An offer that you can’t refuse?
Agrimafias and Migrant Labor on Vineyards in Southern Italy

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The 2011 migration wave in southern Italy
The Mediterranean routes

Source: FRONTEX
Caporalato and the 2011 migration wave

**Caporalato**: system of illegal recruitment and exploitation of underpaid farm labor, run by agrimafias

**Recruited labor**: mostly irregular migrants, vulnerable because illegal and undocumented

**Arab Spring → 2011 migration wave via the Mediterranean:**

- 64,000 migrants (cfr. Sicily: 140,000 foreigners, 14,000 in agriculture)
- Up to 1/3 refuse identification and leave migrant camps

Is there illegal employment on southern Italian vineyards? What are the causal effects of this migrant labor supply shock on employment and wages on vineyards?
How to identify employment of illegal labor?

Idea: Estimate causal effects on labor productivity \((Y/L)\) and wages \((w)\)

- Illegal substitutes legal labor: \(L \downarrow, Y = \) (displacement effect)
- Illegal added to legal labor: \(Y = \) or \(L \uparrow\) or = (complement effect)
- Illegal competes with legal labor: \(w = \) or \(\downarrow\) (competition effect)

→ If there is employment of illegal labor:
  - Overreported labor productivity
  - Wage dampening or decrease
Results and contribution of this study

Results indicate unreported employment and competition between legal and illegal workforce

• Average causal effects 2011-12:
  • Labor productivity increase of 14% (stat. sign.)
  • Wages 7.3% to 23.8% lower than predicted (not stat. sign.)

Contribution:

• First causal analysis of 2011 migration wave for EU
• First empirical study on potential employment of illegal labor in farmlands of southern Italy
• **Unit of interest:** “Treated South” – weighted average of Sicily and Apulia

• **Vineyard panel** 1991-2012 for 25 regions: 14 Italian + 11 French

• **Vineyards aggregated at regional level** (FADN)

• **Outcomes:**

\[
\text{Labor productivity} = \frac{\text{Income from crops}}{\text{Total hours worked}}
\]

\[
\text{Hourly wage} = \frac{\text{Total wage bill}}{\text{Paid hours worked}}
\]
The causal model

**Aim:** Estimate causal effects of the shock/treatment

- \( Y_{it} \): outcome (labor productivity or wages)
- \( t = 1, \ldots, T_0, \ldots, T \) with \( T_0 \) pre-treatment periods
- \( i = 1, \ldots, J + 1 \) units, \( i = 1 \) is treated in \( T_0 + 1 \)

**Dependent variables (Y):**

- \( Y^{TR}_{1t} \) Treated; \( Y^N_{1t} \) Not treated

**Control variables (X):**

- \( X_{1t}, \ldots, X_{J+1,t} \)

**Treatment effect (Δ):**

- \( \Delta_{1t} = Y^{TR}_{1t} - Y^N_{1t}, \text{ for } t > T_0 \)

**Problem of causal inference:** \( Y^N_{1t} \) is not observable for \( t > T_0 \)

**Estimate counterfactual** \( \hat{Y}^N_{1t} \)
The synthetic control method (SCM, Abadie 2010)

**Aim:** For \( t > T_0 \), estimate \( Y_{1t}^N \) (outcome had the shock not occurred)

**Idea:** For \( t < T_0 \), build twin (synthetic control) of treated unit w.r.t. \( Y \) and \( X \)
For \( t > T_0 \), predict \( Y_{1t}^N \) from this twin

**Estimation:**

- For \( t < T_0 \), minimize weighted distance between \((Y_{1t}, X_{1t})\) and \((Y_{jt}, X_{jt})\)

\[ \rightarrow \text{Obtain non-negative weights for untreated unit such that } \sum_{j=2}^{J+1} \hat{w}_j = 1 \]

- Build \( \hat{Y}_{1t}^N \) (synthetic unit) as weighted linear combination of \( Y_{jt} \) using \( \hat{w}_j \)

**SC unit:**

\[ \hat{Y}_{1t}^N = \sum_{j=2}^{J+1} \hat{w}_j \ Y_{jt} \quad \text{Estimated for } t < T_0 \]

**SC estimator:**

\[ \hat{\Delta}_{1t} = Y_{1t}^{TR} - \sum_{j=2}^{J+1} \hat{w}_j \ Y_{jt} \quad \text{Estimated for } t > T_0 \]
Predictors (X)

1. Production function X
   → E.g., land productivity, capital intensity, etc.

2. Labor market X
   → Unemployment rate, unskilled labor share

3. Farm-specific X
   → Paid/family labor
Identification assumptions

**A1:** Exogenous shock (quasi-experimental setting)
   → Southern Italy treated due to geography, no self-selection

**A2:** No spillovers of treatment
   → Fleeing occurs directly after landing

**A3:** No technological progress, no labor market or price shocks
   → Low skill requirements of field picker jobs
Labor productivity: Estimated weights for control regions

- Champagne-Ardenne: 0.007
- Veneto: 0.04
- Emilia-Romagna: 0.171
- Marche: 0.108
- Abruzzo: 0.318
- Tuscany: 0.019
- Languedoc-Roussillon: 0.136
- Sardinia: 0.2

Results

Labor productivity path: Treated South (solid) vs. synthetic (dotted)

\[ ATT_{2011,2012} = 0.5(\Delta_{1,2011} + \Delta_{1,2012}) = 14\% \]
Placebo inference: Labor productivity gaps

No large scale (asymptotic) inference $\rightarrow$ small N $\rightarrow$ placebo inference

$H_0: \text{ATT}_j \geq \text{ATT}_1 \quad \rightarrow \quad P\text{-Value} = \frac{\sum_{j=1}^{J+1} 1(\text{ATT}_j \geq \text{ATT}_1)}{J} = 0.08$
More inference: ATT over MAD of Treated South and placebos

- ATT: exceptionally strong given pre-treatment fit (MAD)

\[ M_A D = \frac{1}{T_0} \sum_{t=1}^{T_0} |Y_{jt} - \hat{Y}_{jt}^N| \]

\[ P - Value = \frac{\sum_{j=1}^{J+1} 1(ATT_j \geq ATT_1)}{J} \]

\[ s. t \ MAD_j \leq MAD_1 \]

\[ = 0.08 \]
Answering our research question

**Labor Productivity Effects**
- Expected: Increase in labor productivity ✓

**Wage Effects**
- Expected: Decrease in wages Wage dampening X ✓

There is causal evidence for the employment of illegal workforce on vineyards after the 2011 migration wave

Substitution and/or complement effect of workers

Separate analysis for Sicily and Apulia: causal effects stronger in Sicily

Little evidence for competition effect that keeps wages close to the minimum level: Wages were already very low (5-6 euros/h)
Thank you for your attention.
On Methodology:


On Migration and Illegal Labor:


Appendix
Climate, temperatures and precipitations of Italy and France

Data

http://go.grolier.com/atlas
## Labor Productivity: Predictor Means

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Treated</th>
<th>Synthetic</th>
<th>Sample Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor productivity</td>
<td>2.331</td>
<td>2.341</td>
<td>2.887</td>
</tr>
<tr>
<td>Unskilled share of population</td>
<td>0.185</td>
<td>0.184</td>
<td>0.161</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.159</td>
<td>0.086</td>
<td>0.079</td>
</tr>
<tr>
<td>Labor productivity value added</td>
<td>3.159</td>
<td>4.101</td>
<td>3.986</td>
</tr>
<tr>
<td>Cost covered by wine income</td>
<td>1.490</td>
<td>1.498</td>
<td>1.483</td>
</tr>
<tr>
<td>Grapes per ha</td>
<td>2.167</td>
<td>2.113</td>
<td>3.537</td>
</tr>
<tr>
<td>Share of capital-related OPEX</td>
<td>0.052</td>
<td>0.052</td>
<td>0.058</td>
</tr>
<tr>
<td>Machinery / total income</td>
<td>0.627</td>
<td>0.626</td>
<td>0.454</td>
</tr>
</tbody>
</table>
## Wage: Predictor Means

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Treated</th>
<th>Synthetic</th>
<th>Sample Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly wage</td>
<td>1.766</td>
<td>1.744</td>
<td>2.122</td>
</tr>
<tr>
<td>Labor productivity</td>
<td>2.286</td>
<td>2.351</td>
<td>2.832</td>
</tr>
<tr>
<td>Unskilled share of population</td>
<td>0.185</td>
<td>0.191</td>
<td>0.161</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.159</td>
<td>0.128</td>
<td>0.079</td>
</tr>
<tr>
<td>Cost covered by wine income</td>
<td>1.658</td>
<td>1.795</td>
<td>1.559</td>
</tr>
<tr>
<td>Labor productivity value added</td>
<td>3.159</td>
<td>3.496</td>
<td>3.986</td>
</tr>
<tr>
<td>Grapes per ha</td>
<td>2.267</td>
<td>1.725</td>
<td>3.567</td>
</tr>
<tr>
<td>Share of capital-related OPEX</td>
<td>0.048</td>
<td>0.036</td>
<td>0.056</td>
</tr>
<tr>
<td>Share of paid hours</td>
<td>0.285</td>
<td>0.266</td>
<td>0.311</td>
</tr>
<tr>
<td>Value of unpaid hours</td>
<td>2.767</td>
<td>3.607</td>
<td>3.808</td>
</tr>
<tr>
<td>Machinery / total income</td>
<td>0.609</td>
<td>0.477</td>
<td>0.442</td>
</tr>
</tbody>
</table>
Descriptives of predictors (X)
## Estimated weights for control units

<table>
<thead>
<tr>
<th>Control Units</th>
<th>Prod.</th>
<th>Wage</th>
<th>Control Units</th>
<th>Prod.</th>
<th>Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abruzzo</td>
<td>0.318</td>
<td>0</td>
<td>Midi-Pyrénées</td>
<td>0</td>
<td>0.078</td>
</tr>
<tr>
<td>Alsace</td>
<td>0</td>
<td>0</td>
<td>Molise</td>
<td>0</td>
<td>0.466</td>
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<tr>
<td>Aquitaine</td>
<td>0</td>
<td>0</td>
<td>Pays de la Loire</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bourgogne-Franche-Comté</td>
<td>0</td>
<td>0</td>
<td>Piedmont</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Campania</td>
<td>0</td>
<td>0</td>
<td>Poitou-Charentes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Centre-Val de Loire</td>
<td>0</td>
<td>0</td>
<td>Provence-Alpes-Côte d’Azur</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Champagne-Ardenne</td>
<td>0.007</td>
<td>0</td>
<td>Rhône-Alpes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emilia-Romagna</td>
<td>0.171</td>
<td>0</td>
<td>Sardinia</td>
<td>0.200</td>
<td>0.454</td>
</tr>
<tr>
<td>Friuli-Venezia Giulia</td>
<td>0</td>
<td>0</td>
<td>Trentino-South Tyrol</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Languedoc-Roussillon</td>
<td>0.136</td>
<td>0</td>
<td>Tuscany</td>
<td>0.019</td>
<td>0</td>
</tr>
<tr>
<td>Lombardy</td>
<td>0</td>
<td>0</td>
<td>Veneto</td>
<td>0.040</td>
<td>0</td>
</tr>
<tr>
<td>Marche</td>
<td>0.108</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>