# 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)

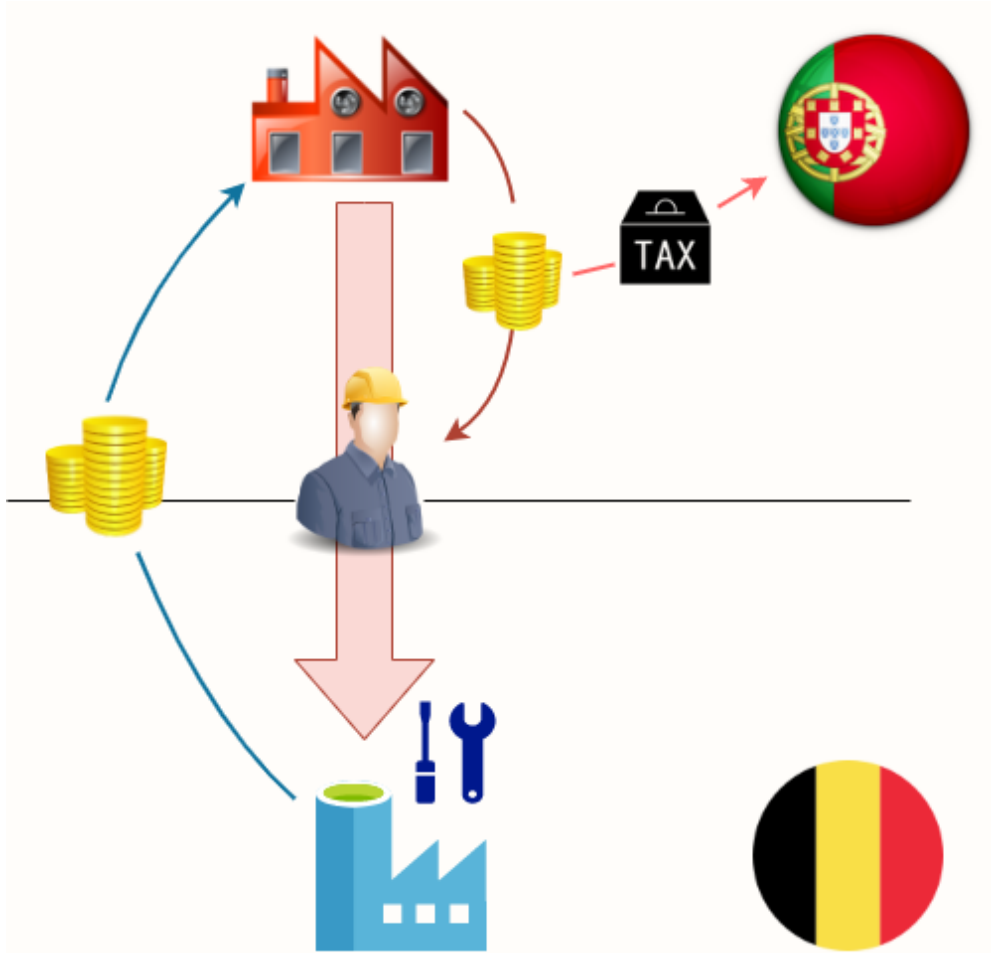
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- Many jobs are assumed non-tradable
  - Blinder & Krueger (2006), Grossman & Rossi-Hansberg (2008)
- Posting policies liberalize **trade in non-tradables**
  - Firms can temporarily send workers abroad to perform those jobs
  - WTO trade in services classification: Mode 4
- First liberalized in the EU: European posting policy
  - Polish firms can send construction workers to France
  - Construction service offshored "on-site"

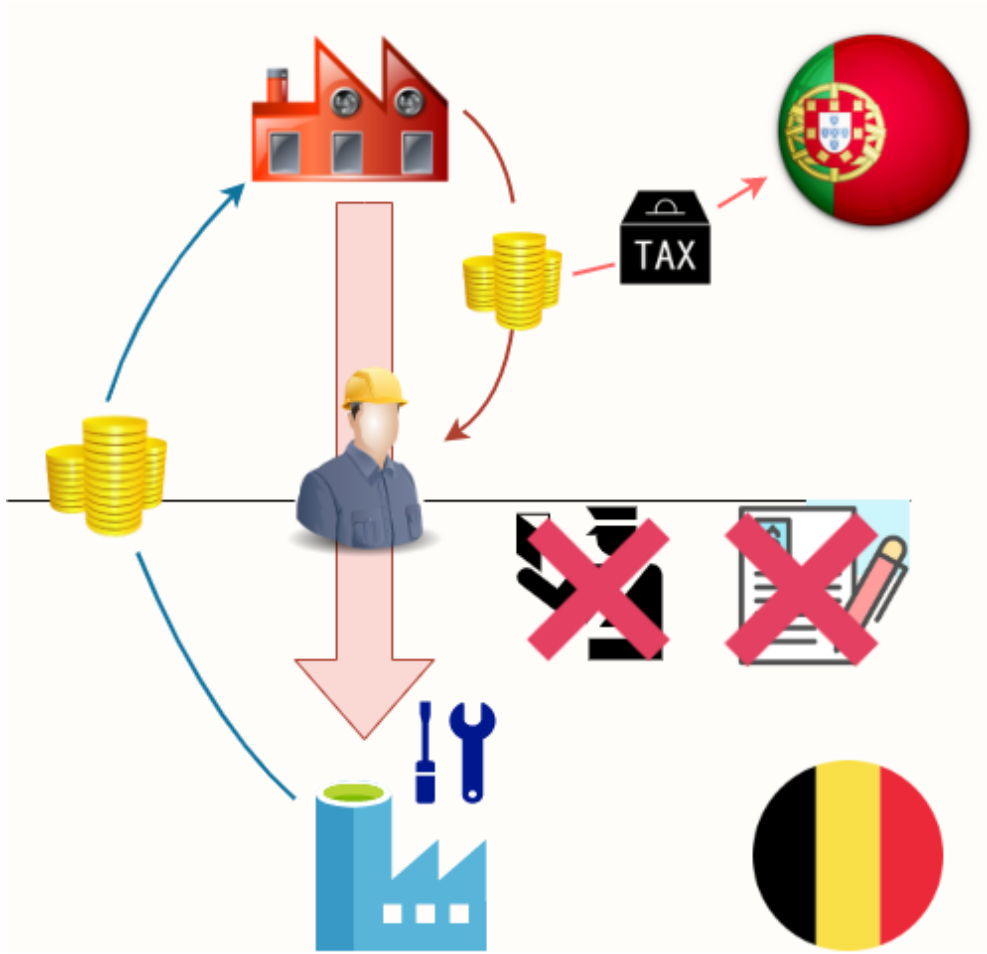
# A New Way to Trade Factors and Services

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



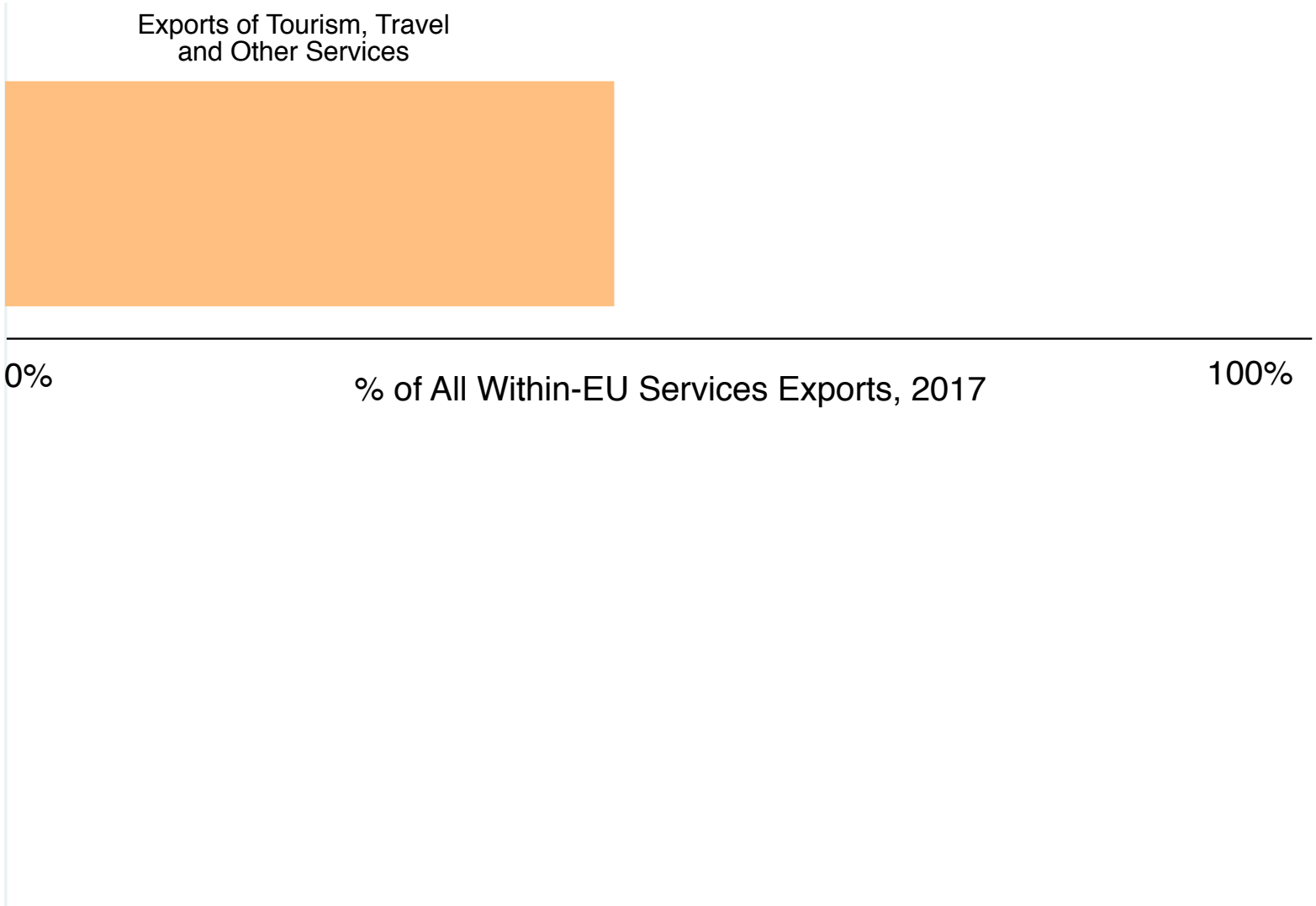
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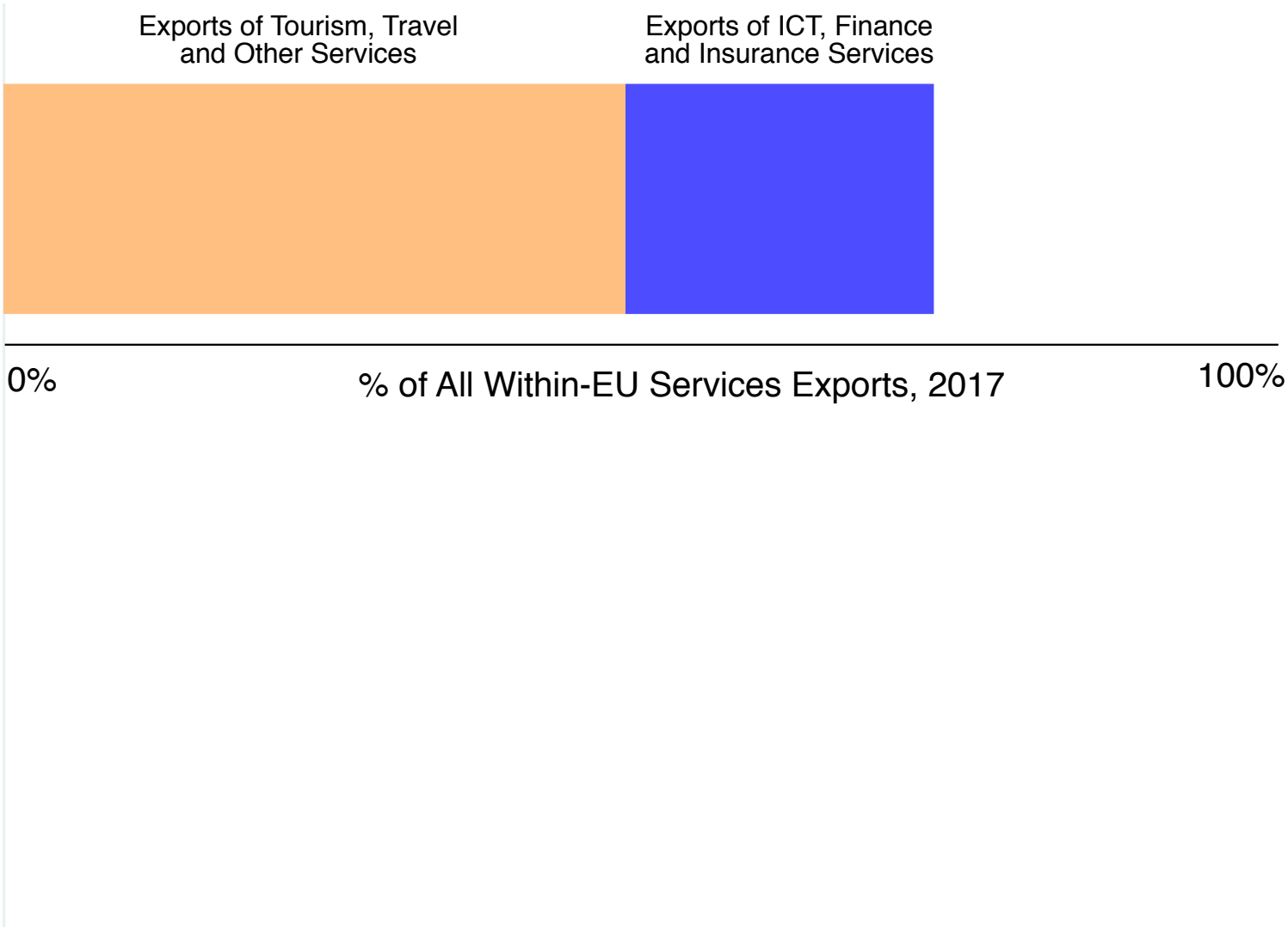



- Portugal exports more truck drivers than wine
- Belgium offshores 15% of construction jobs through posting

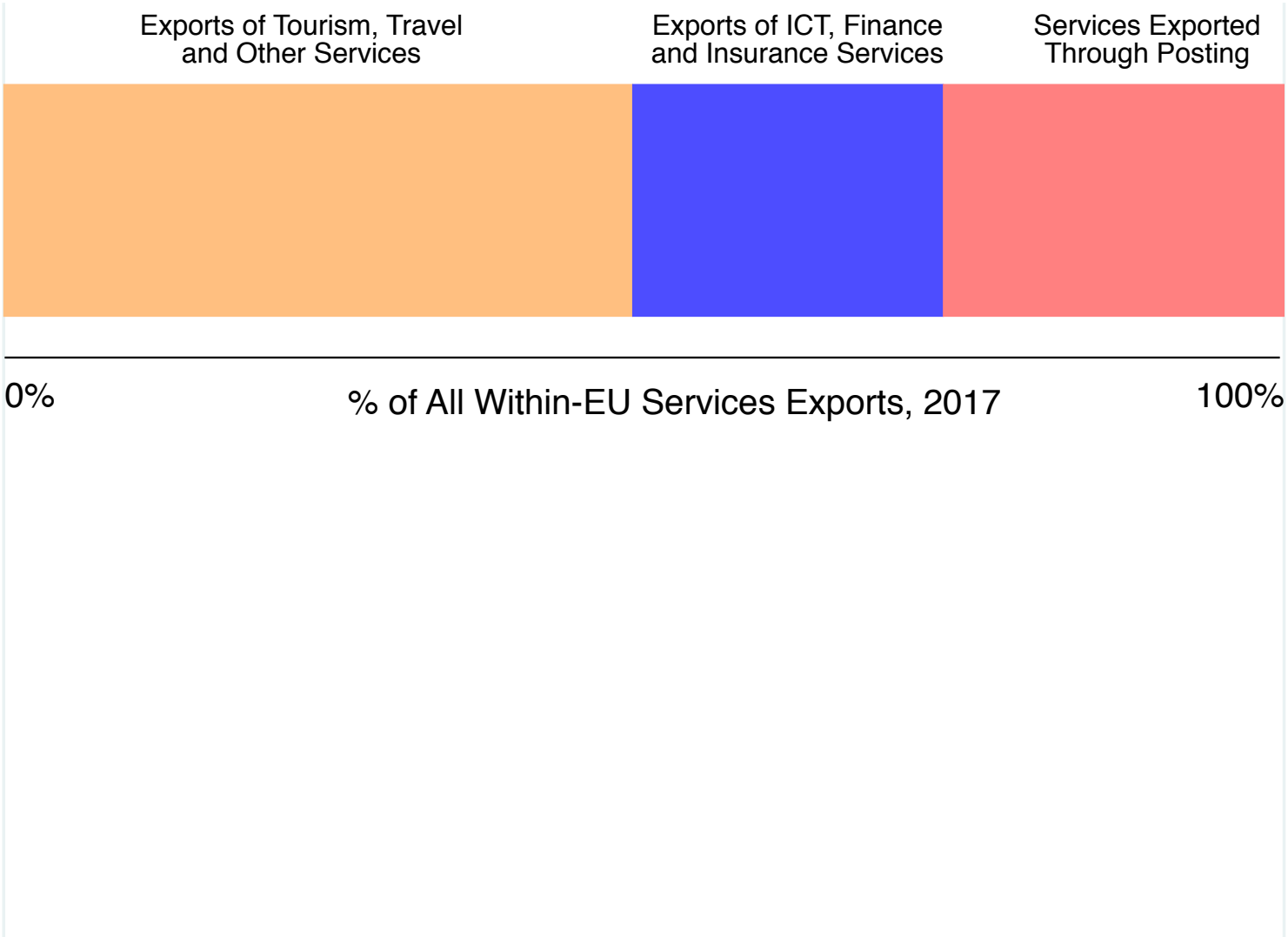
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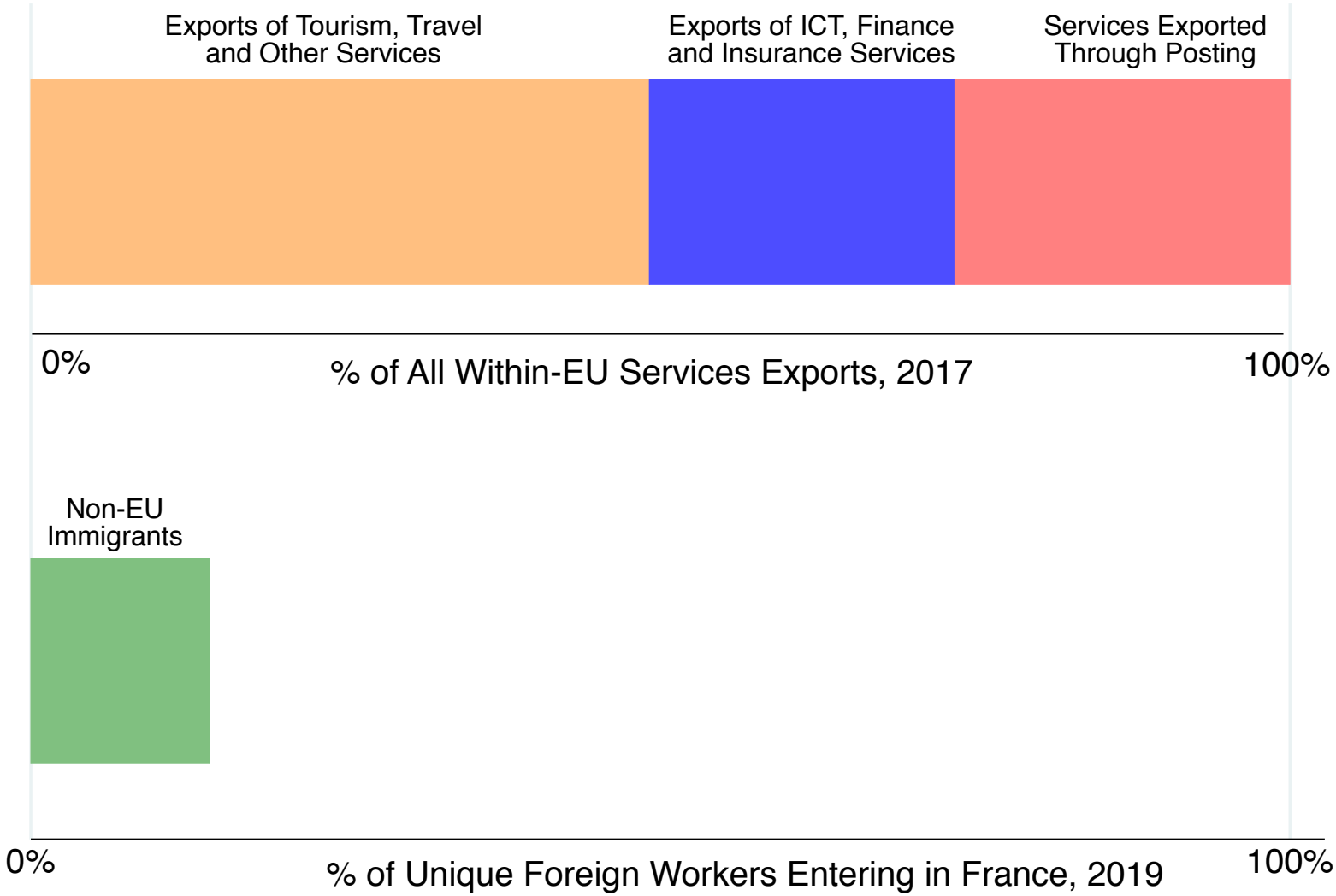
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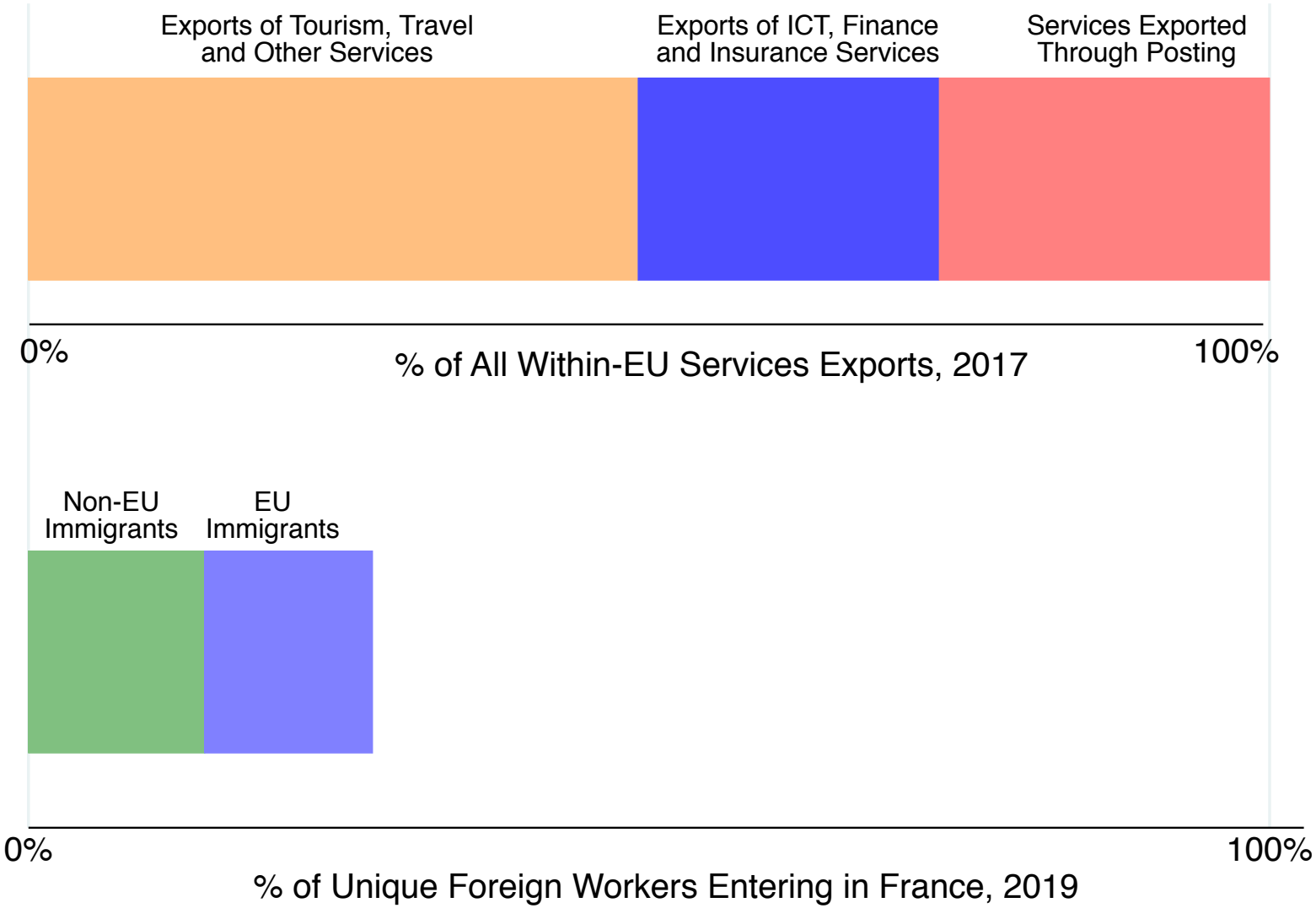
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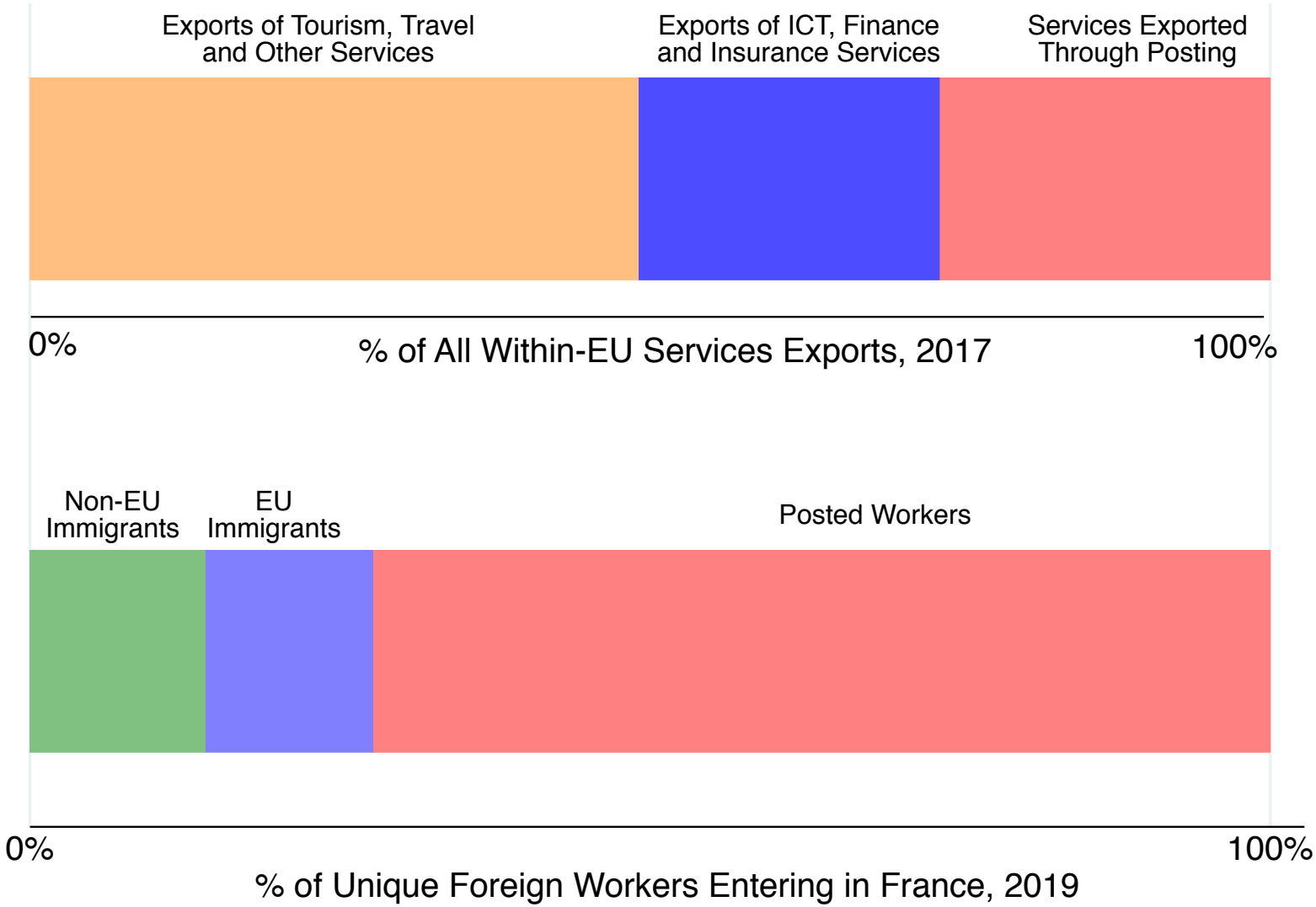
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# 1) What Are the Implications of Posting Policies?

*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 exporters

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   - Same magnitude than exports gains in manufacturing but different incidence
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 $\rightarrow$ payroll taxes in destination Bunching at exemption
- 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

Income Tax Duration Threshold | Political backlash against posting policy | Difference between migration and posting

# 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

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     - **What?** Detailed description of services performed by posted workers
     - **Who?** Receiving firms, Domestic and posted workers at same workplace
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     - **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

Go

# Roadmap

Institutional Framework & Data

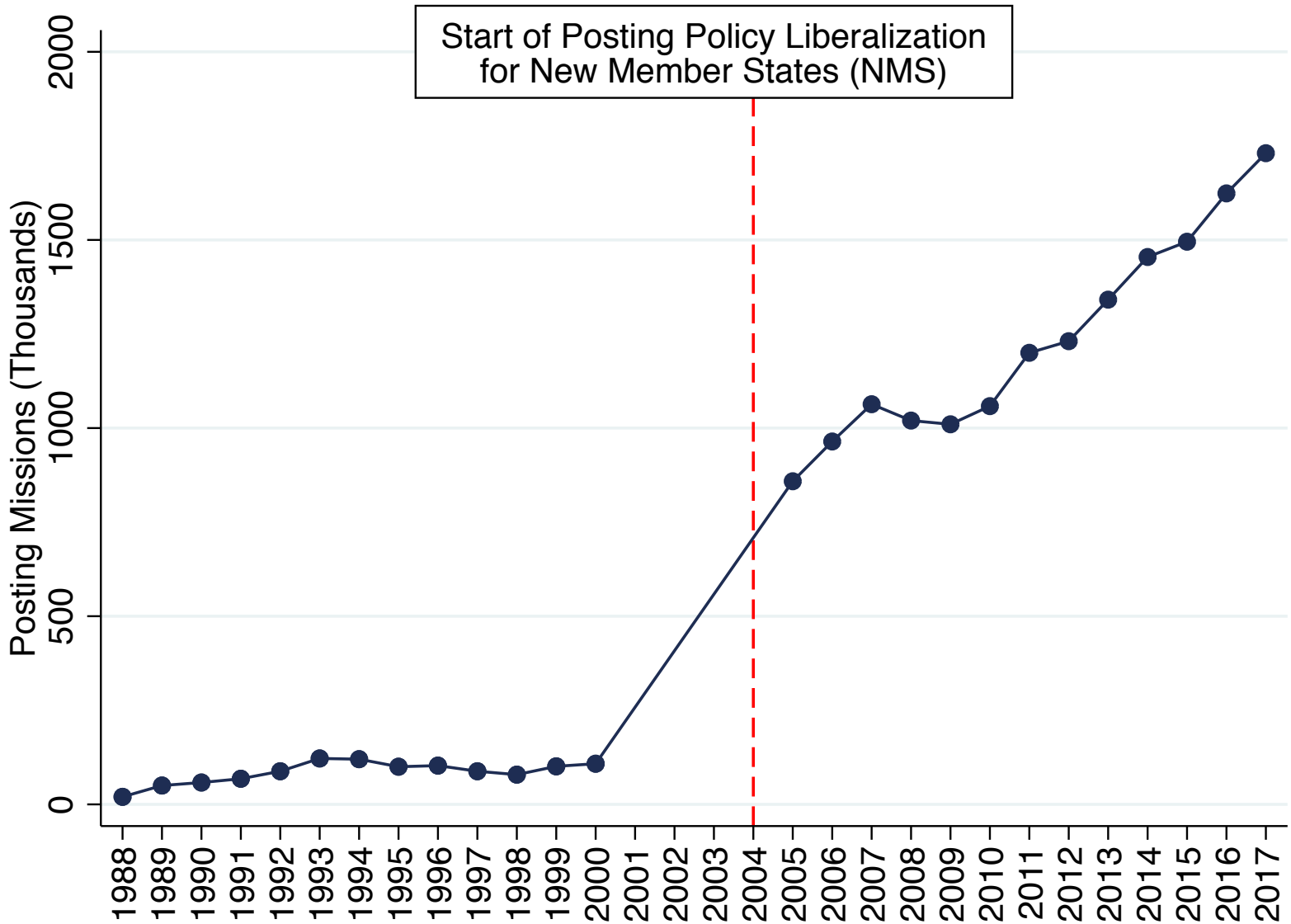
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# Posting Took Off With Expansion to Low-Cost Countries

*Tenfold increase of cross-border provision of services within EU* France



# Effects of Posting Liberalization to NMS

*A staggered difference-in-differences approach* Causal evidence France and Austria

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

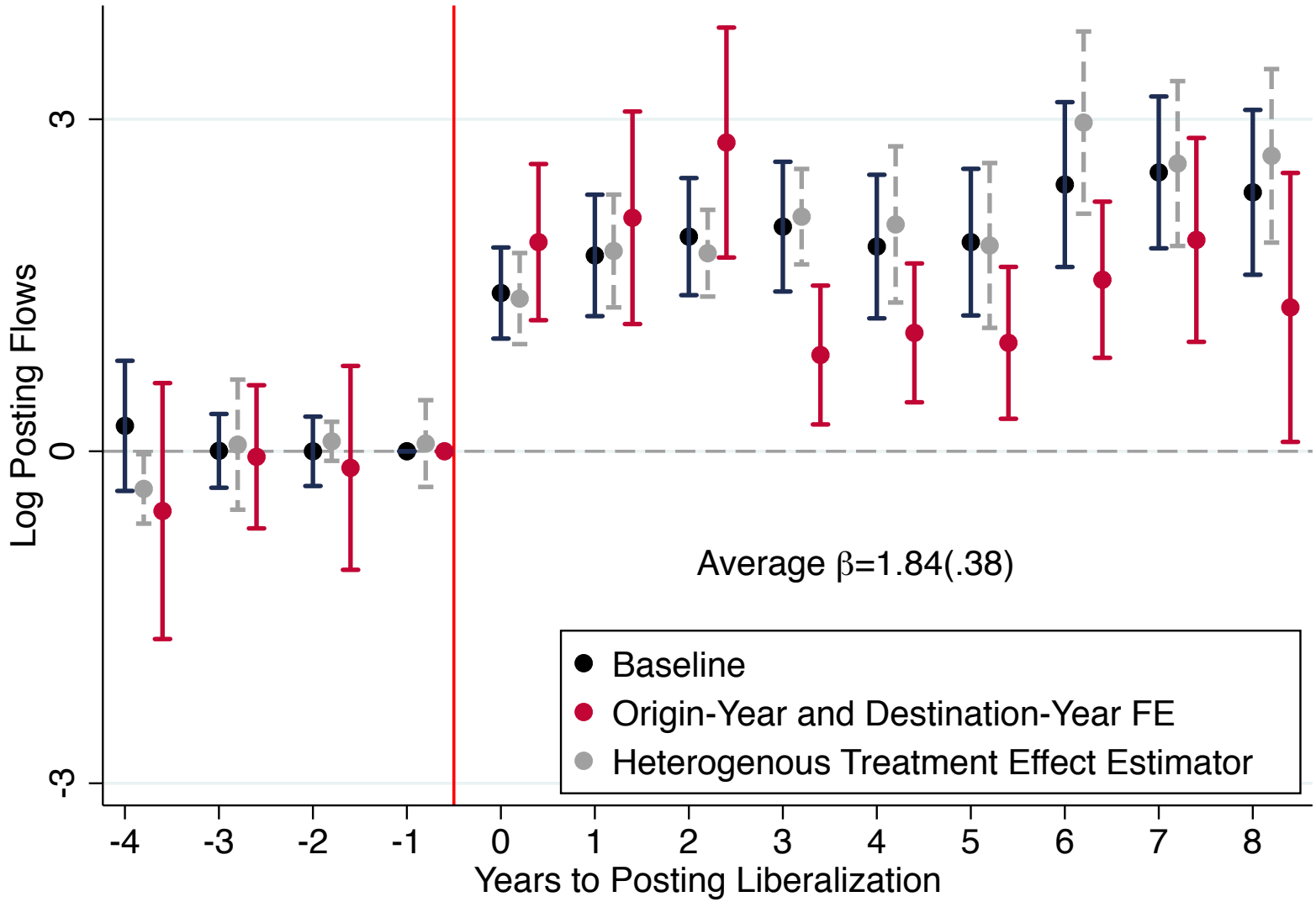
- Staggered difference-in-differences around liberalization $d_{ij}$:

$$\underbrace{\ln S_{ijt}}_{\text{Postings from i to j at t}} = \underbrace{\gamma_{ij}}_{\text{Pair FE}} + \underbrace{\gamma_{it} + \gamma_{jt}}_{\text{Origin-year, Destination-Year FEs}} + \sum_{k=\underline{c}}^{\overline{c}} \beta_k \underbrace{R_{ijt}^k}_{\mathbb{1}.[t = d_{ij} + k]} + \varepsilon_{ijt}$$

- Origin-year & destination-year FEs control for
  - Overall enlargement effects
  - Demand shifters potentially correlated with timing of liberalization

# Posting Liberalization Increased Trade-Migration Flows

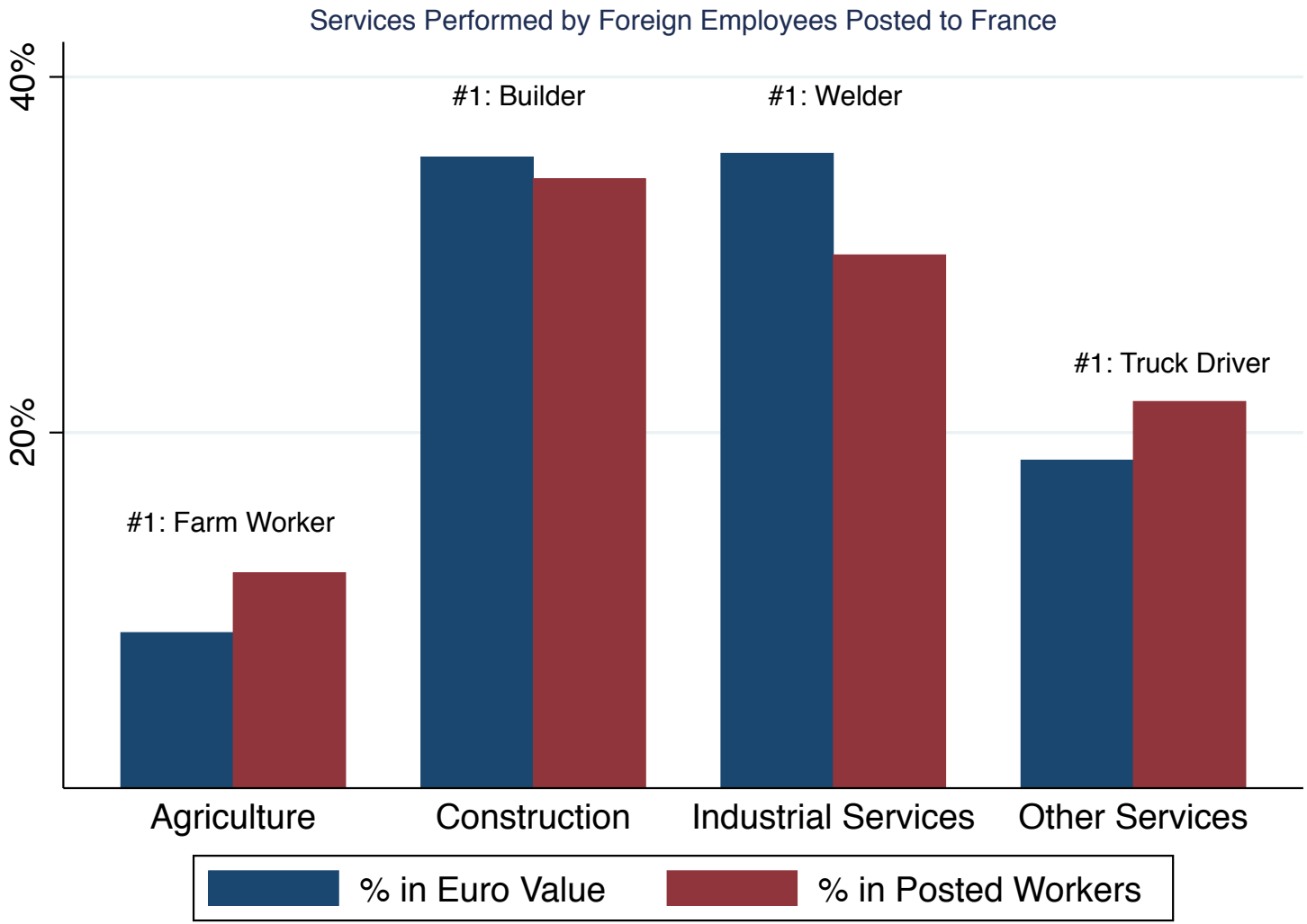





Estimator developped by De Chaisemartin and D'Haultfoeuille (2019) accounting for heterogenous treatment effects.

# ”Non-Tradable” Jobs Become Traded Through Posting

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




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

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# 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 Go
  2. **Local-labor markets**: Persistent spatial heterogeneities in posting Map Shock

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- Predicted exposure: pre-reform posting imports ("Enclave") Trade costs
  - More exposed to the supply shock through pre-existing trade relationships
  - Alternative: geographic distance to NMS

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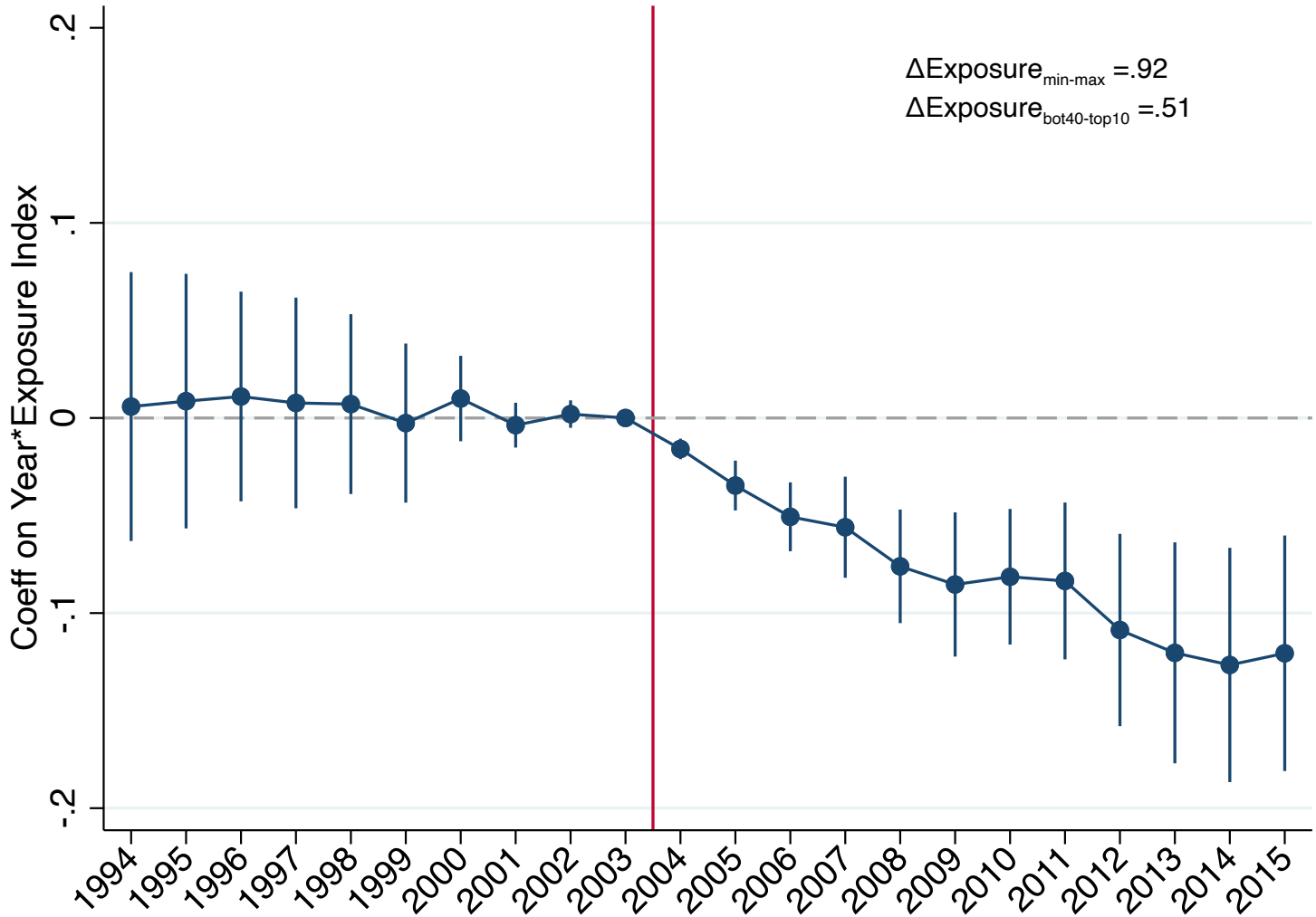
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- Predicted exposure: pre-reform posting imports ("Enclave") Trade costs

- Identifying assumption: Predicted exposure
  1. Predicts posting imports after 2004
     - First stage on actual shocks after the reform: **Fstat=19.5** First Stage
  2. Does not affect employment *changes* through other channels than posting
     - Pre-trends= comparability of provinces with different initial exposure Zero First Stage
     - Flexible controls for initial characteristics $\times$ time trends

# Log Exposed Employment by Exposure to Posting

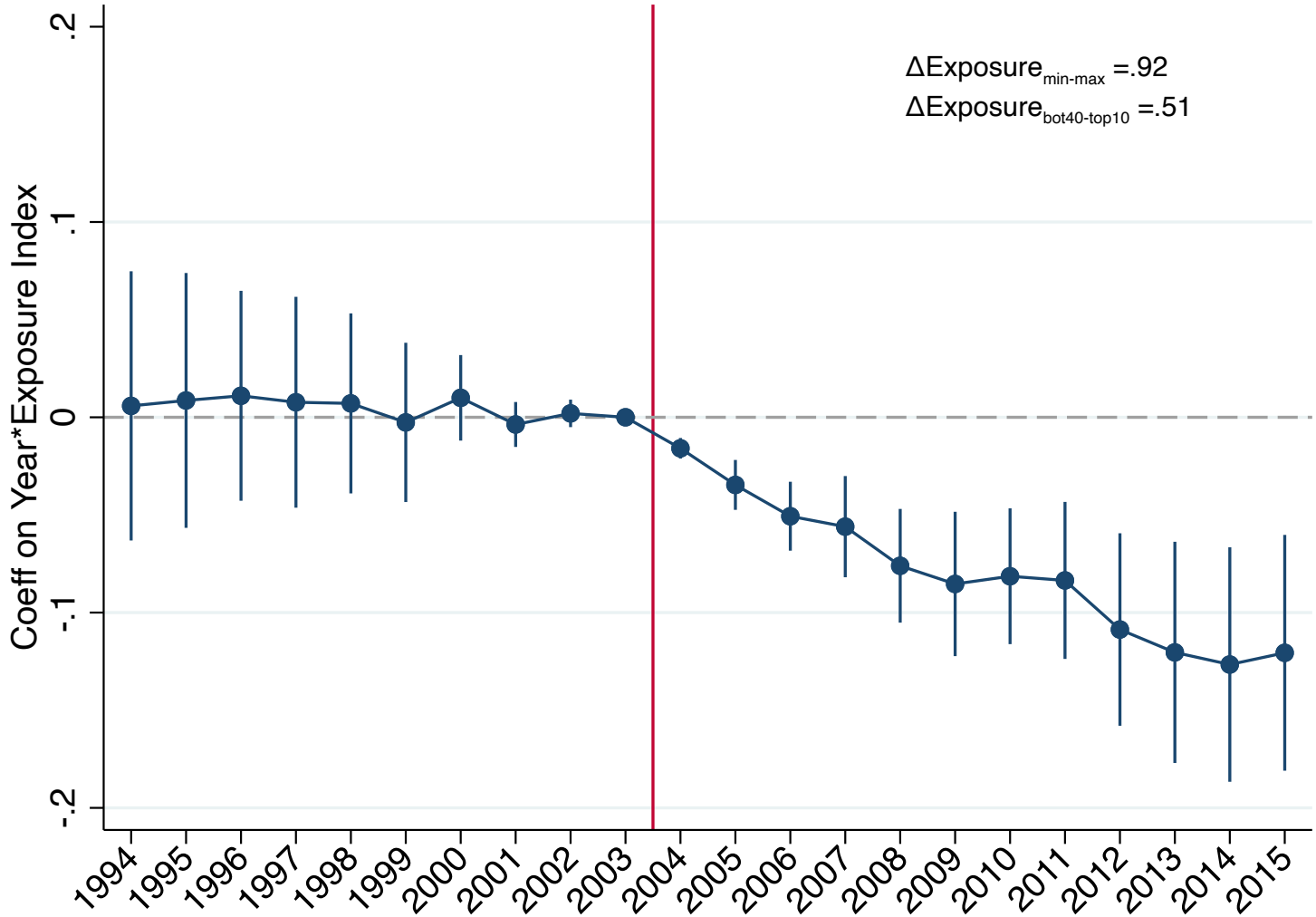
$$\ln Emp_{pt} = \alpha + \lambda_t + \lambda_p + \sum_{k=1994}^{2015} \zeta_k \mathbb{1}_{\{t=k\}} \times e_p^{pre} + \lambda X_{pt} + u_{pt}$$




Migration | Raw | Top vs Bottom | Clustering | Emp-pop ratio | Total employment | More controls | 2007 Shock | IV | Firms

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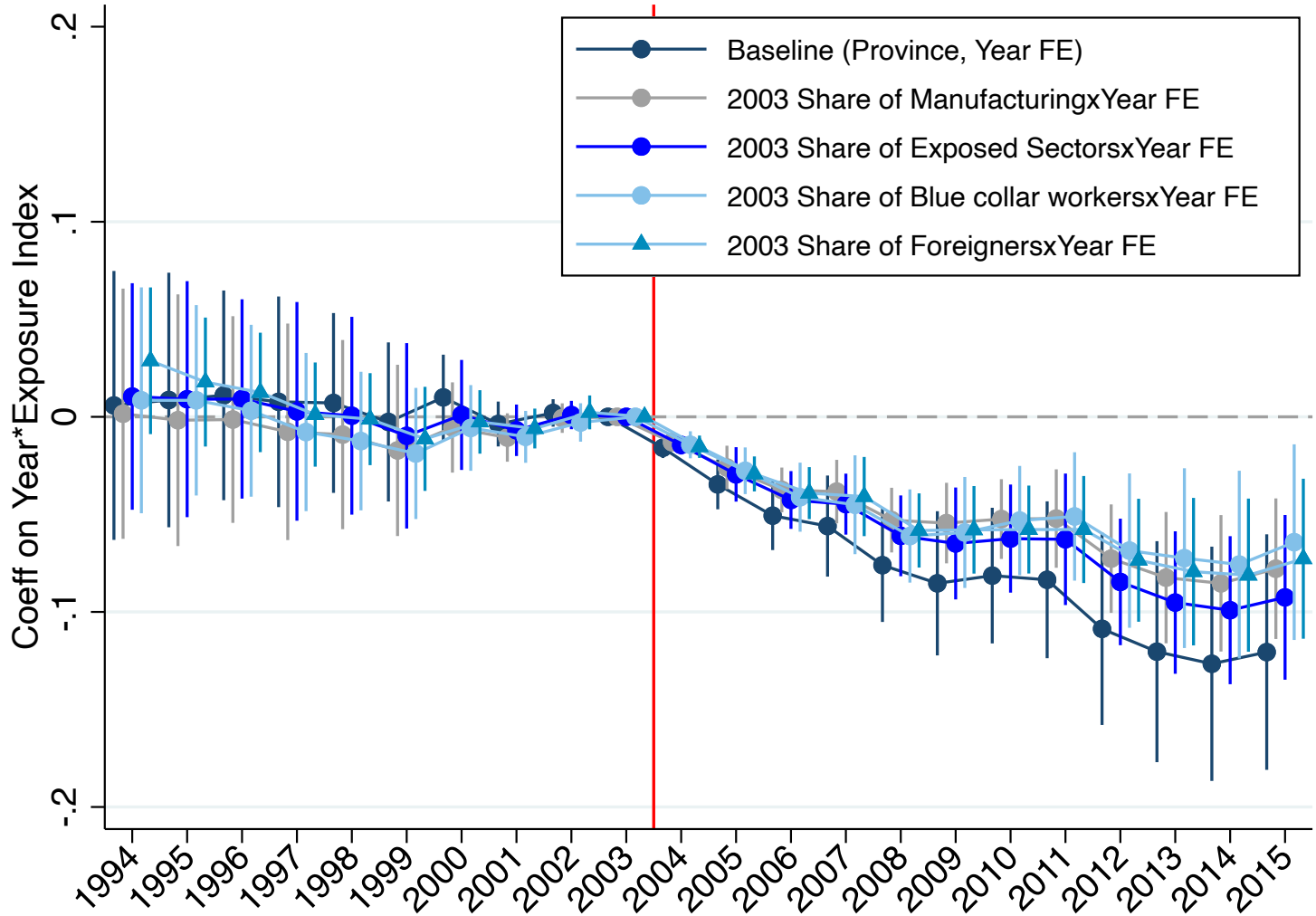
*Moving from bottom 40 to top 10% of exposure decrease employment by 6%*




Migration | Raw | Top vs Bottom | Clustering | Emp-pop ratio | Total employment | More controls | 2007 Shock | IV | Firms

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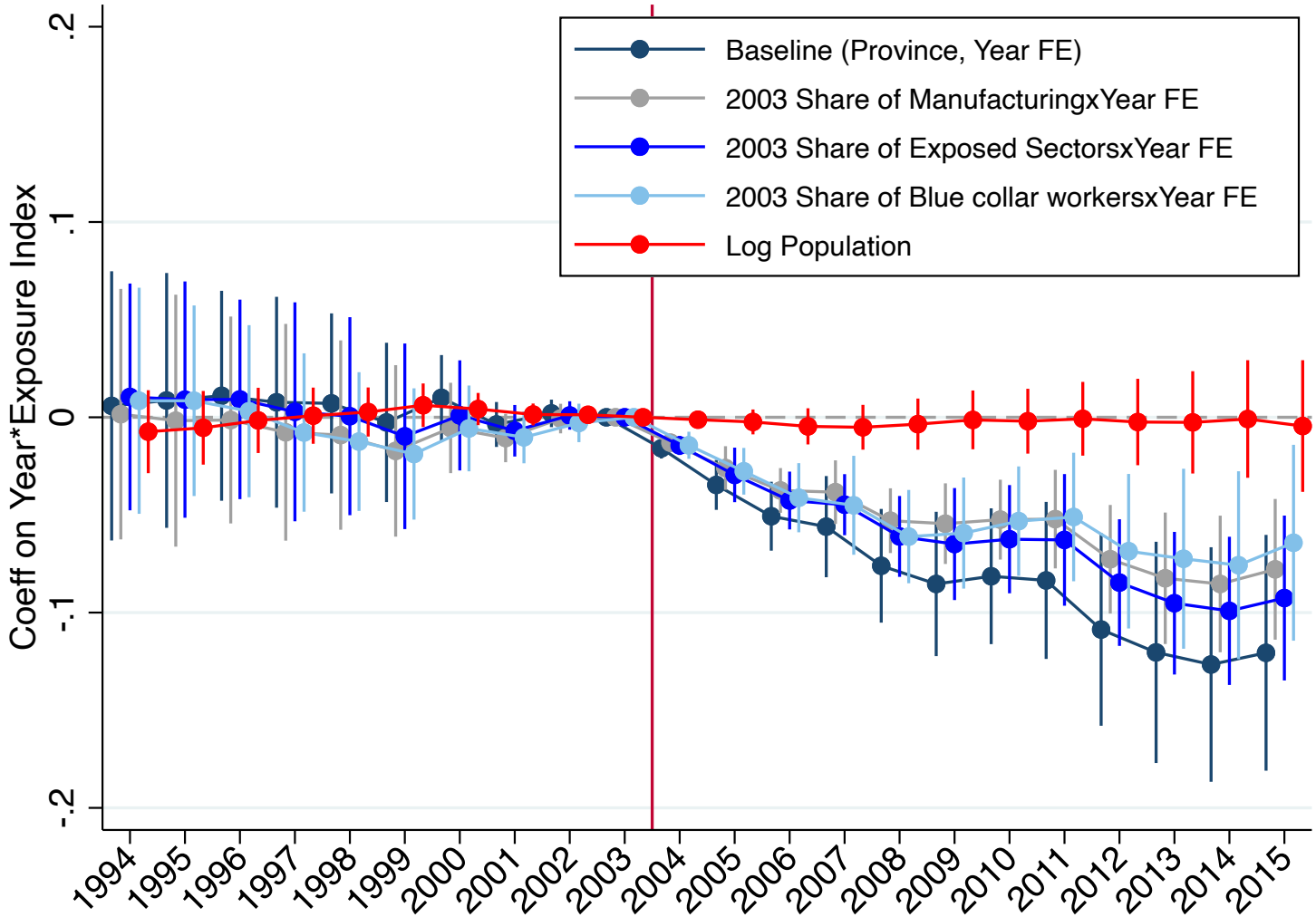
*Controlling for initial local characteristics × time trends*




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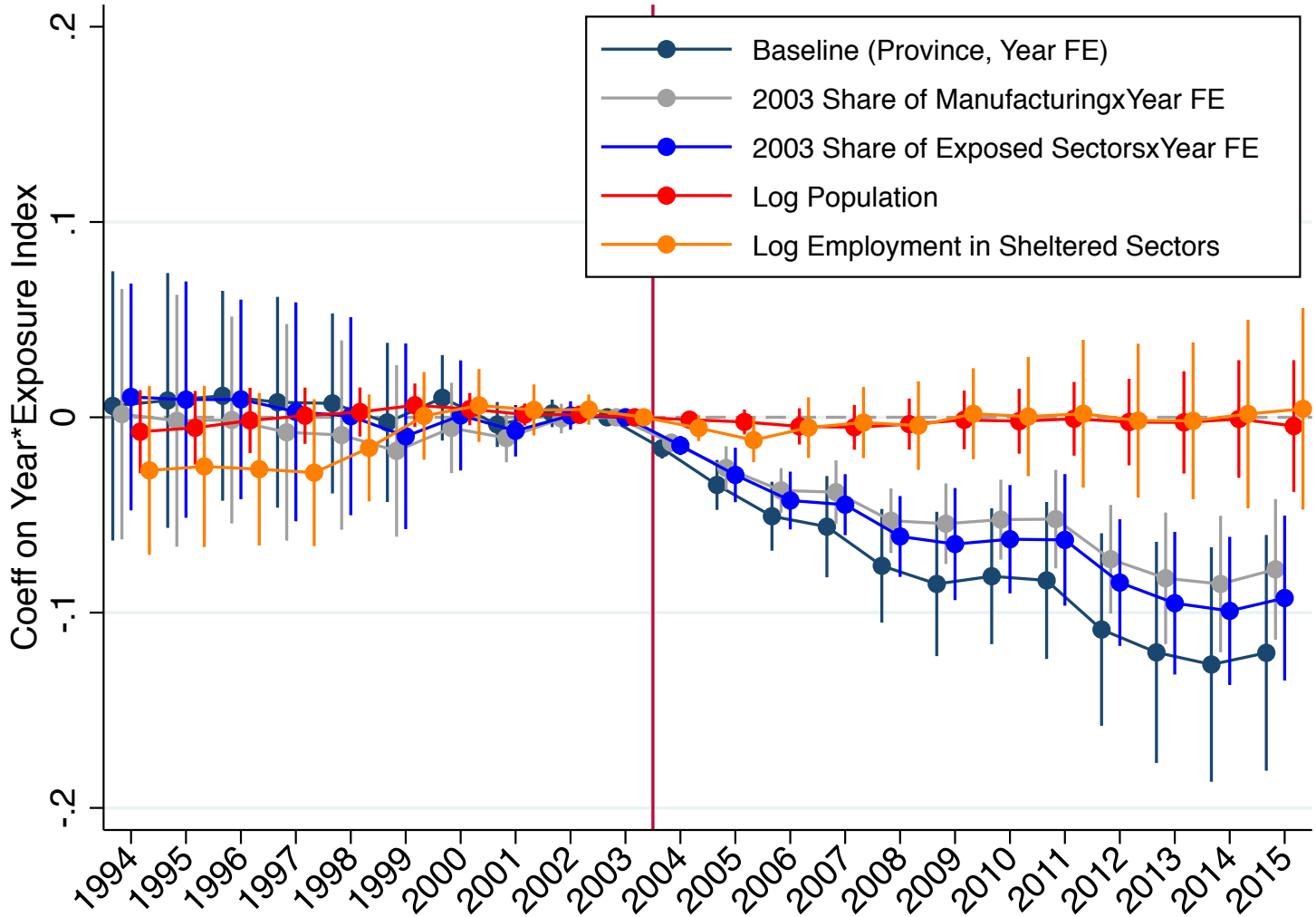
*No migration response to the supply shock*




Migration | Raw | Top vs Bottom | Clustering | Emp-pop ratio | Total employment | More controls | 2007 Shock | IV | Firms

# Log Exposed Employment by Exposure to Posting

*No reallocation of workers to sheltered sectors within exposed labor markets*




Migration | Raw | Top vs Bottom | Clustering | Emp-pop ratio | Total employment | More controls | 2007 Shock | IV | Firms

# Roadmap

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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

$$\underbrace{\ln y_{it}}_{\text{sending firm outcome}} = \alpha_i + \underbrace{\lambda_{pst}}_{\text{5 digit sector-province-year FE}} + \sum_{k=\underline{T}}^{\overline{T}} \theta_k \times \underbrace{D_{it}^k}_{\mathbb{1}.[t = d_i + k]} + \varepsilon_{it} \quad (1)$$

- Comparison groups:
  1. Future posting firm in same sector-province (baseline)

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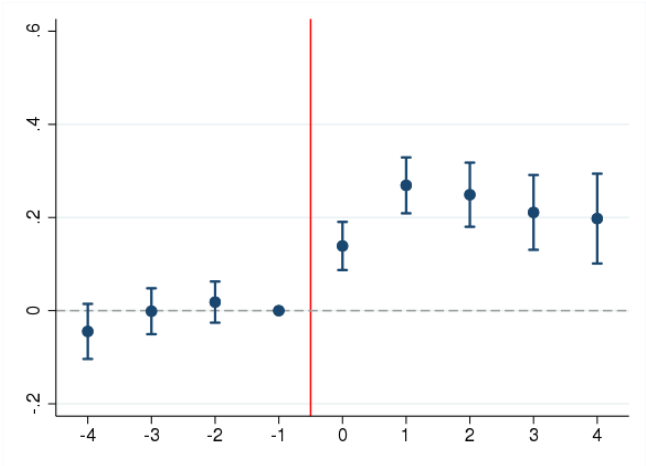
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- Comparison groups:
  1. Future posting firm in same sector-province (baseline)
  2. Matched non-posting firms with same pre-posting sales
  3. Matched firms in sheltered sectors (retailers, hairdressers...)
  4. IV using pre-posting firms' market share $\times$ aggregate posting exports
- Unobserved shocks? Posting mission duration + domestic sales

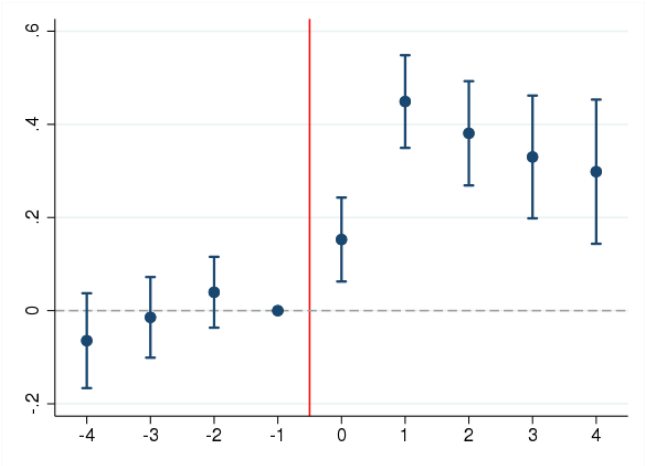
# Sending Firms After First Export of Posting Services

*Firms Scale Up When Accessing Foreign Markets Through Posting*

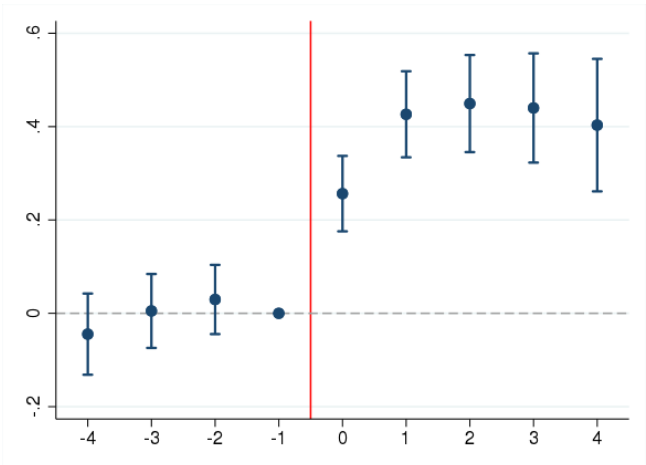
**A. Log Total Employment**



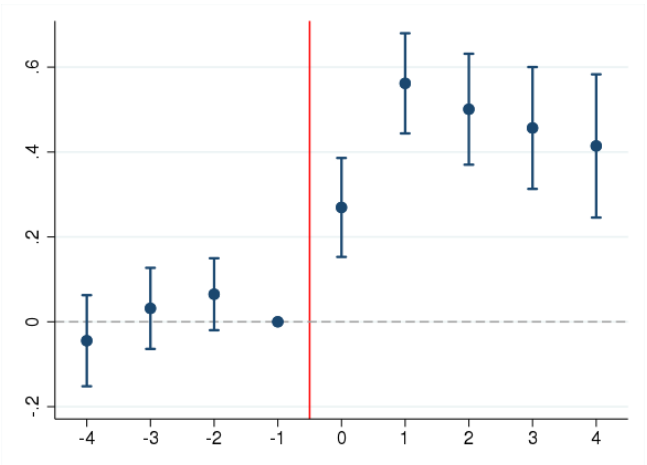

**B. Log Total Turnover**




**C. Log Total Assets**




**D. Log Total Wage Bill**

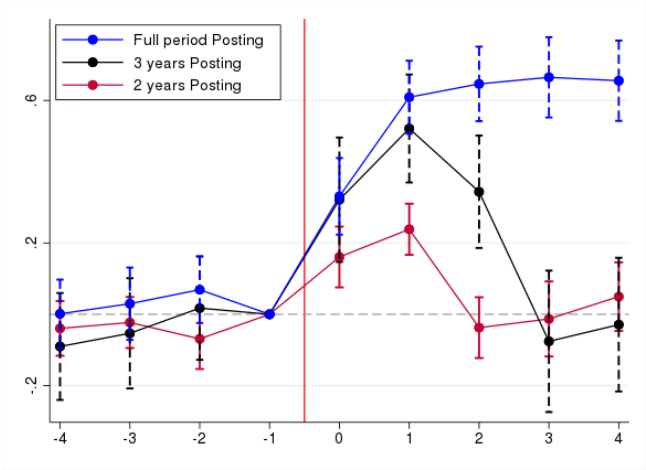



Domestic sales

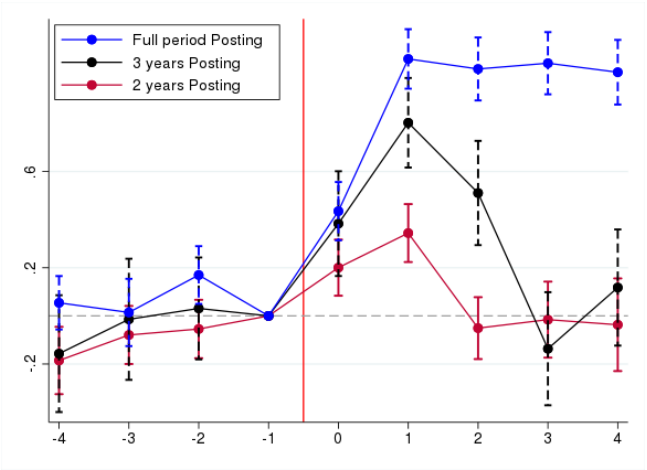
# Export-Mobility Gains of Posting

*Effects start and end with the posting mission*

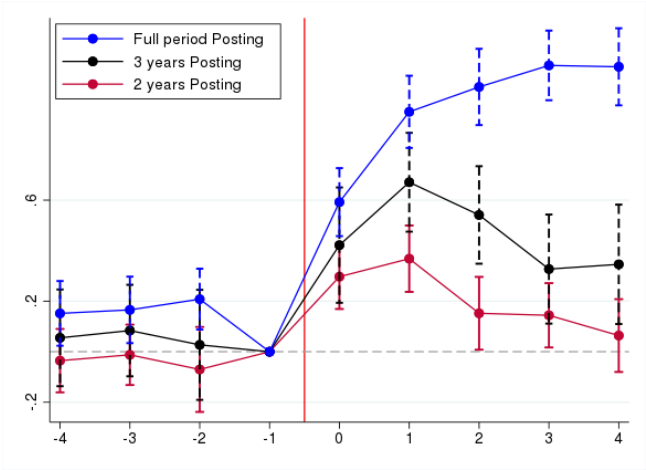
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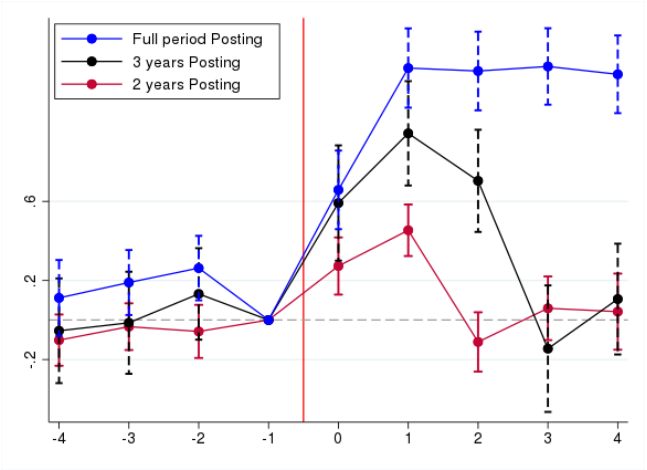

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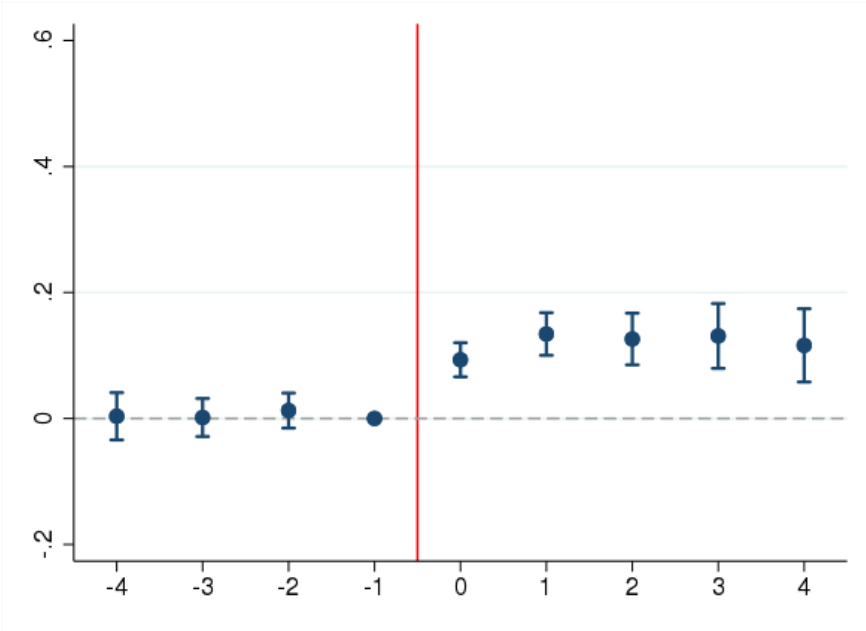



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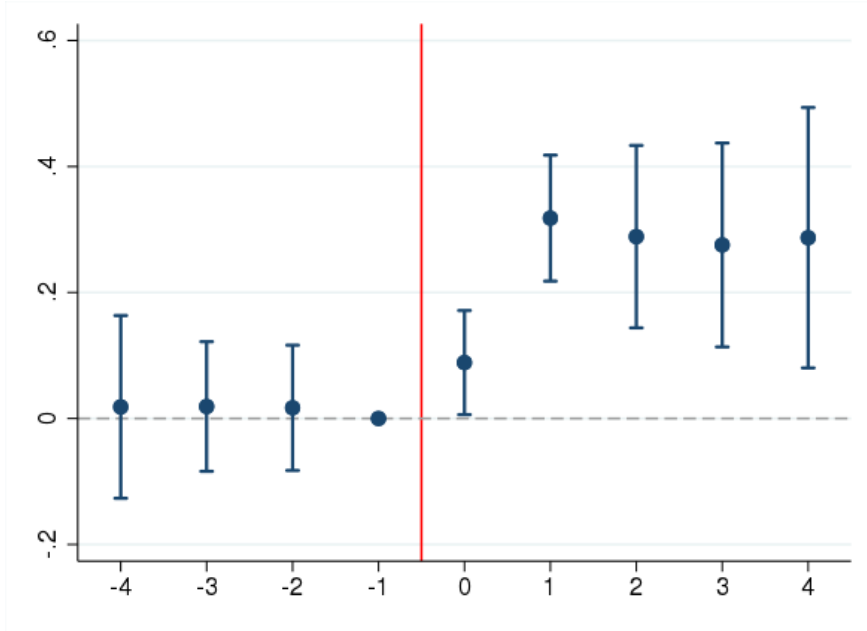
# Profits and Wages at Posting Firms

*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 Go
  - Heterogenous treatment effects Go
  - Placebo event study Go
  - Balancing sample around event time Go
  - Comparable firms in sheltered sectors as control group Go
  - Pre-treatment outcomes matching with non-posting firm Go
  - Consistent with employment & market shares gain after liberalization in NMS
- Are these effects **meaningful** for sending countries?
  - Same growth than standard export gains Dynamic Static
  - No increase in tangible assets
- **Different incidence** than standard exports
  - Benefits smaller, younger and less capital-intensive firms Premium
  - 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

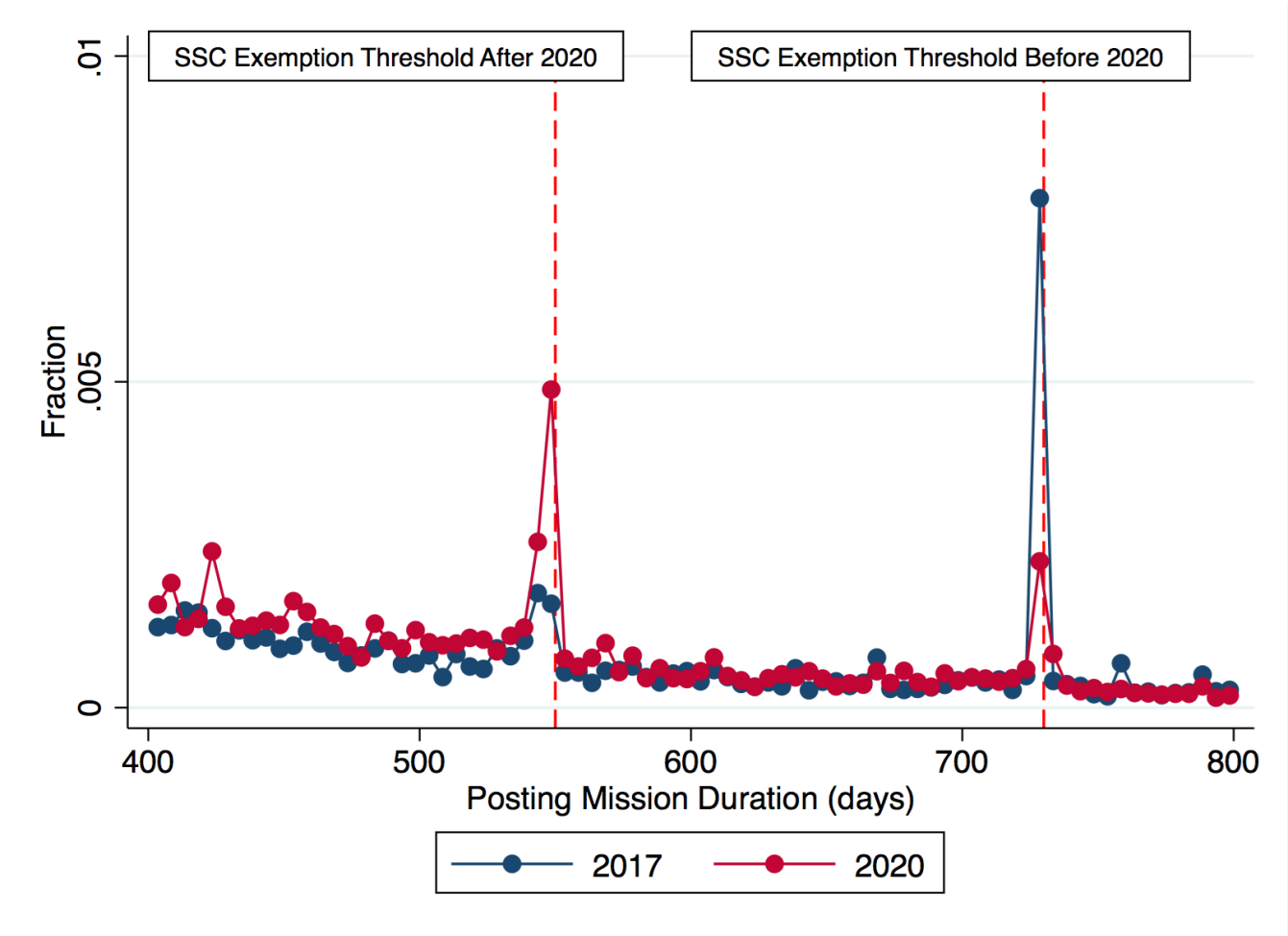
- Novel questions for trade and tax policy
  - Trading people → labor standards & tax exemptions become trade tools
  - Continent-wide experiment of "minimum labor standard" clause

- 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

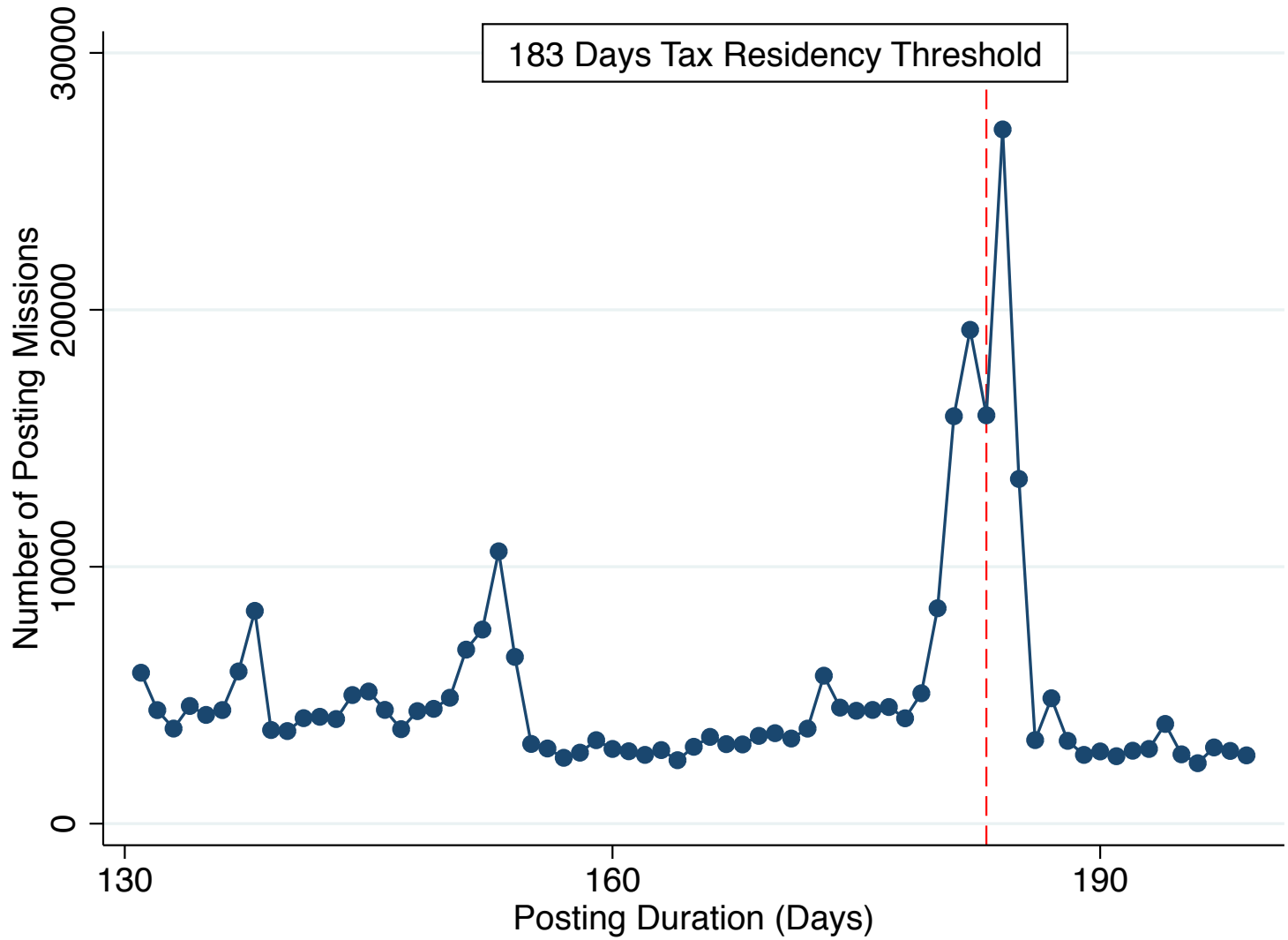
# Posting Duration and Social Security Exemptions Threshold

Back Back2



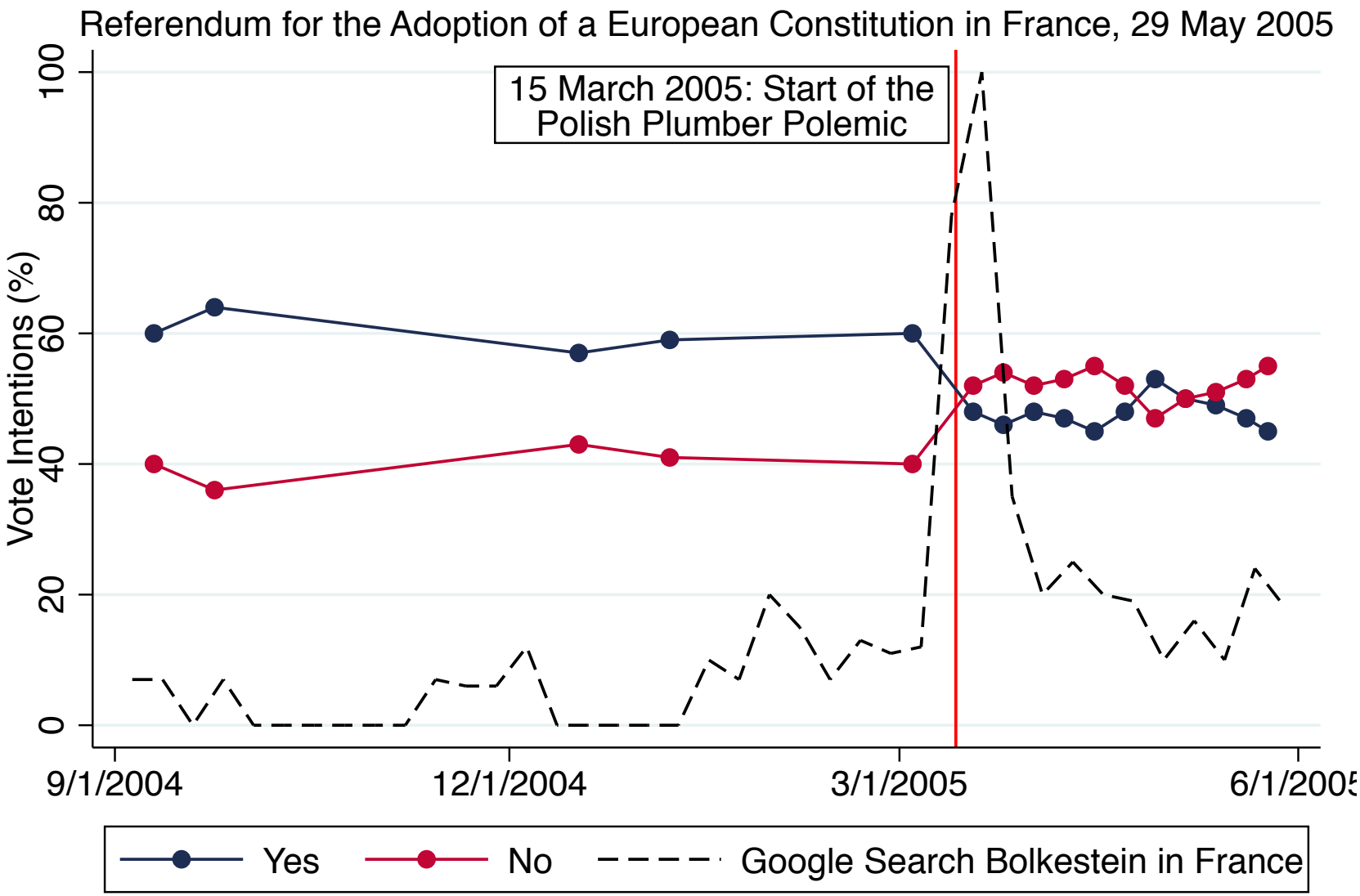
# Posting Duration and Tax Residency Threshold

Back



# Political Backlash against Posting Policy Liberalization

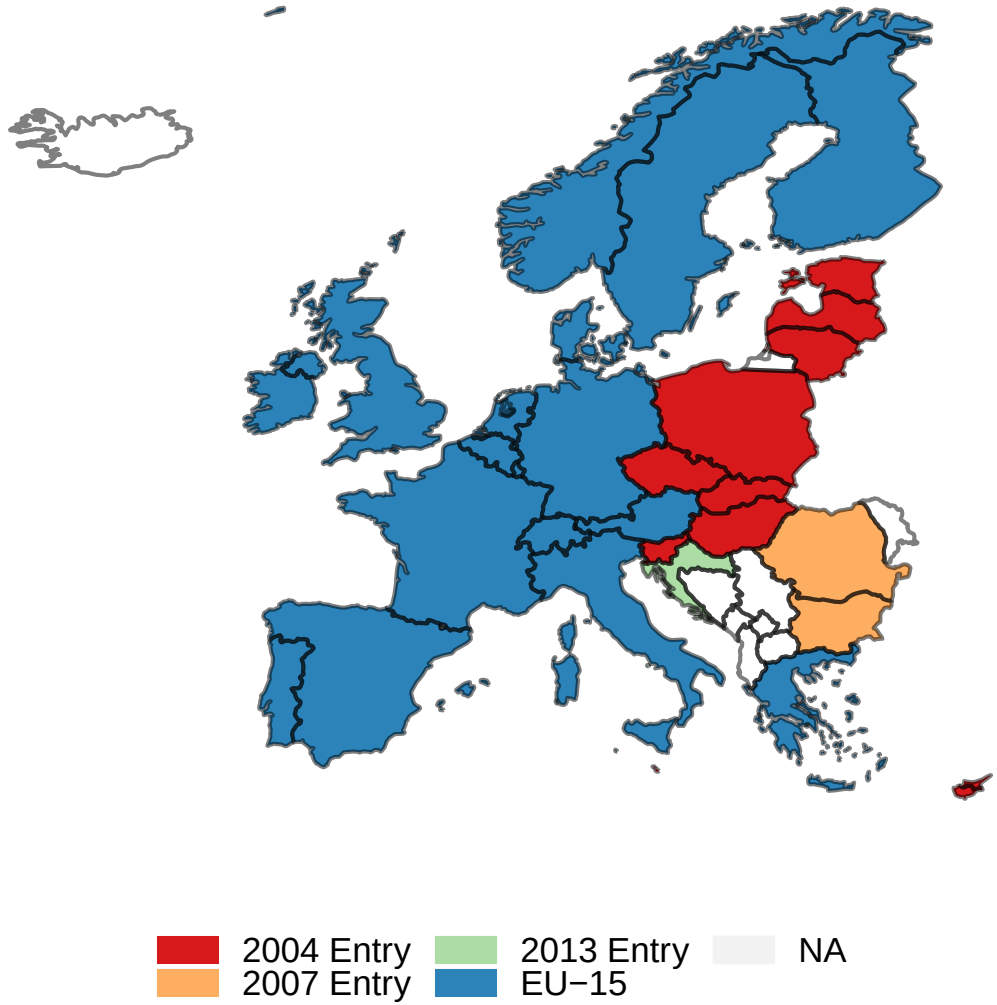
*Bolkestein directive proposed to abolish destination-level minimum wage rule* Back



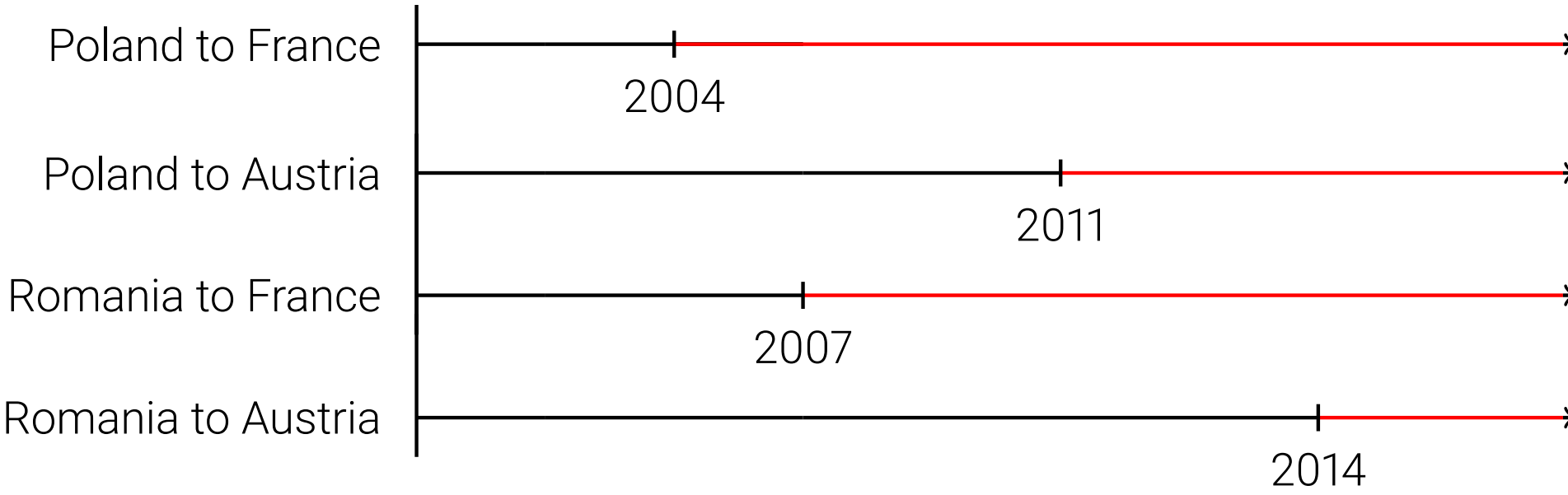

Source: IPSOS Polls and Google Search Trends

# EU Enlargement Timing

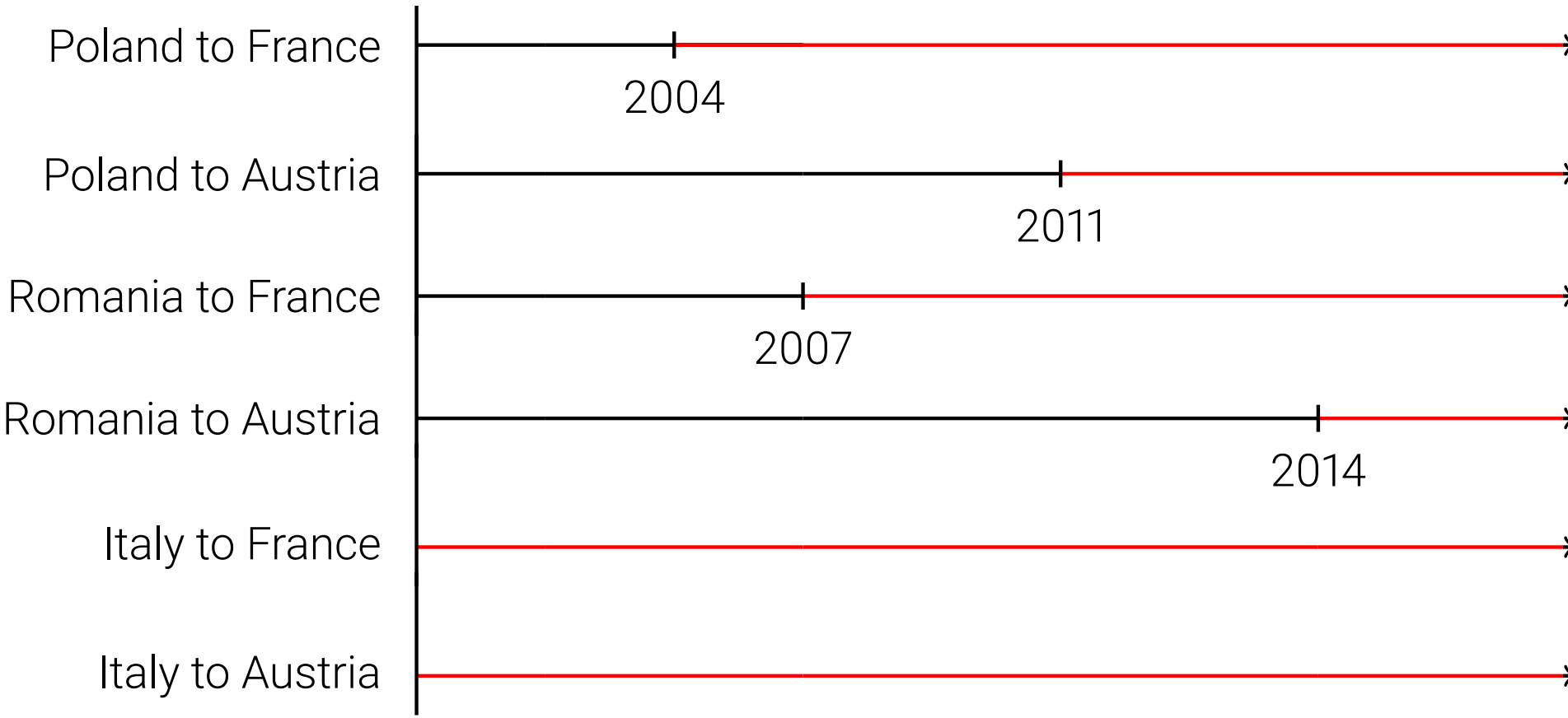
Back



# Staggered Posting Liberalization Reforms: Illustration

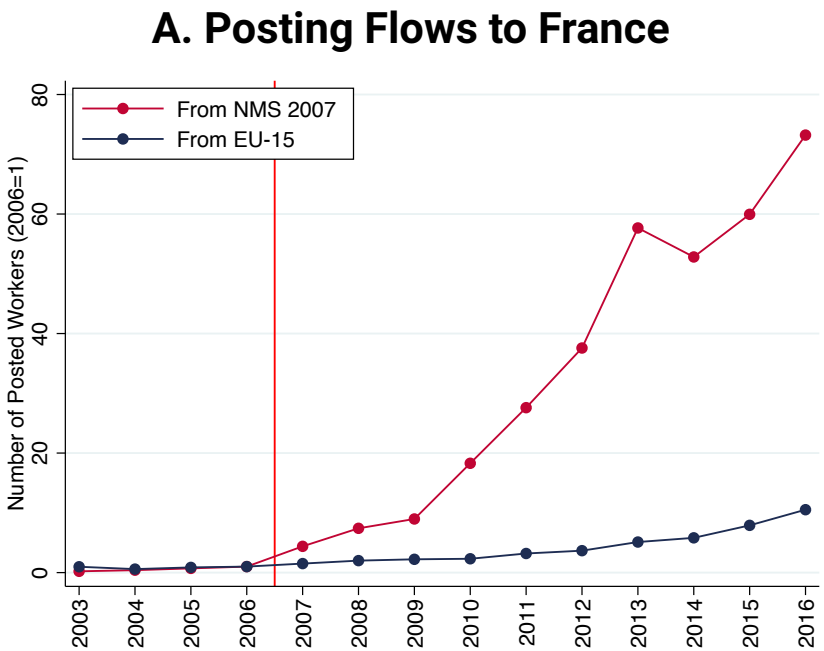


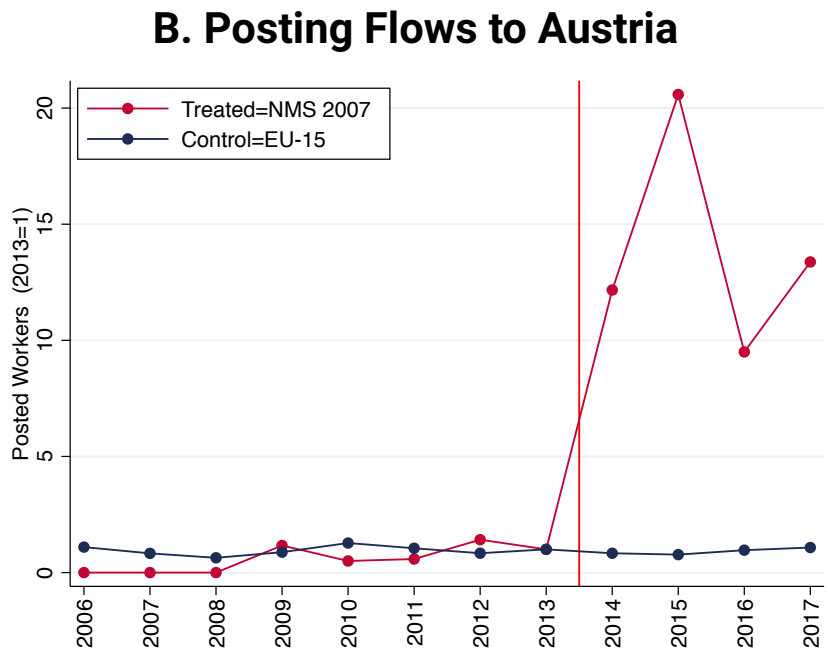
# Staggered Posting Liberalization Reforms: Illustration



# NMS 2007 to France and Austria

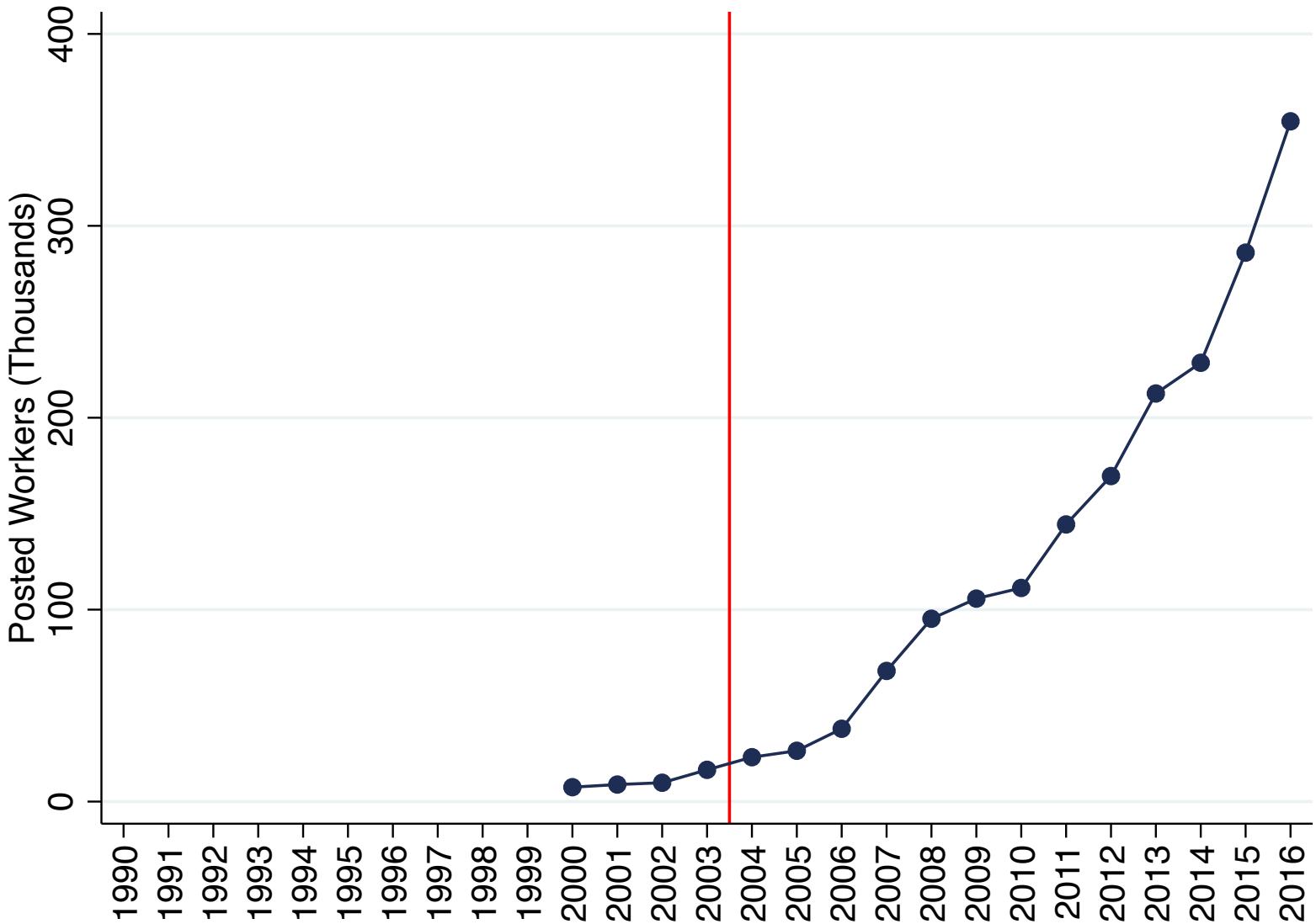
BACK



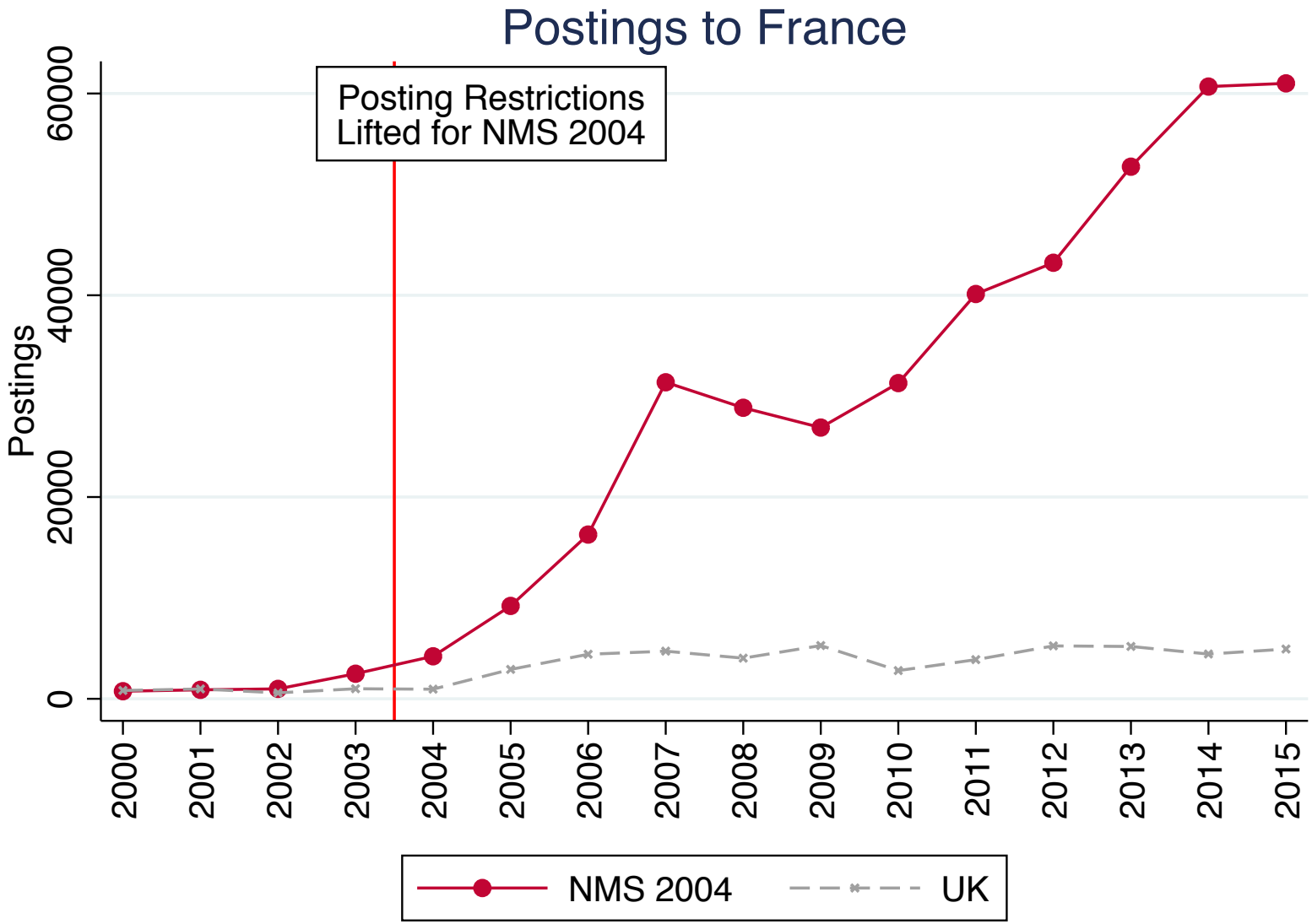
# Posting Policy Increased Trade-Migration Flows

*Posting Flows to France* BACK



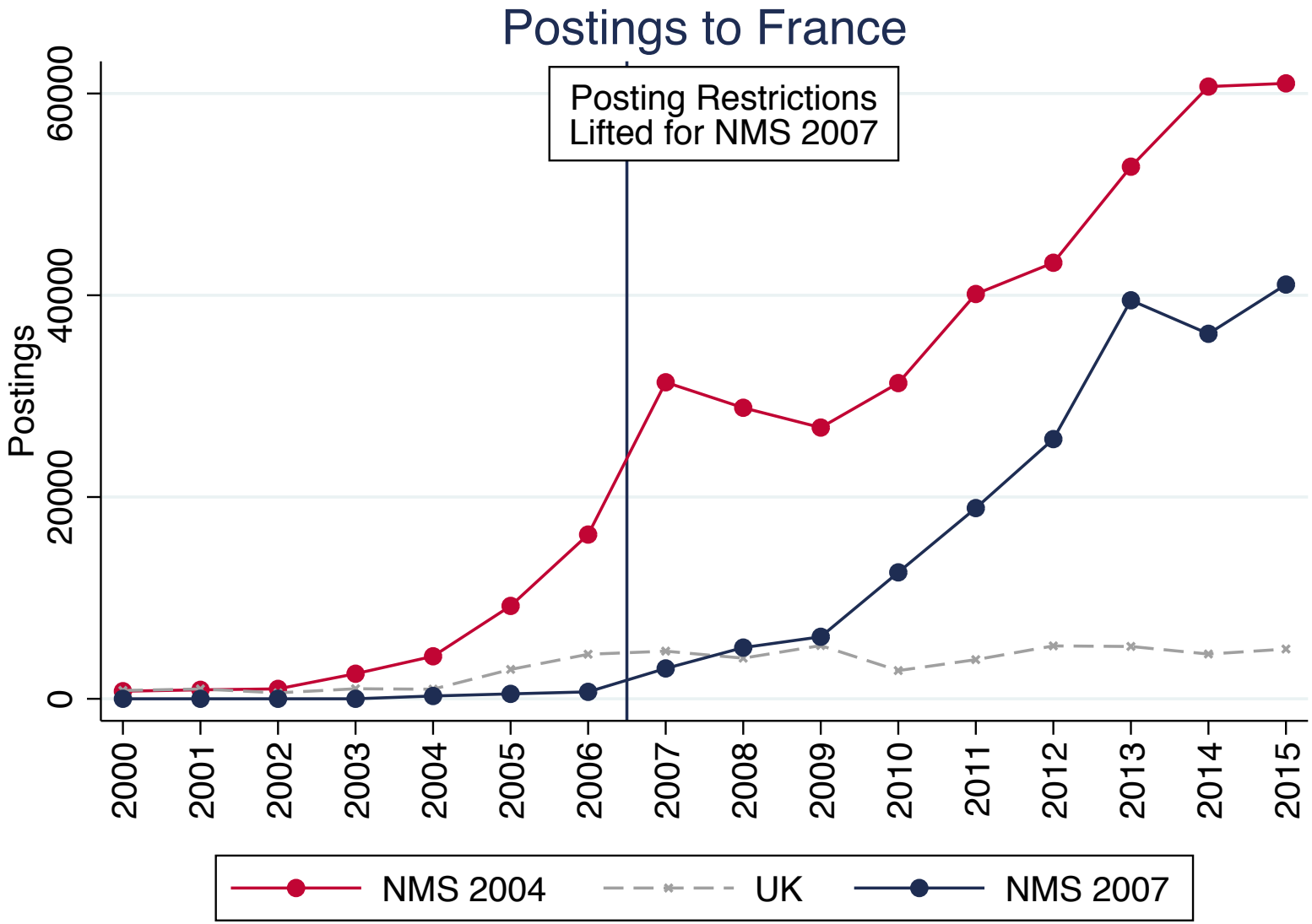
# Posting Policy Increased Trade-Migration Flows

*Posting Flows to France*



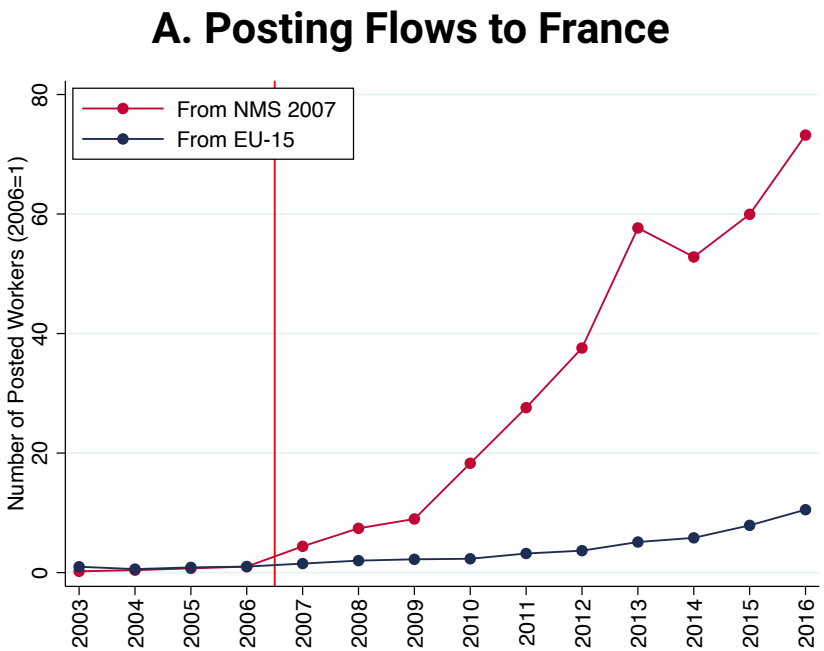
# Posting Policy Increased Trade-Migration Flows

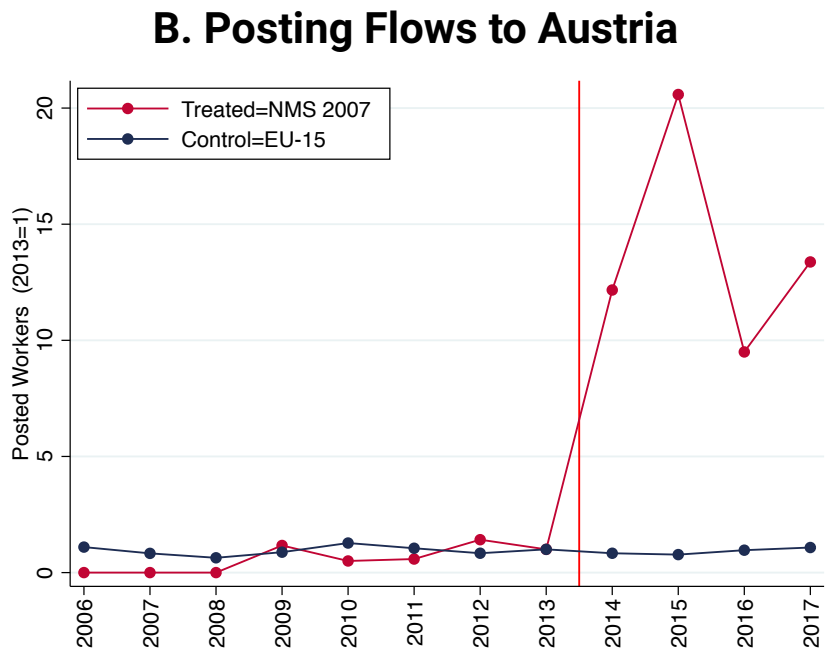
*Posting Flows to France*



# NMS 2007 to France and Austria

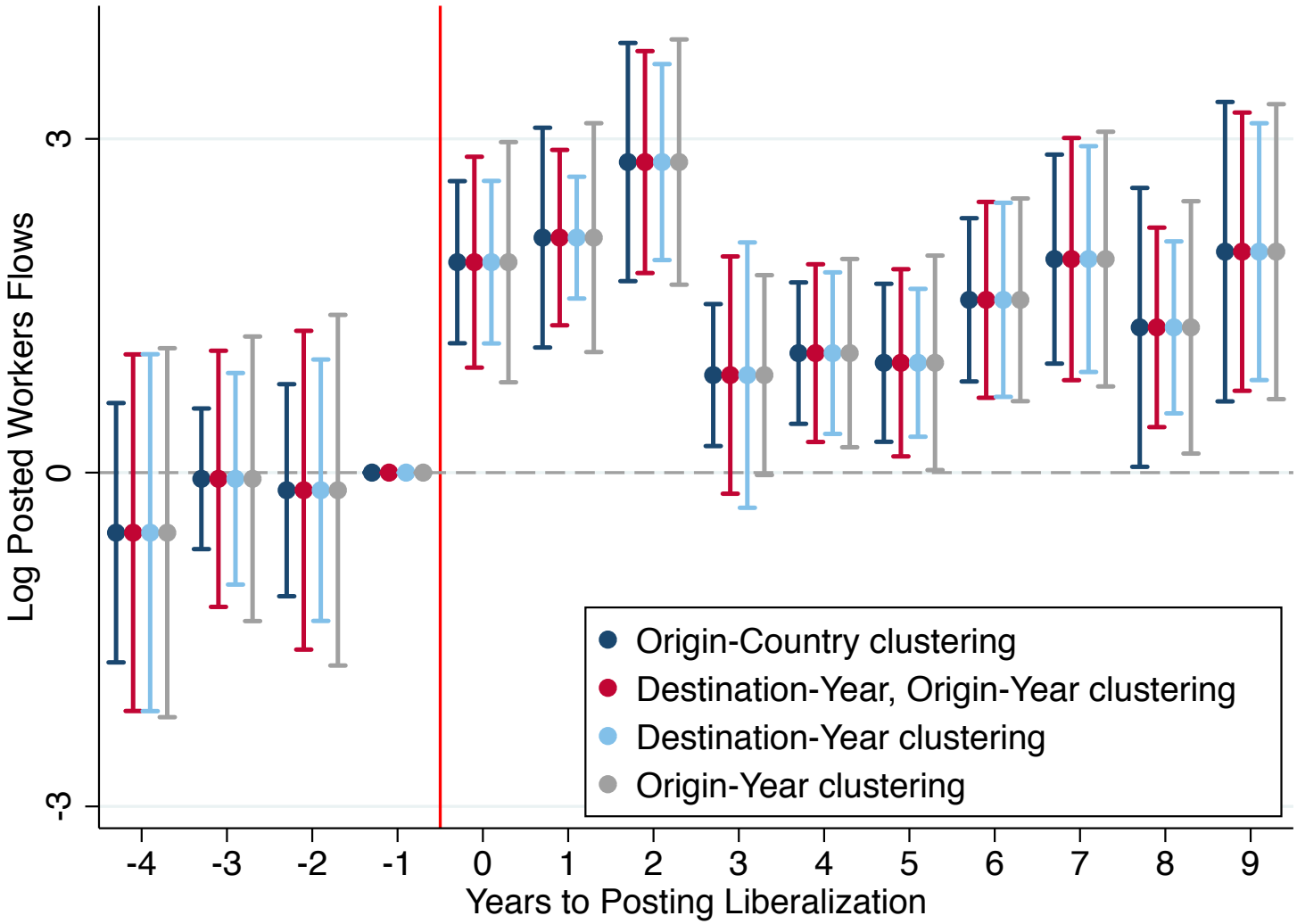
BACK



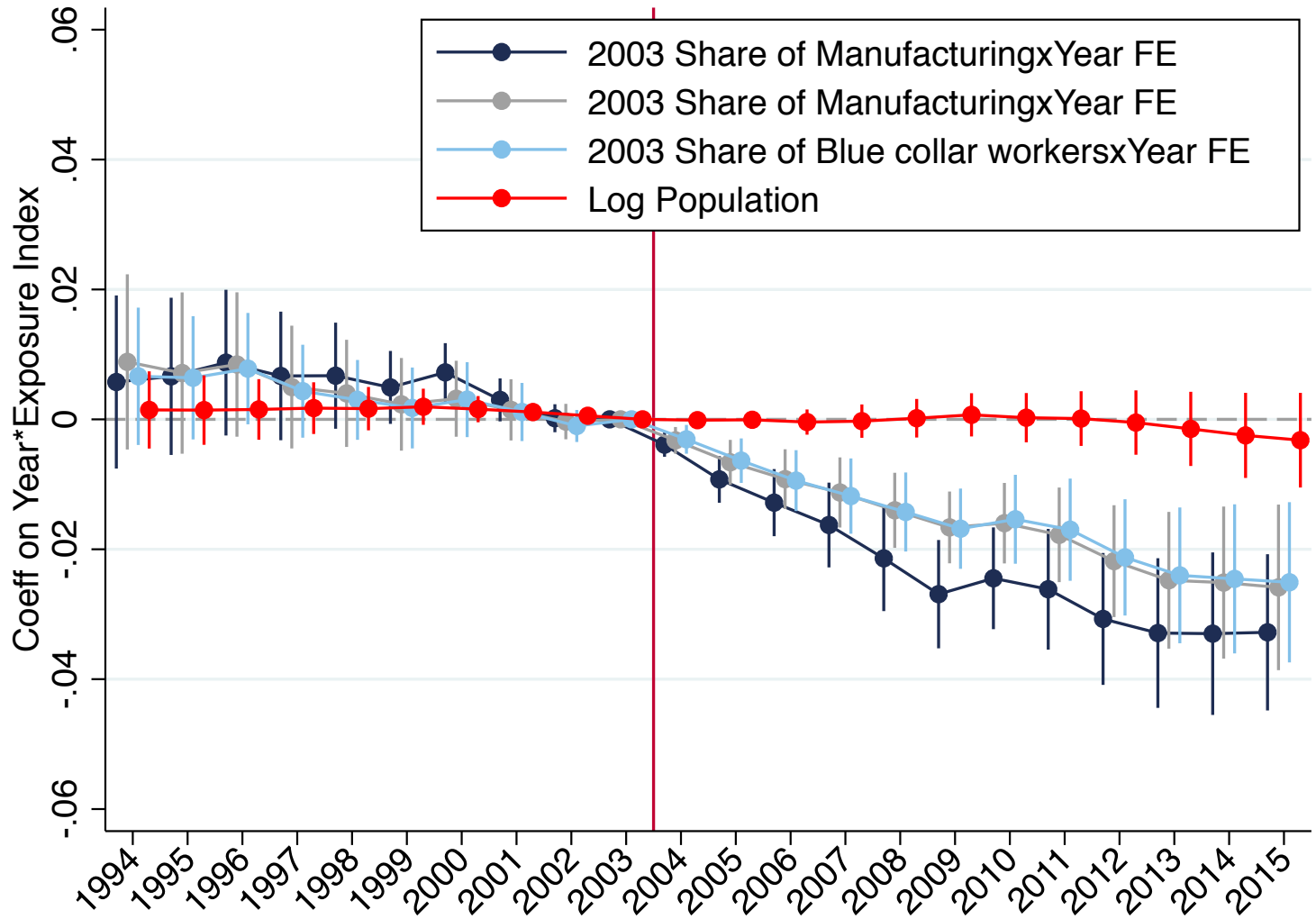
# Alternative Clustering

Back



# Exposed Employment by Predicted Exposure

Back



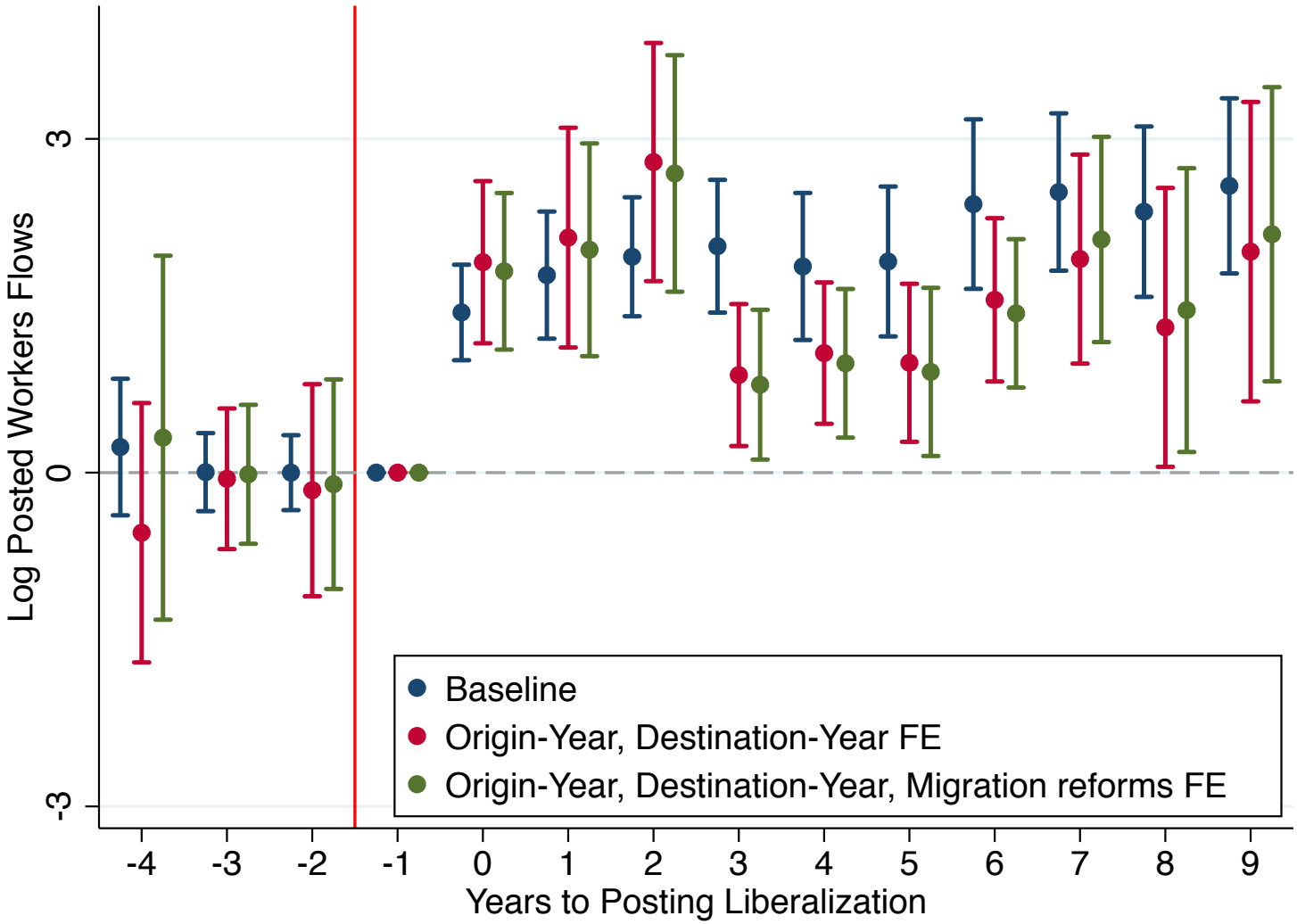
# Estimates

Back

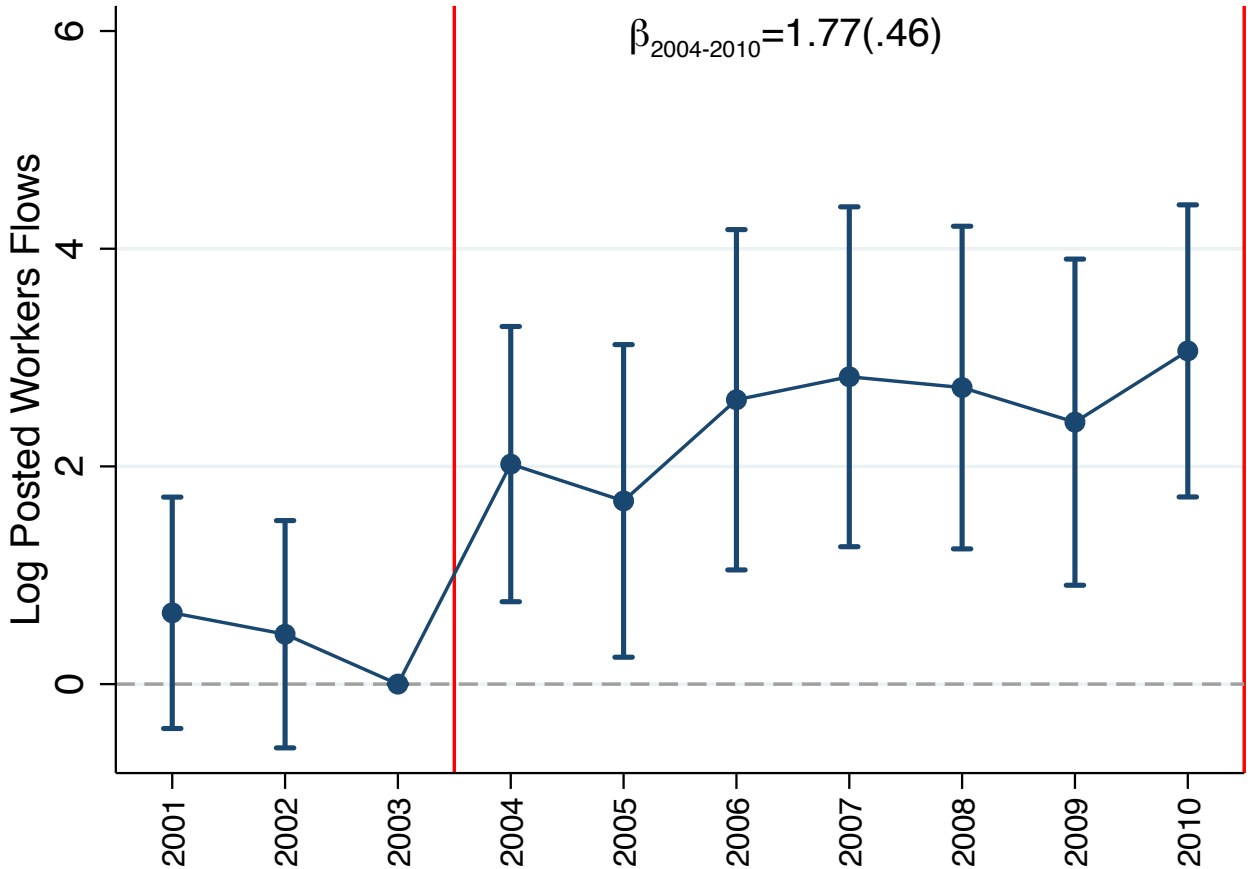
| | (1) | (2) | (3) |
|---|---|---|---|
| 4 years before liberalization | -.53 | | |
| | (.58) | | |
| 3 years before liberalization | -.05 | | |
| | (.31) | | |
| 2 years before liberalization | -.15 | | |
| | (.47) | | |
| Year of liberalization | 1.89*** | | |
| | (.35) | | |
| 1 year after liberalization | 2.11*** | | |
| | (.49) | | |
| 2 years after liberalization | 2.79*** | | |
| | (.53) | | |
| 3 years after liberalization | .88*** | | |
| | (.32) | | |
| 4 years after liberalization | 1.08*** | | |
| | (.32) | | |
| 5 years after liberalization | .99*** | | |
| | (.35) | | |
| 6 years after liberalization | 1.55*** | | |
| | (.37) | | |
| 7 years after liberalization | 1.91*** | | |
| | (.47) | | |
| 8 years after liberalization | 1.3*** | | |
| | (.63) | | |
| **Average Effect** ($\beta$) | | 1.83*** | .75*** |
| | | (.37) | (.13) |
| Observations | 853 | 853 | 953 |
| Origin-Destination FE | Yes | Yes | Yes |
| Destination $\times$ Year FE, Origin $\times$ Year FE | Yes | Yes | Yes |
| Estimation | Log | Log | PPML |

# Controlling for Standard Migration Reforms

Back

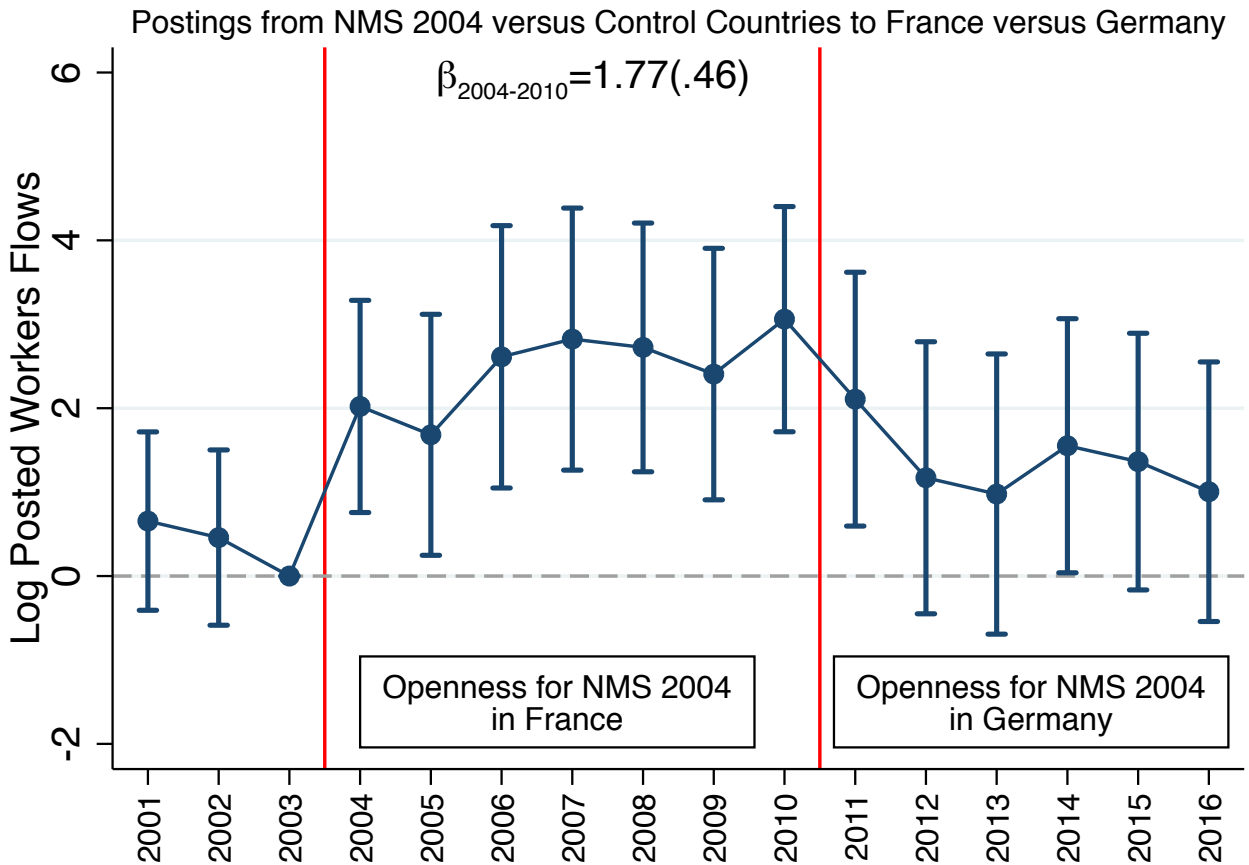


# Case Study: France vs Germany Liberalization Back




- Triple difference: before and after 2004, from NMS 2004 vs others, to France versus Germany Back

# Case Study: France vs Germany Liberalization Back

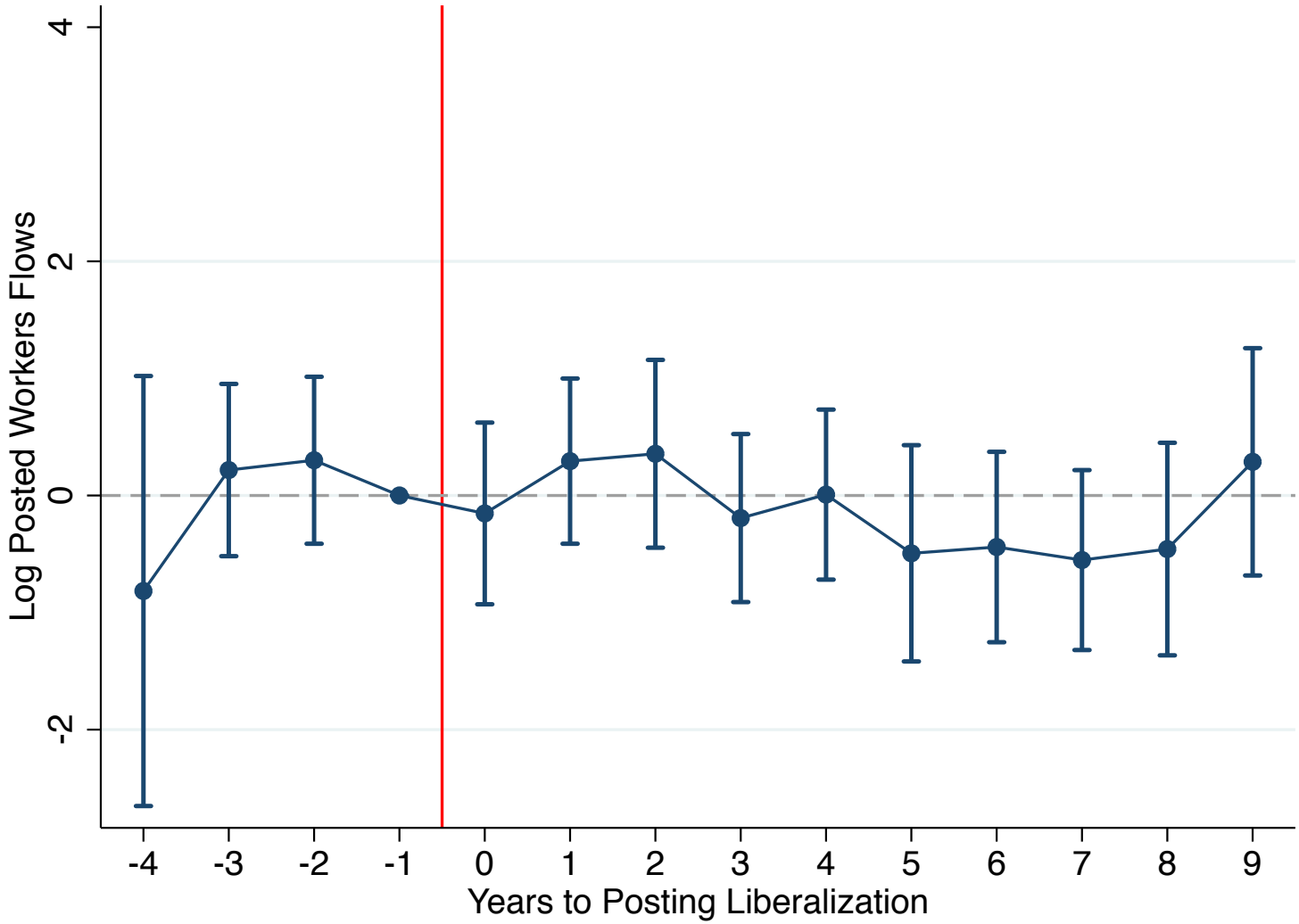



- Triple difference: before and after 2004, from NMS 2004 vs others, to France versus Germany Back

# Placebo Liberalization Event

Back

*Using Croatia as a Placebo Treated Country for the 2004 event*



# Can Posting Crowd-Out Standard Migration? BACK

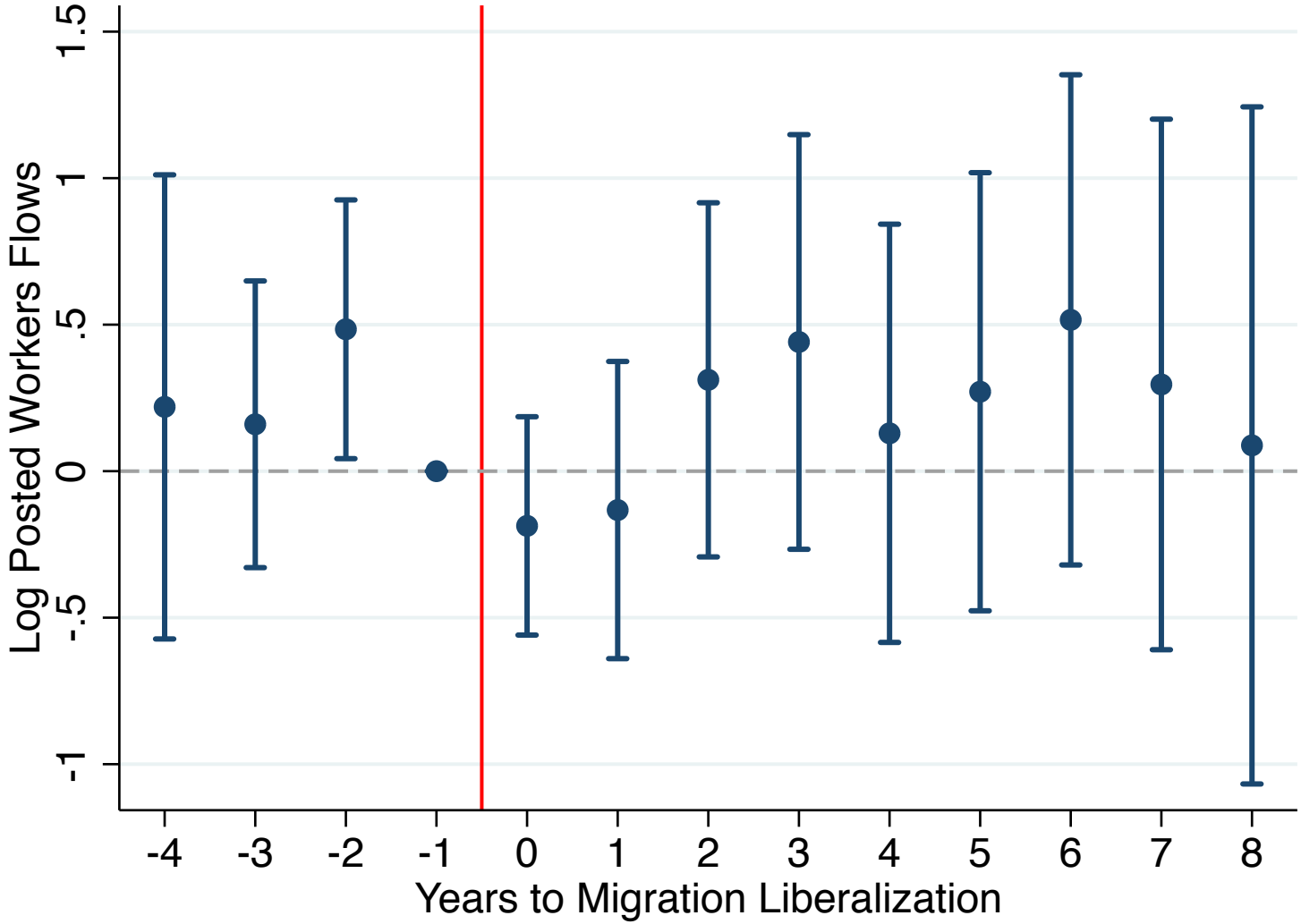
*Substituability and complementarity between posting and migration*

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

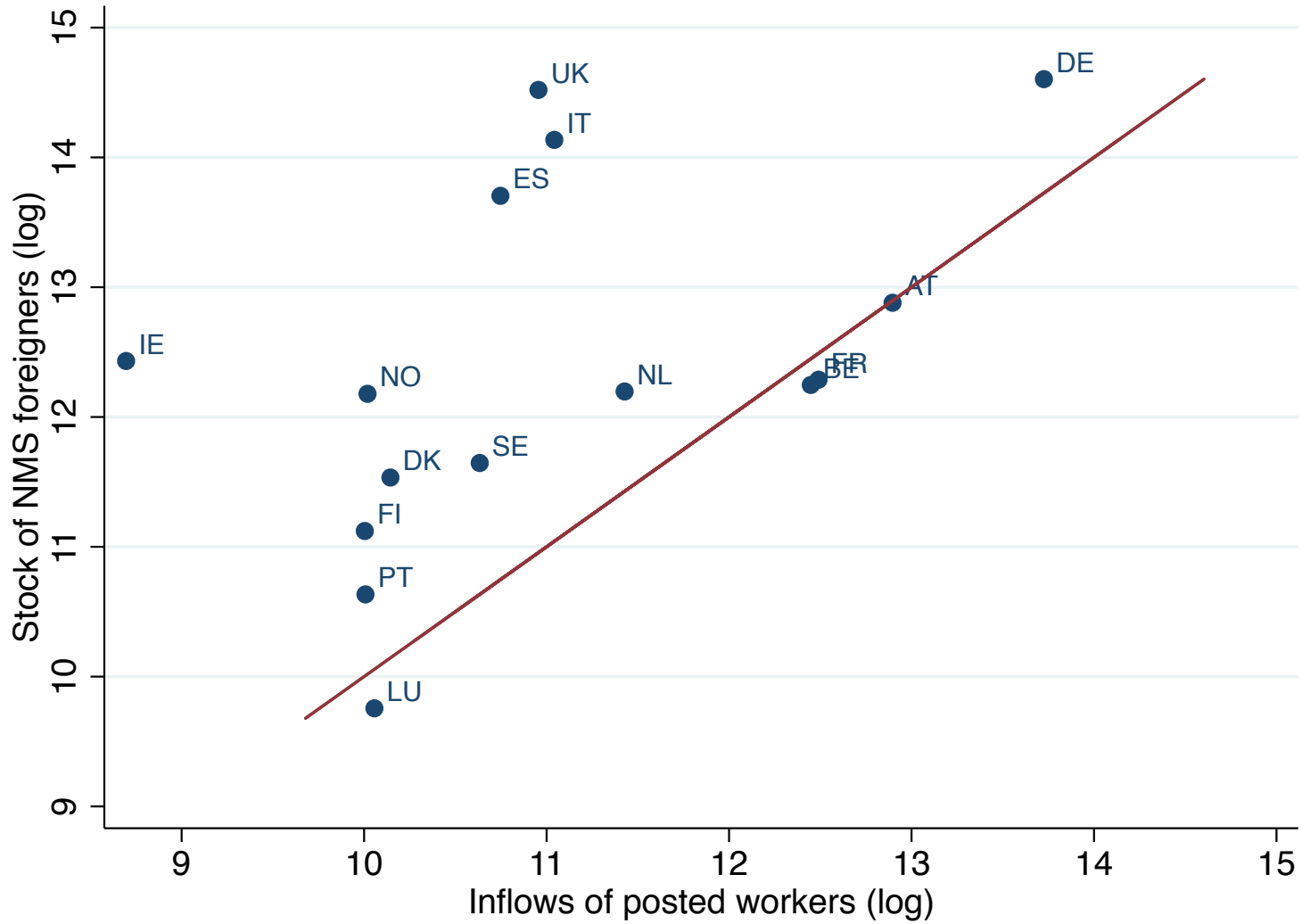
Back

*Posted Workers Do Not React to Change in Standard Migration Rules*



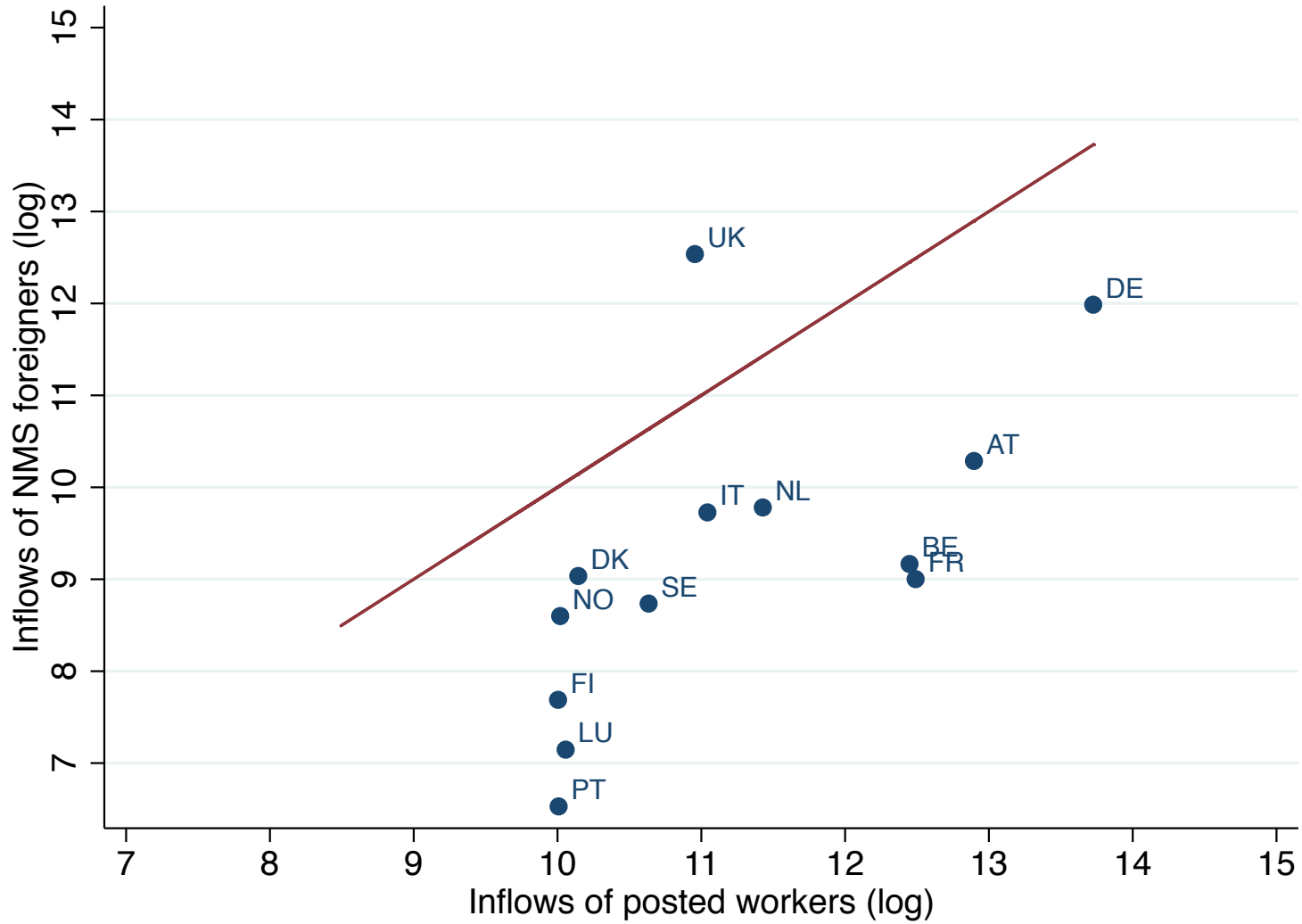
# Posted Workers and Immigrants

Back



# Posted Workers and Immigrants

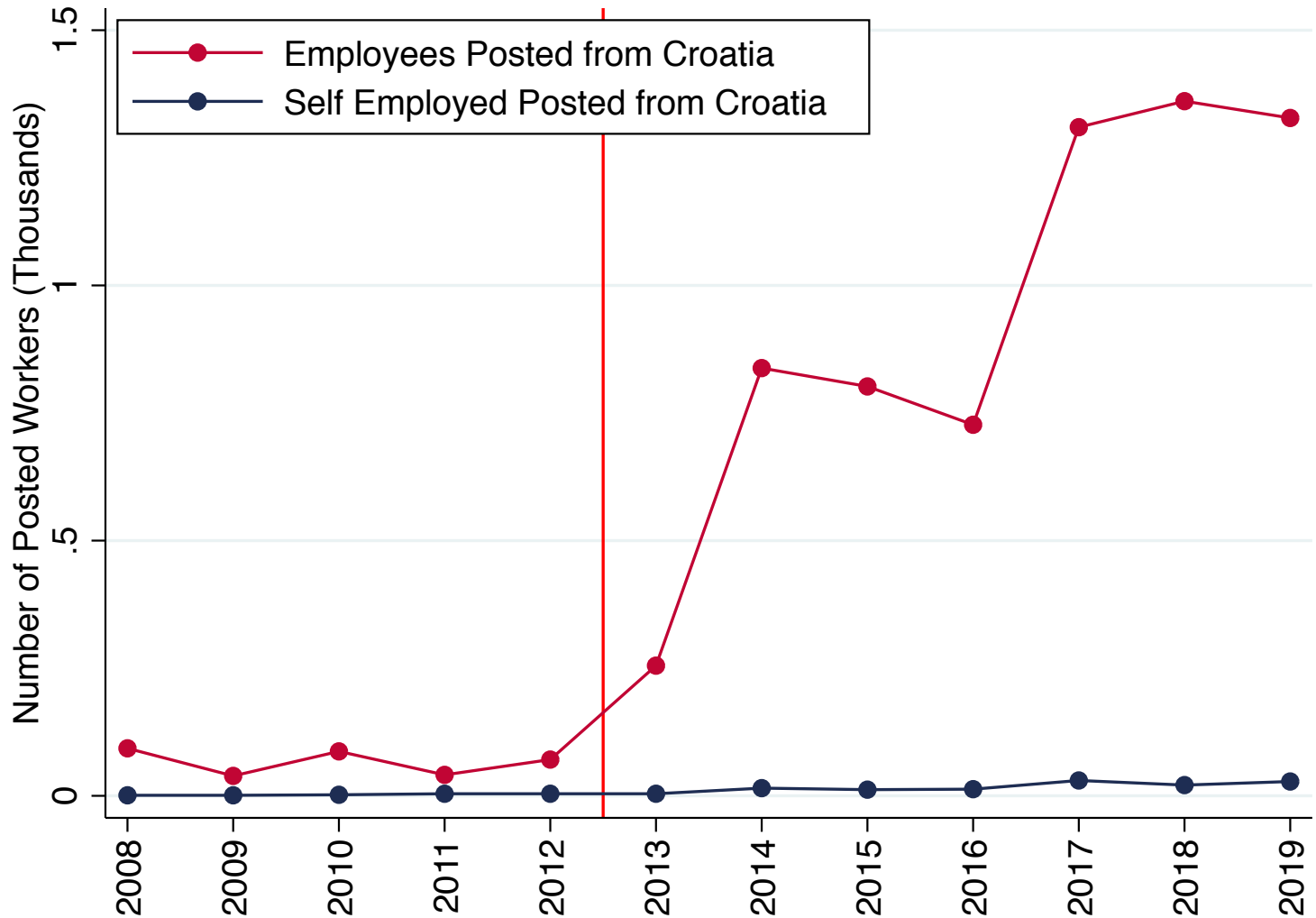
Back



# Response to Posting Liberalization

Back

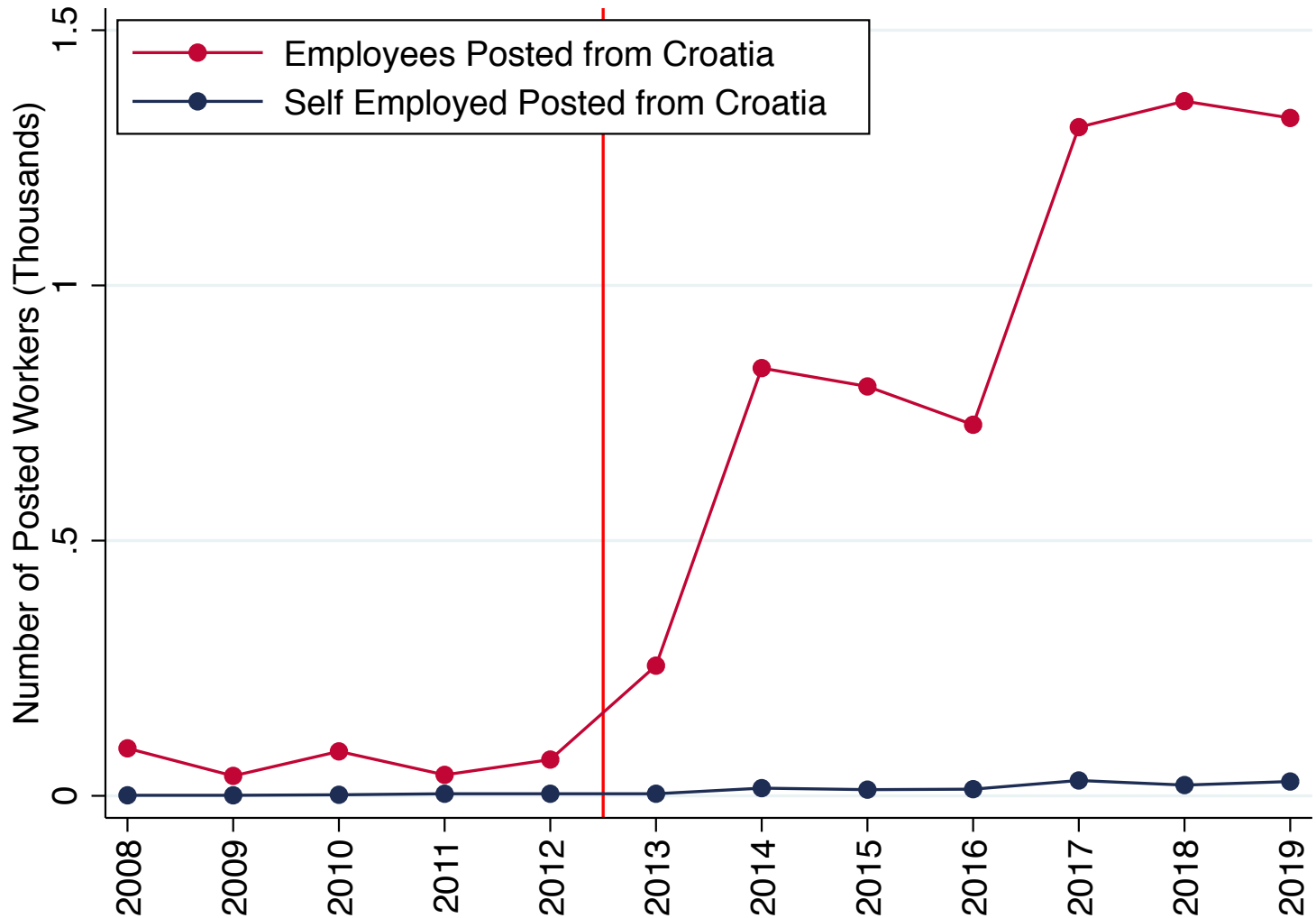
*Employees Rather than Self-Employed Respond to Posting Liberalization*



# Response to Posting Liberalization

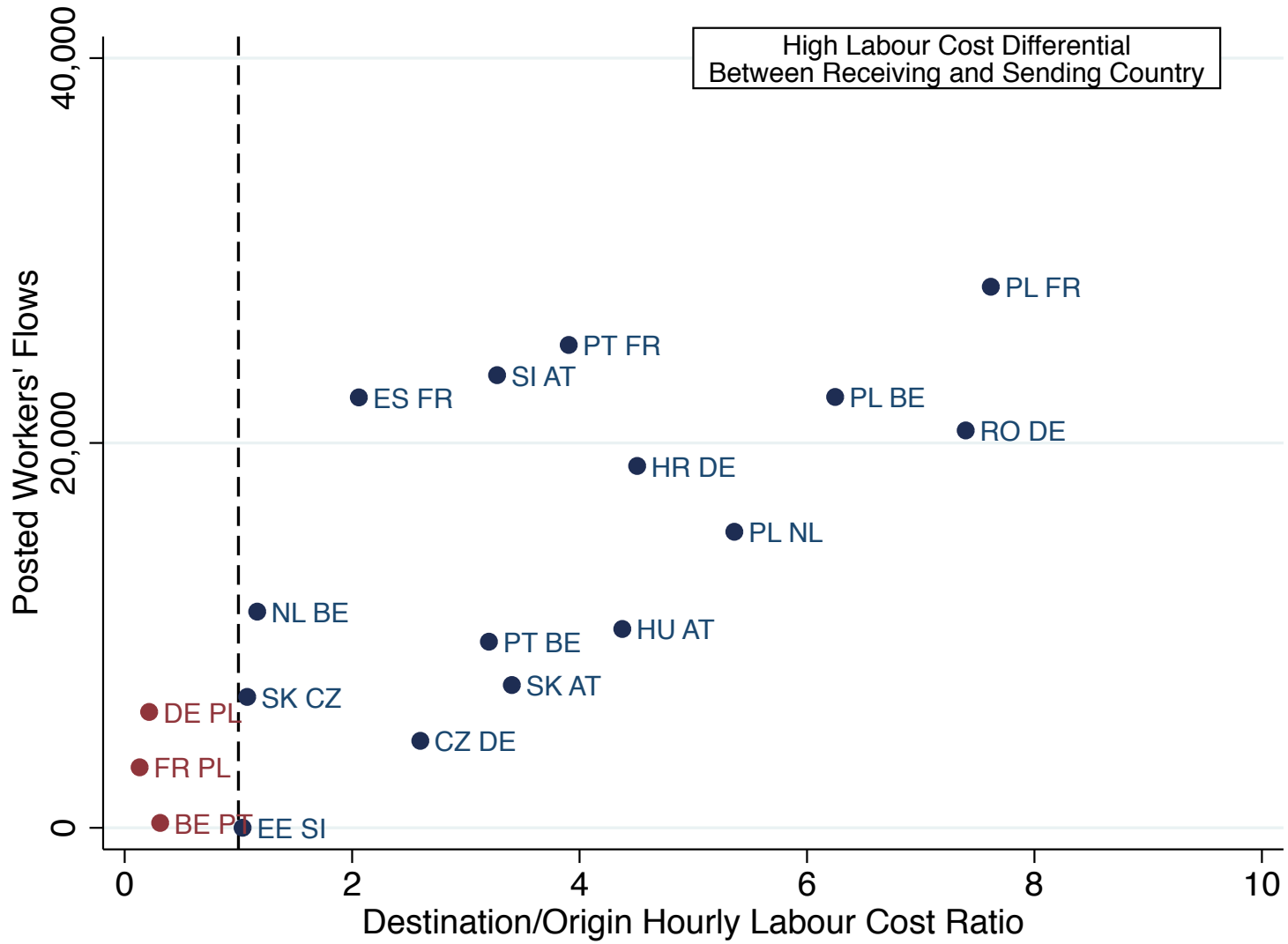
Back

*Employees Rather than Self-Employed Respond to Posting Liberalization*



# Posting Flows and Labor Cost Differentials

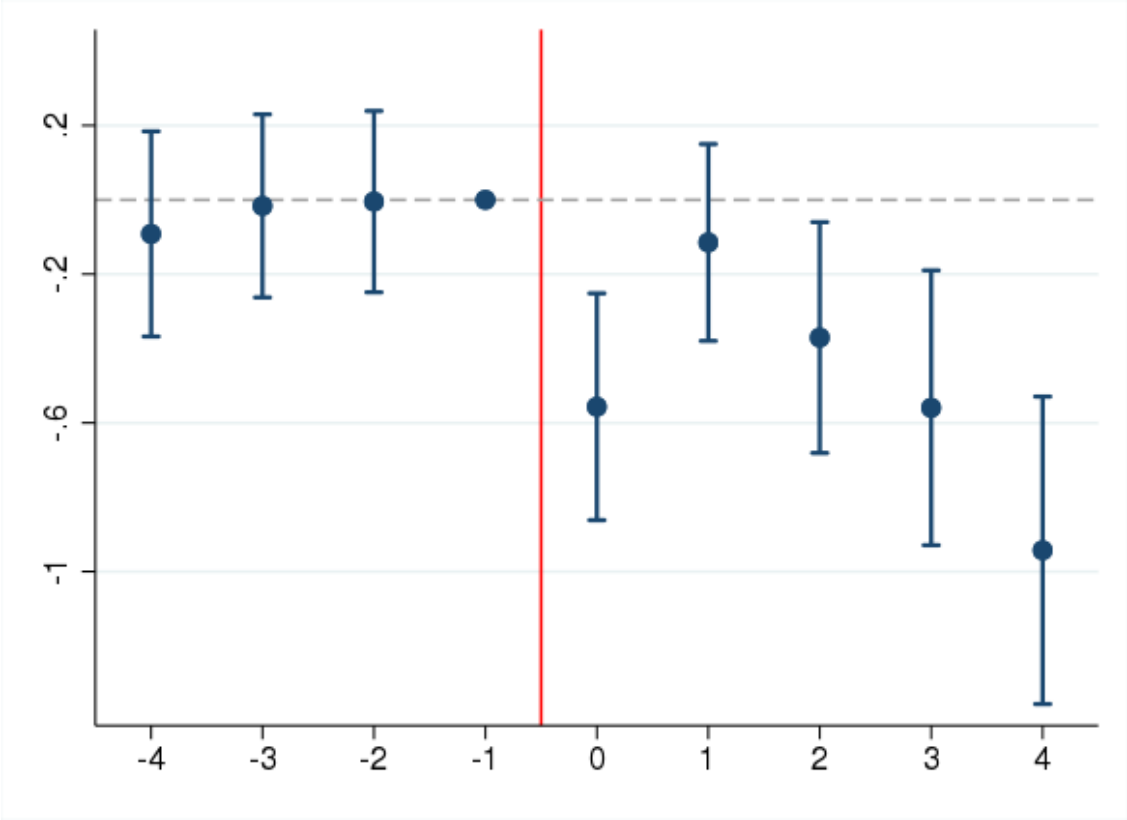
Back



# Domestic Sales After First Posting Event

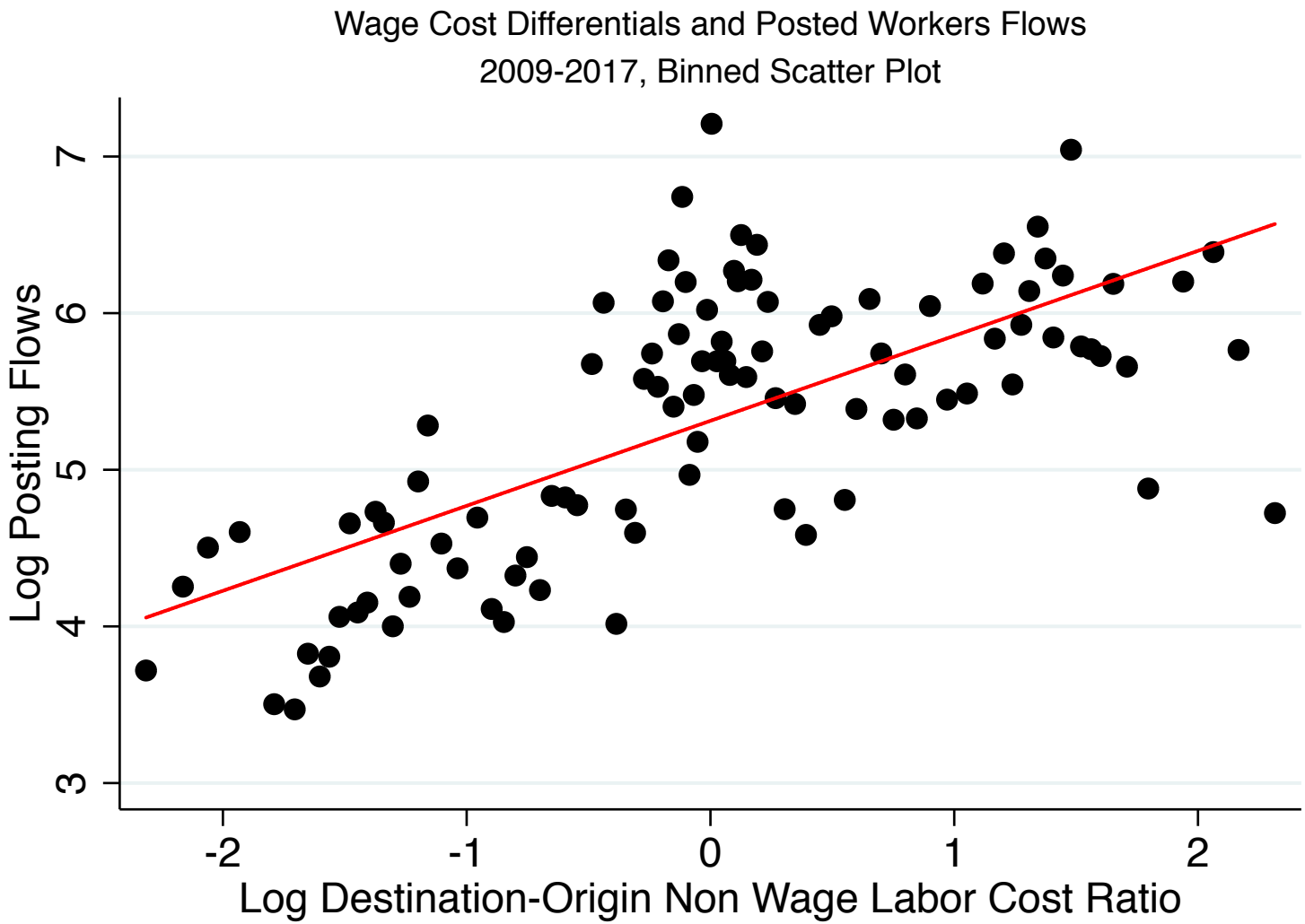
Back Back2

*Sending firms decrease domestic activity when starting to serve foreign markets*



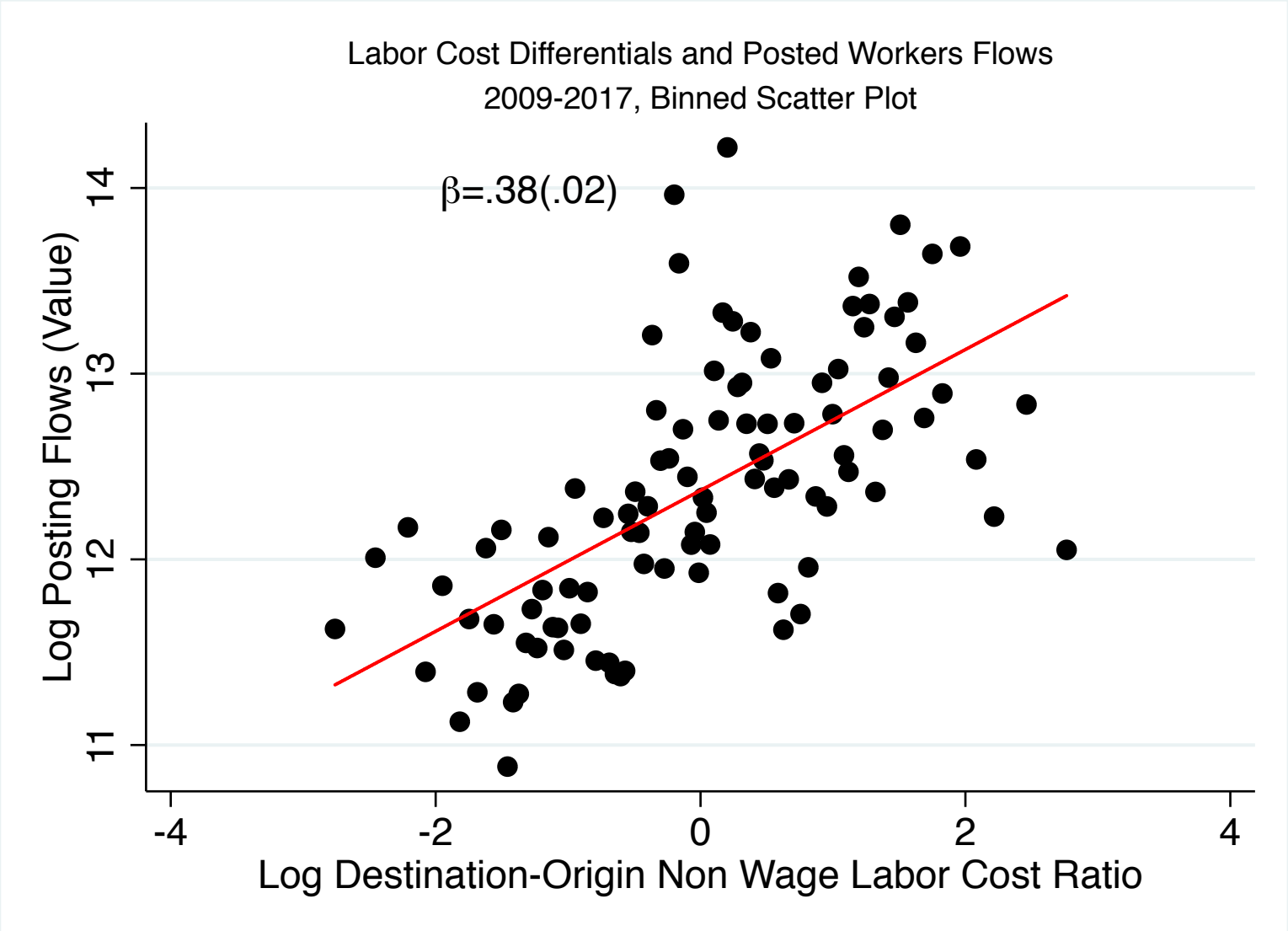
# Posting Flows and Total Wage Cost Differentials

Back



# Posting Flows and Total Wage Cost Differentials

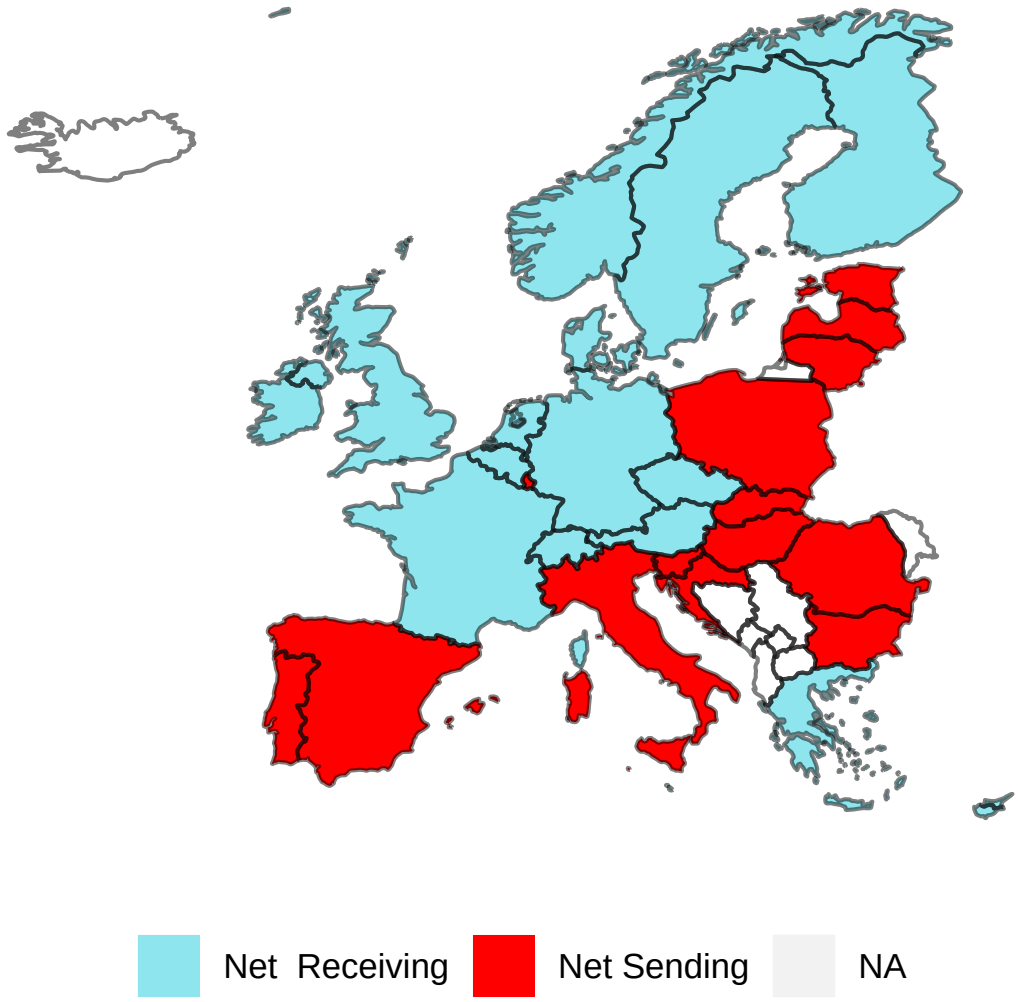
Back



# Net Sending and Receiving Countries

Back

*Rich Countries Are Net Consumers, Low Wage Countries Are Net Producers*



# Labor supply through migration versus posting

Back

*Different regulations, measurements and incidence*

| | Immigrant | Posted worker |
|---|---|---|
| | *Fundamentals* | |
| **Mobility initiated by** | Individual | Sending firm |
| **Demand** | Unlimited stay + family allowed | No permanent integration allowed |
| **Taxes/contributions** | Destination | Origin |
| **Labor code** | Destination | Origin (except min wage ) |
| | *Measurement* | |
| Employment | Destination | Origin |
| Domestic Production | Destination | Origin |
| Census | Destination | Origin |
| Accounted as | Immigration/Emigration | Imports/Exports |

# Receiving Firms Wage Premium

Back

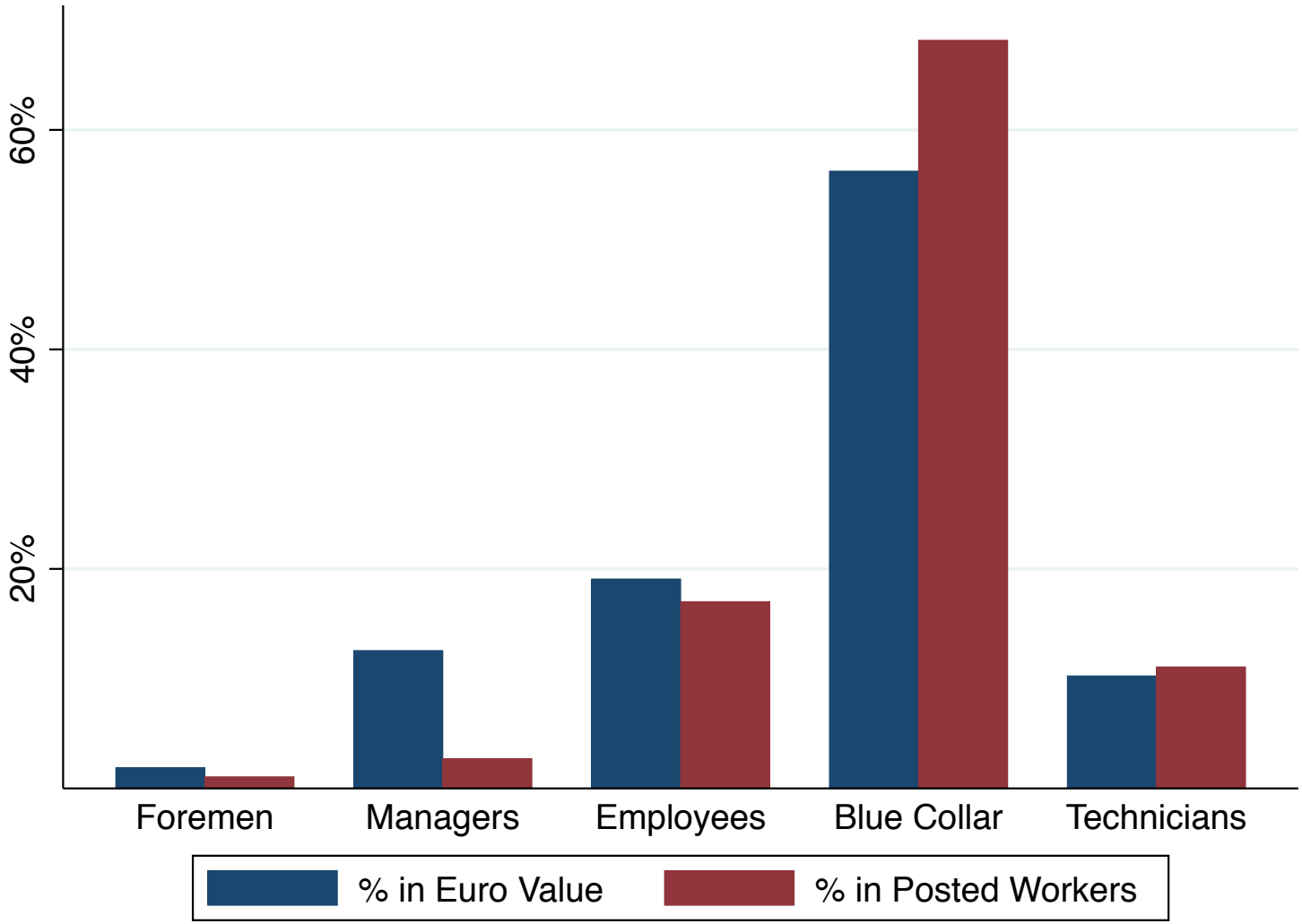
*Firms that use posted workers pay ≈ 20% higher wages to domestic workers*

| Dependent variable: log average wage rate | | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Receiving Firm Indicator | .19*** | .13*** | .15*** |
| | (.002) | (.002) | (.008) |
| Controls | 5-digit sector FE | 5-digit sector FE<br>log firm size | 5-digit sector FExYear FE |
| Country | France | France | Belgium |
| Period | 2018 | 2018 | 2010-2019 |
| Observations | 2,766,475 | 2,766,475 | 2,657,132 |

# Posted Workers by Skills

Back

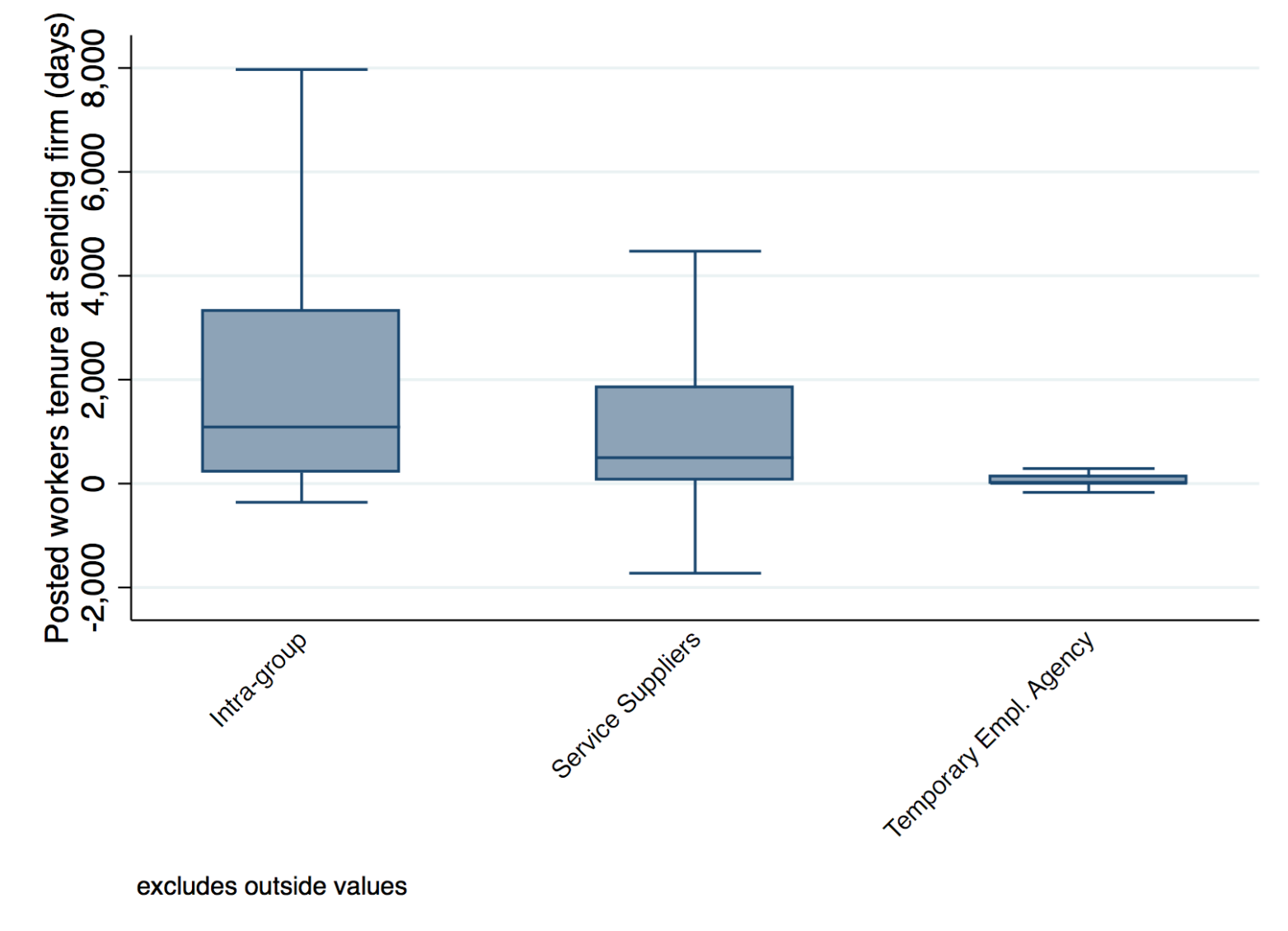
*Posted workers are mostly blue-collar workers*



# Posted Workers Tenure

Back

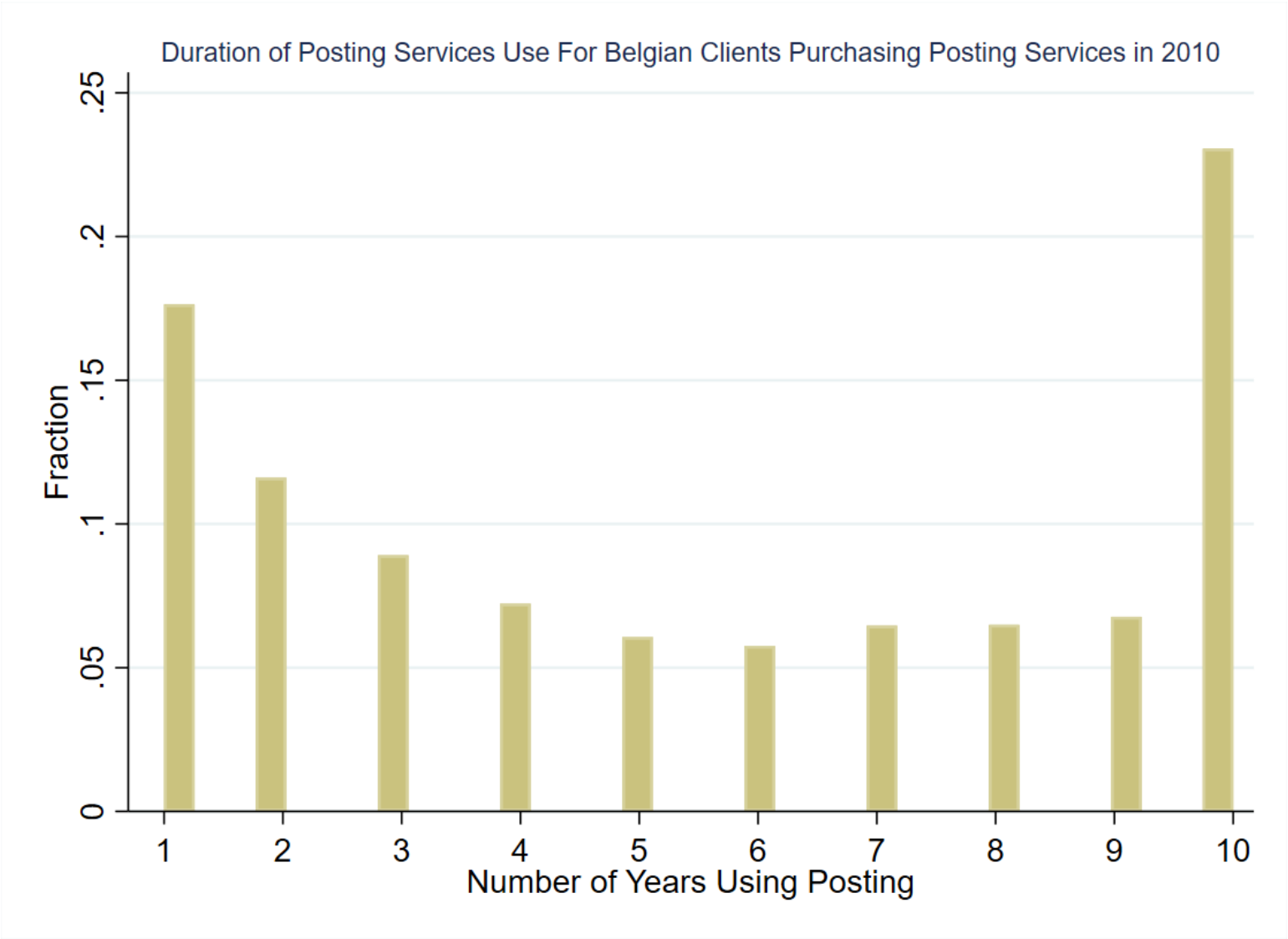
*10% of all workers posted to France are "hired to be posted" in sending countries*



# Persistence of Posting Use

Back

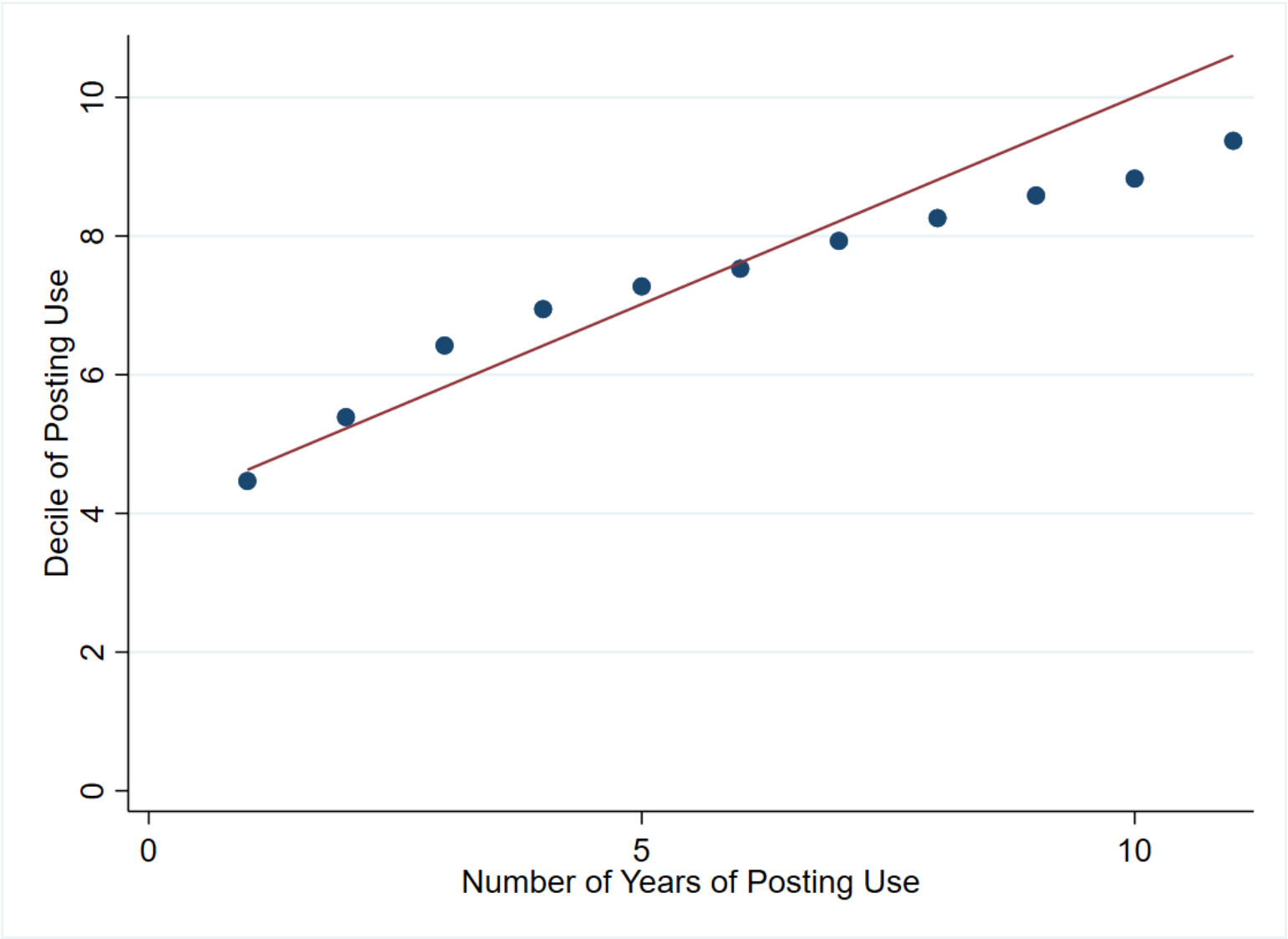
*25% of Firms Using Posted Workers in 2010 use them each year until 2020*



# Persistence and Intensity of Posting Use

Back

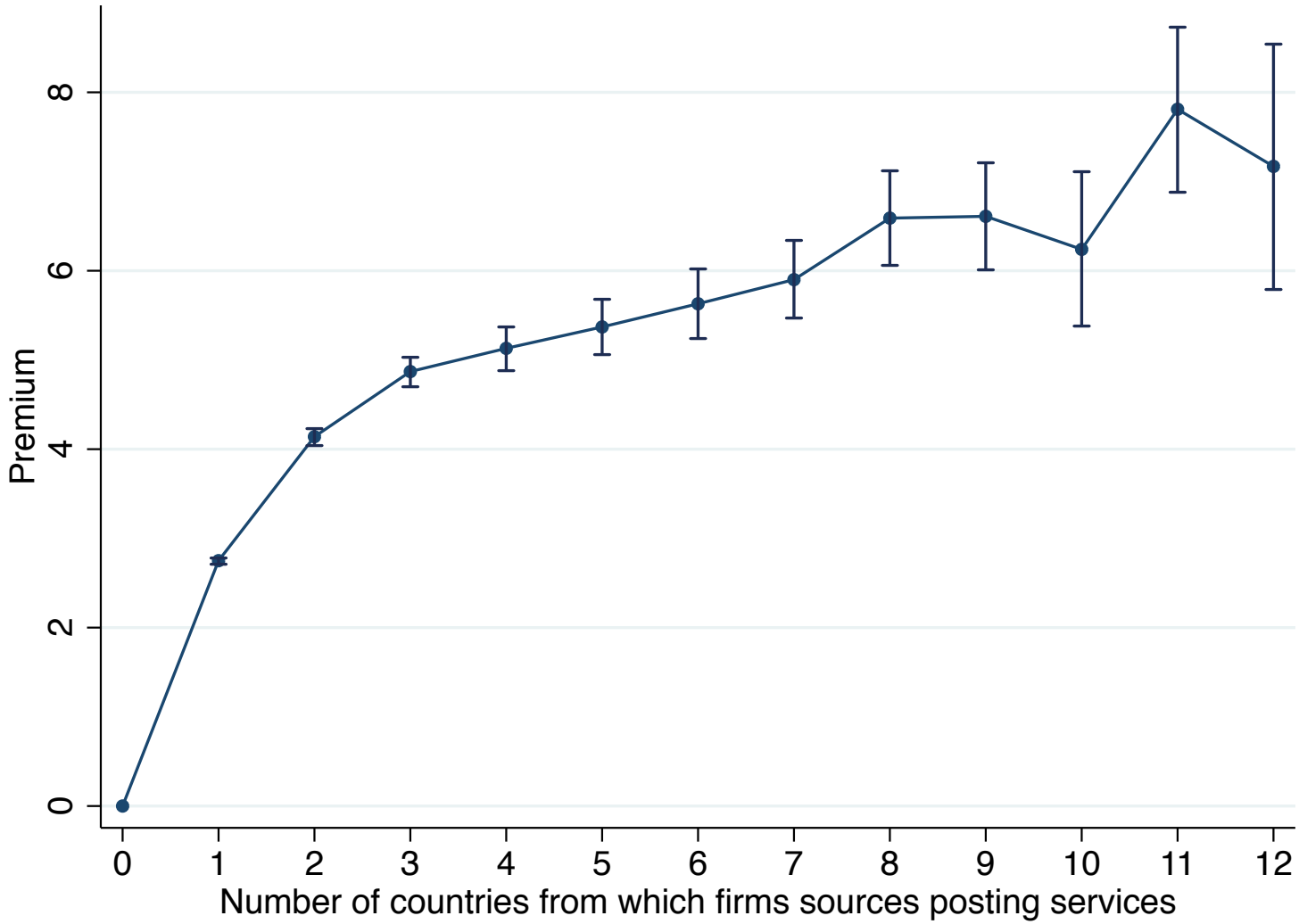
*Permanent users import more posted workers*



# Trade costs in Subcontracting Posting Services

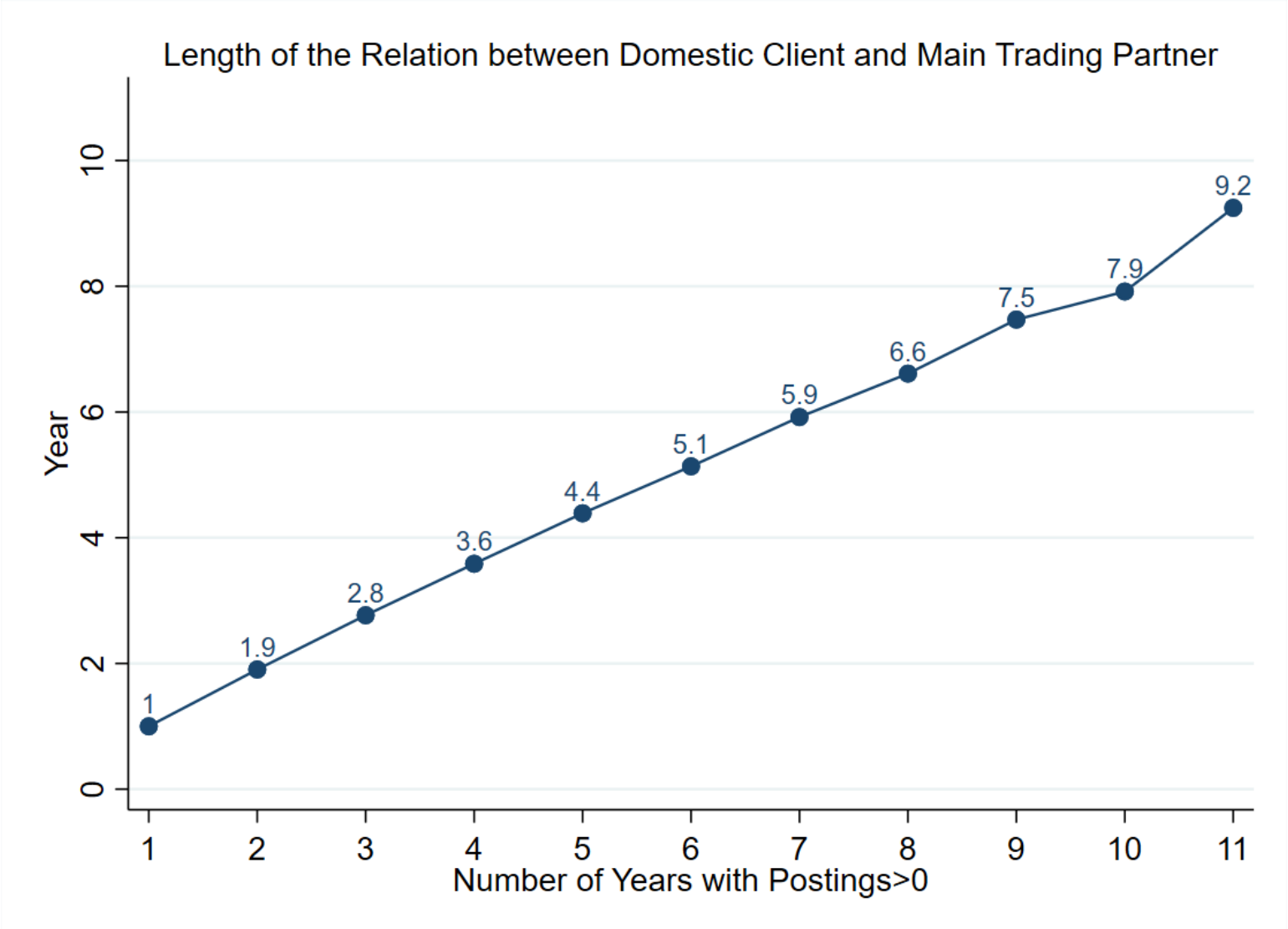
Back Back2

*Trade costs increase with number of clients*



# Posting Relationships Are Sticky

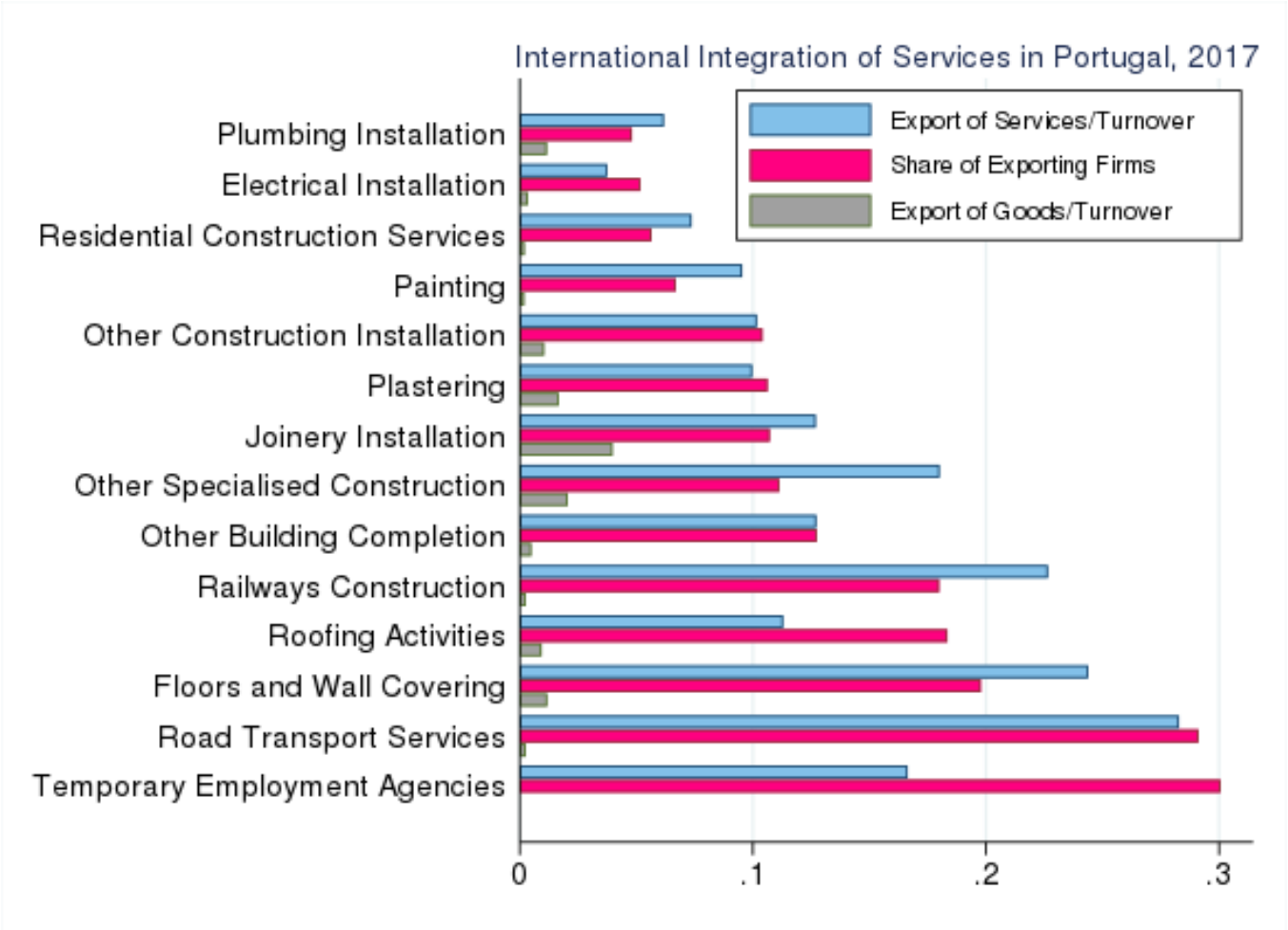
Back2



# Share of Firms Exporting Posting Services

Back

*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* Back Back2

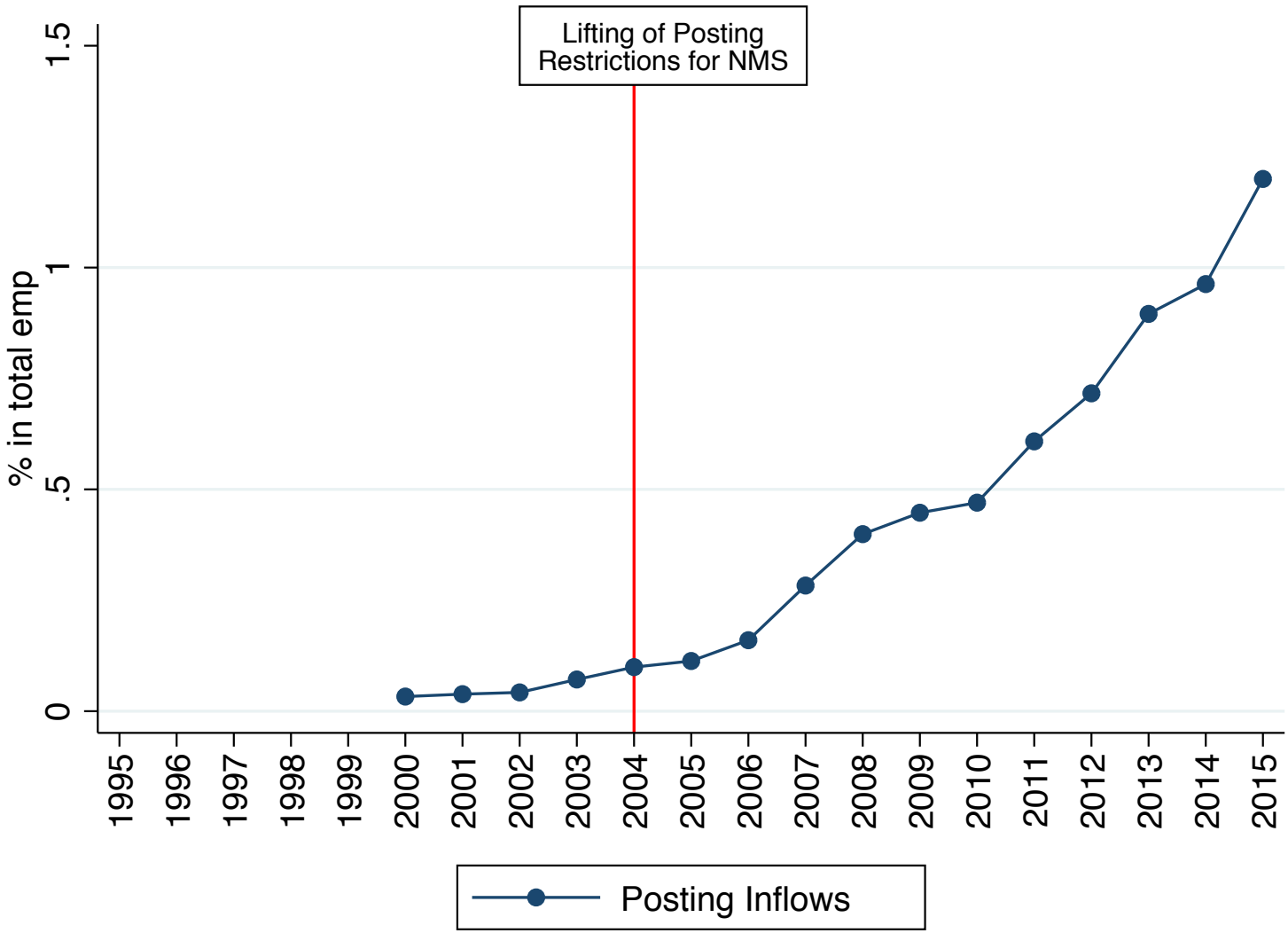
| | Exporters vs Non Exporters | | Exporters |
|---|---|---|---|
| | Manufacturing | Non Trad. Services | Manufacturing vs Non Trad Services |
| | (1) | (2) | (3) |
| Log Turnover | 1.57*** | .84*** | .68*** |
| | (.01) | (.01) | (.01) |
| Log Employment | .91*** | .63*** | .55*** |
| | (.01) | (.01) | (.01) |
| Log Wage | .18*** | .22*** | -.04*** |
| | (.00) | (.00) | (.00) |
| Log Capital/Worker | .64*** | -.14*** | .48*** |
| | (.01) | (.01) | (.01) |
| Log Payroll/Turnover | -.32*** | .04*** | -.19*** |
| | (.00) | (.00) | (.00) |
| Log EBT/Worker | .15*** | -.02* | .12*** |
| | (.01) | (.01) | (.01) |
| Fixed effects | Year × Sector × Prov | Year × Sector × Prov | Year × Prov |

# First Exports in Manufacturing and Non Tradable Sectors

Back

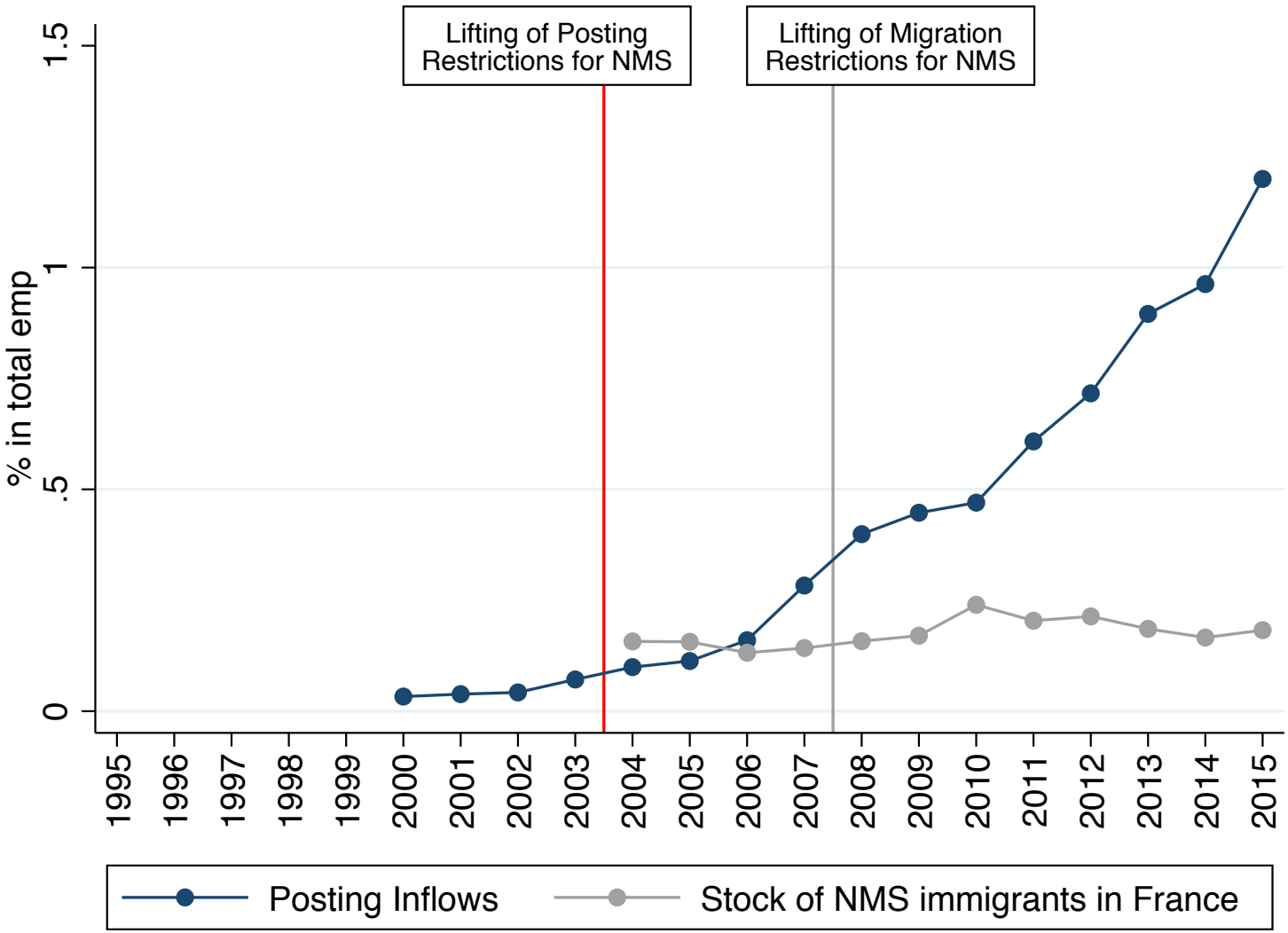
| | Manufacturing (1) | Non Trad. Services (2) |
|---|---|---|
| Exports in Turnover | 25% | 45% |
| % Shifting Full Activity Abroad | 3% | 19% |
| % Exporting in Founding Year | 9% | 21% |
| Average Export Duration (years) | 5 | 3.2 |
| % Permanently Exporters | 41% | 37% |

# The Polish Plumber Shock



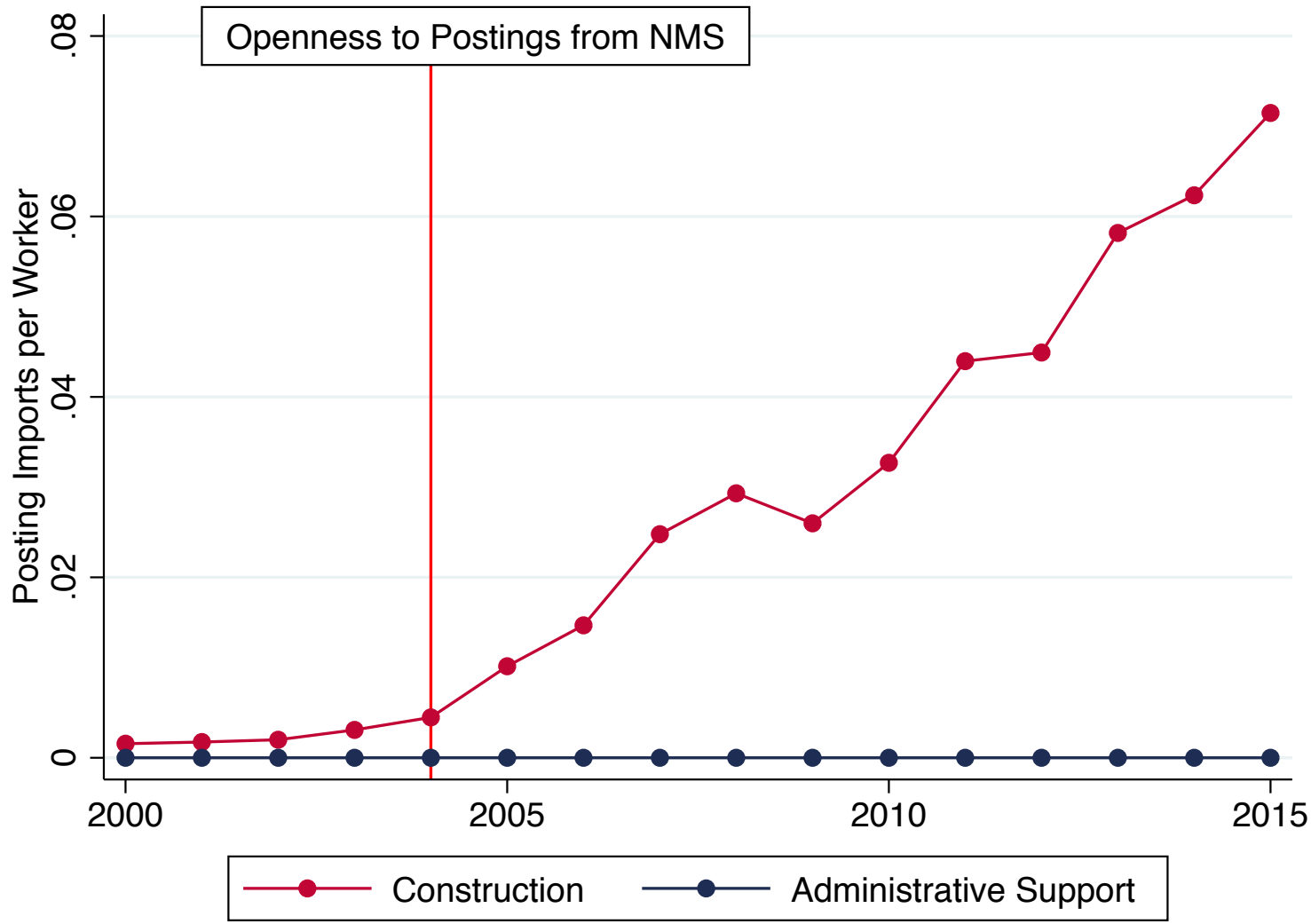

Back

# The Polish Plumber Shock




Back

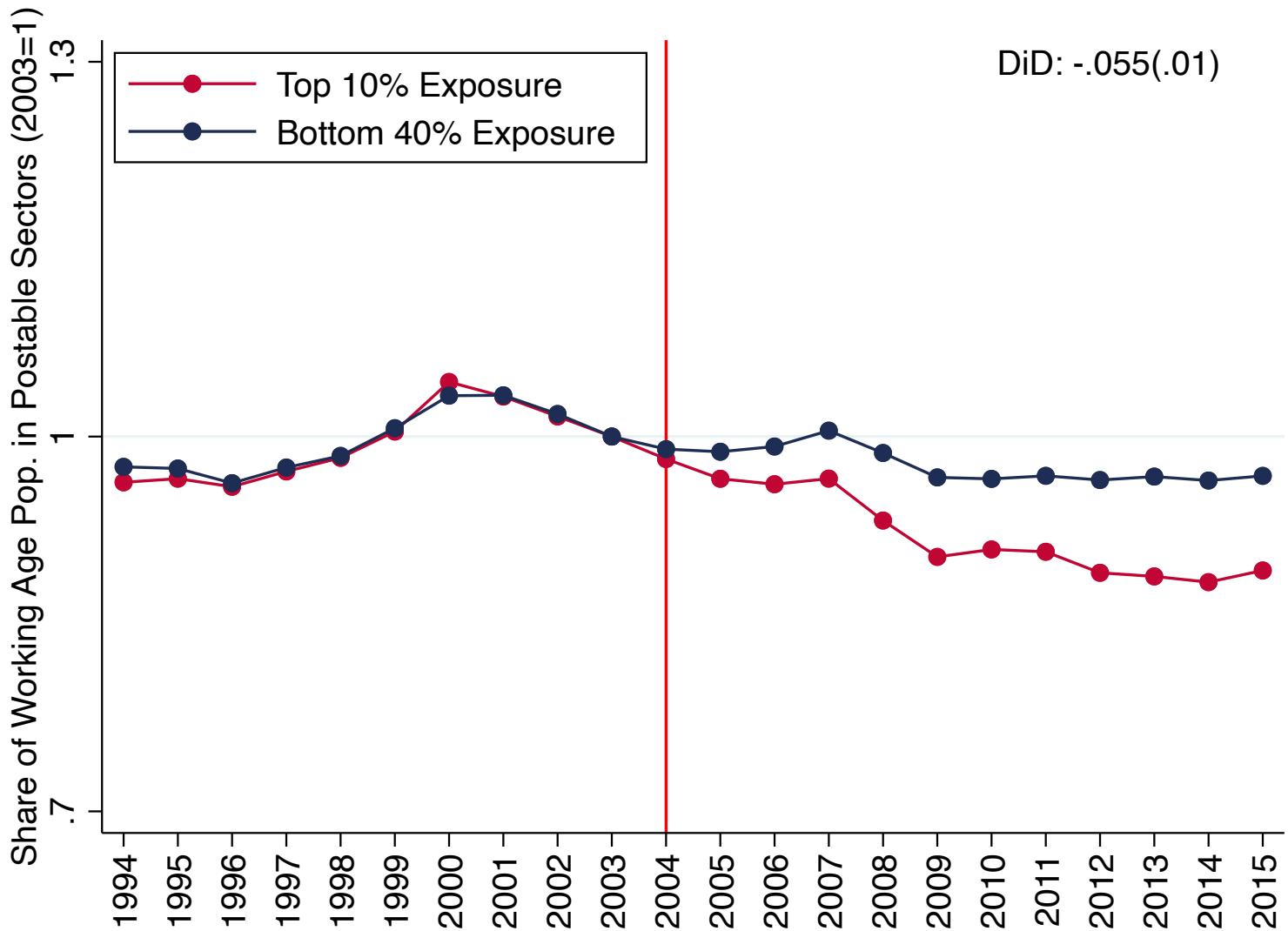
# The Polish Plumber Shock




Back

# Employment Decreased In Exposed Labor Markets

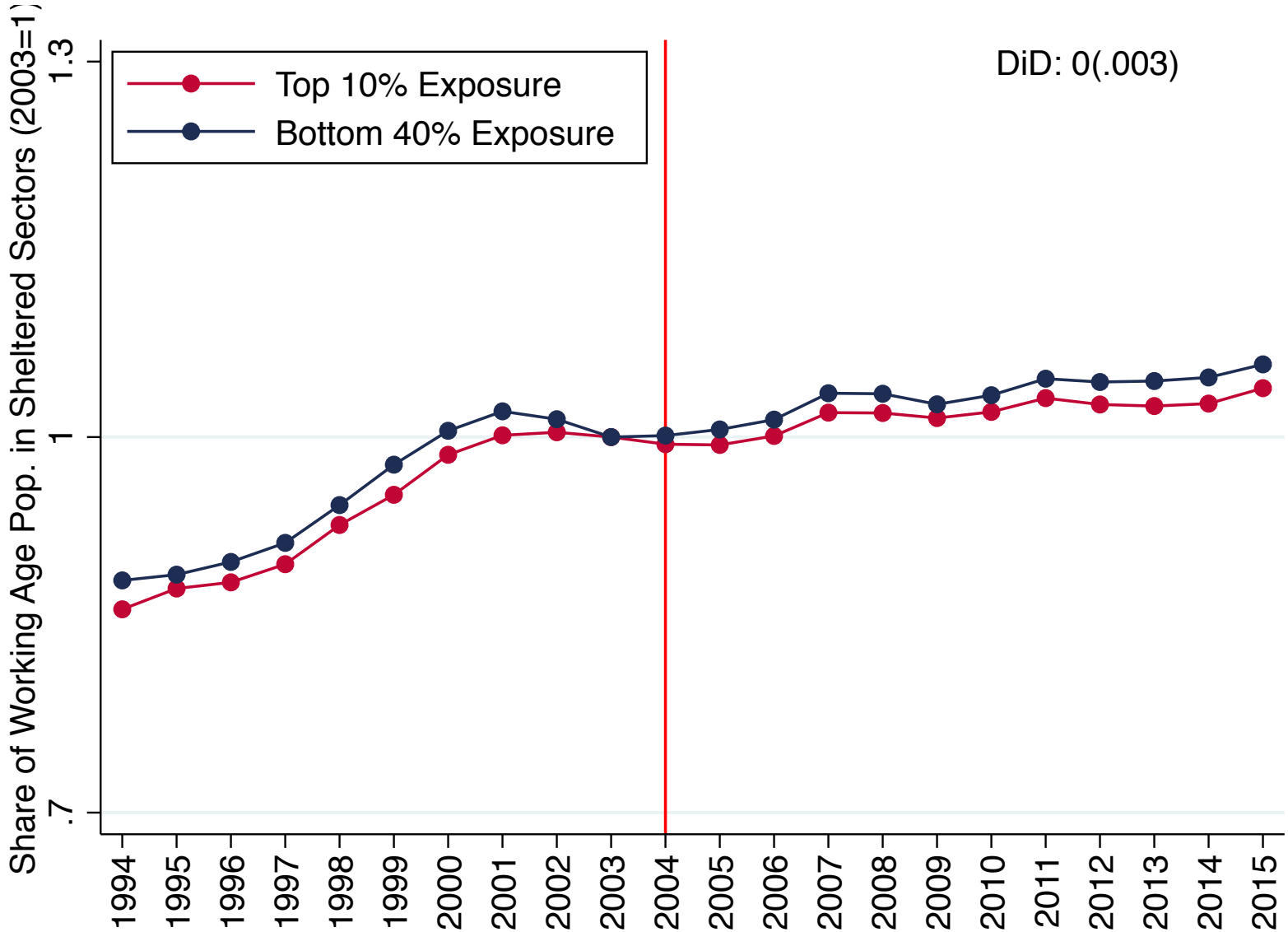
*Differential decrease by 6% after the shock* Top20vsBot20 Top10vsBot30 Top20vsBot30 Back




Emp Levels Excl Neighbors Distance NMS DiD

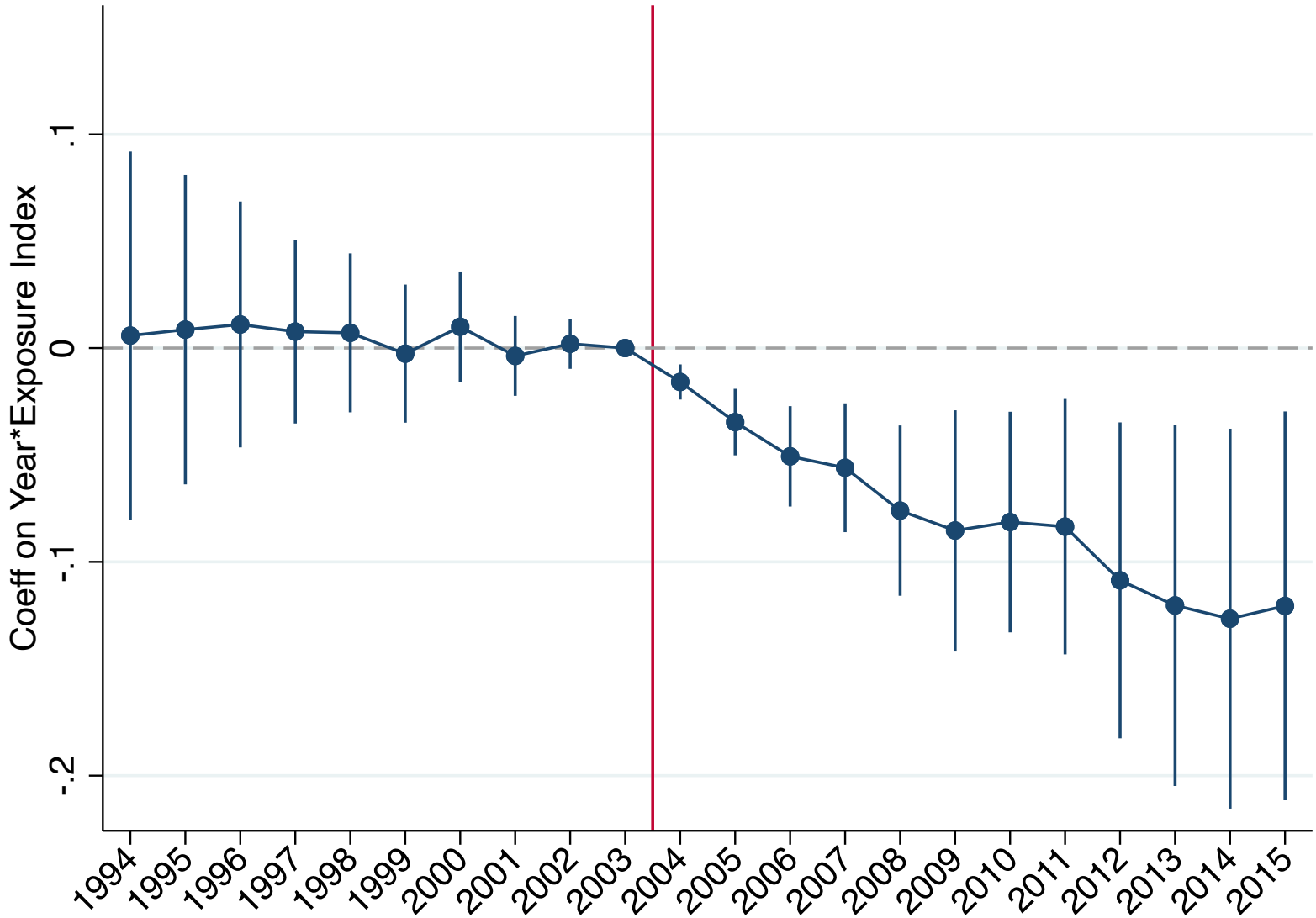
# Employment in Sheltered Sectors

*No differential evolution in sheltered sectors within exposed labor markets* Back



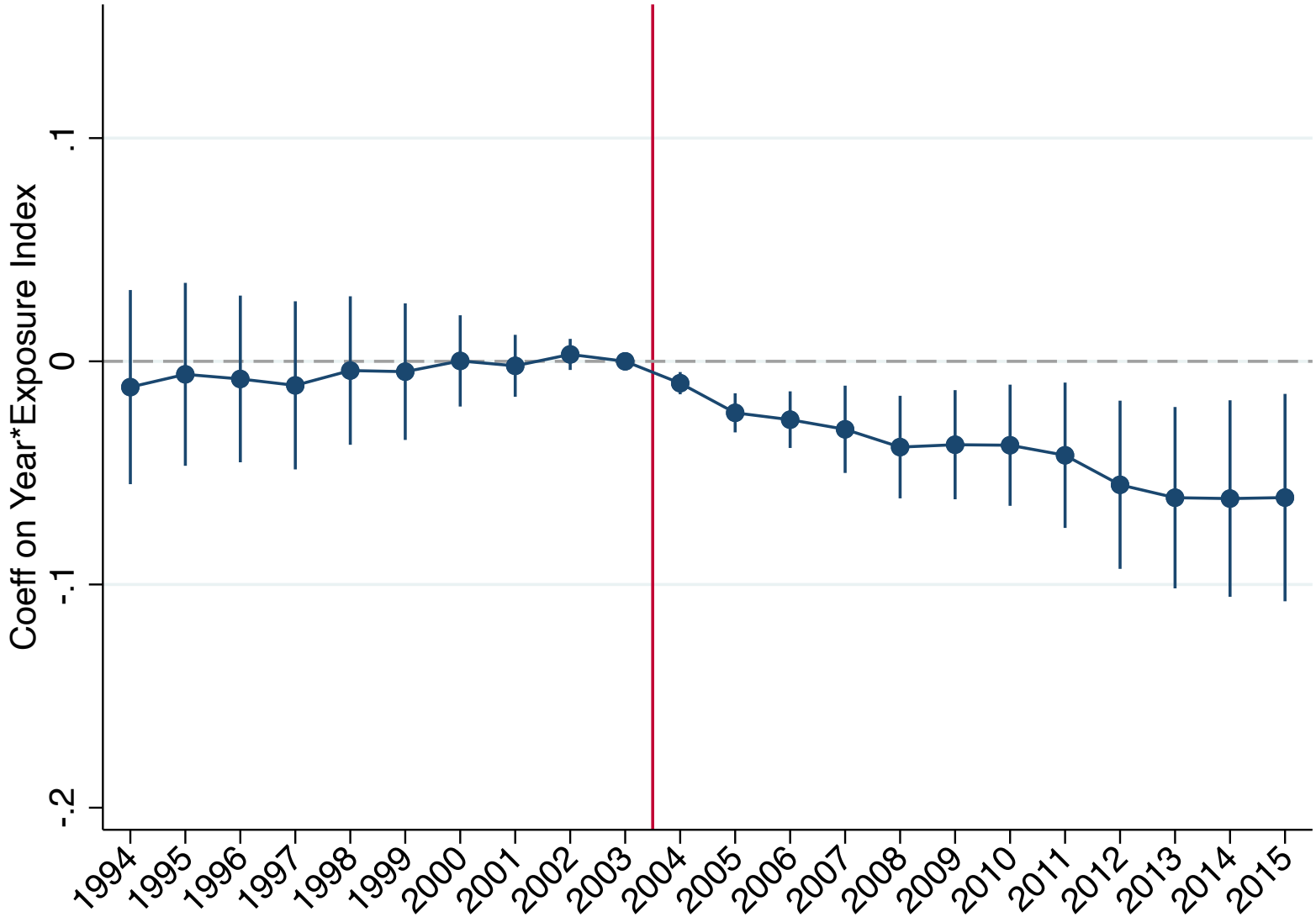
# Clustering standard errors at the region level

Back



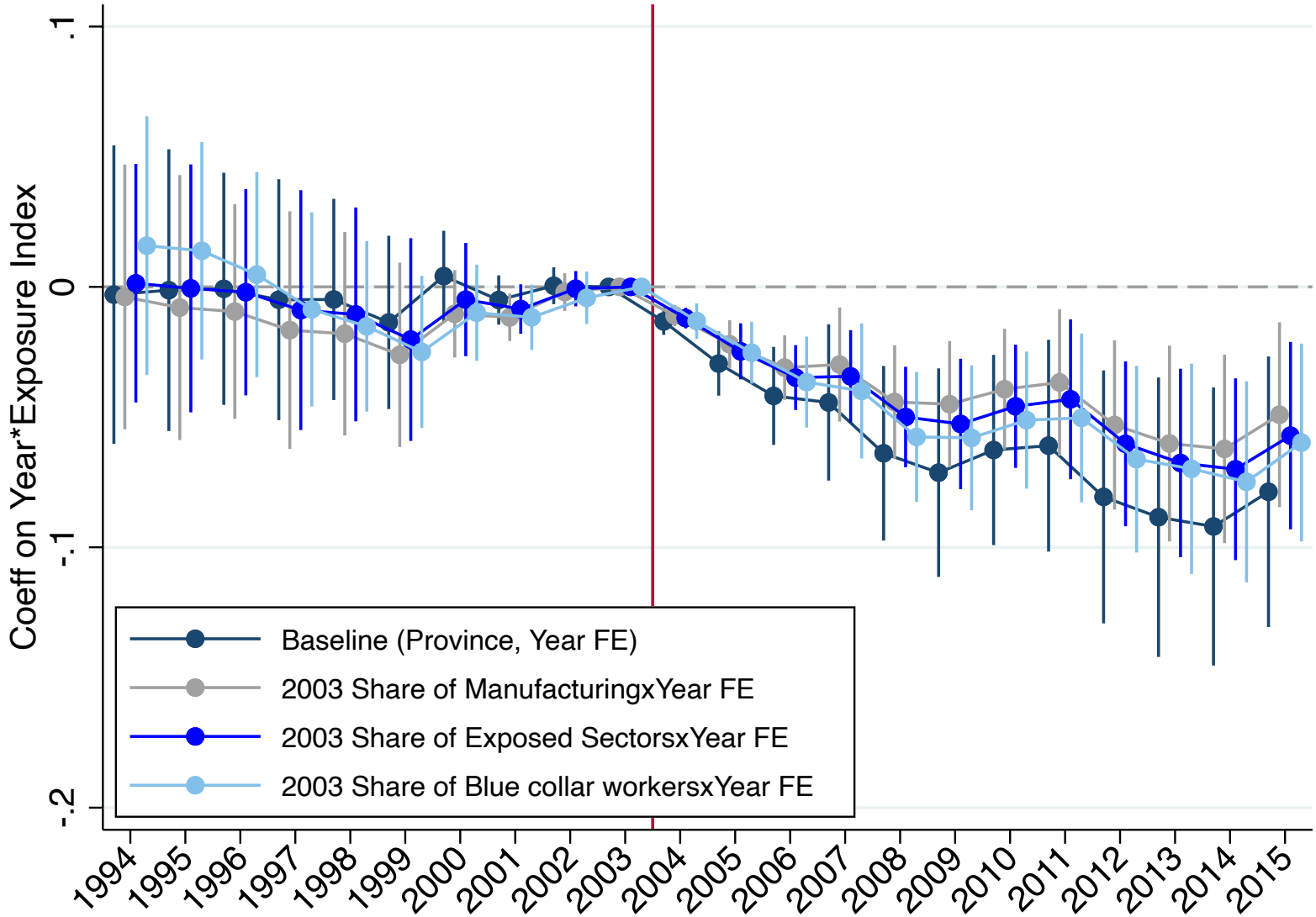
# Log Total Employment by Exposure to Posting

Back



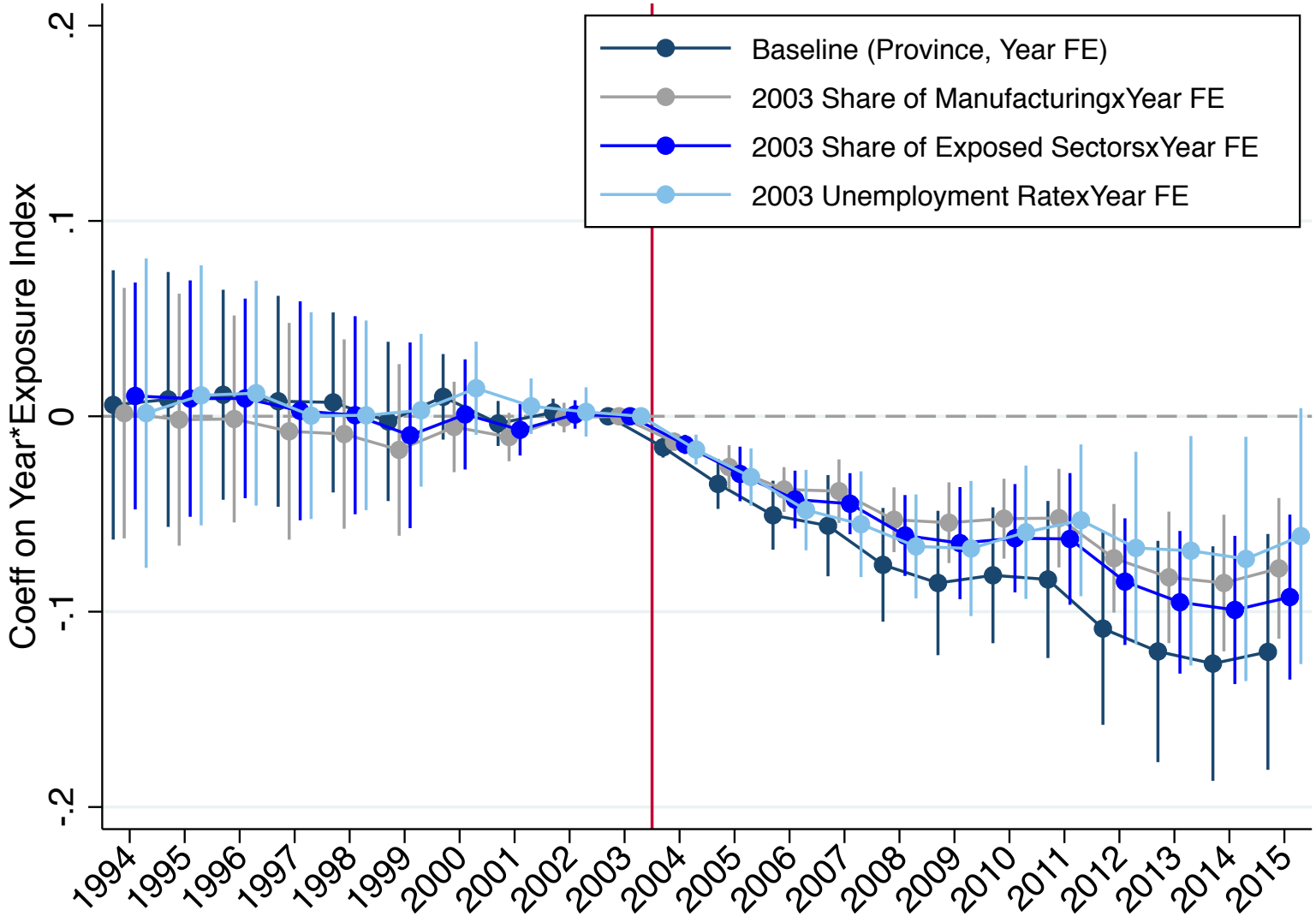
# Log Exposed Employment in Working Age Pop

Back



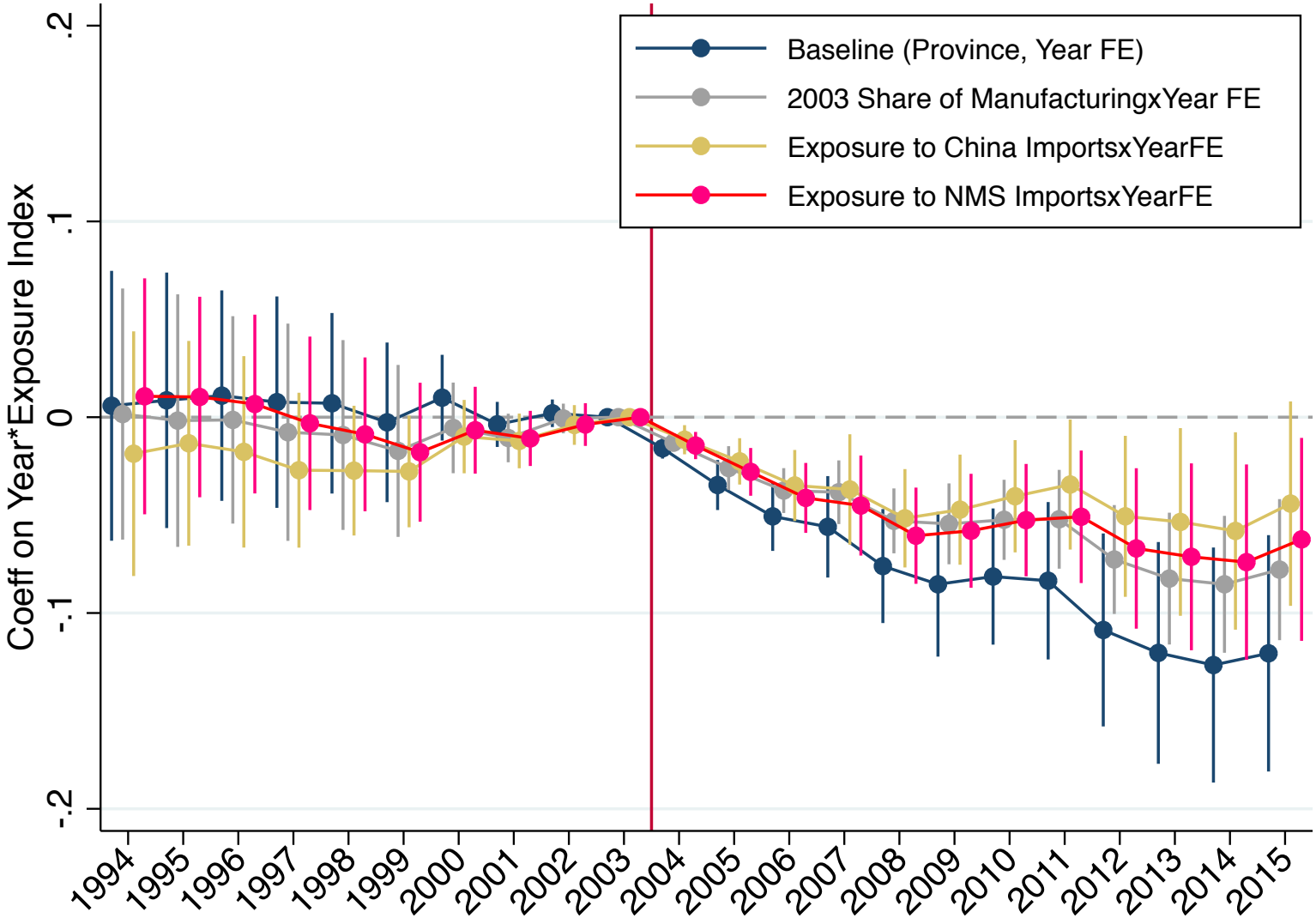
# Log Exposed Employment by Exposure to Posting

Back



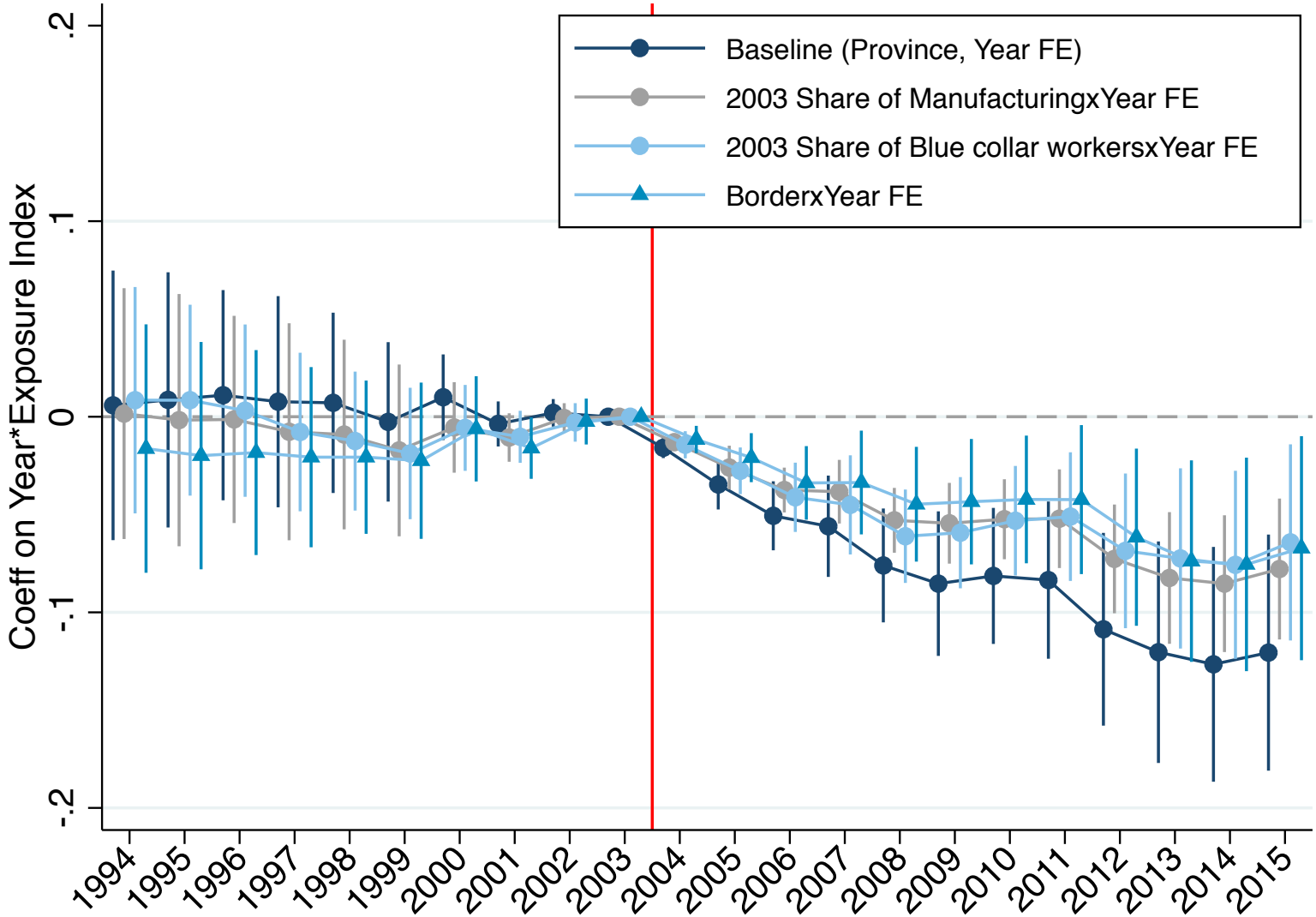
# Log Exposed Employment by Exposure to Posting

Back



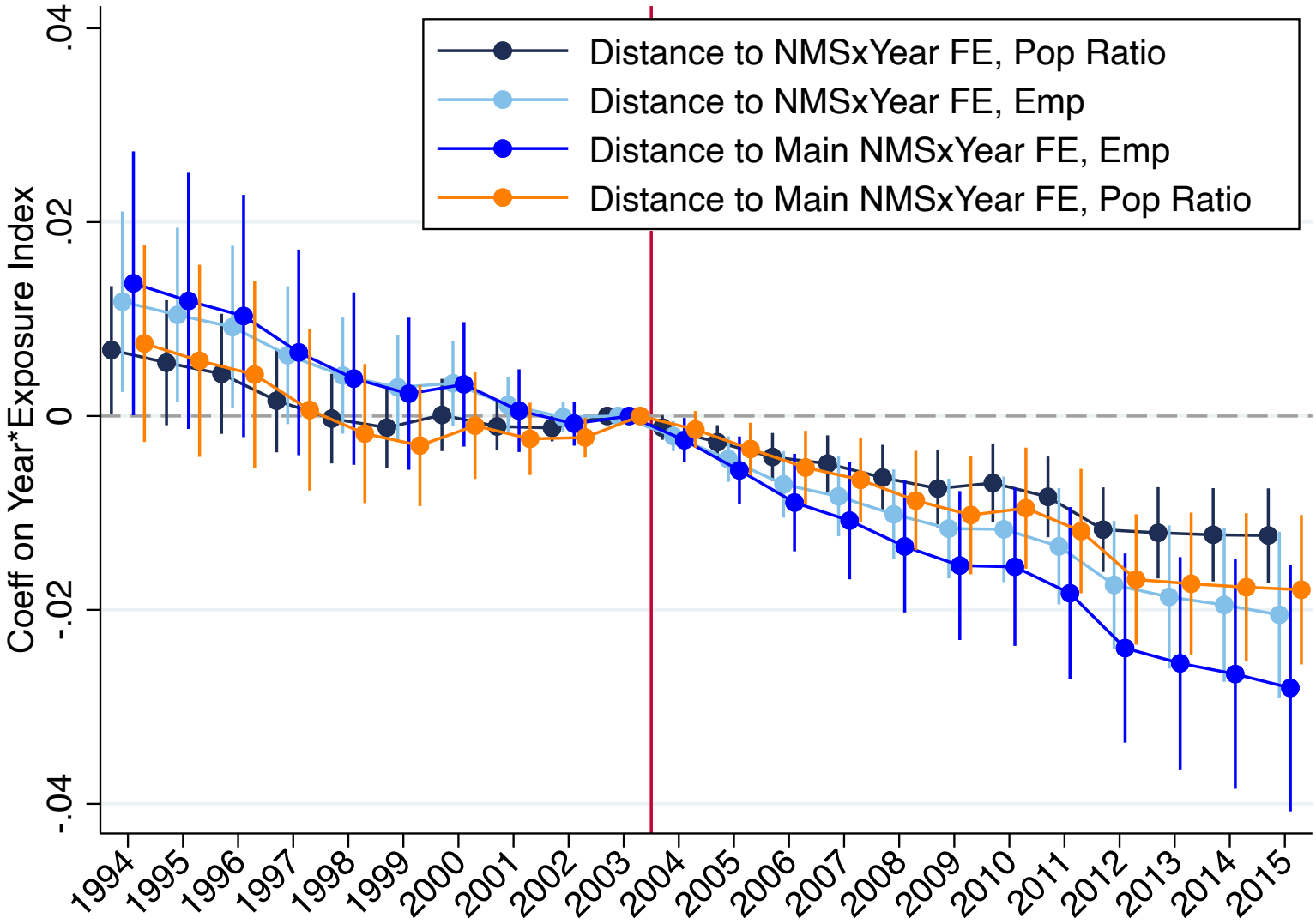
# Log Exposed Employment by Exposure to Posting

Back



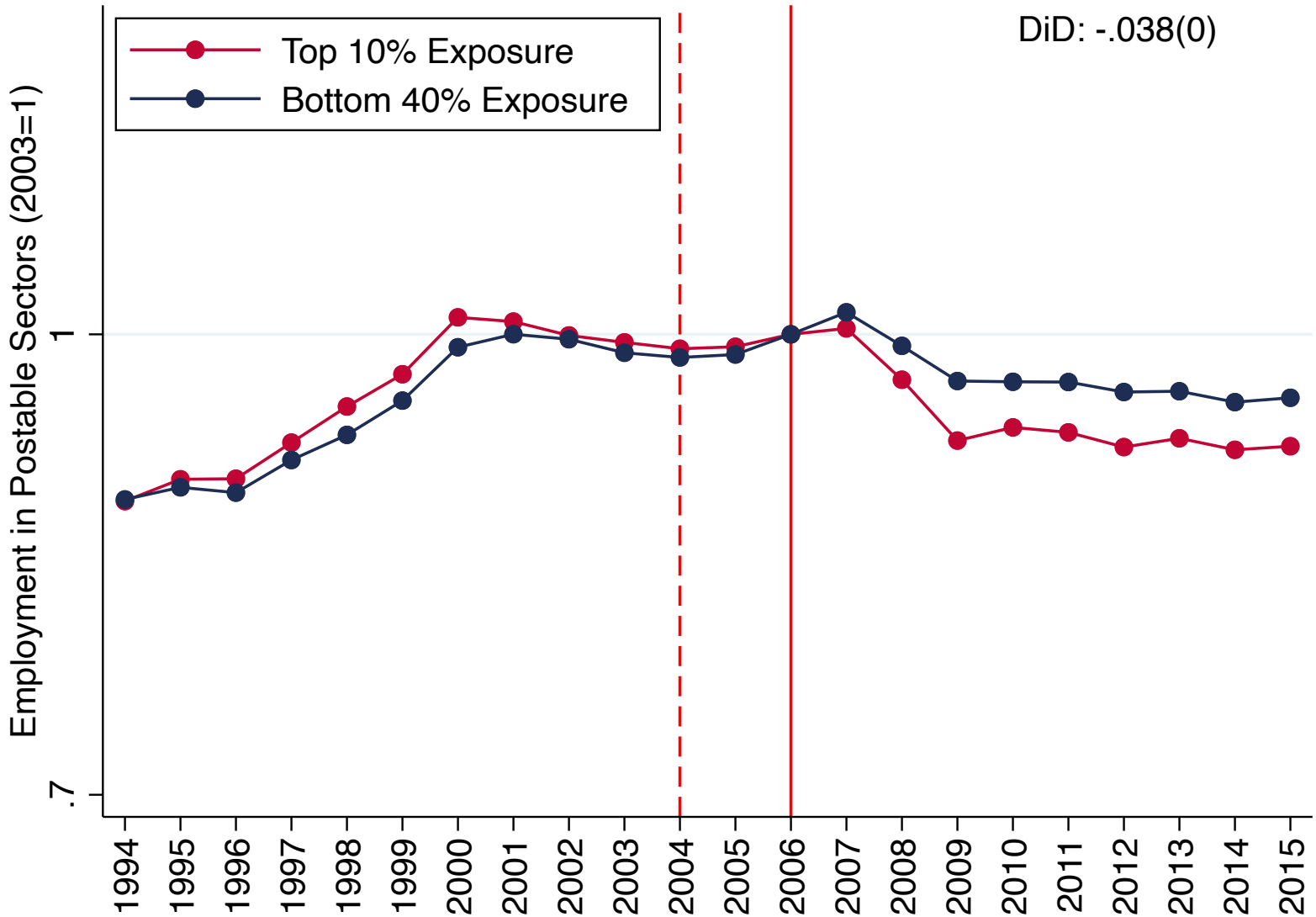
# Log Exposed Employment by Exposure to Posting

Back



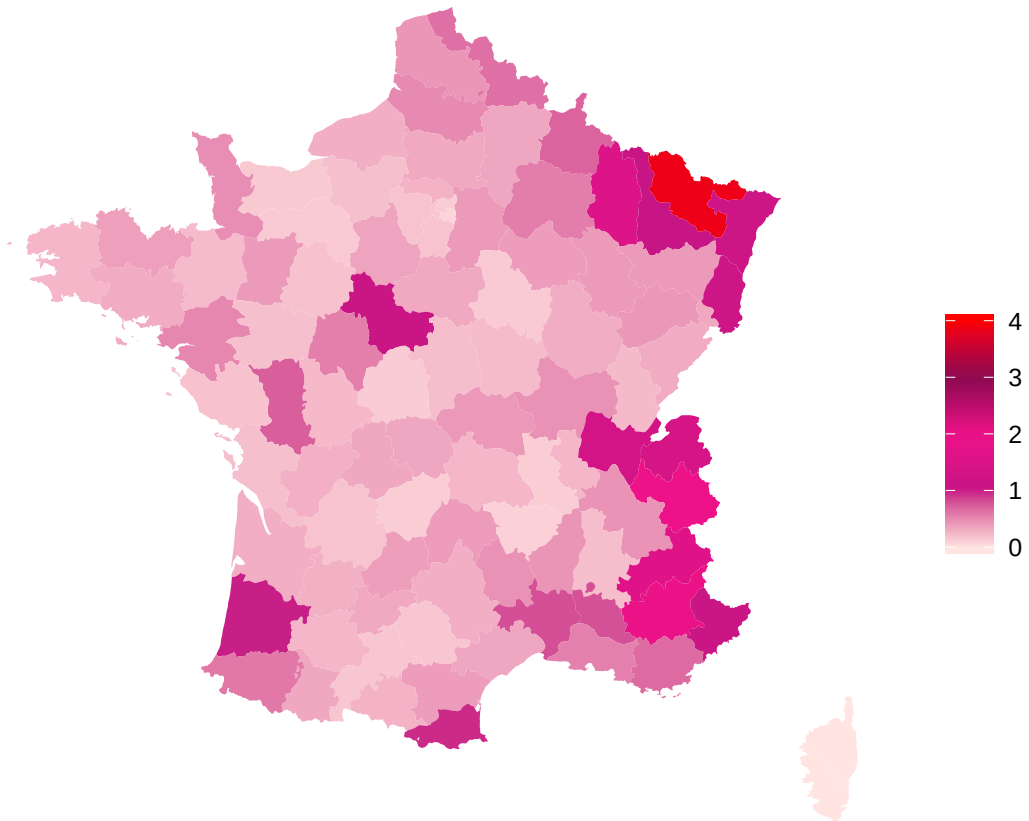
# Log Exposed Employment by Exposure to Posting

Back



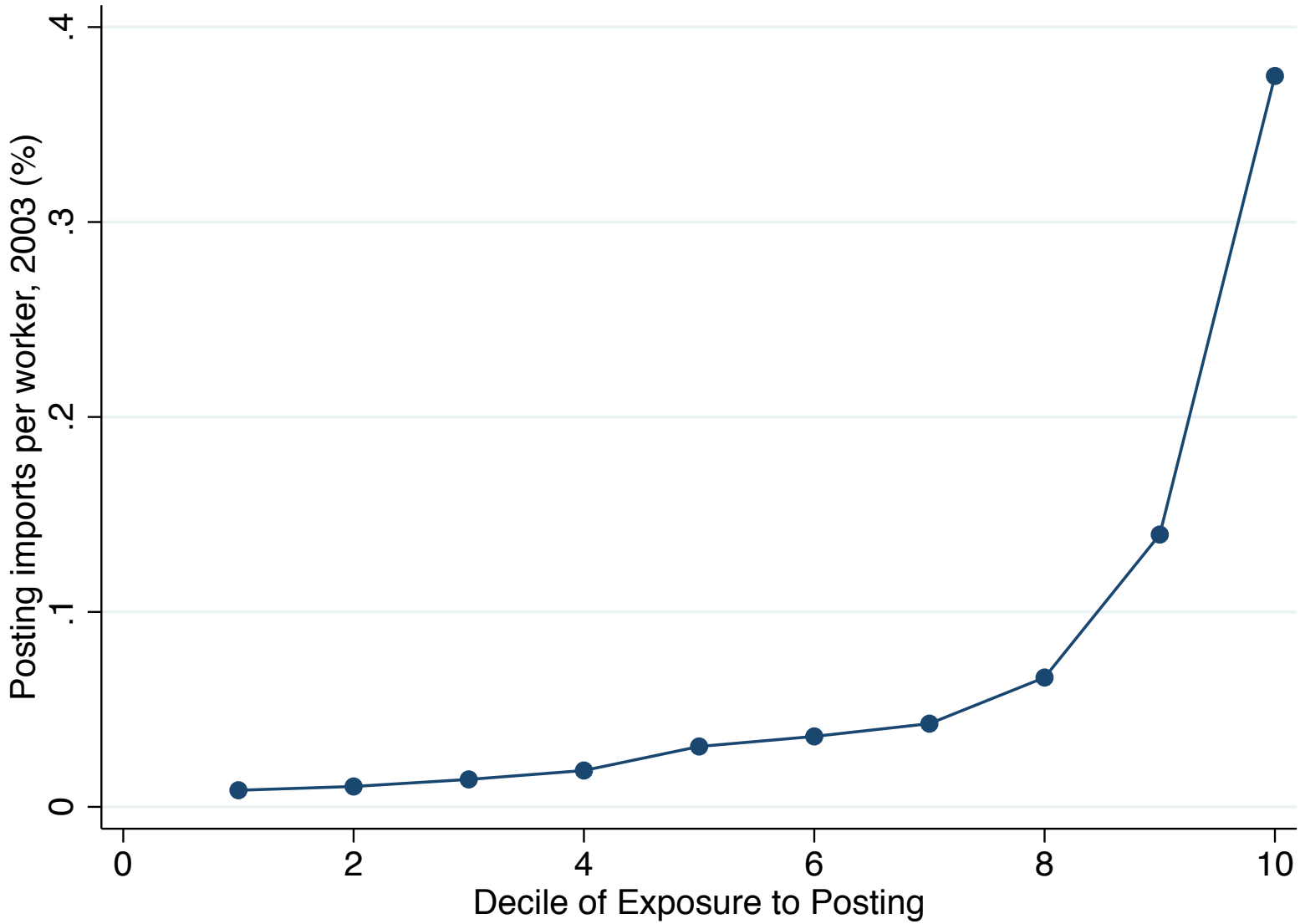
# Posting Imports per Worker, 2005-2015

Back



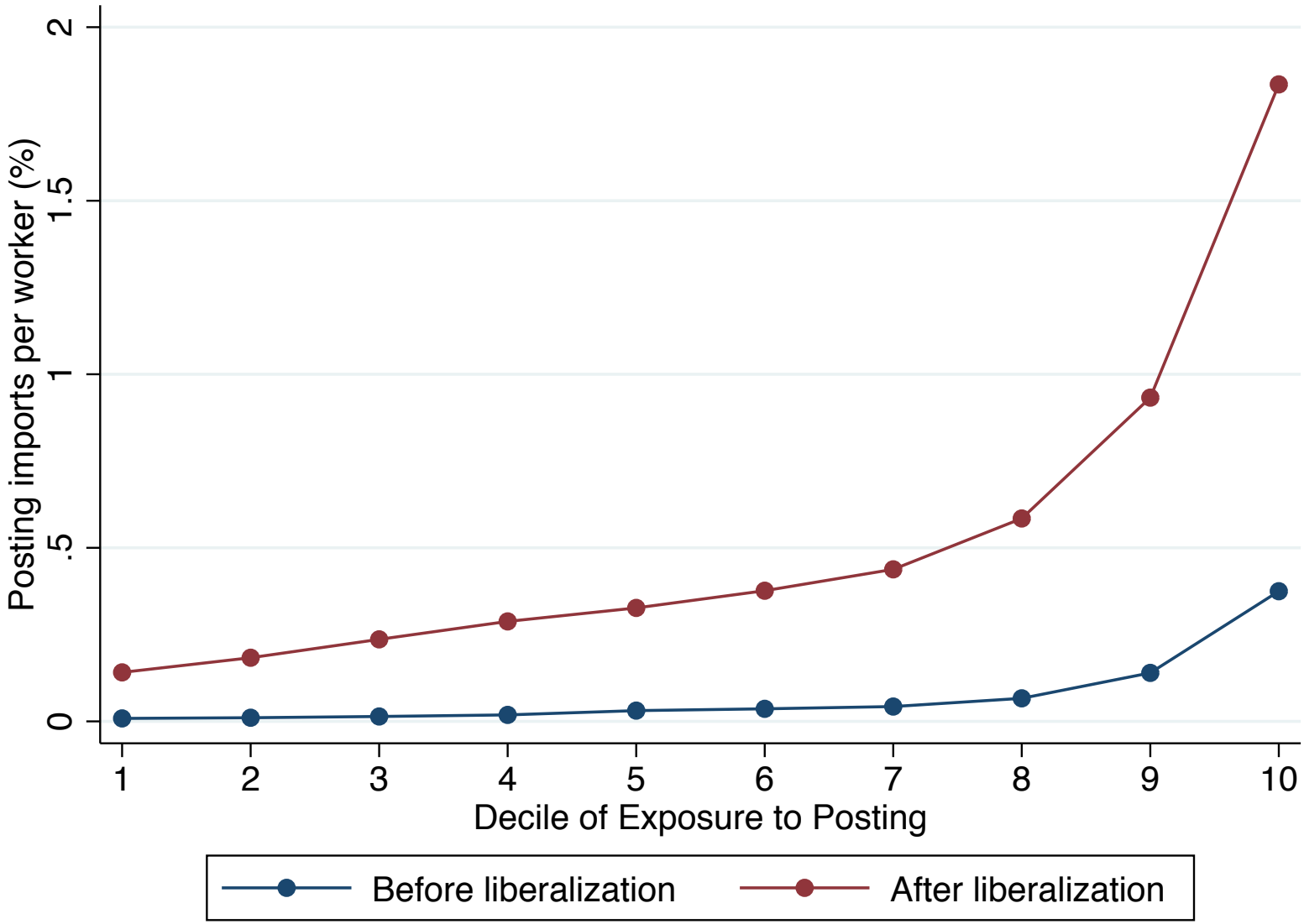
# Spatial heterogeneities in Posting Imports per Worker

*High imports of posting concentrated in a set of provinces* Back

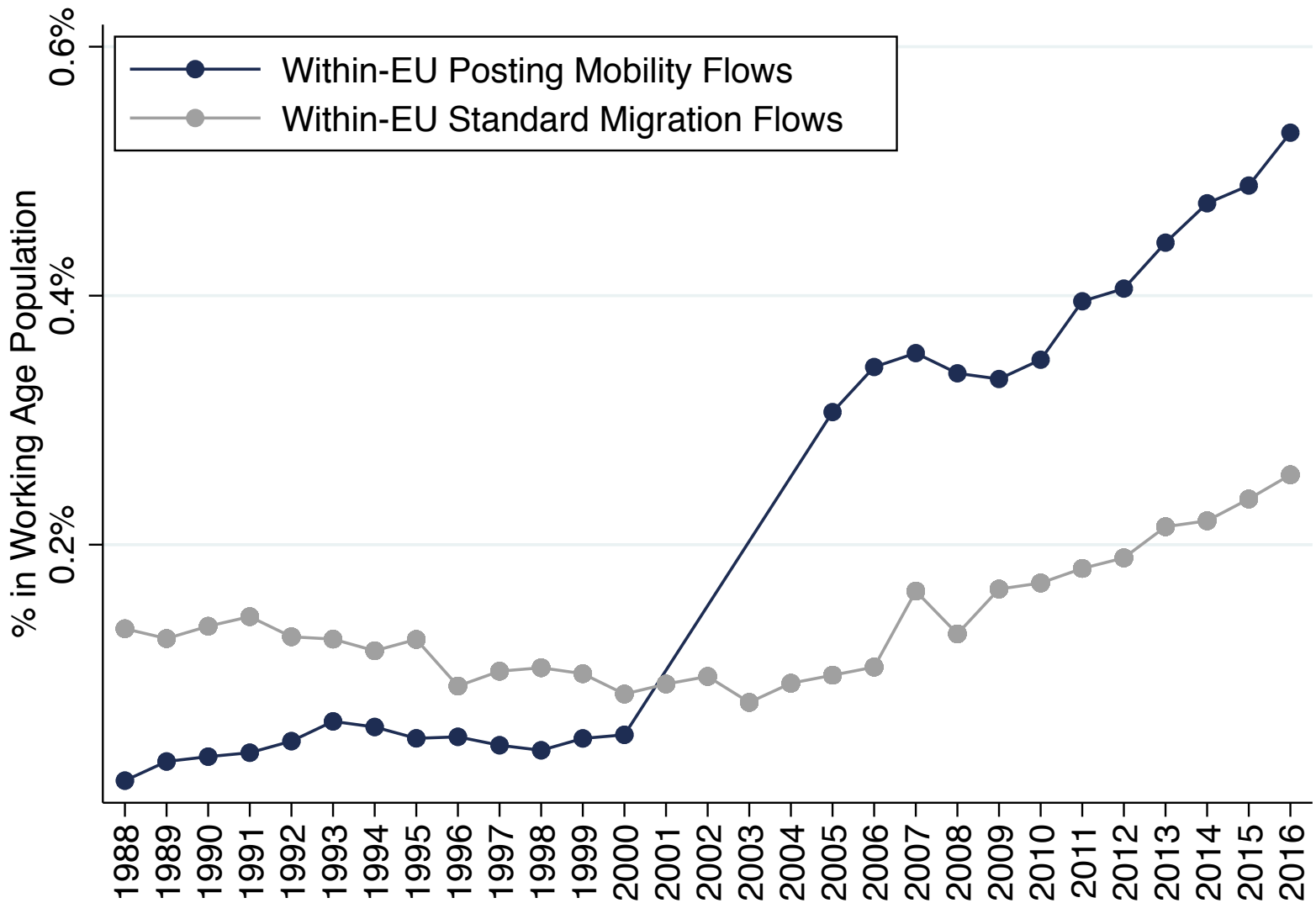


# Spatial heterogeneities in Posting Imports per Worker

*High imports of posting concentrated in a set of provinces* Back



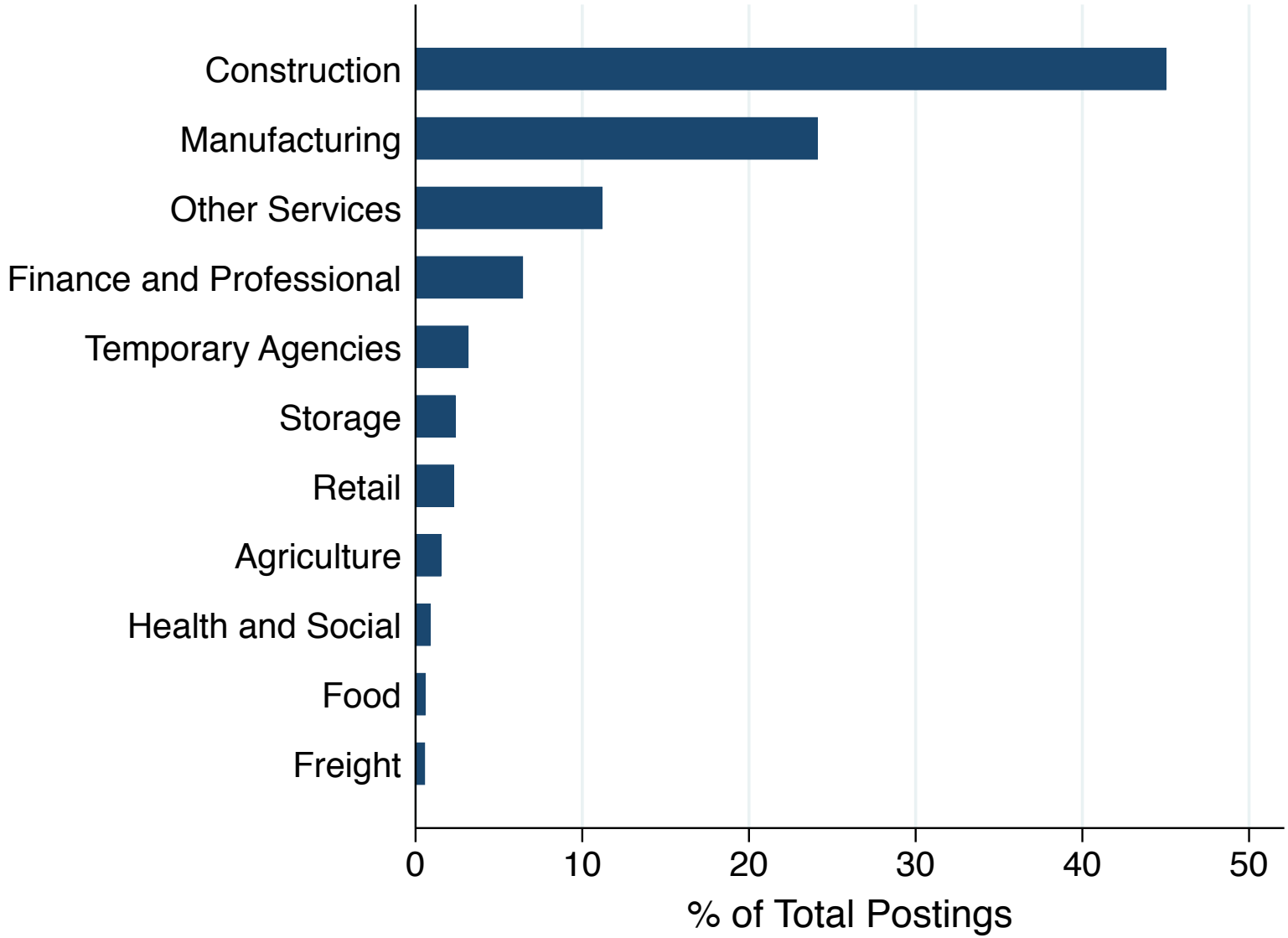
# Migration and Posting Flows




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

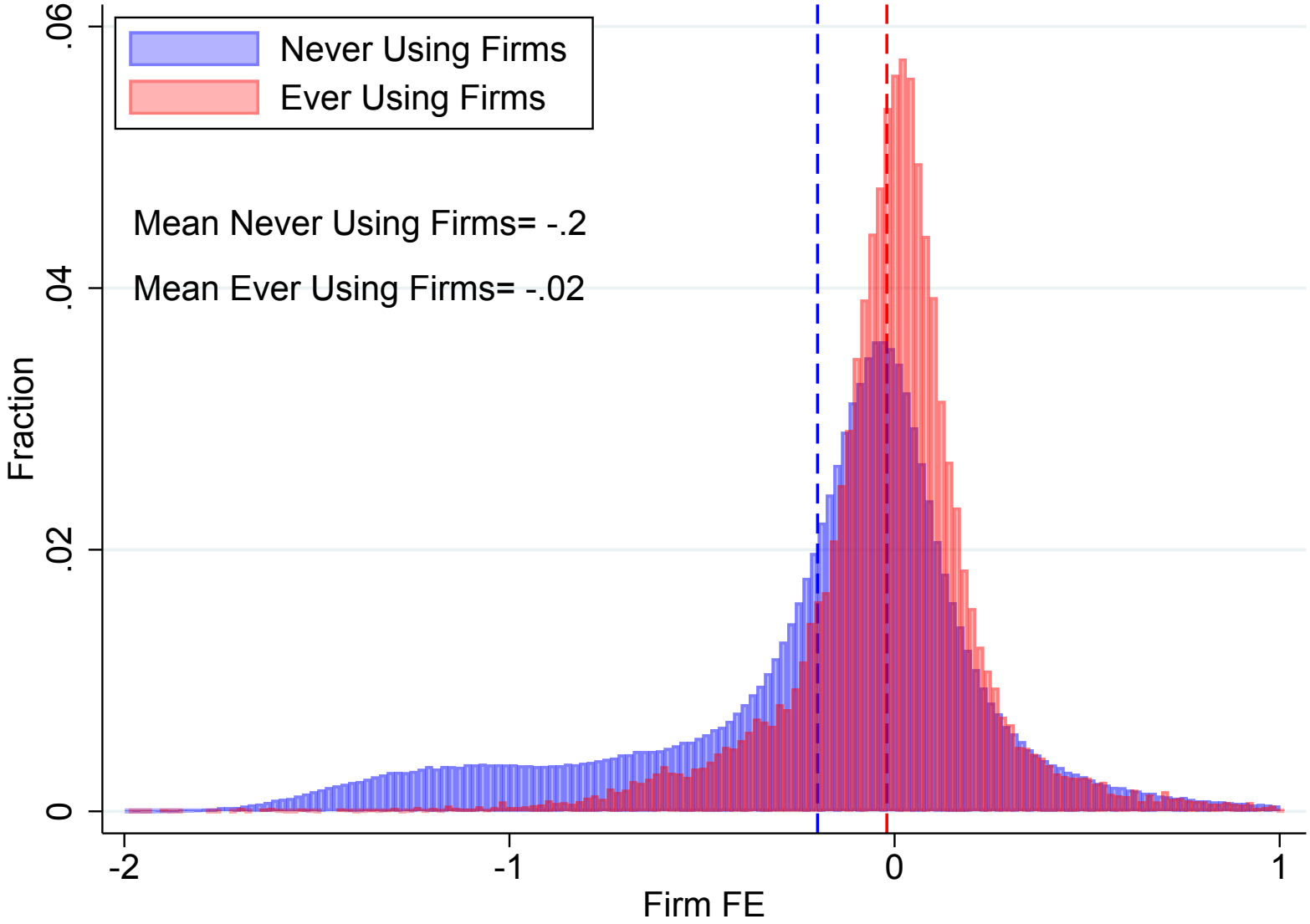
# Sectoral Decomposition, All EU

Back



# Cost-Saving Motives

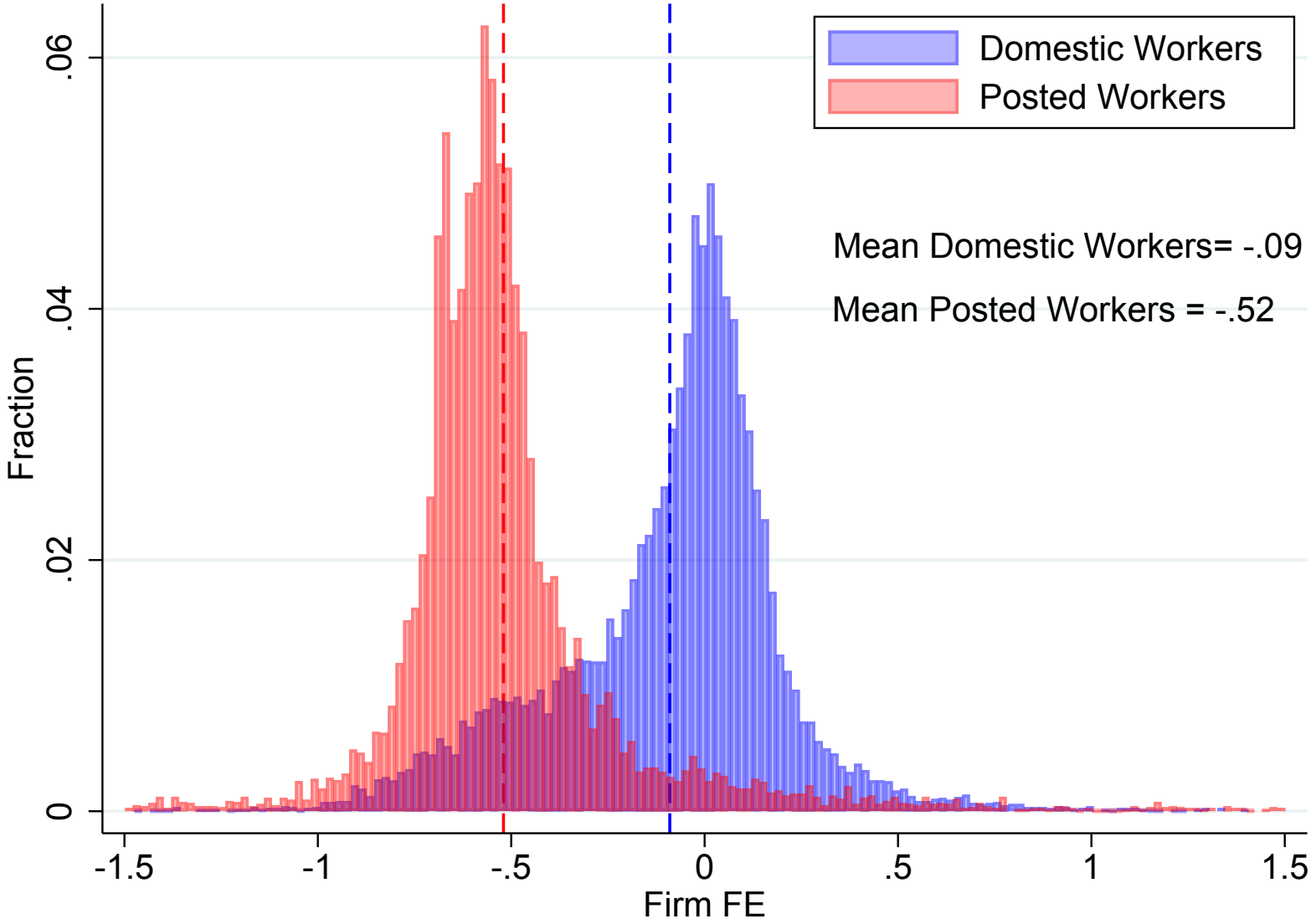
*Posting services are used by high-wage firms*



# Wage Penalty of Posted Workers

BACK

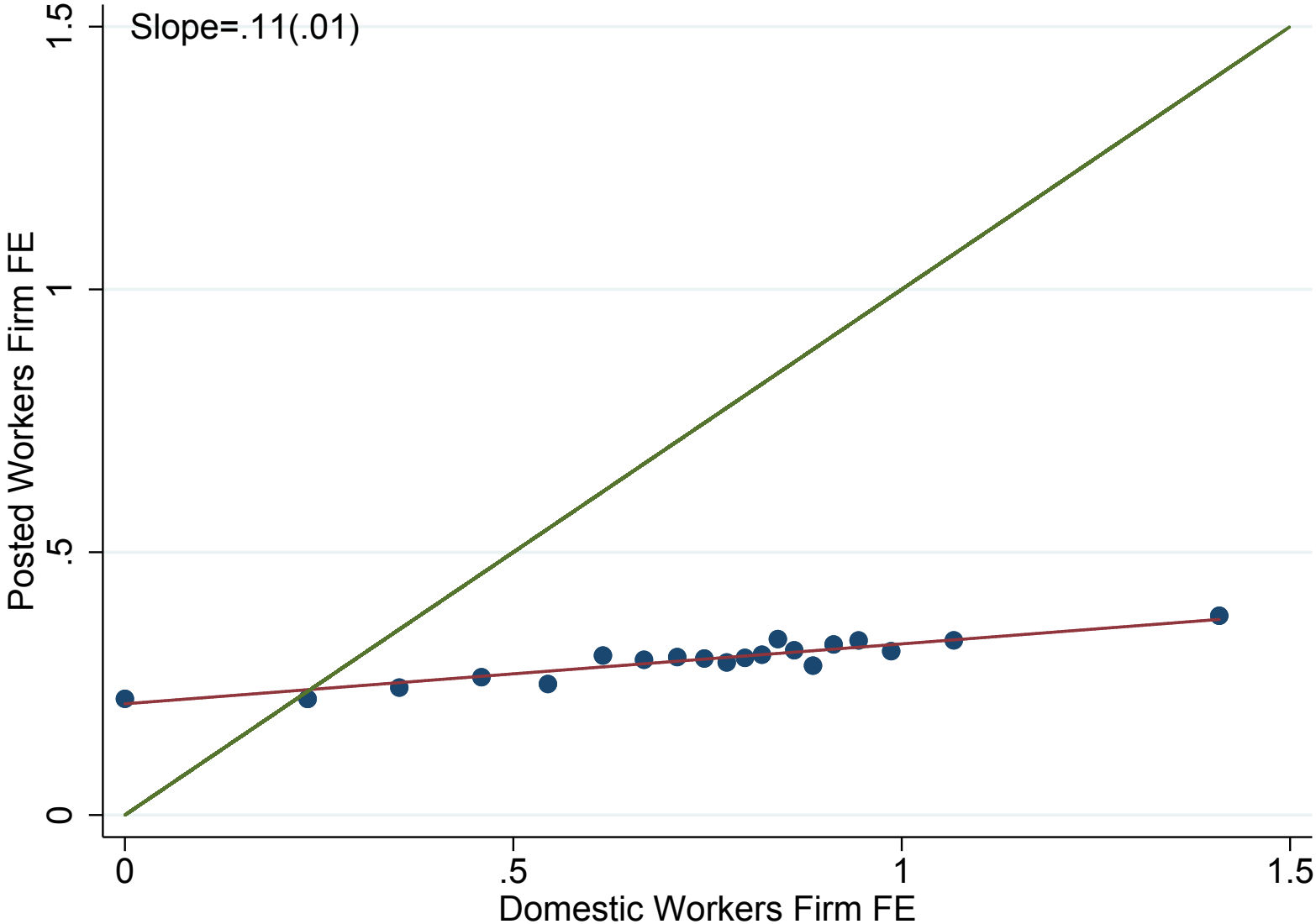
*Receiving firms save on high domestic wage premia through posting*



# Nil Surplus Sharing At Receiving Firms

BACK

*Receiving firms do not share their wage premium with posted 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

# 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

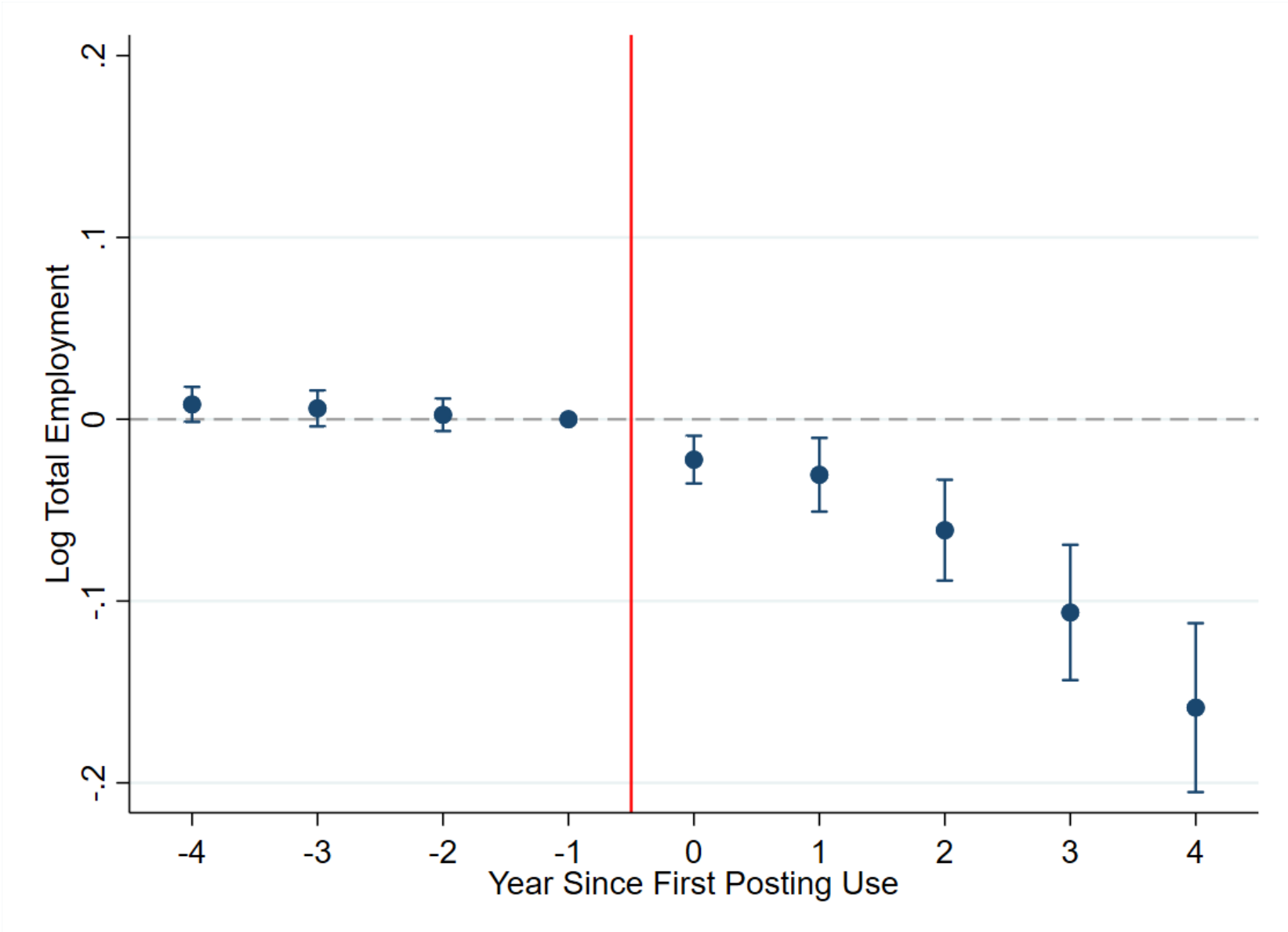
$$\underbrace{\ln y_{it}}_{\text{using firm employment}} = \alpha_i + \underbrace{\lambda_{st}}_{\text{3 digit sector-year FE}} + \sum_{k=\underline{T}}^{\overline{T}} \gamma_k \times \underbrace{D_{it}^k}_{\mathbb{1}.[t = d_i + k]} + \varepsilon_{it}$$

- $\gamma_k$ describes employment before and after firms start using posting

# Substitution of Foreign for Domestic Inputs

HTE estimator BACK

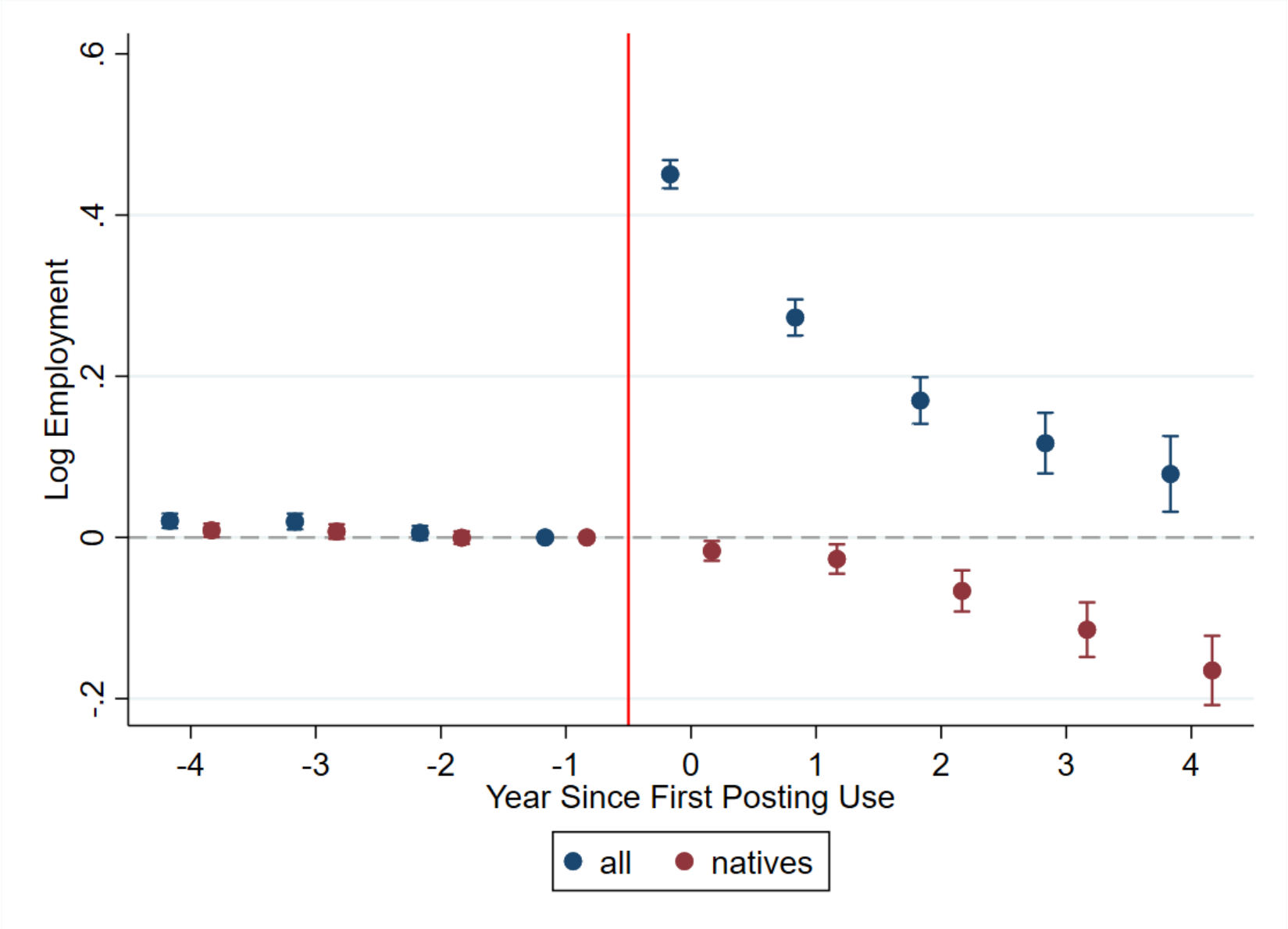
*Receiving firms decrease domestic employment by 16% four years after posting use*



# Substitution of Foreign for Domestic Inputs

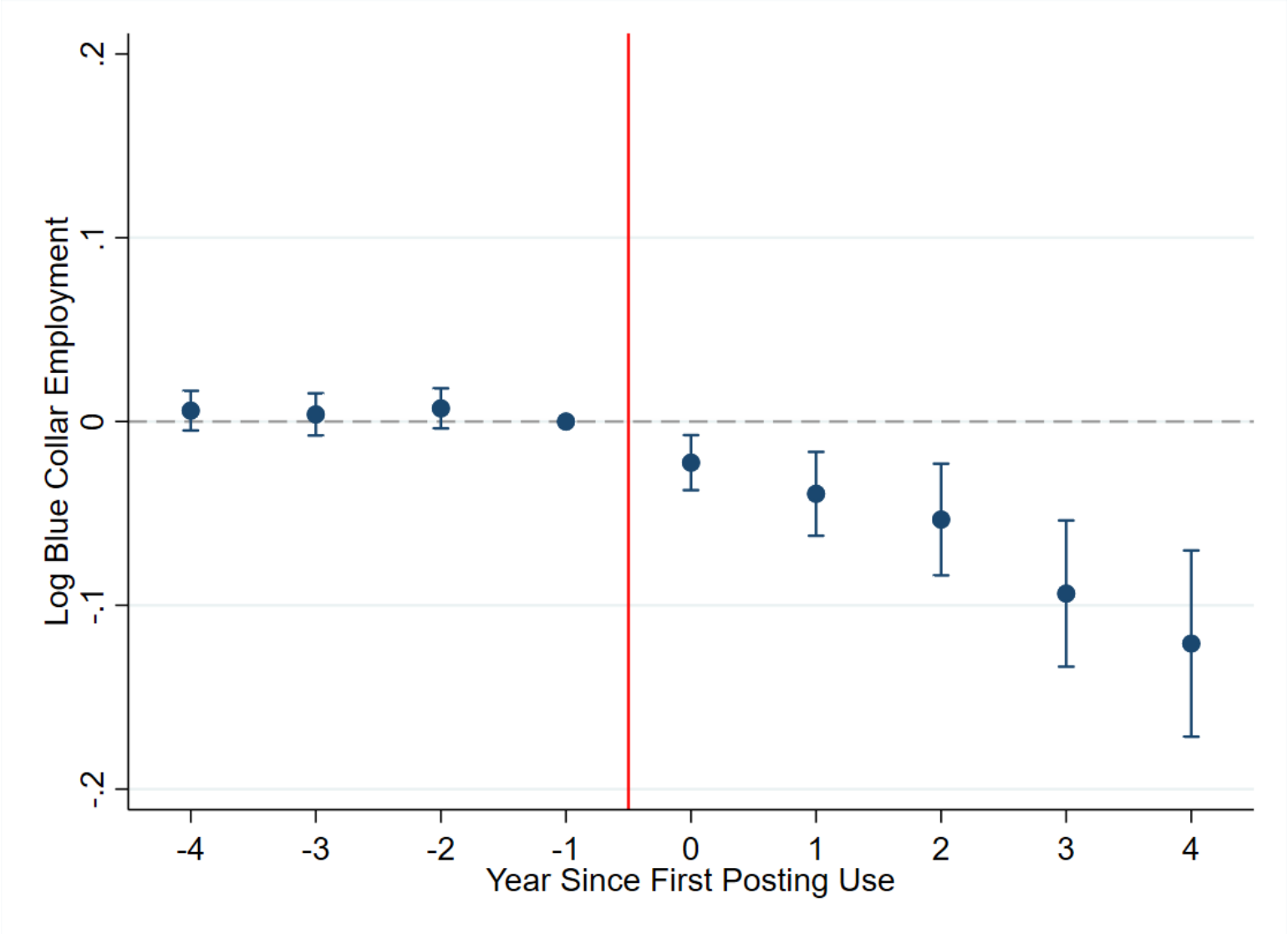
HTE estimator BACK

*Receiving firms gradually converge to their pre-event size as domestic are displaced*



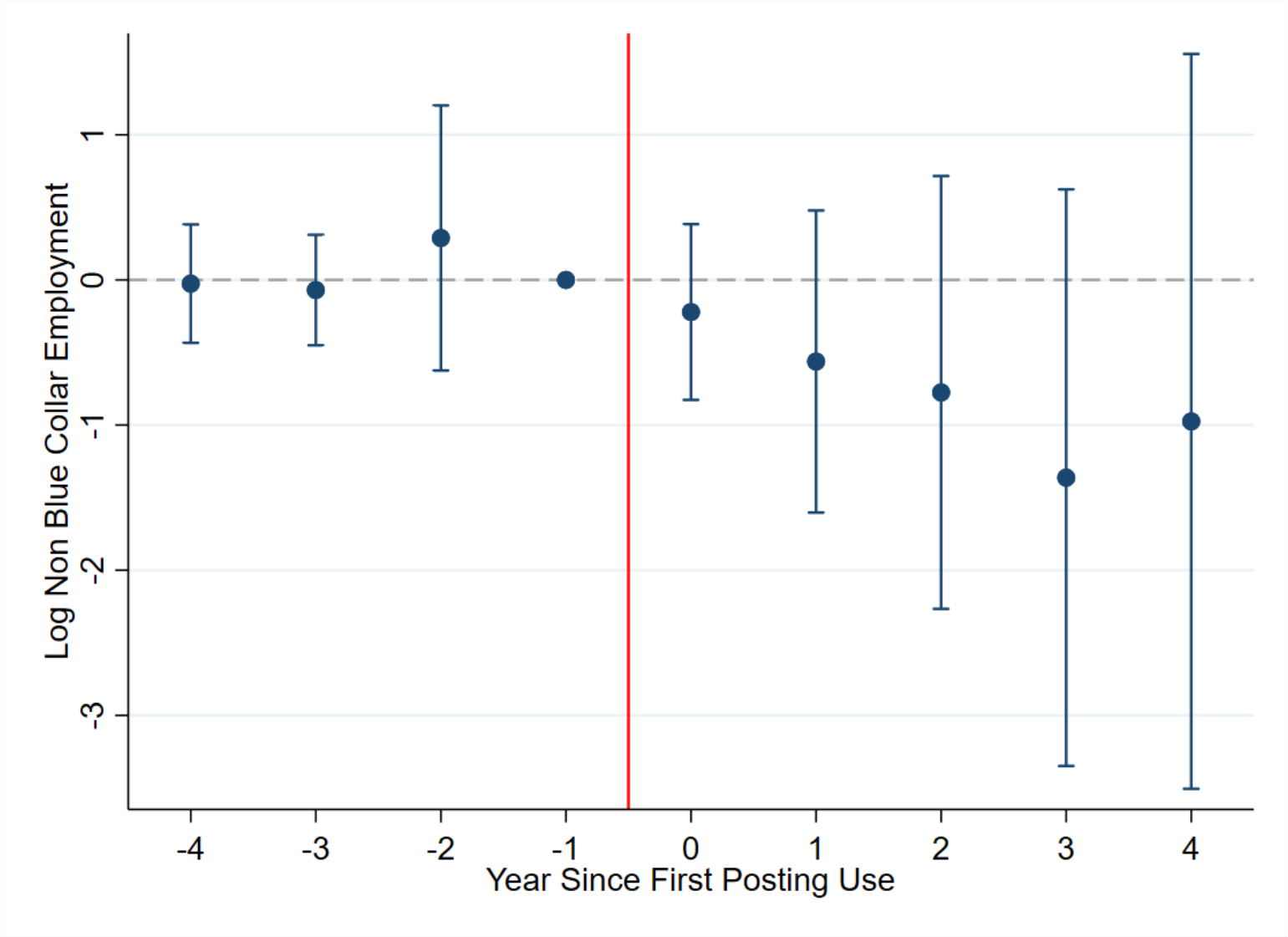
# Blue Collar Employment at Receiving Firms After Posting Use

BACK



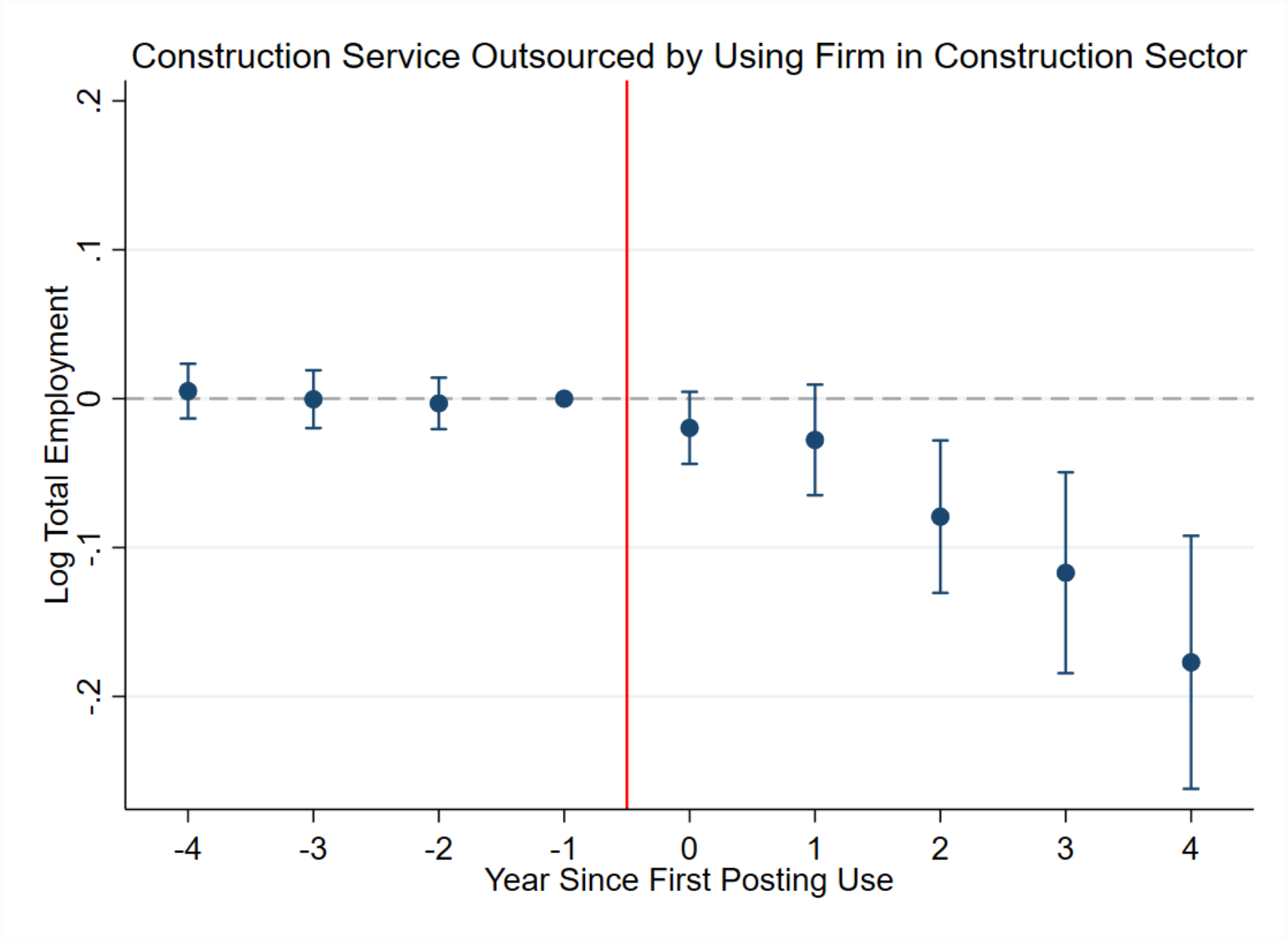
# Other Employment at Receiving Firms After Posting Use

BACK



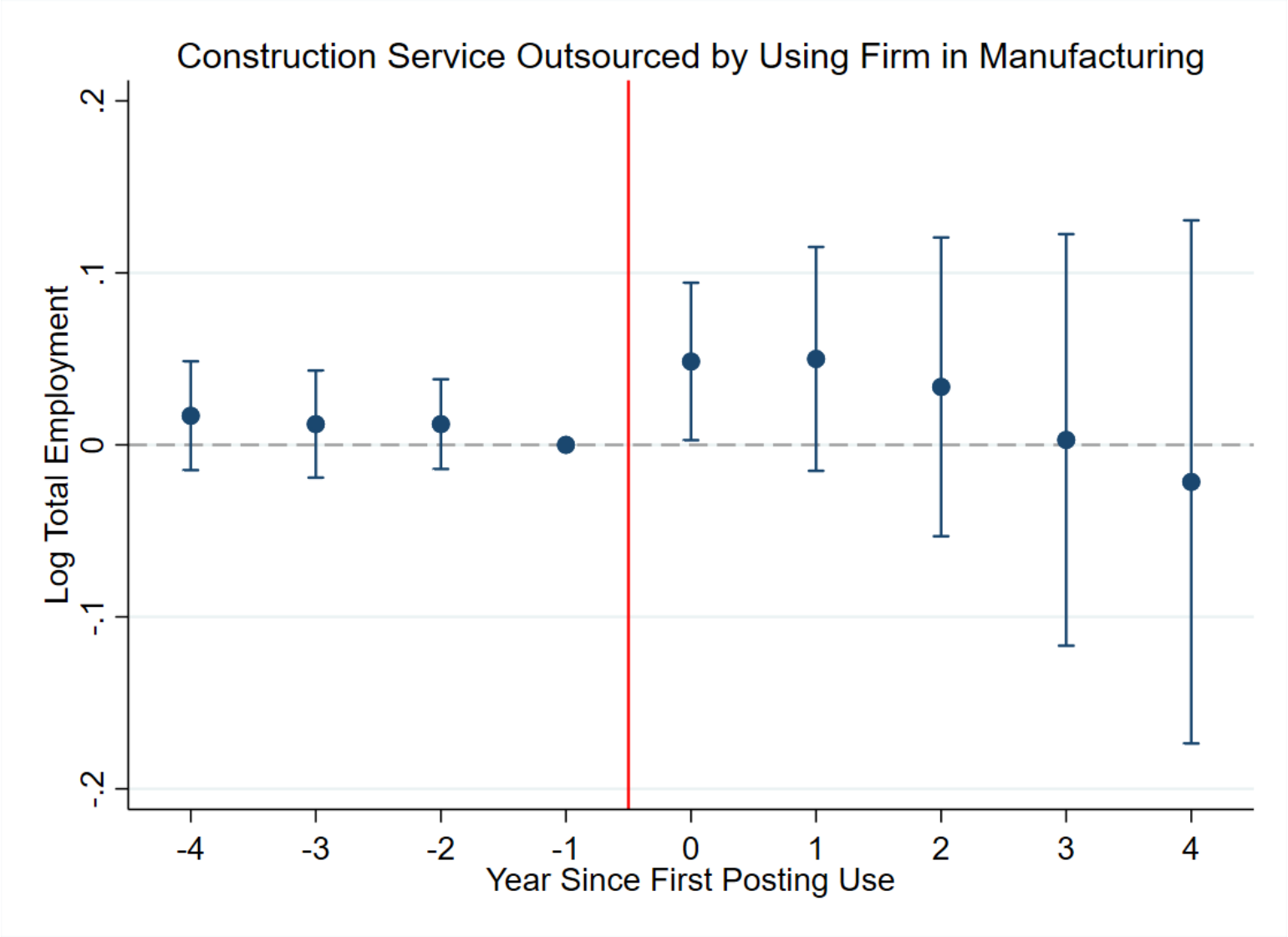
# Posted Workers Performing Same Tasks than Domestic Workers

BACK



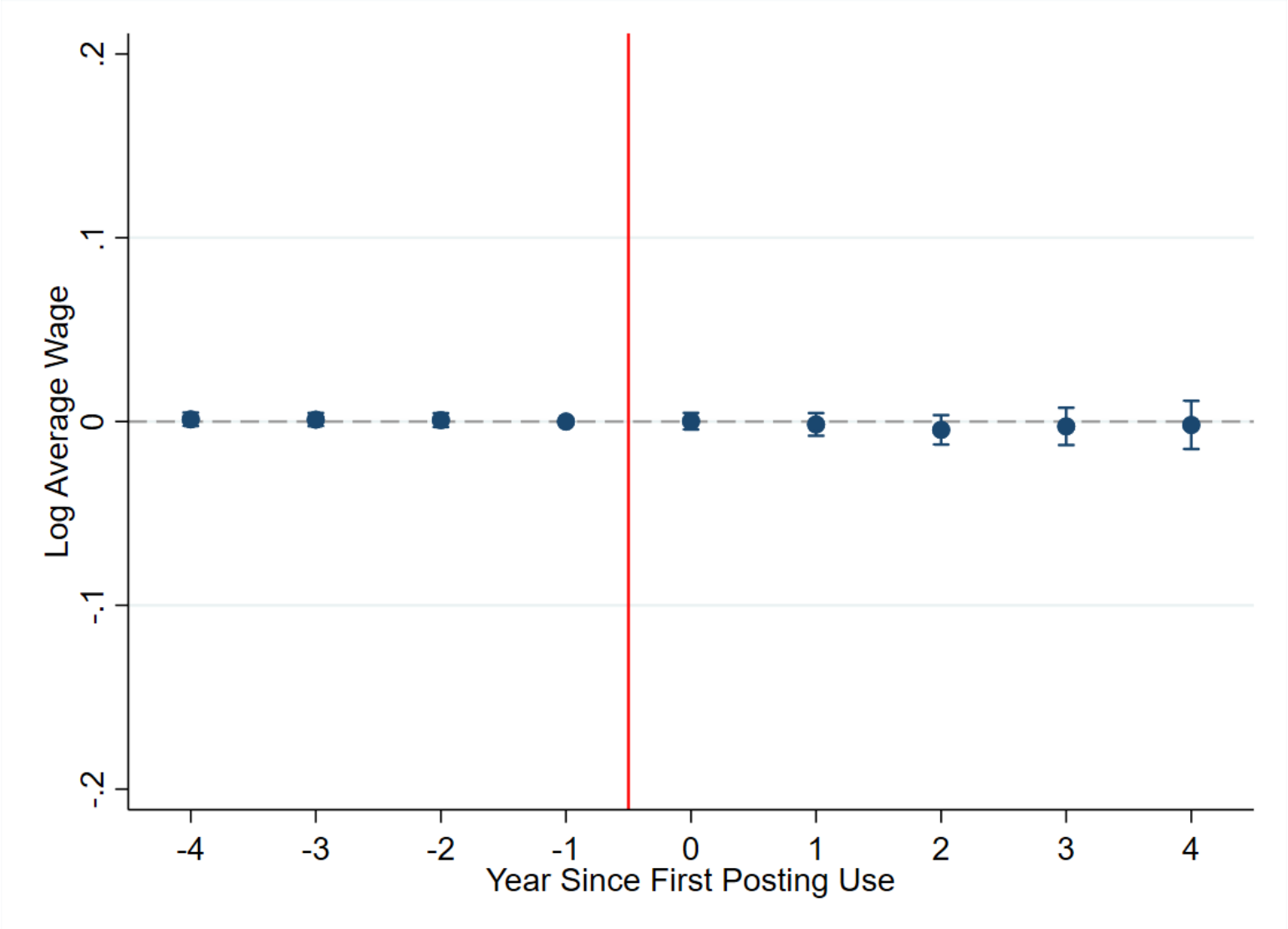
# Posted Workers Performing Different Tasks than Domestic Workers

BACK



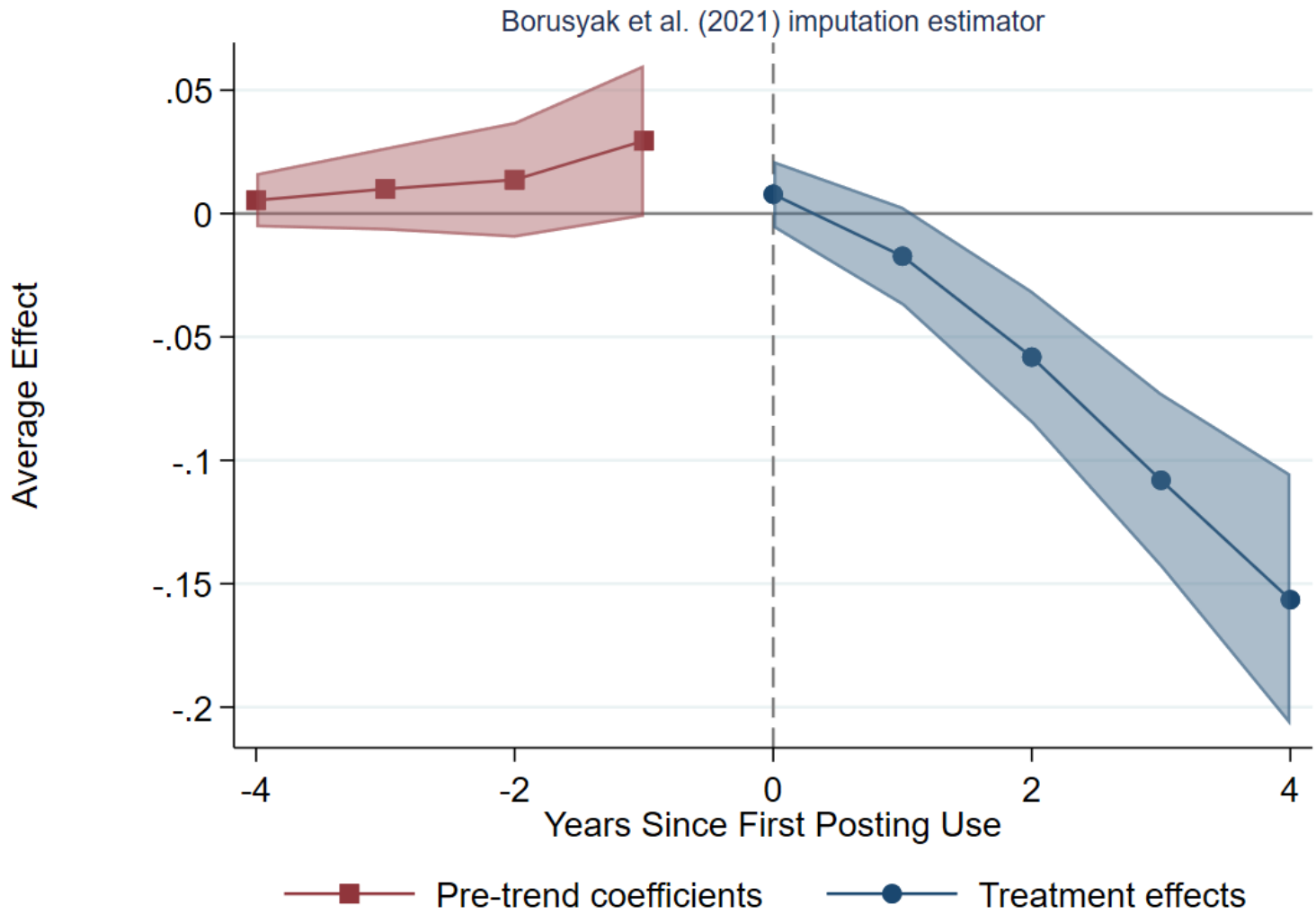
# Incumbent Wages At Receiving Firms

BACK



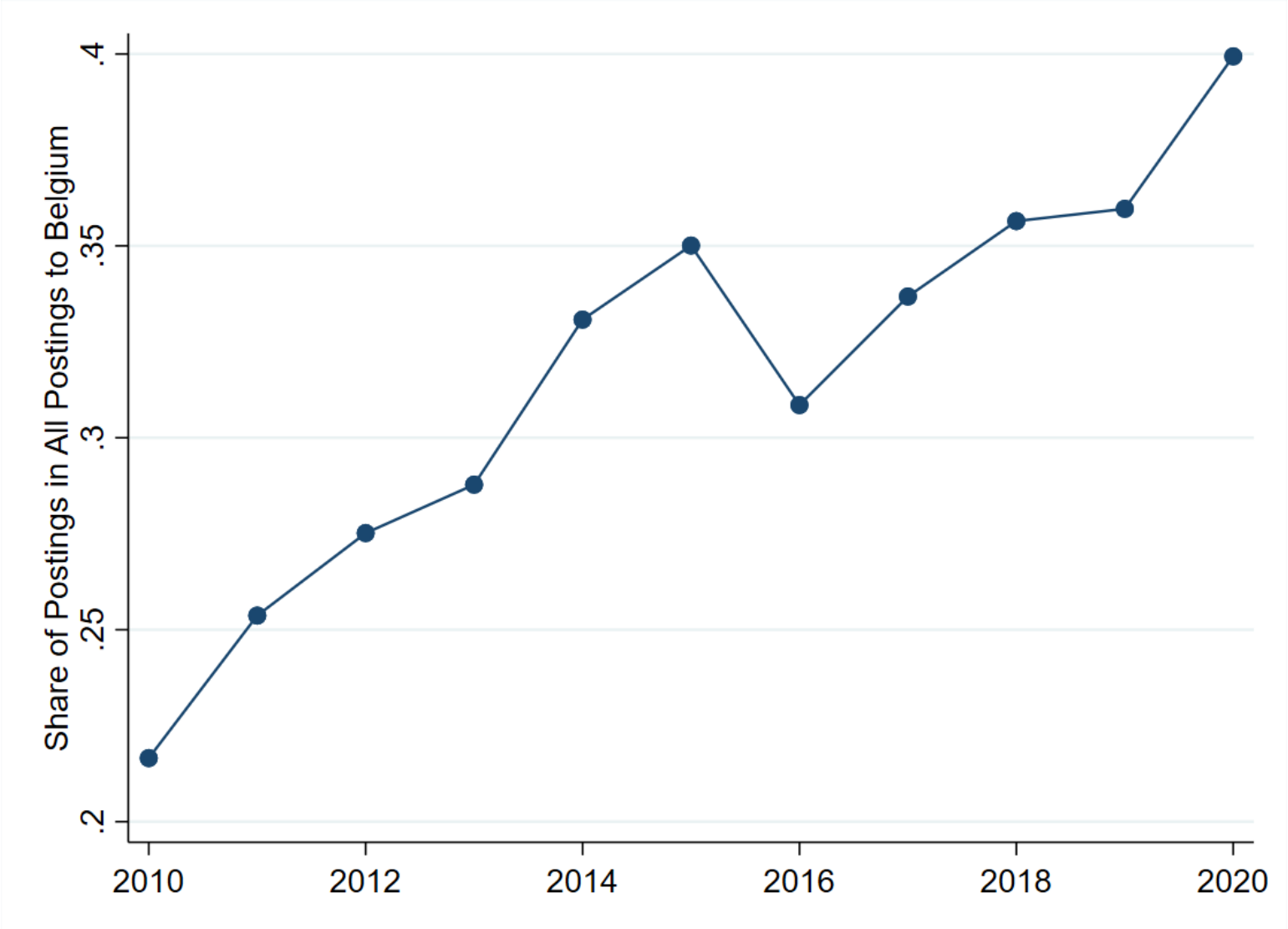
# Imputation Estimator

BACK



# Growing NMS Supply to Belgium

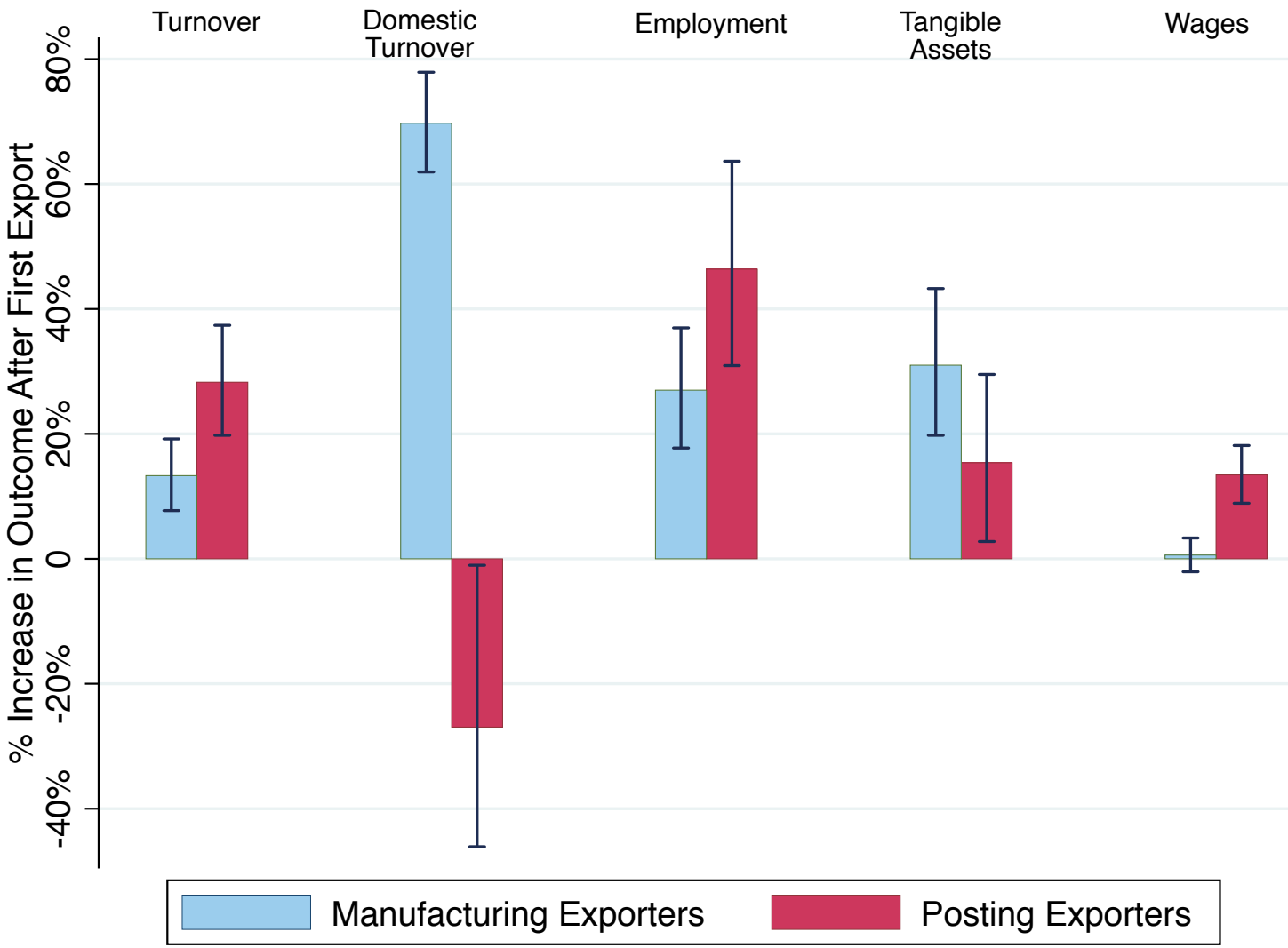
BACK



# Export Gains: Manufacturing vs Non-Tradables

Back

*Similar magnitude except for domestic sales*



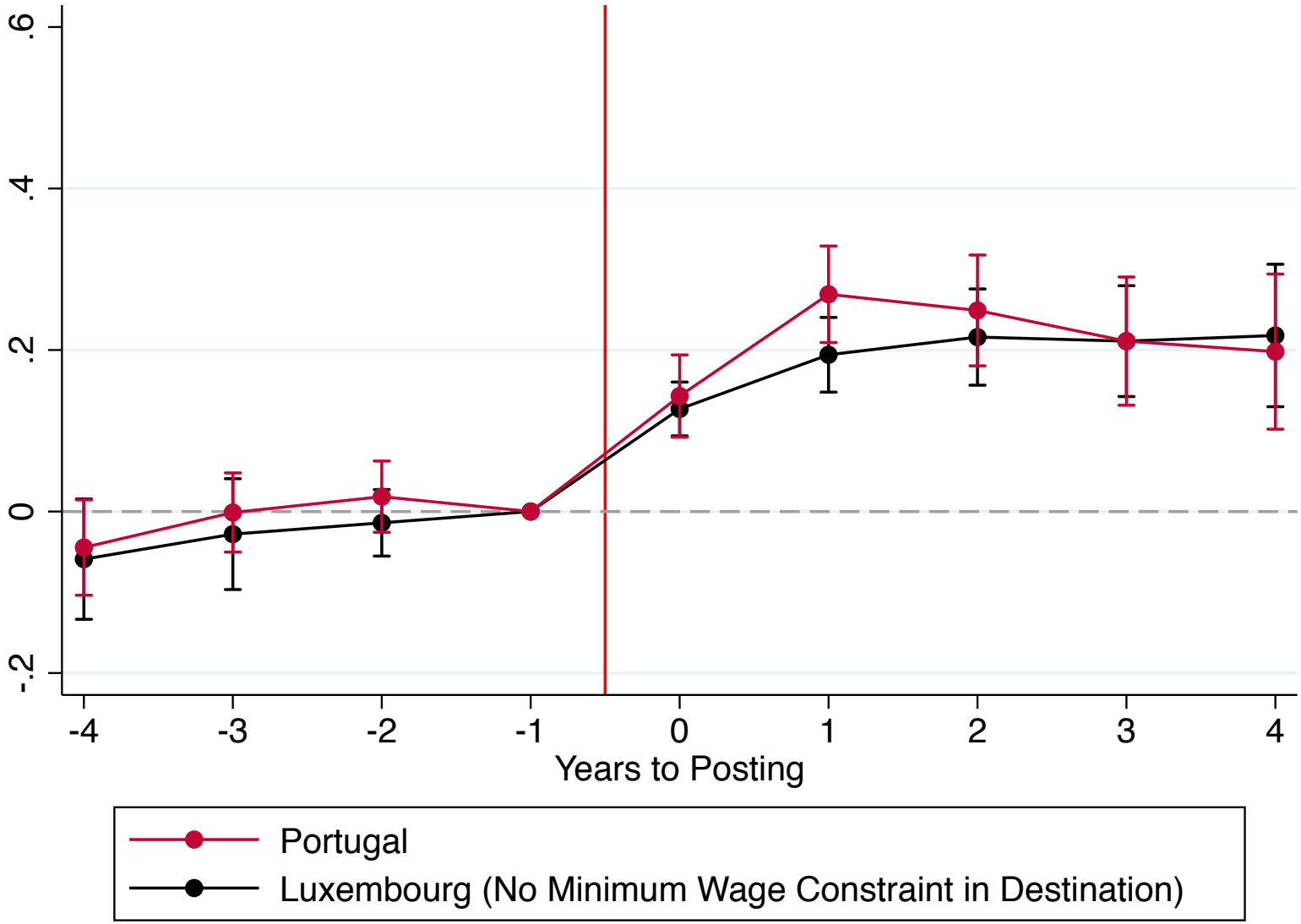
# Are wage gains explained by destination-level rules?

*Minimum wage in importing countries shape wage gains of posted workers* Back

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 Go
2. Firms with different pre-posting bindingness of minimum wage
   - Wage gains driven by firms below destination minimum wages Go
3. Bunching at minimum wage in destination countries
   - Excess mass of Portuguese posted workers' wage at French min wage Go

# Surplus Sharing or Destination-Level Rules?

*Similar increase in total employment at sending firms* Back



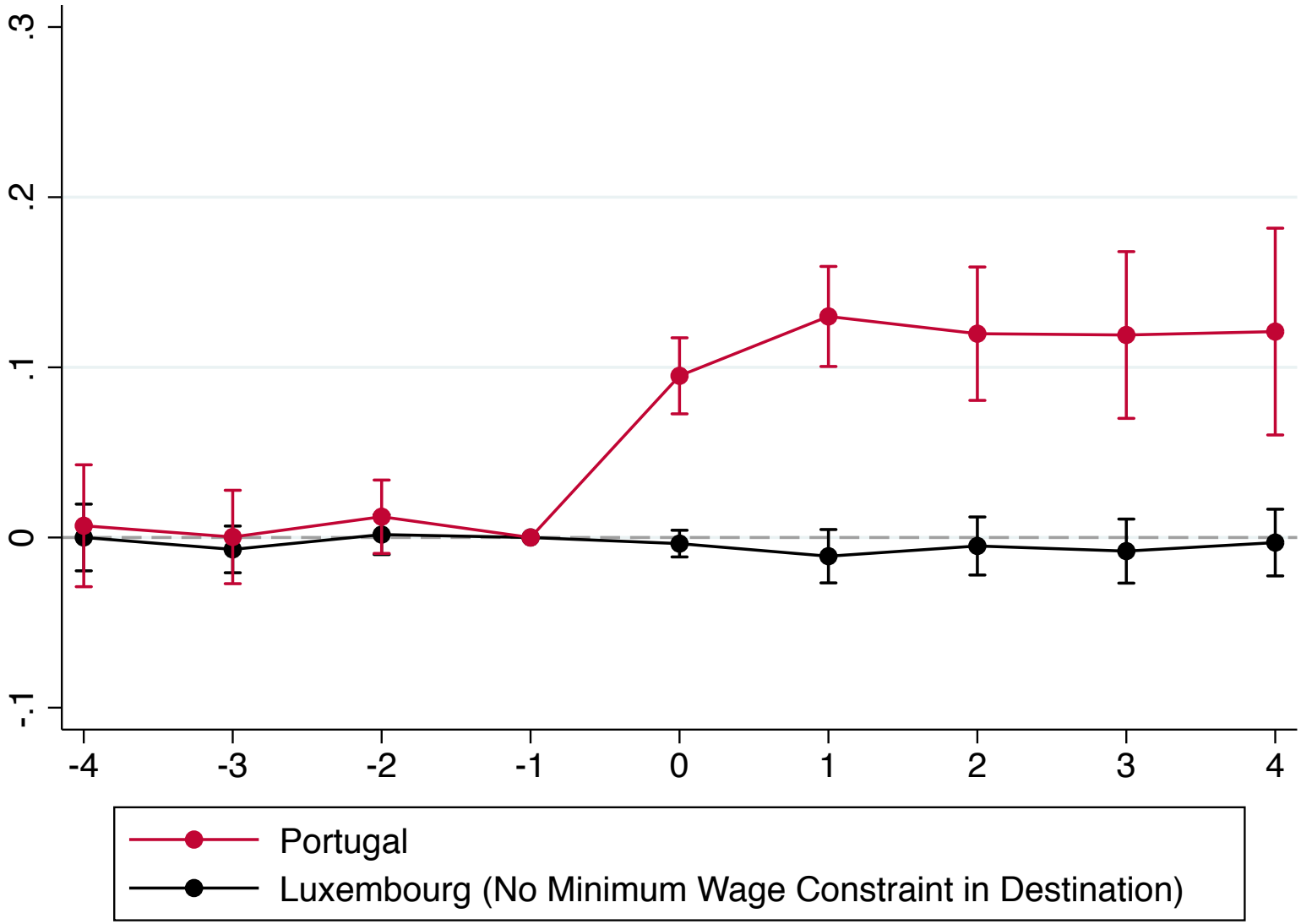
# Surplus Sharing or Destination-Level Rules?

*Similar increase in total hours of work at sending firms* Back



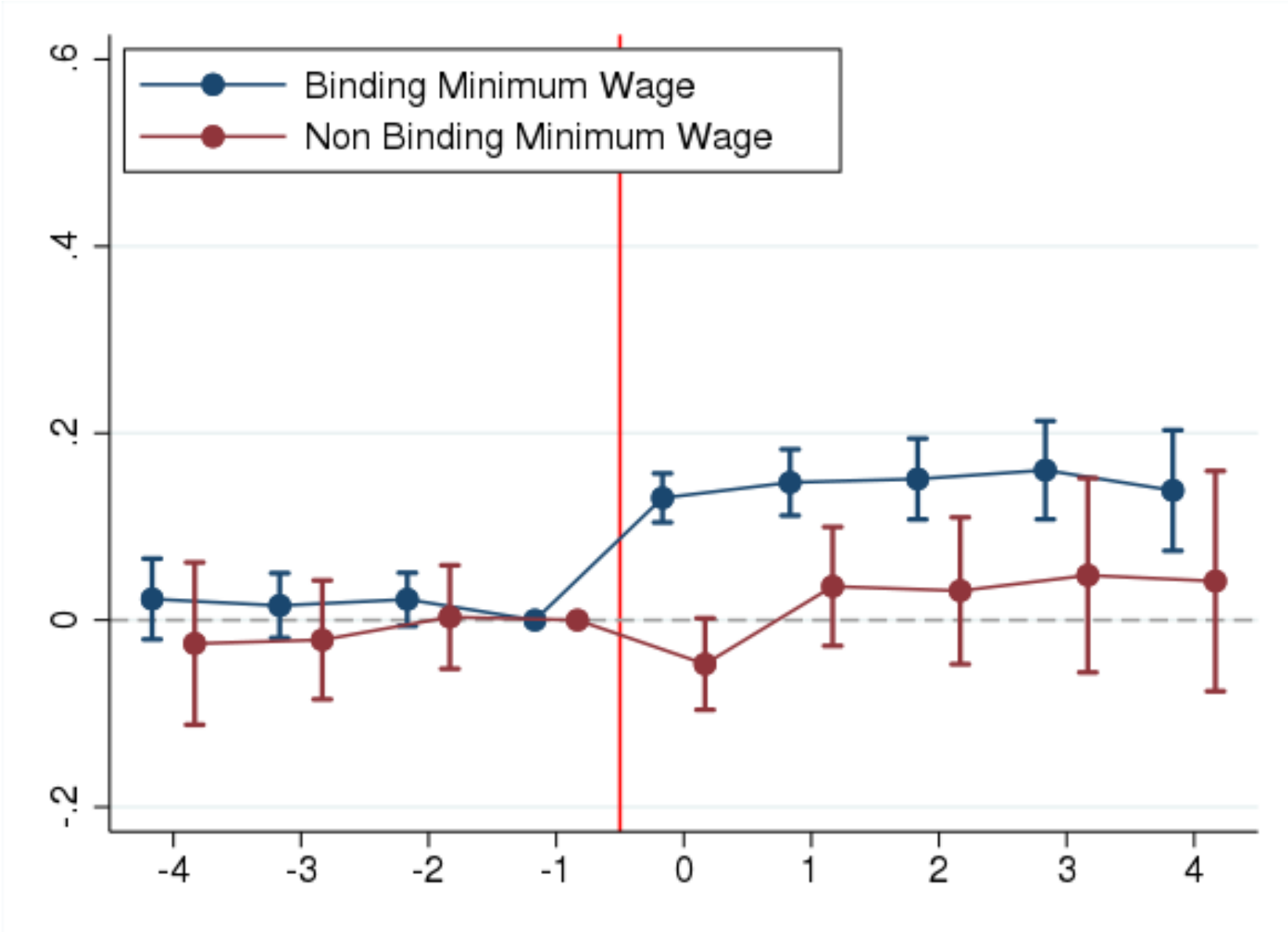
# Surplus Sharing or Destination-Level Rules?

*Only Portuguese workers benefit from wage gains* Back



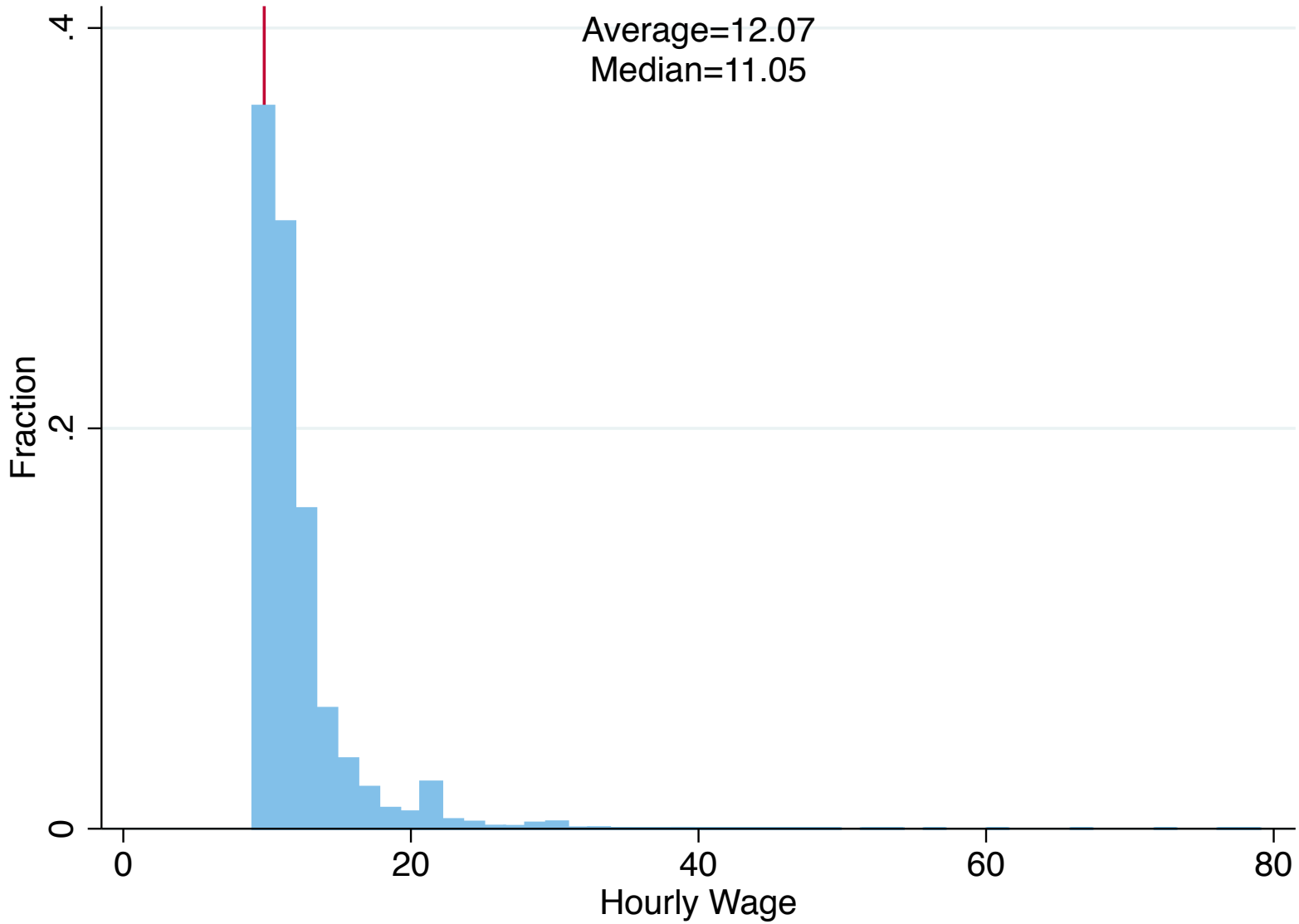
# Wage gains by pre-posting wage level

Back



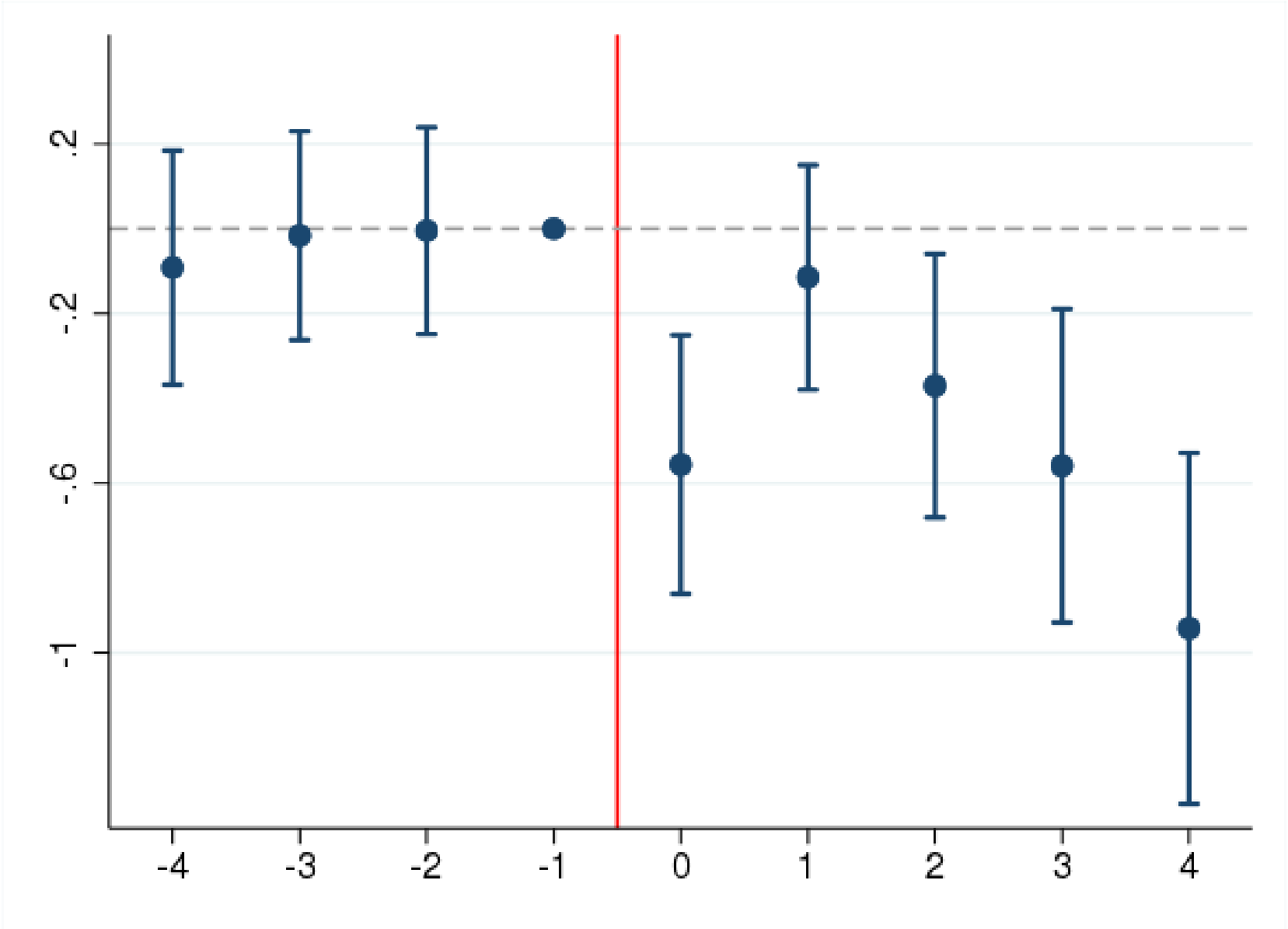
# Wage Distribution of Portuguese Employees Posted to France

Back



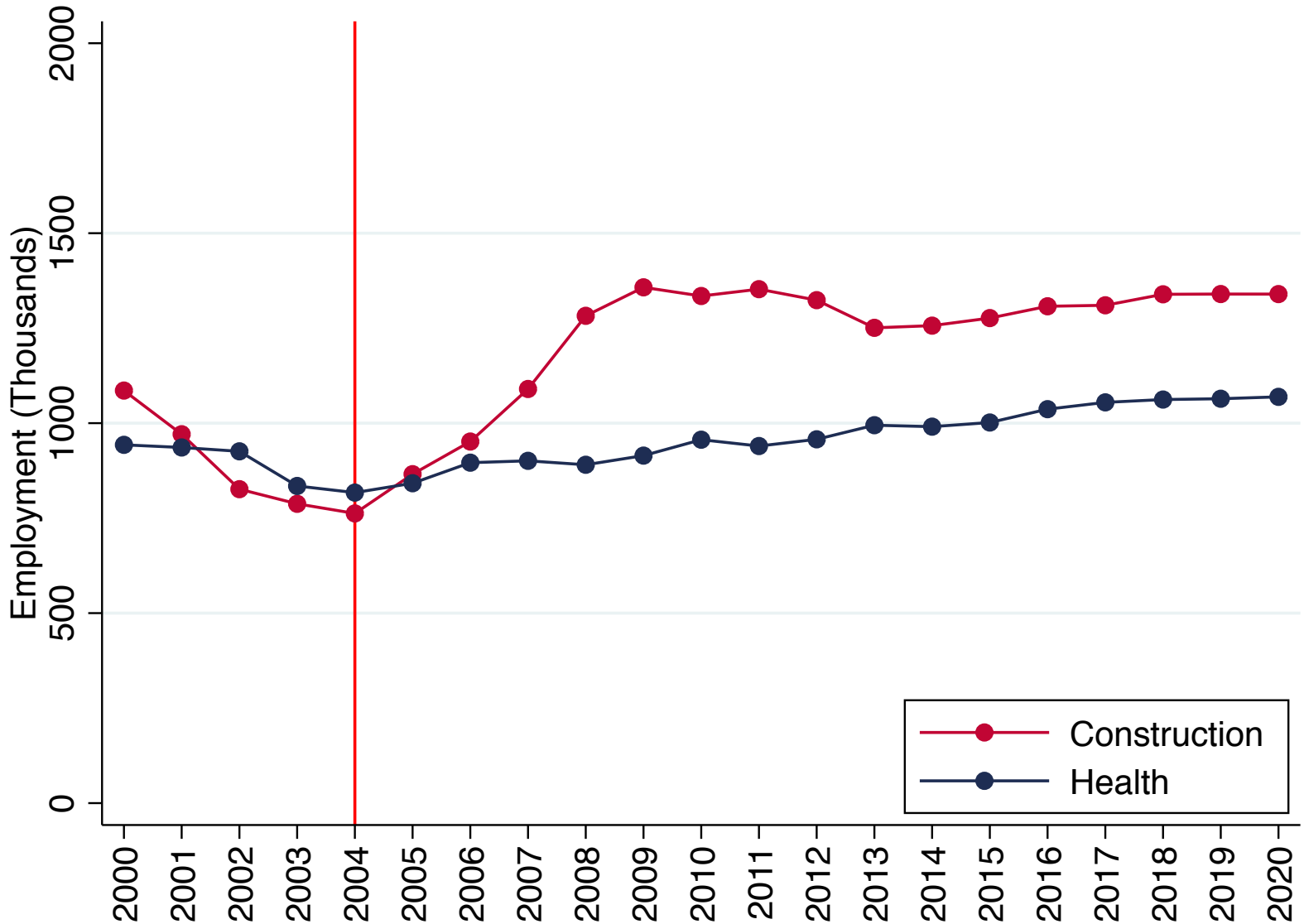
# Domestic Sales After Posting

*Sending firms supply less services at home when they start posting services* Back



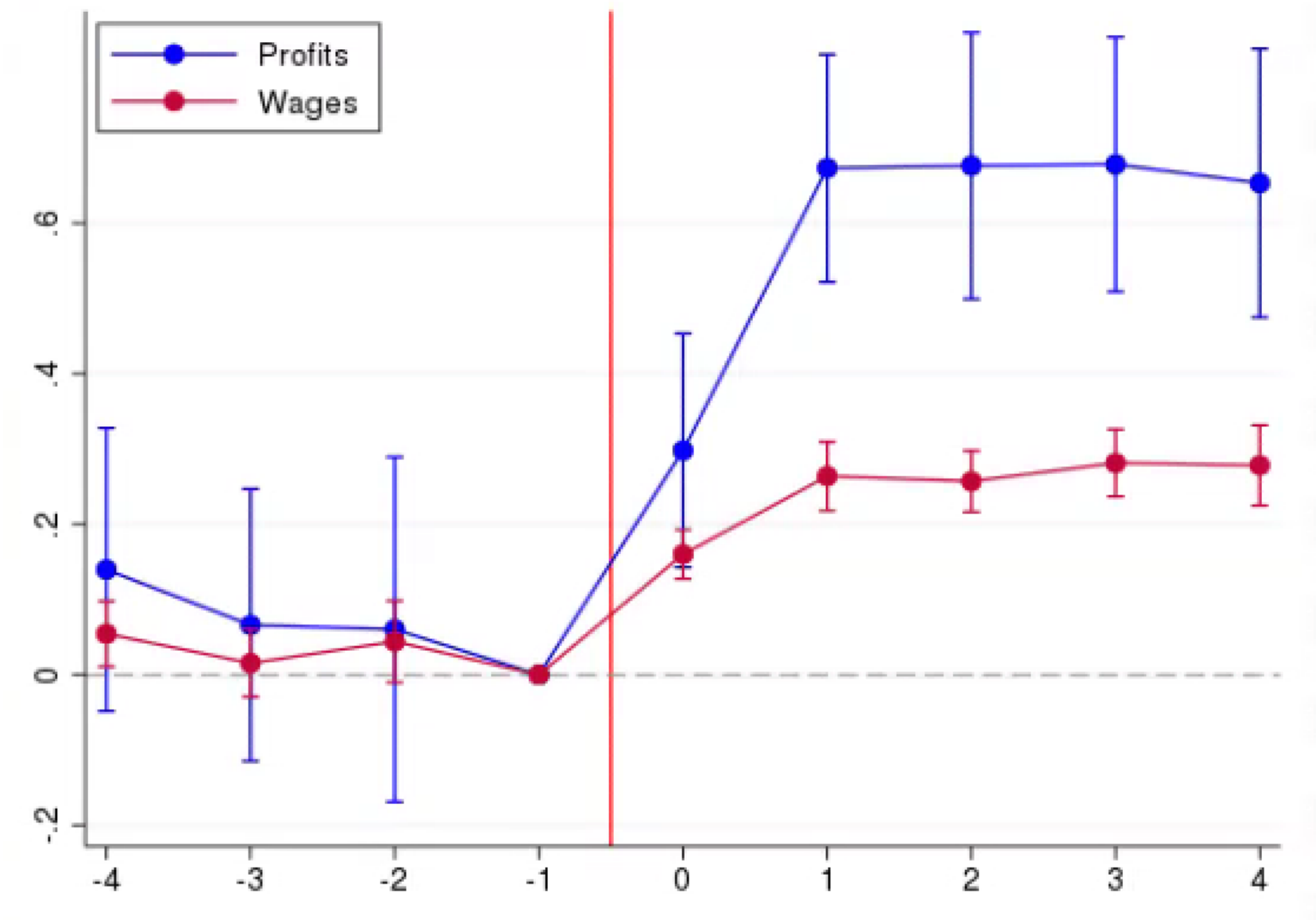
# Employment After Liberalization in Poland

*Employment in construction increased by 16% after 2004* Back



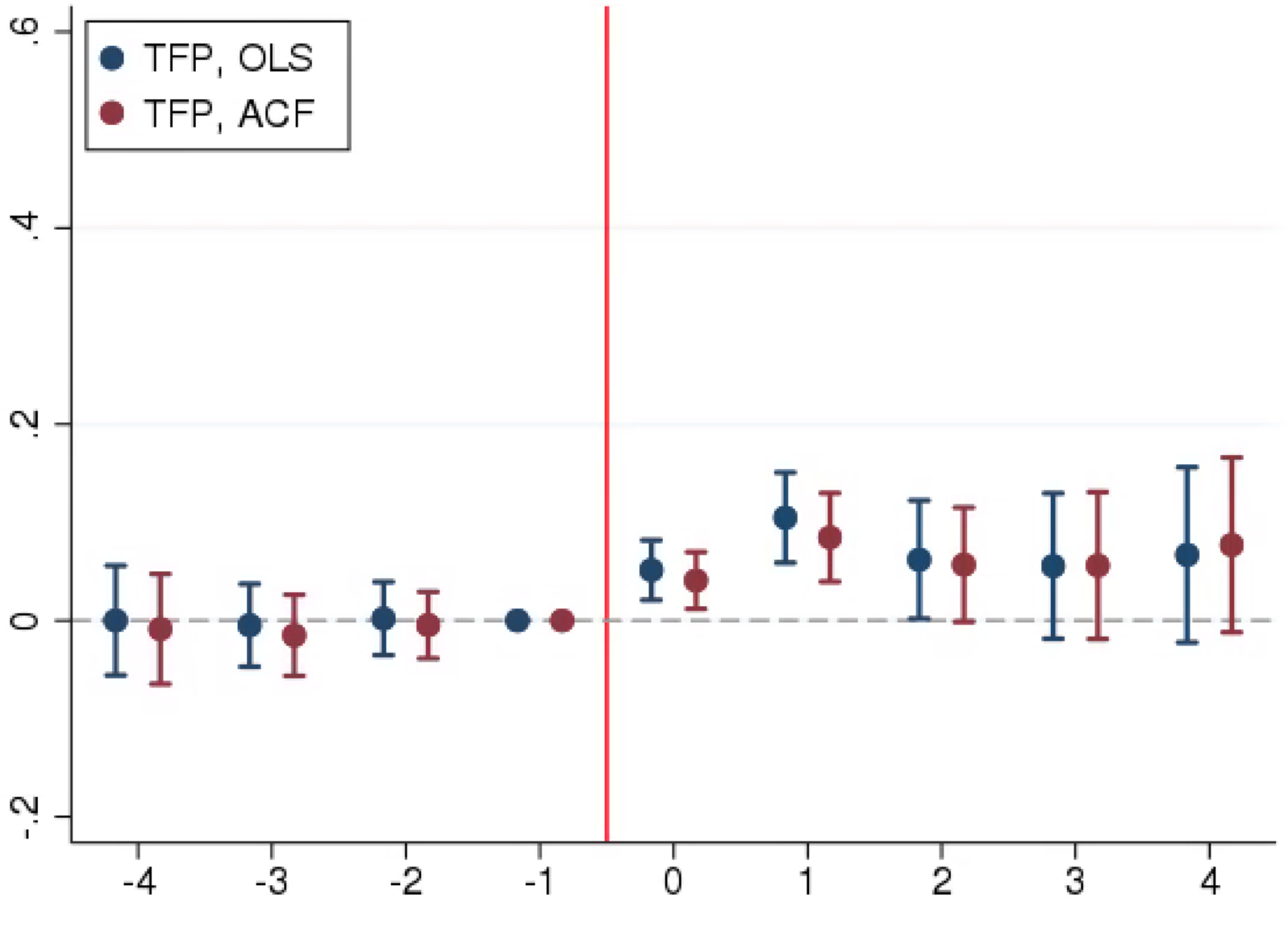
# Profit-Wage Split At Permanent Posting Firms

Back



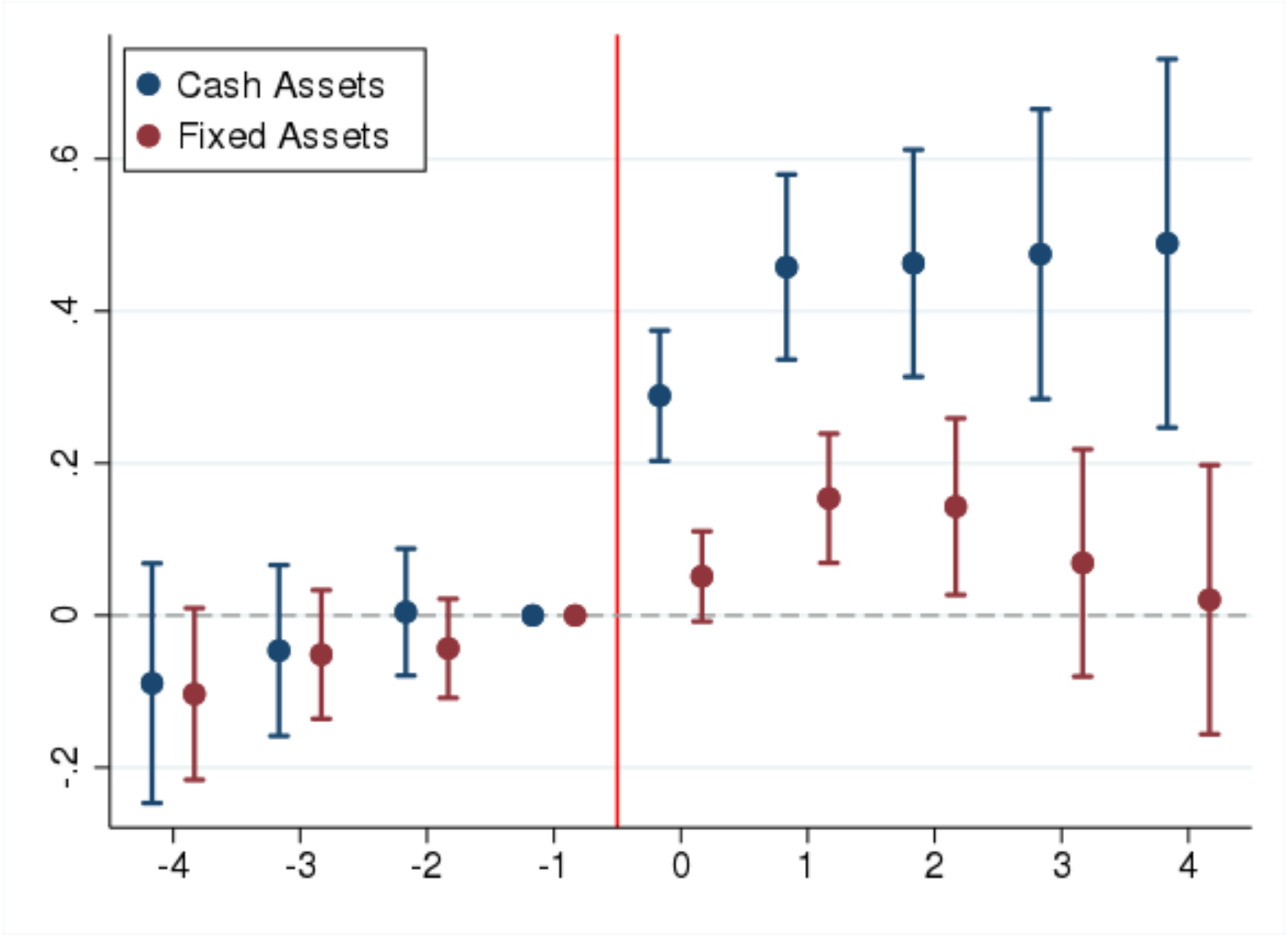
# Effect of Posting on Sending Firms Productivity

Back



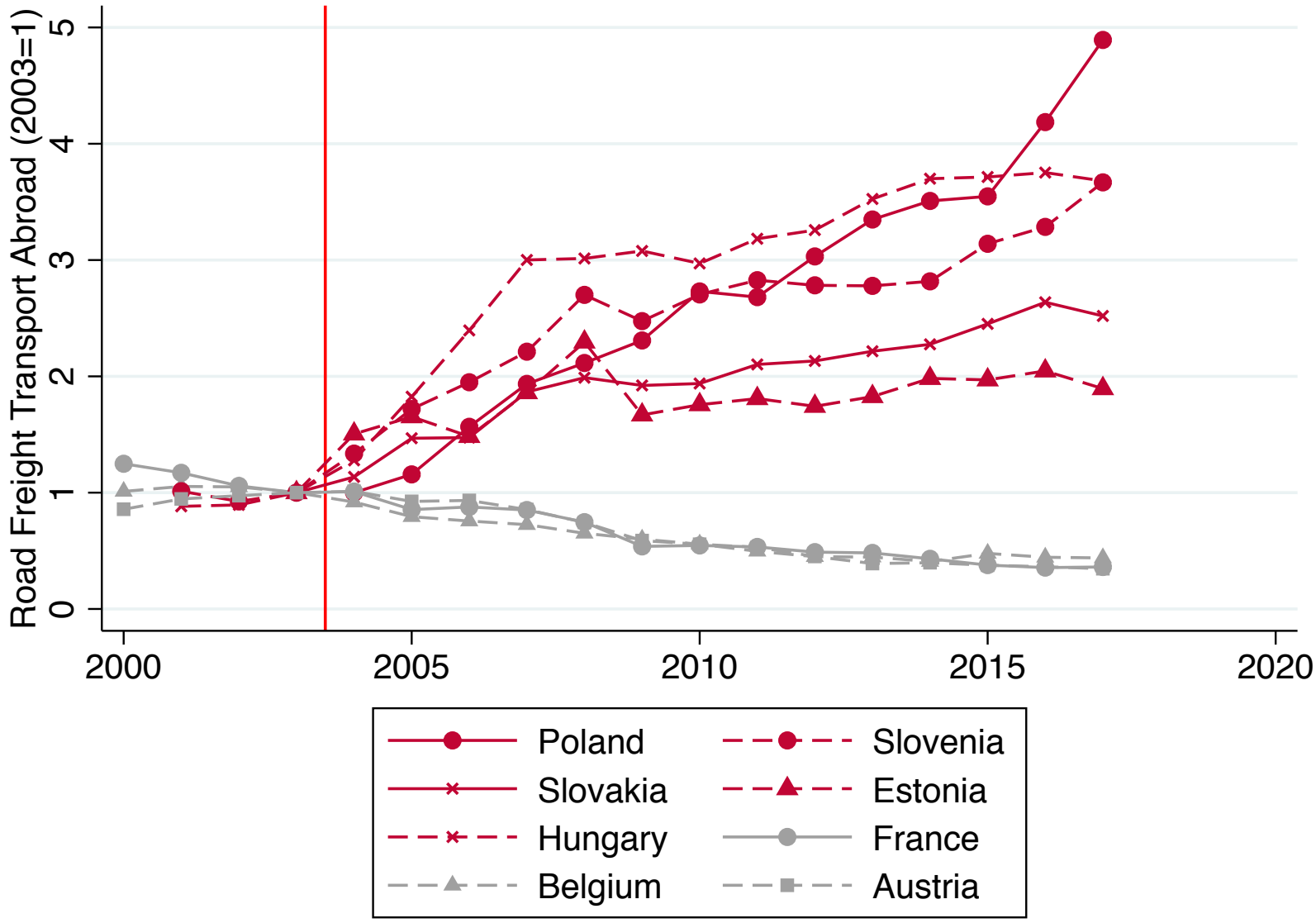
# Effect of Posting on Sending Firms Assets

Back



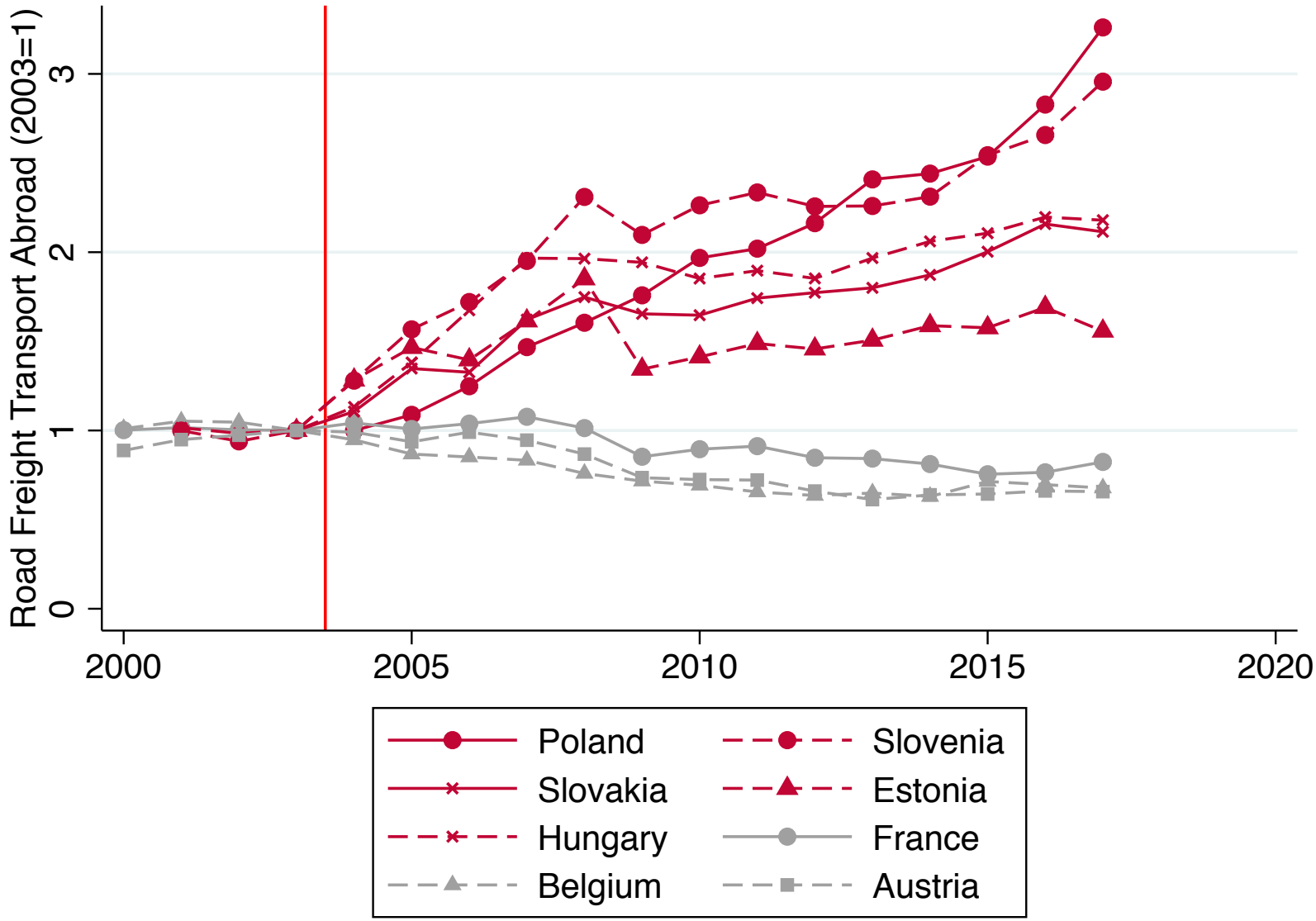
# NMS Export of Truck Services After Liberalization

*Market shares of NMS in road transport boomed after liberalization* Back



# NMS Total Sales of Truck Services After Liberalization

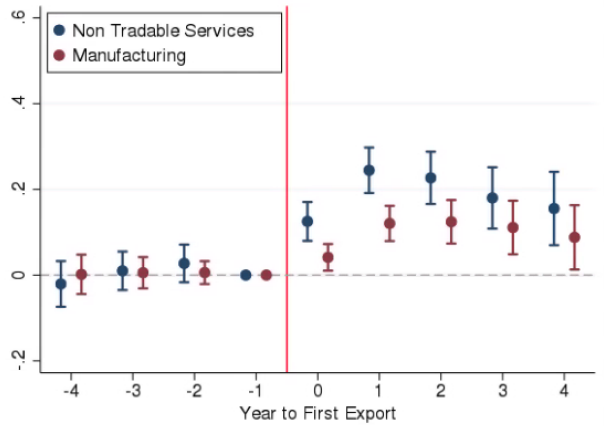
*Overall activity in road transport sectors boomed after liberalization* Back



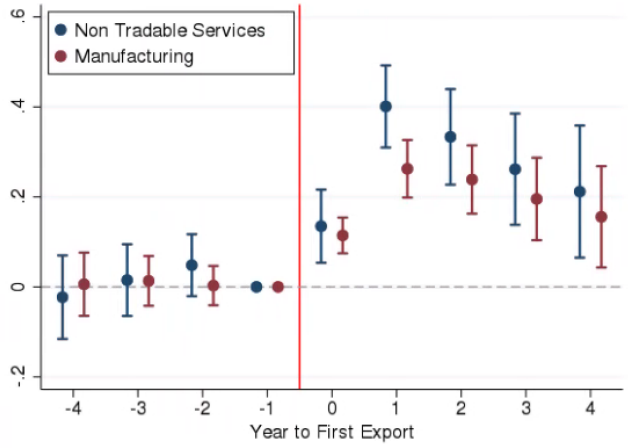
# Non Tradable Vs Manufacturing

Back

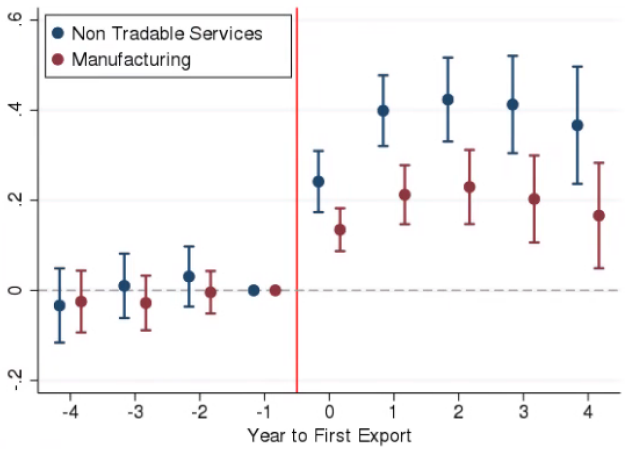
## A. Log Total Employment



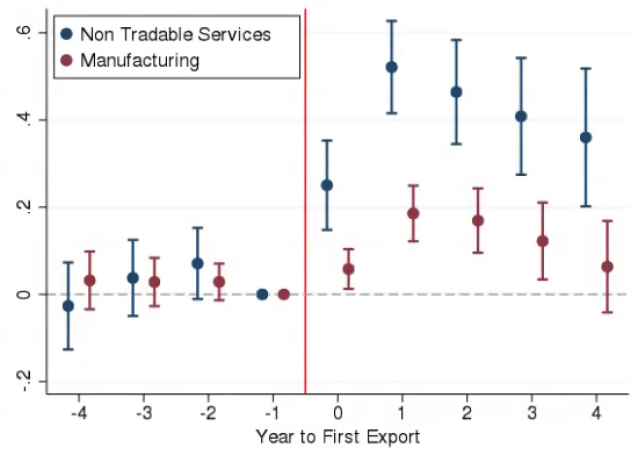

## B. Log Total Turnover




## C. Log Total Assets



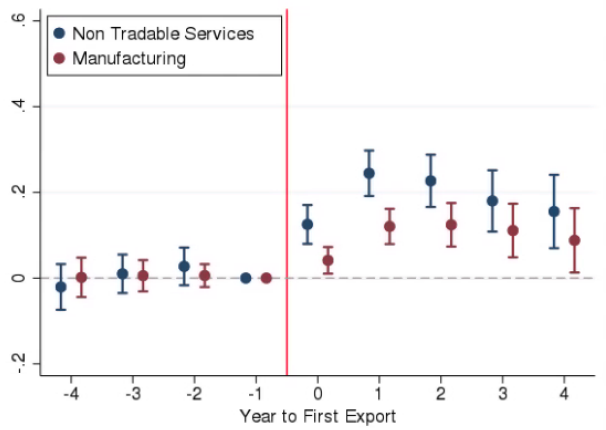

## D. Log Total Wage Bill



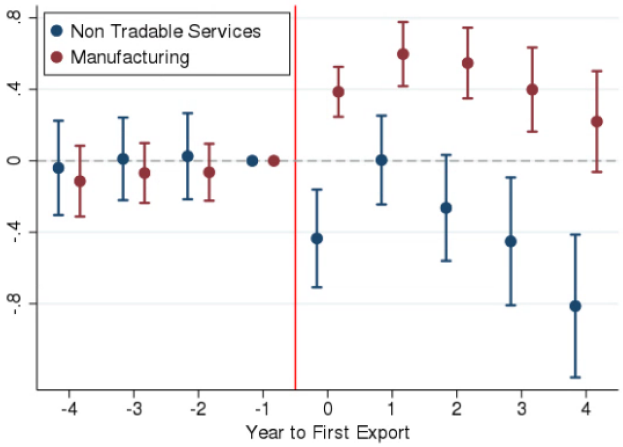
# Non Tradable Vs Manufacturing

Back

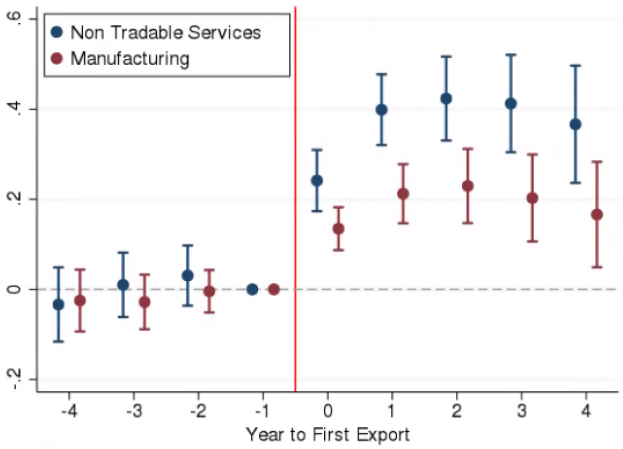
## A. Log Total Employment



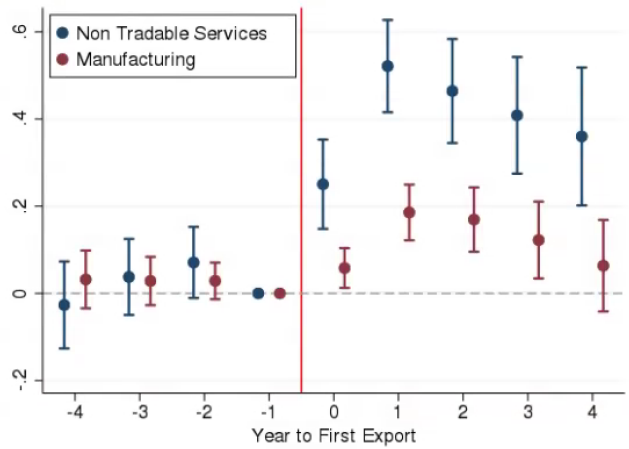

## B. Log Internal Turnover




## C. Log Total Assets

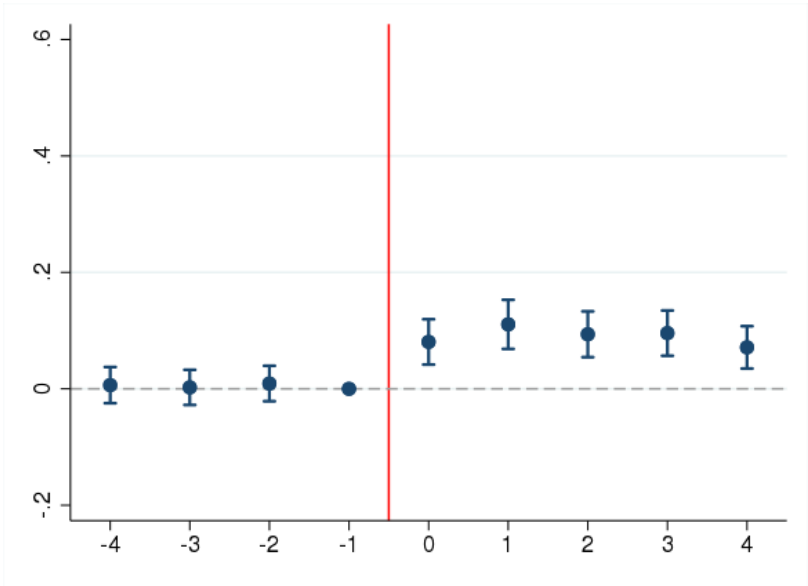



## D. Log Total Wage Bill

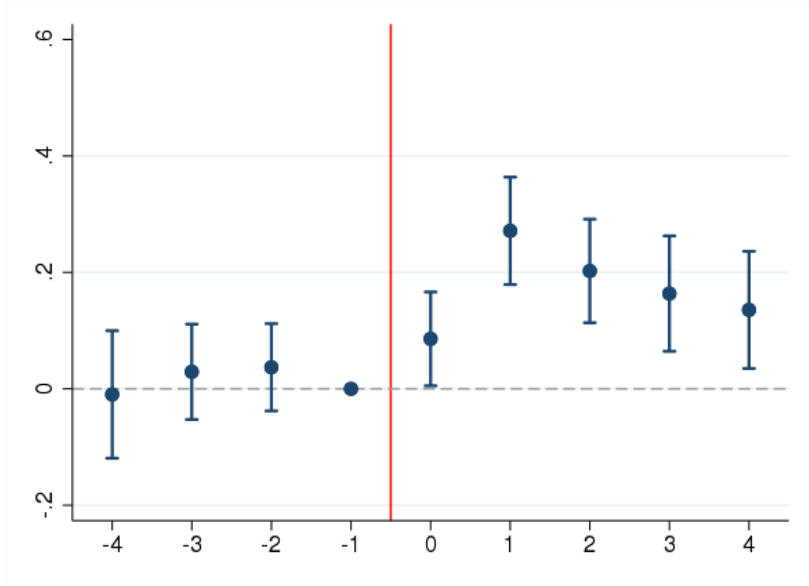


# Mobility Surplus: Firms in Non Postable Sectors

**A. Log Wage**



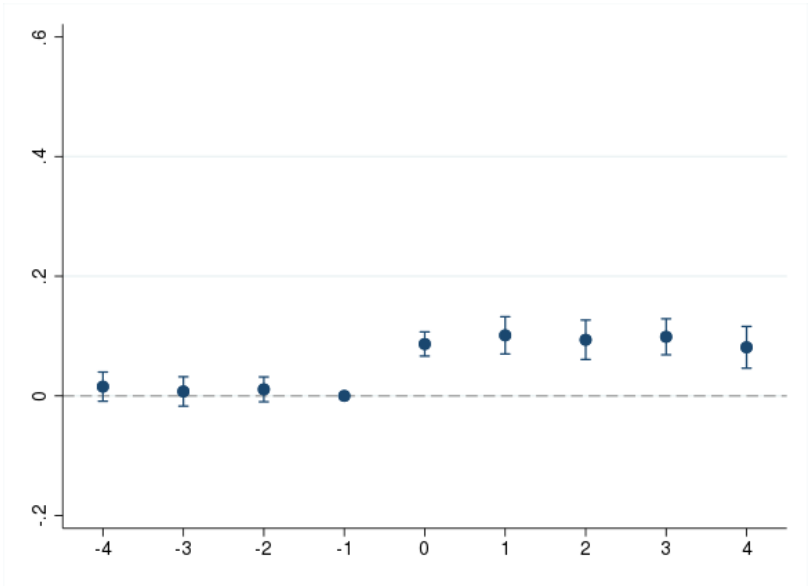

**B. Log Profit**



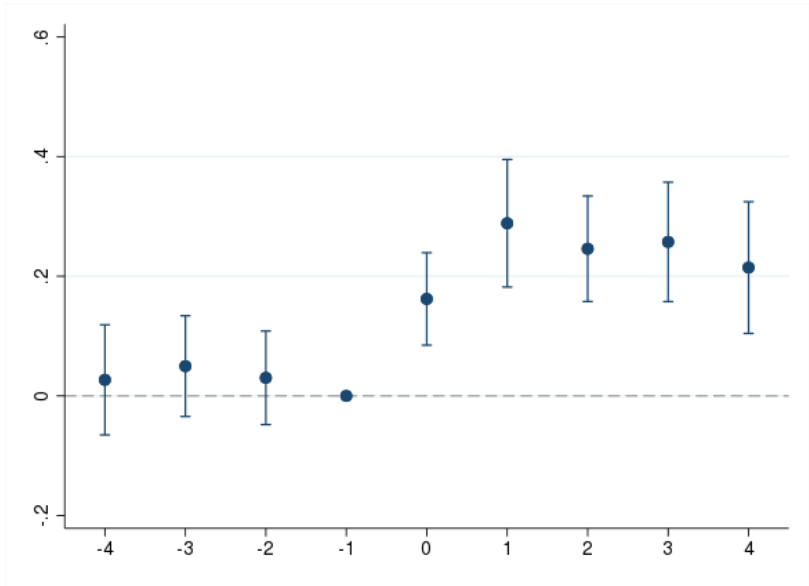

Back

# Mobility Surplus: Matching on Past Outcomes

**A. Log Wage**




**B. Log Profit**

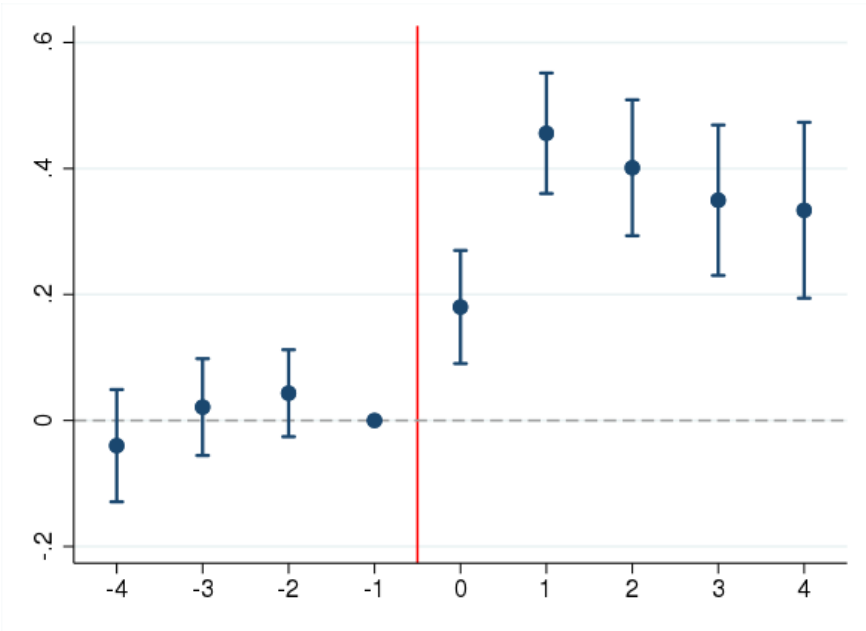



Back

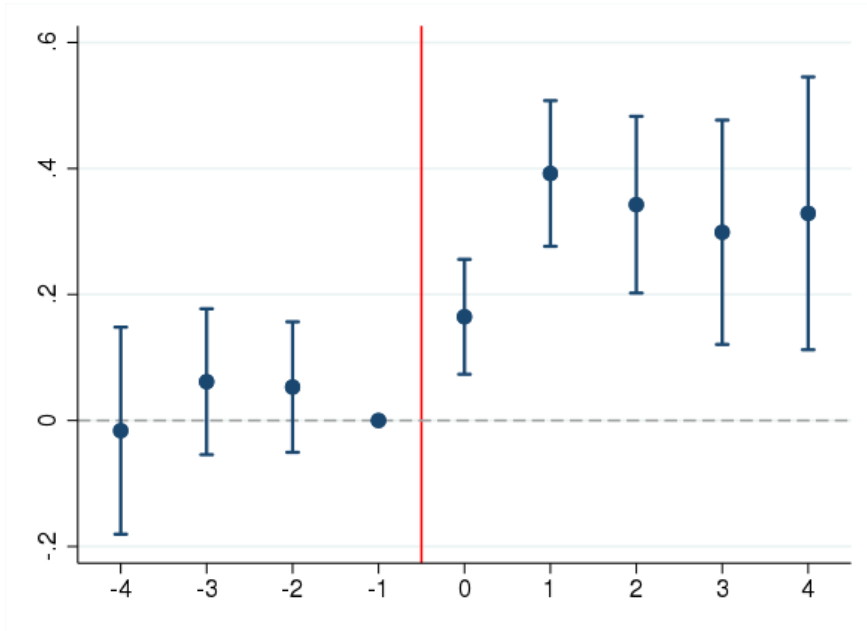
# The Fiscal Externality of Posting in Sending Countries

*Countries collect more taxes when their firms access markets through posting* Go

**A. Log SSC**

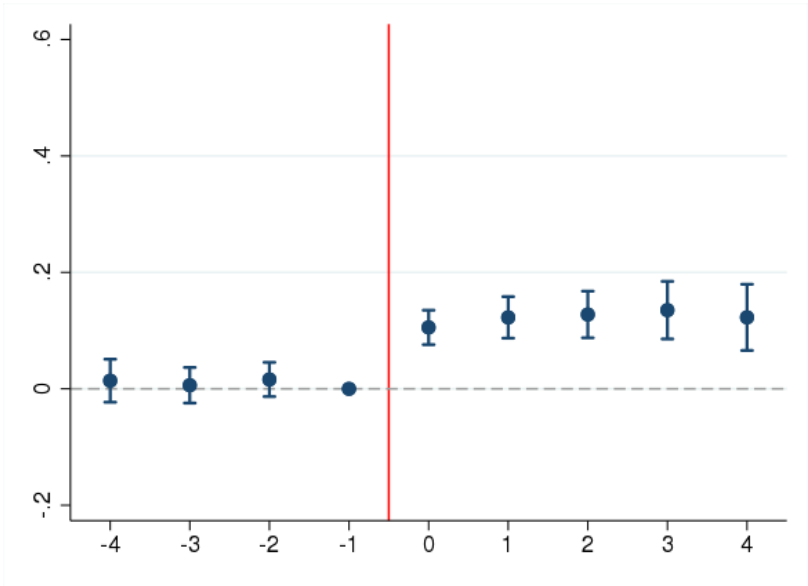



**B. Log CIT**

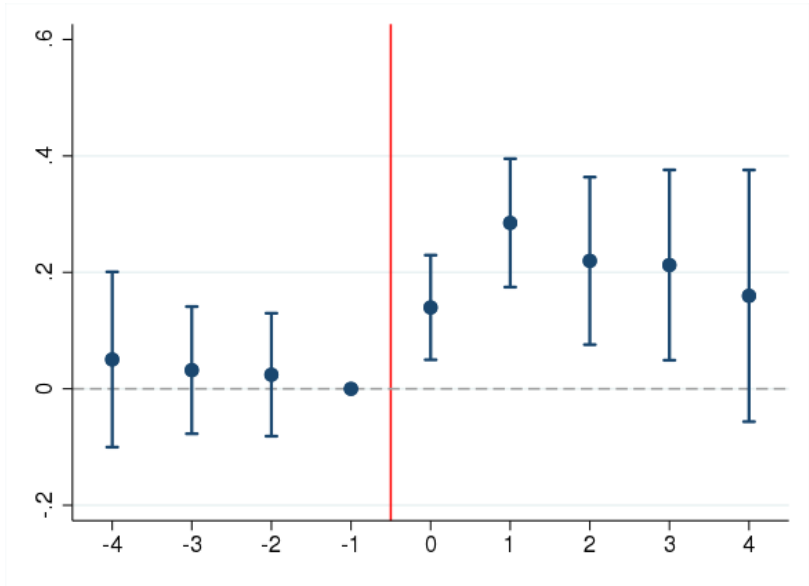


# Mobility Surplus: Balancing Sample Around Event Time

**A. Log Wage**

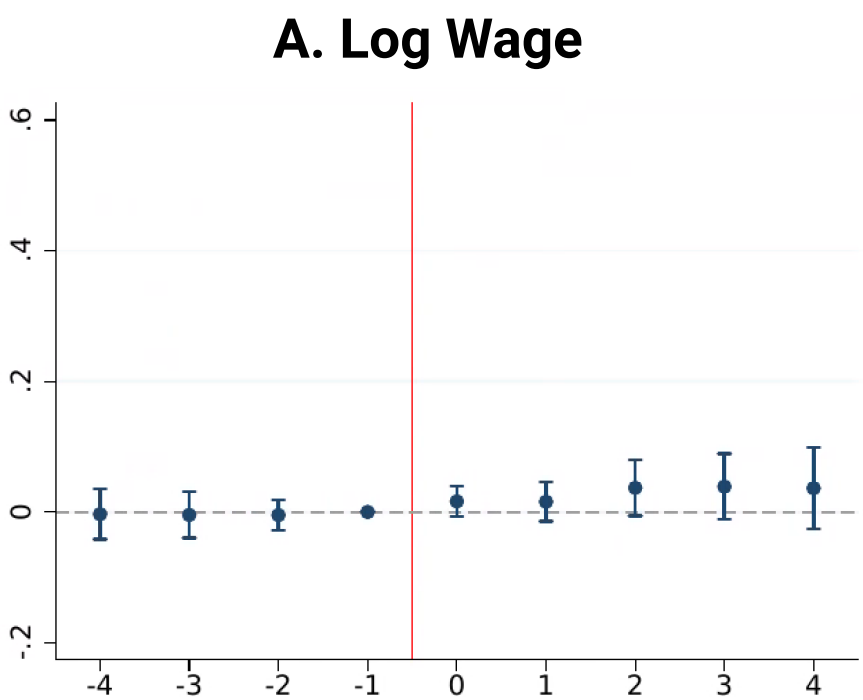


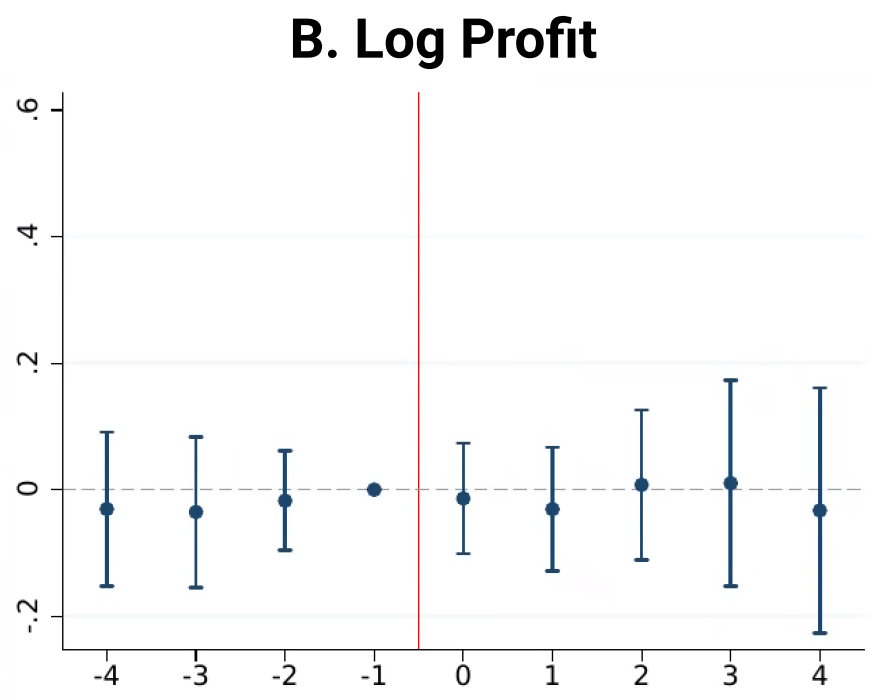

**B. Log Profit**




Back

# Mobility Surplus: Placebo

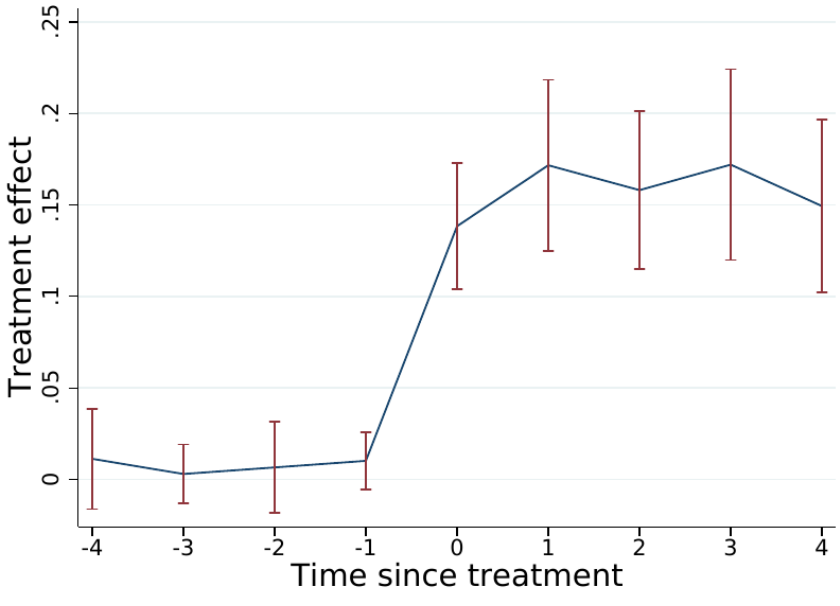


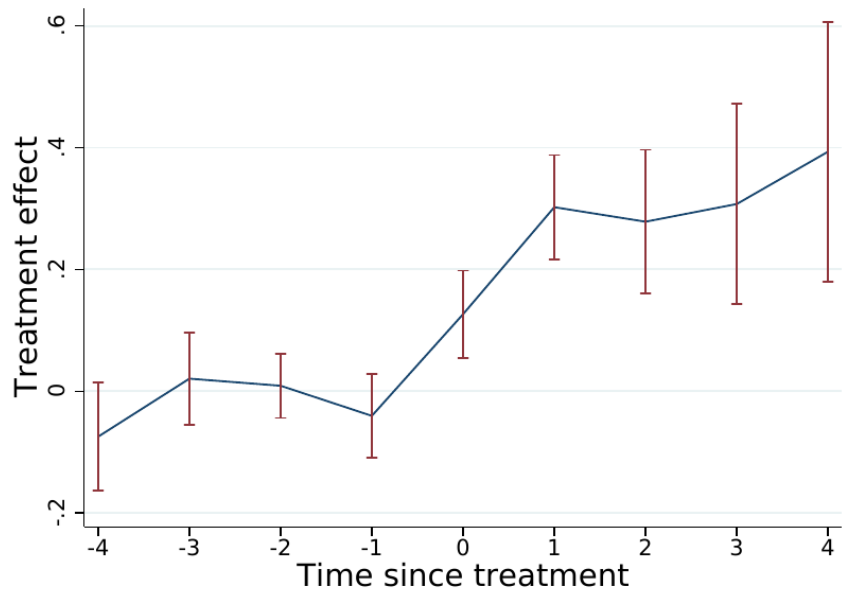

Back

# Mobility Surplus: Heterogenous Treatment Effects

**A. Log Wage**



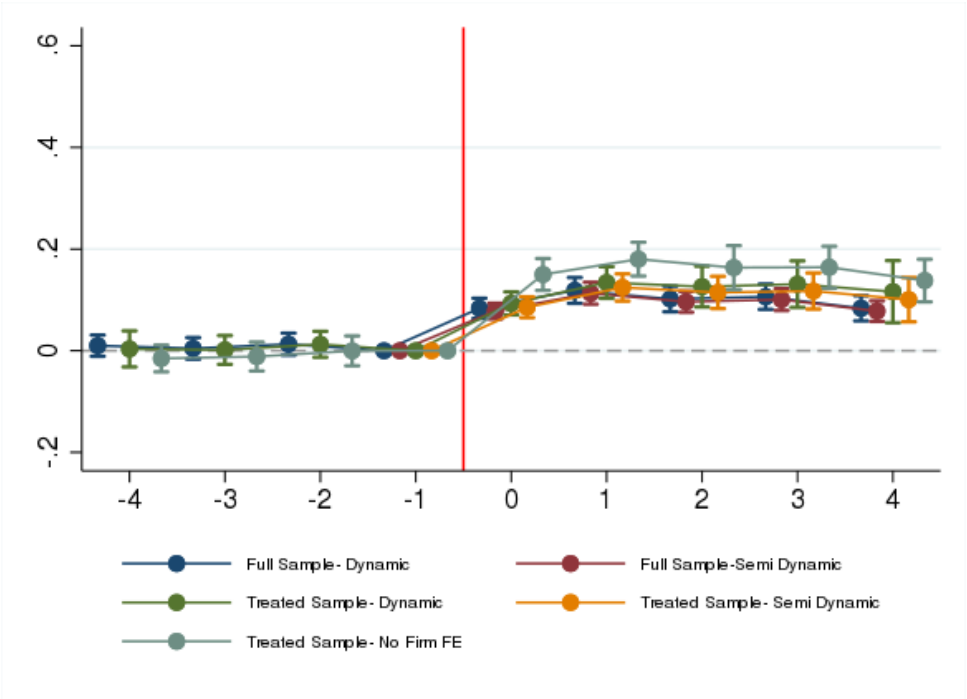

**B. Log Profit**



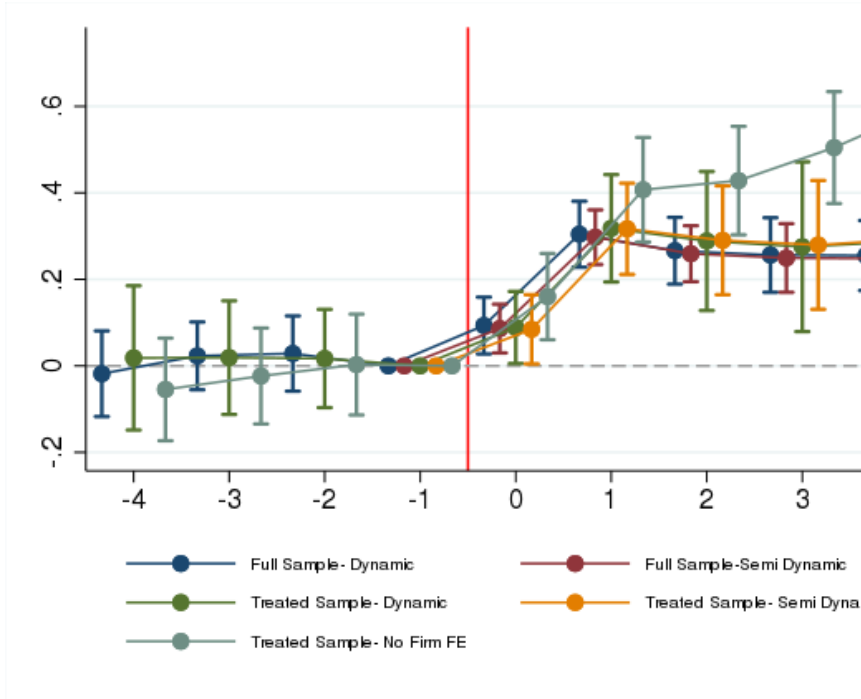

Back

# Mobility Surplus: Heterogenous Treatment Effects

**A. Log Wage**



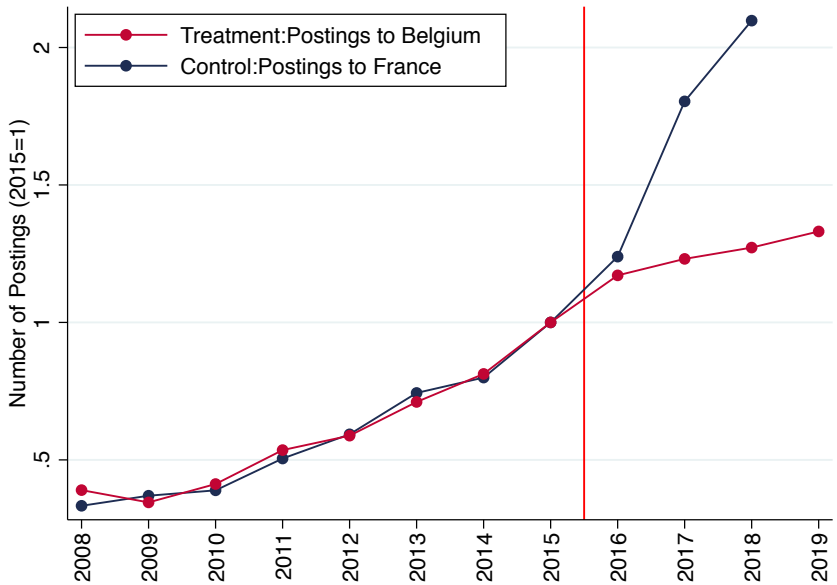

**B. Log Profit**




Back

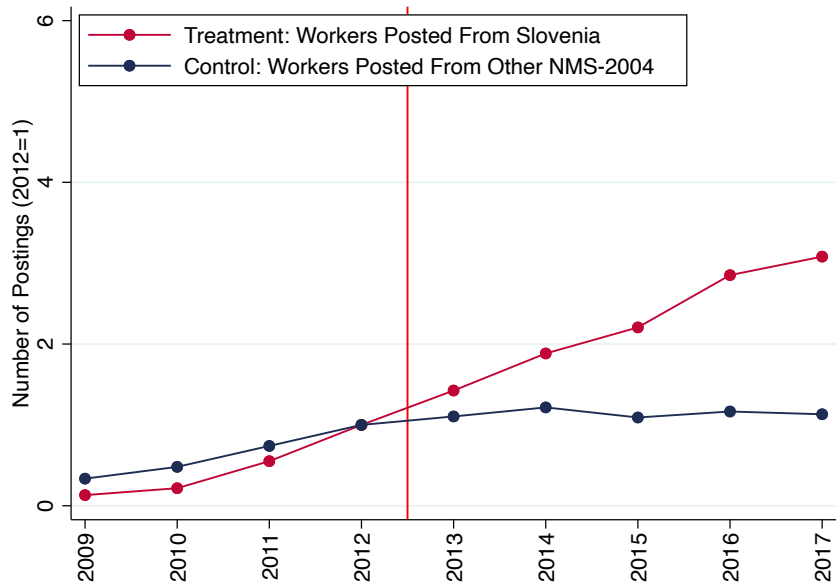
# Effects of Employers Tax Cut on Posting Flows

## A. Belgian Tax Shift
## Tax cut in destination




→ Elasticity=1.4(.4)

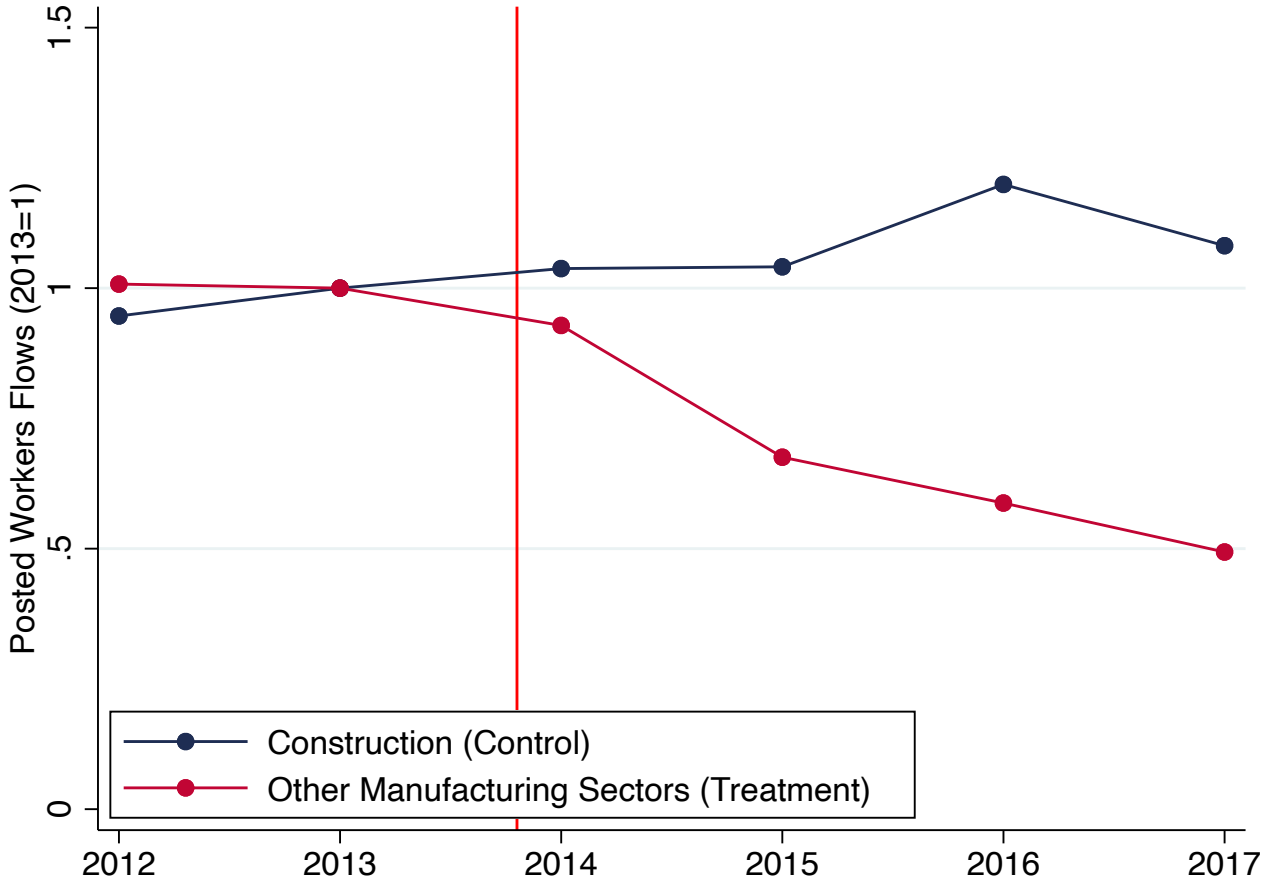
## B. Slovenian Posted Bonus
## Tax cut in origin



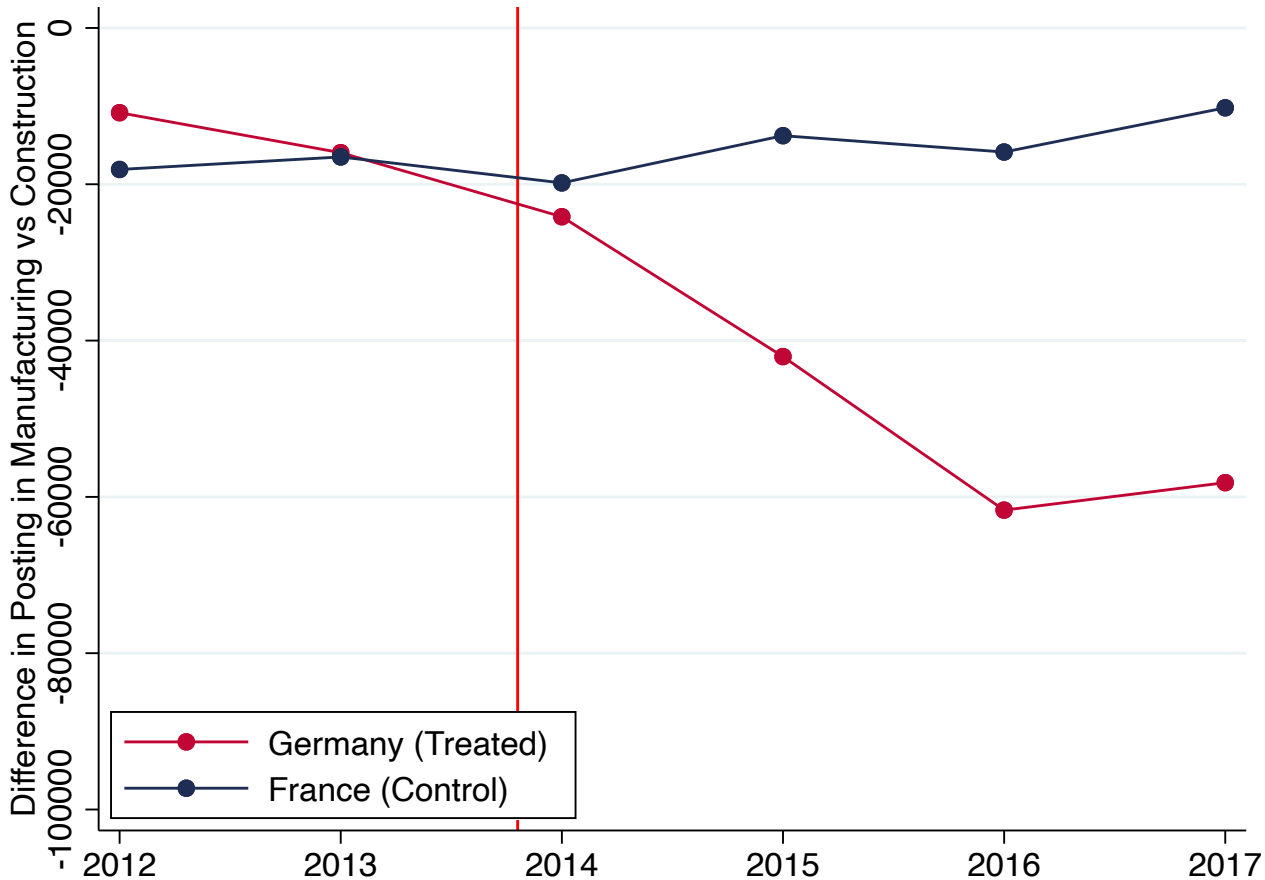

→ Elasticity=-1.6(.3)

Back

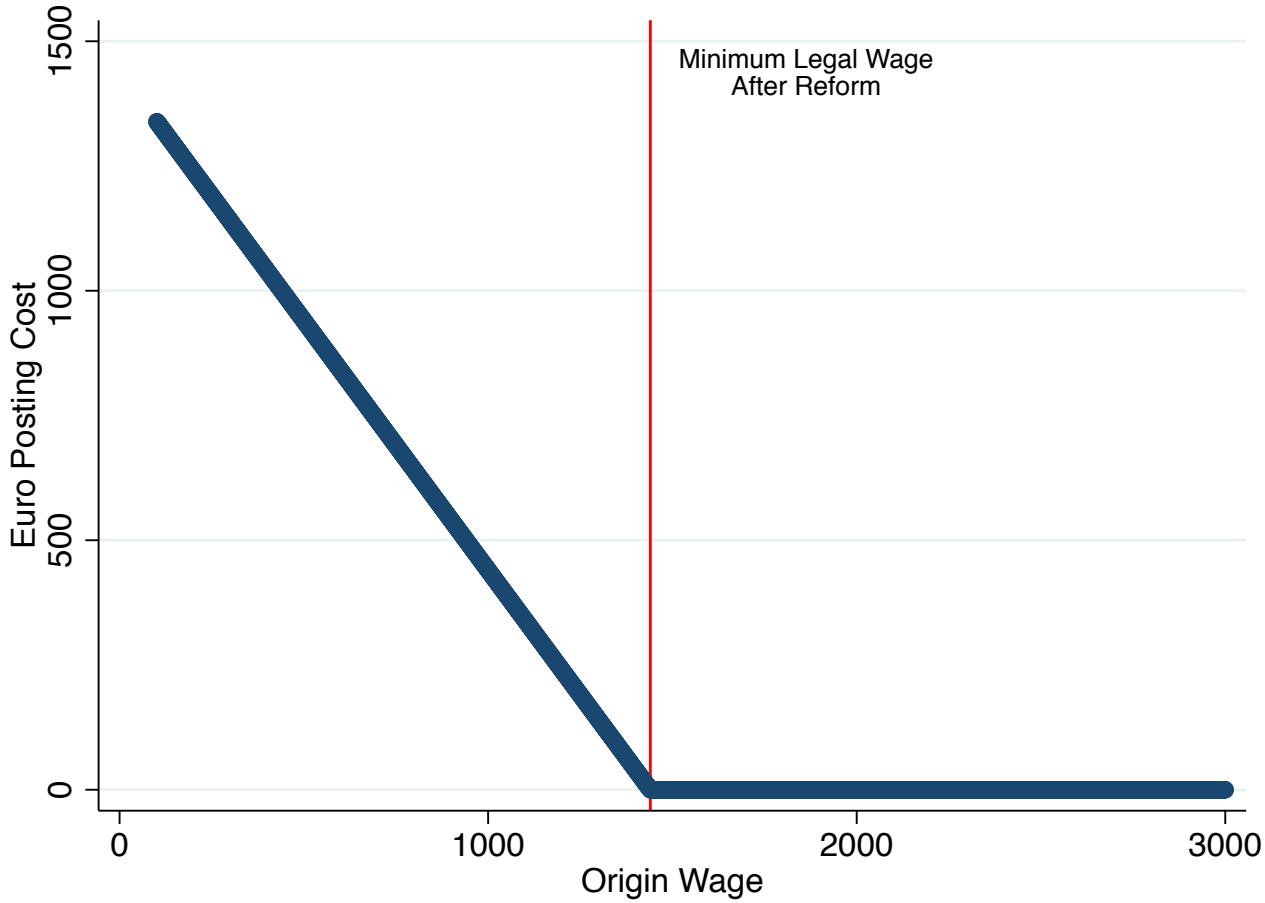
# Postings in Treated vs Control Sector



# Treated vs Control Sector in Treated vs Control Destination



# Heterogeneity by Origin Country




Back

# Heterogeneity by Origin Country

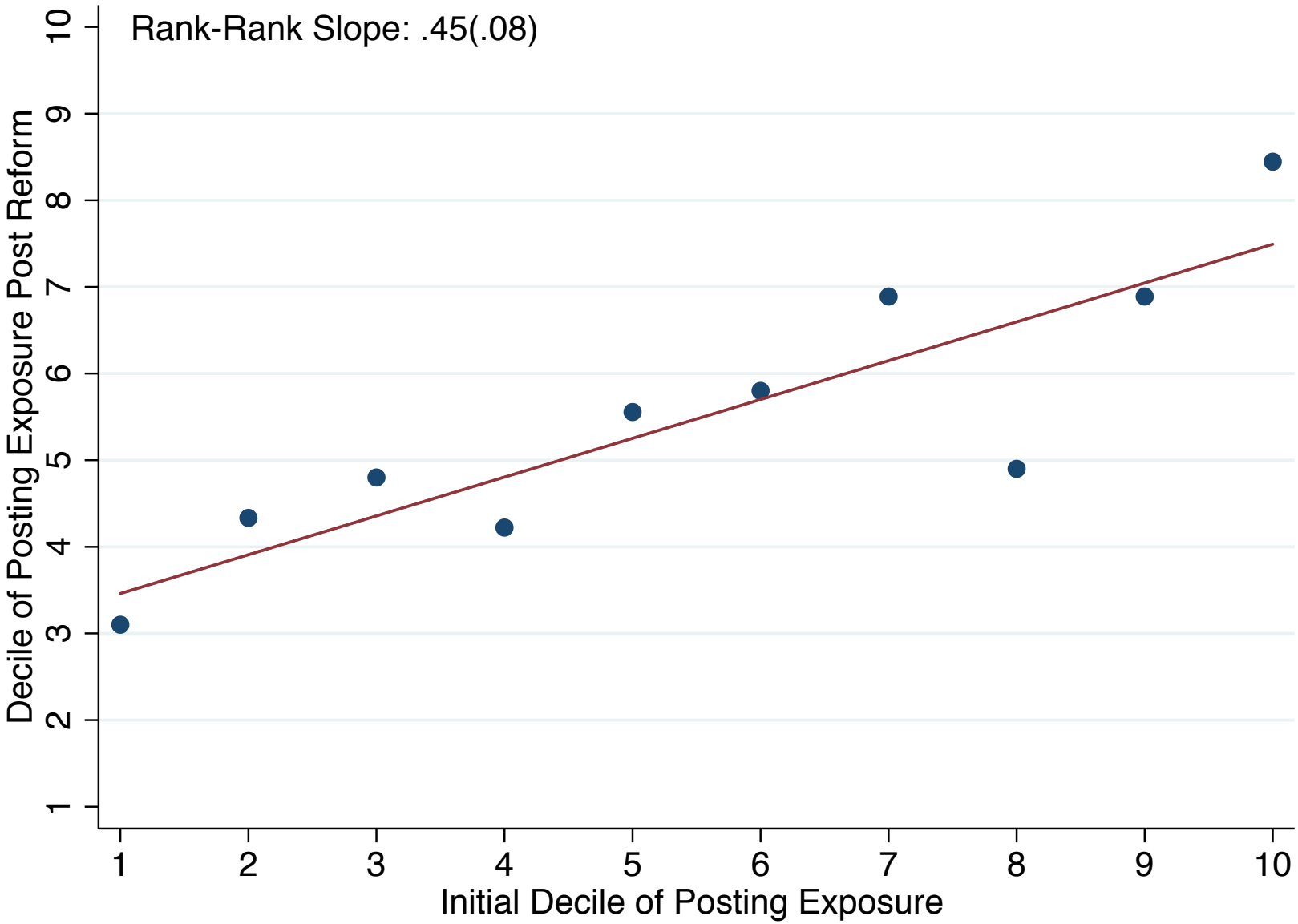



Back

# First Stage: Predicting Exposure to the Liberalization

Back

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



# First Stage: Predicting Exposure to the Liberalization

Back

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

| Dep variable: Posting imports after liberalization per pre-reform worker (log) | | | | |
|---|---|---|---|---|
| | Baseline | Robustness and Alternative Exposure | | |
| | Pre-Reform Exposure (1) | 2000 Norm. (2) | Alt Predicted Exposure (3) | Distance to NMS (4) |
| | .29*** | .28*** | .39*** | -2.4*** |
| | ( .07) | (.06) | (.06) | (.63) |
| Fstat | 19.49 | 19.81 | 44.2 | 14.1 |
| Anderson-Rubin | 15.86 | 15.41 | 38.9 | 21.8 |
| Observations | 94 | 94 | 94 | 94 |
| Average delete-one | 19.3 | 19.5 | 43.2 | 13.1 |
| Fstat, Young (2021) | Graph | | | |

Robust standard errors in parentheses.

# Zero First Stage: Back

*Pre-reform exposure to the policy is not explained by differential labor market pre trends*

| Dep variable: Pre-Reform Exposure | (1) |
|---|---|
| **Pre-trends** | |
| Δ1993-2003 Working Age Pop | 0.005 |
| | (.003) |
| Δ1993-2003 Exposed Employment | .013 |
| | (.012) |
| Δ1993-2003 Sheltered Employment | .004 |
| | (.005) |
| Δ1993-2003 Unemployment | -.001 |
| | (.008) |
| **Initial demographics** | |
| % Working Age Pop Employed in 2003 | -.01 |
| | (.02) |
| % Share Employed in Manufacturing in 2003 | .02 |
| | (.02) |
| % Foreigners in 2003 | -.05*** |
| | (.017) |
| % Blue Collar Workers in 2003 | .06*** |
| | (.019) |

# Balance

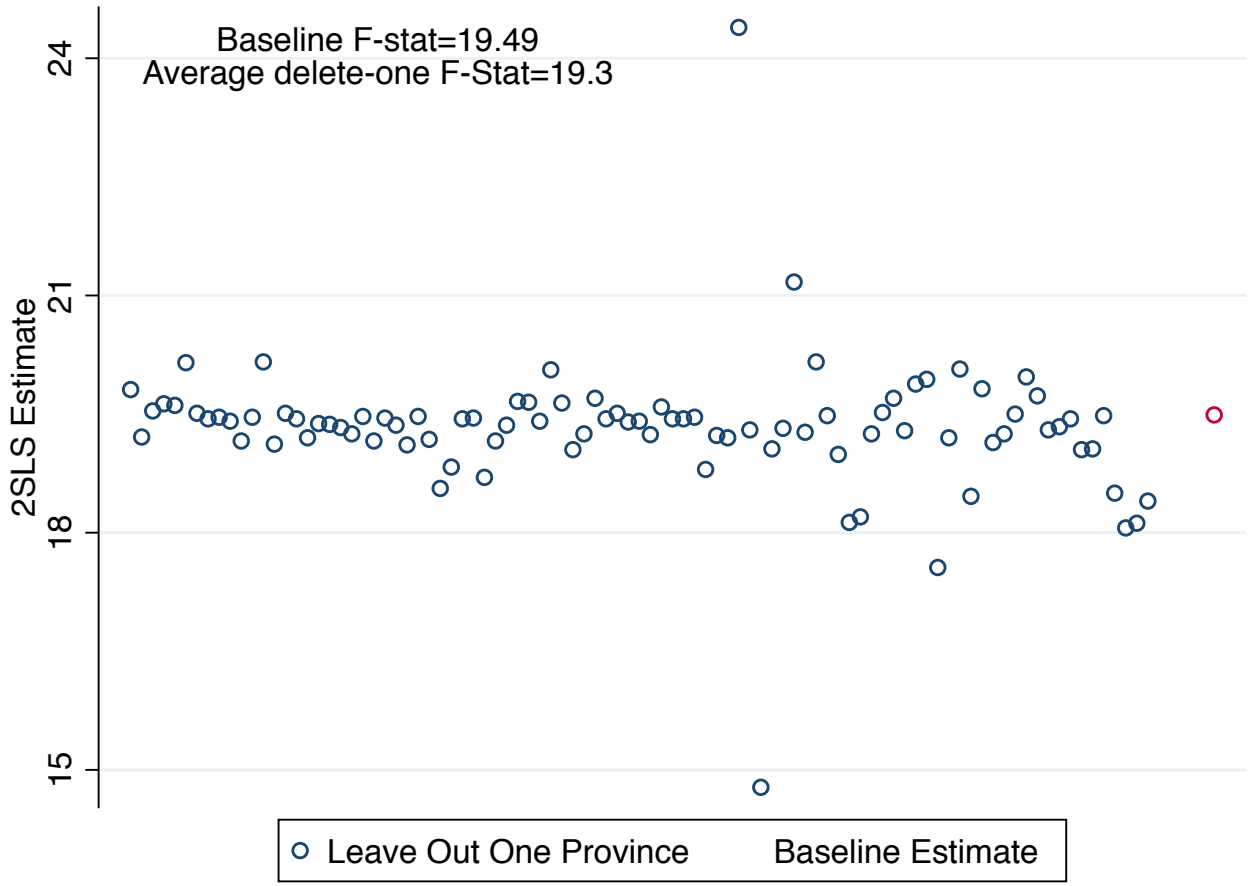
Back

*Pre-reform characteristics of low and high exposure provinces*

| Pre-reform Level | Bottom 20 Exposure | Top 20 Exposure |
|---|---|---|
| Share of blue collar workers | .24 | .28 |
| Share of manufacturing employment | .16 | .18 |
| Share of Foreign Born | 11.2 | 7.9 |
| Share of Working Age Pop in Employment | .65 | .64 |
| Working Age Population (thousands) | 490 | 407 |
| Share with an International Border | 6% | 38% |
| Pre-reform Posting Imports per Worker | .01 % | .4% |

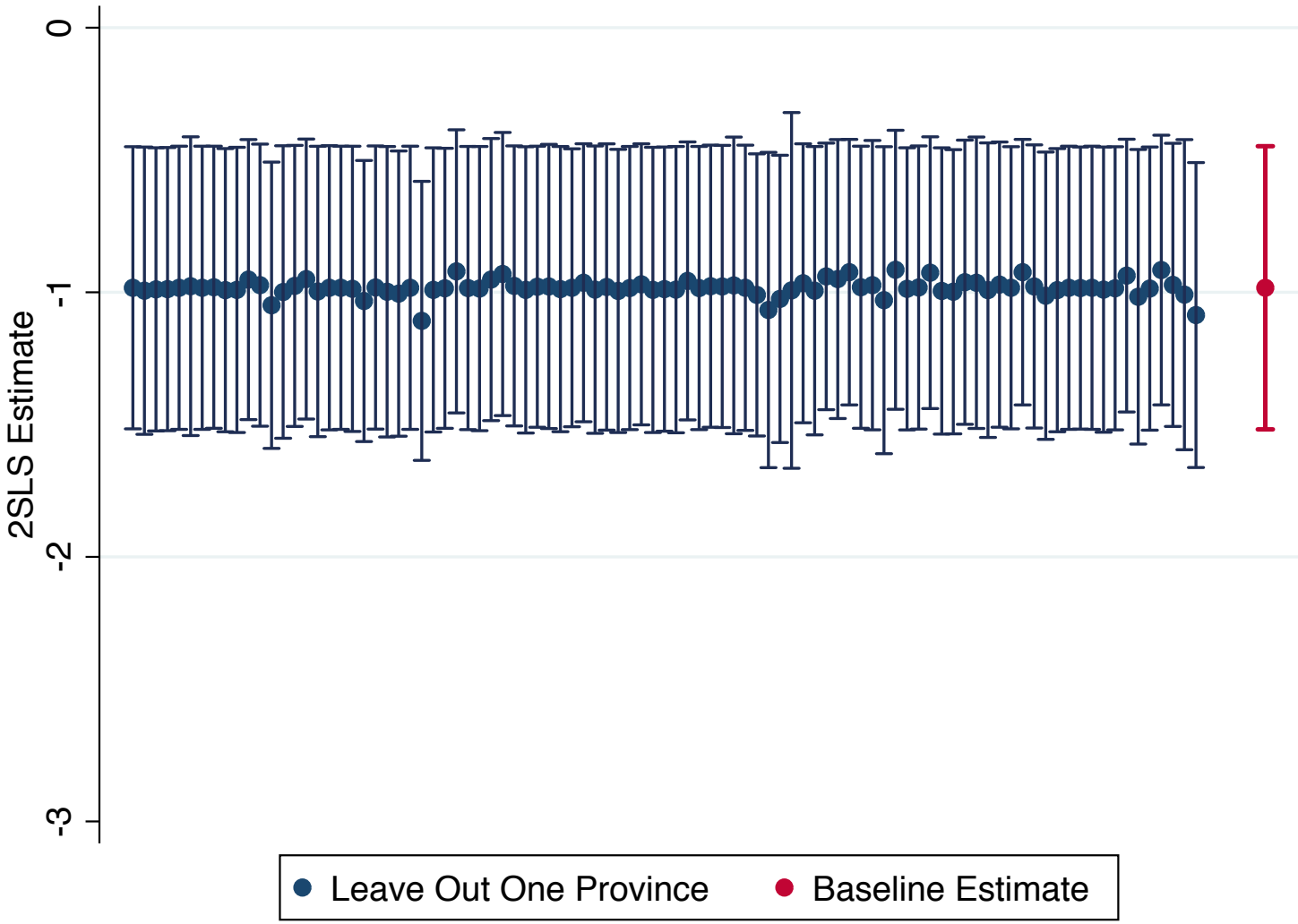
# Robustness to Delete-One Test

Back



# Robustness to Delete-One Test

Back



# Local-Labor-Market Employment Effects

*Robustness and Alternative Specifications* Back

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

| | (1) 2000 Industry Shares | (2) Distance to NMS Exposure | (3) Excluding Industrial Services | (4) Regional Exposure |
|---|---|---|---|---|
| $\rho$ | -.06*** | -.07*** | -.05*** | -.05*** |
| | (.01) | (.01) | (.01) | (.01) |
| Observations | 46 | 46 | 46 | 46 |
| DiD Graph | Go | Go | Go | Go |

| | (5) Employment level | (6) Top 10% Exposure | (7) Excluding adjacent Provinces |
|---|---|---|---|
| $\rho$ | -.07*** | -.08*** | -.08*** |
| | (.01) | (.01) | (.007) |
| Observations | 46 | 46 | 46 |
| DiD Graph | Go | Go | Go |

*p<0.10, **p<0.05, ***p<0.01. Robust standard errors in parentheses.

# Local-Labor-Market Employment Effects

*Robustness and Alternative Specifications* Back

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

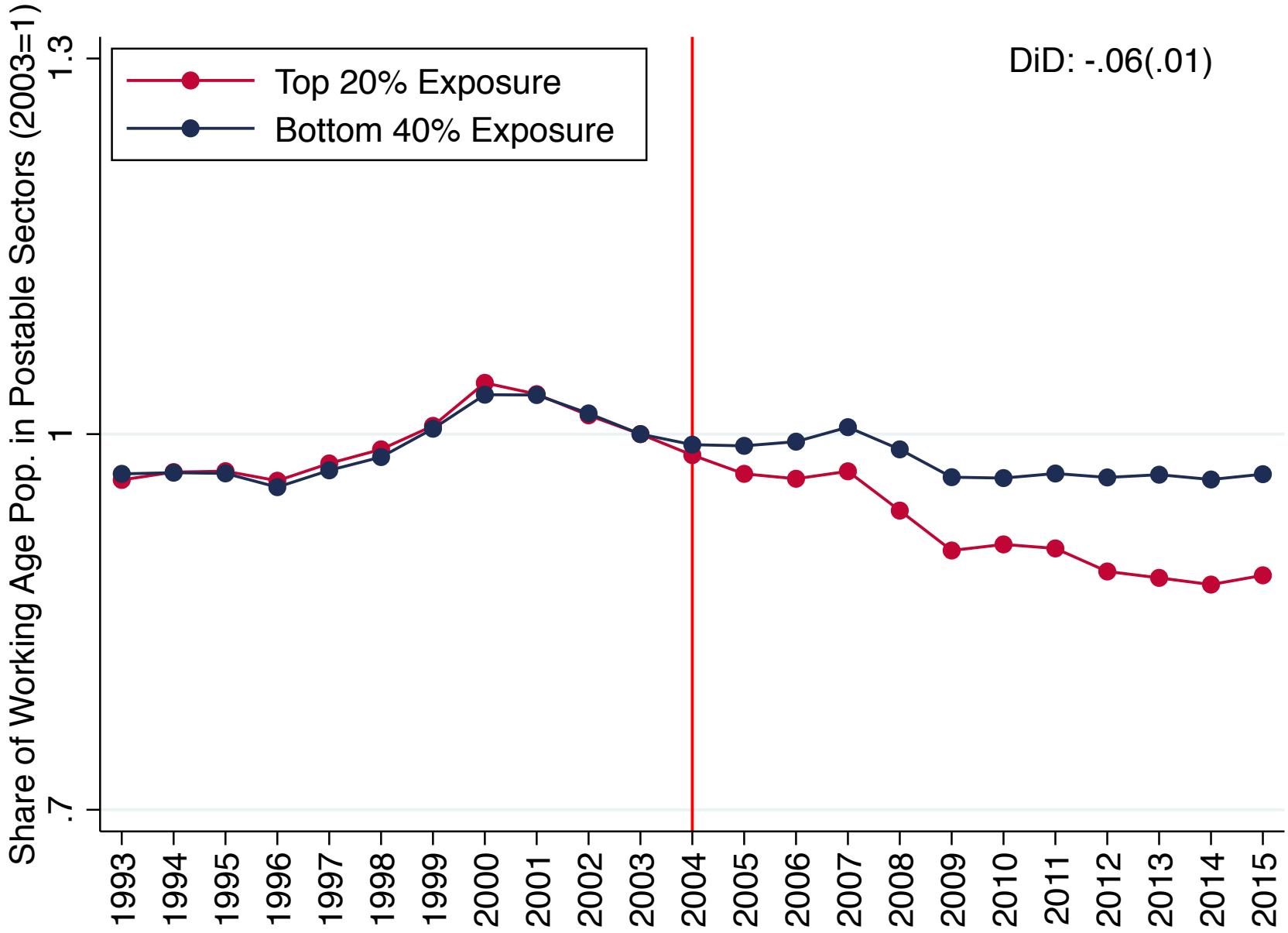
| | (1) 2000 Industry Shares | (2) Distance to NMS Exposure | (3) Excluding Industrial Services | (4) Regional Exposure |
|---|---|---|---|---|
| $\rho$ | -.06*** | -.07*** | -.05*** | -.05*** |
| | (.01) | (.01) | (.01) | (.01) |
| Observations | 46 | 46 | 46 | 46 |
| DiD Graph | Go | Go | Go | Go |

| | $\Delta \ln(Emp_{pt})$ 2003-2015 | |
|---|---|---|
| | OLS | IV |
| 2015 Posting (log) | -.026*** | -.11*** |
| | (.00) | (.02) |
| Observations | 94 | 94 |
| F-Stat | | 18.7 |

*p<0.10, **p<0.05, ***p<0.01. Robust standard errors in parentheses.

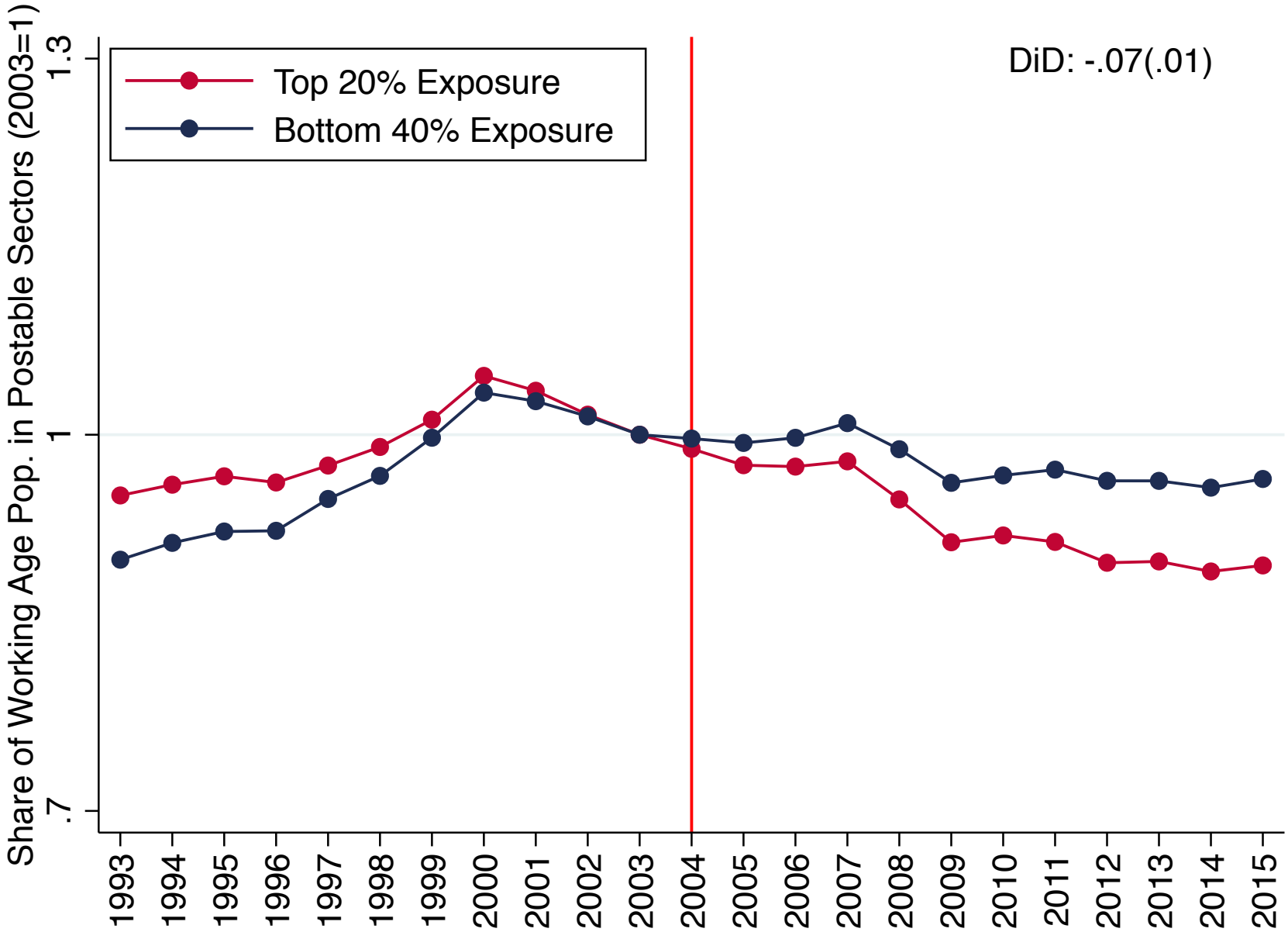
# 2000 Industry Share

Back



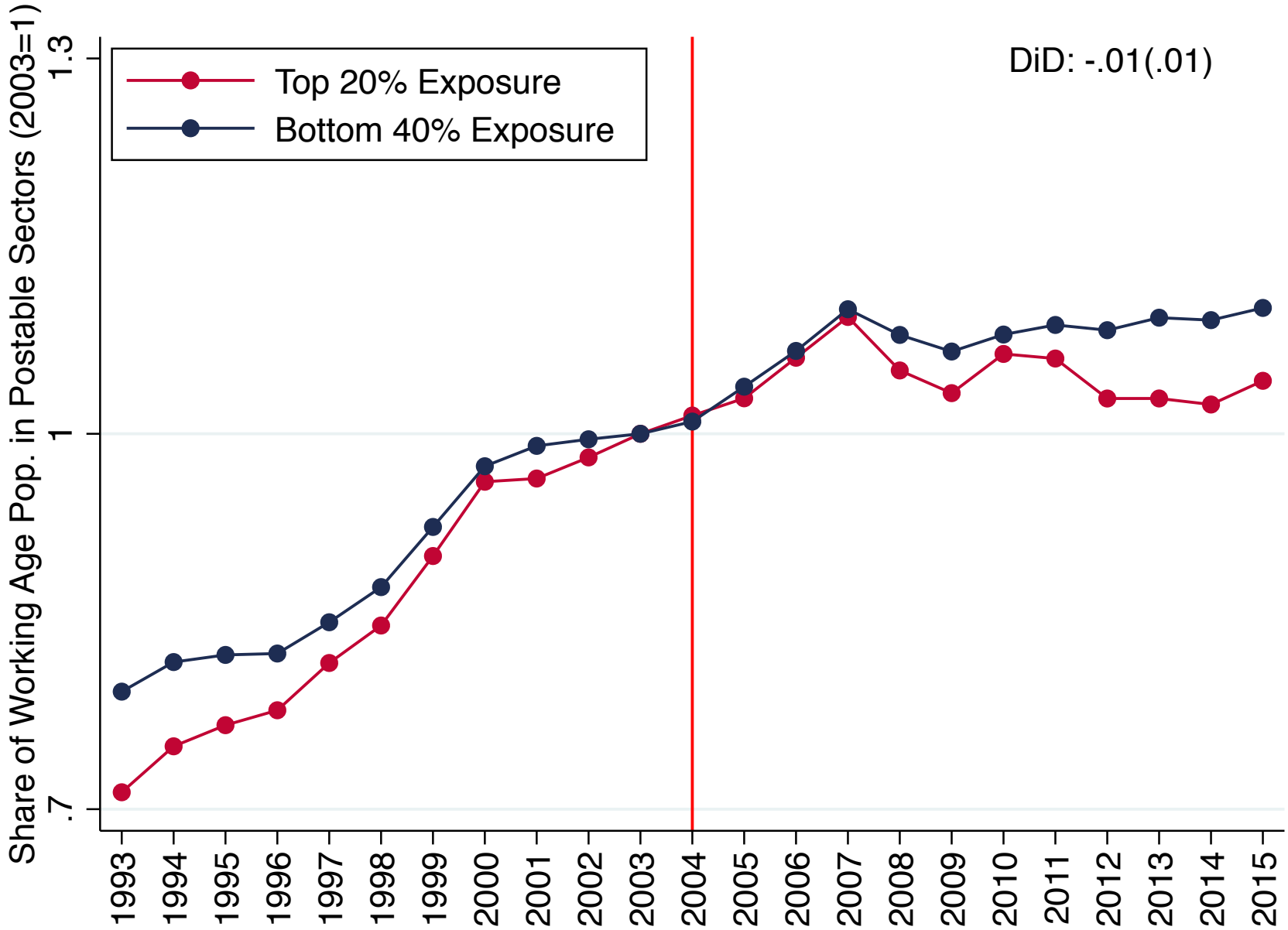
# Distance to NMS as Exposure Measure

Back



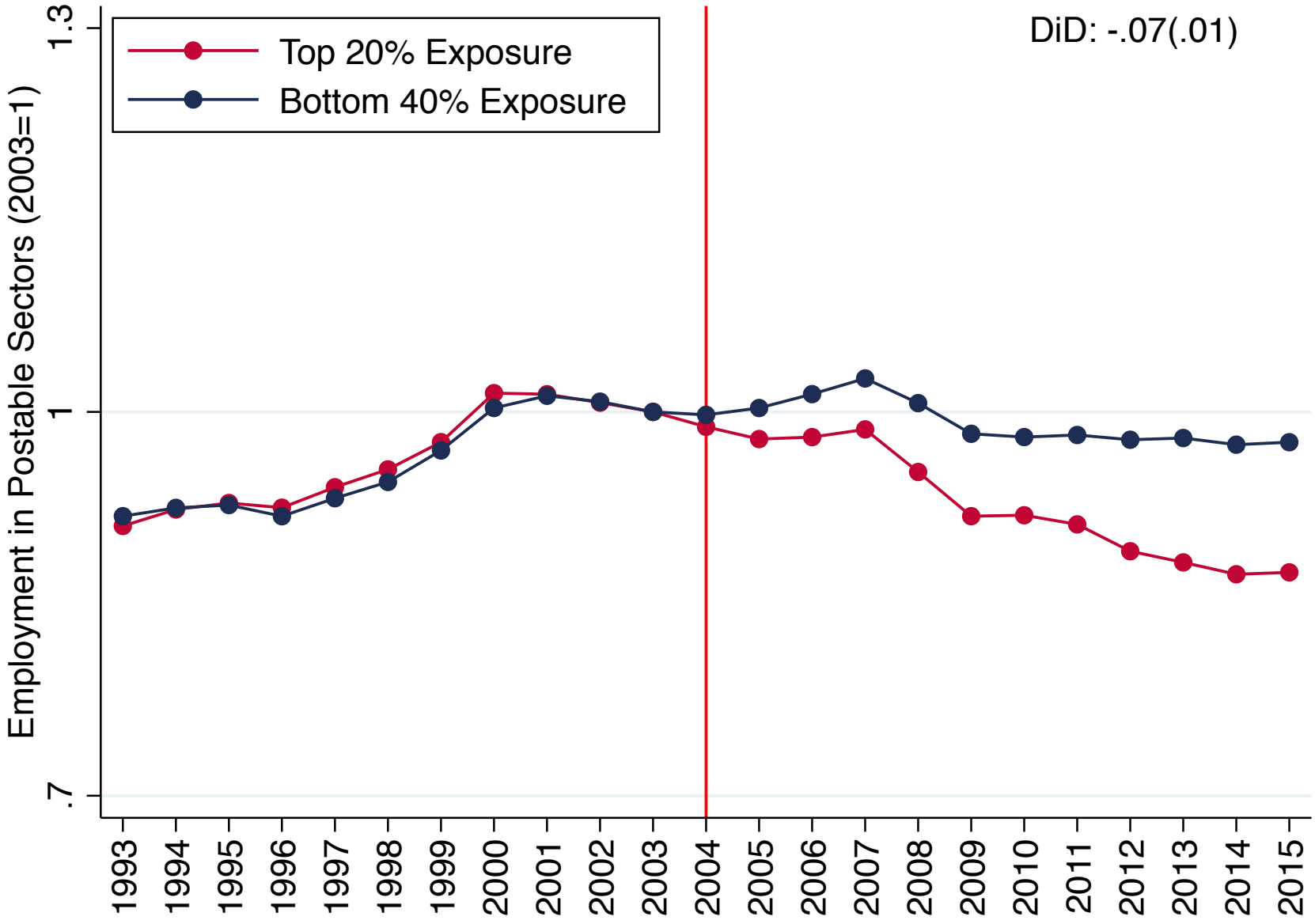
# Excluding Industrial Services

Back



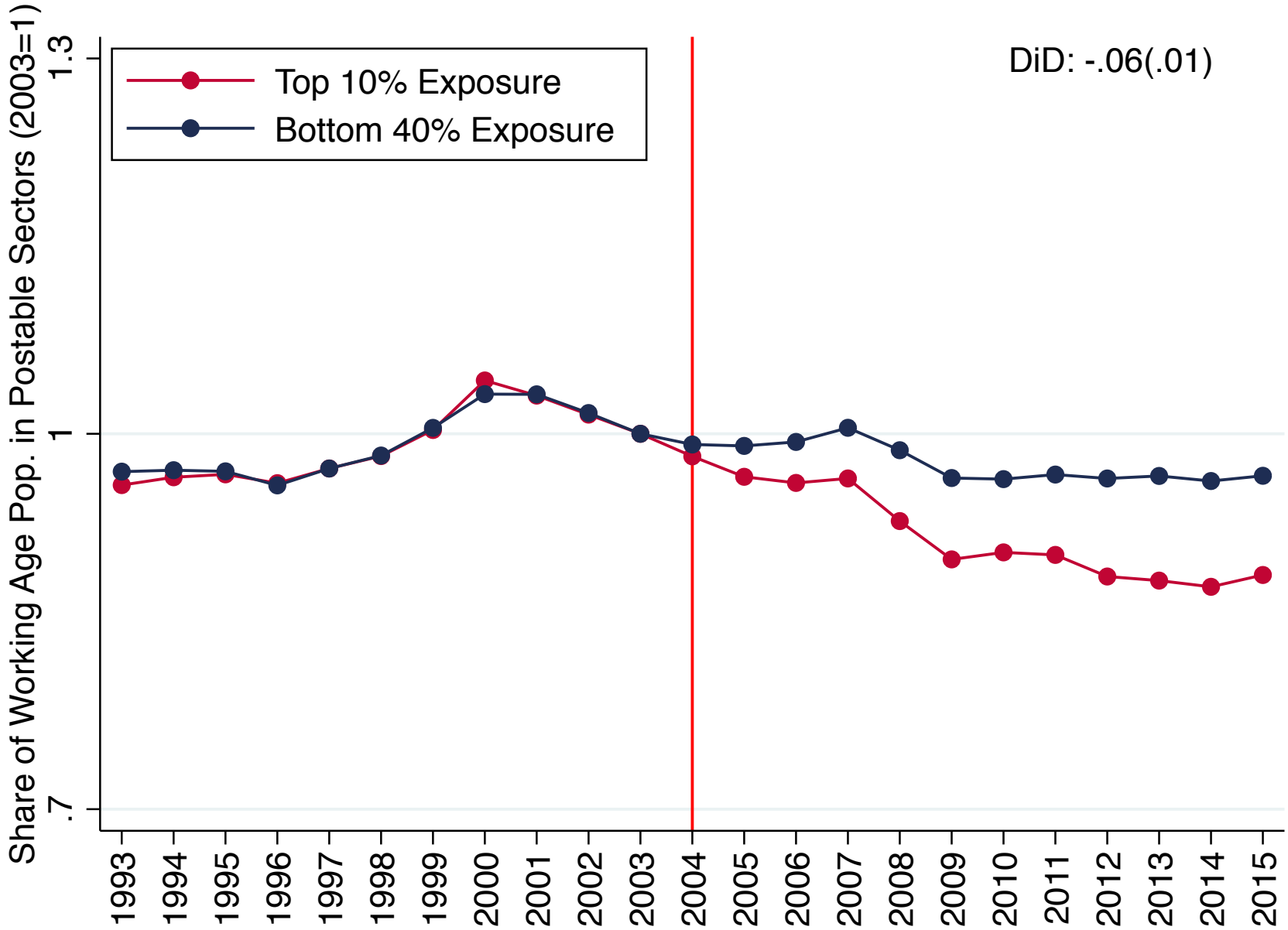
# Employment Level

Back



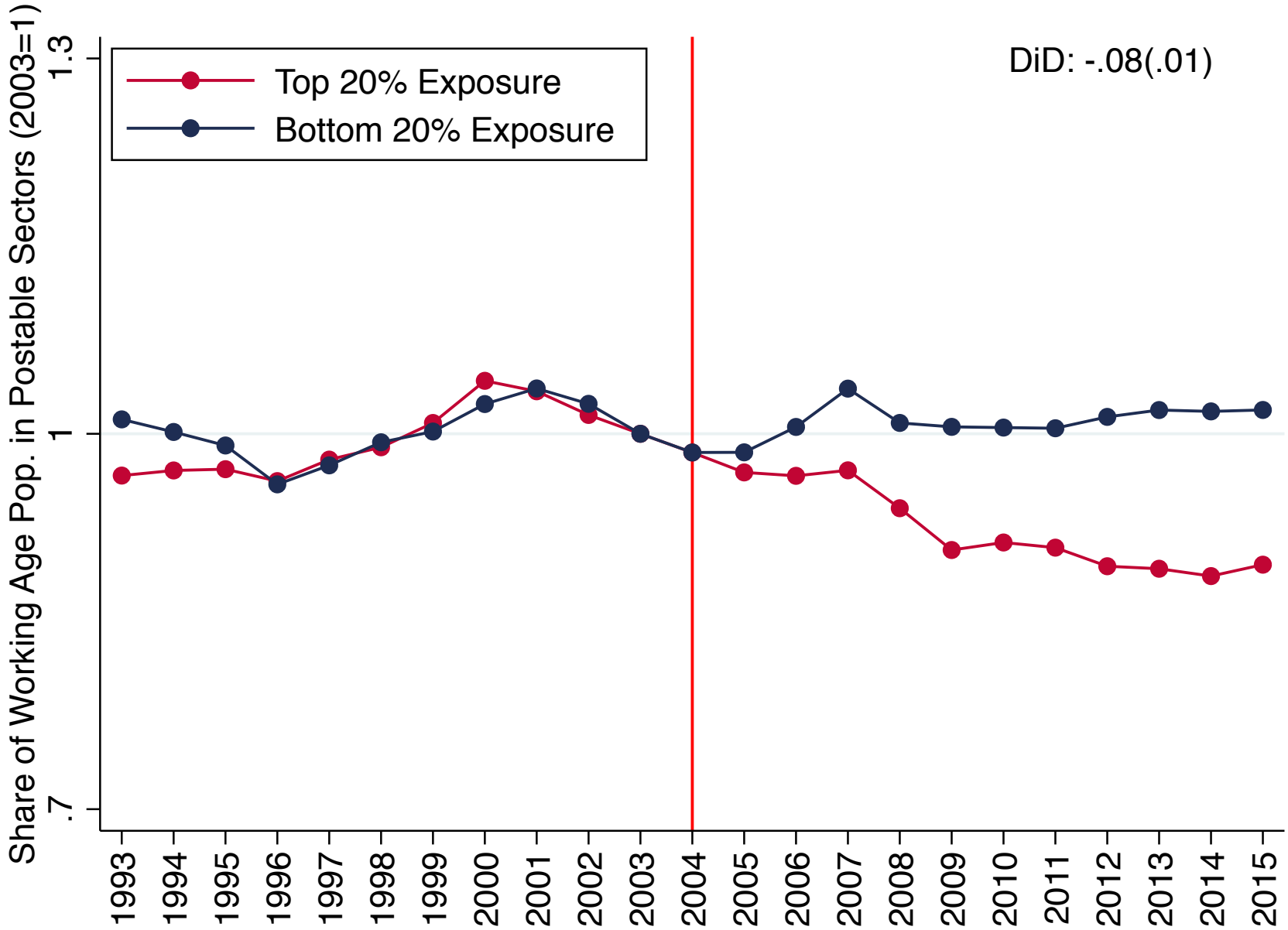
# Top 10% Exposure Only

Back



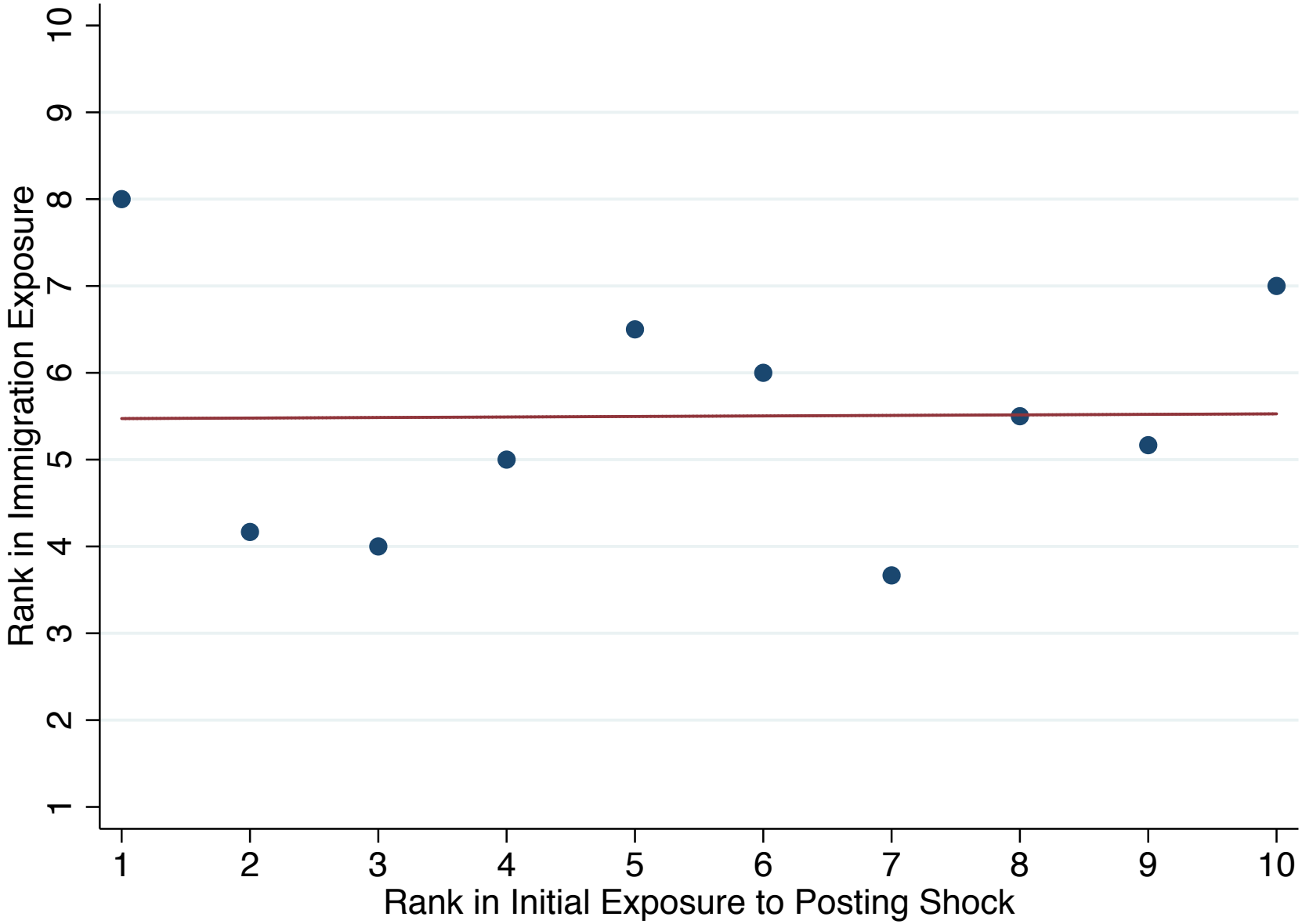
# Excluding Neighbouring Provinces

Back



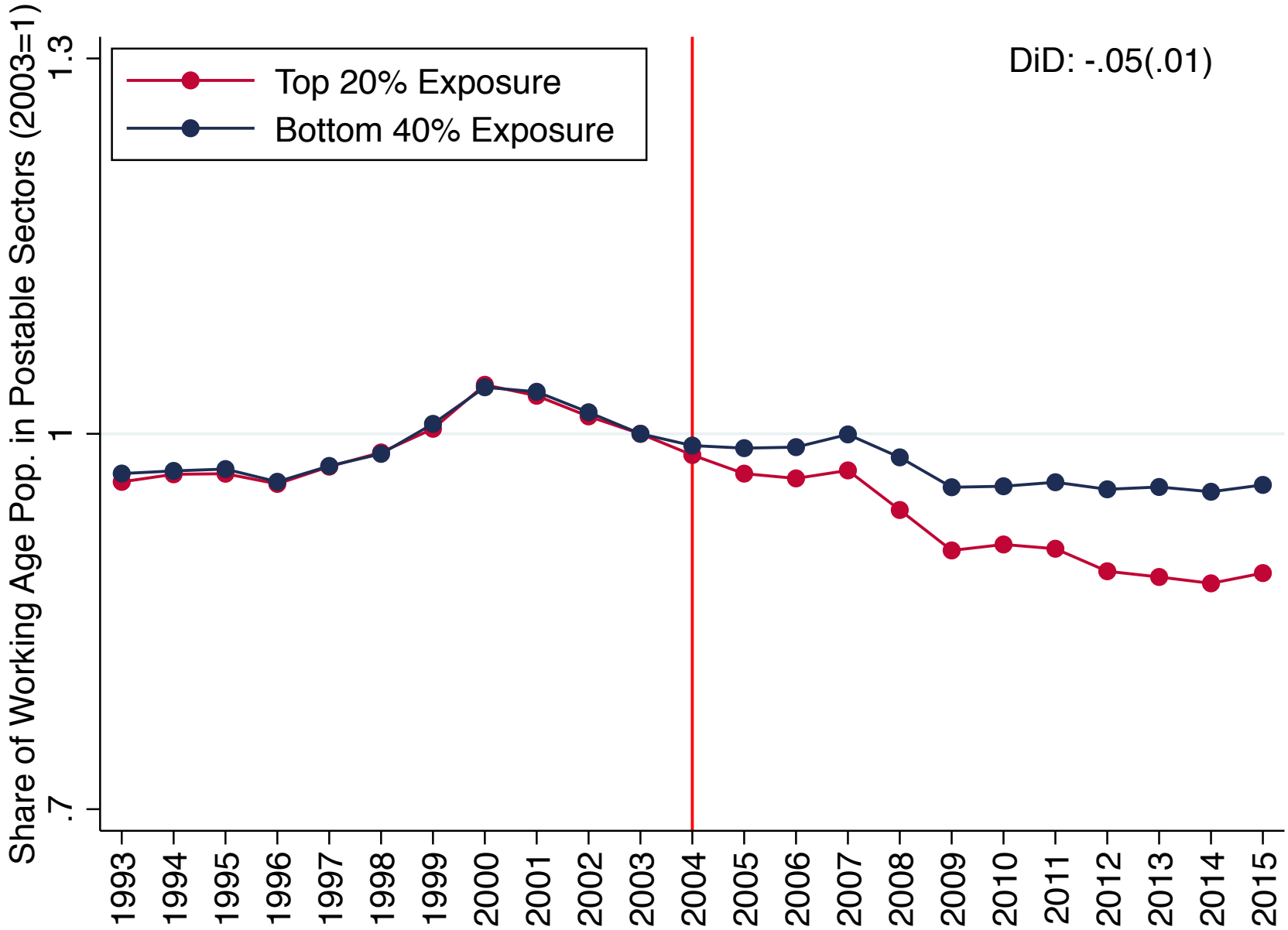
# Exposure to Posting and Immigration

Back



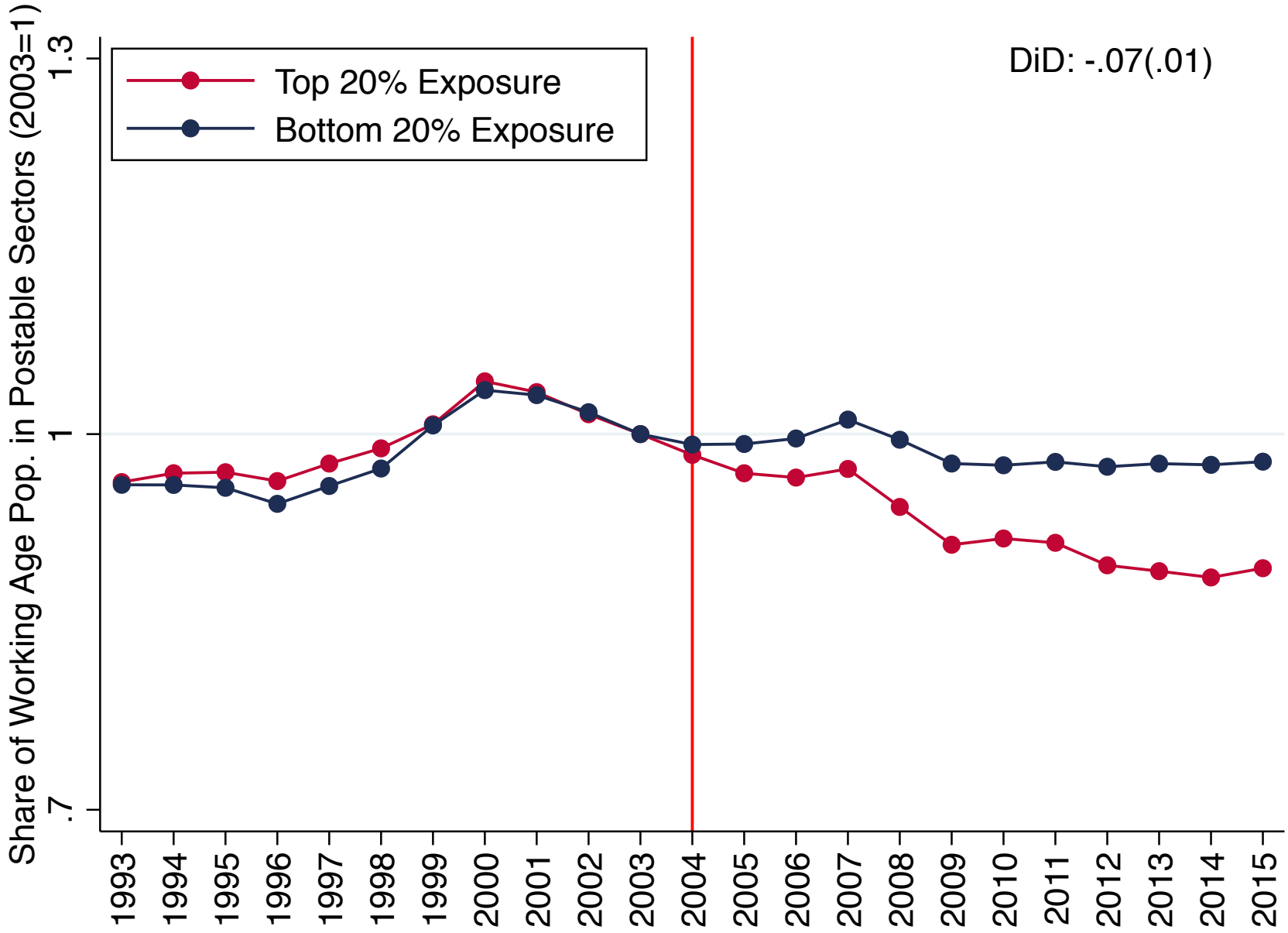
# Region-Level Exposure

Back



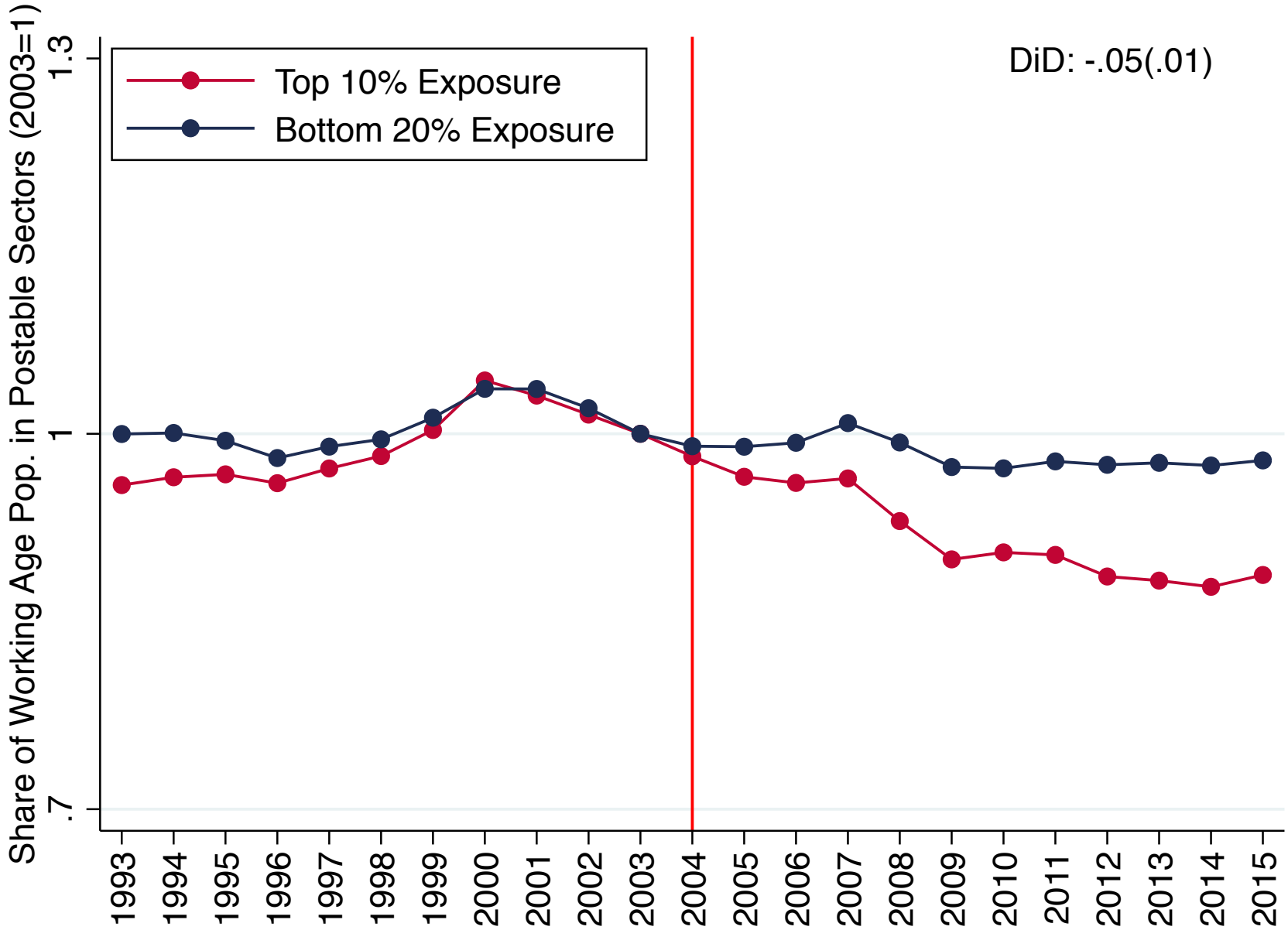
# Top 20% vs Bottom 20%

Back



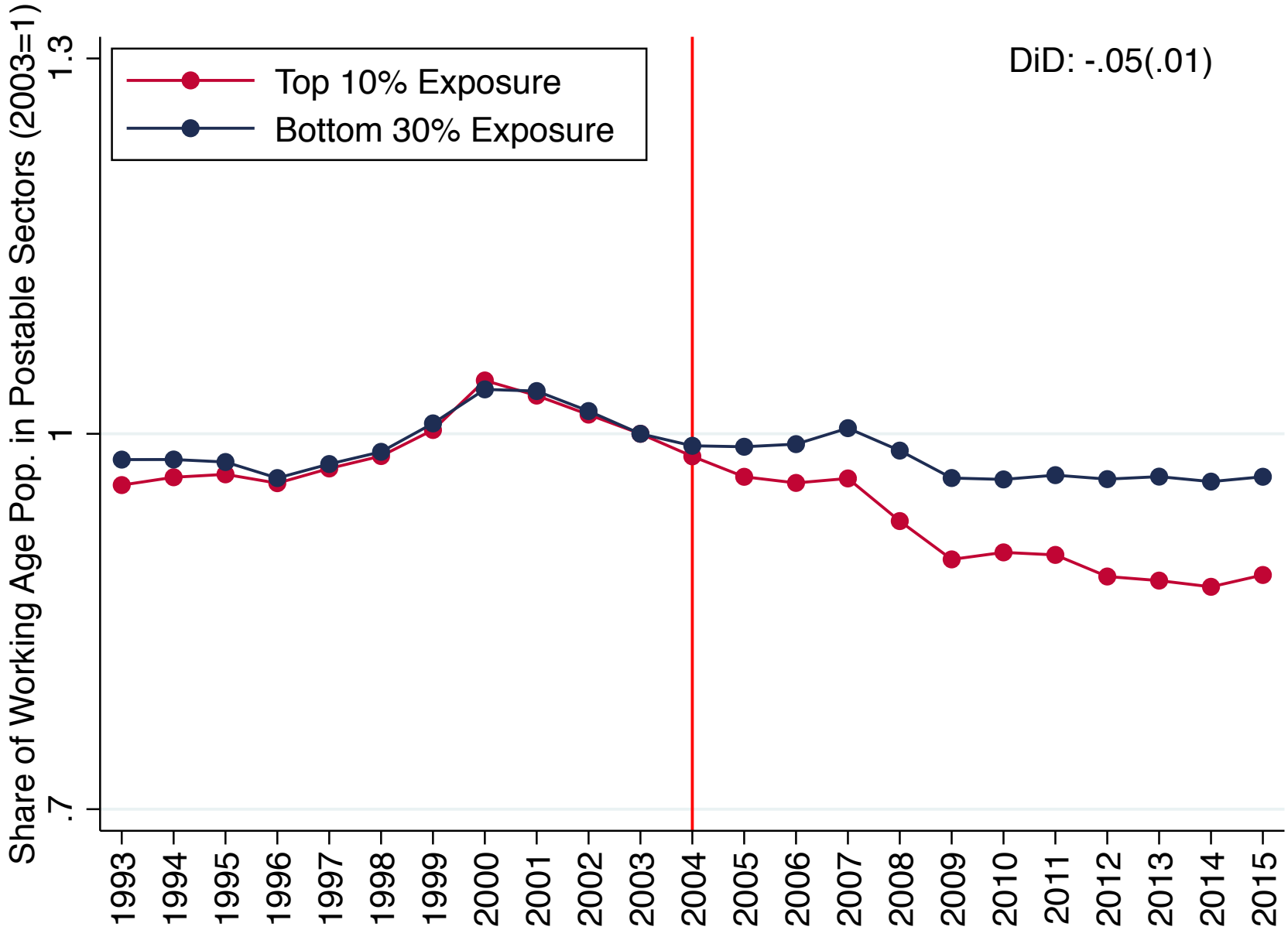
# Top 10% vs Bottom 20%

Back



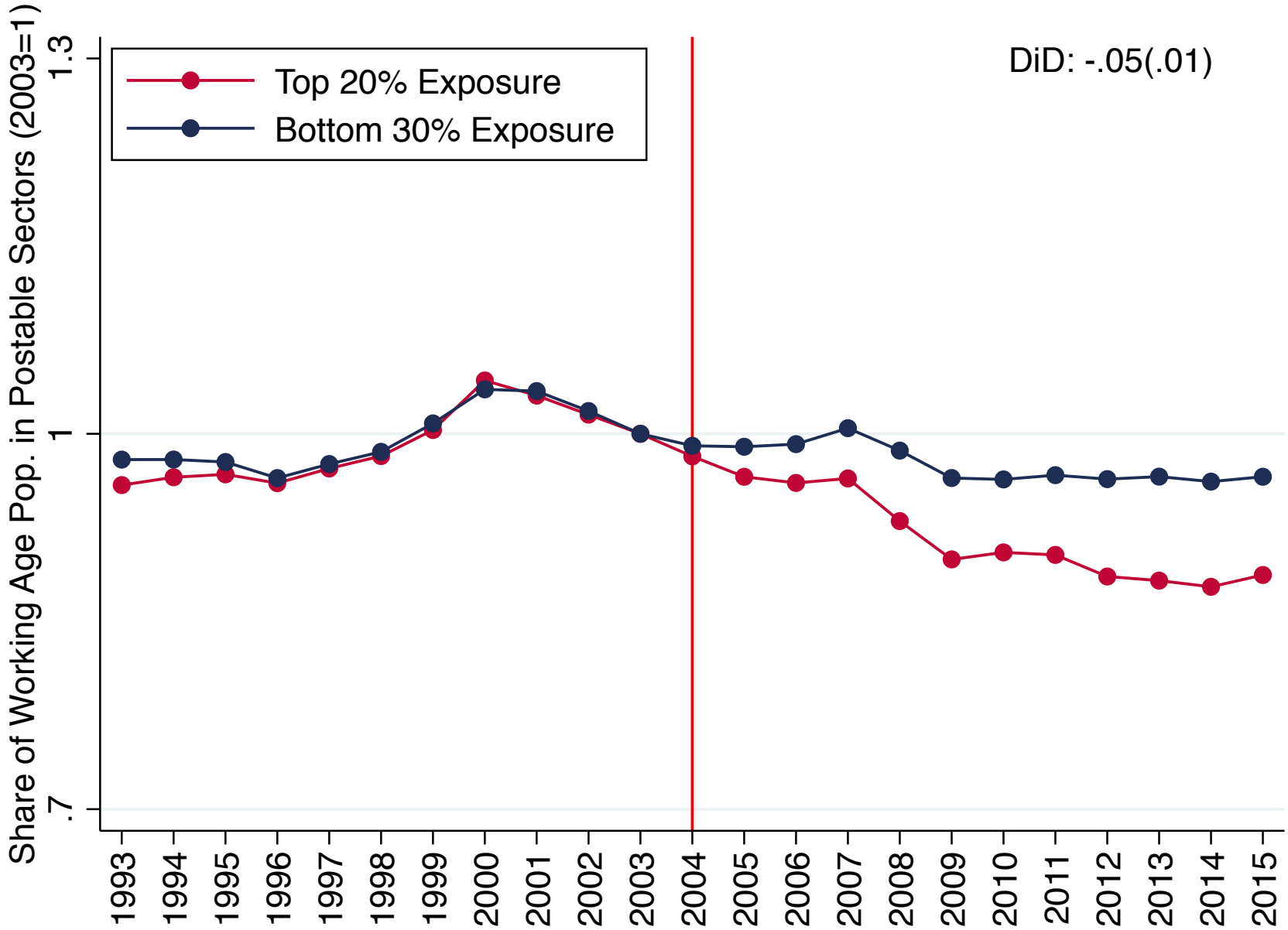
# Top 10% vs Bottom 30%

Back



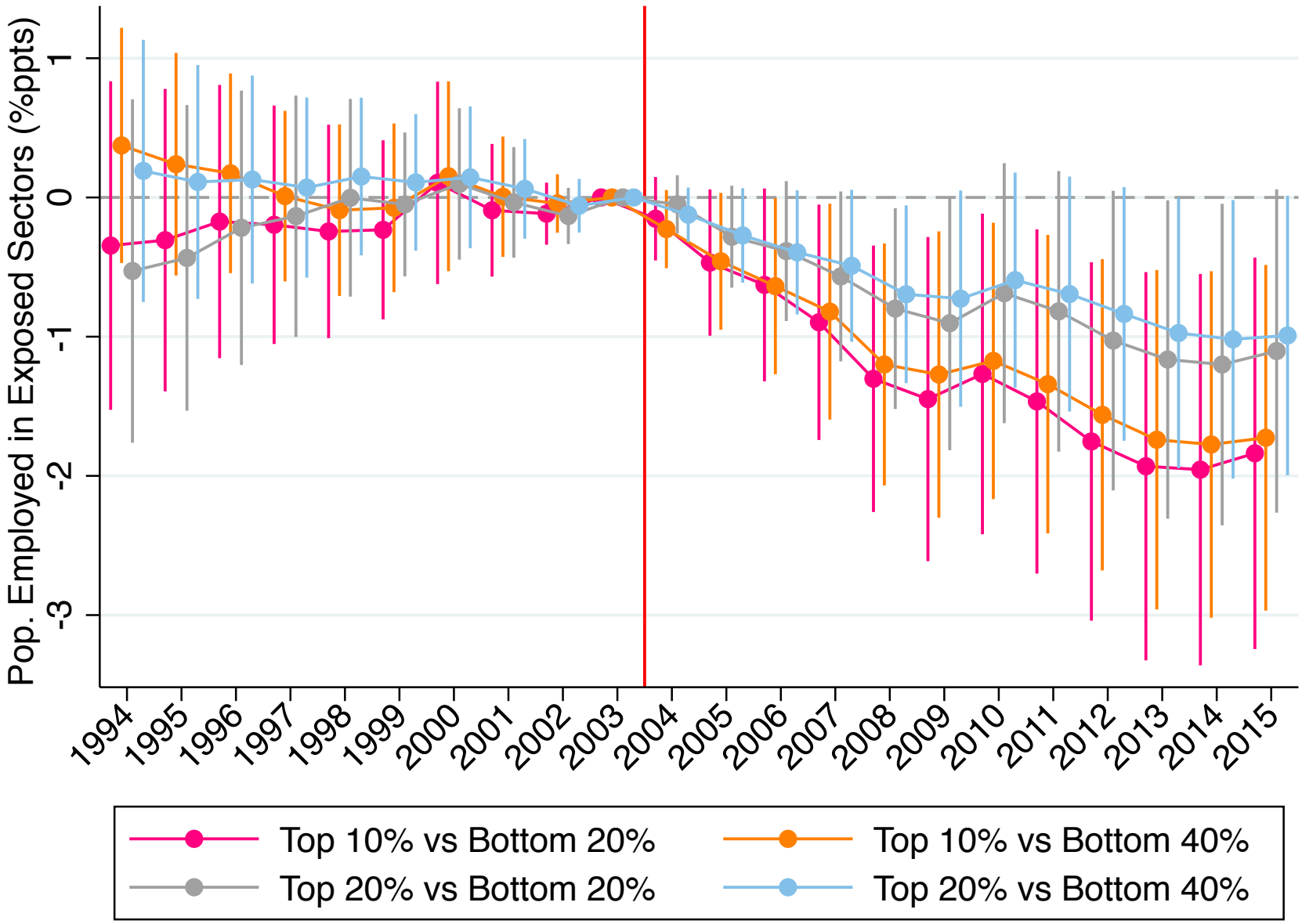
# Top 20% vs Bottom 30%

Back

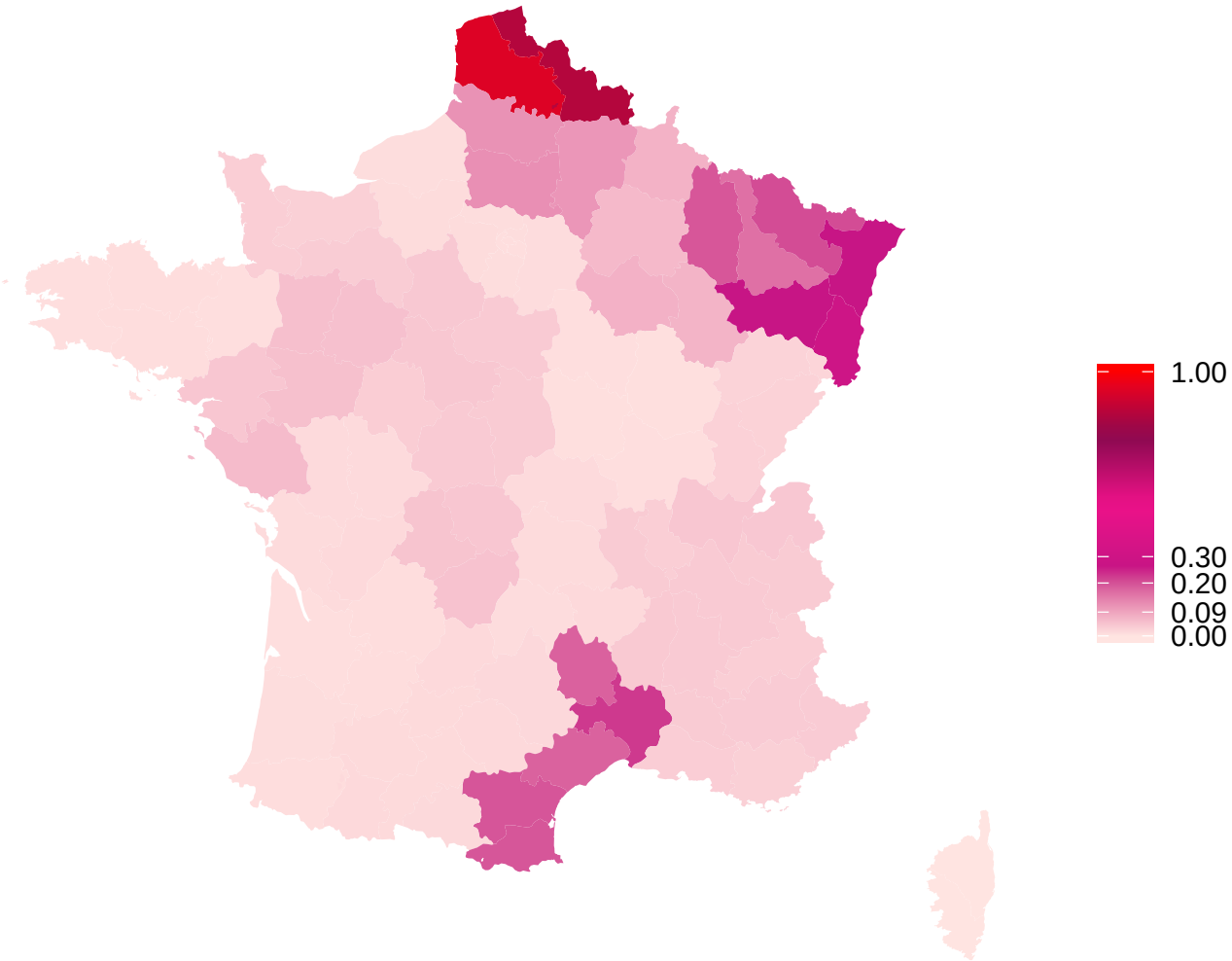


# Diff-Diff Estimates

Back

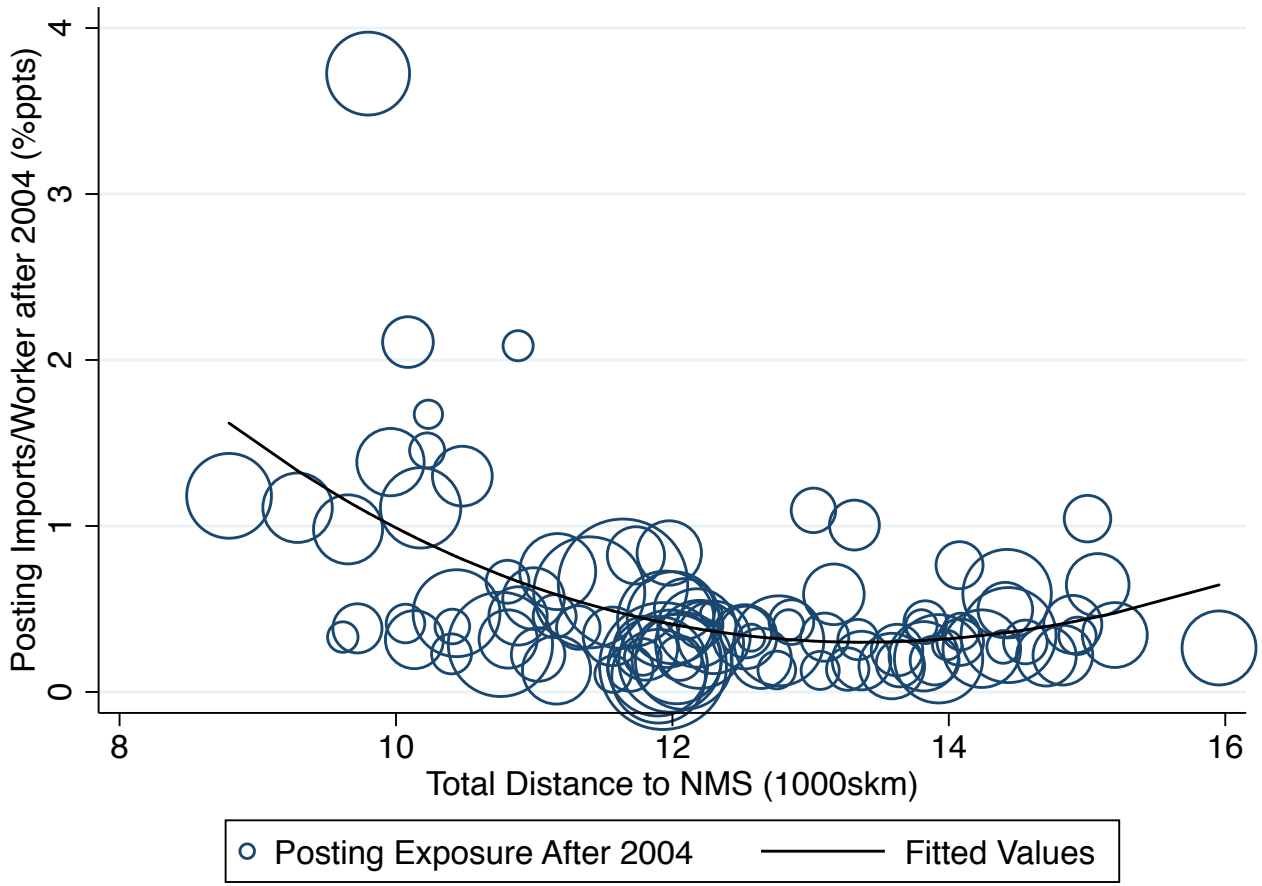


# Spatial Distribution of Posting Exposure pre Liberalization




Back

# Geographic Distance and Exposure to Posting




Back

# Robustness to Baseline Specification

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Δ Posting Imports | -1.604*** | -.983*** | -.529** | -1.711*** | -1.150*** | -.917*** |
| | (.299) | (.245) | (.258) | (.628) | (.280) | (.286) |
| Observations | 94 | 94 | 94 | 94 | 94 | 94 |
| Instrument | Baseline | Baseline | Baseline | Baseline | Baseline | Baseline |
| Rob | No controls | State clustering | Excl. manuf | Level-level | Mig control | Clemens Hunt (2019) |

| | (8) | (9) |
|---|---|---|
| Δ Posting Imports | -.785** | -.919*** |
| | (.325) | (.291) |
| Observations | 94 | 94 |
| Instrument | Baseline | Predicted |
| Rob | 2003 employment control | 2003 posting control |

Back

# Change in Unemployment and Posting Inflows

| *Dependent Variable:100 × log change in population counts, 2003-2015* | | | | | | |
|---|---|---|---|---|---|---|
| | Exposed Emp | | Adult Pop | | Unemployment | |
| | (8) | (9) | (10) | (11) | (12) | (13) |
| Δ log Posting Imports/worker | -9.152*** | -7.109*** | -1.973 | -0.494 | 9.168** | 8.242*** |
| | (2.462) | (3.319) | (1.496) | (1.860) | (4.654) | (3.399) |
| Observations | 94 | 94 | 94 | 94 | 94 | 94 |

Back

# Model Set-Up: Main Ingredients

Back

- Representative consumer in $j$ demand for services:

$$U_j = \left( \int_{\Omega_n} S_j(n) dn \right)^{\frac{\sigma}{\sigma - 1}} \tag{2}$$

- CES preferences yield standard Stiglitz Price index:

$$P_j = \left( \int_{\Omega_n} p_j(n)^{1-\sigma} dn \right)^{\frac{1}{1-\sigma}} \tag{3}$$

- Unit cost of posting workers to supply services from $i$ to $j$ is

$$C_{ij}(n) = \underbrace{w_i \left(1 + \tau_i + a_{ij}\right)}_{\text{Gross labor cost}} \underbrace{m_{ij}}_{\text{Mobility friction}} \underbrace{\frac{1}{z_i(n)}}_{\text{Productivity}} = \frac{c_{ij}}{z_i(n)} \tag{4}$$

- $z_i(n)$ is Fréchet distributed $F_i(z) = exp\left\{ - \left(T_i z\right)^{-\theta} \right\}$

# Perfect Competition Equilibrium

Back

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

$$\lambda_{ij} = \frac{T_i \left(c_{ij}\right)^{-\theta}}{\sum_{k \in S} T_k \left(c_{kj}\right)^{-\theta}} = T_i \left(c_{ij}\right)^{-\theta} \Phi_j^{-1} \tag{5}$$

- Equilibrium price index

$$P_j = \Phi_j^{\frac{-1}{\theta}} \Gamma \left( \frac{\theta + 1 - \sigma}{\theta} \right)^{\frac{1}{1-\sigma}} = \Phi_j^{\frac{-1}{\theta}} C \tag{6}$$

- Equilibrium posting flows

$$S_{ij} = \lambda_{ij} S_j = T_i S_j \left(m_{ij}\right)^{-\theta} \left(w_i \left(1 + \tau_i + a_{ij}\right)\right)^{-\theta} P_j^{\theta} C^{-\theta} \tag{7}$$

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

$$W_i = \frac{w_i (1 + \tau_i + a_{ij})}{P_i} = \lambda_{ii}^{\frac{-1}{\theta}} T_i^{\frac{1}{\theta}} C \tag{8}$$

# Welfare Effects of the Posting Policy

*ACR Formula applied to on-site offshoring*

- In equilibrium, welfare of consumer in $i$ is:

$$W_i = \underbrace{\lambda_{ii}^{\frac{-1}{\theta}}}_{\text{Consumption share of services produced in i}} \times \underbrace{T_i^{\frac{1}{\theta}} C}_{\text{Some parameters of the model}} \tag{9}$$

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

$$\hat{W}_i = \hat{\lambda_{ii}}^{\frac{-1}{\theta}}$$

- 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:

$$\hat{\lambda}_{ij} = \frac{\left(\hat{Y}_i \hat{m}_{ij}\right)^{-\theta}}{\sum_k \lambda_{kj} \left(\hat{Y}_k \hat{m}_{kj}\right)^{-\theta}} \qquad \hat{Y}_i Y_i = \sum_j \frac{\lambda_{ij} \left(\hat{Y}_i \hat{m}_{ij}\right)^{-\theta} \hat{Y}_j Y_j}{\sum_k \lambda_{kj} \left(\hat{Y}_k \hat{m}_{kj}\right)^{-\theta}}$$

- 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

Back

| | (1) | (2) |
|---|---|---|
| Log distance | -1.53*** | -1.47*** |
| | (.08) | (.06) |
| Common border | .237** | .05 |
| | (.09) | (.09) |
| Common currency | -45*** | -1.14*** |
| | (.08) | (.159) |
| Common language | .013 | .555*** |
| | (.35) | (.16) |
| Observations | 3,404 | 3,507 |
| R2 | .84 | |
| Estimator | Log | PPML |
| Origin-Year FE | Yes | Yes |
| Destination-Year FE | Yes | Yes |

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 Reduced form
  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

$$\underbrace{S_{ijt}}_{\text{Postings from i to j}} = \underbrace{\left(w_i\left(1+\tau_{it}+a_{ijt}\right)\right)^{-\theta}}_{\text{Gross labor cost}} \underbrace{m_{ij}^{-\theta}}_{\text{Mobility friction}} \times X_{it}Y_{jt}$$

  - **Quasi-natural experiments**: pre-trends + out of sample estimate

# Posting Flows Responses to Payroll Tax and Min Wage

*Smaller responsiveness than trade in goods, closer to international migration* Back

Model-Based estimating equation | Distance gravity | Reform in SSC exemption | Bunching at SSC exemption

| **Panel A: Gravity Estimation** | | | | | | |
|---|---|---|---|---|---|---|
| Regressor: Total Labor Cost | (1) | (2) | (3) | (4) | (5) | (6) |
| **Posting Elasticity** | -1.2*** | -1.4*** | -1.4*** | -.97*** | -2.4*** | -1.1*** |
| | (.15) | (.25) | (.27) | (.27) | (.47) | (.19) |
| Observations | 4,723 | 4,665 | 4,455 | 4,723 | 4,723 | 4,677 |
| Origin-Dest FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Dest × Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Origin × Year FE | No | No | No | No | No | Yes |
| Weighted | No | Yes | Yes | Yes | No | No |
| Estimator | PPML | Log | Log | PPML | MPPML | MPPML |
| Internal Flows | No | Yes | No | No | No | No |

| **Panel B: Quasi-Natural Experiment Estimates** | Slovenian Posted Bonus | Belgian Tax Shift | German Min Wage |
|---|---|---|---|
| | Go | Go | Go |
| **Posting Elasticity** | -1.6(.33)*** | -1.4(.42)*** | -1.3(.27)*** |

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.

# Change in Posting Imports & Domestic Employment

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

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

| | Post-reform (2003-2015) | | |
|---|---|---|---|
| | OLS | RF | IV |
| | (1) | (2) | (3) |
| Δ log Postings/worker | -.638*** | -.462*** | -.983*** |
| | (.231) | (.117) | (.272) |
| Observations | 94 | 94 | 94 |
| Fstat | | | 25.39 |
| Anderson-Rubin | | | 16.14 |
| AKM standard error | | | (.250) |
| Instrument | | | Baseline |
| | | | Delete One |

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

Unemployment Robustness

# Change in Posting Imports & Domestic Employment

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

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

| | Post-reform (2003-2015) | | | Pre-shock Falsification Test | |
|---|---|---|---|---|---|
| | | | | 1993-2003 | 2000-2003 |
| | OLS | RF | IV | IV | IV |
| | (1) | (2) | (3) | (4) | (5) |
| Δ log Postings/worker | -.638*** | -.462*** | -.983*** | .203 | .140 |
| | (.231) | (.117) | (.272) | (.336) | (.187) |
| Observations | 94 | 94 | 94 | 94 | 94 |
| Fstat | | | 25.39 | 24.77 | 25.29 |
| Anderson-Rubin | | | 16.14 | | |
| AKM standard error | | | (.250) | | |
| Instrument | | | Baseline | | |
| | | | Delete One | | |

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

Unemployment Robustness

# Change in Posting Imports & Domestic Employment

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

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

| | Post-reform (2003-2015) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | RF | IV | IV | IV | IV |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Δ log Postings/worker | -.638*** | -.462*** | -.983*** | .427*** | -.990*** | -1.610*** |
| | (.231) | (.117) | (.272) | (.151) | (.275) | (.520) |
| Observations | 94 | 94 | 94 | 94 | 94 | 94 |
| Fstat | | | 25.39 | 25.39 | 35.2 | 17.39 |
| Anderson-Rubin | | | 16.14 | | 20.1 | 24.7 |
| AKM standard error | | | (.250) | | (.351) | |
| Instrument | | | Baseline | Baseline | Predicted | Distance |
| | | | Delete One | | | |

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

Unemployment Robustness

# Change in Posting Imports & Domestic Employment

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

Dependent Variable: Change in unemployment/pop, 2003-2015 (%pts)

| | Post-reform (2003-2015) | | | | | |
|---|---|---|---|---|---|---|
| | OLS | RF | IV | IV | IV | IV |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Δ log Postings/worker | -.638*** | -.462*** | -.983*** | .427*** | -.990*** | -1.610*** |
| | (.231) | (.117) | (.272) | (.151) | (.275) | (.520) |
| Observations | 94 | 94 | 94 | 94 | 94 | |
| Fstat | | | 25.39 | 25.39 | 35.2 | 17.39 |
| Anderson-Rubin | | | 16.14 | | 20.1 | 24.7 |
| AKM standard error | | | (.250) | | (.351) | |
| Instrument | | | Baseline | Baseline | Predicted | Distance |
| | | | Delete One | | | |

All regressions weighted by province population at the start of the period. AKM refers to Adao, Kolesar & Morales (2019) standard errors.

Unemployment Robustness

# 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 Go
   - Effect borne by blue collar workers Go
   - Driven by workers performing same tasks than posted workers Go

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