



**IRPET** Istituto Regionale  
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Associazione Italiana  
di Scienze Regionali

# Using input-output to disentangle the farm income problem in Tuscany

*An integrated macro-micro level analysis*

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**Europa e Mediterraneo tra transizioni e conflitti.  
Opportunità e rischi per regioni e territori**



# Introduction

# Motivations

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- The European *motto* “*from fork to fork*”, aimed at reducing the length of the food value chains so as to bring more healthy and sustainable food to consumers, is contradicted by the evidence of the regional fragmentation of the food value chains and the distance between farmers and consumers
- The overall scope of agriculture is far beyond the production of food and entails environmental safeguard, the *presidium* of fragile inner areas, the provision of several services and vibrant territorial development (Gasselin and Sautier, 2023; Torre, 2020) → the achievement of these goals is slowed down by the long-standing issue of *farm income problem* (eg. Gardner, 1992)
- The convergence between the farm income and the income of the other sectors has for a long time justified the existence of the common agricultural policy (CAP)



# .... about the farm income problem -1

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Does it still exist?

- Studies from Gardner onwards have underlined that the gap 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
- Empirical evidence is very variable, depending 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)
- The agricultural world is more and more complex, in terms of growing heterogeneity (Finger and El Benni, 2021)
- Growing margins for “fictitious differentiation” (Saccomandi, 1999)



# .... about the farm income problem -2

Why? (USDA, 2007; Mishra, 2002):

1. low elasticity of demand with respect to income and food supply
2. Food supply is highly conditioned by climate variability and other exogenous factors → over time variability increased because of both climate change and increased market volatility
3. Relatively low returns on investments in technology

However, in a value chain framework, performances are supposed to vary according to both the value chain structure and the firm positioning (see, e.g., Lee et al., 2012; Gereffi and Christian, 2010)

*RQ1: is there any differences in terms of profitability among sectors of the food value chain?*

*RQ2: to what extent the relative position of agriculture can explain these differences?*



The focus of this research is on the production side



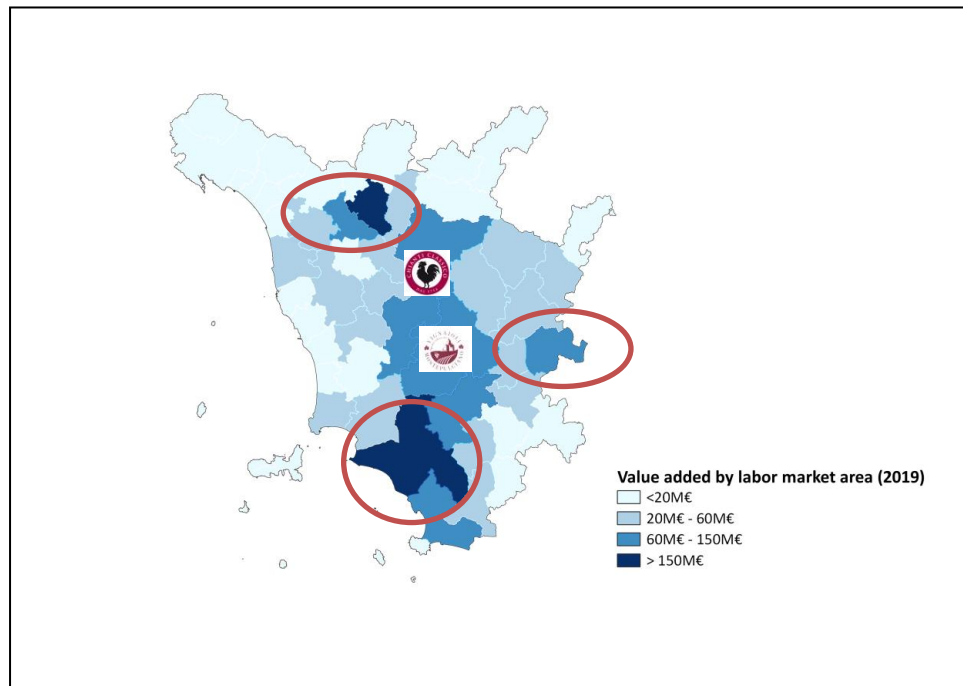
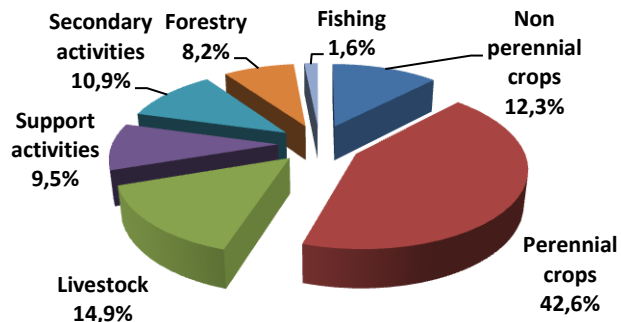
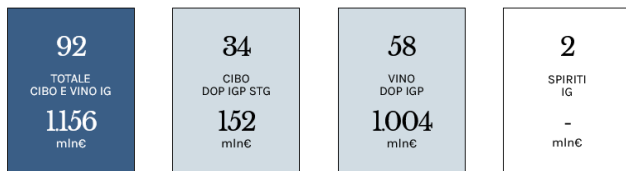
Family farming may have multiple sources of incomes which affect their overall wellbeing.

This is out of the scope of our research which has to do with market power and the distortions induced by the commercial companies in the food market (Pecci, 2011; Zaghi e Bono, 2011).



# Very few tips about agriculture in Tuscany...

## Dati prodotti DOP IGP STG e Spiriti IG





# Methodology

# Linking the macro structure to micro behavior

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1. We define food value chains as production networks activated by household demand for food and distinguish between production phases and post-production steps
2. We compare agriculture and food processing industry in terms of their positioning in the food value chains and assess the distribution of factor remuneration in production vs. post-production phases: characterization of farm income problem in an input-output framework
3. We then analyze firm level data and compare profitability in agriculture vis-à-vis other sectors at work in the food value chains (between-sector heterogeneity) → consistency with the input-output analysis
4. Thus, heterogeneity among farms (within-sector) in terms of profitability may be affected by the structure of value chain they belong to → We finally carry out a explorative analysis by comparing farms directly selling to final demand vs. other farms





# Methodology (Macro)

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1. We define a value chain as the set of contributions (or tasks) to be provided in order to deliver a final good or service (in our case, food): i.e., a **vertical integrated sector**
2. Tasks are performed by different sectors and we can broadly distinguish **production steps** (those carried on to materially produce the final good) vis-à-vis **post-production phases** (those connecting the final producers to consumers)
3. From a factor remuneration perspective, value added measures the contributions provided by different sectors ( $x$ ) to serve final demand for good  $i$  and distinguish between production ( $y$ ) vs. post-production ( $z$ ) phases:  $FD_i = \sum_{x,y} VA_{x,i,y} + \sum_{x,z} VA_{x,i,z}$ .
4. Normalizing final demand to 1 we can compute, for 1 euro of food expenditures, how many cents go to production phases vs. post-production steps



# Methodology (Macro)

5. In interregional input-output tables at basic prices the remuneration of production phases of a final good produced by different sectors of the economy is obtained by pre-multiplying the Leontief inverse by the matrix of value added coefficients:  $\hat{V} \cdot (I - A)^{-1}$
6. However, post-production phases would be excluded by tables at basic prices. In order to recover them tables at purchase prices are needed.
7. In particular, margins differently applied to different production sectors when delivering the final good have to be computed. Here, in particular, we look at those applied to agriculture vis-à-vis the food processing industry



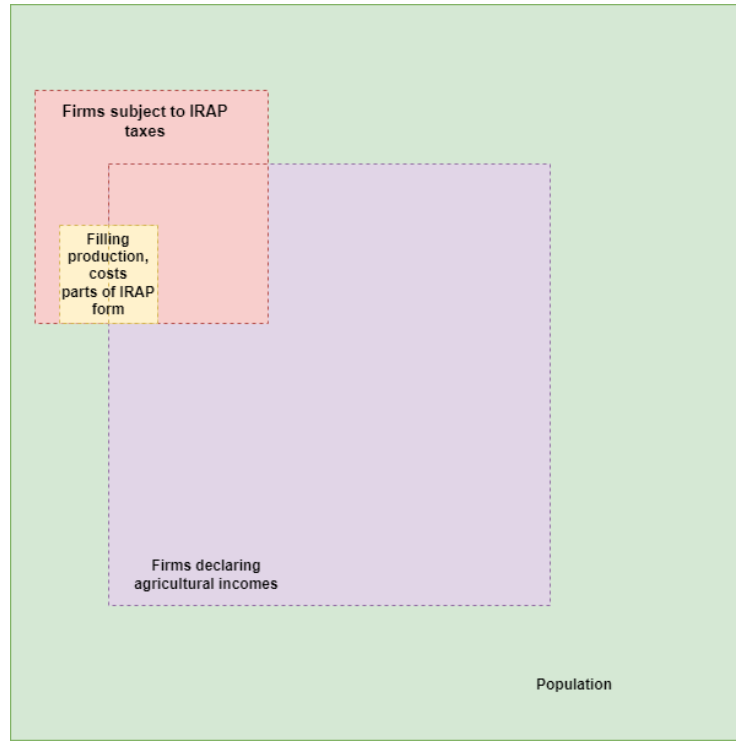
# Taking macro-methods to data...

Intermediate inputs				Final demand				Inventories	Exports
region	pie	vda	sar	pie	vda	sar			
sector	1..43	1..43	1..43	1..5	1..5	1..5			
pie	43..1								
vda	43..1								
	:	:	:	:	:	:	:	:	
	43..1								
	:	:	:	:	:	:	:	:	
sar	43..1								
imports									
value added									
taxes									

1. Starting from the interregional input-output table at basic prices constructed by IRPET (see Panicià and Rosignoli, 2018) we recover  $\hat{V} \cdot (I - A)^{-1}$ . Column-vectors return remuneration of different production phases.
2. We then compute margins related to post-production phases from a new table at purchase prices provided by IRPET (Panicià, *forth.*).
3. We then normalize to 1 the price paid by final consumers to buy final agricultural food products vs. final industry processed food and assess the share occupied by post-production phases in the two cases



# Taking micro-methods to data...



1. What is needed: production, intermediate costs, value added (gross operating margin and labor cost)
2. In this work we use tax declarations by firms (IRAP and income data) and employees (income data) in order to recover production, intermediate input costs, value added and labor cost
3. We then exploit survey data to disentangle different distribution channels





## Results

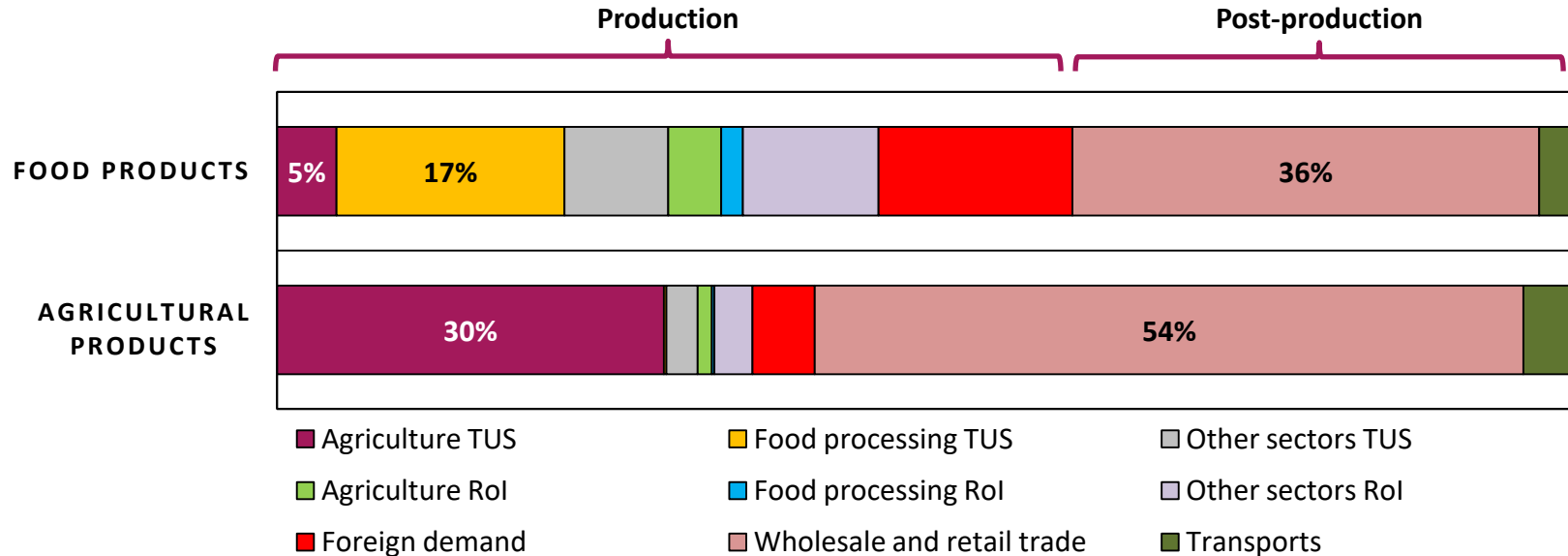
# Agriculture vs. Food Processing: value added



National consumption expenditures on food generate almost 30% of value added in both agriculture and food processing industry. Relevant sources of value added are also represented by alcoholic beverage consumption and restaurants expenditures. Exports are more relevant for food processing industry (wine and olive oil) vis-à-vis agriculture (plants).



# Factor remuneration over the food value chain

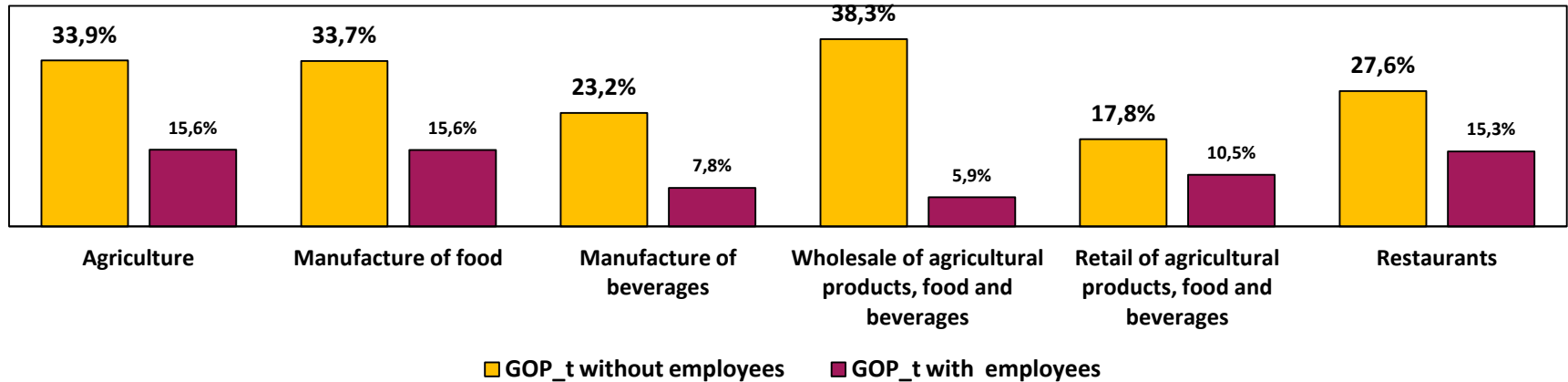


Post production processes (i.e., commercial services) capture most of the value added in the value chains activated by expenditures on agricultural final goods (54%).

I.e., the price more than doubles in the phase connecting producers to consumers!



# Going micro.. is it a «backward» problem?



GOP on sales in agriculture are aligned with that of other sectors involved in the production and/or in the distribution of food.

However





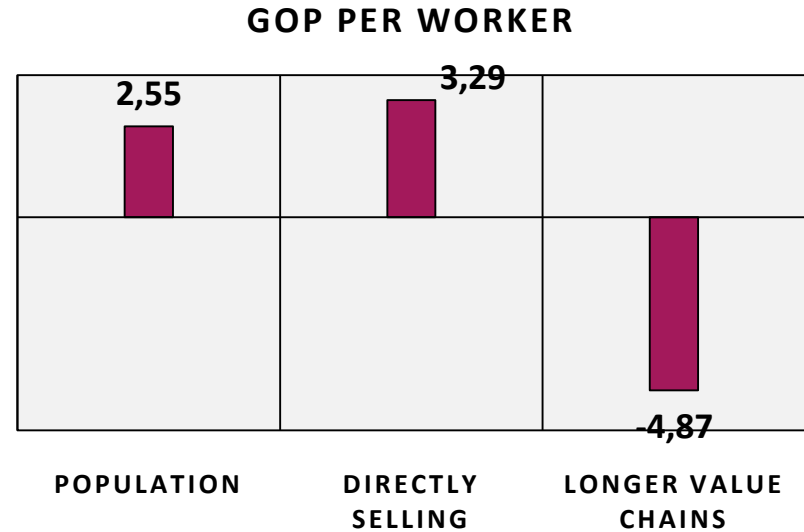
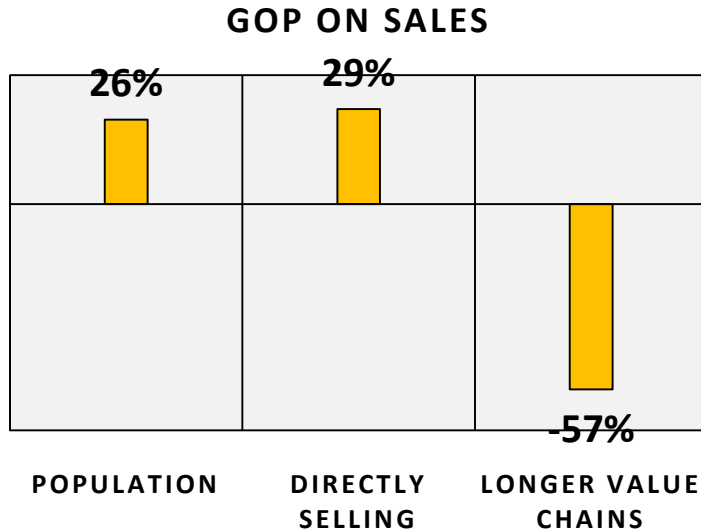
# Going micro: but absolute GOP quite low

	Mean	Median	% agricultural mean GOP	% agricultural median GOP
Agriculture	24.843	2.879		
Manufacture of food	116.755	32.591	21,3	8,8
Manufacture of beverages	800.877	21.061	3,1	13,7
Restaurants	95.137	23.473	26,1	12,3
Wholesale of agricultural products, food and beverages	93.401	25.724	26,6	11,2
Retail of agricultural products, food and beverages	51.522	16.813	48,2	17,1

- Average/median GOP of agriculture are rather low compared to other sectors
- High heterogeneity (high mean to median ratio)



# Is it a «forward» problem? A primary explorative analysis...



- Firms serving longer value chains (i.e., selling to wholesale distribution and to food processing industry) display lower (actually negative!) margins...
- This result will be further investigated using the next Census data





# Discussion

# Concluding remarks

- In this work we explore the farm income problem from a value chain perspective
- We did that by complementing an IO analysis with microdata about farms
- Our research questions were:
  - RQ1: is there any differences in terms of profitability among sectors of the food value chain?*
  - RQ2: to what extent the relative position of agriculture can explain these differences?*



- We find that:
  - Most of the value added generated by consumption of final agricultural goods goes to commercial services
  - Microdata mirrors macro results since agricultural firms show lower profit margins with respect to other sectors involved in the food value chains and, at the same time, agricultural firms involved in longer value chains display even lower margins
- in the very specific case of Tuscany, we can conclude that the structure of the food value chain and the relative positioning of agriculture highly contribute to the farm income problem by relatively decreasing the profitability at sector level

# Future research

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1. Pinning down extra-profits (due to, e.g., monopsony and market power in general), especially in commercial services, and figuring out some policy implications (e.g., supporting producers' organizations and networking might compensate for the bargaining power of big companies)
2. Segmenting value chains according to i. different items in the food basket; ii. different sectoral specializations in both agricultural sector and food processing industry
3. Filling production, value added, intermediate costs, labor cost for a larger group of agricultural firms in order to increasing macro-micro consistency
4. Better identifying firm level characteristics vis-à-vis positioning and value chain structure through new Census data





Thank you!

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