Full Research Article

The contribution of different off-farm income sources and government payments to regional income inequality among farm households in Italy

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Abstract. This paper investigates the contribution of different off-farm income sources and Common Agricultural Policy direct payments on income inequality among farm households. The analysis uses the Gini coefficient concept and its decomposition on the whole sample of Farm Accountancy Data Network individual farms of Italy in 2011. A marginal increase in either off-farm incomes or direct payments reduces income concentration. This result could feed the current debate regarding the application of the new CAP in Italy. Deciding on a narrow definition of "active farmer" or not using the redistributive payment could increase DP and FHI concentration. Of the five considered off-farm income sources, only pensions reduce income concentration. Therefore, policies reducing the level of pensions will increase income inequality. Finally, if rural development policies have also to reduce income inequality, these should be aimed at increasing job opportunities for additional family members.

Keywords. Farm household income, income concentration, disaggregation of the Gini coefficient, off-farm income, CAP direct payments.

JEL Codes. Q12, D31, Q18.

1. Introduction

Raising farm income and changing its distribution are still among the main goals of government intervention in the farm sector, even if new perspectives regarding the "farm problem" have been developed (Gardner, 1992). Studies on the evolution of income of Italian farms show an increasing trend of the level of farm net value added per unit of labor during the past decades (Henke and Salvioni, 2010) and a decreasing gap among income levels of farm and non-farm families (Rocchi *et al.*, 2012). However, the large heterogeneity in asset positions across Italian farm households suggests to also focus on the income distribution within the farm population (i.e. income inequality) as it has been done in other Countries (Gardner, 1968; De Janvry and Saudolet, 2001). Furthermore, due to the ever increasing contribution of off-farm incomes (OFI), it seems more appropriate to move the attention from farm income (FI) to farm household income (FHI).

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The analysis focuses on the concentration of farm household income among farm families in Italy and is developed on the whole sample of FADN individual farms in Italy for the last available year (2011). This large sample also allows its stratification according to different macro-regions and zones within Italy. The analysis, developed by calculating the Gini concentration coefficient[2] and its decomposition by income sources, is aimed at assessing the concentration of FHI and the role played by the considered income components with regard to it. More specifically, the objectives are to assess:

1) how and how differently DP contribute to the concentration of both farm income (FI) and farm household income (FHI);
2) whether OFI as a whole would bring about a reduction in FHI concentration;
3) sign and extent of the effect of the different OFI sources on FHI concentration.

Furthermore, by comparing the results referring to different macro-regions and zones of Italy, it is possible to show whether the obtained results vary according to the physical, structural and economic environments in which farm families live.

The originality of this paper is that it extends the analysis from the FI to the whole FHI considering different off-farm income sources as well as CAP direct payments (DP) and uses a large farm-level dataset. This allows to discuss the issue of which income concept should be the reference for the measurement of the contribution of DP to income distribution, to compare and to quantify the contribution of single off-farm income sources to farm household income inequality and, finally, to consider the possible role played by some other policies (including pension, rural development and regional policies) affecting the possibility that farm families have to earn OFI.

The next section provides a brief review of the literature on income concentration within farm families and few elements motivating the analysis in the Italian case. Section 3 presents data and methodology, while section 4 presents and discusses the obtained results. The final section provides some policy considerations and identifies possible future research developments.

2. Literature review on the income inequality among farm households

A large part of the literature on income distribution deals with the contribution of agricultural policies on income distribution and variability because these are concerned with income support and distribution as well as with other environmental, sustainability and rural development goals. This topic has been explored by several studies conducted in the US (Ahearn *et al.*, 1985; Gardner, 1969; Mishra and Sandretto, 2002; Mishra and El-Osta, 2005; Mishra *et al.*, 2006; Mishra *et al.*, 2009; Mishra *et al.*, 2010), in Europe (Allanson, 2008; El Benni and Finger, 2013; Keeney, 2000; Schmid *et al.*, 2006) and in a cross-country comparison including Canada (Moreddu, 2011). This topic is very relevant also in Italy because farm households strongly differ in asset positions. For example, Italian farms have very different size: the last agricultural census (2010) show that farms smaller than 5 ha of Utilized Agricultural Area (UAA) are around 73% of the Italian farms but have less

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[2] Using the Gini coefficient, this paper refers to relative inequality in contrast with absolute inequality such as in Allanson (2008).

than 15% of the whole UAA. On the contrary, farms with more than 100 ha of UAA are around 1% of the farm population but have around 26% of the whole UAA.

Most of the analyses on income concentration have found that government payments decrease income inequality (Ahearn *et al.*, 1985; El Benni and Finger, 2013; Keeney, 2000; Mishra *et al.*, 2002; Mishra *et al.*, 2009; Moreddu, 2011; Severini and Tantari, 2013a and 2013b) even if some other studies reached the opposite conclusion (Allanson, 2008; Schmid *et al.*, 2006). Only a limited number of these analyses decompose the Gini coefficients to analyze the contribution of each income source on income inequality (El Benni and Finger, 2013; Keeney, 2000; Mishra *et al.*, 2009; Severini and Tantari, 2013a and 2013b) and few of these account for differences in the farm population within the considered countries (El Benni and Finger, 2013; Mishra *et al.*, 2009). The role of CAP policies in changing income distribution is currently under scrutiny in Italy because the Italian government is deciding on how to apply the recently reformed DP and rural development policies. In particular, the definition of the requirements needed to qualify for being beneficiaries of DP (i.e. "active farmer") and the possibility to introduce a redistributive payment for the first 30 ha of land of each farm[3] could strongly influence farm income distribution among Italian farms.

The increased importance of OFI in generating farm household income has been documented in many countries including the US and Switzerland, making this income component a relevant share of FHI (El-Osta *et al.*, 1995; El Benni and Finger, 2013, Mishra *et al.*, 2009) and influencing farm organization and performances (Lien *et al.*, 2010; Pfeiffer *et al.*, 2009). This stimulated a growing literature on the effect of OFI on FHI both in developing and in developed countries (De Janvry and Saudolet, 2001; Ahearn *et al.*, 1985; Boinsvert and Ranney, 1990; El-Osta *et al.*, 1995; Findeis and Reddy, 1987; Mishra *et al.*, 2009). Empirical analysis on this specific topic in Europe is more limited and, with the noticeable exceptions of El Benni and Finger (2013), Hill (1999) and Allanson and Rocchi (2008), most of the papers focus on the concentration of only farm income. As shown by Hill (1999), this seems a limitation because it does not consider the multiplicity of sources of income farm households are relying upon (De Janvry and Saudolet, 2001). This is also true in Italy given that the relative importance of OFI can be very high especially in those families managing small farms provided that off-farm labor participation in Italian farm households is negatively correlated with farm size (Corsi and Salvioni, 2012). Thus, taking into account OFI allows to analyze how DP affect FHI concentration and to consider also non-agricultural policies affecting OFI (Boisver and Ranney, 1990; Findeis and Reddy, 1987).

This paper, building on the previously described literature, looks at the following research topics. First, it compares the contribution of DP on FI concentration with that on FHI concentration. Indeed, different results are expected not just because the relative importance of DP decreases when moving from FI to FHI, but also because of the effect of OFI on the distribution of FHI among farm households.

Second, off-farm incomes as a whole reduce income concentration (De Janvry and Saudolet, 2001; Ahearn *et al.*, 1985; Boinsvert and Ranney, 1990; El-Osta *et al.*, 1995; Findeis and Reddy, 1987; Mishra *et al.*, 2010; Mishra *et al.*, 2009; El Benni and Finger,

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[3] Respectively articles 9 and 41 of Reg. (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013. Official Journal of the European Union, L 347/608, 20.12.2013.

2013). However, we test whether this is also true in Italy and, if this is the case, whether this effect is more or less strong than in other Countries.

Third, this paper investigates the contribution of the different single sources of off-farm income. The results of this analysis could feed the policy debate provided that some governmental programs, including rural development policies, could be used to increase the importance of some of these income components.

Finally, because of the differences across territories in terms of availability of off-farm income opportunities, structure and level of income from farming, and the relative importance of DP in the generation of income, the analysis is developed not just on the whole Italian sample, but also separately for farm households belonging to different regions and zones. This allows us to assess whether policies should be tailored differently in the different cases.

3. Data and methods

3.1. Data

The analysis is based on all individual farms belonging to the Italian Farm Accountancy Data Network (FADN)[4]. This is a sample of 9,722 units in 2011 corresponding to a weighted sample of 728,440 families (Table 1)[5].

The whole sample has been stratified by altimetry zones and macro-regions. The former are hilly, mountain and plain zones while the five macro-regions are North-West, North-East, Center, South, and main Islands. The decomposition of family income has been performed for every subsample. The sampled farms are mainly located in hilly zones (4,579 families) while in plain and mountain zones there is a smaller distribution of farm families (3,077 and 2,066 families, respectively). The distribution by macro-regions highlights that a large share of the sample is located in the South and North-East of Italy.

The analysis focuses on Farm Household Income (FHI) that consists in two components: income from farming (or Farm Income) (FI) and Off-Farm Income (OFI). The former is made of revenues from farming activities and CAP direct payments minus costs for intermediate consumptions and external factors (European Commission, 2010b). In the analysis, FI is divided into two components: Market Income (MI) and Direct Payments (DP), with MI = FI - DP. It is important to note that, as it is the case of many EU Member States and other Countries, MI is negative in some farms (European Commission, 2010a; Mishra, 2009) causing also around 6.3% of the farms having negative FI levels (Table 1). The Italian FADN provides data regarding the relative importance of OFI coming from the following five sources: wages, income from independent activities, pensions, income from capital and a residual group of off-farm income sources. First of all, the FHI is decomposed into three categories (MI, DP and OFI) in order to assess their impact on

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[4] Corporate farms are excluded from the analysis. FADN is managed by the European Commission (European Commission, 2010 b). The European Commission relies on national liaison agencies. In Italy, it is the Istituto Nazionale di Economia Agraria (INEA) of Rome.

[5] It is important to recall that FADN does not include farms below a given size. This is not the case of other surveys such as, for example, the Agricultural Business Survey (REA). Thus, families managing very small business are not considered in the analysis.

Table 1. Sample size and average income level (total and by income sources) in the whole sample and in the sub-samples. Year 2011.

	Number of families (N)	Weighted number of families (Nw)	Households with negative FI (%)	Farm household income (FHI) (euro/ house-hold)	Market income (MI) (euro/ house-hold)	Direct payments (DP) (euro/ house-hold)	Off farm incomes (OFI) (euro/ house-hold)
Whole sample	9,722	728,440	6.3	35,548	17,790	9,946	7,812
Altimetry zones							
Plain	3,077	239,090	7.4	38,619	19,362	12,246	7,011
Hill	4,579	370,522	5.1	32,216	16,127	8,910	7,179
Mountain	2,066	118,828	7.4	38,358	19,136	8,816	10,406
Macro-regions							
North-West	1,983	87,256	10.7	36,022	19,667	12,753	3,603
North-East	2,069	137,925	7.3	42,184	22,155	8,180	11,849
Center	1,794	104,622	5.1	35,080	16,322	11,451	7,308
South	2,826	272,255	3.9	32,111	14,886	8,708	8,517
Islands	1,050	126,383	4.9	31,622	15,968	8,887	6,767

Note: FHI = MI + DP + OFI; FI = MI + DP.
Source: Own elaboration on Italian FADN sample.

the whole FHI. Subsequently, the decomposition has been expanded further to consider each one of the five OFI components previously described.

3.2. Gini decomposition by income source

Gini decomposition by income source has been developed following Pyatt *et al.* (1980):

$$G = \sum_{k=1}^{K} R_K \star G_K \star S_K \tag{1}$$

in which:

R_k (the Gini correlation) denotes the ratio of the covariance between the income component Y_k and the rank of total income Y and the covariance between Y_k and its own rank, with observations ordered with respect to total income and income from the k-th source, respectively:

$$R_k = \frac{cov(Y_k, F(Y))}{cov(Y_k, F(Y_k))}, \text{ where: } -1 \le R_k \le 1 \tag{2}$$

Inspection of the latter equation suggests that $R_k = 1$ only if $F(Y_k) = F(Y)$, implying that farm families have the same ranking with respect to the k-th income component as they have with respect to total income (see Pyatt *et al.*, 1980). For example, if the R_k for DP is close to 1, this means that households having relatively higher income levels also receive relatively higher levels of DP.

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 that is ranked with respect to the level of total income each member of the population received.

Equation (1) means that each income component influences income concentration according to how important that source of income is (S_k), and to how it is distributed among the sample (G_k), as well as according 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' of the k-th income source:

$$P_K = (R_K * G_K * S_K)/G \tag{3}$$

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

$$\frac{dG}{d\mu_k} = \frac{1}{\mu} * (C_k - G) \tag{4}$$

in which μ_k is the mean value of the k-th income component. From this it is possible to derive the elasticity of the Gini coefficient for each income component as follows:

$$\eta_k = \frac{\mu_k}{G} * \frac{dG}{d\mu_k} = \frac{1}{G} * \left[\frac{\mu_k}{\mu} * (C_k - G) \right] \tag{5}$$

This allows the measurement of the contribution of a one percent change of a single income source on the income concentration, assuming that the internal ratio between the total income distribution and the mean of the income source remained undisturbed (El Benni and Finger, 2013, p. 641).

As noted by Keeney (2000) and Mishra *et al.* (2009), with a 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 is positive for the entire sample (Pyatt *et al.*, 1980; Findeis and Reddy, 1987). Therefore, because the average income for each income source is

always positive in the whole sample and in the sub-samples, it has been possible to use this procedure for our dataset. Furthermore, because the focus of this analysis is to decompose farm household income and to analyze the contribution of OFI and DP on income concentration, it did not seem fundamental to calculated adjusted Gini coefficients.

4. Results of the empirical analysis

4.1. Level and composition of farm household income

Average farm household income is higher in the North-East and North-West and in families located in plain zones. The same distribution occurs for market income: in the North-East MI is around 22,000 Euros. As already noticed, 6.3% of the considered families have negative farm income indicating that the amount of direct payments (DP) received is not big enough to compensate for negative MI. These families are mainly located in the North-West (Table 1). The average level of DP is around 10,000 Euro per farm: in plain zones and in the North-West this value is higher because these farms used to produce commodities that have received a strong policy support. In the whole sample, off-farm incomes (OFI) are around 7,800 Euro per family, but this level is higher in mountain zones and in the North-East.

The distribution of the main sources of income is not homogeneous in the different geographical areas: in fact, the relative share of OFI is very high in the South (around 47%), while it is lower in the North-West (around 13%) where market incomes generate more than half of the FHI (Table 1).

Stratification by altimetry zones shows that OFI contributes more to the generation of farm household income in hilly areas (around 43% of FHI) while MI and DP are relatively more important in families located in the plains (Table 1).

4.2. Concentration of farm household income in the whole sample

FHI is not very concentrated, showing a Gini coefficient of around 0.53, lower than FI concentration. Indeed, the relative importance of OFI in reducing total income concentration should be stressed. The relative shares as well as the relative concentration coefficients of the different sources of income strongly differ (Table 2). MI is very concentrated (Gini coefficient of 0.987), also because of the presence of negative values in the sample, while DP and OFI are less concentrated.

While the Gini coefficients of DP and OFI are quite similar, the degree of correlation with the rank of total income (R) is higher for OFI, meaning that this source of income is more important for high income families.

The relative importance of OFI in the formation of total income is bigger than that of DP but their relative contribution to total inequality, as measured by the Gini elasticity, is quite similar. Both these sources of income contribute to the reduction of total income inequality, even if the magnitude of this effect is low.

Because of its high degree of concentration, MI increase total income inequality. The opposite is true for DP. Indeed, the proportional contribution of DP to FI inequality is larger than the proportional contribution of DP to FHI concentration. This is mainly due

Table 2. Gini decomposition of Farm Household Income and Farm Income in the whole sample. Year 2011.

		Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
		S	G	R	C	P	η
Market income	MI	37.5	0.987	0.731	0.721	0.509	0.134
Direct Payments	DP	21.2	0.713	0.496	0.353	0.141	-0.071
Off-farm income	OFI	41.3	0.660	0.681	0.450	0.350	-0.063
Farm household income	FHI	100.0	0.531	1.000	0.531	1.000	0.000
Market income	MI	63.8	0.987	0.882	0.870	0.777	0.139
Direct Payments	DP	36.2	0.713	0.617	0.440	0.223	-0.139
Farm income	FI	100.0	0.714	1.000	0.714	1.000	0.000

Note: FHI = MI + DP + OFI; FI = MI + DP.
Source: Own elaboration on Italian FADN sample.

to the declining share of DP moving from FI to FHI. However, this is also due to the fact that DP are less correlated with FHI.

As it will be discussed in paragraph 4.4, the different sources of OFI contribute differently to FHI inequality.

4.3. Concentration of farm household income in the altimetry zones and macro-regions

The analysis shows that the results for the considered subsamples are very similar to those obtained from the whole sample (Table 3) with very few exceptions. Thus, the following text refers only to these few exceptions.

The Gini coefficient for farm household income is only slightly higher in families located in plain zones than in the other altimetry zones.

MI and DP are relatively more important in the plain zones. The Gini coefficient for MI is slightly higher in the plain zones where it becomes bigger than one, due to the presence of cases with negative MI[6]. Finally, elasticity values for OFI are relatively smaller in the hilly zones and larger in the plain zones than in the whole sample.

The analysis performed on geographical areas gives very similar results as those obtained on the whole sample. OFI reduce FHI inequality in all macro-regions except for the South (Table 4).

The contribution of each source of income to FHI inequality is comparable with what has been observed for the whole sample. However, the Gini elasticity of DP in the North-West is bigger than in the rest of the sample: this is mainly due to the relatively high share of DP in this area.

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[6] Negative MI have also been reported in previous studies on farm income concentration such as, for example, Findeis and Reddy (1987), Keeney (2000) and Mishra *et al.* (2009).

Table 3. Gini decomposition of Farm Household Income in the altimetry zones of Italy. Year 2011.

	Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
	S	G	R	C	P	η
Hill						
Market income	36.5	0.924	0.696	0.643	0.463	0.098
Direct payments	20.3	0.701	0.474	0.332	0.133	-0.070
Off-farm income	43.2	0.659	0.717	0.473	0.404	-0.029
Farm household income	100.0	0.506	1.000	0.506	1.000	0.000
Mountain						
Market income	37.8	0.997	0.773	0.771	0.540	0.162
Direct payments	20.4	0.673	0.406	0.273	0.103	-0.101
Off-farm income	41.8	0.674	0.683	0.460	0.357	-0.062
Farm household income	100.0	0.540	1.000	0.540	1.000	0.000
Plain						
Market income	38.6	1.055	0.749	0.789	0.548	0.162
Direct payments	22.9	0.740	0.551	0.408	0.168	-0.061
Off-farm income	38.5	0.655	0.625	0.409	0.284	-0.102
Farm household income	100.0	0.556	1.000	0.556	1.000	0.000

Source: Own elaboration on Italian FADN sample.

4.4. The contribution of different sources of off-farm incomes on total household inequality

The decomposition of the 5 OFI sources allows the assessment of their specific contribution to FHI concentration. Pensions generate the biggest share of OFI in all subgroups of families, accounting for around 17.6% of the FHI, even if wages account for a similar share. The other sources of OFI only account for a limited portion of farm household income.

Among the different OFI sources, pensions are the least concentrated and have the lowest Gini correlation: this means that a relative increase in pensions' share could lead to a bigger decrease of FHI concentration if compared with other sources of off-farm income (Gini elasticity of -0.077) (Table 5). Among the analyzed sources of OFI, pensions seem to be the most effective in reducing FHI inequality, mainly because of their higher share and their lower degree of concentration.

Among the other sources of OFI, wages and, to a lesser extent, incomes from independent work have a not negligible proportional contribution to FHI inequality (Table 5). Both sources have Gini coefficients and correlations higher than the pensions. This is why these income sources tend to increase FHI inequality and to partially counterbalance the contribution of pensions. This is true in the whole sample and in all examined subsamples (see Table A.1 in the appendix).

The elasticity value of OFI (i.e. the effect of a unitary increase of the share of OFI) in the Italian farm families is lower than the values estimated, for example, by Mishra *et*

Table 4. Gini decomposition of Farm Household Income in the macro-regions of Italy. Year 2011.

	Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
	S	G	R	C	P	η
North-West						
Market income	51.9	1.352	0.872	1.179	0.748	0.229
Direct payments	34.7	0.734	0.610	0.448	0.190	-0.157
Off-farm income	13.4	0.845	0.447	0.378	0.062	-0.072
Farm household income	100.0	0.818	1.000	0.818	1.000	0.000
North-East						
Market income	38.5	0.937	0.776	0.727	0.545	0.159
Direct payments	16.0	0.733	0.493	0.361	0.112	-0.048
Off-farm income	45.5	0.599	0.648	0.388	0.343	-0.112
Farm household income	100.0	0.514	1.000	0.514	1.000	0.000
Center						
Market income	37.6	1.009	0.679	0.685	0.486	0.111
Direct payments	22.5	0.729	0.508	0.370	0.157	-0.068
Off-farm income	40.0	0.679	0.695	0.472	0.357	-0.043
Farm household income	100.0	0.529	1.000	0.529	1.000	0.000
South						
Market income	32.1	0.858	0.591	0.507	0.368	0.047
Direct payments	20.6	0.678	0.463	0.313	0.146	-0.060
Off-farm income	47.3	0.623	0.729	0.454	0.486	0.013
Farm household income	100.0	0.442	1.000	0.442	1.000	0.000
Islands						
Market income	38.3	0.896	0.750	0.673	0.498	0.115
Direct payments	19.9	0.709	0.480	0.341	0.131	-0.068
Off-farm income	41.8	0.646	0.712	0.459	0.371	-0.047
Farm household income	100.0	0.517	1.000	0.517	1.000	0.000

Source: Own elaboration on Italian FADN sample.

al. (2009) in the US but in line with most of the values estimated by El Benni and Finger (2013) in Switzerland. The elasticity values of OFI in the Italian farm families seem limited because some sources of OFI do not decrease FHI concentration. The relative importance of OFI in Italian families is lower than the share of OFI estimated for the US but bigger than the relative importance of OFI in Switzerland agriculture (Mishra *et al.*, 2009; El Benni and Finger, 2013). Income from pensions remains the only OFI source that strongly reduce income inequality[7].

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[7] This is particularly true in the North-East, in which the contribution of this source of income is above the average value (Table A.2 in the Appendix). In the North-West all OFI sources reduce FHI inequality, with pensions

Table 5. Gini decomposition of Farm Household Income including all different sources of Off-Farm Income. Whole Italian sample. Year 2011.

	Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
	S	G	R	C	P	η
Market income	37.5	0.987	0.731	0.721	0.509	0.134
Direct payments	21.2	0.713	0.496	0.353	0.141	-0.071
Off-Farm Incomes (OFI):						
Pensions	17.6	0.735	0.409	0.301	0.100	-0.077
Wages	16.5	0.872	0.650	0.567	0.176	0.011
Independent work	5.8	0.952	0.605	0.576	0.063	0.005
Capital	1.2	0.987	0.497	0.491	0.011	-0.001
Other off-farm income	0.3	0.996	0.166	0.165	0.001	-0.002
Farm household income	100.0	0.531	1.000	0.531	1.000	0.000

Source: Own elaboration on Italian FADN sample.

Results of the analysis performed on the considered regions and zones in which the whole sample has been divided do confirm the main findings previously described for the Italian whole sample (See Appendix).

The different off-farm income sources are not equally effective in decreasing income inequality: only pensions could be useful to decrease FHI inequality, while the other sources of OFI have a negligible impact on FHI inequality or, as in the case of wages and income from independent work, contribute to increase it.

5. Conclusions

The main result of the analysis is that the concentration of Farm Household Income (FHI) is not very high and lower than that of only Farm Income (FI). This arises two policy relevant questions provided that the inequality of income distribution among the farm population is also used to justify policy intervention in rural areas.

The first is whether it is correct to focus our attention only on FI as it is often the case in the CAP policy debate. The results of the analysis suggest that, if the interest is on the wellbeing of farm families, it seems more appropriate to consider FHI because narrowing the analysis only on FI allows just a partial approach to cope with this issue.

The second question refers to whether FHI is so concentrated to require an intervention to reduce its concentration. The provided evidences on the level of FHI concentration

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contributing the most. In all three altimetry zones, pensions decrease FHI inequality to a similar extent and the other sources of off-farm income have only a limited contribution on farm household income concentration. Pensions are particularly effective in reducing FHI concentration in plain areas in which, due to their higher contribution to FHI and lower concentration, they have an elasticity above the average in absolute values (Table A.2).

can be used by policy makers to decide whether income distribution policies specifically focused on farm households are really needed given that general policies, such as tax and welfare policies, are already available also to pursue income distribution goals. However, it is important to consider that future evolutions of CAP can change this situation. The analysis has shown that reducing the level of DP and concentrating them on a smaller number of beneficiaries may result in an increase of FHI concentration. On the contrary, the increasing role OFI are playing in generating FHI is expected to have the opposite effect.

In the case reducing FHI concentration is perceived as a policy relevant goal, it is important to identify the most appropriate policy tools to reach it. The analysis has provided insights regarding the use of agricultural as well as other policies.

As DP are concerned, the analysis has confirmed the findings of previous studies: DP play an important role in reducing income concentration of Italian farm households and this is the case also when the whole FHI is considered. This is because DP are relatively more important for those farms generating limited levels of market income (i.e. farm income net of DP). These results can feed the current debate regarding the application of the new DP policy measures in Italy taking into account also their potential implications in terms of income distribution. On the one hand, applying a "narrow" definition of "active farmers" could strongly reduce the number of beneficiaries of DP and increase DP concentration. On the other hand, the redistributive payment for the first 30 ha could reduce DP concentration because it moves part of the overall amount of DP from large to small farms. Both measures can have an effect on household income concentration even if the extent of such effect is reduced in those households where the relative importance of OFI is high.

FHI inequality can be affected also by a large set of not agricultural policies by means of their impact on OFI. The results of the analysis allow for considerations regarding pension, rural development and regional policies. Pensions received by members of farm households have been found to reduce FHI concentration. Therefore, policy makers should be aware that any change in welfare policies causing a reduction of the level of the pensions earned by farm families will increase FHI concentration.

Rural development and regional policies can affect the possibility of farm family members to work off-farm and to generate off-farm incomes. However, the analysis has shown that an increase of wages or incomes from independent activities does not result in a decrease of FHI concentration. Therefore, rural development and regional policy measures increasing only the level of income of the current beneficiaries of these sources of income are not expected to decrease income inequality. This suggests that, if policy makers want these policies also to decrease FHI concentration, these should be specifically aimed at enlarging the number of family members earning these sources of income. This issue could be taken into consideration in the new rural development programs that Italian Regions are currently designing.

Finally, it is important to underline some methodological issues. First of all, the developed large individual farm dataset reporting both farm and off-farm incomes could provide the basis for further research such as, for example, on the degree of pluriactivity of Italian farm households (Severini *et al.*, 2014) or on the variability of farm income and farm household income. However, the analysis presented in this paper is subject to some limitations apart from those that are common to the studies based on the decomposition

of the Gini coefficient (Lerman and Yitzhaki, 1985) and the difficulties in measuring FHI (Hill, 1999). The empirical analysis has been developed on a single year and this neither allow to assess the stability of the obtained results over time nor to investigate the dynamic of the investigated phenomena accounting for policy or market induced responses. Thus, future researches should analyze more years to cope with these issues. Furthermore, it seems useful in future research to compare the income disparity within farm families with that within non-farm families because this can show whether the income disparity within farm households is higher than that within non-farm families. This is an important issue because this can help in answering whether it exists a justification for policies specifically aimed at decreasing income inequality in farm households.

Acknowledgments

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Appendix. Results for the macro-regions and altimetry zones of Italy.

Table A.1. Gini decomposition of Farm Household Income. Data regarding only the sources of Off-Farm Income in the macro-regions of Italy. Year 2011.

	Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
North-West						
Pensions	7.9	0.858	0.315	0.270	0.026	-0.053
Wages	4.0	0.969	0.557	0.540	0.026	-0.014
Independent work	0.9	0.993	0.629	0.624	0.007	-0.002
Capital	0.5	0.996	0.534	0.532	0.003	-0.002
Other off-farm income	0.2	0.997	-0.078	-0.078	0.000	-0.002
North-East						
Pensions	21.1	0.635	0.308	0.195	0.080	-0.131
Wages	18.3	0.855	0.659	0.564	0.200	0.018
Independent work	5.3	0.952	0.563	0.535	0.055	0.002
Capital	0.7	0.994	0.537	0.534	0.007	0.000
Other off-farm income	0.1	0.998	0.240	0.240	0.001	-0.001
Center						
Pensions	18.5	0.704	0.381	0.269	0.094	-0.091
Wages	12.6	0.915	0.702	0.642	0.153	0.027
Independent work	6.8	0.958	0.714	0.684	0.087	0.020
Capital	1.9	0.985	0.609	0.599	0.022	0.003
Other off-farm income	0.2	0.996	0.137	0.136	0.001	-0.001
South						
Pensions	18.5	0.744	0.450	0.335	0.140	-0.045
Wages	21.4	0.829	0.641	0.531	0.256	0.043
Independent work	6.2	0.946	0.594	0.562	0.079	0.017
Capital	1.1	0.984	0.400	0.393	0.010	-0.001
Other off-farm income	0.2	0.997	0.349	0.348	0.002	0.000
Islands						
Pensions	16.5	0.752	0.438	0.329	0.105	-0.060
Wages	14.7	0.871	0.642	0.559	0.159	0.012
Independent work	7.9	0.926	0.596	0.552	0.085	0.005
Capital	1.9	0.976	0.544	0.531	0.019	0.001
Other off-farm income	0.8	0.986	0.208	0.205	0.003	-0.005

Source: Own elaboration on Italian FADN sample.

Table A.2. Gini decomposition of Farm Household Income. Data regarding only the sources of Off-Farm Income in the altimetry zones of Italy. Year 2011.

	Share (%)	Gini coefficient	Correlation coefficient	Concentration coefficient	Proportional contribution to inequality	Elasticity (%)
Hill						
Pensions	17.8	0.737	0.443	0.326	0.115	-0.063
Wages	16.6	0.871	0.655	0.571	0.188	0.021
Independent work	7.2	0.943	0.628	0.593	0.085	0.012
Capital	1.4	0.985	0.561	0.553	0.015	0.001
Other off-farm income	0.2	0.998	0.450	0.449	0.002	0.000
Mountain						
Pensions	14.2	0.767	0.377	0.289	0.076	-0.066
Wages	21.1	0.854	0.660	0.563	0.220	0.009
Independent work	4.6	0.963	0.581	0.559	0.047	0.002
Capital	1.3	0.986	0.524	0.516	0.013	-0.001
Other off-farm income	0.7	0.988	0.041	0.040	0.001	-0.006
Plain						
Pensions	19.1	0.713	0.370	0.263	0.090	-0.100
Wages	14.1	0.881	0.641	0.565	0.144	0.002
Independent work	4.4	0.959	0.599	0.575	0.046	0.002
Capital	0.7	0.990	0.318	0.315	0.004	-0.003
Other off-farm income	0.2	0.995	0.010	0.010	0.000	-0.002

Source: Own elaboration on Italian FADN sample.