# The taxation of farm income in Italy.

# Evidences from the EU-SILC database

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## Summary

*In this paper the level of taxation of Italian farm households is studied by analyzing the data of agricultural households in the Italian EU-SILC database. The proposed approach allows to use the EU- SILC database to fill missing information on FADN database through a methodology of statistical matching. The work provides some indications on the level of tax burden and on some factors affecting it as well as on the degree of progressivity of the taxation of agricultural incomes. The results suggest that the level of tax burden is not very much affected by the amount of income actually produced. Indeed, the taxation of agricultural incomes seems paradoxically to have a regressive effect favouring farm families in which farming accounts for the large part of family income.*

Keywords: income taxation, statistical matching, farm household income

JEL Classification codes: H24; Q12

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## 1. Introduction

In almost all individual (i.e. non-corporate) farms of Italy the taxation of farm income is based on the identification of agricultural income through land register data. In particular, this is done considering estimates of the income that could be normally generated by the land and labor employed in the performance of the organization of agricultural activities on it. This approach, by identifying a standard income level, benefits relatively more those farmers that, having similar amount and quality of land, have better economic performances.

The analysis of the impact of taxation in Italian agriculture are scant. In part this is because of the lack of easily accessible databases to study this issue. For example, the most extensive database and used at the enterprise level, the Farm Accountancy Data Network (FADN), does not collect data on the taxation of personal incomes. Thus, farm income is reported before personal income taxes are deducted so it could be seen as a Gross Farm Income (GFI). However, this is not the case of the Eurostat database European Union Statistics on Income and Living Conditions (EU-SILC), which is managed in Italy by ISTAT (ISTAT, 2010). This database, which considers all types of families, also includes a subset of families who run farms (farm households). In this case farm incomes are reported in terms of both Gross (pre-tax) and net (after-tax) (i.e. GFI and NFI). In addition, this database also contains a range of information to help characterize them (e.g. number of components, geographical location, etc..).

The topic of this paper is the taxation of agricultural incomes that is studied by analyzing the data of agricultural households in the Italian EU- SILC database. The objectives of the analysis are of two types.

On one hand, we propose a methodology to identify the level of taxation on farm incomes. This is useful because the results of this type of analysis can be used to fill missing information in other databases. In particular, the operational objective is to develop a methodology of statistical matching (Pizzoli et al., 2012; Rocchi et al., 2012) to transform the incomes of agricultural holdings reported by FADN (which are before-tax) in after-tax income. In the case of Italy, this step allows us to get a post-tax farm income figures (NFI) that are comparable to those regarding the Off-Farm Income of family members (OFI). Thus, by adding these two categories of income, we can obtain a post-tax figure for the whole Farm Household Income (FHI).

On the other hand, the paper tries to answer specific research questions related to the factors that influence the level of taxation on agricultural income. These are: 1) how much the level of taxation of agricultural income is linked to the amount of income actually produced? 2) Which characteristics of households do affect the level of taxation? 3) How strong is the degree of progressivity of the level of taxation of agricultural incomes?

The next section makes a brief review of the work done on the taxation of agricultural incomes and agricultural households. Section 3 describes the data and methodology used for the empirical analysis. Paragraph 4 presents the results obtained from the empirical analysis. The last section discusses the results obtained in order to answer the research questions just mentioned.

## 2. Literature review

The assessment of agricultural incomes for fiscal purposes in Italy is still largely based on the land register (Cristofaro, 2003). In other words, the definition of the agricultural tax basis is still the outcome of a scientific debate carried out by distinguished scholars during the first half of the 20th Century. Indeed, during the last revision of the land register on 1990, the way agricultural incomes were calculated for fiscal purposes was essentially the same defined on 1939, during the Second General Revision of the Register.

Among the most important contributors to the definition of the conceptual framework and the technical solutions adopted in Italy for agricultural income taxation can be recalled Arrigo Serpieri (1925, 1940 and 1943) and Luigi Einaudi (1924 and 1942). The preference for a tax basis referred to a system of conventional (normal) incomes from farming instead of the actual ones (as in the other sectors of economic activity) was justified by three major motivations. First of all the expected reduction of administrative costs (for monitoring and composition of fiscal cases) of taxation: at the time they were considered relevant, due to the large number of small, peasant farms operating in the Italian agriculture as well as the low prevalence of accounting records (Einaudi, 1942). Furthermore the adoption of a single system of assessment was expected to correct some inconsistency of the previous tax regime for agriculture (were different types of farmer were burdened with different tax rates) and, more generally, to promote a overall equalization of fiscal burden across different farming activities (Serpieri, 1940). Finally, the new system would have created an incentive to investments aiming at fostering land productivity (due to the long period between periodical revisions of the land register, planned every thirty years) and increasing efficiency in farming (due to the taxation of a normal instead of the actual agricultural income).

Nowadays the taxation of agricultural incomes based on the land register is a peculiar feature of the Italian fiscal system when compared with other European countries (Cristofaro, 2003). It is an easy task to stress the possible distortions of economic incentives depending of such a system (Colombo, 2003). The classification of farming activities ("crop quality" in the technical wording) resulting from the land register is no longer able to properly represent the contemporary agriculture, with the increasing diversification and multifunctionality of agricultural holdings. As a consequence the equalizing properties of the fiscal system may be substantially reduced. Furthermore, the fiscal incentive to the increase land productivity seems more and more in contrast with the current agricultural policy, aiming at supporting an extensive use of land and promoting sustainable forms of farming.

A further point must be stressed here. Several studies showed that farming is only a secondary source of income for many agricultural households (Gardner, 1992; Hill, 1999; Eurostat, 2002). When the *total* income (inclusive of off farm incomes) is considered, on the average the Italian agricultural households don't show a negative differential in comparison with other social groups (Stefani *et al.*, 2012). Moreover, the largest part of income from farming is earned by agricultural households included in the highest quintiles of income distribution (Rocchi *et al.*, 2011).

A possible revision of the tax basis should take into account the changed role of farming in the definition of income distribution among Italian households. A better knowledge of the fiscal burden on agricultural incomes *within* the direct taxation of households may provide an useful empirical evidence to be used in the design of a reform of agricultural income taxation.

## 3. Data and methodology

The analysis was performed on the Italian EU-SILC database for the year 2011. It considers only the subset of households that have an income from agricultural self-employment to be consistent with a "broad" definition of farm families. In particular, the analysis refers only to the individual companies and, in particular, only to families where there is only one individual autonomous agricultural income earner ("holder") or two married holders[1].

This choice results in the exclusion of some of the families reported in the EU-SILC DB with autonomous agricultural income. The final sample size was 266 families[2].

The criterion for identification of families under analysis refers to people who have income from self-employment in agriculture. The first step was to identify people with this type of income and who have been called "holders". The criterion was to identify as holders those members of the family for which the following three criteria are satisfied simultaneously. He/she carries out: a) self-employment as a main activity, b) in the agricultural sector, c) with a position classified as a holder of small businesses or specialized farm worker. This latter criterion runs out for example agronomists even if they work in the farm sector. Excluded are also those families in which there are more than one holder. In this way the holder can be defined as entrepreneur or self-employed in agriculture (ESA).

The second step was carried out taking into account, for each core, the degree of relationship between him and the other members of the core. In this way it was possible to identify any spouse / domestic partner and children, as well as the other members in the DB but without this kind of relationship. This step is crucial to rebuild the core subject to taxation. In fact, the latter has been defined on the basis of what is indicated by Ceriani *et al.* (2012). In particular, it consists of the following three figures: an entrepreneur or self-employed agriculture (ESA) (which is the reference point for the identification of the family); spouse of the ESA; dependent persons. These latter are made up of all sons of ESA or his/her spouse in the database provided that they have an income of less than € 2840. Therefore it is assumed that all other members are taxed independently from the identified family members.

The basic idea of the methodology used for data analysis has been to identify a relationship between Net Farm Income (NFI), on the one hand, and Gross Farm Income (GFI) and additional variables related to other family characteristics. In particular, it was assumed that the level of NFI depends on the level of GFI (not necessarily linearly), the presence of Off-Farm Incomes and the

[1] This choice is motivated by the fact that it should be avoided to consider within the same family all members related to the management of a FADN farm when these indeed belong to more than one family.
[2] In DB 2011 285 families are present with members who have agricultural income self ("holder"). However, to eliminate cases where farms are not individual, 19 families have been eliminated. These are made up of 3 or more income earners agricultural self-employment or farm income earners by two independent unmarried. In particular, in 23 of 42 families in which there is more of a holder, the autonomous agricultural earners are 2 and are married.

geographical location of the family. The analysis was carried out by applying the following regression model to the sample of agricultural households in the EU-SILC DB:

$$NFI_i = a + bGFI_i + cGFI_i^2 + dFIS_i + eGEO + \varepsilon_i \qquad (1)$$

where:

$NFI_i$ Net Farm Income (after personal income taxes are subtracted)

$GFI_i$ Gross Farm Income (before personal income taxes are subtracted)

$GFI_i^2$ Squared GFI

$FIS_i$ Farm Income Share in the total household income

GEO dummies used to identify the macro-regions where farm families are located. This are the North-West, North-East, Center and South macro-regions of Italy. The dummies are identified as: d_nw, d_ne, d_c, d_s. The dummy for the remaining macro-region (Islands) is excluded.

$\varepsilon_i$ estimation error

and *a*, *b, c*, *d* as well as *e* are estimation parameters.

The ratio between Net Farm Income ($NFI_i$) and Gross Farm Income ($GFI_i$) gives an indirect measure of the level of taxation (in fact the complementary to *b* is the level of taxation).

The presence of FIS variable allows to take into account the presence of other types of taxes, especially those kind of taxes which are affecting rich families (eg. tax on property of a house). In fact, the relative importance of farm income differs between families and it is a proxy of the relative importance of other types of incomes.

Other characteristics of households could be taken into account but a selection of the independent variables was taken into account for three main reasons: first, not all characteristics of the families is available, second the selected variables seem to be the most important in determining the level of taxation, third a bound exists due to the low degree of freedom of the regression models. For the latter reason the analysis considers only macro-regions instead of regions or provinces (eg., nuts2 or nuts3 level)

EU-SILC statistical weights have not been used in the estimation because, given the limited number of (sub)sampled observations, these have been considered not adequate to represent the population of the Italian agricultural households. However, different approaches can be used in this regard when data are available (Rocchi *et al.*, 2012).

## 4. Results

Before proceeding to the estimation of model (1) the correlation between the independent variables has been analyzed (Table 1). Moreover, the presence of multicollinearity in the model has been excluded by calculating the Variance Inflation Factor (VIF)[3] (Greene, 2002) which assumes for all variables a value less than 10.

**Table 1.** Correlation matrix between the independent variables of the model.

| | GFI | $GFI^2$ | FIS | d_nw | d_ne | d_c | d_s |
|---|---|---|---|---|---|---|---|
| GFI | 1.000 | | | | | | |
| $GFI^2$ | 0.920 | 1.000 | | | | | |
| FIS | 0.577 | 0.422 | 1.000 | | | | |
| d_nw | 0.138 | 0.180 | 0.079 | 1.000 | | | |
| d_ne | 0.043 | 0.014 | -0.112 | -0.313 | 1.000 | | |
| d_c | 0.090 | 0.033 | 0.078 | -0.213 | -0.305 | 1.000 | |
| d_s | -0.101 | -0.108 | 0.080 | -0.263 | -0.376 | -0.256 | 1.000 |

*Source: Own elaborations on EU-Silc data of 2011.*

Results of the ordinary least squares model (OLS) show a very high R-squared (Table 2).

[3] The VIF quantifies the degree of multicollinearity in the OLS regression (Greene, 2002). Multicollinearity increases the variance of the estimated coefficients. The VIF index provides a measure of how much the variance of each estimated coefficient increases due to collinearity. In general, the threshold value is set to 10 or 20 and collinearity issues are considered relevant when these thresholds are exceeded.

**Table 2.** Results of the ordinary least squares model (OLS).

| NFI | Coef. | Std. Err. | t | P>t | [95% Conf. | Interval] | R-squared | 0.981 |
|---|---|---|---|---|---|---|---|---|
| GFI | 0.844 | 0.020 | 41.360 | 0.000 | 0.804 | 0.884 | Adj R-squared | 0.980 |
| GFI$^2$ | -0.000002 | 0.000 | -6.970 | 0.000 | 0.000 | 0.000 | | |
| FIS | 1219.828 | 515.584 | 2.370 | 0.019 | 204.463 | 2235.192 | | |
| d_nw | 579.504 | 533.062 | 1.090 | 0.278 | -470.280 | 1629.288 | | |
| d_ne | 391.322 | 495.165 | 0.790 | 0.430 | -583.830 | 1366.474 | | |
| d_c | -39.742 | 542.784 | -0.070 | 0.942 | -1108.672 | 1029.187 | | |
| d_s | 210.861 | 502.650 | 0.420 | 0.675 | -779.032 | 1200.753 | | |
| cons | -242.263 | 437.020 | -0.550 | 0.580 | -1102.908 | 618.382 | | |

*Source: Own elaborations on EU-Silc data of 2011.*

This evidence, combined with the fact that the analysis is based on a cross-section of observations, suggests that the model may be subject to heteroscedasticity (Greene, 2002).

The presence of heteroscedasticity has been verified by applying a test based on the Breusch-Pagan and Cook-Weisberg approaches (Greene, 2002). The results do not allow to rule out the hypothesis that there is heteroscedasticity. To overcome this problem the model was also estimated with the robust regression approach that is typically suggested in these cases (Greene, 2002).

*Results of the robust regression model*

The robust regression model is well-defined (high value of R-squared) (Table 3).

**Table 3.** Results of the robust regression model.

| NFI | Coef. | Std. Err. | t | P>t | [95% Conf. | Interval] | R-squared | 0.998 |
|---|---|---|---|---|---|---|---|---|
| GFI | 0.866 | 0.007 | 125.630 | 0.000 | 0.852 | 0.879 | | |
| GFI$^2$ | -0.000002 | 0.000 | -23.030 | 0.000 | 0.000 | 0.000 | | |
| FIS | 426.266 | 174.086 | 2.450 | 0.015 | 83.430 | 769.103 | | |
| d_nw | 352.836 | 179.988 | 1.960 | 0.051 | -1.622 | 707.294 | | |
| d_ne | 204.169 | 167.192 | 1.220 | 0.223 | -125.089 | 533.428 | | |
| d_c | 19.191 | 183.270 | 0.100 | 0.917 | -341.731 | 380.114 | | |
| d_s | 78.634 | 169.719 | 0.460 | 0.644 | -255.602 | 412.870 | | |
| cons | 16.458 | 147.559 | 0.110 | 0.911 | -274.138 | 307.054 | | |

*Source: Own elaborations on EU-Silc data of 2011.*

The coefficients related to gross farm income (GFI and $GFI^2$) and to FIS are significant. The coefficient for GFI shows that there is a reference level of taxation (the ratio between net and gross income) (Table 3). The coefficient for gross farm income is positive and equal to 0.866. Thus, without considering the role of other variables, net farm income is on average equal to 86% of gross farm income: this corresponds to a level of taxation of around 14%.

The estimated coefficients are comparable with the values of average tax pressure published by the Italian Institute of Agricultural Economics (INEA, 2011) that were equal to 9.8%. This data refers to the ratio between paid taxes and value added. In this work the income value used for calculations refers to Net Income, which is always below the corresponding value added. In fact, the first is obtained by subtracting to the value added the remuneration of all the external factors (interest on capital, wages and rents). The value added of the agricultural sector is on average equal to about one and a half the value of Net Farm Income (INEA, 2011).

However the level of taxation varies depending on the effect of other variables. In particular, as the coefficient for the quadratic gross income is negative, the level of net farm income gradually decreases as income increases. Therefore, the results suggest the existence of a relationship of progressivity of taxation. However, the estimated coefficient, although significantly different from zero, is extremely small. This suggests that the degree of progressivity is almost negligible and that the role of the quadratic gross income becomes relevant only for high income levels and, therefore, for a limited portion of the available observations. This result is also confirmed by the low value assumed by the Kakwani index referred to incomes from farming (0.16). Interestingly, the same index is higher when calculated considering *total* incomes, including off- farm sources: a result suggesting a regressive (less progressive) impact of agricultural incomes taxation compared with the overall direct taxation of incomes in Italy.

Finally, the coefficient related to FIS is positive and significant. This implies that, as the share of agricultural income increases, the level of taxation of agricultural income decreases. As the share of agricultural income tends to increase in households with higher total income, this would seem to indicate a source of distortion of agricultural taxation with regressive effect. This could be in accordance with the positive degree of correlation between Farm Income Share in the total household income and gross farm income (Table 1).

The coefficients related to geographical dummies are not statistically significant. This suggests that the level of farm income does not differ between households located in different geographical areas.

## 5. Conclusions

The work has achieved both methodological and empirical results. Regarding the first ones, the proposed approach allows to use the EU- SILC database to study the taxation in farm families. This seems particular useful because the obtained results can be used to complement other database, noticeably FADN, where this info is missing. This idea is borrowed from the statistical matching approaches (Pizzoli *et al.* , 2012; Rocchi *et al.* , 2012).

Regarding the empirical results, the work has provided some indications on the level of tax burden and on some factors affecting it, as well as on the degree of progressivity of the taxation of agricultural incomes.

In the group of families analyzed, the relative average taxation level (i.e. Income taxes/GFI) is approximately 13.3%.

However, the developed model adjust NFFI (adjusting the taxation level) on the basis of other elements, two of which are found to affect its level: the share of household income derived from farming and the square of the FFI level.

Regarding the first element, it was noted that the tax burden falls in the observations where the weight of farm incomes is high. In fact, when FIS approaches 1 (Household income only comes from farming), the NFI increases of approximately 400 euros. This suggests that agricultural incomes are less burdened by taxation, compared to non-agricultural. Regarding the quadratic component of income ($GFI^2$), it tends to reduce the NFI (at constant GFI), although it was stressed that the estimated coefficient is very small. This shows that, in the sample considered, it is found that the progressivity of the tax burden is positive but extremely small. Therefore, the results suggest that the level of tax burden of the considered farms are not very much affected by the amount of income actually produced. Indeed, the taxation of agricultural incomes seems paradoxically to have a regressive effect favouring rich farm families in which farming accounts for the large part of family income. Finally, the analysis does not support the hypothesis that the levels of taxation differ significantly in the various national areas.

Clearly, as in any empirical work, the analysis is subject to some limitations. Among these, the most important ones appear to be: the small sample size; the possibility of not having included in the model other relevant explanatory variables. Both of these limitations could be overcome in the presence of larger and more in-depth information on which to develop further analysis.

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