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Distribution of farm income and redistribution role of CAP payments in France

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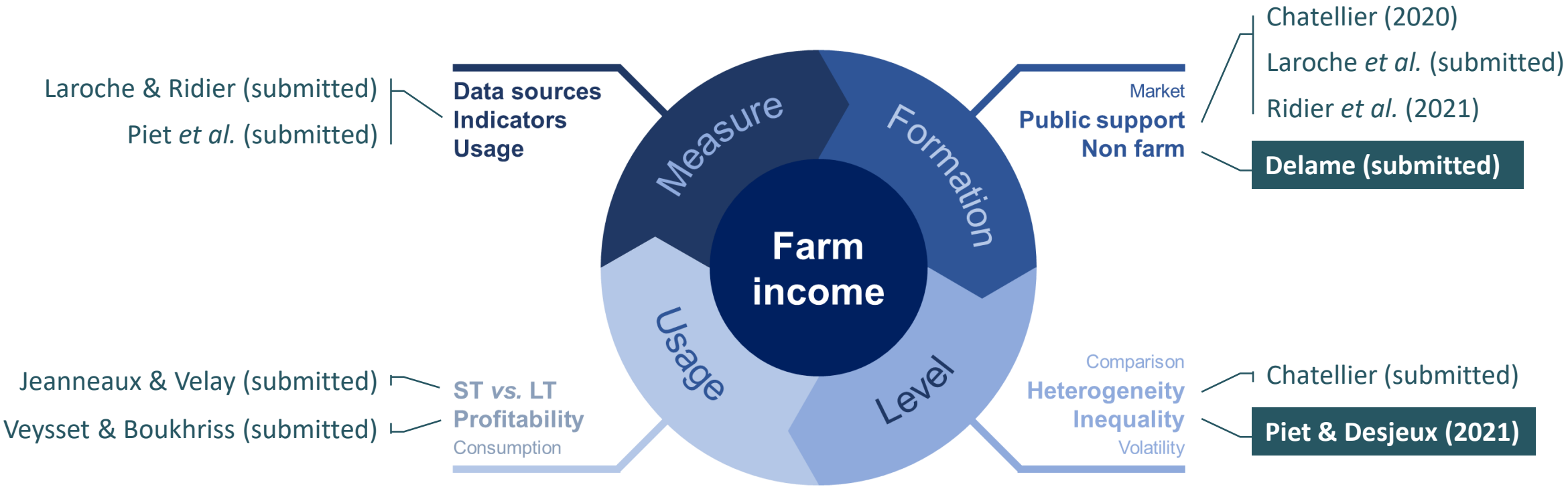
Overall background

- The **Agr'Income** research project
  https://www6.rennes.inrae.fr/smart/Contrats-de-recherche/Agr-Income (FR)



This paper's background

- Previous studies on ag. income inequality mostly rely on the Gini coefficient

  (Ahearn et al., 1985; Keeney, 2000; El-Osta and Morehart, 2002; Allanson, 2006, 2008; Allanson and Rocchi, 2008 Mishra *et al.*, 2009; Moreddu, 2011; El Benni and Finger, 2013; Severini and Tantari, 2013a,b)

  - Relative or absolute Gini, and its decompositions ► A single **summary** measure of inequality

- Our contribution

  - Apply **Ferreira *et al.*'s (J. Applied Econ., 2019)** method

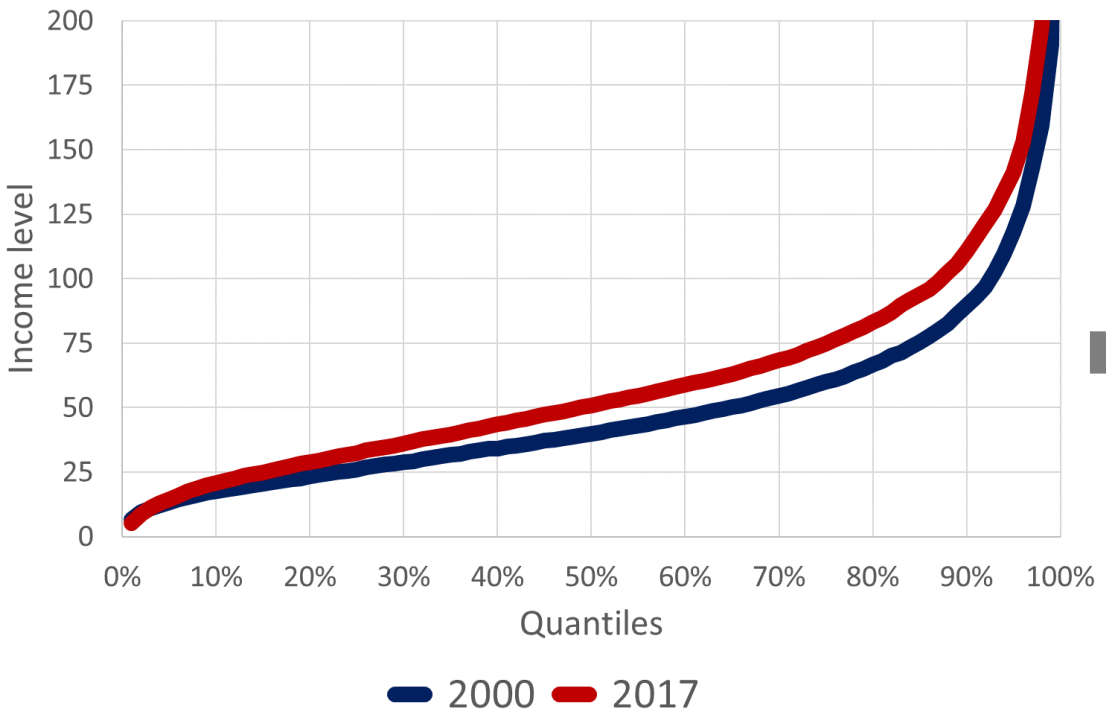
  - Detailed analysis of the overall farm income **distribution** at the quantiles level
    - What happens at virtually any level of the income distribution
    - More systematic / less arbitrary than specific centiles, deciles or quintiles
      (El Osta and Morehart, 2002; Mishra *et al.*, 2009; Sinabell *et al.*, 2013)

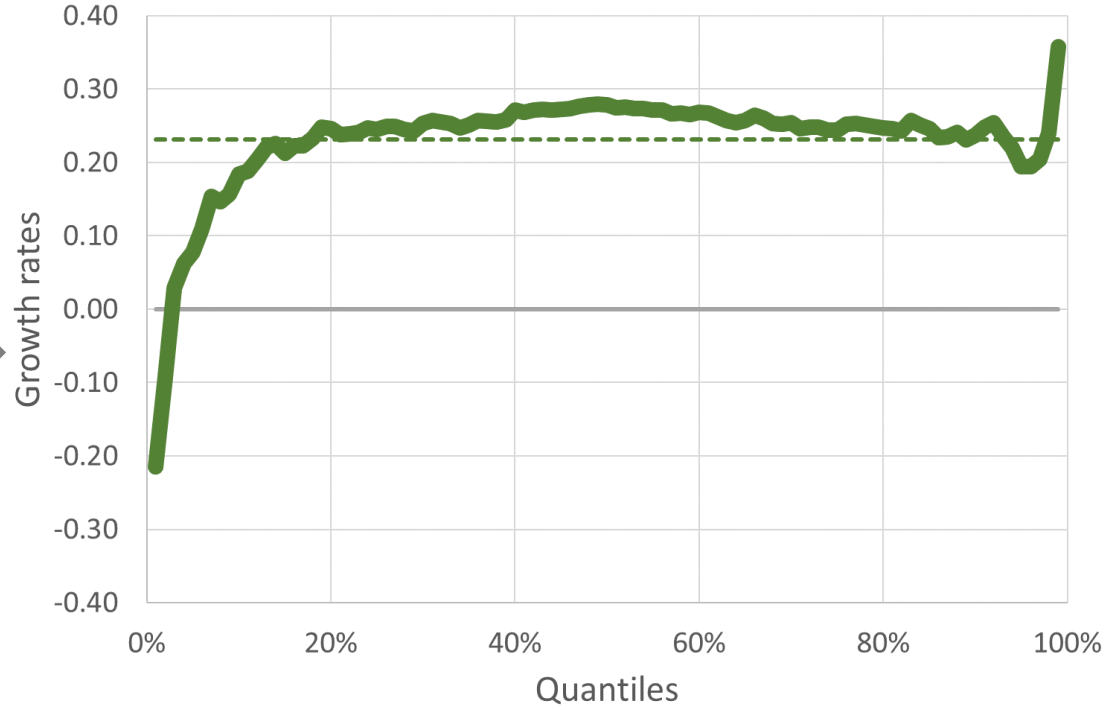
  - Allows to **compare** income distributions
    - At two different dates
    - Before and after public support transfers
    - Factual *vs.* counterfactual ► impact of **economic context** *vs.* of **potential drivers**

Model (1/3)

- The Growth Incidence Curve (GIC)
  - **Income growth rates** at all quantiles

For any τ, between t and $t-1$: $\mathrm{GIC}(\tau) = \frac{q_t(\tau)}{q_{t-1}(\tau)} - 1$, for any $q_{t-1}(\tau) \neq 0$

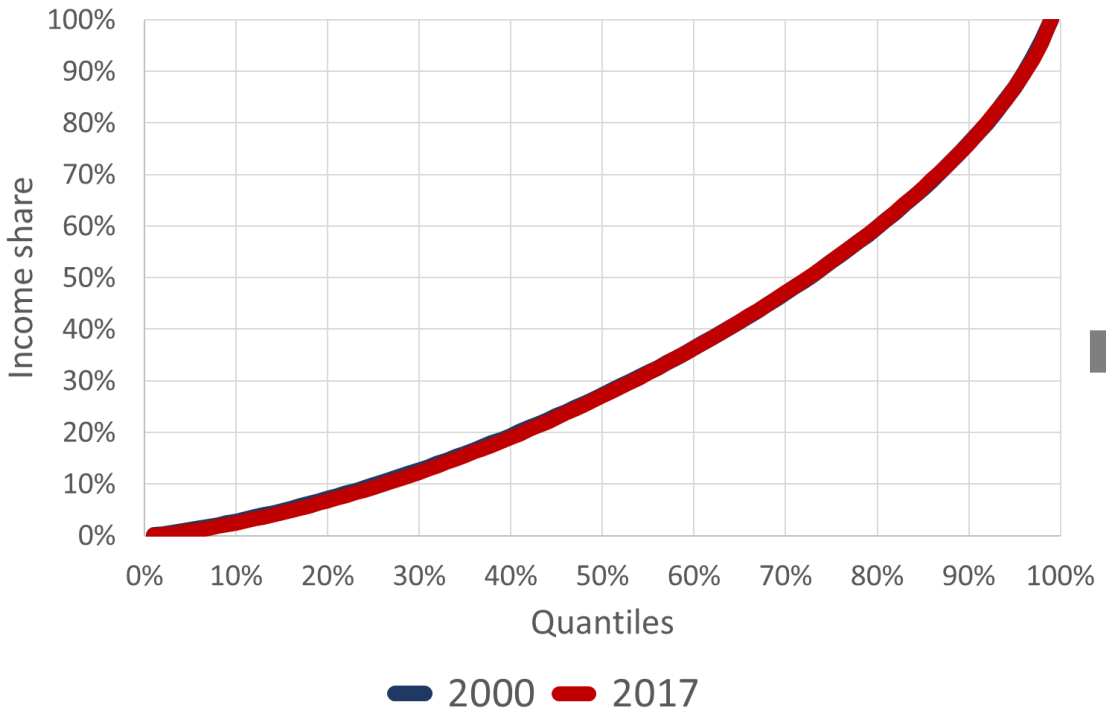


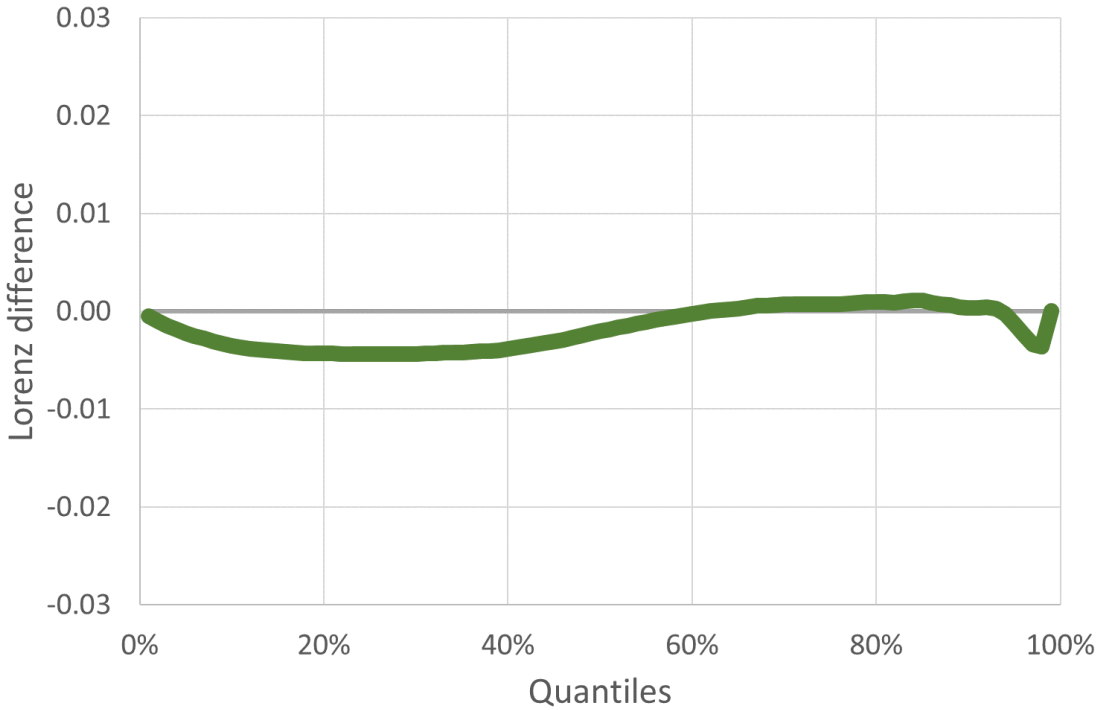


Model (2/3)

- The Delta Lorenz Curve (DLC)
  - **Difference of the Lorenz curves** at all quantiles

For any τ, between t and $t-1$: $\mathrm{DLC}(\tau) = \int_0^{\tau} \left(\frac{q_t(s)}{\mu_t} - \frac{q_{t-1}(s)}{\mu_{t-1}} \right) \mathrm{d}s$, where $\mu_t = \int_{-\infty}^{+\infty} y \mathrm{d}F_{Y|t}$





Model (3/3)

- Counterfactual curves
  - **Hypothetical** GIC and DLC if the joint distribution of covariates had not changed
    - ▶ Disentangle the economic ***context effect*** and the population ***composition effect***

  - Let $\boldsymbol{X}$ be a set of covariates

1. **Estimate** the logit model:

$$Prob(\boldsymbol{D} = 1|\boldsymbol{X} = \boldsymbol{x}) = \frac{\exp(\boldsymbol{\beta}'\boldsymbol{x})}{1 - \exp(\boldsymbol{\beta}'\boldsymbol{x})} + \boldsymbol{u}$$

where $\boldsymbol{D} = 1$ if $\boldsymbol{T} = \boldsymbol{t}$ and 0 otherwise, and $\boldsymbol{u}$ is the error term

2. **Compute** $\mathrm{GIC}^*(\boldsymbol{\tau})$ and $\mathrm{DLC}^*(\boldsymbol{\tau})$ by re-weighting each observation by:

$$\phi_{\boldsymbol{t}-1,\boldsymbol{t}}(\boldsymbol{x}) = \frac{\widehat{\mathrm{Prob}}(\boldsymbol{D} = 0|\boldsymbol{X} = \boldsymbol{x})}{\widehat{\mathrm{Prob}}(\boldsymbol{D} = 1|\boldsymbol{X} = \boldsymbol{x})} = \frac{1 - \widehat{\mathrm{Prob}}(\boldsymbol{D} = 1|\boldsymbol{X} = \boldsymbol{x})}{\widehat{\mathrm{Prob}}(\boldsymbol{D} = 1|\boldsymbol{X} = \boldsymbol{x})} = \frac{1}{\exp(\widehat{\boldsymbol{\beta}}'\boldsymbol{x})}$$

Data (1/3)

- French Farm Accounting Data Network ("Rica")
  - 2000 ($t-1$) and 2017 (t)
  - **Rotating stratified panel** of 7,000 to 7,500 commercial farms per year
    - **Commercial**: ≥ 25,000 € of standard output ► **smaller farms excluded**
  - Each sampled farm is assigned a **year- and strata-specific weight**
  - Sample selection
    - Positive **operating surplus by unpaid AWU excl. subsidies**
    - Trimming of the lower and upper 0.5%
  - **Final sample**
    - **6,773** observations in 2000 (87% of initial sample) ► 329,037 represented farms
    - **5,811** observations in 2017 (80% of initial sample) ► 229,786 represented farms

Data (2/3)

- Income variable
  - **Operating surplus** by unpaid annual workforce unit (AWU)
    - ***Including*** CAP subsidies
    - ***Excluding*** CAP subsidies
  - **Deflated** in 2017 constant Euros

Year	Sample	Farms	Total unpaid AWU	Mean (€)	Std. dev. (€)
Incl. Subsidies					
2000	6,773	329,037	487,443	**47,200**	33,200
2017	5,811	229,786	335,851	**58,400**	42,800
Excl. Subsidies					
2000	6,773	329,037	487,443	**30,900**	29,700
2017	5,811	229,786	335,851	**38,700**	40,600

Data (3/3)

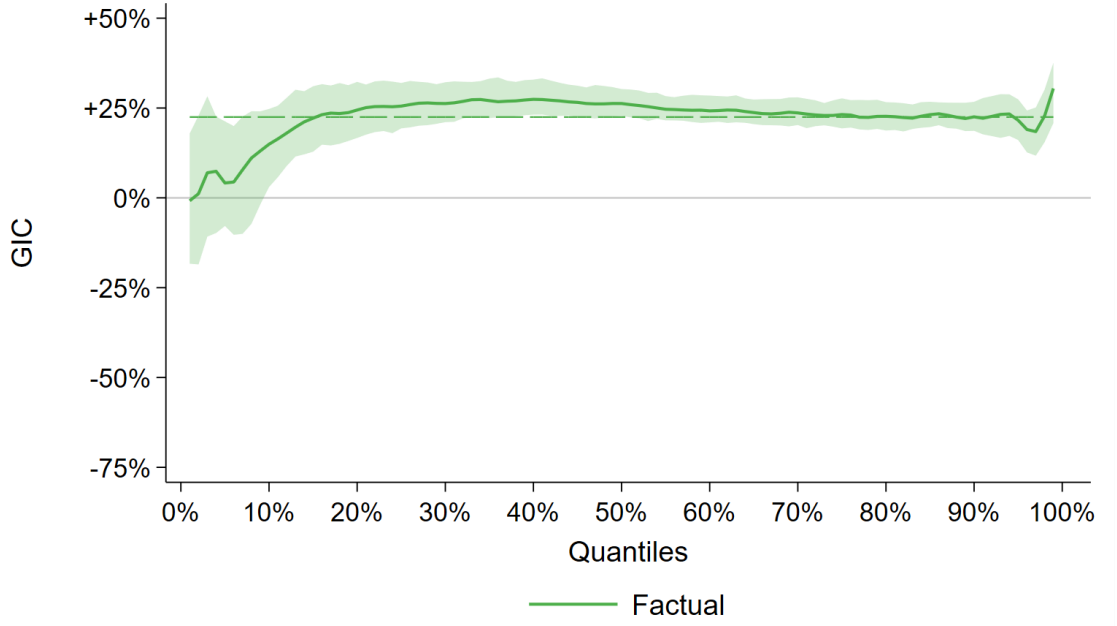
- Covariates: **structural** farm characteristics
  - Used for overall **counterfactual** analysis

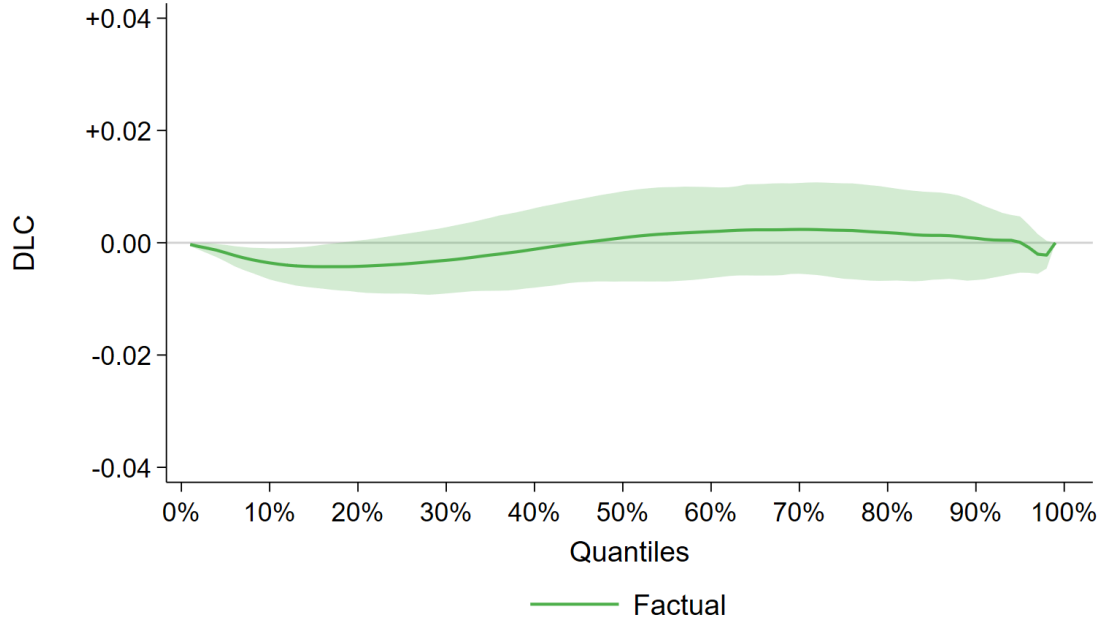
	2000		2017	
Variable	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Age (years)	**46**	9	**51**	9
Utilized agric. **area** (ha)	**66**	59	**88**	78
Herd size (LU)	**67**	116	**85**	171
Individual farm (0/1)	**71%**	0.5	**46%**	0.5
Share of **paid labour** (%)	**11%**	0.2	**16%**	0.2
Less-favoured area (0/1)	**42%**	0.5	**34%**	0.5

+ **Type** of farming and administrative **region**

Results (1/3)

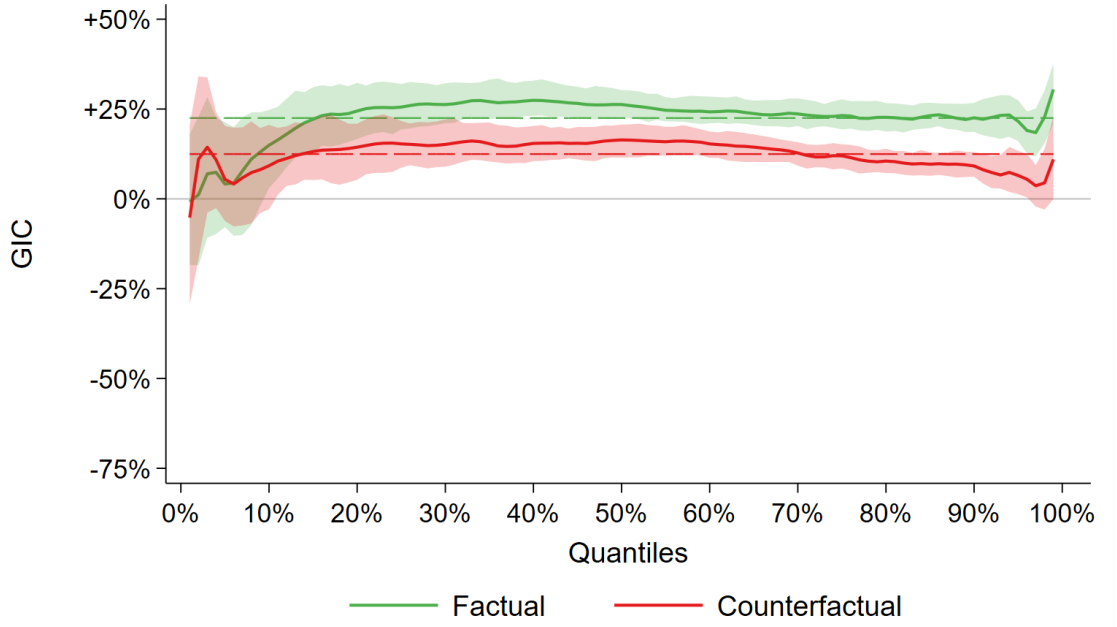
- Overall evolutions **including** subsidies
- **Factual** analysis
  - Income **growth > 0** at all quantiles, and fairly **homogenous**
  - Income **inequality** did **not increase**

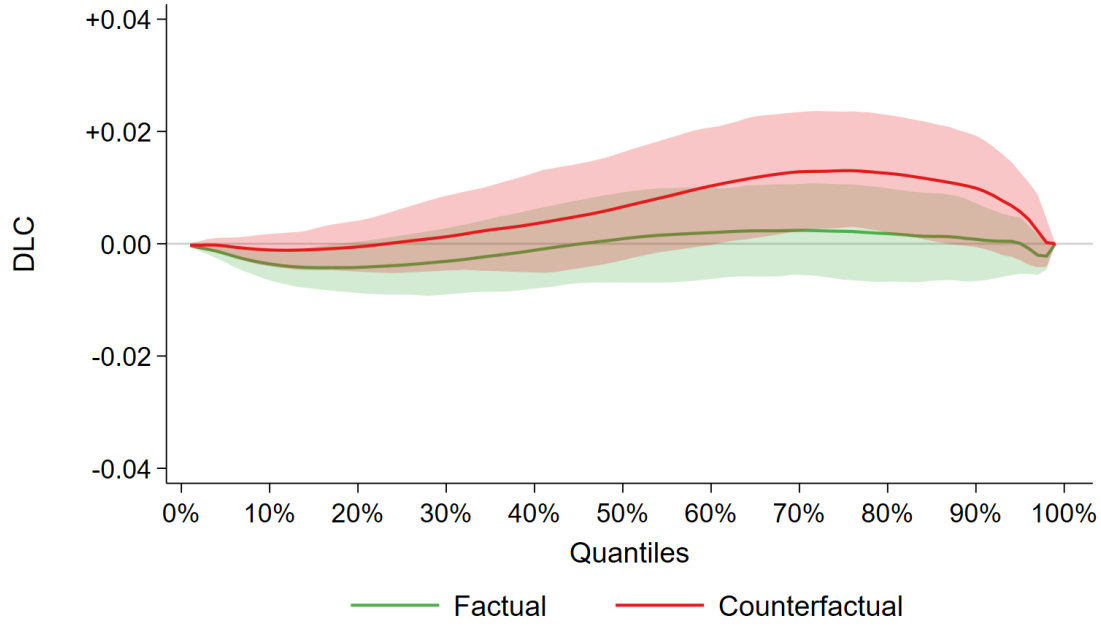




Results (2/3)

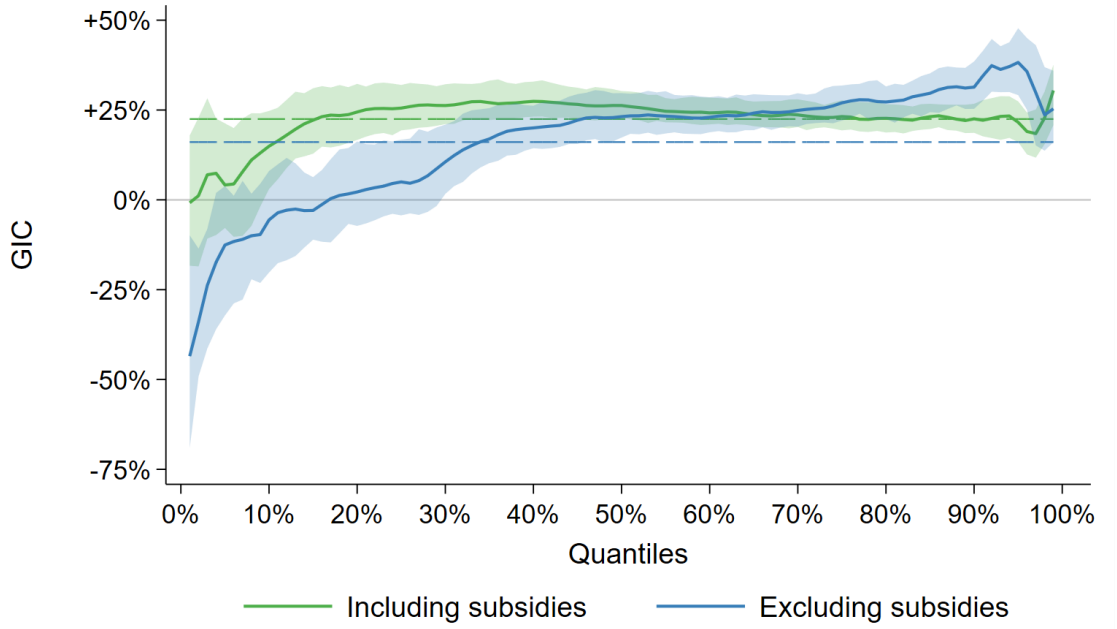
- Overall evolutions **including** subsidies
- **Counterfactual** analysis: had the population characteristics not changed…
  - Income **growth** would have been **lower** and **less homogenous**
  - Income **inequality** would have **decreased**

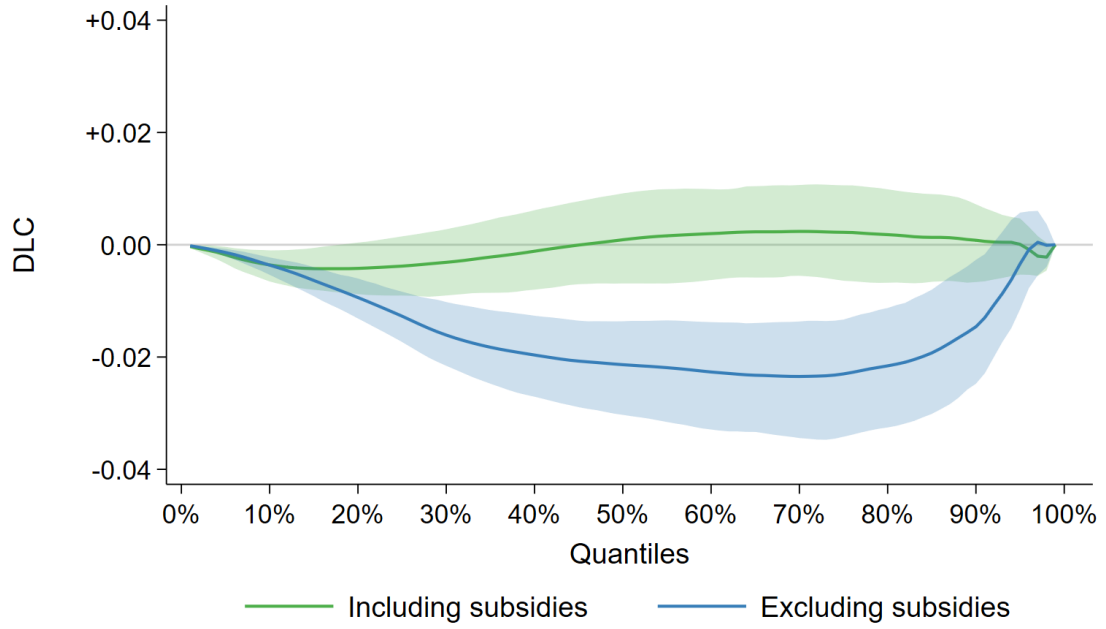




Results (3/3)

- **Subsidies** impact analysis
- **Factual** analysis: **excluding** total subsidies…
  - Income **growth** is **heterogeneous**: lower (higher) at lower (higher) quantiles
  - Income **inequality** is **higher**





Discussion

- **Ferreira et al.'s (2019)** method ► detailed insights on income growth and inequality

- Remaining **limitation**: dealing with **negative incomes**
  - Increase in inequality is **underestimated**

- Directions for **future research**
  - Comparing France w.r.t. other EU member states: FADN individual data

  - Taking **small farms** into account: using the "Mutualité Sociale Agricole" database
    - Annual exhaustive data for unpaid workers (≈560,000 obs. in 2004; ≈450,000 obs. in 2018)
    - Pre-tax income **but** fiscal and social optimization

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Thank you for your attention!

Piet L. and Desjeux Y. (2021). New perspectives on the distribution of farm incomes and the redistributive impact of CAP payments. *Eur. Rev. Agr. Econ.*, 48(2): 385–414.

https://academic.oup.com/erae/article/48/2/385/6124427

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