Using input-output to disentangle the farm income problem in Tuscany: an integrated macro-micro level analysis

Sara Turchetti[1] (IRPET), Tommaso Ferraresi[2] (IRPET)

Abstract

The aim of this paper is to analyze the distribution of the value added in the Tuscan agri-food chain and, in particular, to understand the position of agriculture along the value chain. Our analysis makes use of an interregional input-output table for Italian NUTS2 regions, augmented in order to single out value added generated in both production and post-production phases by the food final demand. We then single out the contribution in terms of value added of each sector and region from raw materials to consumption. Second, we build up a novel microeconomic dataset of Tuscan firms, derived from administrative and statistical sources, in which all the sectors of the economy are represented, together with their balance sheets, and assess how macro-economic indicators are mirrored by micro-performances of firms at work for the agri-food value chain. The results both at the macro and the micro-level show that the structure of the food value chain impacts agricultural firm profitability.

JEL codes: Q12, Q18, R15

Keywords: farm income problem, input-output analysis, agri-food value chain, agricultural firms

[1] sara.turchetti@irpet.it
[2] tommaso.ferraresi@irpet.it

1. The farm income problem

Over time the European economic support to farmers within the Common Agricultural Policy (CAP) framework has been justified by the so-called "farm income problem" (e.g., Gardner, 1992), namely the gap between agricultural incomes and the incomes of the other sectors and the need to bring farmers' earnings to converge with the levels of incomes of the other sectors. The reasons identified at the basis of this gap are the low elasticity of demand with respect to income and food supply, always conditioned by climate variability and other exogenous factors, the variability and instability of prices and the relatively low returns on investments in technology (USDA, 2007; Mishra, 2002).

As far as the farm income problem still persists, other motivations may be more connected to the structure of the food value chains and the relative position of agriculture rather than internal problems of the agricultural sector. Accordingly, one of the main aim of the 2023-2027 CAP is to improve the position of farmers along the agri-food value chain, in order to increase their incomes and to limit the asymmetric transmission of prices along the value chain. Indeed, in time of constant prices and stable supply, the issue turns to be less crucial, even if some imbalances along the supply chain might still persist (Pecci, 2011; Zaghi e Bono, 2011). However, the triggering of inflation and the increasing probability of supply crises at the global level, due to the diffusion of unpredictable natural disasters associated to climate change, have recentralized the issue of redressing these imbalances.

Is there still a "farm income problem"? Studies from Gardner onwards have underlined that the gap between farmers' income and the income of other sectors has narrowed over time. A recent longitudinal empirical study by Marino et al. (2018), who used the EU-SILC survey on the well-being of European citizens in the decade 2005-2015, highlighted that, except for Central Europe, farming families are not poorer than the others, especially those with primary agricultural income.

The variability of the results depends on the approach used, whether on the production or the consumption side, on the variables used to measure income and related indicators and on the available sources of data, which are always fragmented and dispersed in case of agricultural analysis (Hill, 2018). Moreover, the growing complexity of the agricultural world and its heterogeneity make it even more difficult the estimation of the remuneration of factors (Finger and El Benni, 2021). A variety of business models are observed in the agricultural world that move on a broad continuum, ranging from micro and small companies, mainly dedicated to self-consumption and integration of the primary income, to the more market-oriented big companies, with large concentration of physical, financial and human assets. For example, in the case of Tuscany, half of the utilized agricultural area (UAA) is cropped by 5% of the biggest companies and 100% employees are hired by only 16% of the farms (IRPET, 2022; IRPET, 2022a).

Profitability can also vary based on the capacity to differentiate production. Generally speaking, agricultural products are intrinsically more homogenous compared to food products. However, the margins of differentiation of the so-called "fictitious differentiation" - i.e., based on some additive characteristics determined by marketing, including advertising, branding, labeling and any other element that can confer specificity and non-approval to the product - has increased over time (Saccomandi, 1999), because of the ever-increasing focus on the territories of origin, quality, healthiness and production methods characterized by environmental or social sustainability.

The main aim of this paper is to find out whether the farm income problem, in the very specific case of Tuscany, still exists, and whether it relates to the position of agricultural firms in the agri-food value chain. In the next section we carry out a macro-level analysis using the interregional input-output tables of IRPET,

to bring about evidence about the position of Tuscany agriculture along the agri-food value chain and how it relates to the profitability of the agricultural sector; next, the results from the macro-analysis are integrated with a micro-level analysis of farms profitability.

2. The farm income problem from a value chain perspective

In this Section we provide an assessment of the profitability of Tuscan agriculture in the agri-food value chain starting from a macroeconomic perspective. More specifically, we implement input-output techniques so as to pin down the different actors working over the supply chain in different production and post-production stages, together with the remuneration which they get for their activities.

Before proceeding with the analysis, it is useful to provide a definition of what is meant by agri-food value chain. The commonly accepted definition refers to it as the set of "distinct and separable technological stages of production associated with the use of a certain resource or with obtaining a specific product. The productive-technological supply chains serve to highlight the interrelationships existing between the various production phases, the technological stages relating to the use of the agricultural product and the relative markets" (Saccomandi, 1999: pp. 36-37).

Bearing this definition in mind, we complement it with the framework provided by Gereffi and Fernandez-Stark (2016), which define a value chain as "the set of activities that companies and workers carry out to bring a product from its conception to its final use and beyond. This includes research and development (R&D), design, manufacturing, marketing, distribution and final consumption support" (p. 7). In such a definition, the role of consumption in activating the set of activities aimed at producing food is highlighted, together with the one of post-production stages.

In our input-output framework, the agri-food value chain can be defined as the set of production stages carried out by different sectors and places to serve the final demand for food in a specific area. Technically, COICOP household food consumption function constitutes the demand shock activating the various production phases which are then analyzed in terms of factor remuneration.

In this sense, the food chain can be reconstructed starting from the demand for food of families and from all the economic activities called, directly and indirectly, to satisfy it. By way of example, the demand for food of Italian families will be expressed through a basket of finished products, produced by some firms, partly operating on the Italian territory. The latter ones will require intermediate inputs and raw materials, which will thus be also part of the supply chain. But the producers of these raw materials will also need intermediate inputs. And so on. The supply chain will therefore be the set of economic activities intended for the creation of the finished products demanded by consumers.

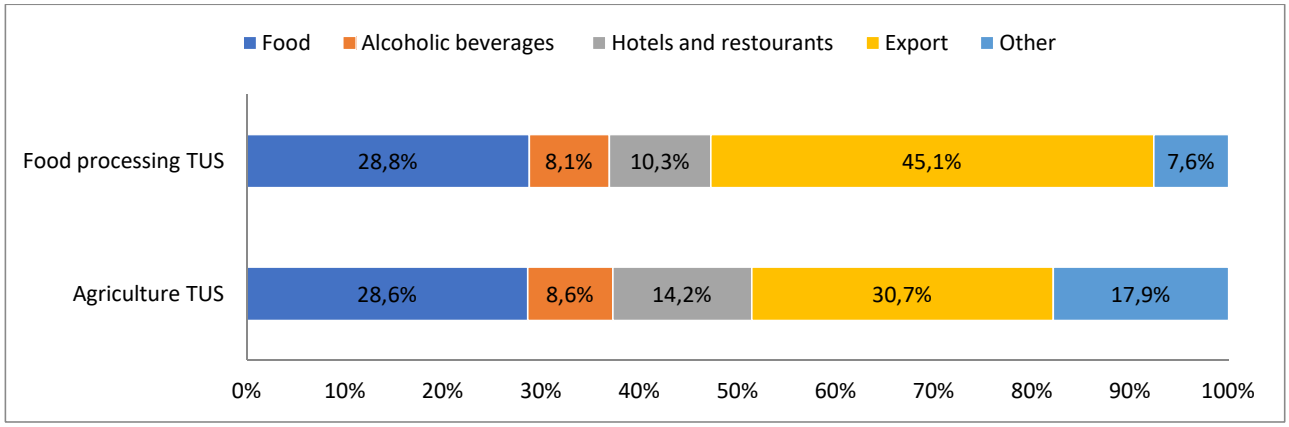
Apart from that for food, other components of final demand contribute to generate the value added of the strategic sectors for food provision. For instance, final demand for alcoholic beverages and for hotels and restaurants. In this respect, we can break down the value added of the two main sectors involved in food production, i.e., agriculture and food processing, according to the relative shares of the different value chains they work for. More precisely, we distinguish three needs within the expenditure items of Italian families: food, alcoholic beverages and expenses for hotels and restaurants. These are three items of expenditure that can well represent, for agriculture and food, the set of productions that fall within the food chain. In addition to these, we identify the productions intended to satisfy foreign demand, and then group the others into a residual supply chain.

Assuming the value added of each of these sectors to be 100, Figure 1 shows the relative importance of different value chains in generating sectoral value added. In both sectors, foreign demand is the one that contributes most to activation, although for the food industry the contribution is 45.1% and for the agricultural sector it is 30.7%. This is not surprising considering the importance for Tuscan exports of sectors such as wine, olive, horticulture and the confectionery and bakery products industry.

The demand for food from Tuscany and the rest of Italy generates almost 30% of the value added in both sectors. With regard to agriculture, which is typically a basic sector, around 40% of this share is activated by intermediate demand, therefore aimed at transformation, while the rest is sold directly to meet the final demand.

Finally, Figure 1 highlights the strong link in Tuscany between agri-food production and hotel and restaurant services, which generate 14.2% of agricultural value added and 10.3% of that of the food industry.

Figure 1: The sources of value added for food processing and agriculture in Tuscany



Source: Elaborations on IRPET IRIO table 2018

Figure 1 has made it possible to identify the different sources of income for agriculture and the Tuscan food industry. Once that agri-food value has been generated, is it possible to estimate its distribution among the various economic sectors of the agri-food value chain? The following analysis is part of the few studies in the literature that use the input-output tables to break down the value added starting from the final demand for agricultural and food products, in order to return the share of each sector that makes up the agri-food chain (Nucera et al., 2016; Finizia and Merciai, 2012).

From the point of view of the consumer who buys a finished product, the price of the latter can be considered as the sum of all the contributions (in terms of value added) to its creation. It includes the remuneration of the commercial activity, of the final producer, and of all those who have carried out the necessary intermediate productions.

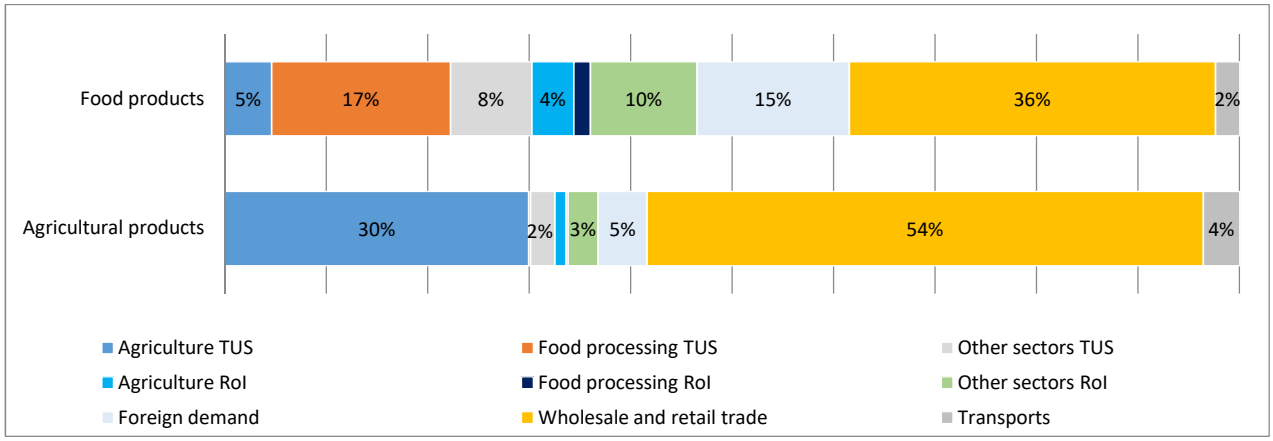
Assuming 100 the price paid by the consumer, through the system of input-output tables of IRPET we can estimate, the distribution of contributions in terms of value added along the production chain. To the "production" chain, which starting from an interregional table at basic prices estimates the distribution of value added between sectors and regions net of the post-production intermediation phases, we have "added" post-production intermediation activities, namely commercial and transport margins. Adding these together makes it possible to evaluate the distance between the price paid by consumers (which includes trade and transport margins) and the price paid to actual producers (which is net of them).

Assuming 100 the final expenditure on agricultural and food products addressed by Tuscany, Figure 2 shows the breakdown of the value added of the agri-food chain. The share of commercial margins for both sectors is immediately evident, and in the case of agriculture it is even higher (54%). Such results are consistent with previous studies (see, e.g., Finizia and Merciai, 2012).

The value added of agriculture for the direct purchase of agricultural products is about 30%, while when agricultural products are processed and then sold as food products, the margin left to the agricultural sector for factor remuneration is significantly lower (5%). As a study by Nomisma already noted in the 1990s, the Italian agri-food value chains suffer from consolidated imbalances (lack of competition, concentration of distribution, excessive presence of commercial intermediaries), which are often unloaded on farms, reducing their profit margin, or on consumers, by increasing the selling prices of products (Pezzoli, 2011; Petriccione et al., 2011). Consequently, it is said that the increase in consumer prices does not depend on inefficiencies of farms, but, very often, on external costs relating to the structure of the entire agri-food chain. The gross operating margin of Tuscan agriculture, after deducting labor costs and taxes, is about one third of these two residual shares.

Taking 100 expenditure on food consumption, the value added of the food industry is around 17% and the supply chain is considerably more fragmented in terms of the sectors that participate in it.

Figure 2: value added remuneration of different sectors being 100 final expenditures on food alternatively produced by food processing industry and agriculture



Source: Elaborations on IRPET IRIO table 2018

Tuscan agriculture faces a high gap between the price paid by consumers and the remuneration of its contribution. Net of the low efficiency, which might partly characterize the agricultural and food activities but also other sectors, the high profitability margins of the downstream sectors, necessarily force the former ones to reduce their profitability margins or the production itself.

3. Profitability in the agri-food value chain from a micro perspective

The macroeconomic input-output approach, although appealing, returns results which might hide high within-sector heterogeneity, and which demand for firm level analyses. However, the complexity of the agricultural world, characterized by a large component of informal work and self-consumption and by a high proportion of subjects for whom agricultural activity is secondary and supplementary to a primary income, generally does not allow to rely on microeconomic databases for the analysis of economic performances at firm level.

In this Section we attempt to overcome some of the issues related to agricultural firm level data and provide a microeconomic assessment of firm profitability in agriculture vis-à-vis other actors in the agri-food supply chain. We first build a novel micro dataset containing performance indicators for agricultural firms which are comparable with those recovered for firms belonging to different sectors (Section 3.1). Second, using this newly built dataset, we investigate the farm income problem in the food value chain from a micro-perspective and highlight pressures towards profit compression for agricultural firms; especially those serving longer value chains (Section 3.2).

3.1 A new dataset to consistently analyze firm profitability in the food value chain

The general objective of this work is to analyze the microeconomic heterogeneity of profitability of agricultural enterprises. To do that, we need to construct profitability indicators as far as possible consistent with the macroeconomic analysis developed through the input-output table, notably: production, intermediate costs, value added and, as components of the latter, gross operating margin and labor cost.

Information about firm performances in terms of output, value added and profits, mainly stems from tax records. Starting from the tax declarations relating to the payment of the regional tax on productive activities (IRAP: *Imposta regionale sulle attività produttive*), on the one hand, to the tax declarations relating to the agricultural income of persons and companies, and to the income from employment of individuals, on the other, we have reconstructed various archives which were subsequently analyzed, separately and/or jointly in this work.[3]

The most complete source of balance sheet information in tax archives at our disposal is represented by IRAP declarations. However, the portion of agricultural enterprises subject to it and which fill in the items we need is relatively limited. This is why, in addition to the more comprehensive archive in terms of information, we have reconstructed databases that are less exhaustive in terms of economic items but more complete in terms of the number of companies subject to declaration.

Through the IRAP declarations and the declarations of income from employment of individuals we have reconstructed two databases for the declaring subjects. The first one presents fields relating to the company's value added, labor cost and, by subtraction, gross operating margin. The second, which contains information about only those subjects for whom more information is available, presents data about turnover, production, intermediate costs, and value added in its two components of labor costs and gross operating margin.

To create the first of the two databases, we made use of the IRAP declarations of all the subjects who completed the declaration in the years of interest. For each economic subject, the value added was obtained, alternatively, by the difference between production and intermediate costs or by the sum of its components, according to the parts of the declaration which were filled in. Once estimated the value added of the individual economic entity, we have computed the value of the labor cost, alternatively, as the sum of the deductions of income from employment, or as the sum of the declared labor cost, or as the sum of the income from employment (appropriately revalued to take into account the contributions paid) of all those subjects who have indicated the company in question as a withholding agent in income declarations.

The second of the two databases, richer in information but relating to a smaller number of subjects, shows positive items (turnover, production) and negative items (intermediate costs actually incurred within the

[3] IRAP is due for the habitual exercise of activities aimed at the production or exchange of goods or the provision of services.

period) for the purpose of calculating the value added (obtained therefore as a subtraction between production and intermediate costs) and contains an estimate of the division of value added between labor costs and GOP which essentially follows the procedure followed for the construction of the first of the two archives.[4]

To define the observed population of this study, we started from the open dataset of the Tuscan Regional Agency for Agricultural Disbursements (ARTEA), which contains the shape files of the crop plans, the so-called Piani Colturali Grafici (PCG), that farms periodically submit to the agency.[5] The reference period is the three-year period 2017-2019 and the number of farms for each year is approximately 35,000, for a total of approximately 660,000 hectares of UAA (Tab. A1 in the Appendix). Subsequently, we verified the presence of these companies in the tax archives, tracing about three quarters of them for a total of over 85% of UAA.

To complete the panel with other variables of interest, we used statistical archives from ISTAT (namely, Asia-Local Units, Asia-Frame and Asia-Agriculture Archives) identifying firm size in terms of employees and turnover class and attributing a NACE REV. 2 code.[6]

We also used the ISTAT archives to integrate the panel with companies from other sectors. In the three-year period 2017-2019 we managed to trace a total of 430 thousand companies, of which 5.9% belonging to the agricultural sector. Farms are defined here as those present in the PCG. To this group we added companies (2,767) appearing in the ISTAT archives with NACE REV. 2 code corresponding to agriculture but not present in the PCG.[7]

The panel was then joined with fiscal archives. Tables A4 and A5 in the Appendix display some characteristics of IRAP vis-à-vis non IRAP firms. In particular, they are distributed differently among the various legal forms, with an over-representation of corporations and partnerships and an under-representation of sole proprietorships (Tab. A4). Moreover, IRAP companies represent about 60% of the surface area of our population and half of the total UAA. The average UAA is greater for IRAP firms, but the median is almost the same: the differences in terms of surface dimensions emerge in the long tail of the

[4] Having reconstructed the first two databases not only for agricultural enterprises but also for all other economic subjects and having available for the latter financial statement information from other statistical sources, we were able to validate the obtained estimates by observing the distributions of the various indicators of interest for companies present both in the tax archives and in the official ones available. As far as agricultural incomes are concerned, we instead added the income items deriving from the RA cadres (agricultural income) of the tax returns of physical persons, partnerships and corporations. Both from the IRAP declarations and from the income declarations of sole proprietorships and companies we have also obtained information relating to the NACE sector of the companies.

[5] All farmers who intend to demand the economic support within the common agricultural policy (CAP) framework are obliged to present periodically their crop plans. The archive is representative of both the total of active Tuscany farms and the total agricultural area. The data have been preliminarily processed to join the yearly datasets at NUTS2 level in a unique dataset; then we eliminate the records relating to technical-economic units (UTE) not eligible for the utilized agricultural area (UAA).

[6] Table A2 in the Appendix shows some characteristics by turnover class. Three quarters of the companies fall into the top three turnover classes and use about half of the surface area. The average company size in terms of UAA grows with the increase in turnover, as do the number of employees and the incidence of companies with at least one employee, which in the last two turnover classes is 100%.

[7] 86.5% is classified as sector A and for the vast majority as A01: Agricultural crops and production of animal products (81.7%); A02 follows: Forestry and logging (3.9%) and A03: Fishing and aquaculture, hunting and related services (1%) (Tab. A3 in the Appendix).
The remainders specialize in services and only a minority share in processing. 5.9% of farms have a NACE REV. 2 I: Accommodation and restaurant service activities, with a prevalence of accommodation activities, while 1.8% have a NACE REV. 2 G: Wholesale and retail trade.

distribution due to the presence of very large companies, exceeding 1500 hectares. Differences in terms of number of employees and share of companies with at least one employee are not that relevant (Tab. A5).

3.2 Preliminary results

Having described the construction of the dataset and provided some descriptive statistics in Section 3.1, we now tackle the issue of the farm income problem from a microeconomic perspective. In this paragraph we estimate profitability using the gross operating margin (GOP) as an indicator. This cannot be done on all companies but only on those subject to IRAP, which are a smaller group of the observed population (see table A4 in the appendix).

An initial estimate of the GOP in the three-year period 2017/2019 confirms that the gap between agriculture and the rest of the economy in terms of profitability is significant: the average GOP of agriculture is around 25,000 Euro, i.e., 7.5% with respect to that of other sectors. As expected, the comparison is limited by the heterogeneous composition of the rest of the production system, whereby the dispersion around the mean is greater and conditioned by many outliers. If we consider the median GOP, it is equal to approximately 3,000 Euro, or 17.2% of the rest of the Tuscan economy (Tab. 1).

If we compare agriculture with the other sectors of the agri-food chain, some significant differences are observed, even if the gap remains and, in some cases, is even wider. For example, the average GOP of agriculture is 3.1% of that of beverages, which has rather high margins, especially in the long tail of distribution (Tab. 1).

All the other sectors of the supply chain have lower profit margins than those of beverages and less heterogeneity. The gap compared to agriculture remains high, but it is observed that in the case of the food sector the agricultural median GOP is particularly low, so that even the smallest food companies recover higher profitability margins, both if compared with agriculture and with other sectors.

Finally, another element to take into consideration is the difference between retail and wholesale. Wholesale intermediaries have higher margins not only compared to agriculture, a sector upstream in the supply chain, but also compared to the retail sale of foodstuffs.

Table 1: Sectoral mean and median GOP and share of agriculture with respect to other sectors (Tuscany; mean 2017-2019)

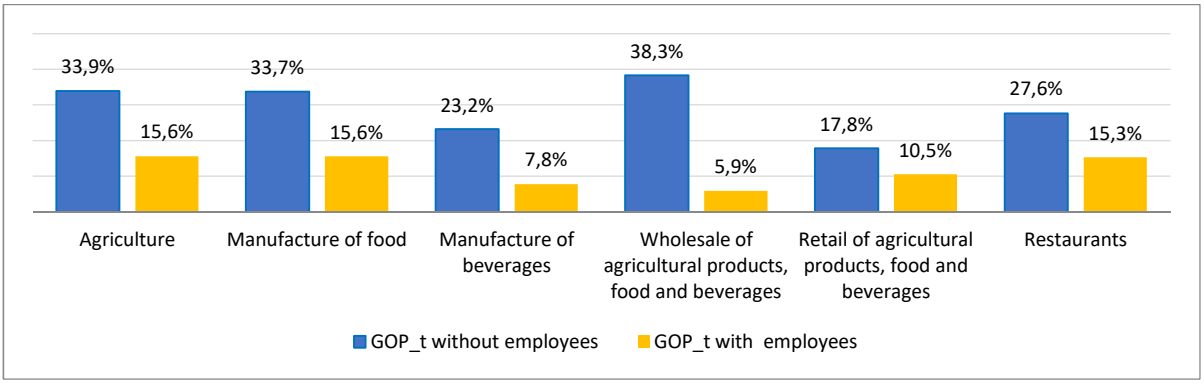
	Mean	Median	% agricultural mean GOP	% agricultural median GOP
Agriculture	24.842,7	2.878,8		
Manufacture of food	116.754,6	32.590,9	21,3	8,8
Manufacture of beverages	800.876,5	21.060,7	3,1	13,7
Restaurants	95.136,6	23.472,6	26,1	12,3
Wholesale of agricultural products, food and beverages	93.401,4	25.723,8	26,6	11,2
Retail of agricultural products, food and beverages	51.522,1	16.813,3	48,2	17,1

Source: Elaborations on Tax archives, PCG e ASIA-agricoltura

We have calculated the share of GOP on turnover, broken down by companies with and without employees. There are 3,661 IRAP farms with employees, therefore one third of the total. In the absence of employees,

by definition, the GOP share of turnover is higher, as the cost of labor decreases. As can be seen in Figure 3, there is no significant differences compared to other sectors, while the profitability gap between companies with and without employees emerges.

Figure 3: Median GOP on sales in firms with/without employees (Tuscany; mean 2017-2019)



Source: Elaborations on Tax archives, PCG e ASIA-agricoltura

Thus, as a primary result, we observe that while, in absolute values, there is still a gap between the part of Tuscan agriculture that we observe and the other sectors, the profitability margin with respect to turnover is comparable with the rest of the economy. One interpretation of this evidence is that the distance between the price imposed on producers by commercial operators and the price faced by consumers tends not to benefit the agricultural sector but the downstream sectors. This is consistent, among other things, with what emerges from the macro analysis and confirms that the farm income problem is more connected to the structure of agri-food value chain than a supposed inefficiency of farms compared to firms of the other sectors. Obviously, the analysis refers to the very specific case of Tuscany farms, even if the degree of integration of the food value chains beyond the regional and national boundaries increases the probability that these results can be extended to other cases.

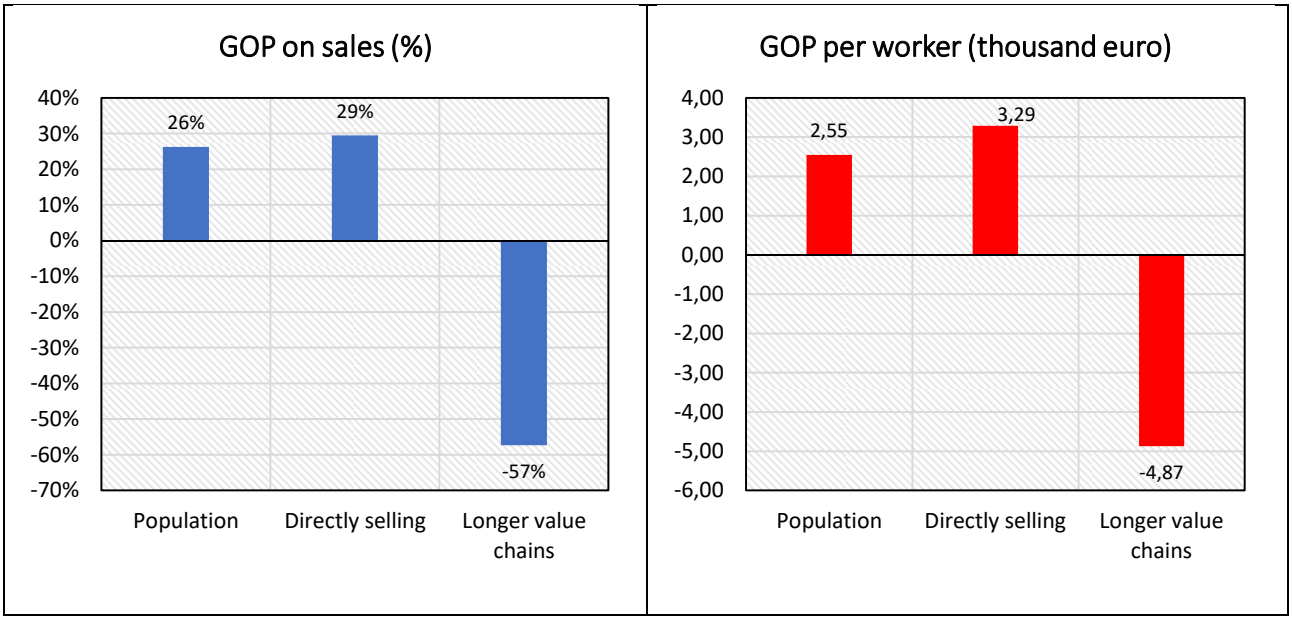
To sum up what we observed thus far, in line with what we expected by observing input-output data, agricultural firms vis-à-vis food processing enterprises do show comparable results in terms of GOP on sales, whereas much lower levels of profits in absolute terms (either total or per worker). It is finally interesting to find some more specific evidence that such results are, at least partially, driven by the position of agricultural firms in the food value chain.

In this respect, by exploiting the results from a survey on agricultural firms realized in 2019 we can disentangle the results on profitability for those firms directly selling their products to households from those instead working to serve longer value chains, and thus selling to food processing firms or wholesale and retailing.

We consider as directly selling to consumers those firms whose at least 30% of revenues stem from direct selling or selling through farmers organizations and cooperatives. The second group of firms is instead populated by those enterprises which are recovering at least 30% of their revenues from selling either to other firms in the agri-food value chain or to wholesale and retailing.

In Figure 4 we report the results for these two types of firms with respect to gross operating margins on sales and per worker (median). The graph clearly captures how firms directly selling to consumers are able to obtain higher margins, with those serving longer value chains displaying losses.

Figure 4. Profitability of agricultural firms depending on their position on the value chain



Elaborations on ISTAT, IRPET, PGC, Tax Archives

4. Discussion

In this work we tackled the issue of the farm income problem in Tuscan agriculture vis-à-vis the other sectors in the agri-food value chain, combining a macro- and a micro- perspective. Through an input-output macroeconomic framework, we highlighted how a part of the farm income problem resides in the gap between the price paid by consumers and the return to agricultural producers. We also showed that most of this gap is generated by post-production activities, namely commercial services.

Results from the micro analysis are broadly in line with those stemming from the macro input-output evaluation. First, agricultural firms, although recovering margins on sales which are in line with those of the other sectors involved in the agri-food supply chain, are far behind when we look at margins in absolute terms. In other words, a relevant share of the price of food finally paid by consumers is formed forward in the value chain and this doesn't allow farmers to get a sufficiently high income from their activities. This guess is confirmed by the survey analysis: firms directly selling to consumers – i.e., also controlling the part of the value chain relating to commercial services – show higher margins with respect to those serving longer value chains. Although results are based on a limited number of respondents and must be confirmed by census data, they nevertheless show that scarce power exerted by agricultural firms in setting the price of food.

Based on these results, in the case of Tuscany the economic support of CAP is still justified by the troubles met by farmers to get an acceptable share of the price paid by consumers. Whether it is accepted that agriculture plays a crucial role not only as a economic sector but also in the environmental protection, especially in remote areas, the issue of providing a fair remuneration to farmers is a *sine-qua-non* condition to achieve the aim of a more sustainable agriculture. Since this study brings evidences that the structure of agri-food value chains affects the distribution of incomes among the various sectors and it confirms that the longer the chain the lower the margin of profitability of farmers, any support aiming at either improving their position or shortening the value chain, may help them to increase their profitability.

Considering the structure of the agricultural system in Tuscany, based on small business companies and family farms, the collective organization of both production and post-production stages would increase the bargaining power of farmers, especially vis-à-vis the commercial operators. According to Sorrentino et al. (2018) and Velázquez et al. (2017), not only the producers' organizations (POs) are able to counterbalance

market inequalities along the value chain but they also contribute to decrease the transactions costs of contracts. Moreover, it is recognized that collective actions turn to be useful to strengthen the overall efforts for a more sustainable agriculture (Cao et al., 2020).

References

Cao, Y., Tao, L., Wu, K., Wan, G. (2020). "Coordinating joint greening efforts in an agri-food supply chain with environmentally sensitive demand". *Journal of Cleaner Production 277*

Cristofaro, A. (2017). "Fisco e agricoltura: una difficile convivenza". *Agriregionieuropa*. Anno 13(50).

Finger, R., El Benni, N. (2021). "Farm income in European agriculture: new perspectives on measurement and implications for policy evaluation". *European Review of Agricultural Economics*. Vol 48 (2). Pp. 253–265.

Finizia, A., Merciai, S. (2012). "La catena del valore della filiera agroalimentare tramite la scomposizione dei consumi domestici delle famiglie". *Agriregionieuropa*. Anno 8(30).

Gardner, B.L. (1992). "Changing Economic Perspectives on the Farm Problem". *Journal of Economic Literature*. Vol. XXX, p. 62-101.

Gereffi, G., Fernández-Stark, K. (2011). *Global value chain analysis: a primer*. Center on Globalization, Governance & Competitiveness (CGGC), Duke University, Durham, NC.

Hill, B. (2018). *Farm income, wealth and agricutltural policy*. Third Edition. Routledge Revivals.

IRPET (2022). "Frammentazione fondiaria, attività agroforestale e servizi ecosistemici nelle aree interne e montane". Nota di lavoro 17/2022. http://www.irpet.it/archives/64310

IRPET (2022a). "Prime elaborazioni dei dati del 7° Censimento Generale dell'Agricoltura in Toscana". Studio commissionato all'IRPET da Regione Toscana - Autorità di Gestione del PSR-FEASR. http://www.irpet.it/wp-content/uploads/2023/04/irpet-prime_elaborazioni_censimento-nov2022.pdf

Marino, M., Rocchi, B., Severini, S. (2018). "The farm income problem in the European Union: A research framework and a longitudinal empirical evaluation". DISEI - Università degli Studi di Firenze. *Working Papers – Economics* N. 29/2018. wp29_2018.pdf (unifi.it)

Mishra, A.K., El-Osta, H.S., Morehart, M.J., Johnson, J.D., Hopkins, J.W. (2002). "Income, Wealth, and the Economic Well-Being of Farm Households". *Economic Research Service/USDA*

Nucera, M., Finizia, A., Ferrari, G.M., Merciai, S., Sorrentino, A. (2016). "La catena del valore Ismea per la valutazione dell'impatto delle OP ortofrutticole". *Agriregionieuropa*. Anno 12 (46).

Pecci, F. (2011). "Conoscere come si formano i prezzi nella catena alimentare". *Agriregionieuropa*. Anno 7 (27), pp. 1-5.

Petriccione, G., dell'Aquila, C., Perito, M.A. (2011). "Ortofrutta e catena del valore globale". *Agriregionieuropa*. Anno 7 (27), pp. 10-14

Pezzoli, A. (2011). "La filiera agroalimentare: i profili di rilevanza concorrenziale". *Agriregionieuropa*. Anno 7 (27), pp. 8-10

Saccomandi, V. (1999). *Economia dei mercati agricoli*. Il Mulino. Bologna.

Sorrentino, A., Russo, C., Cacchiarelli, L. (2018). "Market power and bargaining power in the EU food supply chain: the role of producer organizations". *New Medit.* Vol. 17(4).

USDA (2007). "Off-Farm Income, Technology Adoption, and Farm Economic Performance". *Economic Research Report Number 36*

Velázquez, B., Buffaria, B. (2017). "About farmers' bargaining power within the new CAP". *Agricultural and Food Economics 5:16*

Zaghi, A., Bono,P. (2011). “La distribuzione del valore nella filiera agroalimentare italiana”. *Agriregionieuropa*. Anno 7 (27), pp. 5-8

Appendix

Table A1: Population of agricultural firms and presence in tax data (Tuscany; 2017-2019)

	PIANI COLTURALI GRAFICI (PCG)			PRESENT IN TAX ARCHIVES		
	2017	**2018**	**2019**	**2017**	**2018**	**2019**
Nr.	36.675	37.088	35.979	26.343	26.450	25.566
%				*71,8*	*71,3*	*71,1*
SAU (HA)	663.831,5	669.693,2	669.213,3	589.455,1	588.802,5	578.783,4
%				*88,8*	*87,9*	*86,5*
AVG. SAU (HA)	18,1	18,1	18,6	22,4	22,3	22,6
MEDIAN SAU (HA)	5,4	5,3	5,6	7,8	7,8	7,9

Source: Elaborations on PCG and Tax archives

Table A2: Agricultural firms by turnover class (Tuscany; 2017-2019)

Turnover class (*thousands*)	**% firms**	**% SAU**	**Average size**	**Employment size**	**% of firms with at least 1 employee**
<19	37,4	21,2	16,4	1,3	39,1
19-49	23,3	18,4	22,9	1,5	48,0
50-99	14,5	15,6	31,1	1,9	68,6
100-199	10,0	14,5	42,0	2,6	85,2
199-1000	9,9	19,6	57,0	5,1	100,0
>1000	4,9	10,7	63,5	12,9	100,0

Source: Elaborations on PCG, ASIA-AGRICOLTURA, ASIA-UL, ASIA-FRAME

Table A3: Firms in the observed population by NACE rev. 2 sector (Tuscany; 2017-2019)

NACE REV. 2	Desc. NACE REV. 2	Nr. of non-agricultural firms	Nr. of agricultural firms	Total	% agricultural firms on total	% of sector on total non agricultural firms	% of sector on total agricultural firms
1	Crop and animal production, hunting and related service activities	0	20.662	20.662	100,0	0,0	81,7
2	Forestry and logging	0	981	981	100,0	0,0	3,9
3	Fishing and aquaculture	0	249	249	100,0	0,0	1,0
10	Manufacture of food products	3.129	61	3.190	1,9	0,8	0,2
11	Manufacture of beverages	163	34	197	17,3	0,0	0,1
46	Wholesale trade	35.025	165	35.190	0,5	8,6	0,7
47	Retail trade	50.362	295	50.657	0,6	12,4	1,2
55	Accommodation	6.431	1.308	7.739	16,9	1,6	5,2
56	Food and beverage service activities	24.983	183	25.166	0,7	6,2	0,7
	Other sectors	285.375	1.367	286.742	0,5	70,4	5,4
	Total	**405.468**	**25.305**	**430.773**	**5,9**	**100,0**	**100,0**

Source: Elaborations on PCG, ASIA-AGRICOLTURA, ASIA-UL, ASIA-FRAME

Table A4: Agricultural firms: IRAP vs. non IRAP (Tuscany; 2017-2019)

	IRAP	**Non-IRAP**	**Total**
Nr	10.925	9.883	20.808
Of whom (%):			
Sole proprietorship	*65,7*	*78,9*	*73,2*
Partnership	*20,9*	*17,2*	*18,8*
Public companies	*12,3*	*3,7*	*7,4*
Other	*1,1*	*0,3*	*0,6*

Source: Elaborations on Tax archives, PCG e ASIA-agricoltura

Table A5: Characteristics of firms: IRAP vs. non IRAP (Tuscany; mean 2017-2019)

	IRAP	**non-IRAP**
Nr.	10925,3	9883,3
SAU (ha)	329473,6	239135,0
AVG. SAU	33,3	21,9
Median SAU	10,1	9,8
Value added	513M€	-
Workers	17697,6	23605,6
% of firms with employees	33,5	28,7

Source: Elaborations on Tax archives, PCG e ASIA-agricoltura