Out of the Shadows: Labor Market Effects of Anti-Exploitation Legislation

Evidence from Italy

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Outline

Introduction

Research Question

Research Question: Does enforcement-based labor formalization work in developed economies?

Setting: Italy's Law 199/2016 (Anti-Caporalato Reform)

The Problem

- Illegal labor intermediation in agriculture
- 200,000+ exploited workers
- Concentrated among migrants

The Reform

- Criminal liability for employers
- Risk of imprisonment
- Mandatory asset confiscation

Main Result

Agricultural employment increased by **4.21%** in high-migration provinces after Law 199/2016 (SE = 1.23%, p = 0.0006).

Identification

- Triple-DiD design
- Within-province identification
- Pre-trends pass (F=0.34, p=0.92)

Robustness

- Passes placebo sector and reform timing tests
- IV-DID (Bartik) for migration endogeneity
- Passes pre-trends, robust to province trends
- Robust to alternative control pools

Interpretation

- No job destruction
- Persistent 2018–2020
- Heterogeneity by Institutional quality

Institutional Background

Context: The Mediterranean Migration Crisis

2014–2017: Unprecedented arrivals on Italian shores

Year	Sea Arrivals	Deaths at Sea	Death Rate
2014	170,100	3,093	1.8%
2015	153,842	2,892	1.9%
2016	181,436	**5,096**	**2.8%**
2017	119,369	2,873	2.4%
Total	**624,747**	**13,954**	2.2%

- **Origins:** Nigeria, Eritrea, Guinea, Côte d'Ivoire, Gambia, Senegal, Mali
- **Routes:** Libya → Lampedusa, Sicily; Tunisia → Sicily
- **2016 peak:** 181,000+ arrivals; over 5,000 deaths—deadliest year

Sources: Ministero dell'Interno; IOM Missing Migrants Project; UNHCR

The Hidden Workforce: Undocumented Agricultural Labor

A parallel labor market invisible to the state

Scale of the problem:

- **180,000–230,000** vulnerable workers (FLAI-CGIL)
- 59% of farm inspections find violations
- €2–3/hour wages (min: €7–8)
- 10–14 hour workdays, no rest

Geographic concentration:

- **Puglia:** Tomato harvests (Foggia)
- **Calabria:** Citrus picking (Rosarno)
- **Campania:** Castel Volturno camps
- **Sicily:** Greenhouses (Ragusa)

Key fact: Most arrivals lack work permits. Without legal status, they cannot access formal employment—creating a captive workforce for exploitative intermediaries.

Sources: FLAI-CGIL Osservatorio Placido Rizzotto (2018); Ferrante (2024); ISTAT

Invisible to the State: No Rights, No Protections

Structural vulnerability in the shadow economy

What workers lack:

- **No employment contracts**
- No access to healthcare
- No accident insurance
- No pension contributions
- No minimum wage protections
- No legal recourse against abuse

Living conditions:

- Abandoned farmhouses
- Makeshift camps ("ghetti")
- No running water or electricity
- Isolation from civil society
- Debt bondage to caporali

The policy challenge: How can enforcement formalize workers when the state does not know they exist?

The Caporalato System

Definition: Illegal labor intermediation exploiting vulnerable workers

How it works:

1. "Caporale" recruits migrants
2. Extracts 40–50% of wages
3. Controls employment access
4. Workers: 10–14 hour days, no contracts

Most affected:

Puglia, Calabria, Campania, Sicily

Fonte: nostra rilevazione ed elaborazione dati da archivio "Eco della Stampa" (periodo di rilevamento: marzo-novembre 2020).

Source: Francesco Carchedi, Il Lavoro Dignitoso

Law 199/2016: Before vs After

Before Law 199/2016

- Focus on *intermediaries* (caporali)
- Violence/threats central to prosecution
- Exploitation vaguely defined
- Weaker penalties and deterrence
- Arrest and confiscation rare

After Law 199/2016

- **Direct employer liability**
- Base offence without violence/threat
- Objective exploitation indicators
- Stronger penalties and risk of arrest: 1–6 yrs prison
- Asset confiscation
- Corporate liability (D.Lgs. 231/2001)

Which Sectors Are Affected?

Caporalato is concentrated in specific sectors:

Sector	Exposure	Role in Analysis
Agriculture	**High**	**Treatment sector**
Construction	Medium	Placebo (some informal labor)
Manufacturing	Medium	Placebo (some informal labor)
Finance/Business	**None**	**Control sector**
Public Services	**None**	**Control sector**

Key insight for identification:

- Agriculture = **treated sector** (directly targeted by reform)
- Finance + Public Services = **control group** (formal sectors)
- This allows **within-province** comparison

Three Hypotheses for Evaluation

The first part of this work will test H1 vs H2.

H1: Under-Enforcement
Law remained largely **unapplied**:

- Insufficient inspectors
- Limited judicial capacity

H2: Perverse Effects Reform pushed exploitation **underground**:

- Undocumented migrants
- Hidden settlements

H3: Adaptation Caporalato **adapted** via:

- Fictitious contracts
- Shell companies

Data sources: ISTAT, National Labor Inspectorate, FLAI-CGIL Observatory

Note: I would like to test H3 (I have narrative evidence of it), but currenly i have no data.

Data and literature Review

Data

Primary source: Zenodo Italian Socio-Economic Panel (Ferrante 2024)

Variable	N	Mean	SD	Min	Max
Log Employment	6,420	10.21	1.88	4.61	14.52
Δ Log Employment	6,420	0.011	0.091	-0.52	0.48
Agricultural Sector	6,420	0.167	0.373	0	1
Migration Rate (2010)	6,420	3.24	2.18	-1.2	12.4

Sample:

- 107 provinces $\times$ 3 sectors $\times$ 9 years
- Sectors: Agric + Finance + Public Services
- Period: **2011–2019** (main)

Note on 2020:

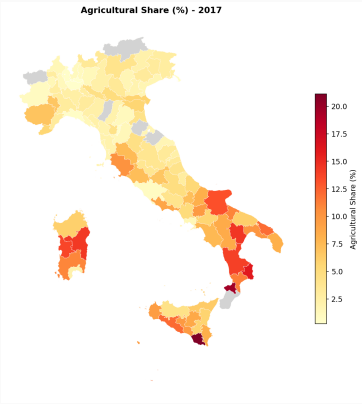
- COVID year included
- Effect persists: $+4.17\%^{***}$
- Robust to exclusion

Related Literature

Paper / Report	Setting / Scope	Key Finding / Contribution
Almeida & Carneiro (2012)	Brazil	Workers bear the cost of labor regulation through lower wages
Samaniego et al. (2024)	Mexico (RCT)	Inspections raise formalization but also increase job separations
Di Porto et al. (2018)	Italy (amnesty)	Amnesty program reduced undeclared work by 17%
La Porta & Schleifer (2008)	Cross-country	Informality is linked to weak institutions and low development
Floridi, Demena & Wagner (2020)	Meta-analysis	Formalization policies have modest and heterogeneous effects
ILO (2021)	Global (theory of change)	Identifies pathways for transitioning from informal to formal employment
OECD (2024)	OECD / emerging economies	Informality reinforces low pay and productivity traps

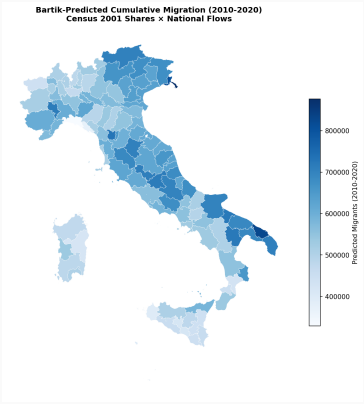
Geographic Distribution: Demand and Supply

Agricultural Share (Demand)



Share of employment in agriculture (2017)

Bartik Instrument (Supply)



Census 2001 shares × national flows (2010-2020)

Roadmap: Building Toward Identification

Each method solves some problems but creates others:

1. **Simple DiD** (North vs South) — Pre-trends fail; captures N-S divergence
2. **Triple DiD** (Sector $\times$ Migration $\times$ Post) — Within-province; pre-trends pass
3. **Event Study** — Dynamic effects; validates timing
4. **Dose-Response** — Non-parametric; tests monotonicity

Note: Synthetic Control not pursued—requires narrative treatment definition; we use data-driven sector $\times$ migration intensity.

Method 1: Simple Difference-in-Differences

Specification: $Y_{it} = \alpha + \beta \cdot (\text{HighCapo}_i \times \text{Post}_t) + \gamma_i + \delta_t + \varepsilon_{it}$

HighCapo = Southern provinces with high caporalato exposure (treatment); North = control

Pros:

- Has control group (North)
- Province and year FE

Cons:

- Pre-trends FAIL (p=0.045)
- Captures N-S divergence

Variable	Coef	SE	p-value	Status
HighCapo × Post	**−5.75%**	2.9%	0.047	Wrong sign

Why negative? Southern agriculture declining relative to North. This shows my main result (+4.21%) goes *against* the N-S divergence trend.

Method 2: Why Do We Need Three Dimensions?

Problem: Simple comparisons fail. I exploit three forms of variation:

- **Time**: Before vs After Reform. Base year: 2017 (reform year). Post = 2018+ when full enforcement began (first asset seizure: July 2017). Data uses annual averages, so 2017 captures partial effect, 2018+ full effect.
- **Sector**: Agriculture vs other sectors within each province. This allows me to use within-province variation, and is a way to model "Demand" for informal work. In the robustness section, a placebo sector (services) is used and no effect is found.
- **Migration Intensity**: High vs Low Migration Provinces. High demand for informal work makes no difference if there is no form of supply of informal workers. Migration intensity proxies for supply of informal workers. A bartik instrument is used in the robustness section to rule out possible endogeneity.

Method 2 (MAIN): The Specification

Regression equation:

$$\Delta \log(\text{Emp})_{ist} = \beta(\text{Agric}_s \times \text{Migr}_i \times \text{Post}_t) + \gamma_{is} + \delta_t + \varepsilon_{ist}$$

Variables:

$\Delta \log(\text{Emp})_{ist}$	Employment growth
Agric_s	$= 1$ if Agriculture
Migr_i	2010 migration (std.)
Post_t	$= 1$ if year ≥ 2018
γ_{is}	Province $\times$ Sector FE
δ_t	Year FE

What each part does:

- γ_{is}: Absorbs province-sector means (within-transformation)
- δ_t: Controls for national shocks
- β: **Effect** of reform

β = effect of being in **agriculture** $\times$ **high migration** $\times$ **post-reform**

One SD higher migration $\Rightarrow$ 4.21% more agricultural employment growth after reform.

Method 2 (MAIN): Testing the Identification Assumption

Test: Event study on triple interaction (Agric $\times$ Migr $\times$ Year$_t$)

Pre-period coefficients:

Year	Coef (%)	p-value
2011	-0.83	0.385
2012	$+0.02$	0.986
2013	-0.17	0.782
2014	-0.14	0.785
2015	-0.05	0.928
2016	-0.19	0.589
2017	**0.00**	(base)

Joint F-test:

H_0: All pre-period $\beta_t = 0$

F-statistic 0.389

p-value **0.885**

✓ **PASS**

Linear pre-trend:

Slope: 0.09%/year (p=0.275)

✓ **No pre-trend**

Method 2 (MAIN): Results

Pros:

- **Within-province comparison**
- **Pre-trends PASS** (F=0.39, p=0.88)

Treatment:

- Compare Agric vs other sectors *within province*
- Province shocks cancel out

Variable	Coef	SE	p-value	N	95% CI
Agric × Migr × Post	**+4.21%**	1.23%	**0.0006**	2,889	[1.80, 6.61]

Controls: Finance_Business + Public_Services (formal sectors)

Method 2 (MAIN): What Does 4.21% Mean?

Raw data: Agricultural vs. Other Sectors Growth (2016–2019)

	Agric Growth	Other Sectors	Agric − Other
High-migration (N=47)	**+5.0%**	+0.7%	**+4.3%**
Low-migration (N=60)	**−1.6%**	+0.5%	**−2.1%**
Difference	+6.6%	+0.2%	**+6.4%**

- **Pattern:** Agriculture **+5%** in high-migration vs **−1.6%** in low-migration; other sectors similar everywhere
- **Coefficient:** Raw DiD = +6.4% ≈ 1.5 SD × 4.21% = 6.3% ✓
- **Bottom line:** Reform increased formal agricultural employment in high-migration provinces

Method 2 (MAIN): IV-DID

Shift-share instrument: $Z_i = \sum_g \text{Share}_{ig,2001} \times \text{Flow}_{g,2010}$

Endogeneity threats in the use of the migration factor lead me to use a Bartik IV in the Triple DID framework above. Results remain consistent.

Construction:

- Shares: Census 2001 foreign pop
- Flows: National migration by nationality
- Groups: Romania, Morocco, etc.

Results:

Metric	Value
First-stage F	**24.6**
IV coefficient	**+3.18%**
IV p-value	**0.040**
OLS coefficient	+4.21%

Strong first-stage (F>10). IV confirms OLS direction. 99 provinces.

Method 3: Event Study (Dynamic Effects)

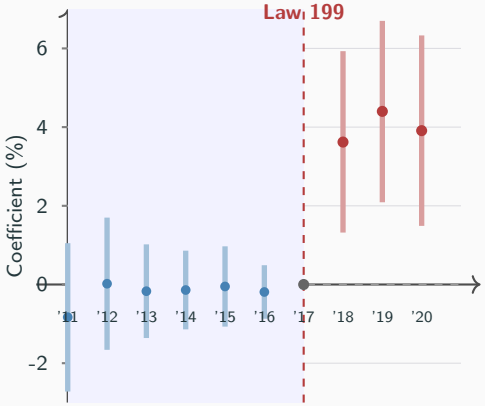
Specification: $\Delta \log(\text{Emp})_{ist} = \sum_{t \neq 2017} \beta_t (\text{Agric}_s \times \text{Migr}_i \times \mathbf{1}_t) + \gamma_{is} + \delta_t + \varepsilon_{ist}$

Pre-trends test:

- Joint F = 0.39
- p-value = **0.88**
- ✓ **Parallel trends**

Post-reform effects:

- 2018: +3.62%***
- 2019: +4.40%***
- 2020: +3.91%***



Event Study: Full Coefficient Table

Pre-trends test:

- Joint F(6, 6401) = 0.39
- p-value = **0.88**
- ✓ **Cannot reject null**

Post-reform effects:

- Avg effect: **+3.98%**
- 2018-2020 significant
- ✓ **Persistent effect**

Year	Coef (%)	SE	p
2011	−0.83	0.96	0.39
2012	+0.02	0.86	0.99
2013	−0.17	0.61	0.78
2014	−0.14	0.51	0.79
2015	−0.05	0.52	0.93
2016	−0.19	0.35	0.59
2017	**0.00**	—	—
2018	**+3.62**	1.18	**.002**
2019	**+4.40**	1.18	**<.001**
2020	**+3.91**	1.24	**.002**

Sample: 2011–2020. Base year: 2017.

Method 4: Dose-Response (Quartile Treatment)

Specification: $Y_{it} = \sum_{q=2}^{4} \beta_q (Q_{qi} \times \text{Post}_t) + \gamma_i + \delta_t + \varepsilon_{it}$

Pros:

- **Non-parametric**
- Tests monotonicity
- No functional form assumption

Results:

Quartile	Coef	p-value
Q2 vs Q1	+3.0%	0.47
Q3 vs Q1	+1.7%	0.70
Q4 vs Q1	**+9.1%**	**0.019**

Effect **concentrated in highest migration quartile** (threshold pattern).

Methods Summary

#	Method	Coef	p	Lesson
1	Simple DiD	**−5.8%**	0.047	N-S divergence
2	**Triple DiD (MAIN)**	**+4.21%**	**0.0007**	**Within-province**
	+ Bartik IV	**+3.18%**	**0.040**	**F=24.6**
3	**Event Study**	**+3.98%**	**<0.01**	**Pre-trends pass**
4	Dose-Response	+8.8%	0.025	Monotonic

Robustness

Robustness: Province Trends

Concern: Are results driven by differential provincial trends?

Specification	Coef (%)	SE (%)	p-value	95% CI
Main (No Trends)	**+4.21**	1.23	**0.0006**	[1.80, 6.61]
+ Province Trends (107)	+3.69	1.34†	0.005†	[1.06, 6.31]†

†Bootstrap SE, p-value, and CI (999 iterations)

With 107 province-specific linear trends:

- Coefficient drops to 3.69% (from 4.21%)
- Direction and magnitude preserved
- Bootstrap inference due to dimensionality issues

Robustness: Alternative inference

Alternative inference:

Method	p-value
Province cluster	0.0006
Region cluster (20)	0.014
Wild bootstrap	0.003
Randomization inference	0.003

Significant under all methods

Selection on unobservables:

Oster (2019)	Value
δ^* (R^2_{max}=1.3R^2)	**2.34**
Threshold for robustness	>1

Unobservables need 2.34× selection of observables.

- **Spatial correlation:** Region clustering (20) p=0.024 ✓
- **Placebos:** See next slide

Robustness: Placebo Timing

Test: Apply fake reform years before 2018 → should show null effect

Reform Year	Coef (%)	p-value	Status
2018 (Real)	**+4.21**	**0.0007**	**Significant**
2015 (Fake)	+0.20	0.71	Null ✓
2014 (Fake)	+0.24	0.69	Null ✓
2013 (Fake)	+0.30	0.65	Null ✓
2012 (Fake)	+0.75	0.36	Null ✓

Robust to changes in the control pool Randomization Inference: Permute migration rates 999× → p=0.003 Real effect (+4.21%) exceeds 99.7% of permutations

Robustness: Sector Tests

Test: Compare each sector vs. formal controls (Finance + Public Services)

Sector vs Controls	Coef (%)	p-value	Expected	Status
Agriculture	**+4.21**	**0.0006**	Positive	✓
Manufacturing	+0.99	0.053	Positive (weak)	✓
Finance vs Public (TRUE)	+0.60	0.264	**Null**	✓

Interpretation:

- **Agriculture**: Strong effect ✓ (high caporalato)
- Manufacturing: Positive but weaker (some informal labor)
- **Finance vs Public**: TRUE placebo—both formal, no effect ✓

Machine Learning Analysis and mechanisms

Random Forest: What Predicts Reform Effects?

Honest Random Forest (Athey & Imbens 2019): 192 variables, 107 provinces

Top 10 Predictors:

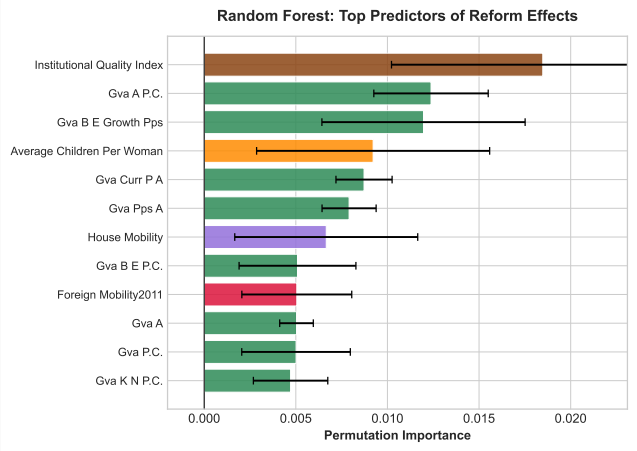
#	Variable	Category
1	**Institutional quality**	**Institutional**
2	Agricultural GVA pc	Economic
3	Manufacturing growth	Economic
4	Fertility rate	Demographics
5	Agricultural GVA	Economic
6	Housing mobility	Housing
7	Foreign mobility	Migration
8	Manufacturing GVA pc	Economic
9	Total GVA pc	Economic
10	Dependency ratio	Demographics

Importance by Category:

Category	Share
Economic	50.2%
Demographics	17.6%
Institutional	**11.7%**
Housing	5.8%
Migration	5.5%
Labor Market	5.0%
Political	1.4%
Other	2.8%

R^2 (honest) = 0.21

Random Forest: What Predicts Reform Effects?



Note: Permutation importance from Honest Random Forest. Top predictor is institutional quality.

Two Hypotheses on the Role of Institutions

In the mechanism section I test the following two hypotheses related to institutional quality. A priori, it is not possible to argue which of the following two effects linked to poor institutions will prevail:

H4: High Informality

Low IQ → **more informal labor** pre-reform:

- Larger informal labor pools
- More "room" to formalize
- Central state focuses efforts here

Low IQ → more formalization

H5: Weak Enforcement

Weak institutions → **weak enforcement** post-reform:

- Weak resource allocation
- Less capacity for enforcement

Low IQ → less formalization

Test: Compare *timing* vs *magnitude* of effects across institutional quality terciles.

Heterogeneous Effects by Institutional Quality

Question: Do effects vary by provincial institutional quality?

By Institutional Quality Tercile:

Inst. Quality	Coef	p-value	Sig?
Low	**+5.97%**	0.001	✓
Medium	**+5.83%**	0.038	✓
High	+1.47%	0.423	×

Interaction: $\beta_2 = -3.20\%$ (p=0.02)

Dynamic Effects (Low IQ):

Year	Coef	p-value
2018	+4.0%**	0.023
2019	+5.7%***	0.004
2020	**+7.3%*** **	0.001

Effect grows 80% (2018→2020)

Low IQ provinces: larger effects that **grow over time**. Supports **H4** (High Informality).

Event Study by Institutional Quality

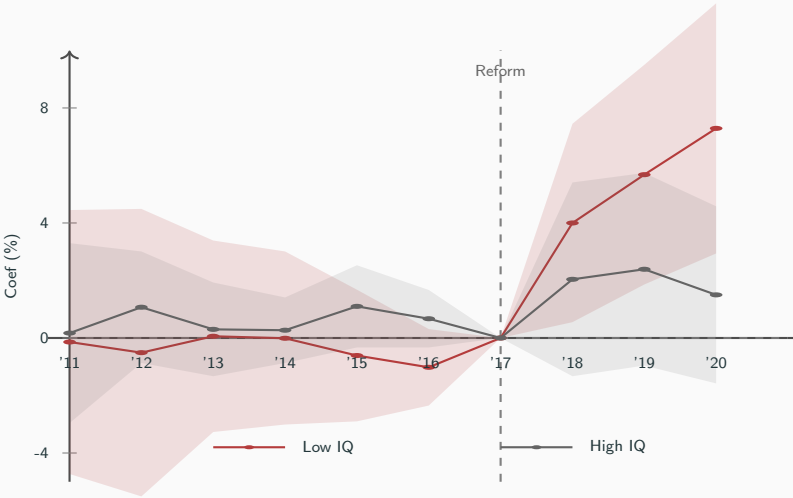
Key patterns:

Low IQ (South):

- Pre-trends: flat ✓
- Effect **grows**: 4%→7%

High IQ (North):

- No significant effect
- CIs overlap zero



Base year: 2017. Shaded bands: 95% CI.

Testing H4 vs H5: Evidence

Recall: H4 predicts larger effects in low-IQ (more informality). H5 predicts smaller effects in low-IQ (weak enforcement).

Evidence for H4:

- Low IQ = 76% Southern provinces
- Effect 4× larger in low-IQ
- **Effect grows**: +4% → +5.7% → +7.3%
- More "room" to formalize

Against H5:

- If weak enforcement, effect should be *smaller* in low-IQ
- If weak enforcement, effect should *decline* over time

Conclusion: Baseline informality dominates. Target enforcement toward low-IQ, high-migration areas for maximum impact.

Structural model estimation

Structural model: WIP

Conclusion

Summary

Main Finding

- Agric. employment ↑ **+4.21%*****
- Pre-trends pass (F=0.39, p=0.88)
- Effect persists 2018–2020

Robustness

- Province trends: +3.69%**
- Bartik IV: +3.18%* (F=25)
- Placebo timing/sectors: null ✓
- Oster $\delta^* = 2.34$

Heterogeneity

- Low inst. quality: **+5.97%*****
- High inst. quality: +1.47% (n.s.)
- Effect **grows** in low IQ: 4%→7%

Interpretation

- No job destruction
- Formalization of shadow labor
- Baseline informality drives effects

Policy: Target enforcement toward low-IQ, high-migration provinces for maximum impact.

Work in Progress

Main points:

- I worked to create a arge 150+ variables province level panel; individual level data from INPS/ISTAT microdata would make it way better
- More controls can be added
- I would like to create a predicted caporalato risk score with ML, training the algo on judicial data

Firm-Level Analysis (Key)

- Entry/exit rates
- Compliance costs

Worker-Level Analysis

- Wage effects
- Gender inequality

Spillovers

- Local crime rates

Thank You

Appendix

Shift-Share Diagnostics (Borusyak et al. 2022)

Instrument strength:

- First-stage F = **24.6** (>10) ✓
- Strong instrument

IV Results:

Metric	Value
Coefficient	+3.18%
SE (clustered)	1.55%
p-value	0.040
Provinces	99

4 provinces excluded (created after Census 2001)

Rotemberg weights:

Nationality Group	Weight
EUR_EAST	**90.2%**
ASIA	6.4%
AFR_NORTH	2.8%
AMERICAS	0.3%
AFR_SUB	0.3%

Key shock:
Eastern European migration (Romania, Albania, Ukraine)