Trading Non-Tradables: The Implications of Europe’s Job Posting Policy

Mathilde Munoz (UC Berkeley)
What Jobs Are Tradable?

“About 7.6 million American worked in construction (...) their jobs were not in danger of moving offshore. You can’t hammer a nail over the Internet.” A. Blinder (2006)
What Jobs Are Tradable?

“About 7.6 million American worked in construction (...) their jobs were not in danger of moving offshore. You can’t hammer a nail over the Internet.” A. Blinder (2006)

- Many jobs are assumed non-tradable

- Posting policies liberalize trade in non-tradables
  - Firms can temporarily send workers abroad to perform those jobs
  - WTO trade in services classification: Mode 4

- First liberalized in the EU: European posting policy
  - Polish firms can send construction workers to France
  - Construction service offshored ”on-site“
A New Way to Trade Factors and Services

The European Posting Policy: Largest ever liberalization of "on-site" offshoring
A New Way to Trade Factors and Services

The European Posting Policy: Largest ever liberalization of "on-site" offshoring

- Portugal exports more truck drivers than wine
- Belgium offshores 15% of construction jobs through posting
Globalization Is Larger Than Previously Thought

Exports of Tourism, Travel and Other Services

% of All Within-EU Services Exports, 2017
Globalization Is Larger Than Previously Thought

Exports of Tourism, Travel and Other Services

Exports of ICT, Finance and Insurance Services

0% % of All Within-EU Services Exports, 2017 100%
Globalization Is Larger Than Previously Thought

Exports of Tourism, Travel and Other Services
Exports of ICT, Finance and Insurance Services
Services Exported Through Posting

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- Exports of Tourism, Travel and Other Services
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- Services Exported Through Posting

% of All Within-EU Services Exports, 2017

- 0% Non-EU Immigrants

% of Unique Foreign Workers Entering in France, 2019
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EU Immigrants

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Non-EU Immigrants
EU Immigrants
Posted Workers

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1) What Are the Implications of Posting Policies?

* A toolkit for trade talks focusing on services and mode 4 trade

1. Posting policies can change **exposure to globalization**
   - Policy took-off after it was opened to low-wage countries
   - New type of jobs are offshored, New type of firms access foreign markets
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   - Receiving-firm data + quasi experimental variation
   - Domestic employment decreases by 6% in exposed local labor markets
   - High-wage firms use less domestic workers & access to cheaper services
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   - Sending-firm data + event-study design
   - Employment +30%, sales +55%, profits +37%, wages +14%
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4. Positive but small gains for EU consumers
   - Trade model calibrated with structural estimates
   - Posting policies can increase consumer gains by 0.3-0.9%
   - Smaller consumption shares but smaller elasticities ($\approx 1.1-1.6$)


Roadmap

Institutional Framework & Data

Who is Getting Globalized?

Employment Effects In Receiving Countries

Export-Mobility Surplus In Sending Countries
European Laboratory: Posted Workers Policy

- Posting policy exists since 1959 for EU member states
  - No licensing for sending firms, No entry restrictions for posted workers

- Posted workers liable to country of origin labor code & taxes
  - Except for destination minimum legal wage + hours of work
  - If duration > 2 years → payroll taxes in destination

- From 2004 to 2013: expansion of the posting policy
  - Low wage Eastern European countries enter in the EU
  - Staggered access to posting at the origin-destination level
  - Liberalized after trade tariffs and before standard immigration

- Other posting policies in the world: APEC (Asia), Chile-Argentina (South America), ECOWAS (Africa), GATS (WTO framework), USMCA
Data Collection

Tracking services’ flows with social security data

1. Aggregated European social security forms issued for posting missions
   - EU-wide **bilateral posting flows** for 1989-2017
Data Collection

*Tracking services’ flows with social security data*

1. **Aggregated** European social security forms issued for posting missions
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2. **Micro** administrative posting registries in receiving and sending countries

---

**France**: high wage country (36 €/hour)
- **What?** Detailed description of services performed by posted workers
- **Who?** Receiving firms, Domestic and posted workers at same workplace
- **Why?** Granular exposure to posting in receiving countries

**Portugal**: low wage country (12 €/hour)
- **What?** Detailed description of non-tradable services exported by posting firms
- **Who?** Identifiers of firms that provide non-tradable services abroad
- **Why?** Granular exposure to posting in sending countries

→ Other micro posting datasets in the paper: Belgium, Germany, Austria, Luxembourg
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Institutional Framework & Data

Who is Getting Globalized?

Employment Effects In Receiving Countries

Export-Mobility Surplus In Sending Countries
Posting Took Off With Expansion to Low-Cost Countries

Tenfold increase of cross-border provision of services within EU

Start of Posting Policy Liberalization for New Member States (NMS)
Effects of Posting Liberalization to NMS

**A staggered difference-in-differences approach**

- **Origin-destination** liberalization of posting
  - Timing set by the European Commission
  - Different timing than migration liberalization in most cases

- **Staggered difference-in-differences** around liberalization \( d_{ij} \):

\[
\ln S_{ijt} = \gamma_{ij} + \gamma_{it} + \gamma_{jt} + \sum_{k=c}^{c} \beta_k R_{ijt}^k + \varepsilon_{ijt}
\]

- **Origin-year & destination-year** FEs control for
  - Overall enlargement effects
  - Demand shifters potentially correlated with timing of liberalization
Posting Liberalization Increased Trade-Migration Flows

Average $\beta = 1.84 (.38)$

- Baseline
- Origin-Year and Destination-Year FE
- Heterogenous Treatment Effect Estimator

Estimator developed by De Chaisemartin and D'Haultfoeuille (2019) accounting for heterogenous treatment effects.
Jobs Traded Through Posting

Used by high-wage firms in high-wage countries to offshore blue collar jobs

Services Performed by Foreign Employees Posted to France

<table>
<thead>
<tr>
<th>Category</th>
<th>% in Euro Value</th>
<th>% in Posted Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#1: Farm Worker
#1: Builder
#1: Welder
#1: Truck Driver

EU Receiving Wage Premium
Posted workers skills
Posted workers tenure
Persistence in Posting Use

14 / 24
Roadmap

Institutional Framework & Data

Who is Getting Globalized?

Employment Effects In Receiving Countries

Export-Mobility Surplus In Sending Countries
Employment Effects on Domestic Workers

Effect of posting liberalization on the French labor market

- **Identification**: Difference-in-differences
  1. **Nation-wide shock**: 2004 sectoral liberalization shock
  2. **Local-labor markets**: Persistent spatial heterogeneities in posting
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- **Identification**: Difference-in-differences
  1. **Nation-wide shock**: 2004 sectoral liberalization shock
  2. **Local-labor markets**: Persistent spatial heterogeneities in posting

- **Predicted exposure**: pre-reform posting imports in a province (“Enclave”)
  - More exposed to the supply shock through pre-existing trade relationships
  - **Alternative**: geographic distance to NMS
Employment Effects on Domestic Workers

*Effect of posting liberalization on the French labor market*

► **Identification**: Difference-in-differences

1. **Nation-wide shock**: 2004 sectoral liberalization shock
2. **Local-labor markets**: Persistent spatial heterogeneities in posting

► **Predicted exposure**: pre-reform posting imports in a province ("Enclave")

► **Identifying assumption**: Predicted exposure

1. Predicts posting imports after 2004
   - First stage on actual shocks after the reform: $F_{stat}=19.5$

2. Does not affect employment *changes* through other channels than posting
   - Pre-trends= comparability of provinces with different initial exposure
   - Flexible controls for initial characteristics $\times$ time trends
Log Exposed Employment by Exposure to Posting

\( \ln Emp_{pt} = \alpha + \lambda_t + \lambda_p + \sum_{k=1994}^{2015} \zeta_k I\{t=k\} \times e_p^{pre} + \lambda X_{pt} + u_{pt} \)

\( \Delta \text{Exposure}_{\text{min-max}} = .92 \)  
\( \Delta \text{Exposure}_{\text{bot40-top10}} = .51 \)
Log Exposed Employment by Exposure to Posting

Moving from bottom 40 to top 10% of exposure decrease employment by 6%

\[ \Delta \text{Exposure}_{\text{min-max}} = 0.92 \]
\[ \Delta \text{Exposure}_{\text{bot40-top10}} = 0.51 \]
Log Exposed Employment by Exposure to Posting

Controlling for initial local characteristics \times \text{time trends}

Coef on Year*Exposure Index

Baseline (Province, Year FE)
2003 Share of Manufacturing\times Year FE
2003 Share of Exposed Sectors\times Year FE
2003 Share of Blue collar workers\times Year FE
2003 Share of Foreigners\times Year FE
No migration response to the supply shock
No reallocation of workers to sheltered sectors within exposed labor markets.
Roadmap

Institutional Framework & Data

Who is Getting Globalized?

Employment Effects In Receiving Countries

Export-Mobility Surplus In Sending Countries
Export-Mobility Gains in Sending Countries

*Describing sending firms posting dynamics in Portugal*

- All Portuguese firms and exports of posting services since 2006
- What happens to firms when they start exporting posting services?
  - Event $d_i$: First time a firm exports posting services abroad

\[
\ln y_{it} = \alpha_i + \lambda_{pst} + \sum_{k=T}^{T} \theta_k \times D_{it}^k + \varepsilon_{it} \tag{1}
\]

- Comparison groups:
  1. Future posting firm in same sector-province (baseline)
Export-Mobility Gains in Sending Countries

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- Comparison groups:
  1. Future posting firm in same sector-province (baseline)
  2. Matched non-posting firms with same pre-posting sales
  3. Matched firms in sheltered sectors (retailers, hairdressers...)
  4. IV using pre-posting firms’ market share \( \times \) aggregate posting exports

- Unobserved shocks? Posting mission duration + domestic sales
Sending Firms After First Export of Posting Services

Firms Scale Up When Accessing Foreign Markets Through Posting

A. Log Total Employment

B. Log Total Turnover

C. Log Total Assets

D. Log Total Wage Bill

Domestic sales
Export-Mobility Gains of Posting

Effects start and end with the posting mission

A. Log Total Employment
B. Log Total Turnover
C. Log Total Assets
D. Log Total Wage Bill

Domestic sales
Profits and Wages at Posting Firms

Wages increase by 14% and profits by 37%

A. Log Wage

B. Log Profit

Effect of destination minimum wage or bargaining?  Permanent Posting Firms  The fiscal externality of posting
Interpretation and Implications

- Consistent evidence that posting is associated with **firm growth**
  - Semi-dynamic and no FE specifications
  - Heterogenous treatment effects
  - Placebo event study
  - Balancing sample around event time
  - Comparable firms in sheltered sectors as control group
  - Pre-treatment outcomes matching with non-posting firm
  - Consistent with employment & market shares gain after liberalization in NMS

- Are these effects **meaningful** for sending countries?
  - Same growth than standard export gains
  - No increase in tangible assets

- **Different incidence** than standard exports
  - Benefits smaller, younger and less capital-intensive firms
  - Surplus-sharing affected by destination-level rules
Conclusion

▶ A toolkit for current trade talks focusing on services

1. What jobs are tradable is a policy choice
2. Employment effects for low-paid workers in rich countries
3. Increased sales, wages & taxes in low-wage countries
4. Moderate consumer gains from increased competition

▶ Novel questions for trade and tax policy

- Trading people → labor standards & tax exemptions become trade tools
- Continent-wide experiment of “minimum labor standard” clause

▶ Novel tools to overcome measurement challenges

- Custom data for services → posted workers are tangible
- Joint international datasets → posted workers can be tracked across borders
Appendix
Posting Duration and Social Security Exemptions Threshold

![Graph showing SSC ExemptionThresholds](image)
Political Backlash against Posting Policy Liberalization

Bolkestein directive proposed to abolish destination-level minimum wage rule

15 March 2005: Start of the Polish Plumber Polemic

Source: IPSOS Polls and Google Search Trends

Referendum for the Adoption of a European Constitution in France, 29 May 2005
Staggered Posting Liberalization Reforms: Illustration

- Poland to France: 2004
- Poland to Austria: 2011
- Romania to France: 2007
- Romania to Austria: 2014
A. Posting Flows to France

B. Posting Flows to Austria
Posting Policy Increased Trade-Migration Flows

Posting Flows to France

- Posted Workers (Thousands)
- Years: 1990 to 2016
Posting Policy Increased Trade-Migration Flows

Posting Flows to France

Postings to France

Posting Restrictions Lifted for NMS 2004

NMS 2004

UK
Posting Policy Increased Trade-Migration Flows

Posting Flows to France

Postings to France

Posting Restrictions Lifted for NMS 2007

Postings to France

- NMS 2004
- UK
- NMS 2007
A. Posting Flows to France

- From NMS 2007
- From EU-15

B. Posting Flows to Austria

- Treated=NMS 2007
- Control=EU-15
Alternative Clustering

- Log Posted Workers Flows
- Years to Posting Liberalization
- Origin-Country clustering
- Destination-Year, Origin-Year clustering
- Destination-Year clustering
- Origin-Year clustering
Exposed Employment by Predicted Exposure

- Coeff on Year*Exposure Index
- 2003 Share of Manufacturing x Year FE
- 2003 Share of Manufacturing x Year FE
- 2003 Share of Blue collar workers x Year FE
- Log Population

Graph showing trends over years from 1994 to 2015.
<table>
<thead>
<tr>
<th>Time Period</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
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<tbody>
<tr>
<td>4 years before liberalization</td>
<td>-.53</td>
<td>.58</td>
<td>(.58)</td>
</tr>
<tr>
<td>3 years before liberalization</td>
<td>-.05</td>
<td>.31</td>
<td>(.31)</td>
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<tr>
<td>2 years before liberalization</td>
<td>-.15</td>
<td>.47</td>
<td>(.47)</td>
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<tr>
<td>Year of liberalization</td>
<td>1.89***</td>
<td>(.35)</td>
<td>(.35)</td>
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<tr>
<td>1 year after liberalization</td>
<td>2.11***</td>
<td>(.49)</td>
<td>(.49)</td>
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<tr>
<td>2 years after liberalization</td>
<td>2.79***</td>
<td>(.53)</td>
<td>(.53)</td>
</tr>
<tr>
<td>3 years after liberalization</td>
<td>.88***</td>
<td>(.32)</td>
<td>(.32)</td>
</tr>
<tr>
<td>4 years after liberalization</td>
<td>1.08***</td>
<td>(.32)</td>
<td>(.32)</td>
</tr>
<tr>
<td>5 years after liberalization</td>
<td>.99***</td>
<td>(.35)</td>
<td>(.35)</td>
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<tr>
<td>6 years after liberalization</td>
<td>1.55***</td>
<td>(.37)</td>
<td>(.37)</td>
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<tr>
<td>7 years after liberalization</td>
<td>1.91***</td>
<td>(.47)</td>
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<tr>
<td>8 years after liberalization</td>
<td>1.3***</td>
<td>(.63)</td>
<td>(.63)</td>
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**Average Effect (β)**

<table>
<thead>
<tr>
<th>Observations</th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td></td>
<td>1.83***</td>
<td>.75***</td>
<td>(.37)</td>
</tr>
<tr>
<td>Observations</td>
<td>853</td>
<td>853</td>
<td>953</td>
</tr>
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<table>
<thead>
<tr>
<th>Differences</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
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</thead>
<tbody>
<tr>
<td>Destination × Year FE, Origin × Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Estimation</td>
<td>Log</td>
<td>Log</td>
<td>PPML</td>
</tr>
</tbody>
</table>
Case Study: France vs Germany Liberalization

β_{2004-2010} = 1.77(.46)

Triple difference: before and after 2004, from NMS 2004 vs others, to France versus Germany
Case Study: France vs Germany Liberalization

$\beta_{2004-2010} = 1.77 (.46)$

Postings from NMS 2004 versus Control Countries to France versus Germany

Openness for NMS 2004 in Germany

Openness for NMS 2004 in France

- Triple difference: before and after 2004, from NMS 2004 vs others, to France versus Germany
Using Croatia as a Placebo Treated Country for the 2004 event
Can Posting Crowd-Out Standard Migration?

Substituability and complementarity between posting and migration

1. Bilateral posting flows do not respond to bilateral migration liberalization
   - Differential timing of migration and posting for same country pair
   - No shift from posting to migration once migration liberalized

2. Posted workers differ from standard migrants
   - They are older, less educated, more often men
   - Self-employed posting themselves abroad represent less than 5% of all flows & do not respond to liberalization reforms

3. Shifts from posting to regular stay are rare events
   - Less than 5% of posted workers in admin Belgian micro data
Posting Responses to Standard Migration Reforms

Posted Workers Do Not React to Change in Standard Migration Rules

Log Posted Workers Flows

Years to Migration Liberalization

-4 -3 -2 -1 0 1 2 3 4 5 6 7 8

-1 -0.5 0 0.5 1 1.5
Posted Workers and Immigrants

Inflows of NMS foreigners (log)

Inflows of posted workers (log)
Employees Rather than Self-Employed Respond to Posting Liberalization
Posting Flows and Labor Cost Differentials

High Labour Cost Differential Between Receiving and Sending Country

Posted Workers' Flows

Destination/Origin Hourly Labour Cost Ratio
Sending firms decrease domestic activity when starting to serve foreign markets.
Posting Flows and Total Wage Cost Differentials

Wage Cost Differentials and Posted Workers Flows
2009-2017, Binned Scatter Plot

Log Posting Flows vs Log Destination-Origin Non Wage Labor Cost Ratio

\[ \beta = 0.52(0.04) \]

\[ 3 \quad 4 \quad 5 \quad 6 \quad 7 \]

\[ -2 \quad -1 \quad 0 \quad 1 \quad 2 \]
Labor Cost Differentials and Posted Workers Flows
2009-2017, Binned Scatter Plot

\[ \beta = 0.38(0.02) \]
Rich Countries Are Net Consumers, Low Wage Countries Are Net Producers
## Labor supply through migration versus posting

*Different regulations, measurements and incidence*

<table>
<thead>
<tr>
<th>Mobility initiated by</th>
<th>Immigrant</th>
<th>Posted worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>Individual</td>
<td>Sending firm</td>
</tr>
<tr>
<td>Taxes/contributions</td>
<td>Unlimited stay + family allowed</td>
<td>No permanent integration allowed</td>
</tr>
<tr>
<td>Labor code</td>
<td>Destination</td>
<td>Origin</td>
</tr>
<tr>
<td></td>
<td>Destination</td>
<td>Origin (except min wage)</td>
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### Fundamentals

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Immigrant</th>
<th>Posted worker</th>
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<tbody>
<tr>
<td>Employment</td>
<td>Destination</td>
<td>Origin</td>
</tr>
<tr>
<td>Domestic Production</td>
<td>Destination</td>
<td>Origin</td>
</tr>
<tr>
<td>Census</td>
<td>Destination</td>
<td>Origin</td>
</tr>
<tr>
<td>Accounted as</td>
<td>Immigration/Emigration</td>
<td>Imports/Exports</td>
</tr>
</tbody>
</table>
Firms that use posted workers pay ≈ 20% higher wages to domestic workers

<table>
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<tr>
<th></th>
<th>(1)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Receiving Firm Indicator</td>
<td>.19***</td>
<td>.13***</td>
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<td>Controls</td>
<td>5-digit sector FE</td>
<td>5-digit sector FE</td>
<td>5-digit sector FExYear FE</td>
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<td>Country</td>
<td>France</td>
<td>France</td>
<td>Belgium</td>
</tr>
<tr>
<td>Period</td>
<td>2018</td>
<td>2018</td>
<td>2010-2019</td>
</tr>
<tr>
<td>Observations</td>
<td>2,766,475</td>
<td>2,766,475</td>
<td>2,657,132</td>
</tr>
</tbody>
</table>
Posted workers are mostly blue-collar workers.
10% of all workers posted to France are “hired to be posted” in sending countries
Persistence of Posting Use

25% of Firms Using Posted Workers in 2010 use them each year until 2020

Duration of Posting Services Use For Belgian Clients Purchasing Posting Services in 2010

Fraction

Number of Years Using Posting

1 2 3 4 5 6 7 8 9 10
Persistent users import more posted workers.
Trade costs in Subcontracting Posting Services

Trade costs increase with number of clients
Posting Relationships Are Sticky
Substantial number of firms access foreign markets through posting
Exporters of Non Trad. Services Are Smaller than Manufacturing Exporters

*Self-selection in exports is twice lower in non-tradable services*

<table>
<thead>
<tr>
<th></th>
<th>Exporters vs Non Exporters</th>
<th></th>
<th>Exporters vs Non Trad. Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manufacturing</td>
<td>Non Trad. Services</td>
<td>Manufacturing vs Non Trad. Services</td>
</tr>
<tr>
<td>Log Turnover</td>
<td>1.57***</td>
<td>.84***</td>
<td>.68***</td>
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<td>(.01)</td>
<td>(.01)</td>
<td>(.01)</td>
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<tr>
<td>Log Employment</td>
<td>.91***</td>
<td>.63***</td>
<td>.55***</td>
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<td>Log Wage</td>
<td>.18***</td>
<td>.22***</td>
<td>-.04***</td>
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<td></td>
<td>(.01)</td>
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<tr>
<td>Log Capital/Worker</td>
<td>.64***</td>
<td>-.14***</td>
<td>.48***</td>
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<td>Log Payroll/Turnover</td>
<td>-.32***</td>
<td>.04***</td>
<td>-.19***</td>
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<td>Log EBT/Worker</td>
<td>.15***</td>
<td>-.02*</td>
<td>.12***</td>
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<td>(.01)</td>
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<tr>
<td>Fixed effects</td>
<td>Year × Sector × Prov</td>
<td>Year × Sector × Prov</td>
<td>Year × Prov</td>
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## First Exports in Manufacturing and Non Tradable Sectors

<table>
<thead>
<tr>
<th></th>
<th>Manufacturing (1)</th>
<th>Non Trad. Services (2)</th>
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<tr>
<td>Exports in Turnover</td>
<td>25%</td>
<td>45%</td>
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<tr>
<td>% Shifting Full Activity Abroad</td>
<td>3%</td>
<td>19%</td>
</tr>
<tr>
<td>% Exporting in Founding Year</td>
<td>9%</td>
<td>21%</td>
</tr>
<tr>
<td>Average Export Duration (years)</td>
<td>5</td>
<td>3.2</td>
</tr>
<tr>
<td>% Permanently Exporters</td>
<td>41%</td>
<td>37%</td>
</tr>
</tbody>
</table>
The Polish Plumber Shock

Lifting of Posting Restrictions for NMS

% in total emp


Posting Inflows

Back
The Polish Plumber Shock

Lifting of Posting Restrictions for NMS

Lifting of Migration Restrictions for NMS

% in total emp

Posting Inflows

Stock of NMS immigrants in France
The Polish Plumber Shock

Openness to Postings from NMS

Posting Imports per Worker

Construction Administrative Support

Openness to Postings from NMS

Posting Imports per Worker

Construction Administrative Support

Back
Employment Decreased In Exposed Labor Markets

Differential decrease by 6% after the shock

Top20vsBot20  Top10vsBot30  Top20vsBot30  Back

DiD: -.055(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

Top 10% Exposure
Bottom 40% Exposure


Emp Levels  Excl Neighbors  Distance NMS  DiD
Employment in Sheltered Sectors

No differential evolution in sheltered sectors within exposed labor markets

DiD: 0(.003)
Clustering standard errors at the region level

Coeff on Year*Exposure Index

-2 -1 0 1

Log Total Employment by Exposure to Posting

Coeff on Year*Exposure Index

Log Exposed Employment by Exposure to Posting

- Baseline (Province, Year FE)
- 2003 Share of Manufacturing \( \times \) Year FE
- 2003 Share of Exposed Sectors \( \times \) Year FE
- 2003 Unemployment Rate \( \times \) Year FE
Log Exposed Employment by Exposure to Posting

Baseline (Province, Year FE)
2003 Share of Manufacturing x Year FE
Exposure to China Imports x Year FE
Exposure to NMS Imports x Year FE
Log Exposed Employment by Exposure to Posting

Baseline (Province, Year FE)
2003 Share of Manufacturing x Year FE
2003 Share of Blue collar workers x Year FE
Border x Year FE

Coefficient on Year*Exposure Index

Years: 1994 to 2015

Baseline (Province, Year FE)
2003 Share of Manufacturing x Year FE
2003 Share of Blue collar workers x Year FE
Border x Year FE
Log Exposed Employment by Exposure to Posting

<table>
<thead>
<tr>
<th>Year</th>
<th>Coeff on Year*Exposure Index</th>
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<tbody>
<tr>
<td>1994</td>
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<td>2014</td>
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<tr>
<td>2015</td>
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</table>

Diagram showing trends over years from 1994 to 2015 for different categories:
- Distance to NMSxYear FE, Pop Ratio
- Distance to NMSxYear FE, Emp
- Distance to Main NMSxYear FE, Emp
- Distance to Main NMSxYear FE, Pop Ratio
Log Exposed Employment by Exposure to Posting

DiD: -0.038

Employment in Postable Sectors (2003=1)

Top 10% Exposure
Bottom 40% Exposure
Spatial heterogeneities in Posting Imports per Worker

High imports of posting concentrated in a set of provinces
Spatial heterogeneities in Posting Imports per Worker

High imports of posting concentrated in a set of provinces

Before liberalization

After liberalization
Within-EU Posting Mobility Flows

Within-EU Standard Migration Flows

Yearly standard migration rates computed from the EU-LFS. One worker may be posted several times during the year.
Cost-Saving Motives

Posting services are used by high-wage firms

\[ \ln w_{it} = \alpha_i + \psi J_{i,t} + \beta X_{it} + \epsilon_{it} \]
Wage Penalty of Posted Workers

Receiving firms save on high domestic wage premia through posting

\[ \ln w_{it} = \alpha_i + \psi P_{it} + J_{it} + \beta X_{it} + \epsilon_{it} \]
Receiving firms do not share their wage premium with posted workers

Slope=.11(.01)
Learning About Receiving Firms’ Production Function

Receiving-firm-level combination of foreign and domestic inputs

Are posted and domestic workers substitute or complement?

- Growing firms import more as they scale-up
- Firms could also substitute posted for domestic workers
Learning About Receiving Firms’ Production Function

Receiving-firm-level combination of foreign and domestic inputs

▶ Are posted and domestic workers substitute or complement?
  - Growing firms import more as they scale-up
  - Firms could also substitute posted for domestic workers

▶ All Belgian receiving firms and posting contracts since 2010
  - Event-study based on all first posting use events since 2014
  - Event $d_i$: First time a firm uses posting services
  - Compare firms that use and are yet-to-use posting services

\[
\ln y_{it} \quad \text{using firm employment} \\
= \alpha_i + \lambda_{st} \quad \text{3 digit sector-year FE} \\
+ \sum_{k=T}^{T} \gamma_k \times D_{it}^k \quad \text{1.}[t = d_i + k] \\
+ \epsilon_{it}
\]

▶ $\gamma_k$ describes employment before and after firms start using posting
Receiving firms decrease domestic employment by 16% four years after posting use.
Receiving firms gradually converge to their pre-event size as domestic are displaced.
Blue Collar Employment at Receiving Firms After Posting Use
Posted Workers Performing Same Tasks than Domestic Workers
Posted Workers Performing Different Tasks than Domestic Workers

Construction Service Outsourced by Using Firm in Manufacturing
Incumbent Wages At Receiving Firms
Growing NMS Supply to Belgium
Export Gains: Manufacturing vs Non-Tradables

Similar magnitude except for domestic sales

% Increase in Outcome After First Export

- Turnover
- Domestic Turnover
- Employment
- Tangible Assets
- Wages

Manufacturing Exporters
Posting Exporters
Are wage gains explained by destination-level rules?

Minimum wage in importing countries shape wage gains of posted workers

1. Origin countries with different bindingness of the rule
   - Posting data for Luxembourg, never affected by minimum wage abroad
   - Same scale-up of activity, wage gains only for Portuguese workers

2. Firms with different pre-posting bindingness of minimum wage
   - Wage gains driven by firms below destination minimum wages

3. Bunching at minimum wage in destination countries
   - Excess mass of Portuguese posted workers’ wage at French min wage
Surplus Sharing or Destination-Level Rules?

Similar increase in total employment at sending firms
Surplus Sharing or Destination-Level Rules?

Similar increase in total hours of work at sending firms
Only Portuguese workers benefit from wage gains.
Wage gains by pre-posting wage level
Wage Distribution of Portuguese Employees Posted to France

Average = 12.07
Median = 11.05
Domestic Sales After Posting

Sending firms supply less services at home when they start posting services.
Employment After Liberalization in Poland

Employment in construction increased by 16% after 2004.
Effect of Posting on Sending Firms Productivity

The diagram illustrates the effect of posting on sending firms' productivity using TFP (Total Factor Productivity) models. The graph compares two methods: OLS (Ordinary Least Squares) and ACF (Autocorrelation Function). The data points show the productivity levels across different time periods, with error bars indicating the confidence intervals. The vertical line at zero represents the baseline productivity level.
Effect of Posting on Sending Firms Assets

- Cash Assets
- Fixed Assets
NMS Export of Truck Services After Liberalization

Market shares of NMS in road transport boomed after liberalization.
Overall activity in road transport sectors boomed after liberalization.
Non Tradable Vs Manufacturing

A. Log Total Employment

B. Log Internal Turnover

C. Log Total Assets

D. Log Total Wage Bill
Mobility Surplus: Firms in Non Postable Sectors

A. Log Wage

B. Log Profit
Mobility Surplus: Matching on Past Outcomes

A. Log Wage

B. Log Profit
The Fiscal Externality of Posting in Sending Countries

Countries collect more taxes when their firms access markets through posting.
Mobility Surplus: Balancing Sample Around Event Time

A. Log Wage

B. Log Profit
Mobility Surplus: Placebo

A. Log Wage

B. Log Profit
Mobility Surplus: Heterogenous Treatment Effects

A. Log Wage

B. Log Profit
Mobility Surplus: Heterogenous Treatment Effects

A. Log Wage

B. Log Profit
Effects of Employers Tax Cut on Posting Flows

A. Belgian Tax Shift
Tax cut in destination

B. Slovenian Posted Bonus
Tax cut in origin

→ Elasticity=1.4(.4)
→ Elasticity=-1.6(.3)
Postings in Treated vs Control Sector

- Construction (Control)
- Other Manufacturing Sectors (Treatment)
Treated vs Control Sector in Treated vs Control Destination

Graph showing the difference in posting in manufacturing vs construction for Germany (Treated) and France (Control) from 2012 to 2017.
Heterogeneity by Origin Country

Minimum Legal Wage After Reform

Euro Posting Cost

Origin Wage

Back
Heterogeneity by Origin Country

Heterogeneous Effect of Minimum Wage Implementation by Exposure to the Reform

- Implied $\theta = -1.27 \pm 0.59$

- Minimum Wage Reform Treatment Effect
- Average Treatment Effect
- Placebo Effect (Control)

Origin Wage Distance to New Legal Minimum Wage in Destination (log difference)
First Stage: Predicting Exposure to the Liberalization

Pre-reform exposure to the policy is a strong predictor of actual exposure to the shock.

Rank-Rank Slope: .45(.08)
First Stage: Predicting Exposure to the Liberalization

Pre-reform exposure to the policy is a strong predictor of actual exposure to the shock.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Robustness and Alternative Exposure</th>
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<td></td>
<td>Pre-Reform Exposure</td>
<td>2000 Norm.</td>
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<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
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<td>Dep variable</td>
<td>Posting imports after liberalization per pre-reform worker (log)</td>
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Robust standard errors in parentheses.
Pre-reform exposure to the policy is not explained by differential labor market pre trends

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<th>Dep variable: Pre-Reform Exposure (1)</th>
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<td><strong>Pre-trends</strong></td>
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<tr>
<td>Δ1993-2003 Working Age Pop</td>
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<tr>
<td>Δ1993-2003 Exposed Employment</td>
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<td>Δ1993-2003 Sheltered Employment</td>
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<tr>
<td>Δ1993-2003 Unemployment</td>
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<tr>
<td><strong>Initial demographics</strong></td>
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<tr>
<td>% Working Age Pop Employed in 2003</td>
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<tr>
<td>% Share Employed in Manufacturing in 2003</td>
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<td></td>
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<tr>
<td>% Foreigners in 2003</td>
</tr>
<tr>
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<tr>
<td>% Blue Collar Workers in 2003</td>
</tr>
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</table>
Pre-reform characteristics of low and high exposure provinces

<table>
<thead>
<tr>
<th>Pre-reform Level</th>
<th>Bottom 20 Exposure</th>
<th>Top 20 Exposure</th>
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<tbody>
<tr>
<td>Share of blue collar workers</td>
<td>.24</td>
<td>.28</td>
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<tr>
<td>Share of manufacturing employment</td>
<td>.16</td>
<td>.18</td>
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<tr>
<td>Share of Foreign Born</td>
<td>11.2</td>
<td>7.9</td>
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<tr>
<td>Share of Working Age Pop in Employment</td>
<td>.65</td>
<td>.64</td>
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<tr>
<td>Working Age Population (thousands)</td>
<td>490</td>
<td>407</td>
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<tr>
<td>Share with an International Border</td>
<td>6%</td>
<td>38%</td>
</tr>
<tr>
<td>Pre-reform Posting Imports per Worker</td>
<td>.01 %</td>
<td>.4%</td>
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Robustness to Delete-One Test

Baseline F-stat = 19.49
Average delete-one F-Stat = 19.3
Robustness to Delete-One Test

-3 -2 -1 0 2

2SLS Estimate

Leave Out One Province  Baseline Estimate
Local-Labor-Market Employment Effects

Robustness and Alternative Specifications

\[ \ln(Emp_{gt}) = \alpha + \gamma_t + \gamma_2 \mathbb{1}(i = top) + \rho \times \mathbb{1}(i = top) \times \mathbb{1}(t \geq 2004) + u_{gt} \]

<table>
<thead>
<tr>
<th></th>
<th>(1) 2000 Industry Shares</th>
<th>(2) Distance to NMS Exposure</th>
<th>(3) Excluding Industrial Services</th>
<th>(4) Regional Exposure</th>
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<td>-.06*** (.01)</td>
<td>-.07*** (.01)</td>
<td>-.05*** (.01)</td>
<td>-.05*** (.01)</td>
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<td>Observations</td>
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<td>DiD Graph</td>
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<table>
<thead>
<tr>
<th></th>
<th>(5) Employment level</th>
<th>(6) Top 10% Exposure</th>
<th>(7) Excluding adjacent Provinces</th>
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<tr>
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*p<0.10, **p<0.05, ***p<0.01. Robust standard errors in parentheses.
\[ \ln(Emp_{gt}) = \alpha + \gamma_t + \gamma_2 1(i = top) + \rho \times 1(i = top) \times 1(t \geq 2004) + u_{gt} \]

<table>
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<tr>
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<th>(2) Distance to NMS Exposure</th>
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<tr>
<td>(\rho)</td>
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<td>DiD Graph</td>
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\[ \Delta \ln(Emp_{pt}) \]

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<td>2015 Posting (log)</td>
<td>-.026***</td>
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*p<0.10, **p<0.05, ***p<0.01. Robust standard errors in parentheses.
2000 Industry Share

Top 20% Exposure
Bottom 40% Exposure

DiD: -.06(.01)
Distance to NMS as Exposure Measure

DiD: -.07(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

- Top 20% Exposure
- Bottom 40% Exposure
Excluding Industrial Services

- Top 20% Exposure
- Bottom 40% Exposure

DiD: -.01(.01)
Employment Level

Top 20% Exposure

Bottom 40% Exposure

DiD: -.07(.01)

Employment in Postable Sectors (2003=1)

Top 10% Exposure Only

<table>
<thead>
<tr>
<th>Year</th>
<th>Top 10% Exposure</th>
<th>Bottom 40% Exposure</th>
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<tr>
<td>2015</td>
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</tbody>
</table>

DiD: -.06(.01)
Excluding Neighbouring Provinces

Share of Working Age Pop. in Postable Sectors (2003=1)

- Top 20% Exposure
- Bottom 20% Exposure

DiD: -.08(.01)
Region-Level Exposure

DiD: -.05(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

Top 20% Exposure

Bottom 40% Exposure

1.3

1

.7


DiD: -.05(.01)
Top 20% vs Bottom 20%

DiD: -.07(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

Top 20% Exposure

Bottom 20% Exposure

Top 10% vs Bottom 20%

DiD: -.05(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)


Top 10% Exposure
Bottom 20% Exposure
Top 10% vs Bottom 30%

DiD: -.05(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

- Top 10% Exposure
- Bottom 30% Exposure
Top 20% vs Bottom 30%

DiD: -.05(.01)

Share of Working Age Pop. in Postable Sectors (2003=1)

- Top 20% Exposure
- Bottom 30% Exposure
Spatial Distribution of Posting Exposure pre Liberalization
Geographic Distance and Exposure to Posting

Posting Imports/Worker after 2004 (%ppts) vs. Total Distance to NMS (1000skm)

- Posting Exposure After 2004
- Fitted Values
Robustness to Baseline Specification

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta ) Posting Imports</td>
<td>-1.604***</td>
<td>-0.983***</td>
<td>-0.529**</td>
<td>-1.711***</td>
<td>-1.150***</td>
<td>-0.917***</td>
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<tr>
<td></td>
<td>(0.299)</td>
<td>(0.245)</td>
<td>(0.258)</td>
<td>(0.628)</td>
<td>(0.280)</td>
<td>(0.286)</td>
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</tr>
<tr>
<td>Instrument Rob</td>
<td>Baseline No controls</td>
<td>Baseline State clustering</td>
<td>Baseline Excl. manuf</td>
<td>Baseline Level-level</td>
<td>Baseline Mig control</td>
<td>Baseline Clemens Hunt (2019)</td>
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<tr>
<td>( \Delta ) Posting Imports</td>
<td>-0.785**</td>
<td>-0.919***</td>
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<td></td>
<td>(0.325)</td>
<td>(0.291)</td>
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<td>94</td>
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<td>Instrument Rob</td>
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</tr>
<tr>
<td>Rob</td>
<td>2003 employment control</td>
<td>2003 posting control</td>
</tr>
</tbody>
</table>
### Change in Unemployment and Posting Inflows

**Dependent Variable:** $100 \times \log \text{change in population counts, 2003-2015}$

<table>
<thead>
<tr>
<th></th>
<th>Exposed Emp (8)</th>
<th>Adult Pop (10)</th>
<th>Unemployment (12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \log \text{Posting Imports/worker}$</td>
<td>-9.152*** (2.462)</td>
<td>-7.109*** (3.319)</td>
<td>9.168** (4.654)</td>
</tr>
<tr>
<td>Observations</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Exposed Emp (9)</th>
<th>Adult Pop (11)</th>
<th>Unemployment (13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \log \text{Posting Imports/worker}$</td>
<td>-1.973 (1.496)</td>
<td>-0.494 (1.860)</td>
<td>8.242*** (3.399)</td>
</tr>
<tr>
<td>Observations</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
</tbody>
</table>
Representative consumer in \( j \) demand for services:

\[
U_j = \left( \int_{\Omega_n} S_j(n) \, dn \right)^{\frac{\sigma}{\sigma-1}}
\]  

(CES preferences yield standard Stiglitz Price index:

\[
P_j = \left( \int_{\Omega_n} p_j(n)^{1-\sigma} \, dn \right)^{\frac{1}{1-\sigma}}
\]  

Unit cost of posting workers to supply services from \( i \) to \( j \) is

\[
C_{ij}(n) = w_i (1 + \tau_i + a_{ij}) m_{ij} \frac{1}{z_i(n)} = \frac{c_{ij}}{z_i(n)}
\]

\( z_i(n) \) is Fréchet distributed

\[
F_i(z) = \exp \left\{ - (T_i z)^{-\theta} \right\}
\]
Perfect Competition Equilibrium

- Proba that $i$ is the lowest supplier of $n$ in $j$ is:

$$
\lambda_{ij} = \frac{T_i (c_{ij})^{-\theta}}{\sum_{k \in S} T_k (c_{kj})^{-\theta}} = T_i (c_{ij})^{-\theta} \Phi_j^{-1}
$$

(5)

- Equilibrium price index

$$
P_j = \Phi_j^{-\frac{1}{\theta}} \Gamma \left( \frac{\theta + 1 - \sigma}{\theta} \right)^{\frac{1}{1-\sigma}} = \Phi_j^{-\frac{1}{\theta}} C
$$

(6)

- Equilibrium posting flows

$$
S_{ij} = \lambda_{ij} S_j = T_i S_j (m_{ij})^{-\theta} (w_i (1 + \tau_i + a_{ij}))^{-\theta} P_j^\theta C^{-\theta}
$$

(7)

- Welfare of consumer in $i'$ (CES preferences, $m_{ii} = 1$)

$$
W_i = \frac{w_i (1 + \tau_i + a_{ij})}{P_i} = \lambda_{ii}^{-\frac{1}{\theta}} T_i^\frac{1}{\theta} C
$$

(8)
In equilibrium, welfare of consumer in $i$ is:

$$W_i = \lambda_i^{-1} \times T_i^1 C$$

Some parameters of the model

- Denote $\hat{x} = x'/x$ equilibrium after a posting policy shock
- Welfare effect of a posting policy shock is:

$$\hat{W}_i = \hat{\lambda}_i^{-1}$$

To get the welfare effects of a reform:

- How substitutable are services ($\theta$)
- How do service consumption shares change with the shock ($\hat{\lambda}_{ii}$)
Structural Counterfactual: Posting Liberalization

Exact hat algebra (Dekle et. al (2012)) to get the effects of policy shock $\hat{m}_{kj}$

- With fixed labor endowment, $\hat{Y}_i = \hat{w}_i$. With market clearing conditions:

\[
\hat{\lambda}_{ij} = \frac{\left(\hat{Y}_i \hat{m}_{ij}\right)^\theta}{\sum_k \lambda_{kj} \left(\hat{Y}_k \hat{m}_{kj}\right)}
\]

\[
\hat{Y}_i Y_i = \sum_j \sum_k \lambda_{kj} \left(\hat{Y}_k \hat{m}_{kj}\right)^\theta \hat{Y}_j Y_j
\]

- Solve the system to get $\hat{\lambda}_{ii}$ accounting for general equilibrium effects

1. Identify structural elasticity $\theta$ from tax reforms
2. Convert reduced form estimate of NMS liberalization with $\theta$ to get $\hat{m}_{ij}$
3. Combine (1) and (2) with current $(\lambda_{ii}, Y_i)$ to solve the model numerically
## Distance Gravity Coefficient for Non-Tradable Services

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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</thead>
<tbody>
<tr>
<td>Log distance</td>
<td>-1.53***</td>
<td>-1.47***</td>
</tr>
<tr>
<td></td>
<td>(.08)</td>
<td>(.06)</td>
</tr>
<tr>
<td>Common border</td>
<td>.237**</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>(.09)</td>
<td>(.09)</td>
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<tr>
<td>Common currency</td>
<td>-45**</td>
<td>-1.14***</td>
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<tr>
<td></td>
<td>(.08)</td>
<td>(.159)</td>
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<tr>
<td>Common language</td>
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<td>.555***</td>
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<td>(.35)</td>
<td>(.16)</td>
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<td>3,404</td>
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<td>R2</td>
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<td>Estimator</td>
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<td>PPML</td>
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<td>Origin-Year FE</td>
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<td>Yes</td>
</tr>
<tr>
<td>Destination-Year FE</td>
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<td>Yes</td>
</tr>
</tbody>
</table>

Robust standard errors clustered at destination-year level in parentheses. All bilateral posting flows 2009-2015. Dependent variable is posting flows from an origin to a destination country, in log or level.
Model-Based Consumer Gains from Posting Policies

Empirical parameters and calibration

To get the welfare effects of the liberalization shock

1. Posting flows in the current equilibrium
2. A measure of the liberalization shock
3. Elasticity of posting flows with respect to changes in costs

Exploit payroll tax & minimum wage reforms to identify the elasticity:

- **Model-based** gravity relating posting flows and labor cost

\[
S_{ijt} = \left( w_i (1 + \tau_{it} + a_{ijt}) \right)^{-\theta} \cdot m_{ij}^{-\theta} \times X_{it} Y_{jt}
\]

- **Quasi-natural experiments**: pre-trends + out of sample estimate
## Panel A: Gravity Estimation

<table>
<thead>
<tr>
<th>Regressor: Total Labor Cost</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tbody>
<tr>
<td><strong>Posting Elasticity</strong></td>
<td>-1.2***</td>
<td>-1.4***</td>
<td>-1.4***</td>
<td>-0.97***</td>
<td>-2.4***</td>
<td>-1.1***</td>
</tr>
<tr>
<td></td>
<td>(.15)</td>
<td>(.25)</td>
<td>(.27)</td>
<td>(.27)</td>
<td>(.47)</td>
<td>(.19)</td>
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<td><strong>Observations</strong></td>
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<td>4,665</td>
<td>4,455</td>
<td>4,723</td>
<td>4,723</td>
<td>4,677</td>
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<tr>
<td><strong>Origin-Dest FE</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Dest \times Year FE</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>Origin \times Year FE</strong></td>
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<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td><strong>Weighted</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Estimator</strong></td>
<td>PPML</td>
<td>Log</td>
<td>Log</td>
<td>PPML</td>
<td>MPPML</td>
<td>MPPML</td>
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<tr>
<td><strong>Internal Flows</strong></td>
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<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</tbody>
</table>

Robust standard errors clustered at destination-year level in parentheses. Panel A based on all bilateral posting flows 2009-2017. Dependent variable is posting flows from an origin to a destination country, in log or level.

## Panel B: Quasi-Natural Experiment Estimates

<table>
<thead>
<tr>
<th>Slovenian Posted Bonus</th>
<th>Belgian Tax Shift</th>
<th>German Min Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Posting Elasticity</strong></td>
<td>-1.6(.33)***</td>
<td>-1.4(.42)***</td>
</tr>
</tbody>
</table>

Robust standard errors clustered at destination-year level in parentheses.
### Change in Posting Imports & Domestic Employment

25th → 75th exposure = 0.8 pp decrease of exposed employment in population

---

**Dependent Variable:** Change in exposed employment/pop, 2003-2015 (%pts)

**Post-reform (2003-2015)**

<table>
<thead>
<tr>
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<th>OLS (1)</th>
<th>RF (2)</th>
<th>IV (3)</th>
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<tbody>
<tr>
<td>Δ log Postings/worker</td>
<td>-.638*** (.231)</td>
<td>-.462*** (.117)</td>
<td>-.983*** (.272)</td>
</tr>
<tr>
<td>Observations</td>
<td>94</td>
<td>94</td>
<td>94</td>
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<tr>
<td>Fstat</td>
<td></td>
<td></td>
<td>25.39</td>
</tr>
<tr>
<td>Anderson-Rubin</td>
<td></td>
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</tr>
<tr>
<td>AKM standard error</td>
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<td></td>
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<tr>
<td>Instrument</td>
<td></td>
<td></td>
<td>Baseline</td>
</tr>
</tbody>
</table>

All regressions weighted by province population at the start of the period. AKM refers to Adao, Kolosar & Morales (2019) standard errors.
### Change in Posting Imports & Domestic Employment

25th → 75th exposure = 0.8 pp decrease of exposed employment in population

![Back](Back.png)

---

**Dependent Variable**: Change in exposed employment/pop, 2003-2015 (%pts)

<table>
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<td>(1) (2) (3) (4) (5) (6)</td>
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<tr>
<td>( \Delta ) log Postings/worker</td>
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</tr>
<tr>
<td></td>
<td>(.231)</td>
</tr>
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<td>Observations</td>
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</tr>
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<td>Instrument</td>
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All regressions weighted by province population at the start of the period. AKM refers to Adao, Kolosar & Morales (2019) standard errors.
# Change in Posting Imports & Domestic Employment

25th → 75th exposure = 0.8 pp decrease of exposed employment in population

## Dependent Variable: Change in exposed employment/pop, 2003-2015 (%pts)

### Post-reform (2003-2015)

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
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<th>IV (3)</th>
<th>IV (4)</th>
<th>IV (5)</th>
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<tbody>
<tr>
<td>∆ log Postings/worker</td>
<td>-.638***</td>
<td>-.462***</td>
<td>-.983***</td>
<td>.427**</td>
<td>-.990***</td>
<td>-1.610***</td>
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<tr>
<td></td>
<td>(.231)</td>
<td>(.117)</td>
<td>(.272)</td>
<td>(.176)</td>
<td>(.275)</td>
<td>(.520)</td>
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<td>94</td>
<td>94</td>
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<td>24.7</td>
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<td>Anderson-Rubin</td>
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<tr>
<td>AKM standard error</td>
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<td>(.250)</td>
<td></td>
<td></td>
<td>(.351)</td>
<td></td>
</tr>
<tr>
<td>Instrument</td>
<td>Baseline</td>
<td>Baseline</td>
<td>Predicted</td>
<td>Distance</td>
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</table>

All regressions weighted by province population at the start of the period. AKM refers to Adao, Kolosar & Morales (2019) standard errors.
Dependent Variable: Change in unemployment/pop, 2003-2015 (%pts)

<table>
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<tr>
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<th>RF (2)</th>
<th>IV (3)</th>
<th>IV (4)</th>
<th>IV (5)</th>
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<td>.427**</td>
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<td>(.272)</td>
<td>.176</td>
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<tr>
<td>Instrument</td>
<td>Baseline</td>
<td>Baseline</td>
<td>Predicted</td>
<td>Distance</td>
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</tr>
</tbody>
</table>

All regressions weighted by province population at the start of the period. AKM refers to Adao, Kolosar & Morales (2019) standard errors.
Employment and Labor Cost at Receiving Firms

Mechanisms and implications

- Market-level employment effects in exposed sectors
  - Employment differentially decreases in exposed local labor markets

- What happens at receiving firms?

  1. Decrease in domestic blue collar employment
     - Firms decrease domestic employment by 16% when starting to use posting
     - Effect borne by blue collar workers
     - Driven by workers performing same tasks than posted workers

  2. Posting lowers inputs prices
     - Posted workers are 30% cheaper than French workers at same workplace
     - and 15% cheaper than domestic temp. workers at same firm
     - Surplus-sharing between posted workers and receiving firms $\approx 0$
Exposure to Posting Shock

Measuring posting exposure in "quasi-autarky"

\[ e_{p \in r}^{2003} = \frac{1}{E_{p}^{2003}} \sum_{s} \frac{E_{s,p}^{2003}}{E_{s,r}^{2003}} \times P_{s,r}^{2003} \]

Industry share of province p in region r

Posting flows to region r in sector s

Measuring posting exposure using post reform shifters

\[ e_{p \in r}^{post} = \frac{1}{E_{p}^{2003}} \sum_{s} \frac{E_{s,p}^{2003}}{E_{s,r}^{2003}} \times \Delta P_{s,r,-p}^{2004-2015} \]

Industry share of province p in region r

Posting flows to region r except p in sector s