Winners and Losers of Immigration

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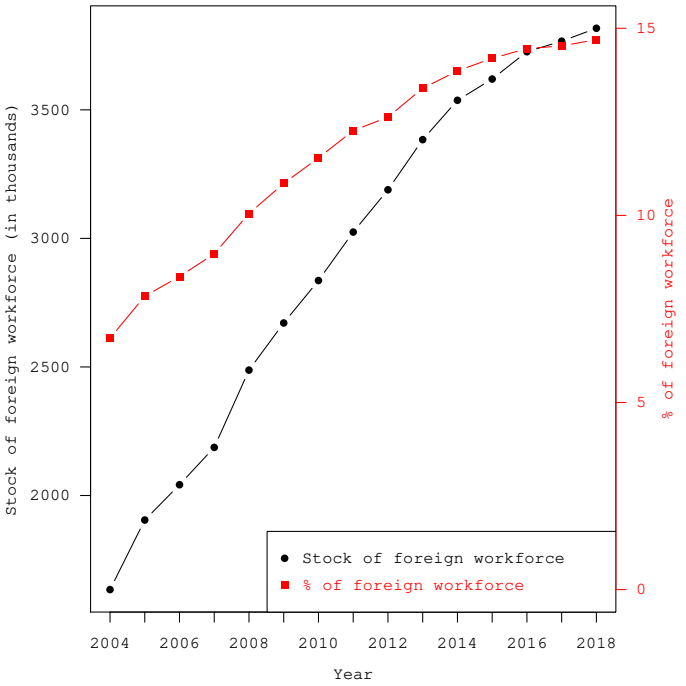
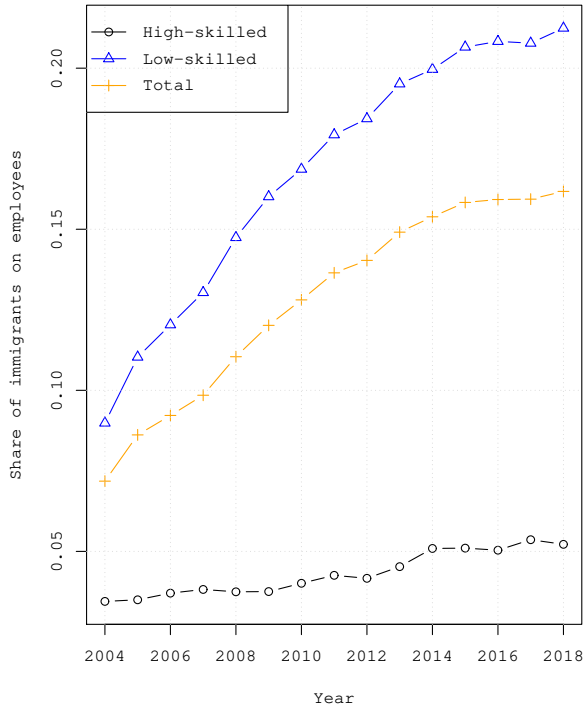
Natives and non-natives in Italian labour market

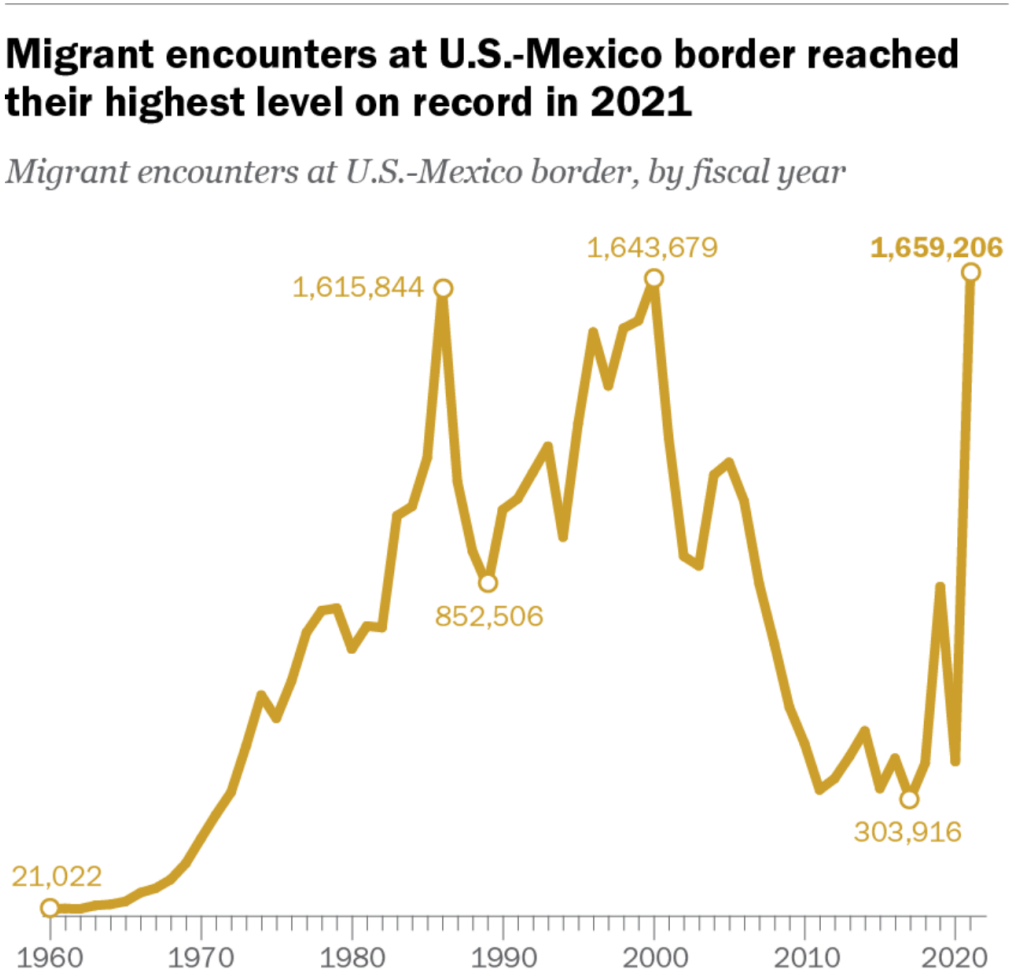


(a) Stock and share of foreign-born workforce.



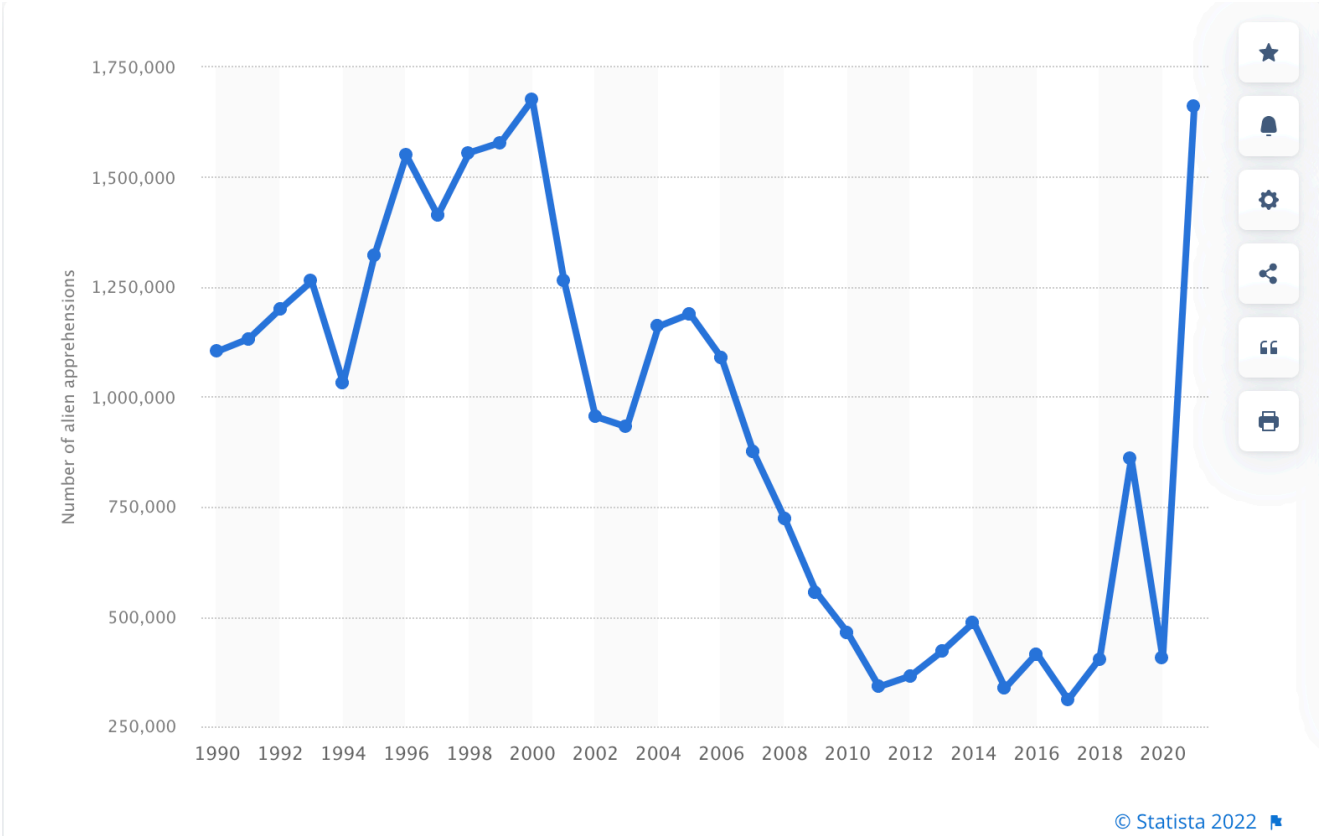
(b) Share of non-natives in the workforce by skill level.

Not only an Italian problem (I)



Not only an Italian problem (II)

Alien apprehensions registered by the U.S. border patrol



Short-run effects of immigration in developed countries

- It is an **asymmetric shock** (typically immigrants are low-skilled);
- It changes the **relative prices of goods/services**, i.e. to decrease the prices of goods/services mainly produced by low-skilled workers;
- It tends to increase **total output**, raising Government **revenues** (taxes and social contributions);
- It creates **congestion** in the provision of **public goods**, services and pressure on the distribution of **subsidies**;
- It is still an *open issue* if immigration tends to change the **relative wages**, i.e. to decrease wages of low-skilled workers.

What we do in the paper

- We study the impact of immigration on **wages, profits and welfare**
- We develop a **general equilibrium** search and matching model with
  - employees with **different skills** (high-skilled vs low-skilled) produce two types of goods
  - **unemployment benefits** and **public goods** are financed by **taxes** on wages, profits and production
  - a labour market with **frictions** per each category of employees (high-skilled vs low-skilled and natives vs non-natives)
- We discuss the crucial role of **substitutability/complementarity between consumption goods**, through their relative price change induced by immigration
- We **estimate** the model using Italian data per each year in the period 2008-2017

Mechanisms

A large inflow of low-skilled employees has two major effects on wages and prices:

1. it changes the **skill composition** of the workforce, with an **ambiguous impact** on the real wages of low-skilled employees
2. by increasing the supply of the low-skilled good produced by low-skilled employees, it leads to a **drop in its price**, causing an **increase** in the real wage of high-skilled employees

Even when the wage of low-skilled employees is lower, the adverse effect on the price of the low-skilled good might induce a **loss for employers who operate in the low-skilled market**.

Employees

Employees maximize the following CES **utility function**

$$Z_{i,j} = \left[\gamma d_{h,i,j}^{\rho} + (1-\gamma) d_{l,i,j}^{\rho}\right]^{1/\rho} + \iota\nu, \tag{1}$$

subject to the **budget constraint**:

$$p_h d_{h,i,j} + p_l d_{l,i,j} = y_{i,j} = \begin{cases} (1-t)(w_{i,j}+\tau) & \text{if worker } (i,j) \text{ is employed,} \\ b(1-t)(w_{i,j}+\tau) & \text{if worker } (i,j) \text{ is unemployed.} \end{cases}$$

Real Wages of Natives vs Not Natives

$$\tilde{w}_{i,N} = \underbrace{A_{i,N}(\theta_i)}_{>0}\tilde{p}_i x_i - \underbrace{B_{i,N}(\theta_i)}_{>0}\tilde{\tau} + \underbrace{C_{i,N}(\theta_i)}_{>0}\tilde{p}_i x_i F \tag{2}$$

$$\begin{aligned}\tilde{w}_{i,I} = & \underbrace{D_{i,I}(\theta_i)}_{>0}\tilde{p}_i x_i - \underbrace{E_{i,I}(\theta_i)}_{>0}\tilde{\tau} + \underbrace{G_{i,I}(\theta_i)}_{>0}\tilde{p}_i x_i F + \underbrace{K_{i,I}(\theta_i)}_{>0} W_{i,FC} \\ & - \underbrace{H_{i,I}(\theta_i)}_{>0}\iota\nu,\end{aligned} \tag{3}$$

Real Prices of High-skilled and Low-skilled goods

$$\tilde{p}_h = \left\{ \gamma^{1/(1-\rho)} + (1-\gamma)\gamma^{\rho/(1-\rho)} \left[\frac{(1-g_l)x_l(e_{l,N}+e_{l,I})}{(1-g_h)x_h(e_{h,N}+e_{h,I})} \right]^{\rho} \right\}^{(1-\rho)/\rho} \quad (4)$$

$$\tilde{p}_l = \left\{ (1-\gamma)^{1/(1-\rho)} + \gamma(1-\gamma)^{\rho/(1-\rho)} \left[\frac{(1-g_h)x_h(e_{h,N}+e_{h,I})}{(1-g_l)x_l(e_{l,N}+e_{l,I})} \right]^{\rho} \right\}^{(1-\rho)/\rho} \quad (5)$$

▸ Bellmans

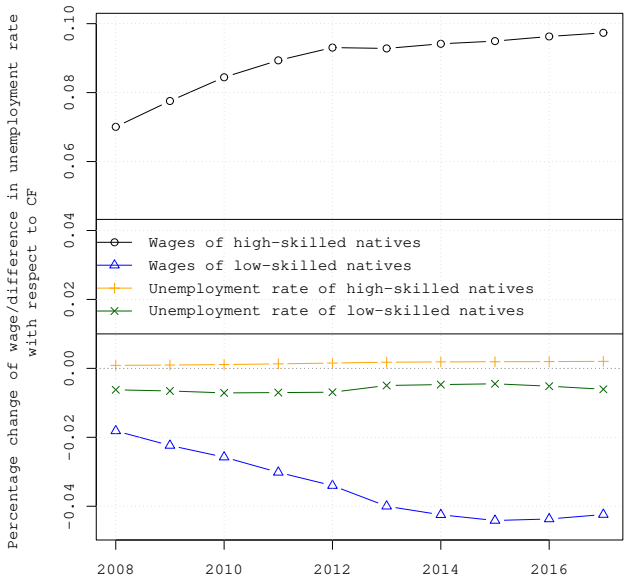
Estimation methodology

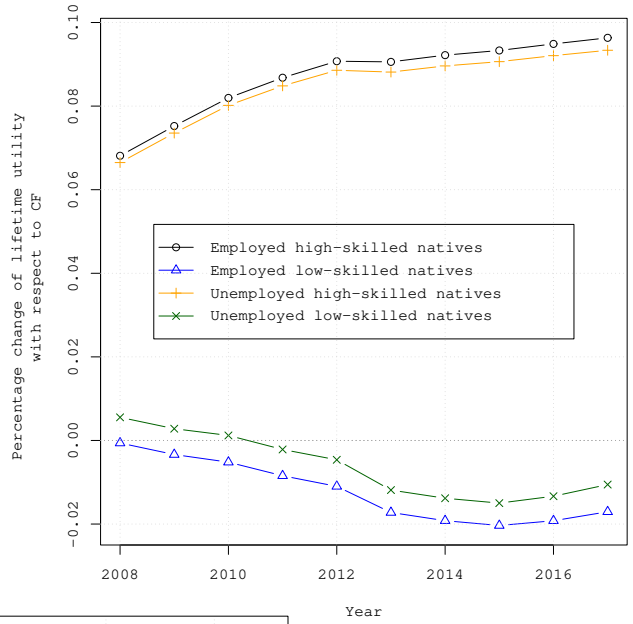
We match seventeen moments:

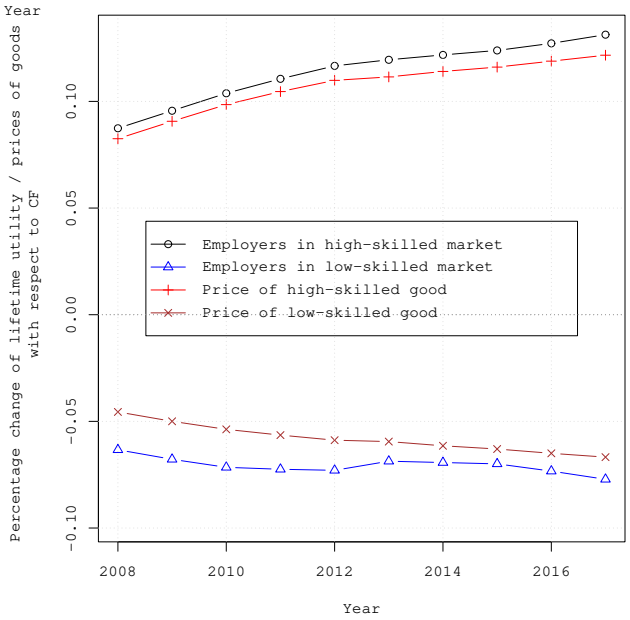
- four net wages,
- four job finding rates,
- four unemployment rates,
- the share of (non-adjusted) labour income on total gross value added,
- total real GDP,
- total real GDP per worker,
- the two shares of native unemployed in the two labour markets.

$$\hat{\omega}_{N,W_N} = \min_{\omega \in \Omega} (M_N - \tilde{M}(\omega))' W_N (M_N - \tilde{M}(\omega)).$$

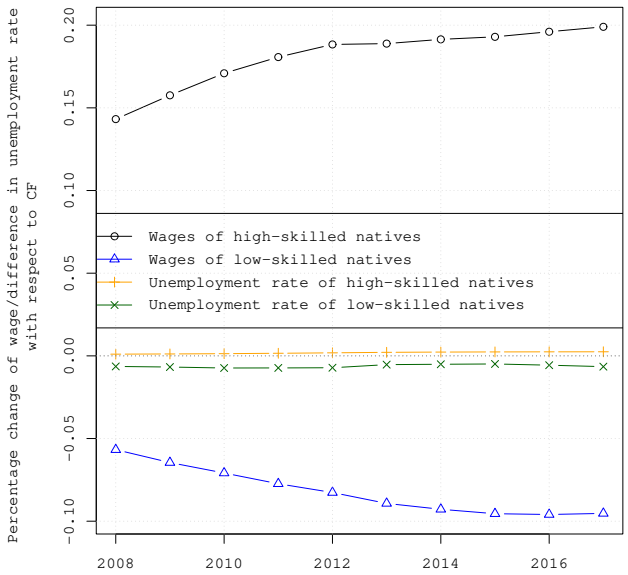
Counterfactual analysis: no non-natives

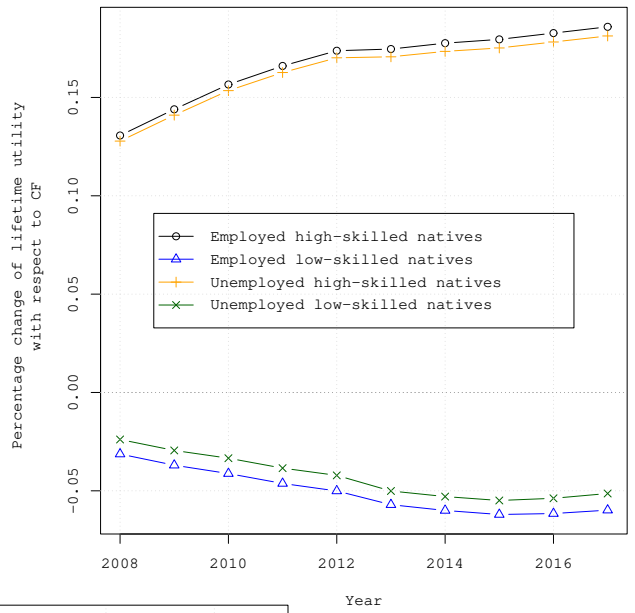


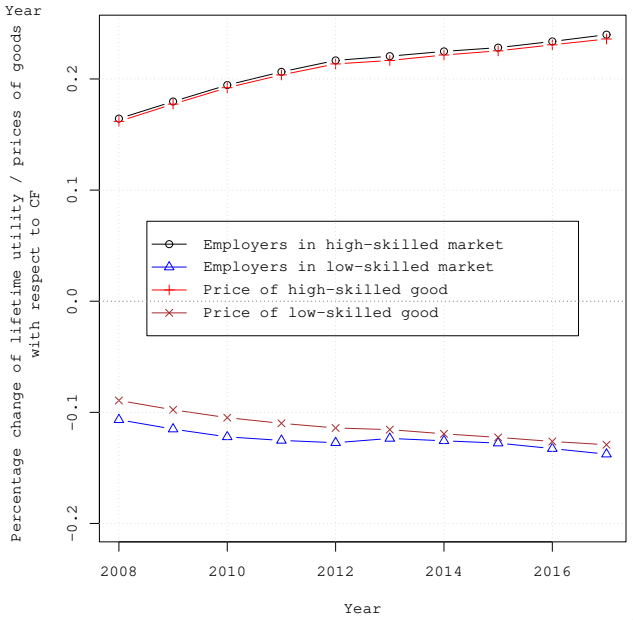




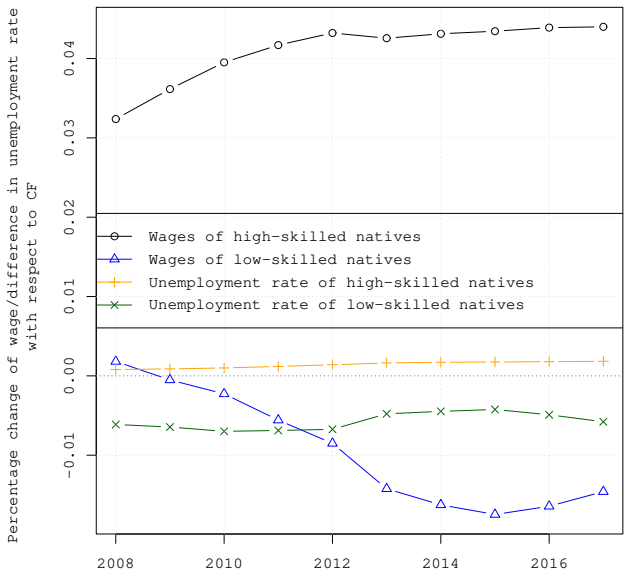
Counterfactual analysis: goods are more complements

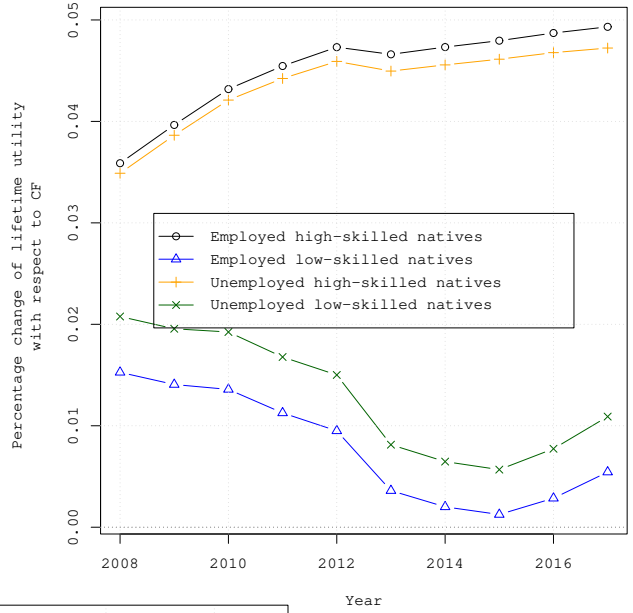


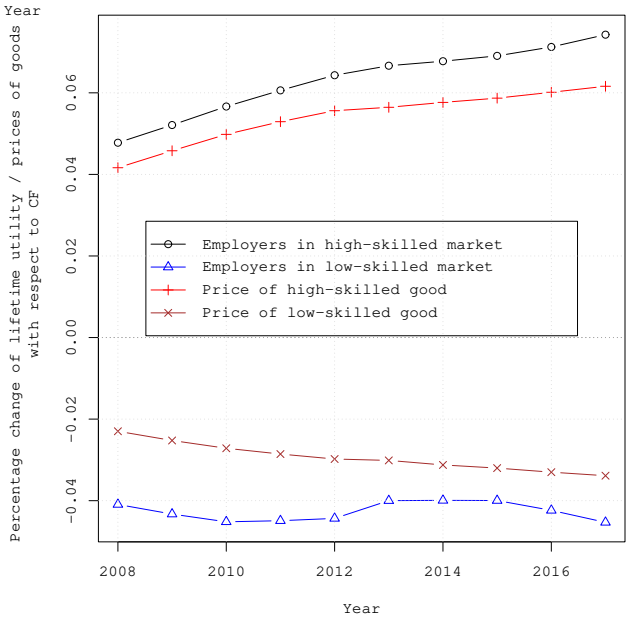




Counterfactual analysis: goods are more substitutes







Thank you for your attention!

Email: c.tealdi@hw.ac.uk

Paper available at: https://www.iza.org/publications/dp/13600/winners-and-losers-of-immigration

The search and matching model

Employees

- Continuous time infinite-horizon
- All employees supply labour inelastically, are risk neutral and discount the future at rate r
- Employees differ according to their **skill level** (high-skilled h vs low-skilled l) and their **country of origin** (natives N vs non-natives I)
- Employees can be either **employed or unemployed**

Employees

- When employed, they may lose their job at exogenous rate $\delta_{i,j}$, where $i \in \{h, l\}$ and $j \in \{N, I\}$.
- When unemployed, the **probability that they find a job** differs by skill level and country of origin of the worker = probability that an employee meets an employer $\times$ the probability that the match is formed
- Wages and profits are taxed at the **proportional rate** t
- Workers receive a **tax subsidy** τ
- Unemployed workers receive **unemployment benefits** which are a proportion b of their net wage

Employees

Employees maximize the following CES **utility function**

$$Z_{i,j} = \left[\gamma d_{h,i,j}^{\rho} + (1-\gamma) d_{l,i,j}^{\rho}\right]^{1/\rho} + \iota\nu, \tag{6}$$

subject to the **budget constraint**:

$$p_h d_{h,i,j} + p_l d_{l,i,j} = y_{i,j} = \begin{cases} (1-t)(w_{i,j}+\tau) & \text{if worker } (i,j) \text{ is employed,} \\ b(1-t)(w_{i,j}+\tau) & \text{if worker } (i,j) \text{ is unemployed.} \end{cases}$$

The model – Employees

Demand of good h and good l:

$$d_{h,i,j} = \left(\frac{\tilde{p}_h}{\gamma}\right)^{1/(\rho-1)} \tilde{y}_{i,j}, \tag{7}$$

$$d_{l,i,j} = \left(\frac{\tilde{p}_l}{1-\gamma}\right)^{1/(\rho-1)} \tilde{y}_{i,j}, \tag{8}$$

where $\tilde{p}_i \equiv p_i/P$ is the *real price* of good $i \in \{h, l\}$ and $\tilde{y}_{i,j} \equiv y_{i,j}/P$ is the *real income*, having defined P as the *aggregate price index*:

$$P = \left[p_h \left(\frac{p_h}{\gamma}\right)^{1/(\rho-1)} + p_l \left(\frac{p_l}{1-\gamma}\right)^{1/(\rho-1)}\right]^{(\rho-1)/\rho}. \tag{9}$$

Non-natives

- When coming from abroad join the home labour market as **unemployed**;
- Can be either employed or unemployed in the labour market, or **abroad**;
- Can **leave the labour market** and go back to their country of origin;
- The possibility of unemployed not natives to go back to the foreign country caused a key **asymmetry** between natives and non-natives (this will be reflected in the equilibrium level of wages).

▸ Bellmans

Employers

- Employers are **ex-ante homogeneous** and post **skill-specific vacancies** to fill a job, which are open to both natives and non-natives;
- Each employer specializes in the production of **one** of the two goods;
- Good y_h is produced using **only high-skilled workers** h, whose value added is $p_h x_h$;
- Good y_l is produced using **only low-skilled workers** l, with value added $p_l x_l$;
- Goods are sold at price p_h and p_l;

Employers (cont.)

- Every time a shock destroys a match, the employer is required to pay **firing costs** F, which are *proportional* to the productivity of the employee;
- A share ϕ of this cost will then be transferred to the employee as a **severance payment**, while the share $1-\phi$ is a **dead-weight loss** (red-tape cost) (Garibaldi and Violante, 2005);
- The **probability that a vacancy is filled** differs by skill level and country of origin of the worker = probability that an employer meets an employee $\times$ the probability that the match is formed;
- Production is taxed at rate t_p.

▸ Bellmans

Employees' Bellman Equations

Back

Employed

$$\begin{aligned} rW^e_{i,N} &= Y^e_{i,N} + \delta_{i,N}\left(W^u_{i,N} + \phi\tilde{p}_i x_i F - W^e_{i,N}\right) \text{ and} \\ rW^e_{i,I} &= Y^e_{i,I} + \delta_{i,I}\left(W^u_{i,I} + \phi\tilde{p}_i x_i F - W^e_{i,I}\right). \end{aligned}$$

Unemployed

$$\begin{aligned} rW^u_{i,N} &= Y^u_{i,N} + \kappa_{i,N}\theta_i q\left(\theta_i\right)\left(W^e_{i,N} - W^u_{i,N}\right) \text{ and} \\ rW^u_{i,I} &= Y^u_{i,I} + \lambda\left(W_{i,FC} - W^u_{i,I}\right) + \kappa_{i,I}\theta_i q\left(\theta_i\right)\left(W^e_{i,I} - W^u_{i,I}\right). \end{aligned}$$

Employers' Bellman Equations

▸ Prices
▸ Employers

Filled

$$\begin{aligned} rJ_{i,N} &= (1-t)(\tilde{p}_i x_i - \tilde{w}_{i,N}) + \delta_{i,N}\left(V_i - J_{i,N} - \tilde{p}_i x_i F\right) \text{ and} \\ rJ_{i,I} &= (1-t)(\tilde{p}_i x_i - \tilde{w}_{i,I}) + \delta_{i,I}\left(V_i - J_{i,I} - \tilde{p}_i x_i F\right), \end{aligned}$$

Vacant

$$rV_i = -c\tilde{p}_i x_i + \pi_{i,N}\kappa_{i,N} q\left(\theta_i\right)\left(J_{i,N} - V_i\right) + \left(1-\pi_{i,N}\right)\kappa_{i,I} q\left(\theta_i\right)\left(J_{i,I} - V_i\right),$$

where $\pi_{i,N}$ = share of natives who are unemployed.

Matching and equilibrium in goods markets

- Matches formed in a **frictional labour market** (DMP)
- **Matching function** $m(v_i, u_i)$
- $\theta_i \equiv v_i/u_i$ is the **labour market tightness**
- Wages are determined through a **Nash bargaining mechanism**
- Prices are **endogenously** determined by equating the demand and supply of the high-skilled and low-skilled goods.

Government

Government **expenditure**:

- Unemployment benefits b
- Subsidies τ
- Public consumption of good h and good l, g_h and g_l (public goods)

Direct taxes:

- Income taxes (rate t)

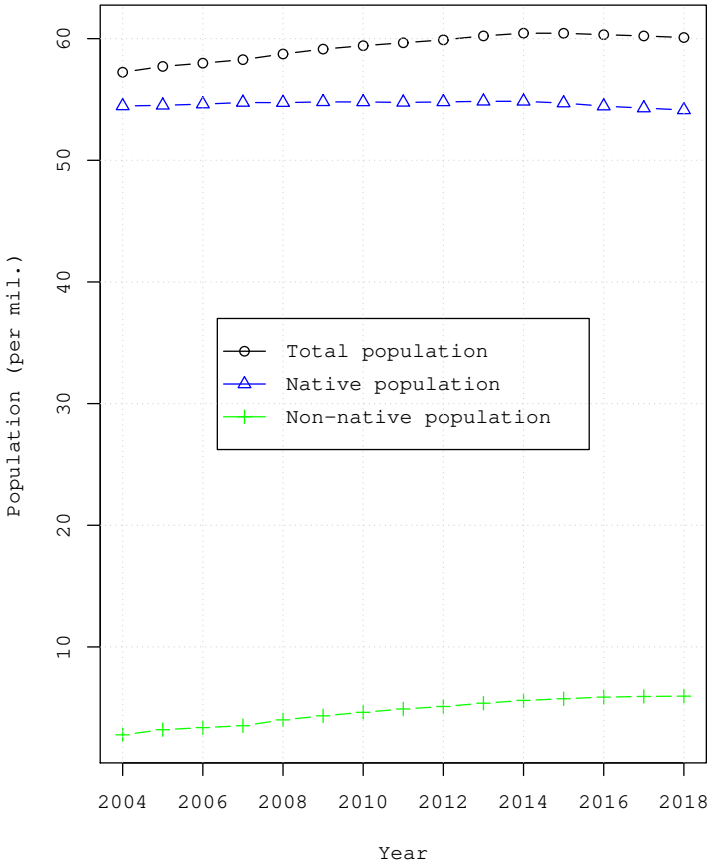
Indirect taxes:

- Taxes on production (rate t_p)

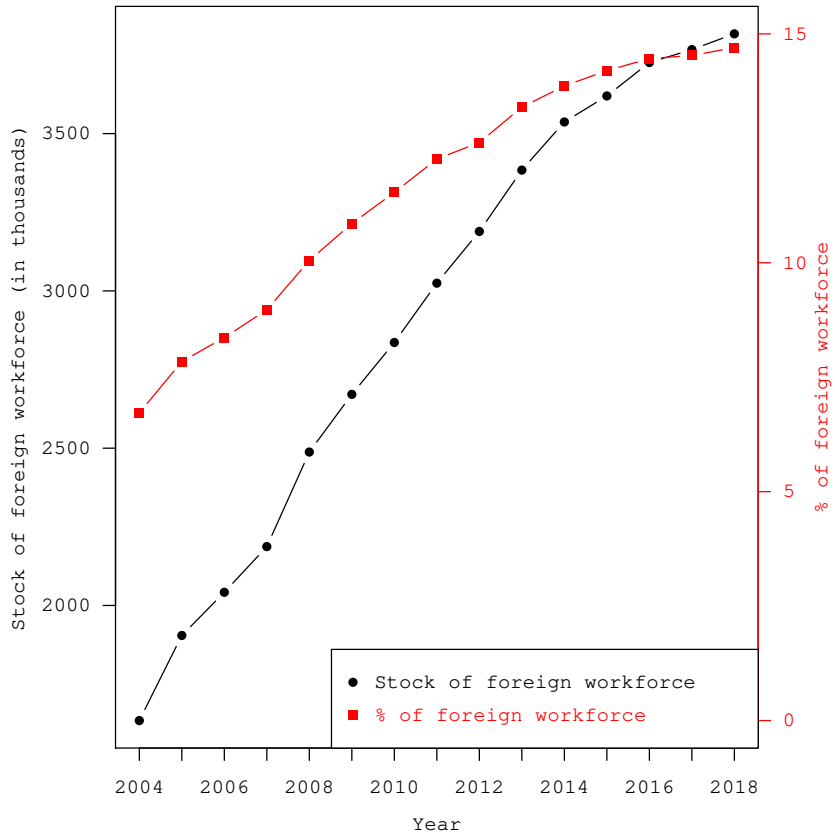
In equilibrium, the **government primary surplus** is equal to **zero**, i.e., total Government expenditure= direct and indirect taxes

Empirical evidence

Natives and non-natives in Italian labour market



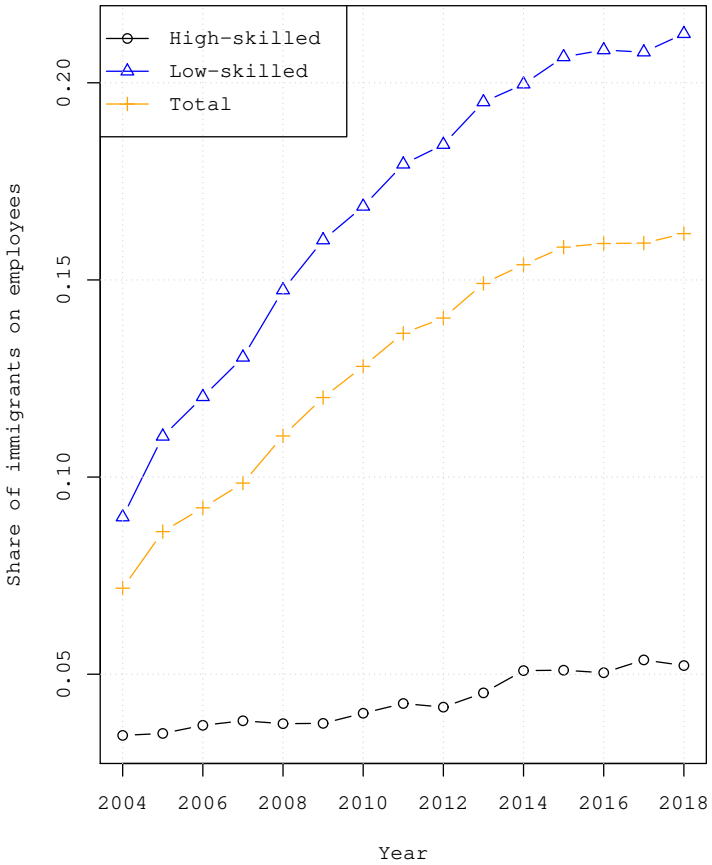
(a) Stock of native and non-native population.



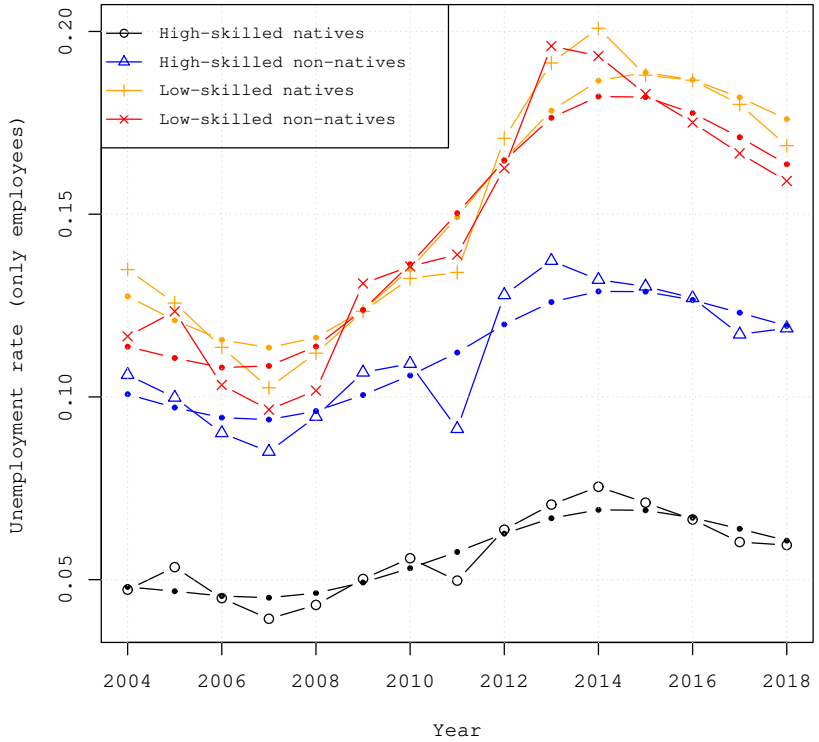
(b) Stock and share of foreign-born workforce.

Skills: education and occupation

- **High-skilled workers**
  - Skill levels 3 or 4 (ILO classification)
  - Occupation: Managers or professionals.
  - Education: Tertiary level of education.
- **Low-skilled workers**
  - Skill levels 1 or 2 (ILO classification)
  - Occupation: Clerks, sales workers, craft workers, plant and machine operators and in elementary occupations.
  - Education: Primary or secondary level of education.

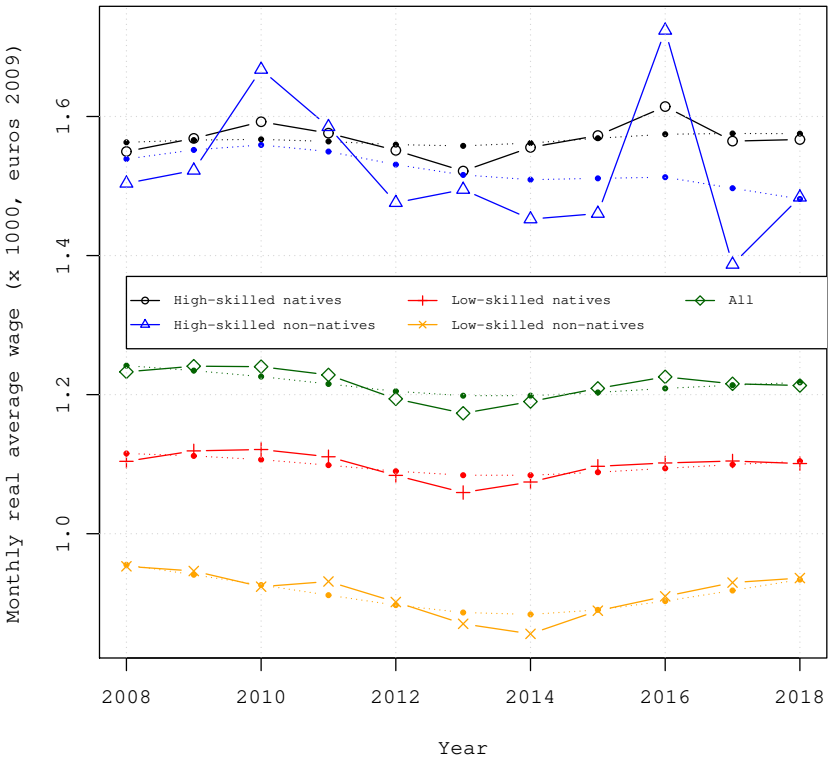


(a) Share of non-natives in the workforce by skill level.

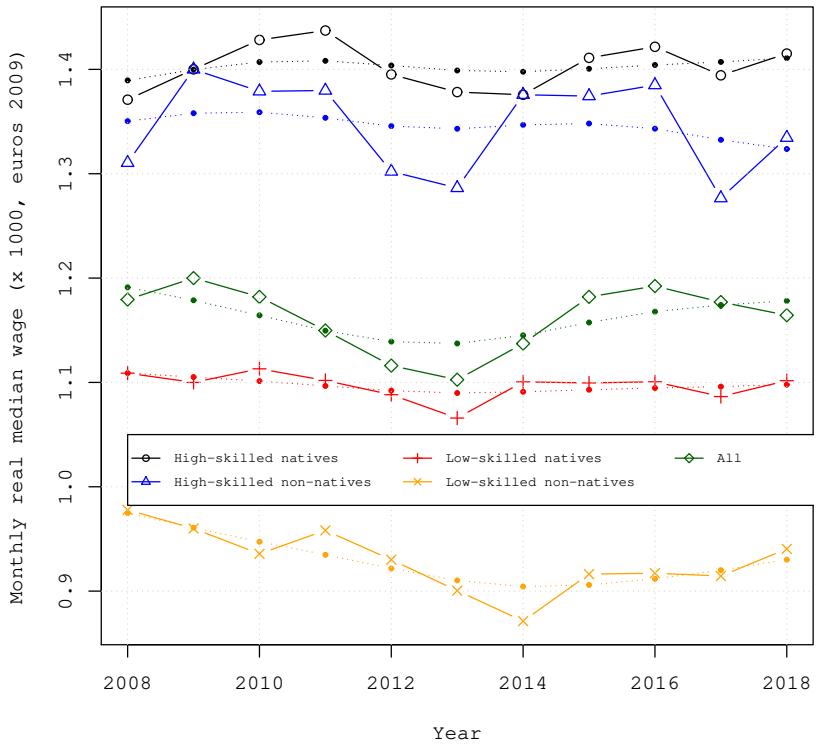


(b) Unemployment rate by country of origin and skill level.

Real wages for different employees

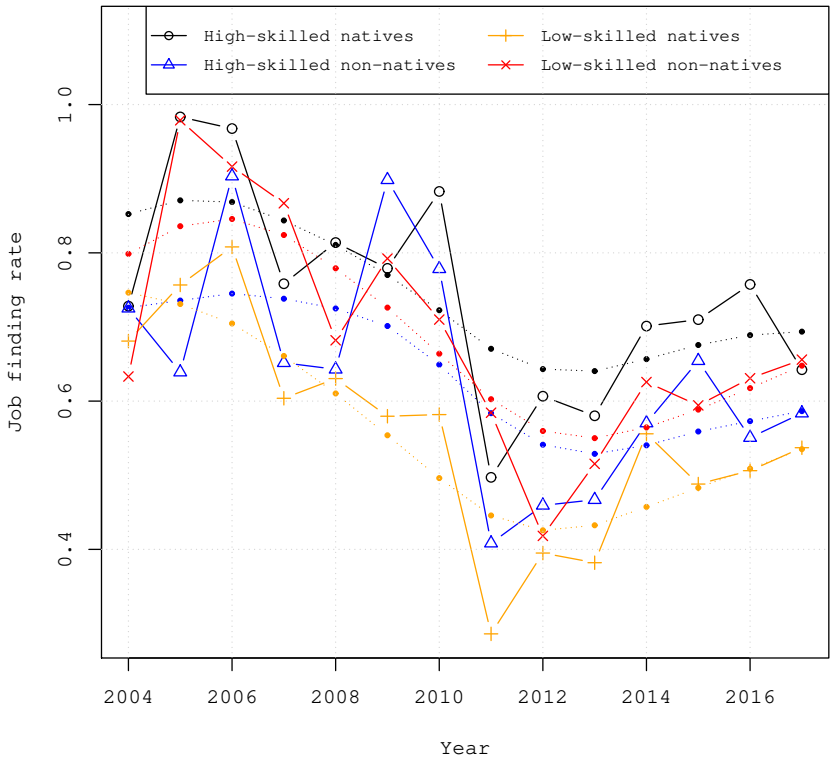


(a) Monthly real average net wages.

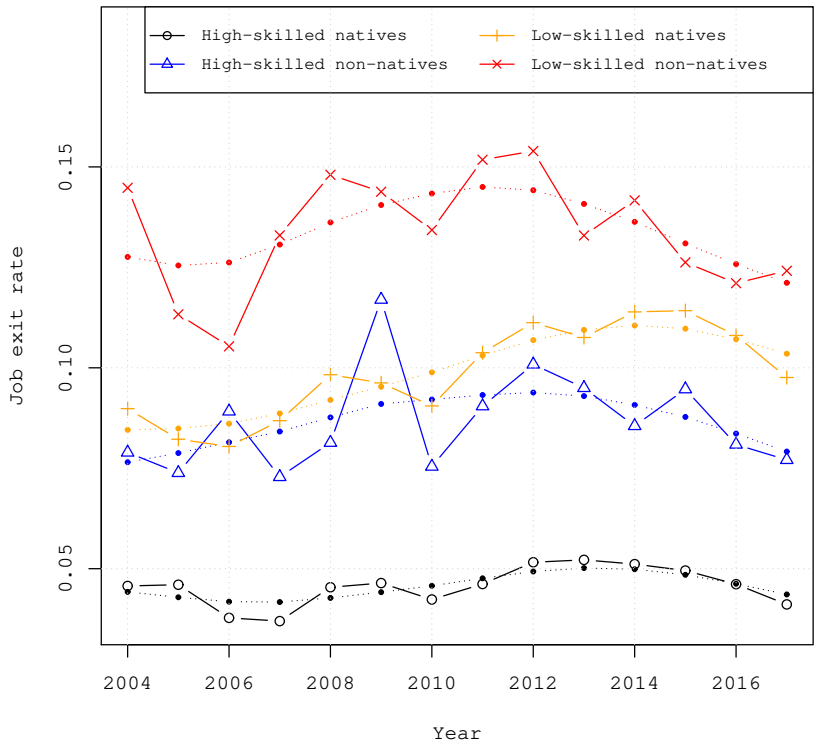


(b) Monthly real median net wages.

Job creation and job exit rates for different employees



(a) Job finding rates.



(b) Job exit rates.

Estimation procedure

Parameter	Description	Source
r	Discount rate	Della Vigna and Paserman (2005)
ϕ	Share of firing costs transferred to employees	Garibaldi and Violante (2005)
α	Elasticity of matching function with respect to unemployment	Petrongolo and Pissarides (2001)
c	Vacancy cost	Our calculation
F	Firing cost	Our calculation
$\delta_{h,N}$	Job destruction rate of high-skilled native employees	Our calculation
$\delta_{l,N}$	Job destruction rate of low-skilled native employees	Our calculation
$\delta_{h,I}$	Job destruction rate of high-skilled non-native employees	Our calculation
$\delta_{l,I}$	Job destruction rate of low-skilled non-native employees	Our calculation
χ	Mass of employers	Italian Labour Force Survey (RCFL)
$\sigma_{h,N}$	Mass of high-skilled native employees	Italian Labour Force Survey (RCFL)
$\sigma_{l,N}$	Mass of low-skilled native employees	Italian Labour Force Survey (RCFL)
$\sigma_{h,I}$	Mass of high-skilled non-native employees	Italian Labour Force Survey (RCFL)
$\sigma_{l,I}$	Mass of low-skilled non-native employees	Italian Labour Force Survey (RCFL)
g	Government expenditure in public goods as percentage of GVA	Our calculation
b	Unemployment benefits	Our calculation
τ	Tax subsidy	Our calculation
t_p	Indirect tax rate	Our calculation
η	Rate at which non-natives enter the country	Our calculation
λ	Rate at which non-natives exit the country	Our calculation
β_N	Bargaining power of native employees	Estimated by matching moments
β_I	Bargaining power of non-native employees	Estimated by matching moments
γ	Share of income spent on good h	Estimated by matching moments
x_h	Quantity of good h produced by high-skilled employees	Estimated by matching moments
x_l	Quantity of good l produced by low-skilled employees	Estimated by matching moments
t	Direct tax rate (income and profits)	Estimated by matching moments
$\kappa_{h,N}$	Hiring chances of high-skilled native employees	Estimated by matching moments
$\kappa_{l,N}$	Hiring chances of low-skilled native employees	Estimated by matching moments
$\kappa_{h,I}$	Hiring chances of high-skilled non-native employees	Estimated by matching moments
$\kappa_{l,I}$	Hiring chances of low-skilled non-native employees	Estimated by matching moments
$W_{h,FC}$	Utility of high-skilled employees abroad	Estimated by matching moments
$W_{l,FC}$	Utility of low-skilled employees abroad	Estimated by matching moments
ι	Elasticity of substitution between private and public goods	Set to 1 (neutral value)
ρ	Degree of congestion in accessing the public good	Set to 1 (neutral value)

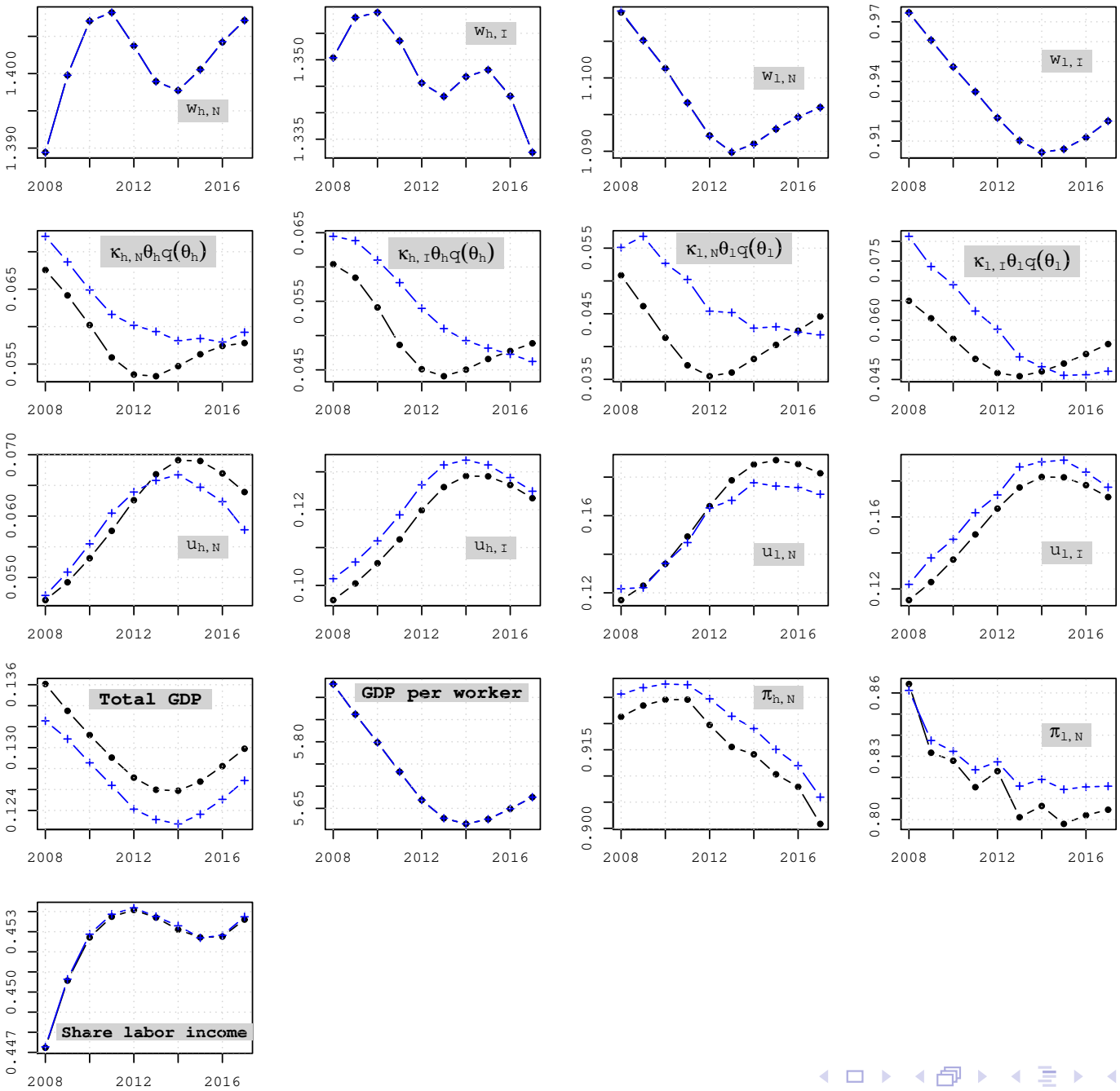
Estimation methodology

We match seventeen moments:

- four net wages,
- four job finding rates,
- four unemployment rates,
- the share of (non-adjusted) labour income on total gross value added,
- total real GDP,
- total real GDP per worker,
- the two shares of native unemployed in the two labour markets.

$$\hat{\omega}_{N,W_N} = \min_{\omega \in \Omega} (M_N - \tilde{M}(\omega))' W_N (M_N - \tilde{M}(\omega)).$$

The seventeen observed versus matched moments.

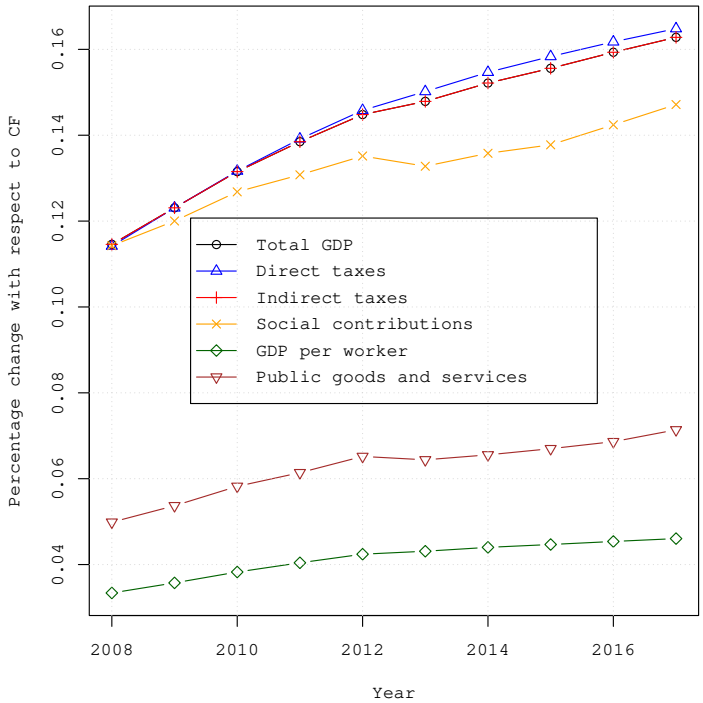


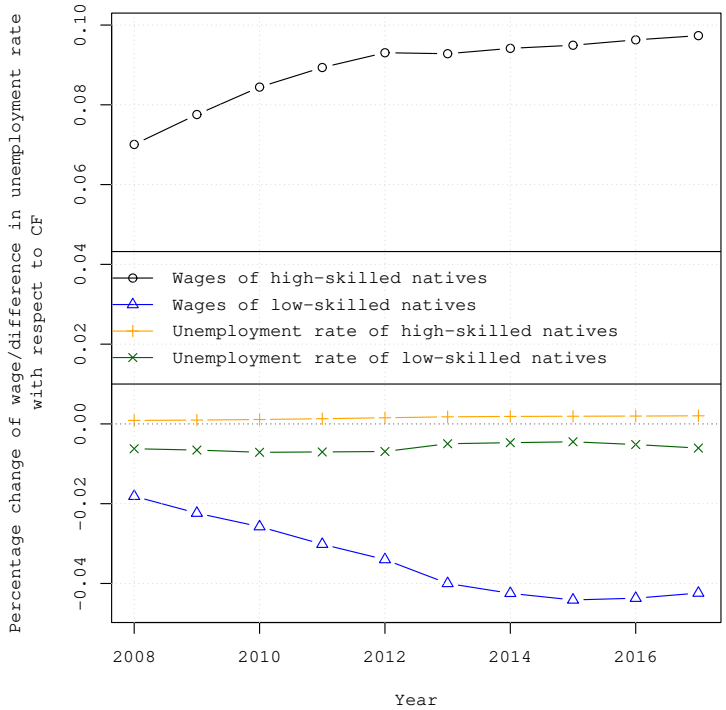
Counterfactual analysis

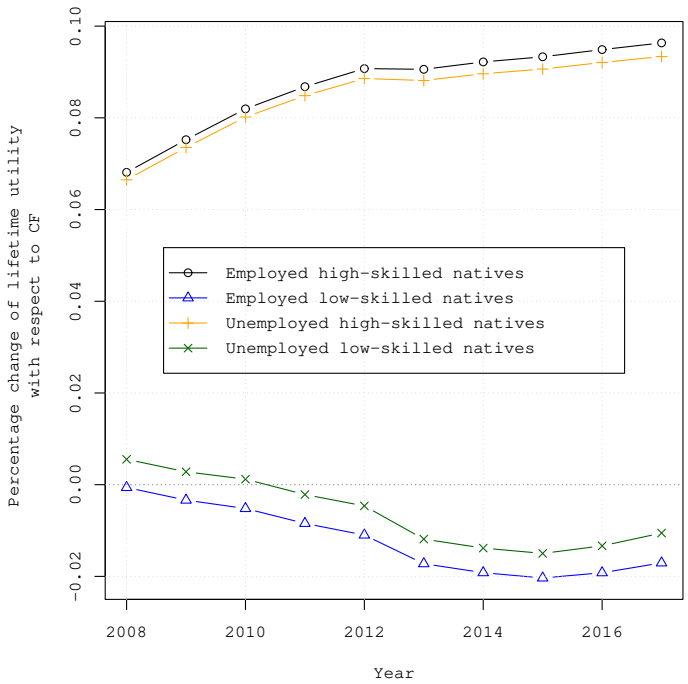
Counterfactual analysis

- Two counter-factual analyses
  - no non-natives in the economy,
  - sudden inflow of 160 thousands low-skilled non-natives (forecasted net migration for Italy in 2020)
- We calculate the new equilibrium, keeping the other parameters at their original estimated values, while allowing all endogenous variables such as wages, prices, etc. to adjust.

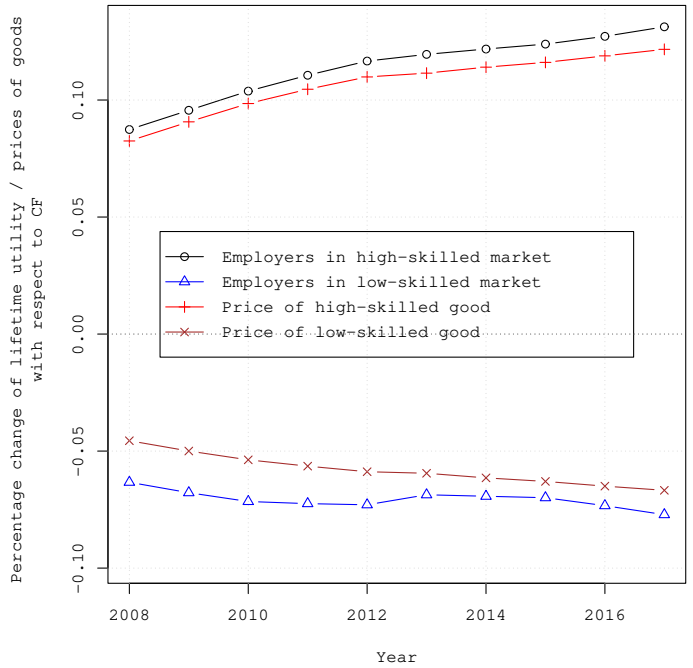
Counterfactual analysis: no non-natives







(a) Employees' lifetime utility



(b) Employers' lifetime utility and real prices of goods

Summary of results of counterfactual analysis (for 2017)

- The **real wages** of low-skilled and high-skilled employees were **8% lower** and **4% higher**, respectively, compared to the counter-factual scenario with no non-natives
- Similarly, employers working in the low-skilled market experienced a drop in **profits** of comparable magnitude, while the opposite happened to employers operating in the high-skilled market ▸ Prices
- The presence of non-natives led to a **10% increase** in **GDP** and to an increment of approximately **70 billions** € in **Government revenues** and **18 billions** € in **social security contributions**
- The presence of non-natives led to a **1% decrease** in **GDP per worker** and a similar drop in the **provision of public goods**.

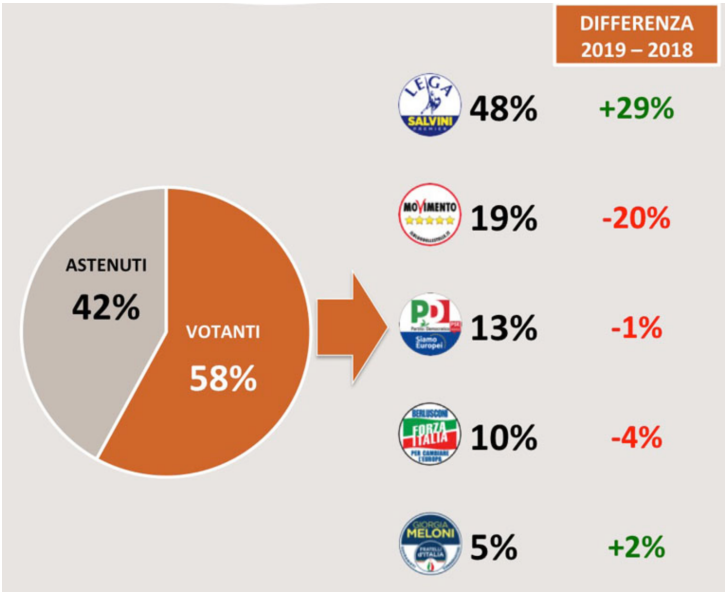
Thank you for your attention!

Paper available at: https://www.iza.org/publications/dp/13600/winners-and-losers-of-immigration

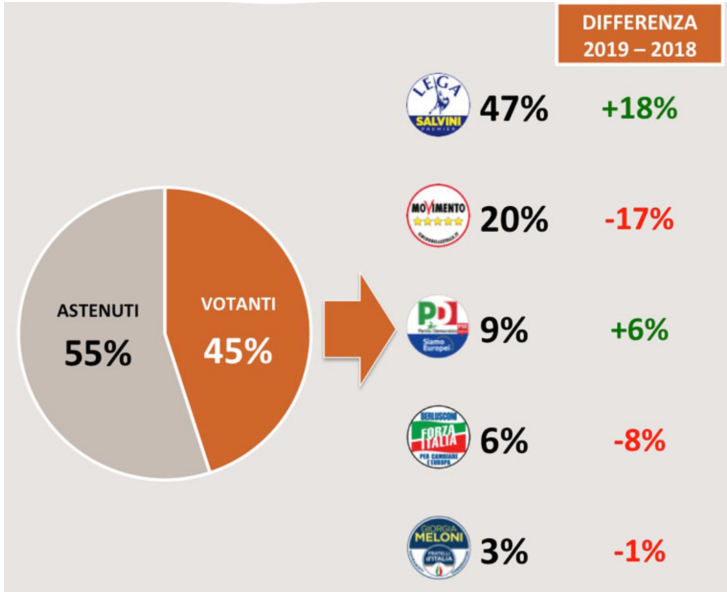
Email: c.tealdi@hw.ac.uk

Go Back

(a) Switchers



(b) Blue collars



(c) Poors

Source: SWG 2019.

Prices in high-skilled vs low-skilled sectors

Back

Sector	High-skilled employees (2017)
Security and investigation activities	0.06
Warehousing and storage	0.23
Management consultancy activities	0.78
Computer programming, consultancy and related activities	0.91

Source: Eurostat Service producer prices and Italian Labour Force Survey (RCFL).