (Euros/Ha)	1,432.74	1,577.65	1,520.31	1,638.52	1,590.21
Average Income/farm (Euros)	32,683.91	41,831.61	56,114.05	65,643.81	73,501.36

Source: Income per cápita of Jaén province from Nacional Estatistic Institute (INE).

[1]Agrarian Work Unit: days of work per person dedicated to full-time during one year to the agrarian activity. It was established in 1,826 hour/year or 228 days/year.

In the first column in table 5 we can observe average values got in each year sampling and for each farm (this information is also shown in tables 2 and 3 for 1994 and 1999 crop years).The following columns show values corresponding to the main socieconomic variables of those farms giving an income equals or higher than once, twice, three times and four times average per capita income in the province of Jaén during 1994 and 1999.

In all tables it is possible to observe a progressive reduction of the number of farms that fulfill the criteria (which is logical in our opinion). However, when it is higher the income level it is necessary to increase the average size of farm to be able to fulfill the criteria and at the same time there is a better productivity per hectare in the farm. This generally comes with an increase of labour work per hectare and above all in the total labour work employed in the farm (AWU).

Respect to the economic variables, the subsidies/Ha increase in the same way that per capita income does (except for the dry land in 1994, Table 5, which was an extremely dry year

[6] The marginal farms are not significant in 1994 and 1999 crop years. In 1994 shown an income lower than Jaen province average per capita income, while in 1999 only four farms was significant.

and subsidies to 80%); expenditure per hectare is equally reduced when income increases (except for dry land in 1999, Table 7, inputs increase to reach more production and more subsidies); in the same way revenue per hectare has an increase (except for the dry land in 1999).

Table 6. Analysis of main social-economic variables in Jaén olive tree irrigated land in 1994 comparing the original survey with new data income per cápita. (Euros. Reference year 2000=100)

1994	Survey	One Income/capita	Doubled Income/capita	Tripled Income/capita	Quadrupled Income/capita
Cross-section Data	26	22	16	13	10
Farming Area (Ha)	15.20	17.64	22.66	26.42	30.35
Crop Yield (kg/Ha)	3,908.92	3,989.92	4,013.20	3,862.40	4,227.69
Labour work (working-days/Ha)	20.98	20.13	21.66	21.73	23.41
AWU	1.27	1.46	1.90	2.20	2.60
Total Expenditure (Euros/Ha)	1,187.49	1,108.19	1,108.21	1,093.06	1,170.29
Subsidies (Euros/Ha)	851.23	861.18	891.73	917.29	990.79
Total Revenue (Euros/Ha)	3,357.07	3,431.38	3,482.05	3,463.11	3,774.40
Direct Gross Margin (Euros/Ha)	2,187.78	2,344.69	2,403.41	2,385.32	2,612.97
Average Income/farm (Euros)	49,077.09	57,226.55	74,485.88	87,151.13	104,729.63

Source: Income per cápita of Jaén province from Nacional Estatistic Institute (INE).

Table 7. Analysis of main social-economic variables in Jaén olive tree dry land in 1999 comparing the original survey with new data income per cápita. (Euros. Reference year 2000=100)

	Survey	One Income/capita	Doubled Income/capita	Tripled Income/capita	Quadrupled Income/capita
Cross-section Data	47	35	22	15	7
Farming Area (Ha)	13.18	16.84	22.65	25.85	32.48
Crop Yield (kg/Ha)	5,440.74	5,641.92	5,612.14	6,392.88	7,003.97
Labour work (working-days/Ha)	23.56	19.92	19.83	19.54	22.50
AWU	1.17	1.47	2.00	2.34	3.36
Total Expenditure (Euros/Ha)	1,301.04	1,187.69	1,151.41	1,183.34	1,581.17
Subsidies (Euros/Ha)	1,222.43	1,152.69	1,023.56	1,163.88	1,378.23
Total Revenue (Euros/Ha)	3,723.10	3,560.42	3,317.33	3,860.53	4,283.77
Direct Gross Margin (Euros/Ha)	2,436.89	2,390.35	2,177.79	2,693.50	2,728.02
Average Income/farm (Euros)	30,728.06	39,187.58	54,024.15	67,475.16	103,818.58

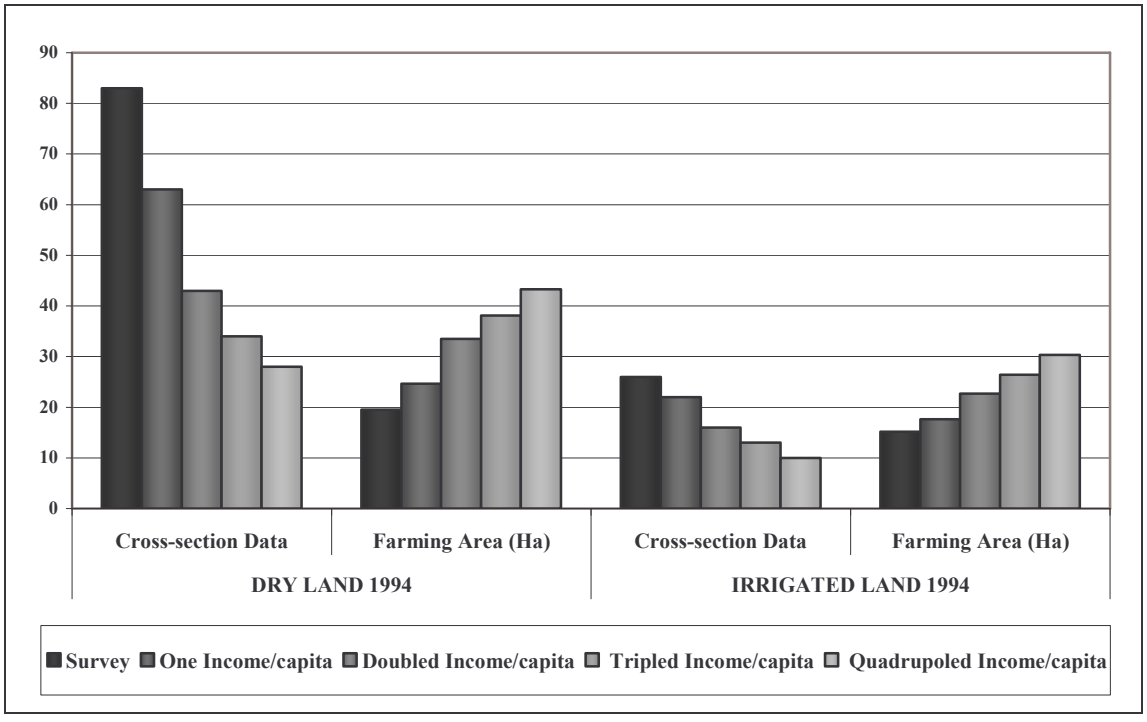
Source: Income per cápita of Jaén province from Nacional Estatistic Institute (INE).

Although there are clear similarities when we compare data from 1994 and 1999, there are also significant differences in the behaviour of farms depending on the type of farm and crop year analysed.

First of all, dry land observations are reduced between a 66 % and 85% in 1994 and 1999, if we consider original data in the sample and four times the income per capita, but in the case of irrigated land observations are reduced in 61.5% in 1994 and 28% in 1999 (Figure 2 and 3). The 24% and 25% of dry land olive tree farms surveyed did not reach even the per capita income in 1994 and 1999. These percentages notably increase when we consider the comparison between sample data and quadrupled average per capita income in Jaén.: 66% reduction in dry land olive tree farms in 1994 and 85% reduction in 1999.

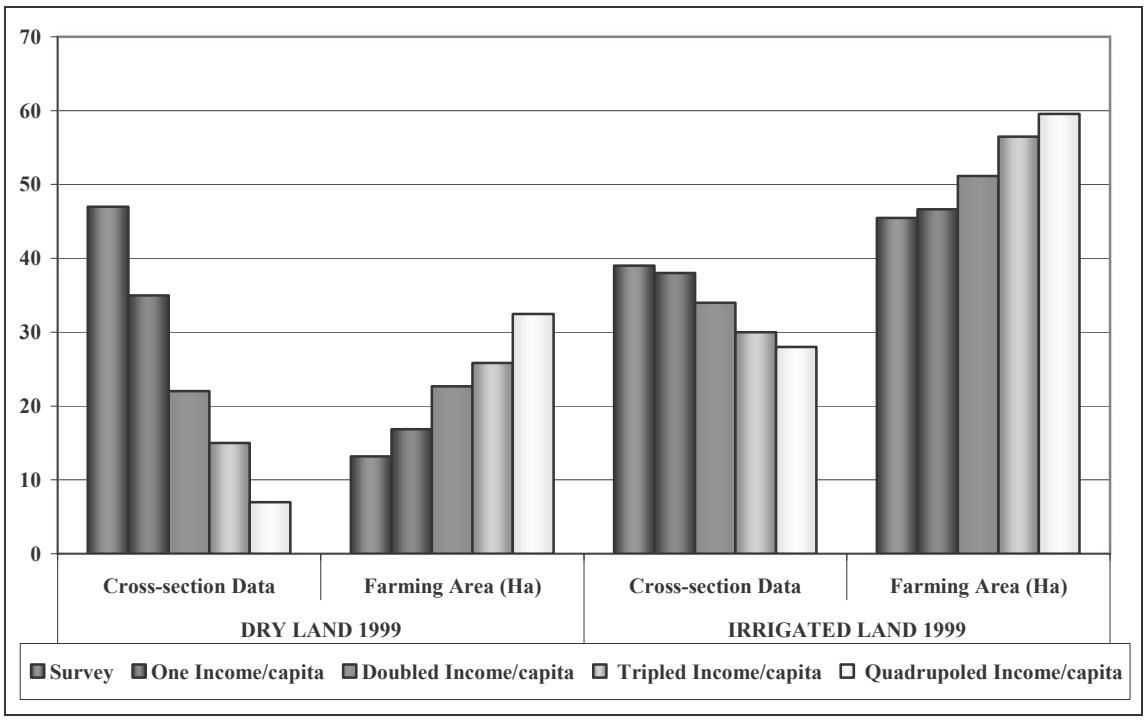
On the other hand, the average income for a four member family in Andalusia was 28,560 euros in 1994 and for a 3.36 member family it was 39,510 euros in 1999 (both in euros; reference year 2000=100)[7]. That means that two thirds of dry land olive tree farms cannot reach the average income for an average family.

Figure 2. Comparison survey cross-section data and farming area with income per capita in 1994.



[7] Data from Familiar Budgets Survey. National Statistic Institute (INE)

Figure 3. Comparison survey cross-section data and farming area with income per capita in 1999



The analysis of irrigated land olive tree farms is less drastic. The number of irrigated farms that can not reach the average per capita income in the province is reduced to a 15.38% in 1994 and 2.56% in 1999.

When comparing sample data with quadrupled of the average per capita income the reduction in the number of farms is 66.5% and 28.2% in 1994 and 1999 respectively. In 1994 the percentages are similar to the one obtained in dry land, but we have to take into account that 1994 was a very dry year and for that reason there was not enough water for irrigation. In 1999 crop year there is a great difference between dry land irrigated land.

Secondly, the average size of farms is bigger for dry land than for irrigated land in1994 (in the sample the average size for dry land was 19.54 Ha and for irrigated land was 15.2 Ha while in farms which had more than quadrupled average per capita income were 43.3 Ha in dry land and 30.35 in irrigated land, Figure 2). In 1999 the average size of farms is smaller in dry land than in irrigated land (in the sample the average size for dry land was 13.18 Ha and for irrigated land 45.56 Ha; farms with had more than four times average per capita income were 32.48 Ha in dry land and 59.56 Ha in irrigated land, Figure 3)

Table 8. Analysis of main social-economic variables in Jaén olive tree irrigated land in 1999 comparing the original survey with new data income per cápita. (Euros. Reference year 2000=100)

	Survey	One Income/capita	Doubled Income/capita	Tripled Income/capita	Quadrupled Income/capita
Cross-section Data	39	38	34	30	28
Farming Area (Ha)	45.46	46.63	51.14	56.49	59.56
Crop Yield (kg/Ha)	5,730.14	5,723.03	5,906.59	6,087.26	6,188.86
Labour work (working-days/Ha)	15.89	15.49	15.05	14.51	14.7
AWU	3.12	3.2	3.5	3.85	4.08
Total Expenditure (Euros/Ha)	954.13	941.38	905.33	880.92	898.79
Subsidies (Euros/Ha)	1,185.87	1,178.22	1,233.43	1,285.05	1,287.82
Total Revenue (Euros/Ha)	3,447.52	3,441.48	3,564.46	3,667.32	3,704.53
Direct Gross Margin (Euros/Ha)	2,474.36	2,480.58	2,637.30	2,778.72	2,797.51
Average Income/farm (Euros)	139,803.52	143,395.21	158,544.28	176,522.78	186,309.29

Source: Income per cápita of Jaén province from Nacional Estatistic Institute (INE).

In third place, irrigated land always need more labour work than dry land in both crop years. In 1999 the average size of irrigated land is bigger than dry land. This could justify the higher AWU of irrigated land but it is not normal that labour work per hectare is higher in dry land than in irrigated land in that crop year[8] (Figure 4).

In fourth place, it strikes us that in the year 1999 the average income per hectare was higher in dry land than irrigated land while in 1994 is on the contrary (as, perhaps, it should always be). However, in 1999 irrigated land had less expenditure than dry land which makes a higher direct gross margin in irrigated than in dry land.

In fifth place, in spite of using more labour work and having more expenditure than dry land, the irrigated land overcomes dry land in average income/farm. In 1994 with irrigated land with smaller size than dry land, the average income of the sample of irrigated land was over 49,000 euros, while in dry land was 32.500 euros. If we compare the same data in farms with quadrupled income per capita the difference is even higher in favour of irrigated land, even when they are half size of a dry land farm (73,500 euros for average income in dry land versus 104,700 euros in irrigated land).

Finally, we can say that olive oil farm is more profitable in 1999 than in1994 in both dry and irrigated land. In 1999 average income per farm in dry land is higher than in irrigated land,

[8] In irrigated land agricultural machinery to the haversting is more used than in dry land, which justify not only the number of labour work, but less total expenditure in 1999 in irrigated land.

although in this year dry land farming area is smaller than in 1994 and irrigated farming area in 1999 is clearly superior to the 1994 one.

Figure 4. Survey Agrarian Work Unit comparison with income per capita

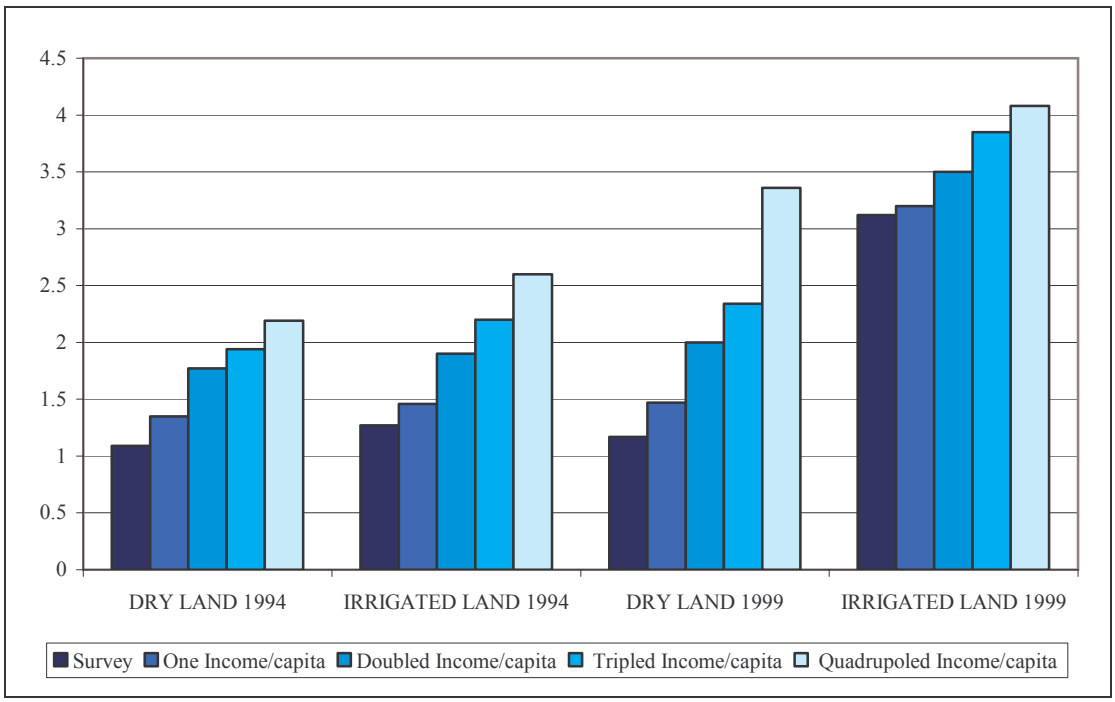


Figure 5. Survey economic variables comparison with income per capita in 1994

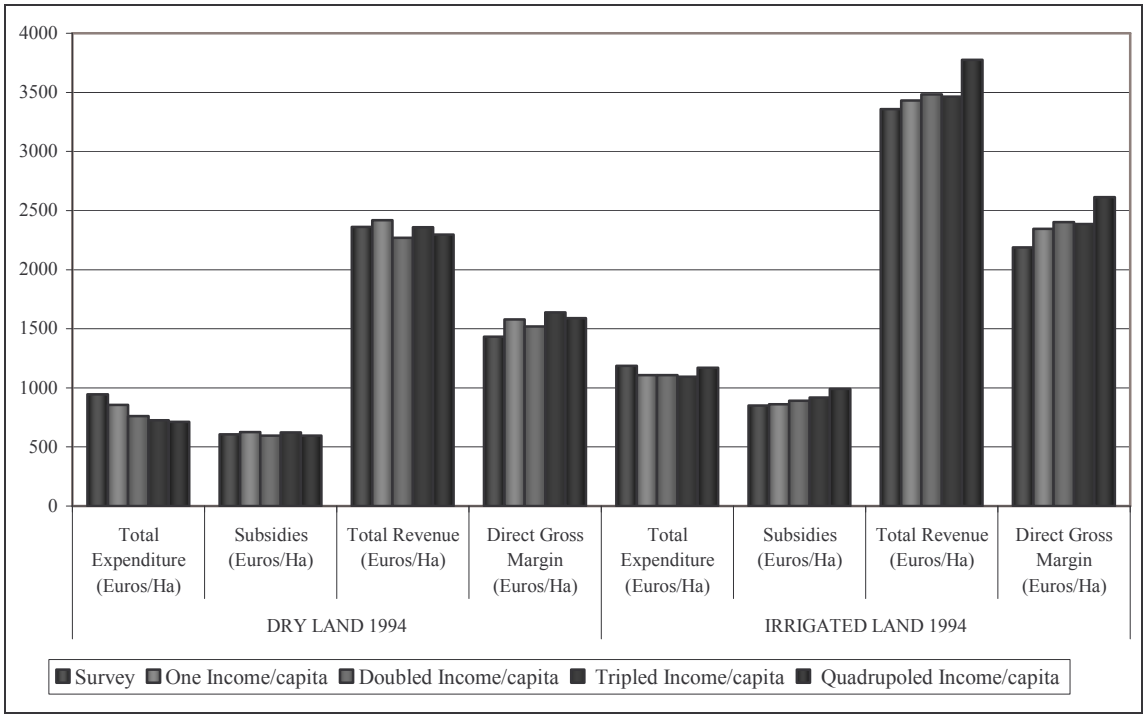
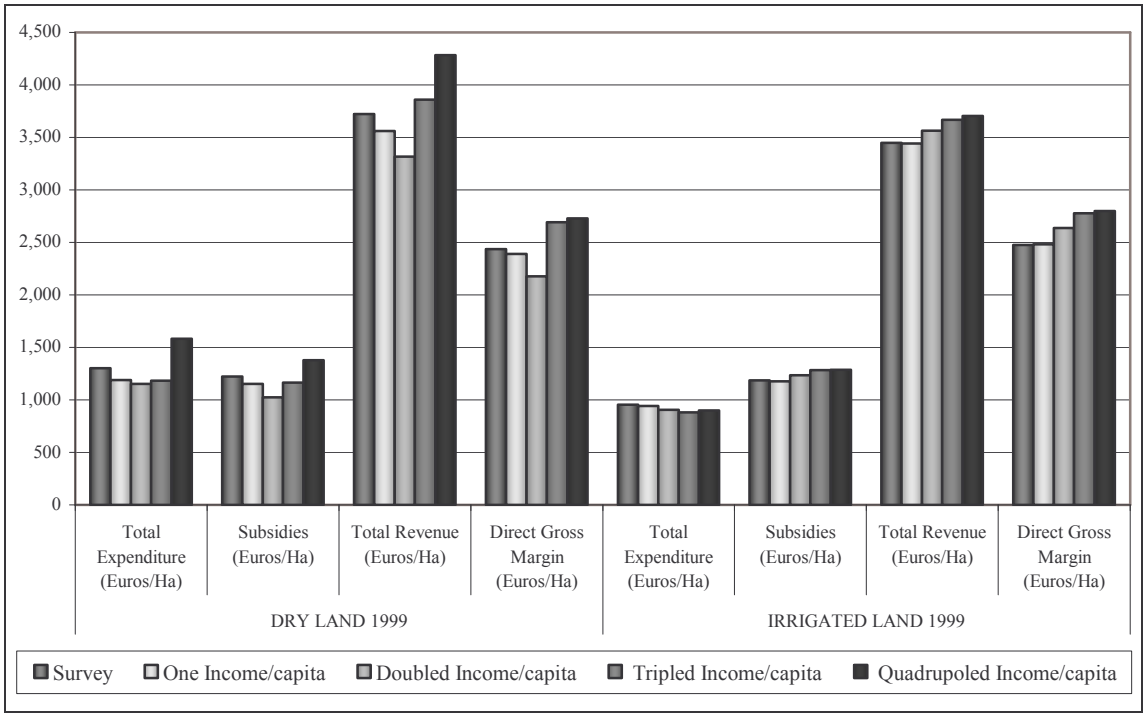


Figure 6. Survey economic variables comparison with income per capita in 1999



5. CONCLUSIONS

Spain, main olive oil productor in EU, was not allowed to integrate in the same conditions than the rest of productors states till 1996. But shortly, in 1998 a CMO for the fat materials reform limited considerably Spanish olive oil farmers the possibility to get aids. In spite of that, the sector, with new farmers' incorporation experimented a big modernization along that decade. In fact, more capital has been introduced in the farming to provide among other aspects a high number of irrigated farms to guarantee a fix production per crop year around three hundred thousand of olive oil tons.

It is evident that Common Agriculture Policy has had a decisive influence in the sector behaviour in Spain and the evolution of the socioeconomic variables in olive oil farms; economic agents have adapted to this changing policy and even some steps have been given on the production merchandising to deal with the market with successful guarantee.

Respect to the aids that will be given within the new intermediate CAP reform we consider that its effects will specially depend on the production level obtained in each crop year. So, if the crop year has a mean or low production, subsidies will be inferior to what it will be expected with the system before 2003 reform, but, if there is a high production, aids could be higher to the ones expected before the intermediate reform. This is so due to the fact that aids are established according to the mean of aids obtained in a reference period of four crop year.

The resulting quantity always will be superior when the crop is high and inferior if there is a low crop (which has happened in the present crop year in Spain).

We firmly believe that improvements made in productive structures in dry and irrigated lands during the last fifteen years should keep and increase if it is possible. These and other improvements will permit to deal with the future with confidence in spite of variations commented on aids that will be implemented in 2006.

On the other hand, the comparison of original samples taken in 1994 and 1999 with the average level of per capita income in Jaén province shows that most of the marginal farms and some irrigated land farms will not allow an average family to reach an average level of life. That is why we believe that most of olive oil farms are kept because they are a complement to family income and it is not its main economic activity. What is more, of the three types of olive farms considered in this paper (marginal, dry or irrigated land) we believe that marginal olive farms and dry land farms which are in the limit between marginal or productive dry land can disappear in the future as incomes are not enough to deal with expenditures derived from farming.

We also consider that aids should be kept for these farms in a quantity enough to avoid these farms from disappearing due in many cases to its geographical location in the limit to semidessert lands. These subsidies will permit not only to keep farms but also there will be a positive influence in the environment and area population. Farmers expect to receive subsidies, higher to the ones perceived so far, to keep these farms.

Finally, analysed data about productive dry land and irrigated land farms in Jaen province, make us to be optimist. We could state that they can provide income levels more than acceptables even when aids will disappear. Perhaps for this statement we should consider concrete circumstances per areas, but we believe that the effort made in merchandising of this excellent product for human feeding is already giving and it will continue giving the real dividens to farmers.Without any doubt changes in agriculture policy will affect the results in short term and even some farms will not be feasible from the economic point of view, but in general the sector can be optimistic if it continues producing not only for the national market but for the whole world market.

BIBLIOGRAPHY

Fernández. L. García. C.R.. Martín. J.M.. y Pérez, P.P..E*structura socioeconómica de las explotaciones agrarias de la Comunidad Autónoma de Andalucía.* Final Report. Consejería de Agricultura y Pesca de la Junta de Andalucía. Sevilla. 2003.

Festinger L. y Katz. L.. *Los métodos de investigación en las ciencias sociales.* Barcelona. Hurape Ed. 1998.

Fuentes García. F. J. Presente y Futuro de las Empresas Agrarias Andaluzas de Cereal y Olivar: un análisis empírico. University of Córdoba and Cajasur Ed.. Córdoba. 1999.

García, C.R., Romero. J.J. y Ramos. E. *Diseño y construcción de un sistema de información para el apoyo a la toma de decisiones en el ámbito agrario de la Comunidad Autónoma de Andalucía. ETEA*. Final Report. Consejería de Agricultura y Pesca de la Junta de Andalucía. Sevilla. 1997.

García, C.R.; Pérez Hernández, P.P. y Martín Lozano, J.M. *La economía del aceite de oliva*, chapter 20 in the Handbook directed by Barranco. D.; Fernández-Escobar. R. and Rallo. L. El cultivo del olivo. Junta de Andalucía and Mundi-Prensa Editions. Madrid. 2004.

Loring, J., Martín. J.M., Duarte. J. and Porras. A. *Estudio de márgenes brutos standard de las explotaciones agrarias de Andalucía. ETEA*. Final Report. Consejería de Agricultura y Pesca de la Junta de Andalucía. Sevilla. 1993.

Kish, L.. *Muestreo de encuestas*. Trillas Ed.. México. 1990.

Martín Lozano, J.M. El impacto de la política agraria común en las agriculturas andaluzas. ETEA Ed. Córdoba. 1998.

Ministerio de Agricultura Pesca y Alimentación. El sector del olivar. White Book of Agricultura and Rural Development in Spain. Secretaria General Técnica. Madrid. 2003.

Pérez Hernández, P.P. & Martin Lozano, J.M. I Anuario Agrario provincia de Jaén. Caja de Ahorros La General Ed. Granada 2003.

Pérez Hernández, P.P.; Cuadros Muñoz. J. R. El sector productor de aceite de oliva en Andalucía: evolución y perspectivas. Analistas Económicos de Andalucía. Ed. Unicaja, Málaga. 1997.

Pérez Hernaández, P.P. et al (2005) Las explotaciones olivareras de la provincia de granada: evolución de la cuenta de explotación en la década de los noventa. Communication VII Andalusian Regional Science Congress, Córdoba February 2005.