How direct payments and their reform have affected farm income inequality in Italy?

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Summary

Farm direct payments (DPs) have been the main instrument of the Common Agricultural Policy (CAP) to support farm income in the EU. After the decoupling of DPs from production levels, the distributional objectives are among the major justifications of DPs. This paper addresses their role in the distribution of farm income among farmers. The analysis accounts direct payments granted in the context of the market and income support policies and of rural development policies.

Using the Gini coefficient and its disaggregation, this study investigates the impact of both kinds of payments on farm income inequality among a large sample of farms in Italy. The analysis is developed at a national level but also considering the three main regions of Italy and three types of farming.

DPs are very concentrated but reduce farm income inequality. Therefore, their reduction should result in an increase of farm income concentration particularly in some of the considered types of farming. Results suggest that the CAP reform has decreased the role DPs have played in reducing farm income inequality. This is not just because of a change in their relative importance, but especially because of changes in the patterns of their distribution.

Keywords: Direct payments; Income concentration; Common Agricultural Policy; disaggregation of the Gini coefficient; CAP reform.

JEL Classification codes: D31; Q18; Q12.

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1. INTRODUCTION

The chronically low and highly variable incomes of farm households has been one of the main reasons for policies supporting farm income (Gardner, 1992). In Europe, the Common Agricultural Policy (CAP) has strongly supported farm income because, as stated in article 39 of the Treaty of the EU[1], one of its objectives is "to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture".

In the past, most of this support has been provided by means of price policies. However, since the CAP reform of 1992, most of the support has been provided by means of annual direct payments that were originally introduced to compensate for the negative impact of the reduction of price support. These kinds of payments are granted to farmers by means of the European Agricultural Guarantee Fund (EAGF) that finances market measures and direct payments (the so called "1st pillar" of the CAP) (DP1). In 2010, DP1s accounted for 39.7 billion Euros, corresponding to around 90% of the expenses of the EAGF, reaching around 7.8 million farmers (European Commission, 2011). Second kinds of payments are granted through rural development programs (RDP) (the so called, "2nd pillar" of the CAP) (DP2s). DP2s absorb a significantly smaller share of CAP budget than DP1s. This is because RDPs finance a large number of policy measures including those supporting investments in rural areas and because the overall RDP budget globally accounts for around 1/3 of that of the "1st pillar".

From 1992 to 2005 the amount of direct payments granted to each farmer in a given year was determined on the basis of the amount and composition of production activities performed in that year on the farm. Payments were product specific and proportional to land under cultivation or number of livestock. However, the 2003 CAP reform has drastically changed the nature of the DP1s, making most of them decoupled from current production patterns[2]. Decoupling has been motivated by the need to increase the market orientation of EU farmers and to reduce the economic distortions caused by the coupled payments on the farm product markets (OECD, 2011) and by other political reasons. Currently around 85% of direct payments granted in the EU can be considered decoupled (European Commission, 2011).

The shift to decoupled payments has made it evident that distributional objectives are among the major justifications of DP1. The role of DP2s is more complex, given that these are granted on the basis of environmental conditions (Agro-Environmental Payments) and on the location of farms in areas characterized by natural handicaps (Less Favored Area Payments). However, also in the case of DP2s, it seems interesting, from a political point of view, to consider the distributional consequences of such payments.

[1] Official Journal of the European Union, C 115 of the 09/05/2008. Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:115:0047:0199:en:PDF .
[2] These are actually based on entitlements granted to farmers according to the production patterns observed in a reference historical period.

This paper addresses the role of DP1s and DP2s in the distribution of farm income among farmers. Using the Gini coefficient and its disaggregation, this study investigates the impact of both kinds of direct payments on farm income inequality among a large sample of family farms in Italy. The analysis is developed at the national aggregate level but also considers the three main regions of Italy: Northern, Central and Southern Italy. Furthermore, an additional analysis was performed on three groups of farms that are among the most supported by DP1. These are: field crop, beef and olive farms.

The objectives of this paper are: (1) to determine the contribution of direct payments granted by the two main "pillars" of the CAP to farm income inequality; (2) to assess if the decoupling of DP1s introduced by the 2003 CAP reform has modified their role on affecting farm income inequality.

2. ROLE OF DIRECT PAYMENTS IN THE GENERATION OF FARM INCOME

Farm income is defined as income from the farming operation itself (i.e. market based income) and from direct payments granted by the two CAP "pillars" (DP1s and DP2s). The average share of DP1s in farm income in the EU was around 27% in the period 2006-2008 and this figure has not changed significantly in recent years, ranging between 26% and 30% according to market situation (European Commission, 2010a). The role of DP1s differ according to farm types: it reaches 50% in crop farms and grazing livestock farms. While the pattern is not the same in all farm types, often DP1s generate a lower than average level of farm income in the largest farms. DP1s are also very important to ensure farm profitability: while more than 90% of the considered farms cover their variable costs, only 20% of farms would be able to cover total costs without receiving DP1s (European Commission, 2010 a).

DP1s are very concentrated. In 2010 (EU-27) less than 2% of the beneficiaries of DP1s received 50,000 Euro per farm or more, but these farms received around 32% of the overall amount of DPs received by the whole EU farms (European Commission, 2011). This confirms the idea that large farms have been the main beneficiaries of the CAP support even if, according to Von Witzke and Noleppa (2007), the smaller farms should have been the *target* of the support.

In the farms of the whole Farm Accountancy Data Network (FADN) sample of Italy, DP1s account for around 30% of Farm Family Income. However, the relative importance of DPs varies among farms located in different regions and which belong to different production orientations. The role of DPs is lower in the northern region and is very high in the three considered types of farming where DPs always account for more than 1/3 of the farm income.

Following Mishra et al. (2009), income inequality has been preliminary assessed by ranking farms by income levels and dividing them into decile groups. The first decile includes the 10% of farms earning the least, the second decile the next 10%, and so on. Average farm incomes, along with medians and income shares, are then calculated for each group (Table 1). This allows a quick assessment of the extent of income disparity: the farms belonging to the top two deciles always earned more than 70% of the whole farm income. The bottom decile accounts for negative farm incomes. However, total farm income has increased in the considered period due to a strong increase of the market income component and this has also reduced the extent of negative incomes.

Table 1. Distribution of Farm Income and Direct Payments of the 1st pillar of the CAP by deciles of income classes, 2003-04 and 2006-07 (%).

	Farm Income		1st pillar direct payments	
	2003-2004	2006-2007	2003-2004	2006-2007
Decile groups				
1	-2,3	-1,2	4,2	3,1
2	0,5	0,5	3,2	2,1
3	1,2	1,2	4,0	2,9
4	2,0	2,1	4,7	3,2
5	3,1	3,2	5,6	4,2
6	4,6	4,6	6,4	5,0
7	6,8	6,8	8,1	6,2
8	10,3	10,7	11,8	10,2
9	17,7	17,9	14,4	17,3
10	56,1	54,0	37,7	45,8
Total	100,0	100,0	100,0	100,0

Source: own calculations on Italian FADN data

DPs are also concentrated. The farms of the two top deciles received more than 50% of the DP1s distributed in the whole sample. In particular, the largest farms (i.e. the top decile) have experienced a relevant increase of the share of the PD1s they received from around 38% to around 46%. However, the distribution of DP1s in the lowest deciles seems in line with that of the next 4 higher deciles.

3. LITERATURE REVIEW

A sizeable literature exists on income inequality in the farm sector. This is because, according to Mishra et al. (2009), farm income inequality has an impact on: (1) economic well-being, including farm family health; (2) farm technology adoption; (3) agricultural productivity; and (4) agricultural sector growth.

Literature has also investigated the role played by agricultural policies on income distribution. This topic is important given that, due to the high income dispersion and the heterogeneity between farms (Keeney, 2000), one of the objectives of agricultural policy concerns the distribution of farm income. This is true even if policy transfers reflect other goals such as environmental, sustainability and rural development goals.

A recent study conducted in Canada, United States and the European Union has come to the conclusion that, in these countries: "While support is unequally distributed, it slightly reduces the inequality in the distribution of farm income by farm size" (Moreddu, 2011: page 46).

This topic has been explored by several studies conducted in the US (Ahearn et al., 1985; Gardner, 1969; Mishra et al., 2009) and in the EU (Allanson, 2006 and 2008; Allanson and Rocchi, 2008; Keeney, 2000; Leon and Mahé, 1987; Schmid et al., 2006; Von Witzke, 1979 and 1984). While most of these analyses have found that government payments decrease income inequality (Ahearn et al., 1985; Allanson, 2006; Keeney, 2000; Mishra et al., 2002; Mishra et al., 2009; Moreddu, 2011), other studies have reached the opposite conclusion (Allanson, 2008; Allanson and Rocchi, 2008; Schmid et al., 2006).

Most of these analyses have been developed by calculating the Gini coefficient of income for samples of individual farm data. However, only a limited number of these analysis decomposed the Gini coefficients by income components (Keeney, 2000; Mishra et al., 2009). This approach allows the analysis of the contribution of each income source on income inequality. Because different measures of agricultural policy are implemented at the same time, it seems important to isolate the impact of different measures in order to assess their relative impact. For example, Keeney (2000) has found that in Ireland compensatory allowances for EU Less Favored Areas are more effective than other measures in reducing income disparities. Schmid et al. (2006) have found that in Austria compensatory allowances for Less Favored Areas have had a limited

role in reducing income inequality while PD1s and agro-environmental payments have even increased income inequality.

Furthermore, because agricultural policies change over time, it could be of interest to assess whether the occurred changes have reduced income inequality or not. Keeney (2000) compared farm income concentrations before and after the 1992 CAP reform in Irish farms, concluding that the newly introduced direct payments have reduced income inequality.

Analyses on income inequality have often been conducted on samples of individual farm data considering national aggregates (Keeney, 2000). However, while this is correct if farms are relatively homogeneous at this level of analysis, when this is not the case it seems better to subdivide the sample. Mishra et al. (2009) have grouped farm households into nine farming resource regions of the US to account for differences in the distribution of income among regions. Furthermore, when a large heterogeneity of farms exists even within the same regions, it seems of interest to also group farms according to characteristics that are relevant for the analysis at stake. In particular, because in Italy and other EU Countries the distribution of direct payments varies a lot according to the farm production pattern and farms with very different patterns exist within the same regions, it is important also to analyze farm groups separately.

4. METHODOLOGY AND DATA

4.1. Decomposition of the Gini coefficients

As explained by Keeney (2000) and Mishra et al. (2009), when income is generated by k components, the Gini coefficient can be decomposed in the following way:

$$G = \sum_{k=1}^{K} R_K * G_K * S_K \qquad (1)$$

R_k denotes the "Gini correlation" between income component k and the rank of total income. This is given by the covariance between income from the k-th income component and the rank of total income, divided by the covariance between income from this component and the rank of this same income component (Pyatt et al., 1980): $\text{cov}(y_k,F)/\text{cov}(y_k,F_k)$.

G_k denotes the Gini coefficient for the k-th income component.

S_k denotes the income share of the k-th income source (i.e. share of Y_k relative to Y).

The product between R_k and G_k gives the concentration coefficient of the k-th income source (C_k). It measures how income from each source is transferred across a population ranked with respect to the level of total income received.

Equation (3) means that each income component influences income concentration according to how much that source of income is important (S_k) and equally distributed among the sample (G_k), as well as to the level of the "Gini correlation" between this income component and the rank of total income (R_k) (Stark *et al.*, 1986).

Pyatt et al. (1980) and Lerman and Yitzhaki (1985) developed a measure that partitions the overall inequality of a particular distribution into contributing components. This measure, in the case of income, accounts for the 'proportional contribution to inequality' by the k-th income source:

$$P_K = R_K * G_K * S_K / \ G \qquad (2)$$

In order to evaluate the marginal impact of a single income component to income inequality, Lerman and Yitzhaki (1985) derived the following measure of the rate of change of Gini coefficient with respect to the mean of k-th income component:

$$\frac{dG}{d\mu_k} = \frac{1}{\mu} * (C_k - G) \qquad (3)$$

From this, it is possible to derive the elasticity of the Gini coefficient to changes in the income components as it follows:

$$\eta_k = \frac{\mu_k}{G} * \frac{dG}{d_{\mu_k}} = \frac{1}{G} * \left[\frac{\mu_k}{\mu} * (C_k - G)\right] \qquad (4)$$

This allows the measurement of the impact of a one percent change of a single income source on the income concentration.

As noted by Keeney (2000) and Mishra et al. (2009), with substantial incidence of negative incomes, $G(Y)$ may become overstated, perhaps causing values greater than 1. However, the decomposition procedure previously described remains applicable as long as the average value of all income sources are positive for the entire sample (Pyatt et al., 1980; Findeis and Reddy, 1987). Therefore, because the average Farm Income for the whole sample and for each of the considered sub-samples of farms we took into consideration is positive, it has been possible to use this procedure for our dataset. Furthermore, because the focus of this analysis is to decompose farm income and to analyze the role of DPs on income concentration, it has not perceived as fundamental to calculated adjusted Gini coefficients.

4.2. Evolution of the Gini coefficients over time: share effect and concentration effect

To consider the contribution of a change in overall inequality due to change in the components of income over time, we used the approach implemented by Keeney (2000) on the basis of the specification of Podder and Chatterjee (1998).

The total derivative of the Gini coefficient with respect to time is defined as:

$$\frac{dG}{dt} = \sum_{k=1}^{K} C_{k,t} \cdot \frac{\partial S_{k,t}}{\partial t} + \sum_{k=1}^{K} S_{k,t} \cdot \frac{\partial C_{k,t}}{\partial t} \qquad (5)$$

However, its approximation for discrete time is:

$$\Delta G_t \approx \sum_{k=1}^{K} C_{k,t} \cdot \Delta S_{k,t} + \sum_{k=1}^{K} S_{k,t} \cdot \Delta C_{k,t} \qquad (6)$$

Where the changes in values from period t-1 to t of Gini coefficients, Concentration coefficients and income Share coefficients are: $\Delta G_t = G_t - G_{t-1}$; $\Delta C_t = C_t - C_{t-1}$; $\Delta S_t = S_t - S_{t-1}$.

The first summation group of (6) represents that part of the change which is due to changes in the share of the various sources, called the share effect (SE). The second summation group of (6) is the concentration effect (CE) and is the change in the pattern of total income distribution which is due to the changes in the distributions of sources incomes over the ranges of total income.

4.3. Data

The analysis is based on the whole sample of the Italian farms belonging to the Farm Accountancy Data Network (FADN)[3]. This represents a sample of 19,468 and 18,568 farms for the years 2003-2004 and 2006-2007 respectively. As the purpose of FADN is to monitor the income of agricultural holdings and to analyze the impacts of CAP (European Commission, 2010 b), it is concerned with agriculture and farm

[3] FADN is an instrument managed by the European Commission and used for evaluating the income of agricultural holdings and the impacts of the Common Agricultural Policy (CAP) (European Commission, 2010 b). The European Commission does not directly collect data itself but relies on the liaison agencies in each Member State. In Italy, the Istituto Nazionale di Economia Agraria (INEA) of Rome is in charge of this survey. For further information, visit: www.inea.it.

income and does not account for farm household income[4]. Therefore, as Keeney (2000), our analysis considers only farm income disregarding income coming into farm households from other sources.

The FADN field of observation consists of commercial farms that are selected introducing a minimum economic size threshold (European Commission, 2010 b). However, it is strongly focused on individual farms (i.e. family): these account for around 90% of the whole sample in the studied period. The analysis focuses only on these farms excluding all partnership, corporate and other non-family farms.

The considered income parameter is Farm Income (FI) that refers to remuneration to factors of production provided by the family members (work, land and capital) and remuneration to the entrepreneur's risks (loss/profit)[5]. FI is made up of two main components: market based income and direct payments (DPs). The former is calculated by excluding the amount of DPs from FI. DPs have been identified by considering only the annual direct payments granted to farmers in the context of the market and income support policies ("1st pillar" of the CAP) (DP1s) and through rural development programs (RDP) ("2nd pillar" of the CAP) (DP2s). In this analysis, the two most important annual RDP direct payments are taken into consideration: Agro-Environmental Payments and Compensatory Allowances for Less Favored Areas. The former payments are granted on the basis of environmental conditions fulfilled by the beneficiary farmers. The latter payments are granted to those farmers that have a farm in areas characterized by natural handicaps.

An individual farm weighing system, developed on the basis on the EU Farm Structure Survey results are provided in the FADN database. The analysis uses the weight of each individual farm recorded in the sample using it as extrapolating factors.

5. RESULTS

The results of the analysis of the income distribution has been organized looking at the decomposition of income concentration in the two considered periods (i.e. static analysis) and at the evolution of income distribution over the considered period (i.e. dynamic analysis). This latter analysis is aimed at trying to verify whether the CAP reform implemented in 2005 has changed the way DP affect income distribution.

While the analysis accounts for all considered income sources, particular emphasis is given to DP1s because of their relevance (Table 2) and because they have been directly affected by the reform. The discussion is mainly focused on data referring to the whole national sample. However, in order to highlight their peculiarities, the results regarding the three considered geographical areas and the three types of farming are also discussed, when considered relevant.

[4] An harmonized and systematic database of farm household income does not exist in the whole EU. Only a limited number of EU Member States collected data relative to non-agricultural incomes of farm households. In these cases, the adopted methodologies are different and data for different Member States cannot be readily compared (Agra CEAS, 2007).

[5] FI is given by subtracting from Farm Net Value Added the remuneration for inputs (work, land and capital) which are not the property of the holder (i.e. wages, rent and interest paid).

Table 2. Average values of Farm Income and its components: market income, direct payments of the 1st and 2nd pillars of the CAP. Whole sample, types of farming and regions, 2003-04 and 2005-06.

Euro per farm		2003-04	2006-07	2003-04	2006-07
Whole sample					
Farm Income	FI	15018	16136		
Market income	MI	10495	11852		
Direct Payments 1st pillar	DP1	4203	3873		
Direct Payments 2nd pillar	DP2	320	411		
Type of farming				Regions	
Field Crop farms				Northern Italy	
Farm Income	FI	10122	13357	17156	18434
Market income	MI	2899	6016	12746	13589
Direct Payments 1st pillar	DP1	7062	7124	3876	4384
Direct Payments 2nd pillar	DP2	163	217	534	461
Beef farms				Central Italy	
Farm Income	FI	30100	28679	15463	17011
Market income	MI	18573	19335	10228	12181
Direct Payments 1st pillar	DP1	10874	7788	4895	4332
Direct Payments 2nd pillar	DP2	653	1556	340	498
Olive farms				Southern Italy	
Farm Income	FI	8963	9277	13573	14483
Market income	MI	3636	4965	9159	10692
Direct Payments 1st pillar	DP1	5148	4021	4233	3434
Direct Payments 2nd pillar	DP2	179	291	182	357

Source: own calculations on Italian FADN data

5.1. Static analysis

Farm income appears highly concentrated both in the pre and post-reform period: the Gini coefficients for these periods are 0.786 and 0.729, respectively. Studies from other countries show a different situation: U.S. farm households incomes exhibit a lower concentration (around 0.60) (Mishra et al., 2009). It is worth noting that farm household income is not comparable to farm income because it includes income which is not from agricultural activities and that has been found to generally reduce income concentration. However, the concentration of farm income in Italy is higher than that reported by Keeney (2000) for Ireland in the mid 90s.

The relative importance of the three considered income components is not homogeneous: market income sums up around 70% of total income, while DP1 accounts for 27% of total income in the pre-reform period and 24% in the post-reform period (Table 3). The relative importance of DP2 is way lower than the other two components, being at around 2% in both periods. The relative contribution to inequality is very high for market income: it generates around 80% of the overall income inequality. DP1 shows an equalizing effect, contributing to decrease inequality. This is why the Gini elasticity of DP1 is negative, showing that a unitary increase of this source of income could reduce income concentration by -0.153 and -0.102 respectively in the pre and post-reform periods. Similar findings have been reported by Mishra et al. (2009) for US government payments and by Keeney (2000) for Ireland.

Table 3. Gini decomposition of the Farm Income for the whole sample, 2003-2004 and 2006-2007.

	Share in FI	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity
	Sk	Gk	Rk	Ck	Pk	ηk
2003-2004						
Market income	0,699	1,046	0,925	0,968	0,860	0,162
Direct Payments 1st pillar	0,280	0,714	0,498	0,355	0,127	-0,153
Direct Payments 2nd pillar	0,021	0,958	0,500	0,479	0,013	-0,008
Farm Income	1,000	0,786	1,000	0,786	1,000	0,000
2006-2007						
Market income	0,734	0,902	0,931	0,840	0,844	0,110
Direct Payments 1st pillar	0,240	0,755	0,557	0,420	0,138	-0,102
Direct Payments 2nd pillar	0,026	0,957	0,524	0,502	0,018	-0,008
Farm Income	1,000	0,730	1,000	0,730	1,000	0,000

Source: own calculations on Italian FADN data

DP1s are also concentrated: the Gini coefficient of DP1s is around 0.70 in both periods. However, despite their high concentration, DP1s decrease income inequality because of two main reasons. First, their concentration is lower than that of total income. Second, because the correlation coefficient of DP1s is not so high and this allow DP1s to reduce total income concentration. The relative contribution of DP1s to total income inequality is 12% and 14% respectively in the pre and post-reform periods. Even if the relative share of DP1s is lower than that of market income, the magnitude of the marginal equalizing effect of DPs is roughly the same as the marginal impact of market income but with opposite sign.

The income share deriving from DP2s is very low (around 2%) and they are very concentrated although they are not very much correlated to total farm income. Because of these reasons, the equalizing effect of DP2s is not relevant.

Regional results reveal that farms located in central Italy exhibit the highest total income concentration in the pre-reform period (Table 4). Farm income concentration is very high in each of the three examined types of farming if compared with national figures.

This is particularly true in field crops farms because, despite that DP1 account for a very large share of farm income (around 70%), here market income is extraordinary concentrated (the Gini coefficient is greater than one in both the pre and post-reform periods) (Table 5)[6]. In beef and olive farms, income concentration is lower than in filed crop farms. As in the rest of the sample, market income represents the most important source of inequality in the three types of farming but this is especially the case in beef farms in which it contributes around 80% of income inequality.

[6] The Gini coefficient of the income component can exceed unity due to negative observations.

Table 4. Gini decomposition of the Farm Income by regions, 2003-2004 and 2006-2007.

	Share in FI	Gini coefficient	Correlation coefficient	Concentra-tion coefficient	Proportional contribution to inequality	Elasticity
	Sk	Gk	Rk	Ck	Pk	ηk
Northern Italy						
2003-2004						
Market income	0,743	1,009	0,935	0,943	0,870	0,127
Direct Payments 1st pillar	0,226	0,779	0,518	0,403	0,113	-0,113
Direct Payments 2nd pillar	0,031	0,932	0,481	0,449	0,017	-0,014
Farm Income	1,000	0,806	1,000	0,806	1,000	0,000
2006-2007						
Market income	0,737	1,009	0,933	0,941	0,850	0,113
Direct Payments 1st pillar	0,238	0,798	0,600	0,479	0,140	-0,098
Direct Payments 2nd pillar	0,025	0,942	0,372	0,350	0,011	-0,014
Farm Income	1,000	0,816	1,000	0,816	1,000	0,000
Central Italy						
2003-2004						
Market income	0,715	1,141	0,888	1,014	0,844	0,129
Direct Payments 1st pillar	0,262	0,789	0,594	0,469	0,143	-0,119
Direct Payments 2nd pillar	0,023	0,964	0,493	0,475	0,013	-0,010
Farm Income	1,000	0,858	1,000	0,858	1,000	0,000
2006-2007						
Market income	0,716	1,003	0,922	0,924	0,844	0,128
Direct Payments 1st pillar	0,255	0,750	0,561	0,421	0,137	-0,118
Direct Payments 2nd pillar	0,029	0,951	0,533	0,507	0,019	-0,010
Farm Income	1,000	0,784	1,000	0,784	1,000	0,000
Southern Italy						
2003-2004						
Market income	0,675	0,947	0,908	0,860	0,841	0,166
Direct Payments 1st pillar	0,312	0,670	0,493	0,330	0,149	-0,163
Direct Payments 2nd pillar	0,013	0,966	0,524	0,506	0,010	-0,004
Farm Income	1,000	0,690	1,000	0,690	1,000	0,000
2006-2007						
Market income	0,738	0,776	0,931	0,723	0,837	0,099
Direct Payments 1st pillar	0,237	0,720	0,517	0,372	0,138	-0,099
Direct Payments 2nd pillar	0,025	0,968	0,652	0,631	0,024	0,000
Farm Income	1,000	0,638	1,000	0,638	1,000	0,000

Source: own calculations on Italian FADN data

Table 5. Gini decomposition of the Farm Income by type of farming, 2003-2004 and 2006-2007.

	Share in FI	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity
	Sk	Gk	Rk	Ck	Pk	ηk
Field crop farms						
2003-2004						
Market income	0,286	2,332	0,751	1,750	0,637	0,351
Direct Payments 1st pillar	0,698	0,634	0,627	0,398	0,353	-0,345
Direct Payments 2nd pillar	0,016	0,975	0,508	0,496	0,010	-0,006
Farm Income	1,000	0,787	1,000	0,787	1,000	0,000
2006-2007						
Market income	0,450	1,425	0,802	1,144	0,677	0,227
Direct Payments 1st pillar	0,533	0,684	0,649	0,444	0,311	-0,223
Direct Payments 2nd pillar	0,016	0,981	0,577	0,566	0,012	-0,004
Farm Income	1,000	0,761	1,000	0,761	1,000	0,000
Beef farms						
2003-2004						
Market income	0,617	0,929	0,930	0,863	0,766	0,149
Direct Payments 1st pillar	0,361	0,638	0,690	0,440	0,229	-0,133
Direct Payments 2nd pillar	0,022	0,923	0,176	0,163	0,005	-0,017
Farm Income	1,000	0,695	1,000	0,695	1,000	0,000
2006-2007						
Market income	0,674	0,903	0,953	0,860	0,813	0,139
Direct Payments 1st pillar	0,272	0,616	0,735	0,453	0,172	-0,099
Direct Payments 2nd pillar	0,054	0,876	0,216	0,189	0,014	-0,040
Farm Income	1,000	0,713	1,000	0,713	1,000	0,000
Olive farms						
2003-2004						
Market income	0,406	1,217	0,878	1,069	0,600	0,194
Direct Payments 1st pillar	0,574	0,598	0,809	0,484	0,385	-0,190
Direct Payments 2nd pillar	0,020	0,973	0,584	0,569	0,016	-0,004
Farm Income	1,000	0,723	1,000	0,723	1,000	0,000
2006-2007						
Market income	0,535	0,929	0,889	0,826	0,680	0,145
Direct Payments 1st pillar	0,434	0,647	0,664	0,429	0,286	-0,147
Direct Payments 2nd pillar	0,031	0,964	0,726	0,700	0,034	0,002
Farm Income	1,000	0,650	1,000	0,650	1,000	0,000

Source: own calculations on Italian FADN data

In the considered types of farming, a large share of farm income is generated by DP1s, consequently, the relative contribution of DP1s to inequality is bigger than in the rest of the sample. This is especially true in olive farms, in which DP1s account for 38% of total income inequality in the pre-reform period. The equalizing efficiency of DPs is the most significant in field crops farms while in olive and beef farms, it exhibits smaller values.

5.2. Dynamic Analysis

The comparison of the data from the two considered periods sheds light on the changes incurred after the CAP reform. The overall inequality decreased in the post-reform period: the Gini coefficient of farm

income fell down from 0.786 to 0.729. The overall change in inequality can be decomposed into two effects: changes in the shares of the various sources (share effect) and changes in the patterns of the distribution of income from the various sources (concentration effect). The decrease of farm income concentration (-0.056) can be totally attributed to change in the concentration of the various income sources because the concentration effect is negative (Table 6). This is mainly due to the decrease in the concentration of market income and of its relative contribution to inequality. However, this income source remains the most important in determining income inequality, contributing to 84% of it.

The share effect contributed to increase income inequality as the relative importance of the equalizing income source DP1s decreased, while the relative importance of the un-equalizing income source (market income) increased. Furthermore, the concentration coefficient of DP1s increased from 0.35 to 0.42, due to both an increase of its Gini coefficient and its correlation coefficient.

Table 6.

Decomposition of the observed changes of Gini coefficient from 2003-2004 to 2006-2007.

	Absolute change of the Gini coeff.	Share effect	Concentra-tion effect
Whole sample	-0,056	0,019	-0,074
Type of farming			
crop farms	-0,026	0,017	-0,194
beef farms	0,018	0,015	0,003
olive farms	-0,073	0,066	-0,138
Regions			
northern Italy	0,010	-0,002	0,013
central Italy	-0,075	0,001	-0,076
southern Italy	-0,053	0,030	-0,083

Source: own calculations on Italian FADN data

However, the correlation coefficient increased more than the Gini coefficient showing that the former element contributed more to determining the increase of DP1s concentration coefficient. This means that the changes occurred after the CAP reform increased the correlation between DP1s and the rank of total income. Finally, even though DP1s remain the most important source in decreasing income inequality, their relative contribution in this sense declined after the CAP reform. Indeed, the relative elasticity of DP1s decreased from -0.153 to -0.102 (Table 6).

Because income inequality decreased in the post-reform period, the inequality reducing trend of market income more than compensated for the decrease of the equalizing effect of DP1s. This latter phenomenon can be shown considering the evolution of the elasticity of DP1s. A 1% increase in the relative share of DP1s causes a 0.15% decrease in total income inequality in the pre-reform period. However, this value falls to 0.10% in the post-reform period.

The results regarding the farms located in the three considered regions of Italy are not homogeneous. Indeed, the overall inequality decreased in farms in central and southern Italy, while in the north the overall inequality increased in the post-reform period. The evolution of total income inequality in central and southern farms can be totally attributed to the concentration effect and particularly to the decreasing market income concentration. However, northern farms experienced a different trend of total inequality: as market income concentration remained roughly constant over time, the concentration effect reduced the overall inequality. The concentration coefficient of DP1 increased in northern and southern farms while it decreased

in central farms in the considered period. The relative contribution of DP1s to total inequality slightly increased in northern farms while it decreased in central and southern farms.

In each of the three considered types of farming, farm income is highly concentrated, particularly in field crops farms. After the CAP reform, income concentration consistently decreased in olive farms while in the other two types of farming income inequality remained roughly the same.

The relative importance of market income increased in the post-reform period due to the rise in farm commodities prices. The concentration coefficient of market income decreased particularly in field crops farms and olive farms. The relative contribution of market income to inequality increased especially in olive oil farms: as in the rest of the sample, market income represents the most important source of inequality in all three types of farming. The relative contribution of market income to the overall inequality is particularly significant in beef farms, in which it accounts for around 80% of total inequality in the post-reform period.

While the relative importance of DP1s decreased in the post-reform period in all types of farming, the evolution of the concentration coefficient after the CAP reform is not homogeneous in the three types of farming examined. In field crops farms DP1s are more concentrated after the reform while in olive farms the concentration coefficient of DP1s decreased and in beef farms it remained roughly the same. The evolution of the concentration coefficient is equally influenced by the Gini coefficient and the correlation coefficient: in field crops farms both the Gini coefficient and the correlation coefficient of DP1s increased in the post-reform period, while in olive oil farms the Gini coefficient of DP1s increased and the correlation coefficient of DP1s strongly decreased from 0.80 to 0.66. This latter phenomenon may be explained by the change in policy. In the olive sector, support was granted by means of a production subsidy fully coupled to the produced quantities. Unlike other sectors, in which the support provided before the CAP reform was granted on the basis of the amount of land or the number of livestock (i.e. partially coupled), the olive oil sector experienced the transition from fully coupled to fully decoupled support. This change has probably resulted in a strong decrease of the correlation between farm income and DP1s.

While the relative importance of DP2s is very low in each of the three types of farming, it is worth noting that beef farms experienced a rise in the share of DP2s in the post-reform period. Decoupling of direct payments may have facilitated the participation to agro-environmental measures that account for most of the DP2s.

6. CONCLUSIONS

The analysis has shown that farm income concentration in Italy is high and that DP1s reduce this concentration. This happens even if, while less concentrated than market income, DP1s are still very concentrated. The income-equalizing role of DP1s derives from the fact that they are less correlated with income levels. However, the role of DP1s in reducing income concentration is relevant because they account for around ¼ of farm income. DP2s are much more concentrated than the other considered sources of income but, because they account for a very limited share of farm income, their effect on income concentration is negligible. This shows that, any reduction in the level of DP1s could bring about an increase of income concentration. Furthermore, any shift of public resources from the 1st to the 2nd "pillar" of the CAP (without altering the distribution of DP1s and DP2s among farms) could not necessarily result in a more equitable distribution of income.

Farm income concentration has declined, moving from the periods before and after the CAP reform implemented in 2005. Most of this phenomenon is due to the observed reduction of the concentration of the market income and has occurred despite the reduction of the income share generated by DP. The analysis regarding DP1s has shown that, in the considered period, this source of income has become more concentrated and more correlated with the overall farm income level than in the previous period. This suggests that the CAP reform has weakened the income equalizing effect of DP1s. This latter aspect should

be carefully considered by policy makers in order to assess if this outcome has been offset by other policy outcomes.

When DPs are unevenly distributed among types of farming, as is the case for Italy and other EU Countries, it seems important to further disaggregate the full sample to consider this aspect. Results of the analysis have shown the heterogeneous role DP1s play in the considered types of farming. These results could be used to support the decisions regarding the next reform of DPs that, by means of the "regionalization" of DP1s , is expected to change the distribution of DPs among farms in Italy and other EU Countries.

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