The Causal Effects of Interventions for Youth Agricultural Start-ups in Tuscany

An Analysis of Evaluation Strategy and Key Findings

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Evaluation in agriculture

- Counterfactual evaluation in agriculture is rare
- Few studies available (e.g. Wuepper Finger 2023; Michalek 2012; Nordin Loven 2020)
- To our knowledge, only one evaluates the impact of a settlement program in Sweden using a RDD. The study shows that the policy favored the entry of younger farmers, also mitigating some effect of income decline during transition (Nordin, Loven, 2020)
- **Our contribution:** first counterfactual evaluation of youth settlement incentives in Italy, comparing one-off vs. package schemes

Motivations and general problems

- **Context:** Youth in agriculture systematically incentivized across Europe
- **Why:** ageing, farm abandonment, considerations about food security and revitalization of rural and peripheral areas
- **Policy challenge:** not whether to support youth, but how to design effective incentives
- **Trade-off:** one-off premium (low cost) vs. package scheme (integrated support)

Research questions and positioning in this session

- **RESEARCH QUESTIONS:**
  - Which scheme works better?
  - Do effects differ across territories within the region (**Intra-regional heterogeneity**)?
- Considerations about the potential for transferring results to other regions (**External validity**)
- *Note*:Tuscany is an illustrative example of this general problem:
  - Experienced both schemes (shift 2011 $\rightarrow$ 2012, return 2024)
  - Good data to run a counterfactual evaluation
  - Good test-bed for a broader question on youth farming policies
- Our contribution to this session: **Causal evidence** on youth farming support (IPW, Rubin framework)

Some data

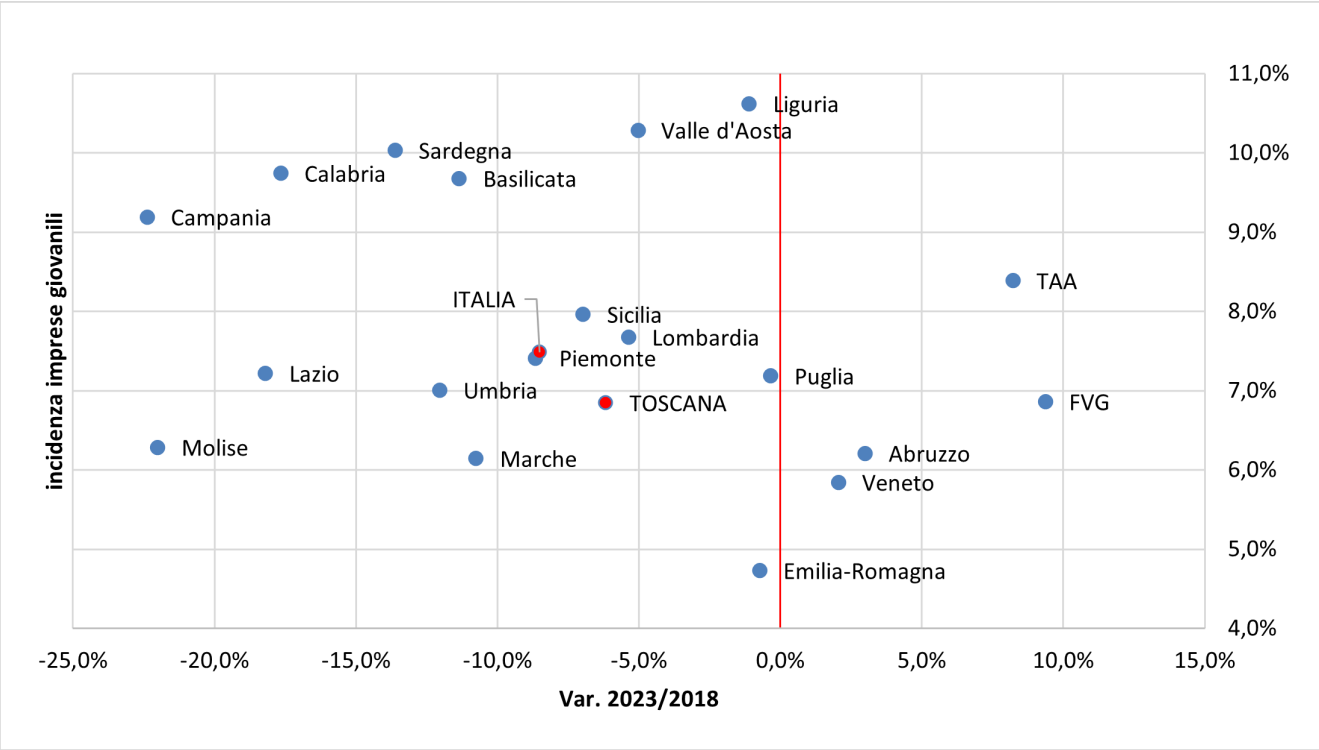


Figure: *Share of young farmers and 2023/2018 variations (RNN, ISMEA, 2024)*

Some data

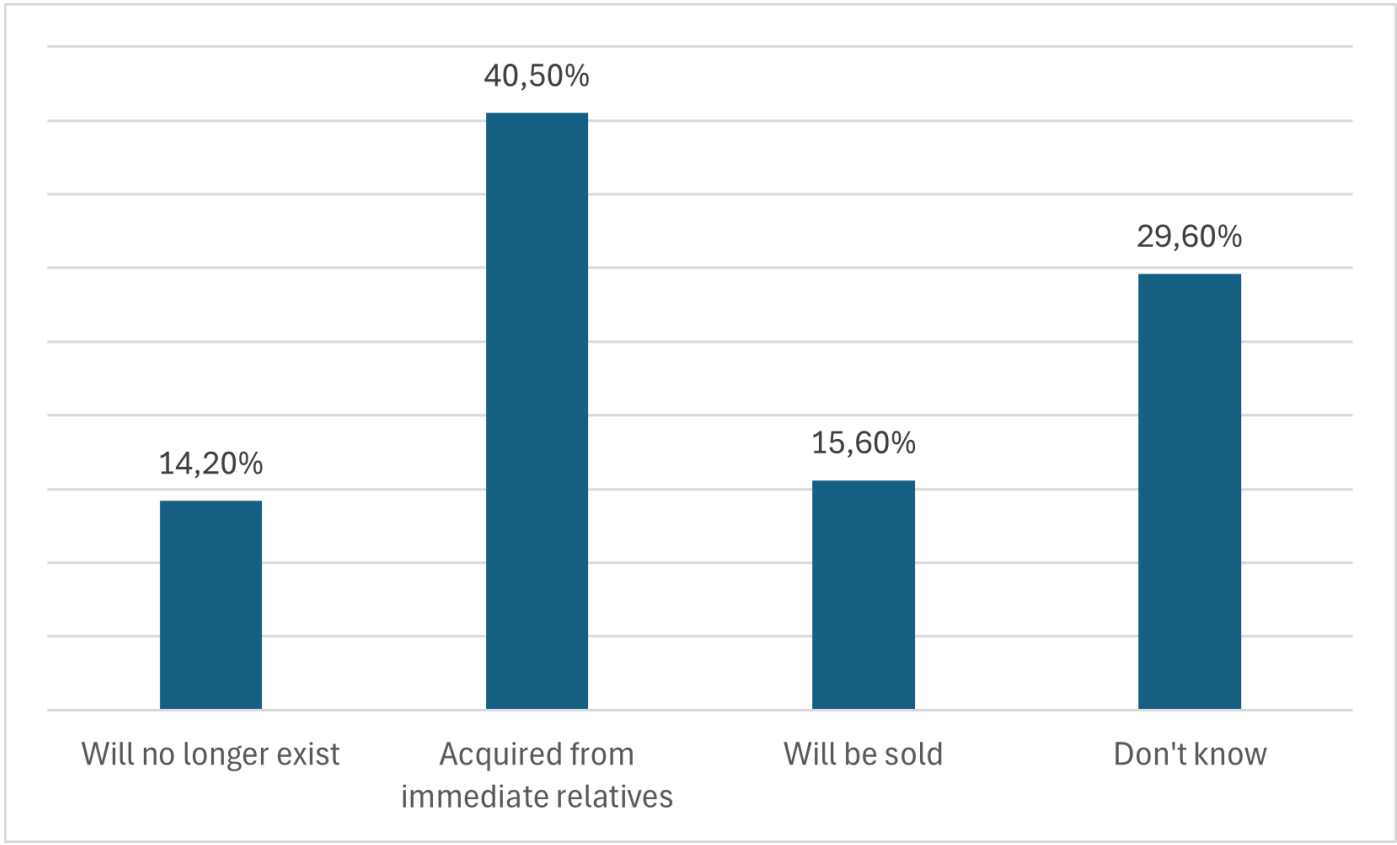


Figure: *Once you left your business, what future do you imagine for your company? (IRPET survey, 2023)*

Policy evolution

- The new measure 112 introduced in 2008 in Tuscany has the general objective of improving the competitiveness of farms and attract young people
- In 2011 the measure 112 provided for the disbursement of a one-off premium of 40,000 euro. In 2012 Tuscany, as well as many other regions, decided to shift to the Package scheme.
- As shown by Licciardo et al.(2022) and Giuliodori (2009), three main reasons pushed for this decision:
  - Inadequate support to investments
  - Combining settlement and investments in order to select more business-oriented farms
  - Avoiding fake settlements

Period	Measures	Supporting scheme
2007-2013	112	One-off premium. Since 2012 shift to Package scheme
2014-2022	6.1, 4.1, 6.4	Package scheme. Since 2024 return to one-off premium

Evaluation Strategy

- **Approach:** Potential Outcomes Framework (Rubin, 1974; Imbens, Rubin, 2015).
- **Treatments (W):**
  - $W_i = 1$: Receipt of the one-off premium (2011)
  - $W_i = 2$: Receipt of the "package" (2012)
- **Potential Outcomes:** For each start-up i and outcome Y:
  - $Y_i(1)$: Outcome if received the one-off premium
  - $Y_i(2)$: Outcome if received the "package"
- **Individual Causal Effect of settlement-only vs. package:** $Y_i(1) - Y_i(2)$

Evaluation Strategy

- **Key assumptions:**
  - **SUTVA:** (i) No hidden versions of treatments; (ii) No interference between units (plausible given the program size)
  - **Identification: Strongly Ignorable Treatment Assignment**
    1. Treatment assignment is independent of potential outcomes, conditional on pre-treatment covariates (Selection on Observables)
    2. Overlapping characteristics between treatment groups (Common Support)
- **Estimation Method: Inverse Probability Weighting (IPW)**
  - Based on propensity scores: $e_i = e(X_i) = \Pr(W_i = 1|X_i)$
  - Two-step approach:
    1. Estimate propensity scores (model treatment assignment)
    2. Calculate weighted averages of outcomes using inverse probabilities.

Causal Quantities of Interest

For each outcome Y at time t:

- **Average Treatment Effect on the Treated (ATT):**

$$ATT^{\{1,2\}}(t) = E[Y_{it}(1) - Y_{it}(2)|W_i = 1]$$

(Effect for those who received the one-off premium)

- **Average Treatment Effect on the Untreated (ATU):**

$$ATU^{\{1,2\}}(t) = E[Y_{it}(1) - Y_{it}(2)|W_i = 2]$$

(Effect for those who received the "package")

- **Average Treatment Effect (ATE):**

$$ATE^{\{1,2\}}(t) = E[Y_{it}(1) - Y_{it}(2)]$$

(Average effect if all firms were assigned to one-off premium instead of the package)

Heterogeneous effects by localization: disadvantaged vs. non-disadvantaged areas

Outcome Variables

Outcome variables	Source	Definition, for each annual temporal unit t
Formal Survival	Company Register Records (Chambers of Commerce)	$S_{it}=1$ if i survives at t; $S_{it}=0$ if i ceases before t or during t
Presence of Cultivation Plan	Cultivation plans filed at ARTEA	P_{it} =1 if i's cultivation plan is present in t; P_{it}=0 if the plan is not present in t
Skilled laborers	Tuscany Region Labor Information System, ISTAT professions classification 2011	Q_{it} is the count of skilled hirings attributable to i in t
No. of working days of skilled laborers	Tuscany Region Labor Information System, ISTAT professions classification 2011	R_{it} is the count of working days by skilled qualifications at i in t
Unskilled laborers	Tuscany Region Labor Information System, ISTAT professions classification 2011	U_{it} is the count of unskilled hirings attributable to i in t
No. of working days of unskilled laborers	Tuscany Region Labor Information System, ISTAT professions classification 2011	V_{it} is the count of working days by unskilled qualifications at i in t

Outcome Variables

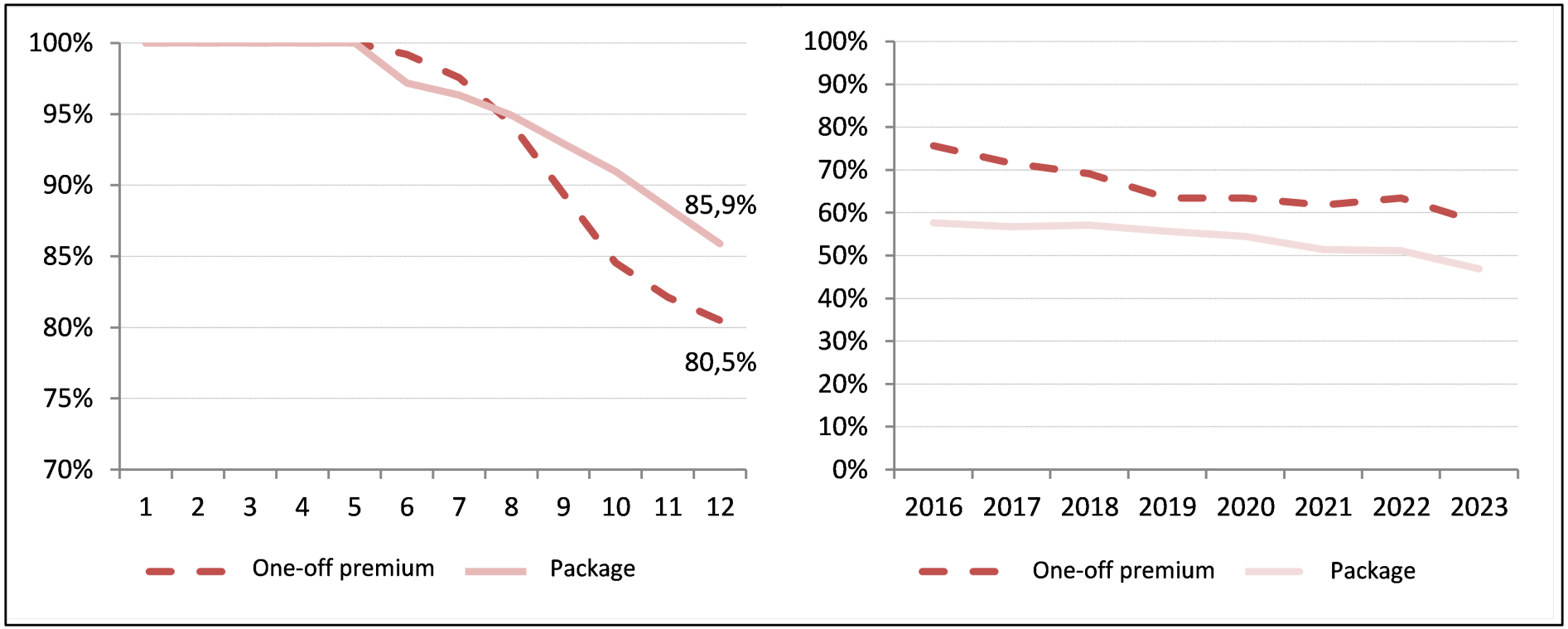


Figure: *Survival functions and cultivation plans*

Outcome Variables

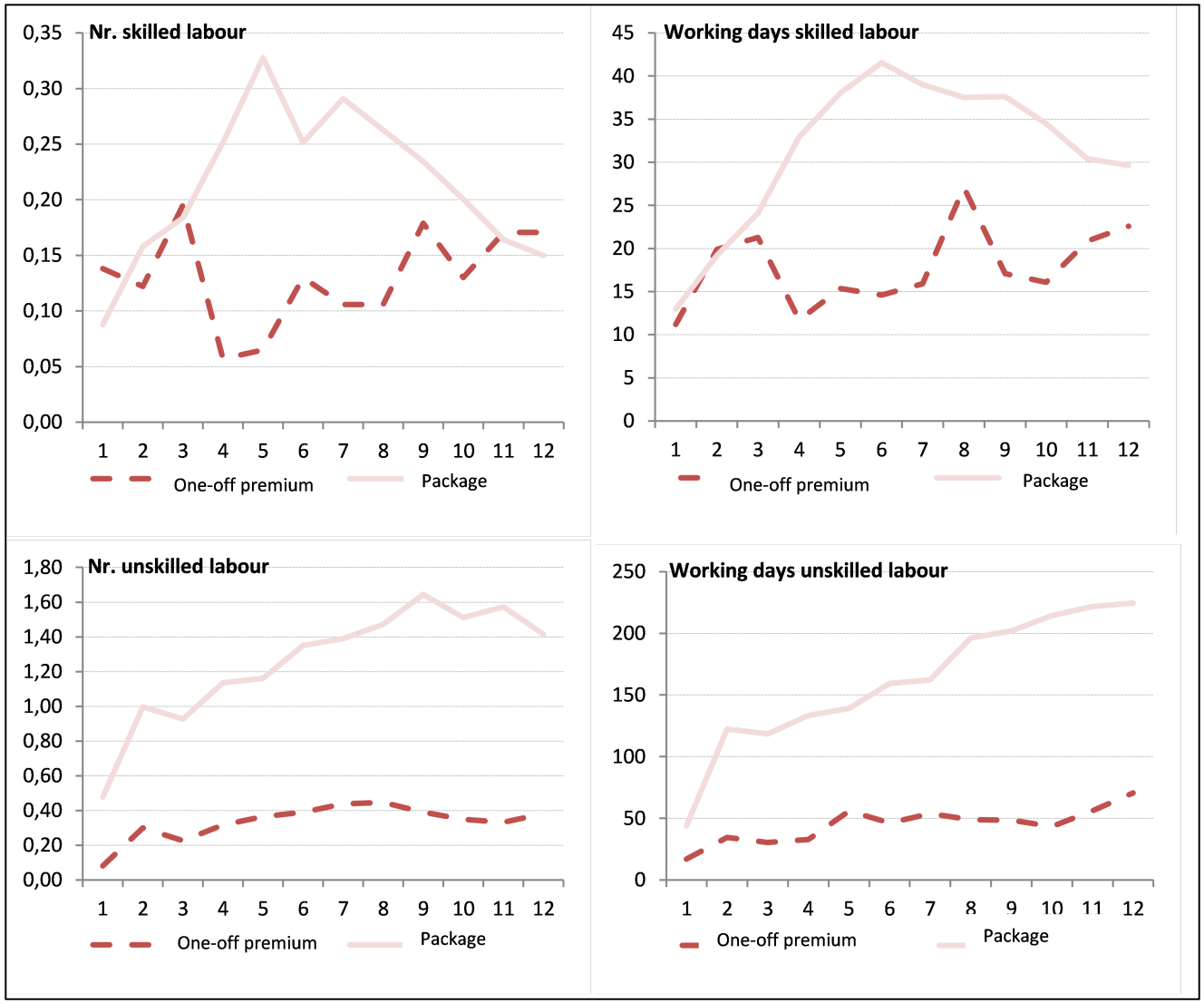


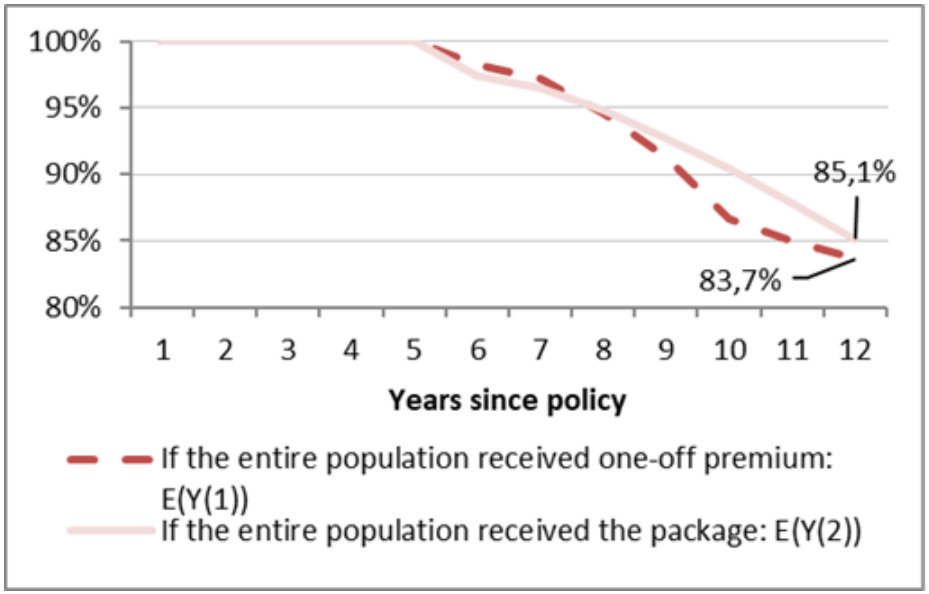
Figure: *Statistics on labor*

Covariates

	Disadvantaged area		Non-disadvantaged area		Total	
	W = 1	W = 2	W = 1	W = 2	W = 1	W = 2
N	36	112	87	249	123	361
Female (1/0)	0,36	0,43	0,38	0,40	0,37	0,40
Age at settlement	29,14	30,21	31,30	29,0	30,7	29,4
Individual enterprise (1/0)	0,97	0,72	0,91	0,70	0,93	0,70
Sector						
Cereals	0,22	0,24	0,17	0,20	0,19	0,21
Horticulture	0,11	0,02	0,17	0,10	0,15	0,08
Floriculture/nursery	–	–	0,09	0,06	0,09	0,06
Vitiviniculture	0,03	0,06	0,18	0,22	0,14	0,17
Olive growing	0,06	0,10	0,09	0,19	0,08	0,16
Fruit growing	0,06	0,07	0,03	0,03	0,04	0,04
Livestock farming	0,19	0,15	0,10	0,05	0,13	0,08
Mixed activity	0,33	0,27	0,02	0,05	0,11	0,12
Silviculture	–	0,04	–	0,01	–	0,02
Unknown	–	0,04	0,01	0,02	0,01	0,03

*No common support for floriculture, silviculture, and unknown sectors

Results - Survival



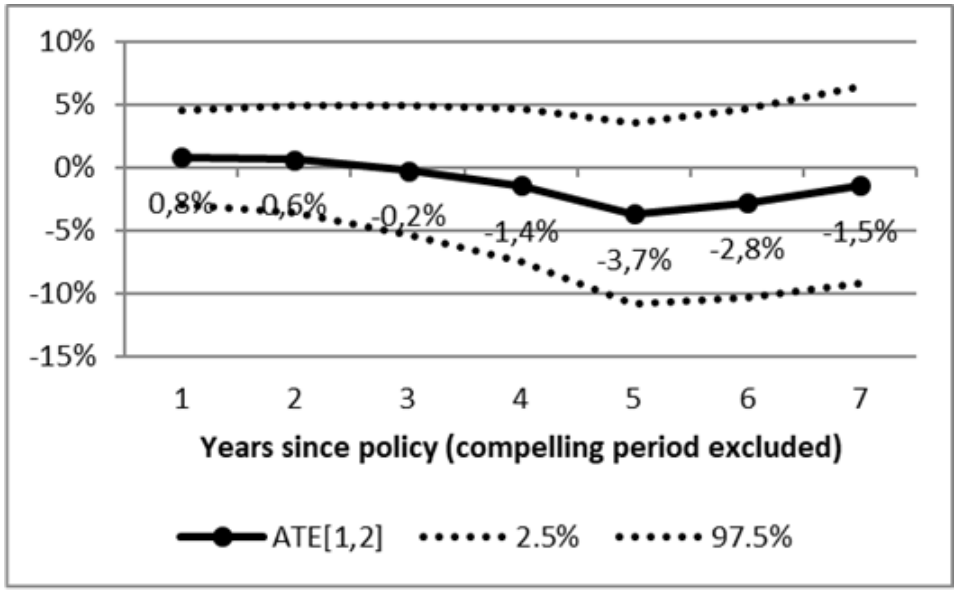


Figure: *Potential survival functions and estimated ATE[1,2]*

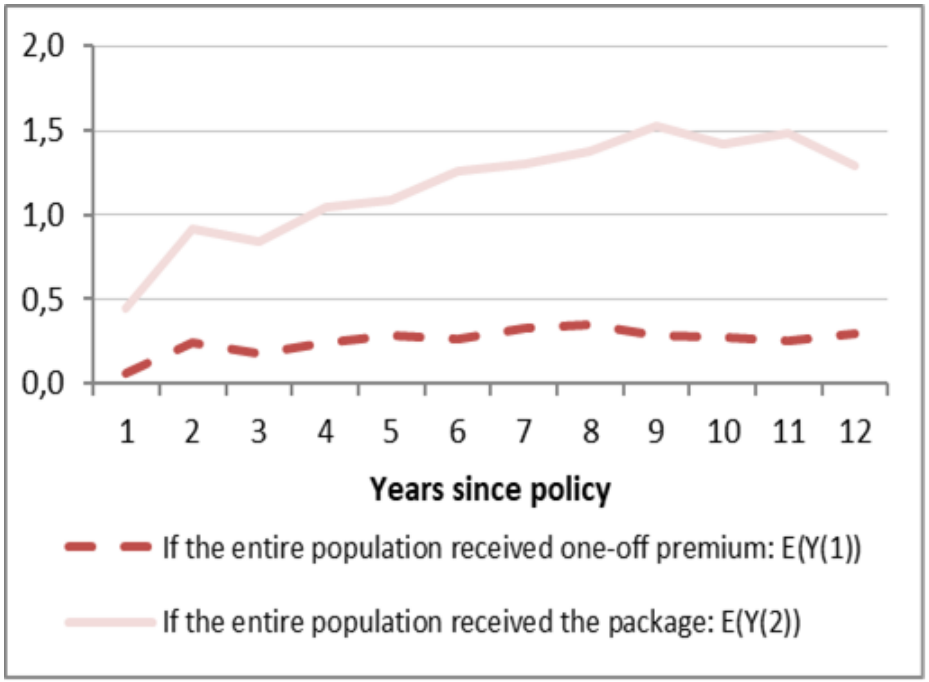
Results - Global Annual Average Effects for other outcome variables

c

Outcome Variable	Global Annual ATE$^{\{1,2\}}$ Est.	P-value	Conclusion
Cultivation Plan	-0.06	0.151	Not-significant
Skilled labor	-0.09	0.339	Not-significant
Working days of skilled labor	-15.28	0.205	Not-significant
Unskilled labor	**-0.91**	**0.000**	**Small reduction for one-off premium**
Working days of unskilled labor	**-118.73**	**0.000**	**Small reduction for one-off premium**

Overall: Schemes largely interchangeable, except for unskilled labor where the "package" performs slightly better

Results - Unskilled labour



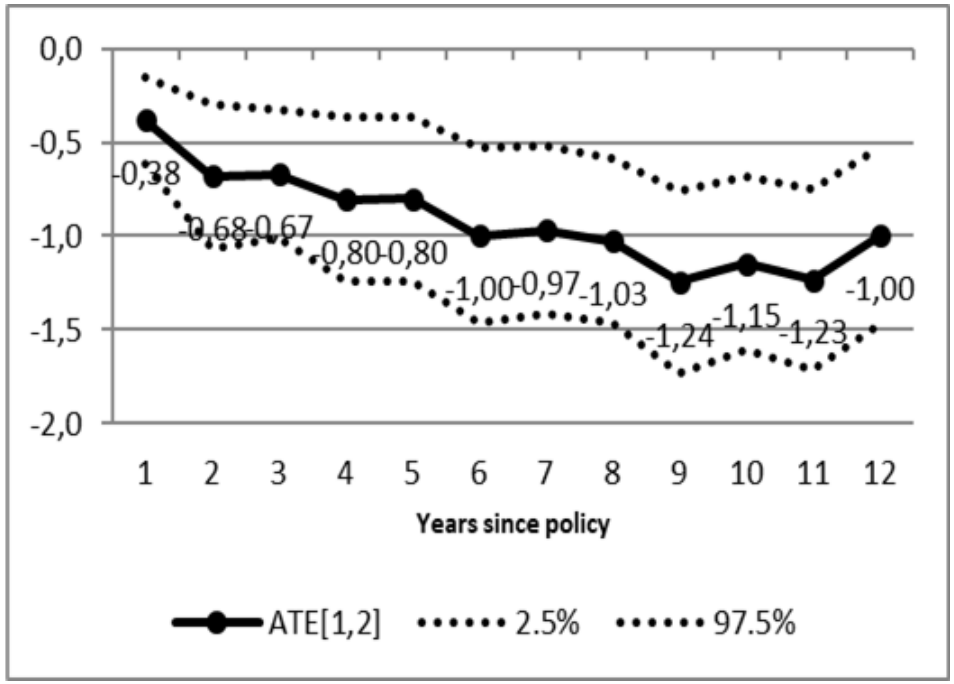
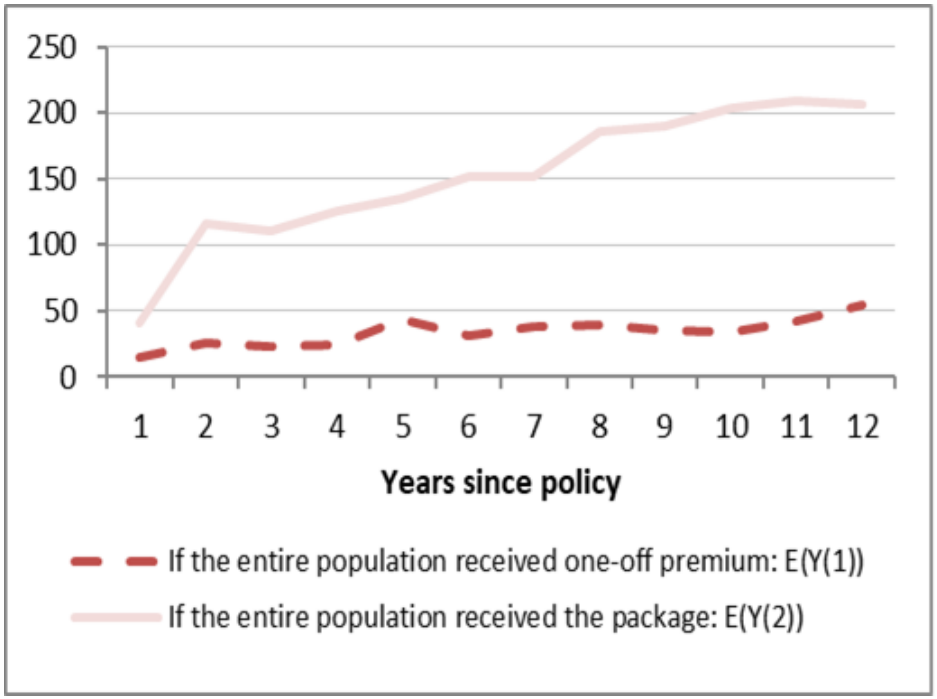


Figure: *Potential outcomes for unskilled labor and estimated ATE[1,2]*

Results - Working days of unskilled labor



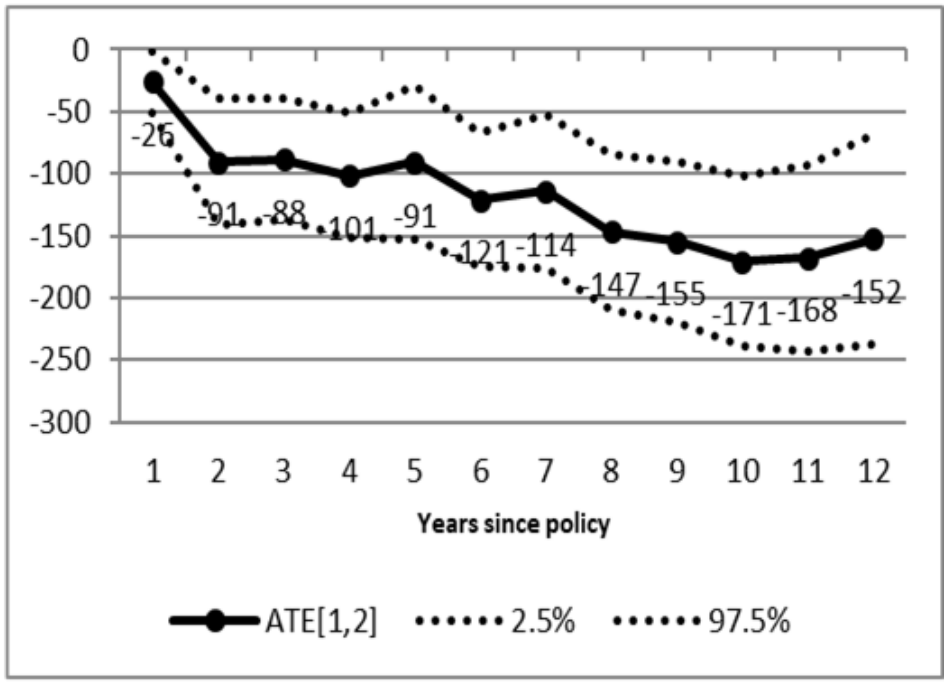


Figure: *Potential outcomes for the number of days of unskilled labor and estimated ATE[1,2]*

Heterogeneity of effects due to type of location area

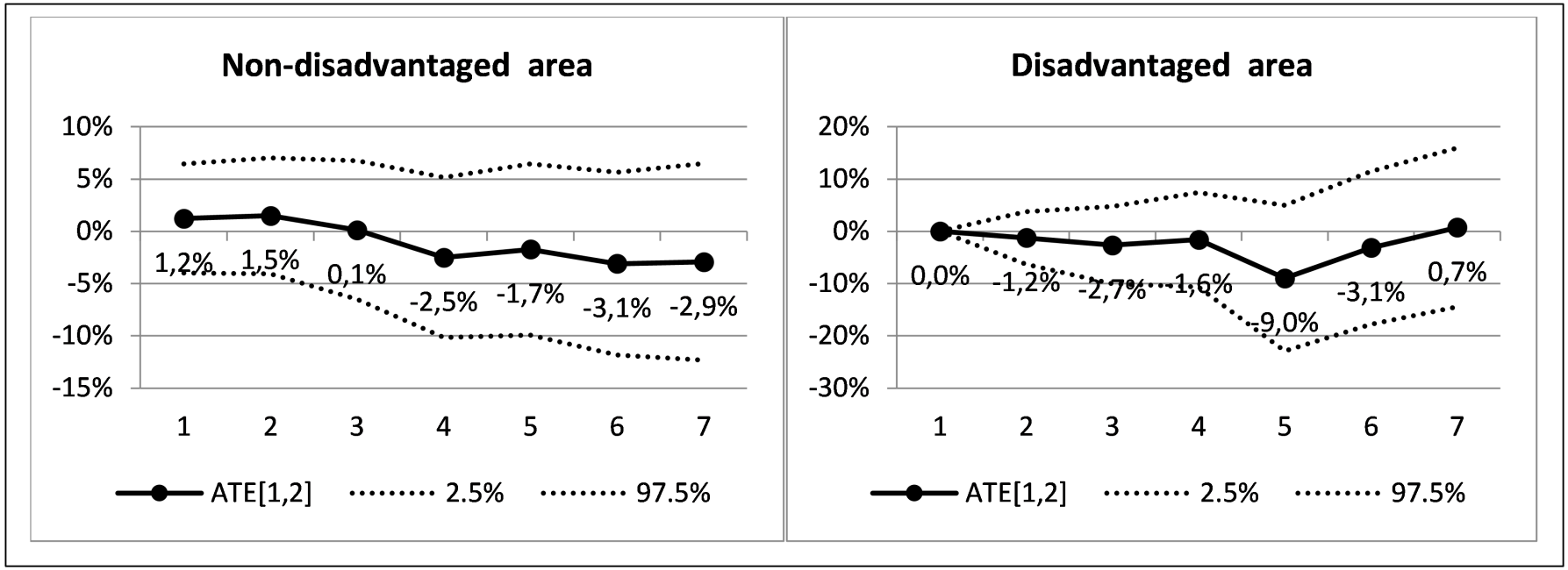


Figure: *Estimated ATE[1,2] for survival by area*

Results - Heterogeneity of effects due to location area

Non-disadvantaged area
c

Outcome Variable	Global Annual ATE$^{\{1,2\}}$ Est.	P-value	Conclusion
Cultivation Plan	-0.06	0,257	Not-significant
Skilled labor	-0,15	0,202	Not-significant
Working days of skilled labor	-26,19	0,052	Not-significant
Unskilled labor	**-0.96**	**0.001**	**Small reduction for one-off premium**
Working days of unskilled labor	**-124,57**	**0.002**	**Small reduction for one-off premium**

Disadvantaged area
c

Outcome Variable	Global Annual ATE$^{\{1,2\}}$ Est.	P-value	Conclusion
Cultivation Plan	-0,116	0,446	Not-significant
Skilled labor	0,045	0,681	Not-significant
Working days of skilled labor	8,041	0,716	Not-significant
Unskilled labor	**-0,786**	**0.019**	**Small reduction for one-off premium**
Working days of unskilled labor	**-102,692**	**0.036**	**Small reduction for one-off premium**

Conclusions (1)

- The two alternative intervention schemes (one-off premium vs. package) are largely interchangeable for crucial outcomes like formal survival and entrepreneurial vitality
- Based on our analysis, the "package" is slightly more effective in the hiring of seasonal workers, but the difference is quite negligible and even less relevant for disadvantaged areas
- The modest "social cost" due to the loss of one position of unskilled labor is offset by the increase in public resource savings, due to the lower cost of the one-off premium scheme.
- Potentially, it can be used to:
  - fund a larger number of start-ups *(extensive margin)*
  - Increase the amount of the premium *(intensive margin)*

Conclusions (2): Transferability

- **Within Tuscany (intra-regional):**
  - Effects are consistent across disadvantaged vs. non-disadvantaged areas
  - Result: no need for territorially differentiated schemes
- **Across regions (external validity):**
  - Directly relevant for regions with similar covariate structures (e.g. Mediterranean crop mix, medium-size farms, reliance on seasonal labour)
  - For dissimilar regions, adaptation requires reweighting/transport methods based on firm- and regional-level covariate distributions
- **Future development:** apply approaches from Stuart (2011), Tipton (2013), Westreich et al. (2017) to rescale effects according to covariate distance
- **Takeaway:** Tuscan findings generalize internally, inform similar regions externally, and open the door to methodological extensions for more different contexts.

Thank You!

Comments and questions are welcome