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)

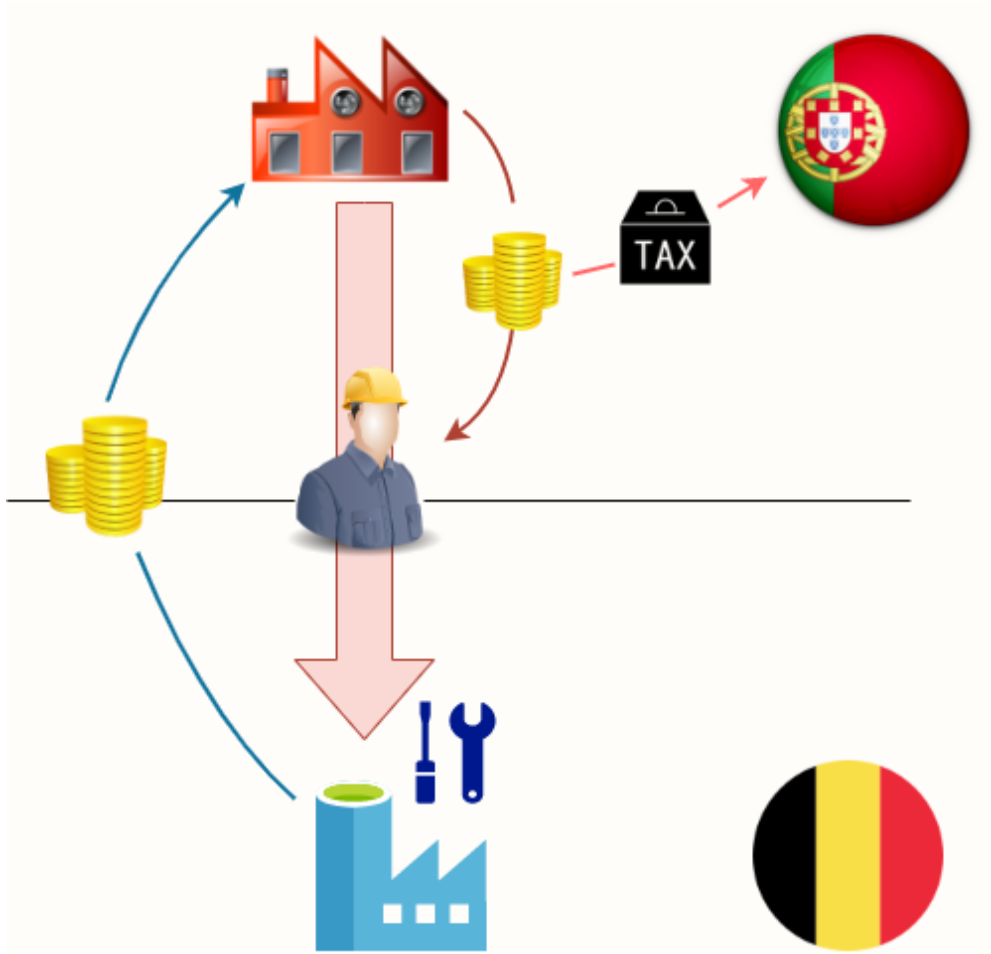
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- Many jobs are assumed non-tradable
  - Blinder & Krueger (2006), Grossman & Rossi-Hansberg (2008)
- Posting policies liberalize **trade in non-tradables**
  - Firms can temporarily send workers abroad to perform those jobs
  - WTO trade in services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

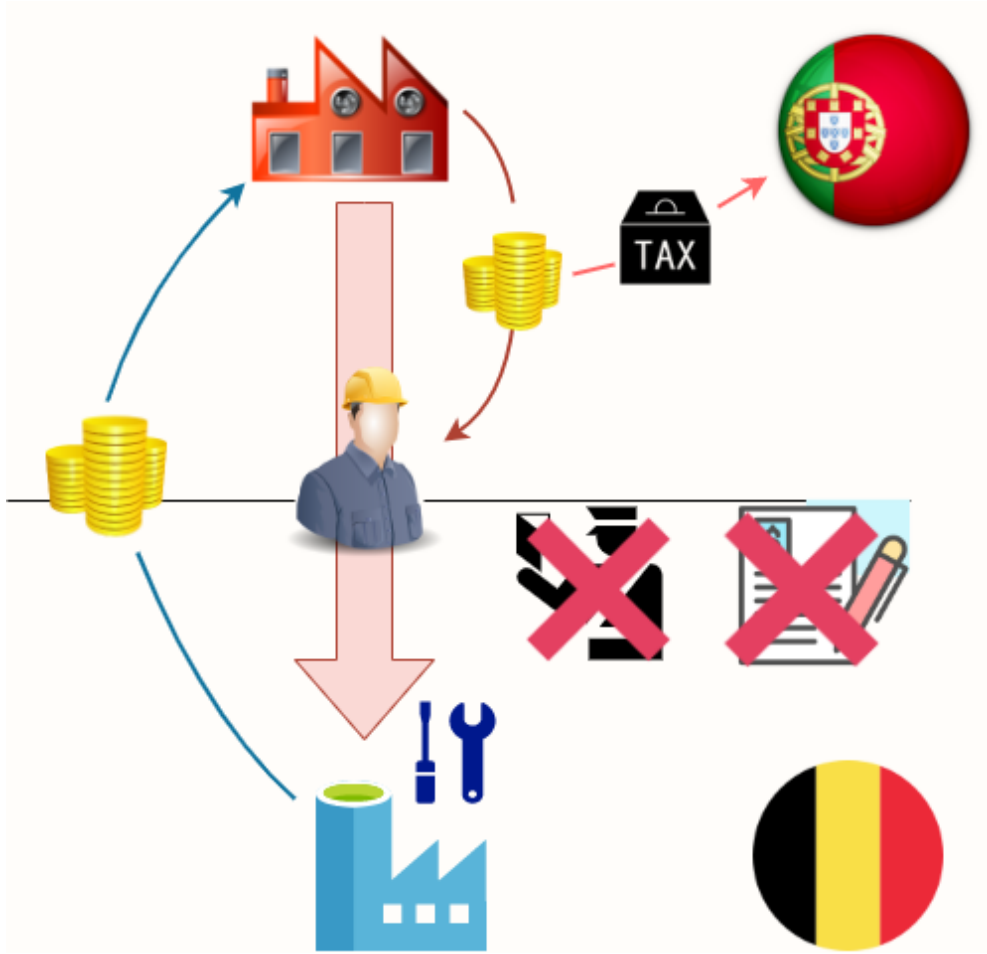
A New Way to Trade Factors and Services

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



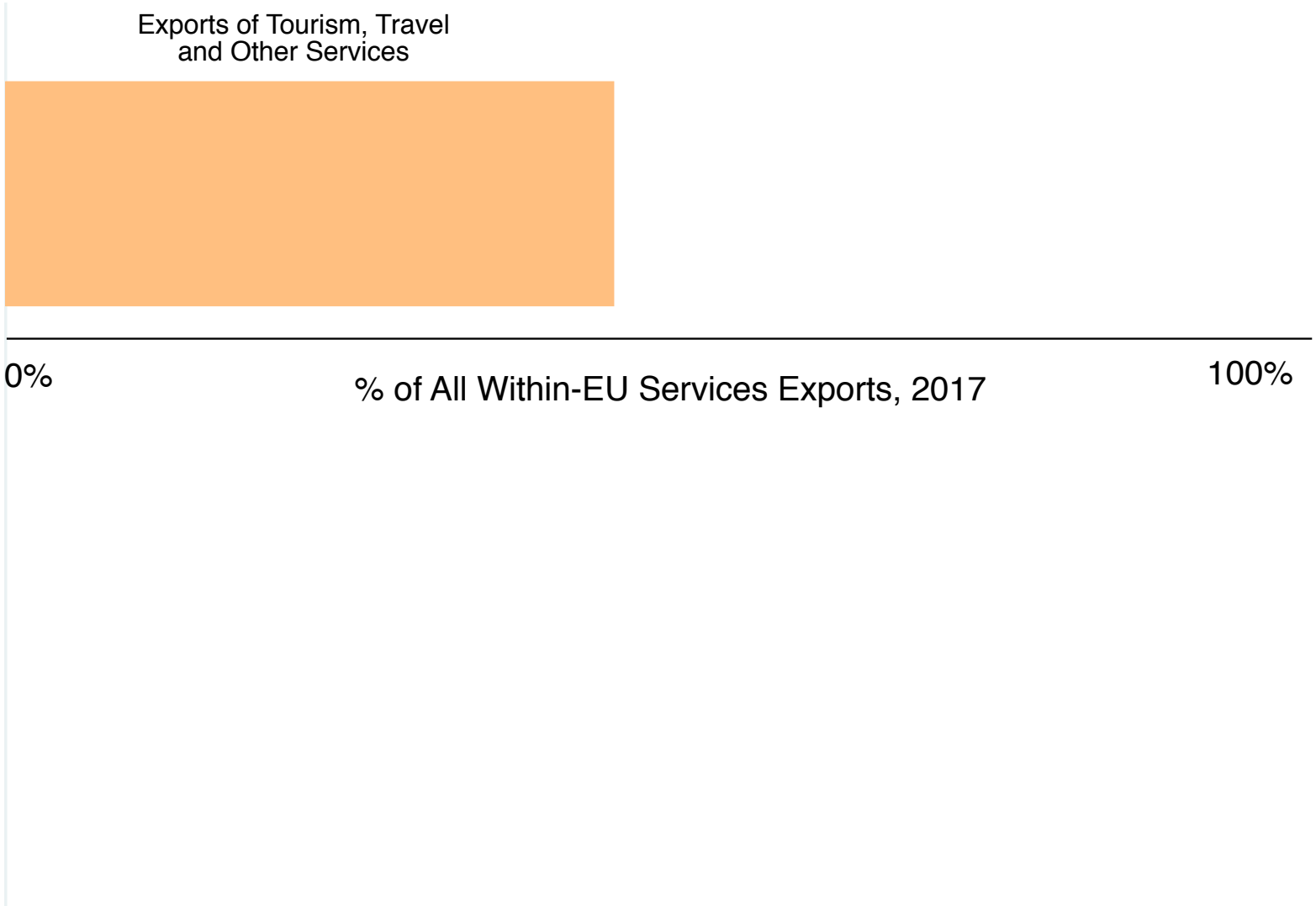
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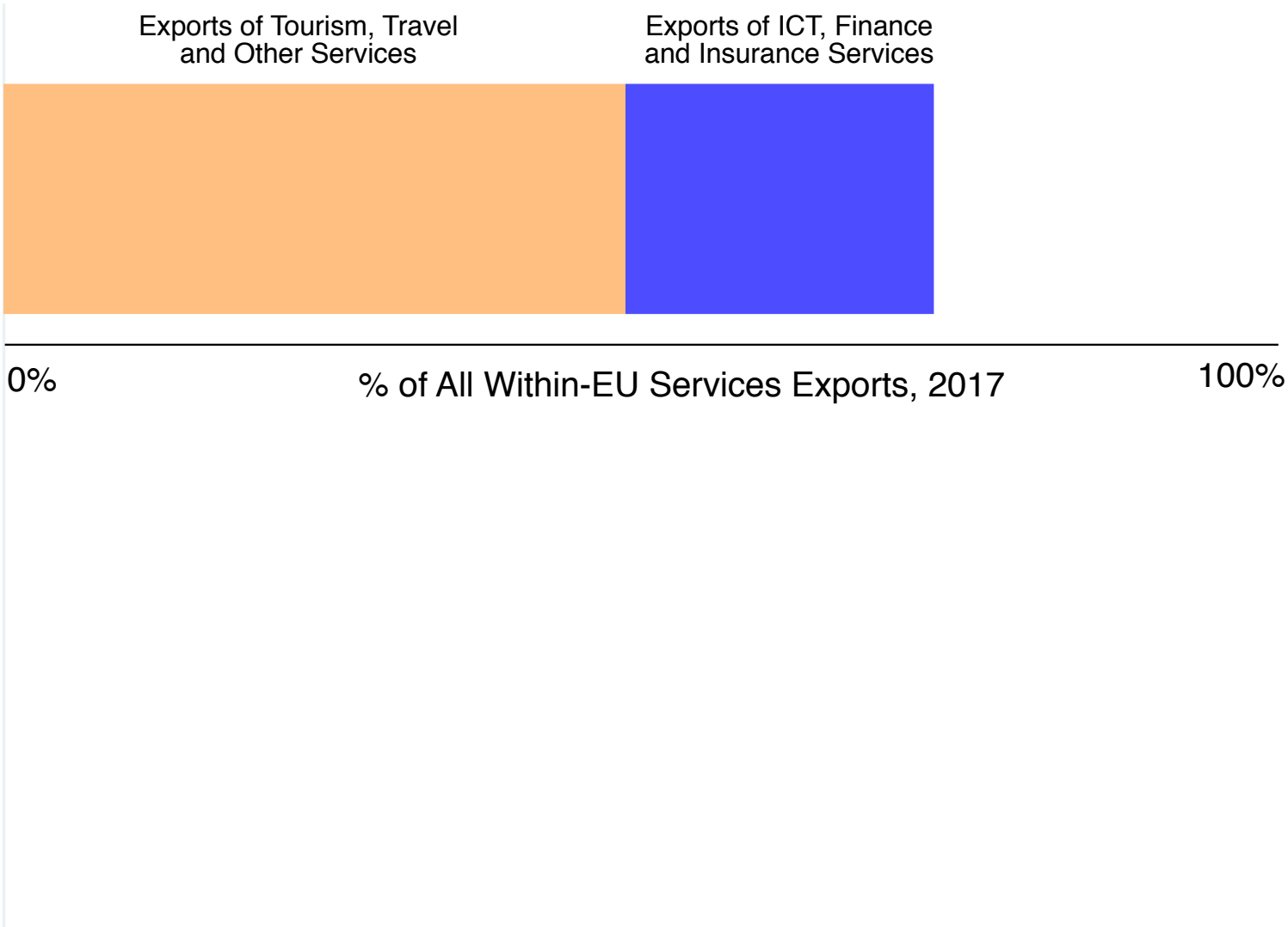


- Portugal exports more truck drivers than wine
- Belgium offshores 15% of construction jobs through posting

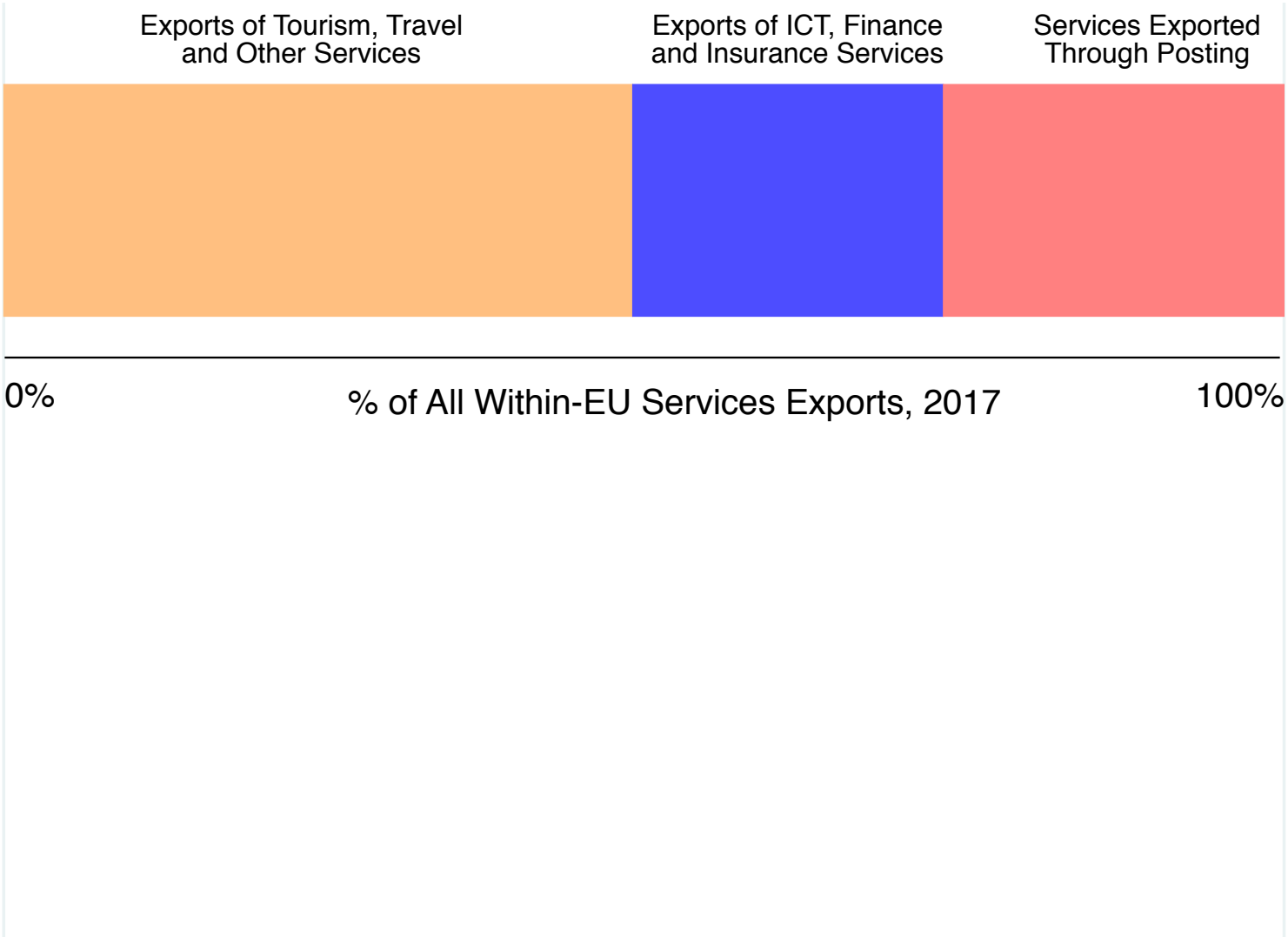
Globalization Is Larger Than Previously Thought



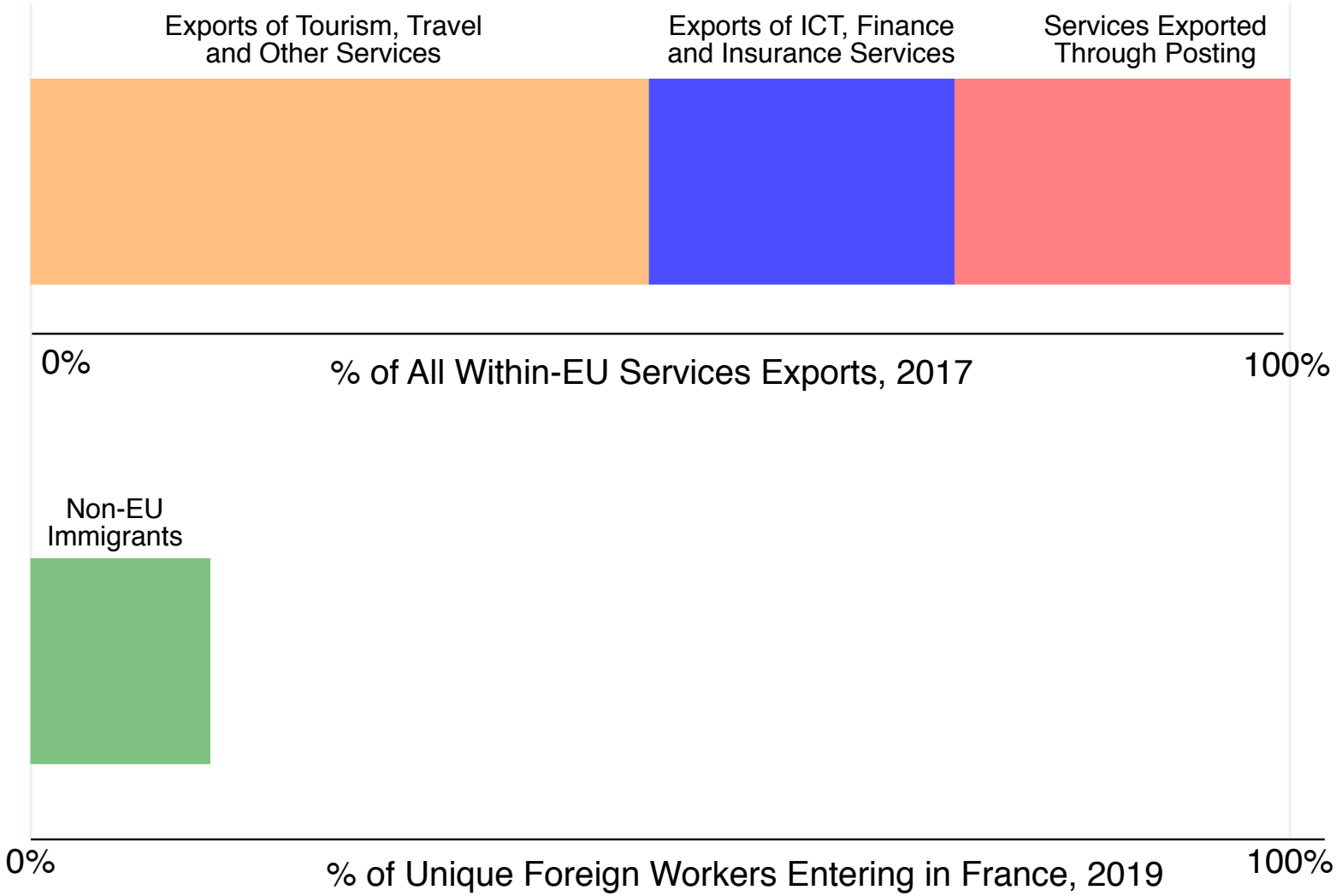
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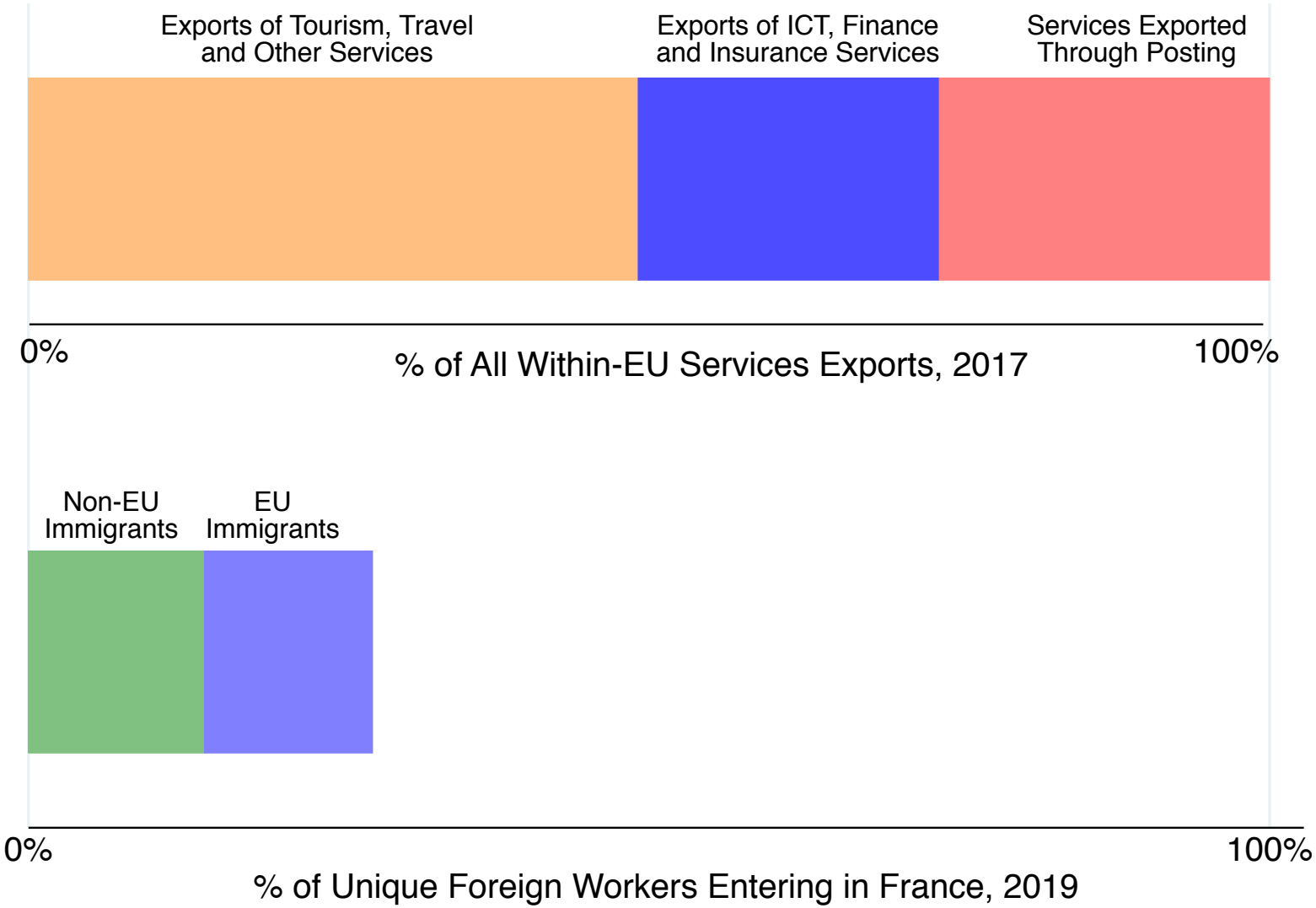
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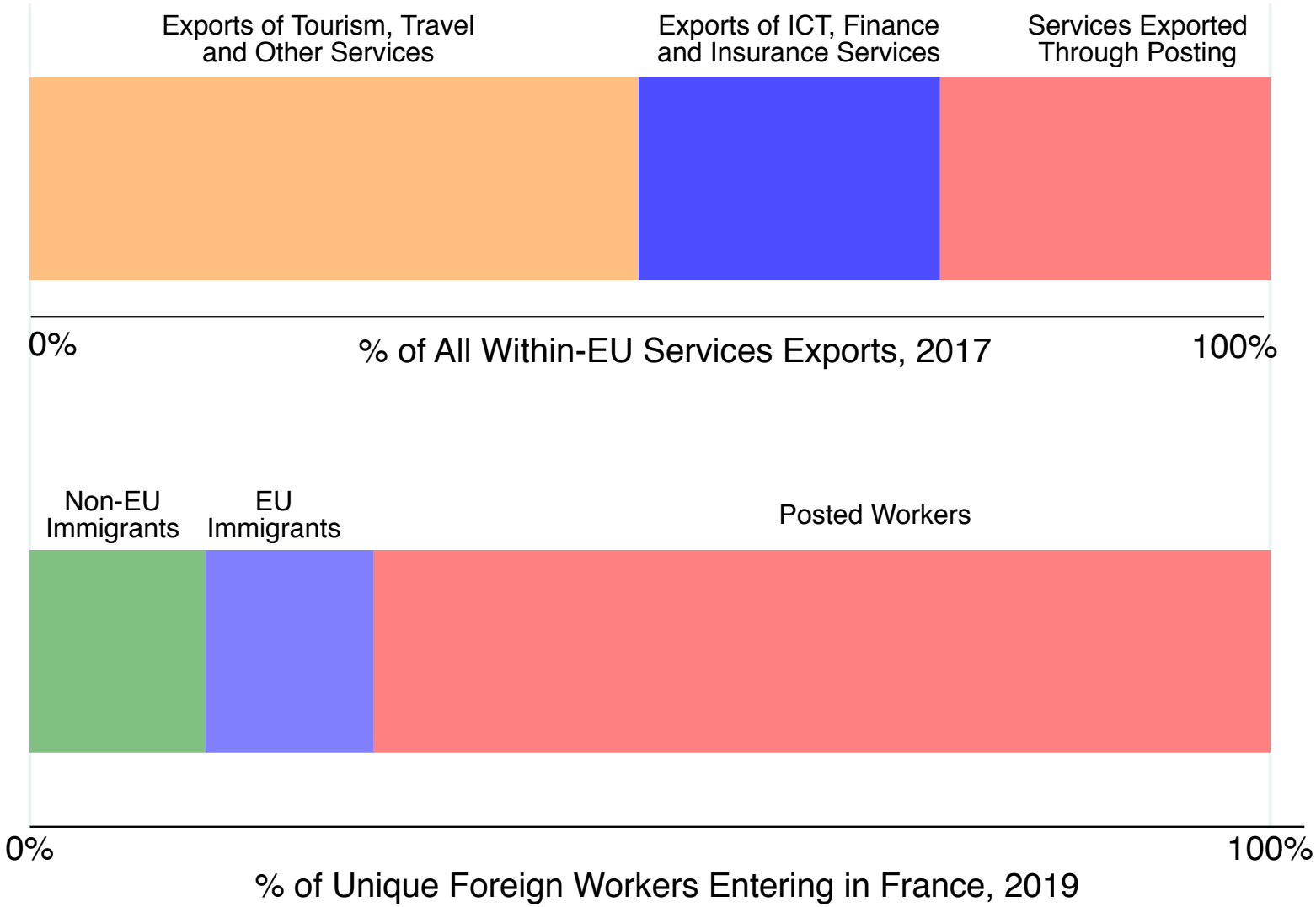
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1) What Are the Implications of Posting Policies?

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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   - Employment +30%, sales +55%, profits +37%, wages +14%
   - 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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   - 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
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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

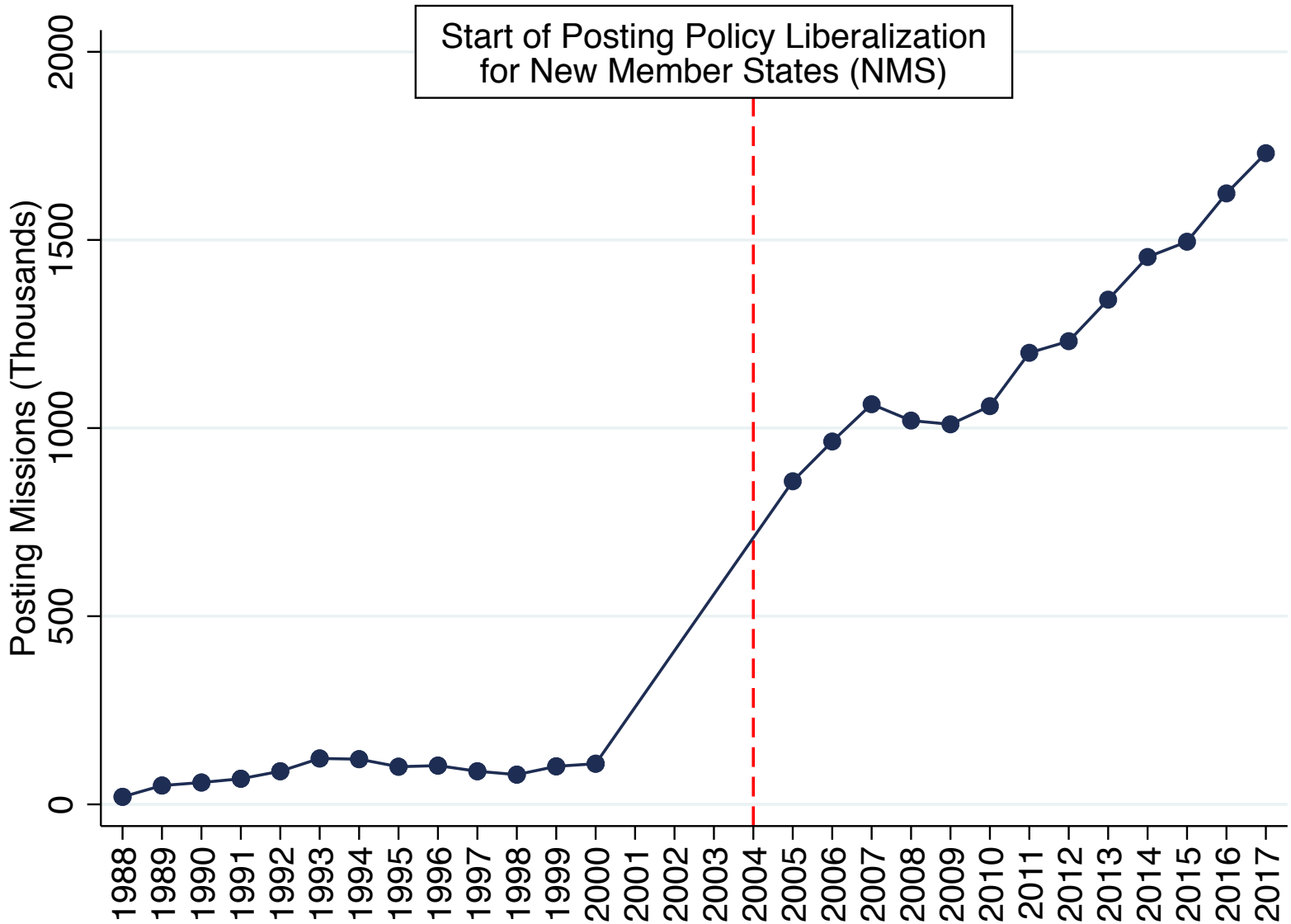
Who is Getting Globalized?

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 France



Effects of Posting Liberalization to NMS

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

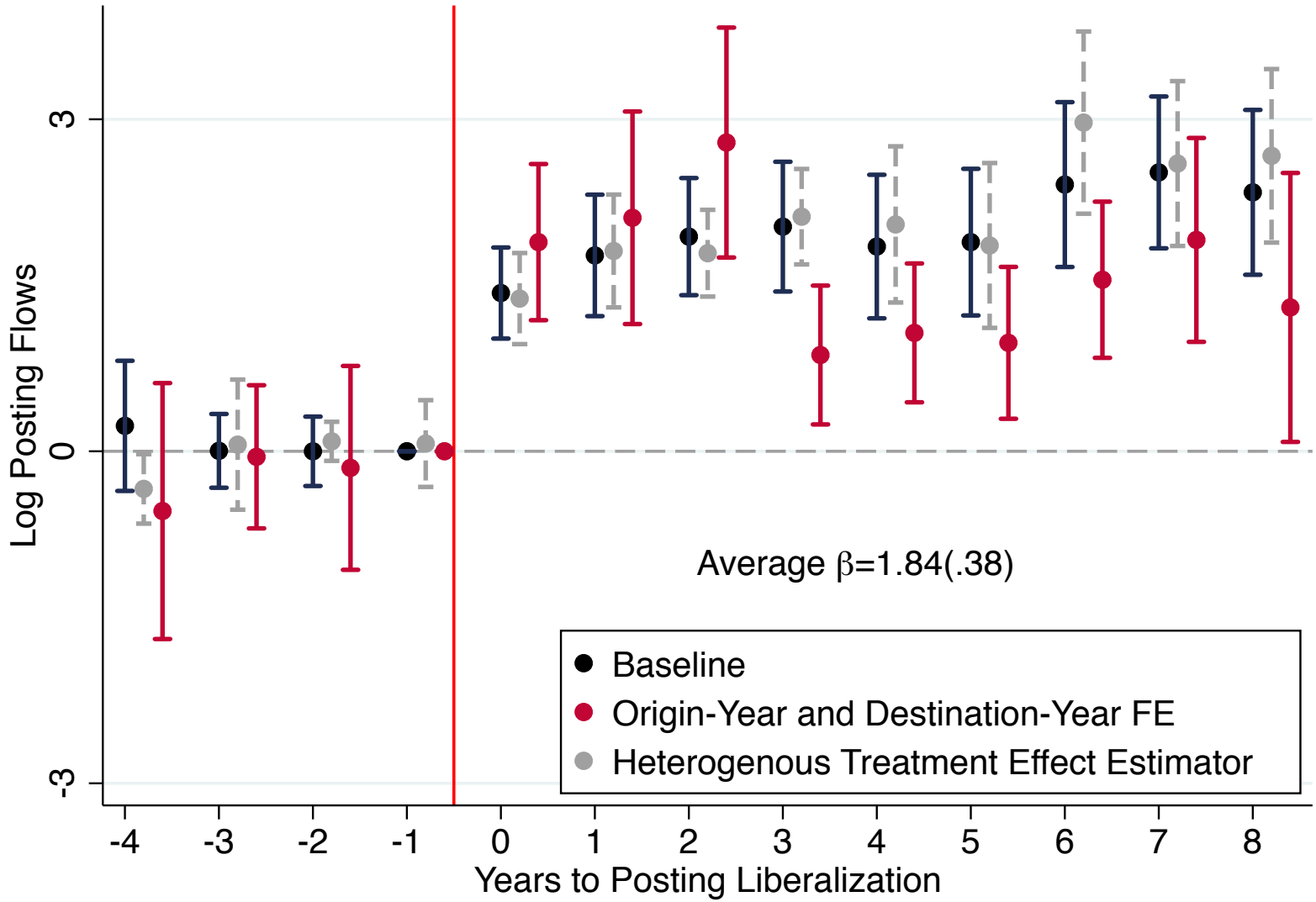
- Origin-destination liberalization of posting
  - Timing set by the European Commission Timing
  - Different timing than migration liberalization in most cases

- 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

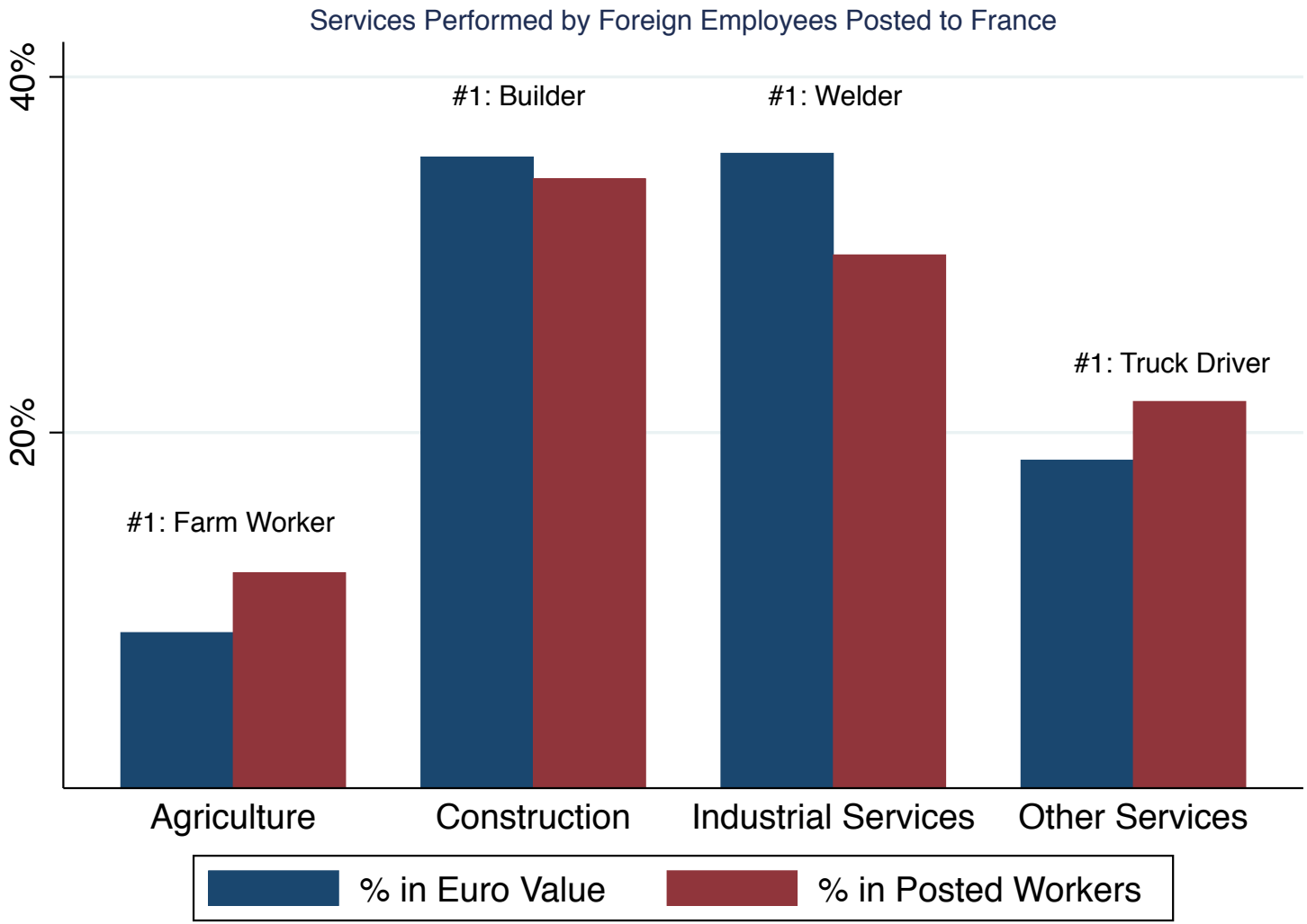
Posting Liberalization Increased Trade-Migration Flows



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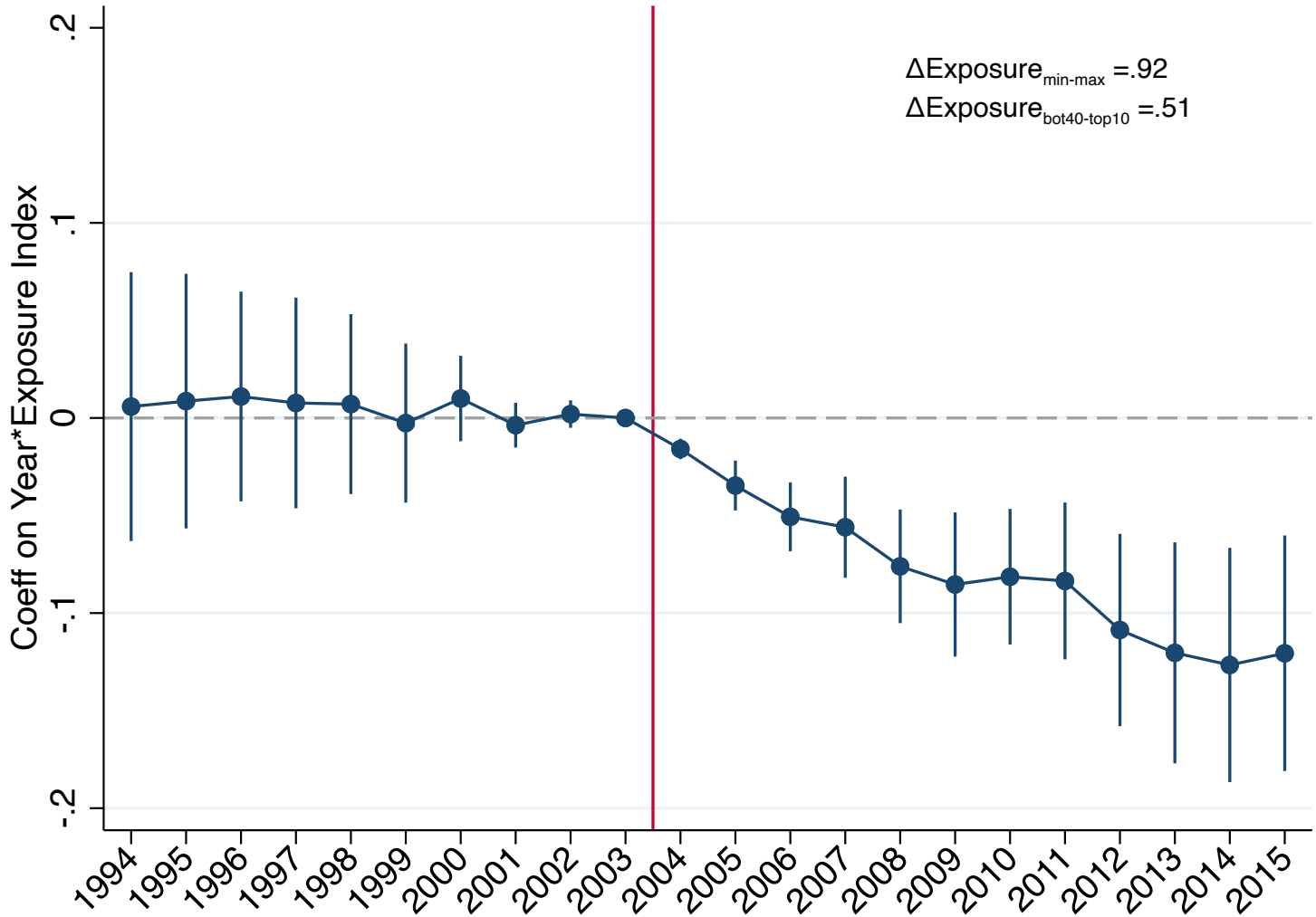
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- Predicted exposure: pre-reform posting imports ("Enclave") Trade costs

- 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

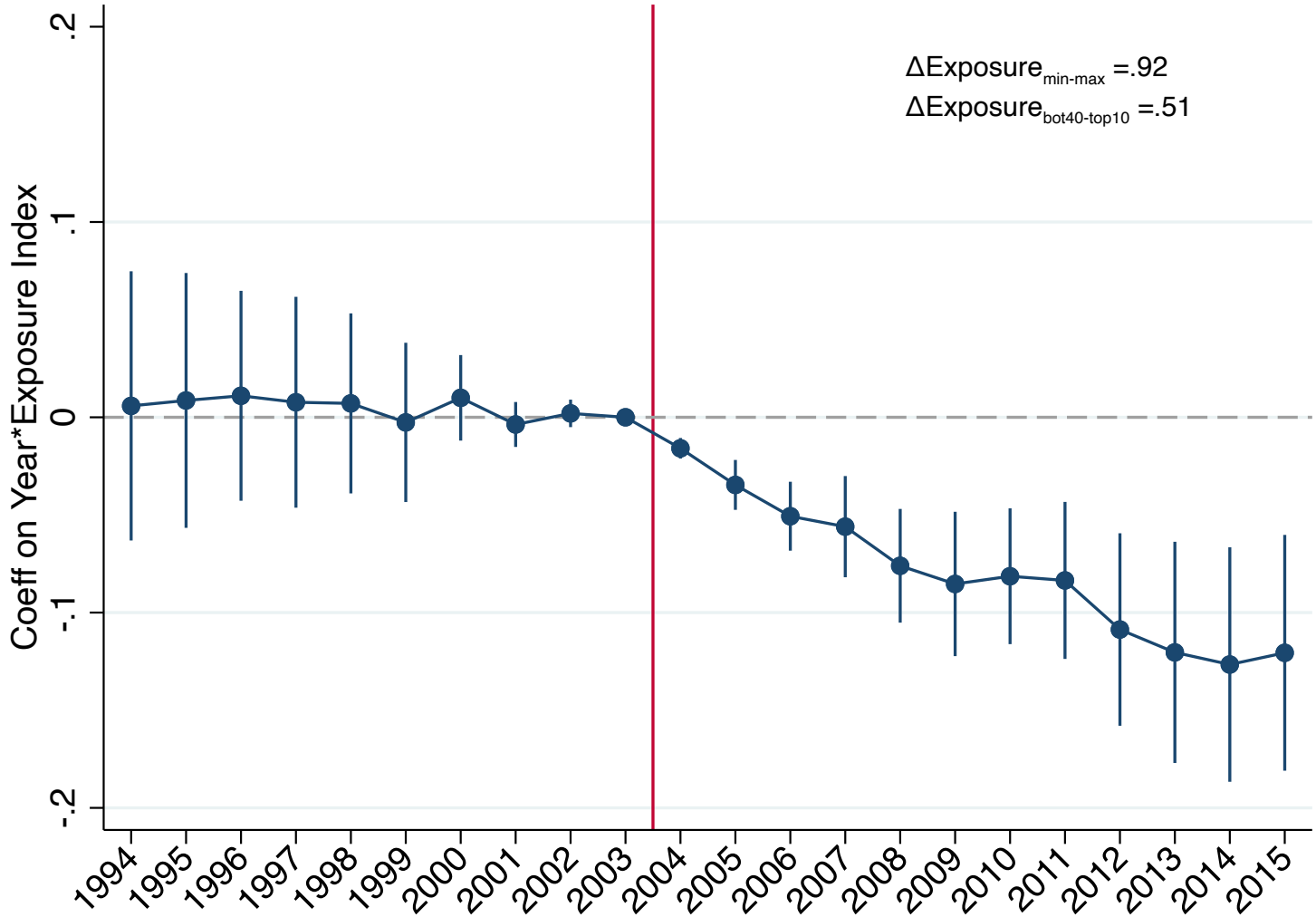
$$\ln Emp_{pt} = \alpha + \lambda_t + \lambda_p + \sum_{k=1994}^{2015} \zeta_k \mathbb{1}_{\{t=k\}} \times e_p^{pre} + \lambda X_{pt} + u_{pt}$$



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

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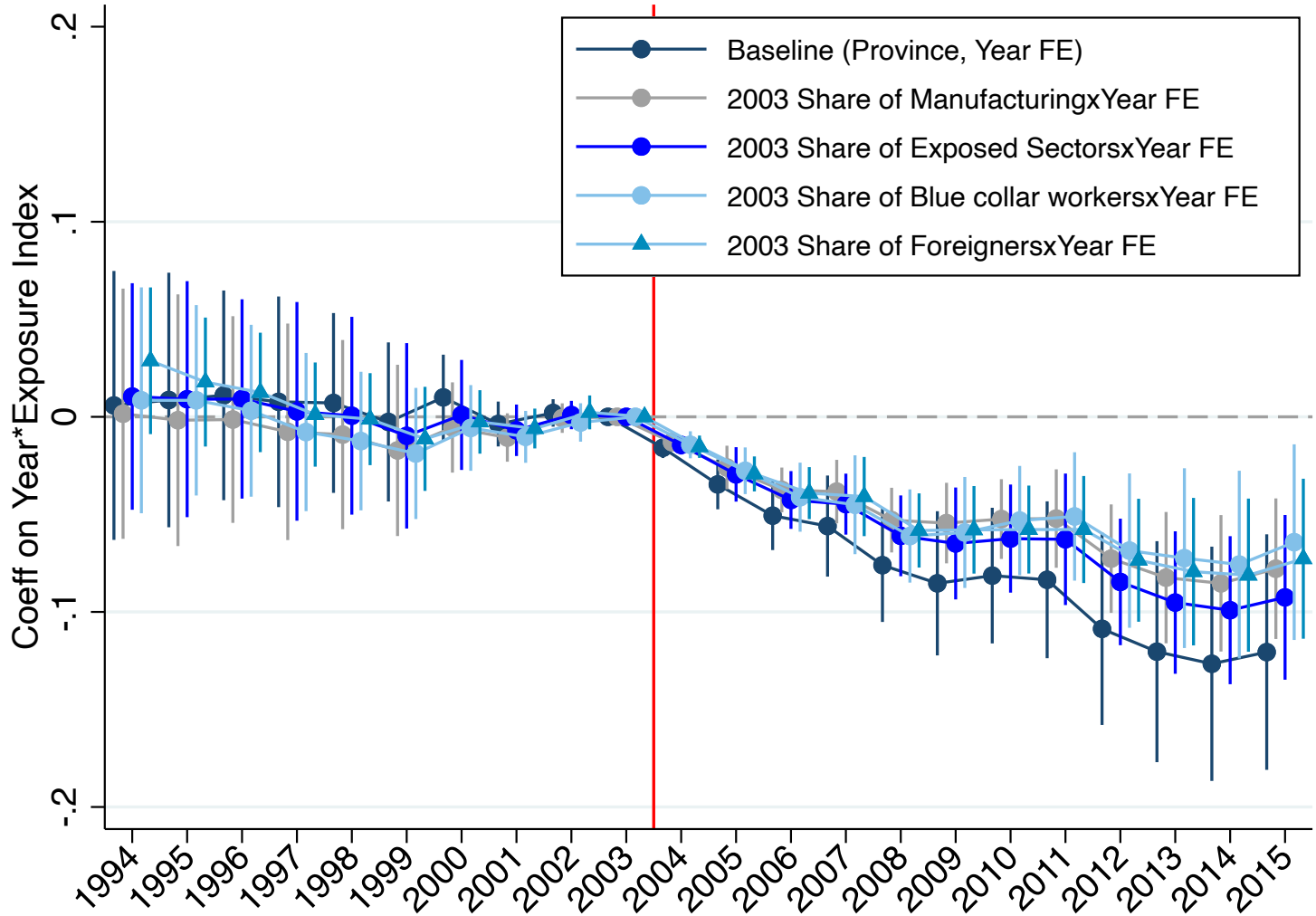
Moving from bottom 40 to top 10% of exposure decrease employment by 6%



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

Log Exposed Employment by Exposure to Posting

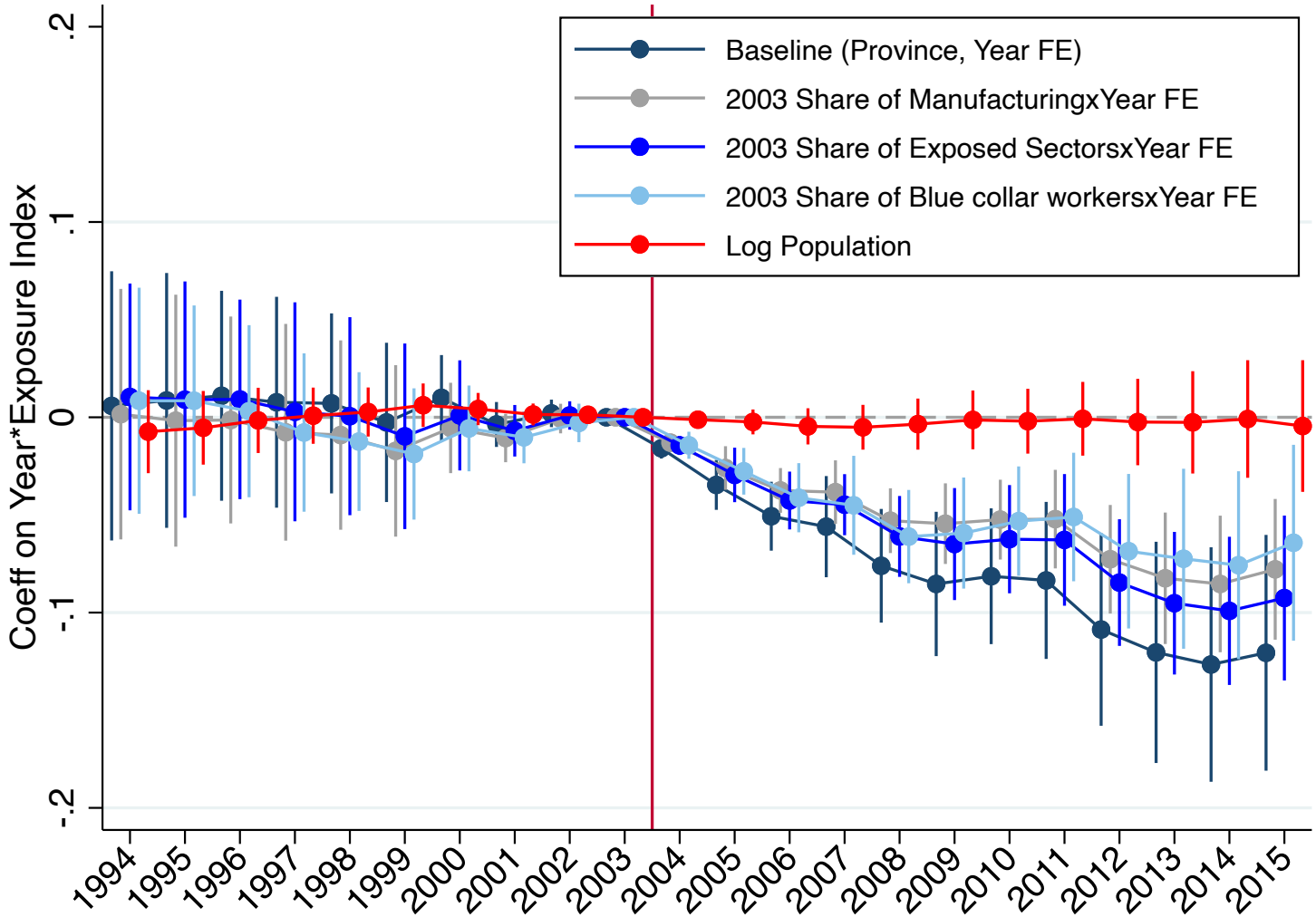
Controlling for initial local characteristics × time trends



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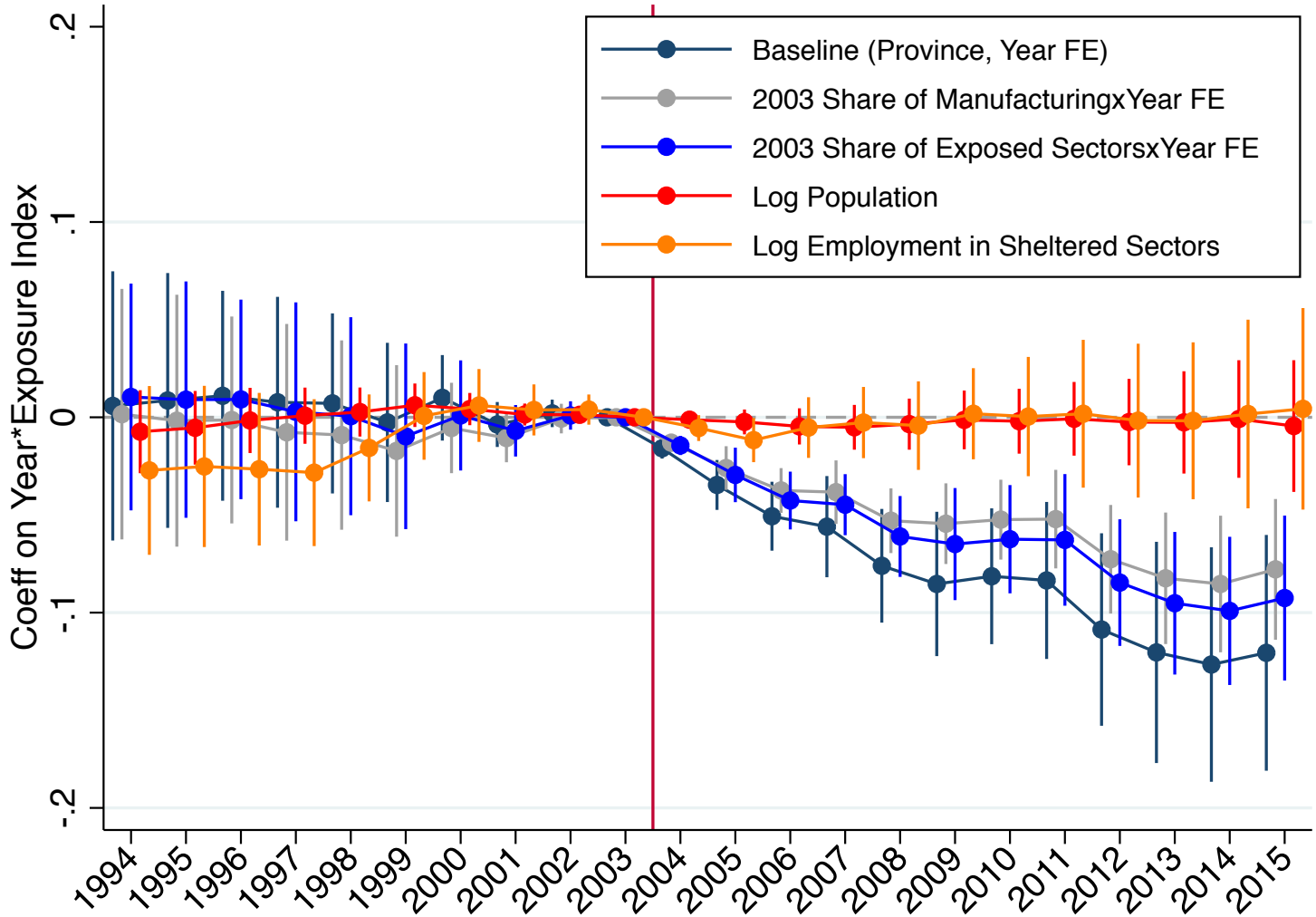
No migration response to the supply shock



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

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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

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

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

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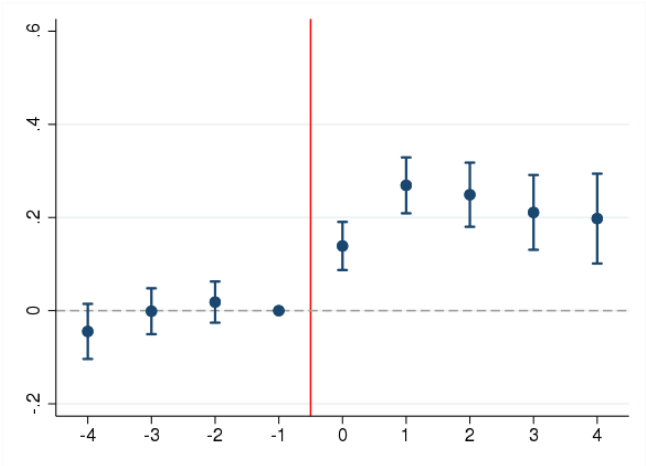
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- Comparison groups:
  1. Future posting firm in same sector-province (baseline)
  2. Matched non-posting firms with same pre-posting sales
  3. Matched firms in sheltered sectors (retailers, hairdressers...)
  4. IV using pre-posting firms' market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

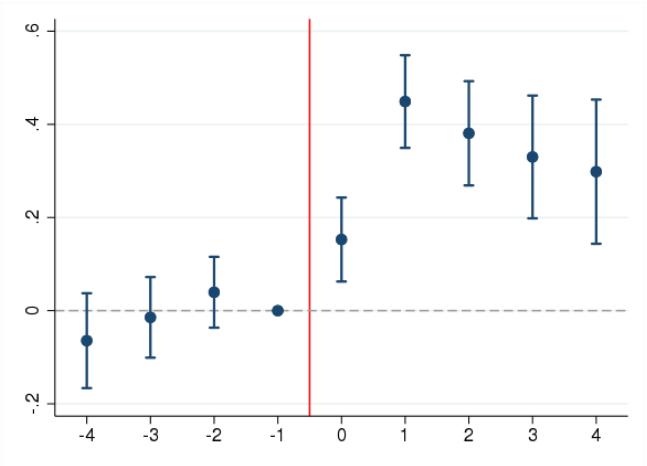
Sending Firms After First Export of Posting Services

Firms Scale Up When Accessing Foreign Markets Through Posting

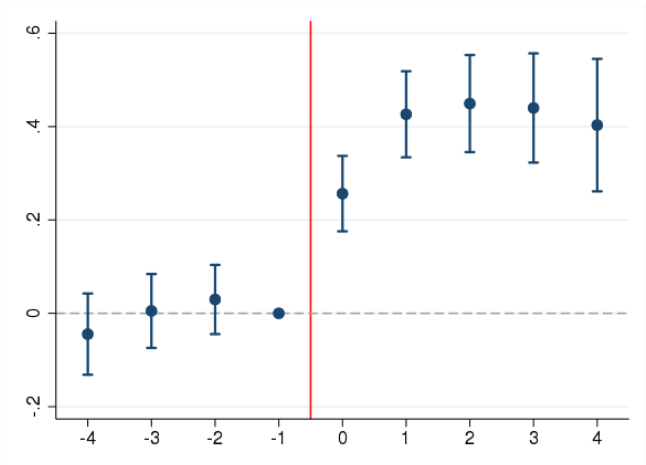
A. Log Total Employment



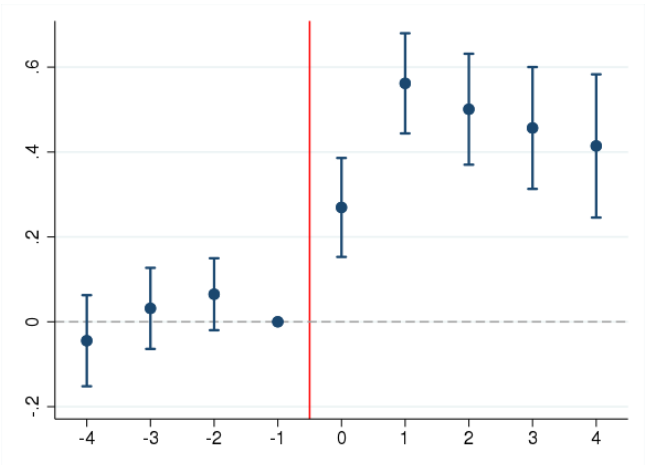
B. Log Total Turnover



C. Log Total Assets



D. Log Total Wage Bill

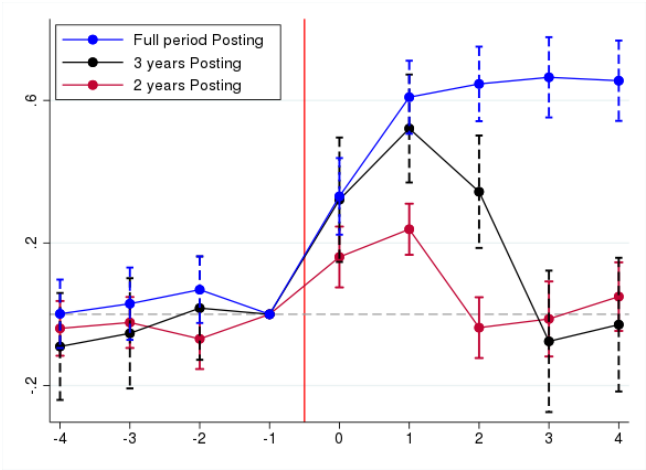


Domestic sales

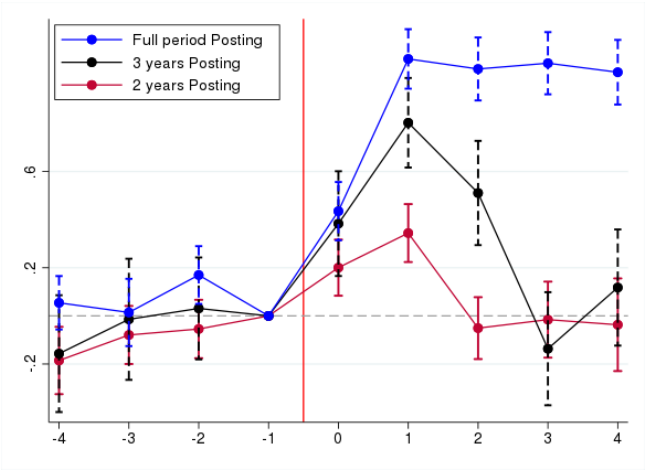
Export-Mobility Gains of Posting

Effects start and end with the posting mission

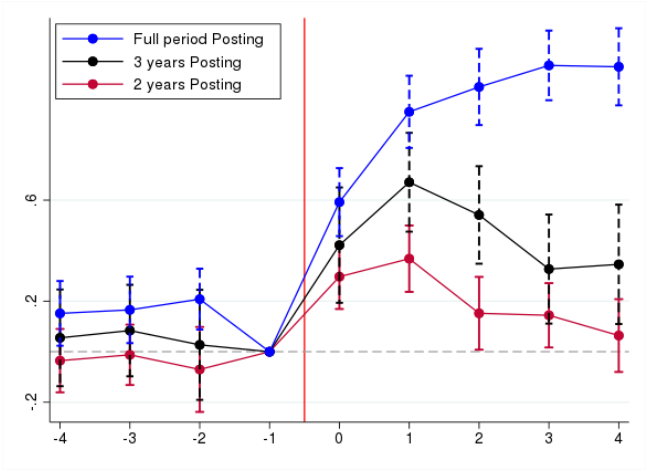
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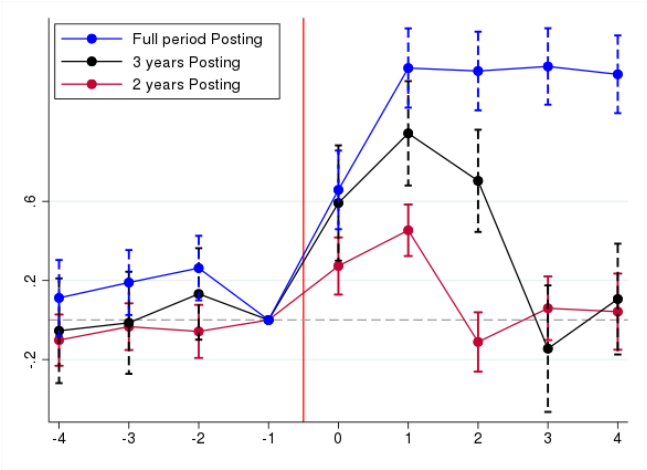
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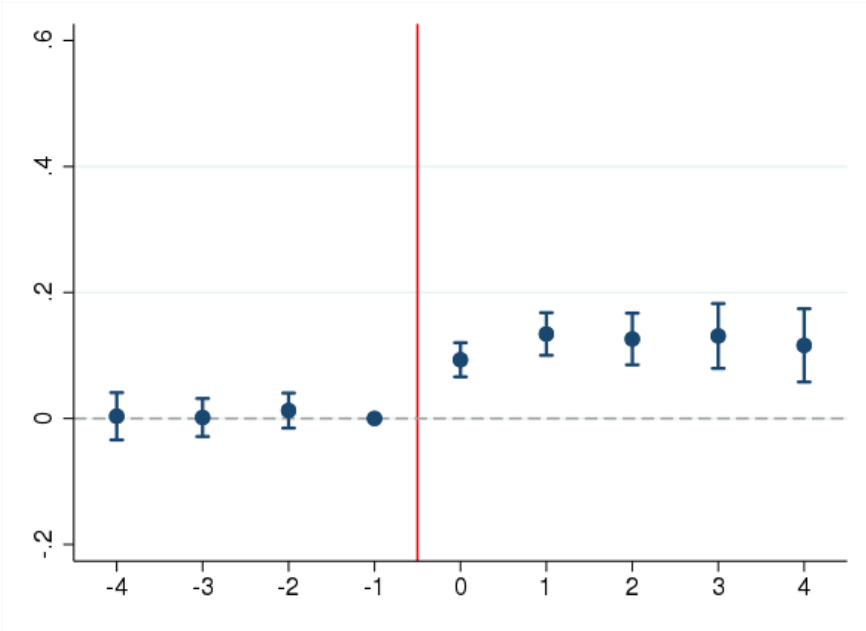


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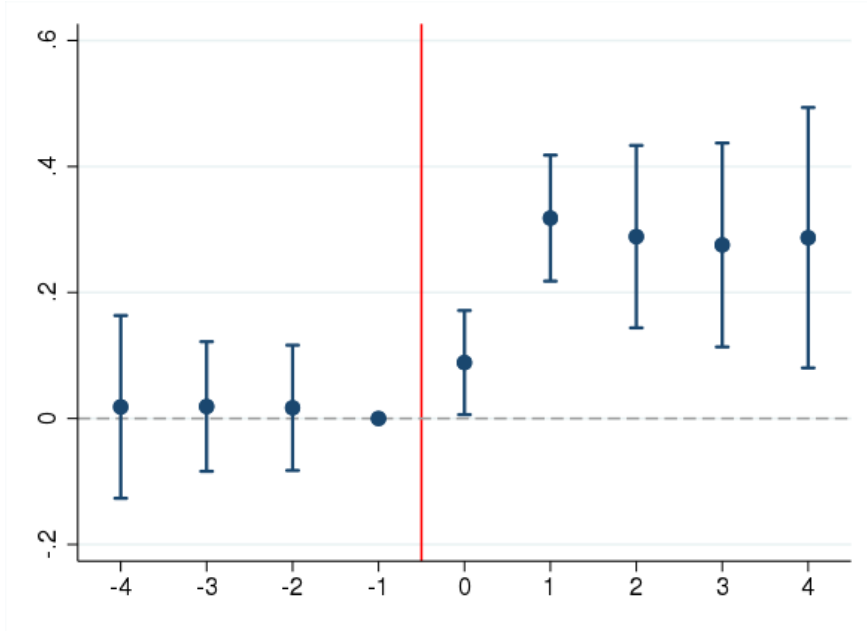
Profits and Wages at Posting Firms

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

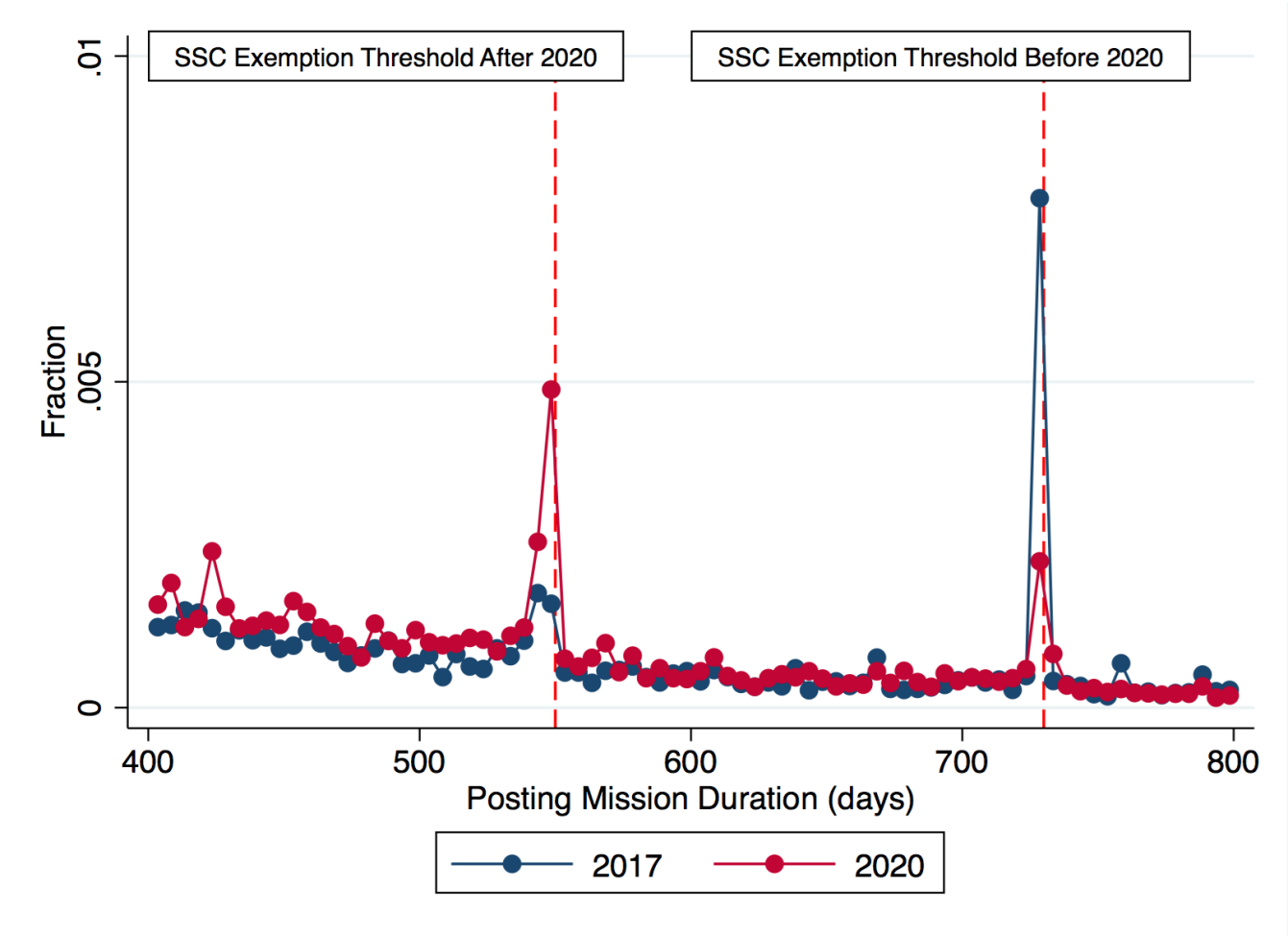
- Novel questions for trade and tax policy
  - Trading people → labor standards & tax exemptions become trade tools
  - Continent-wide experiment of "minimum labor standard" clause

- 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

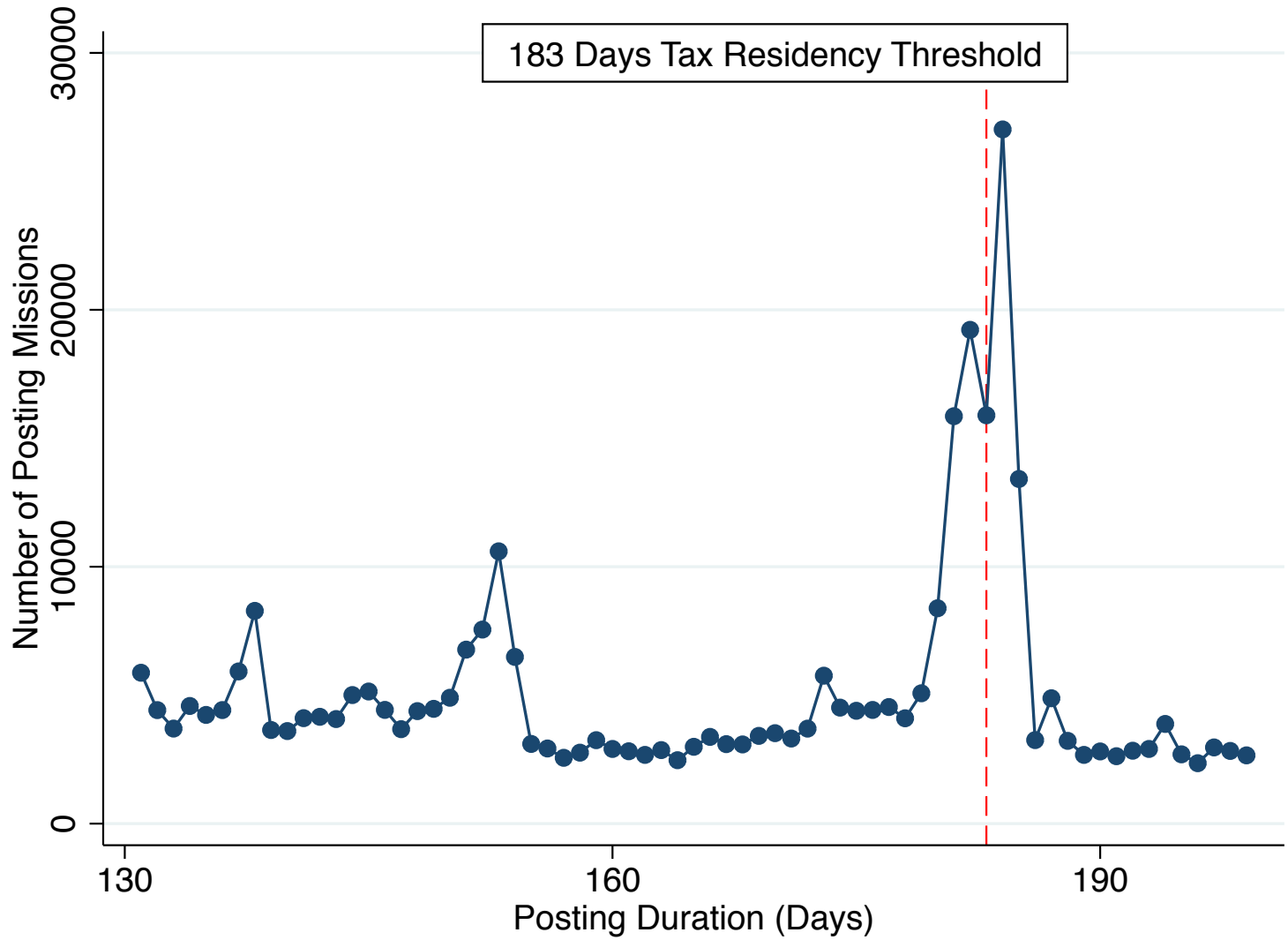
Posting Duration and Social Security Exemptions Threshold

Back Back2



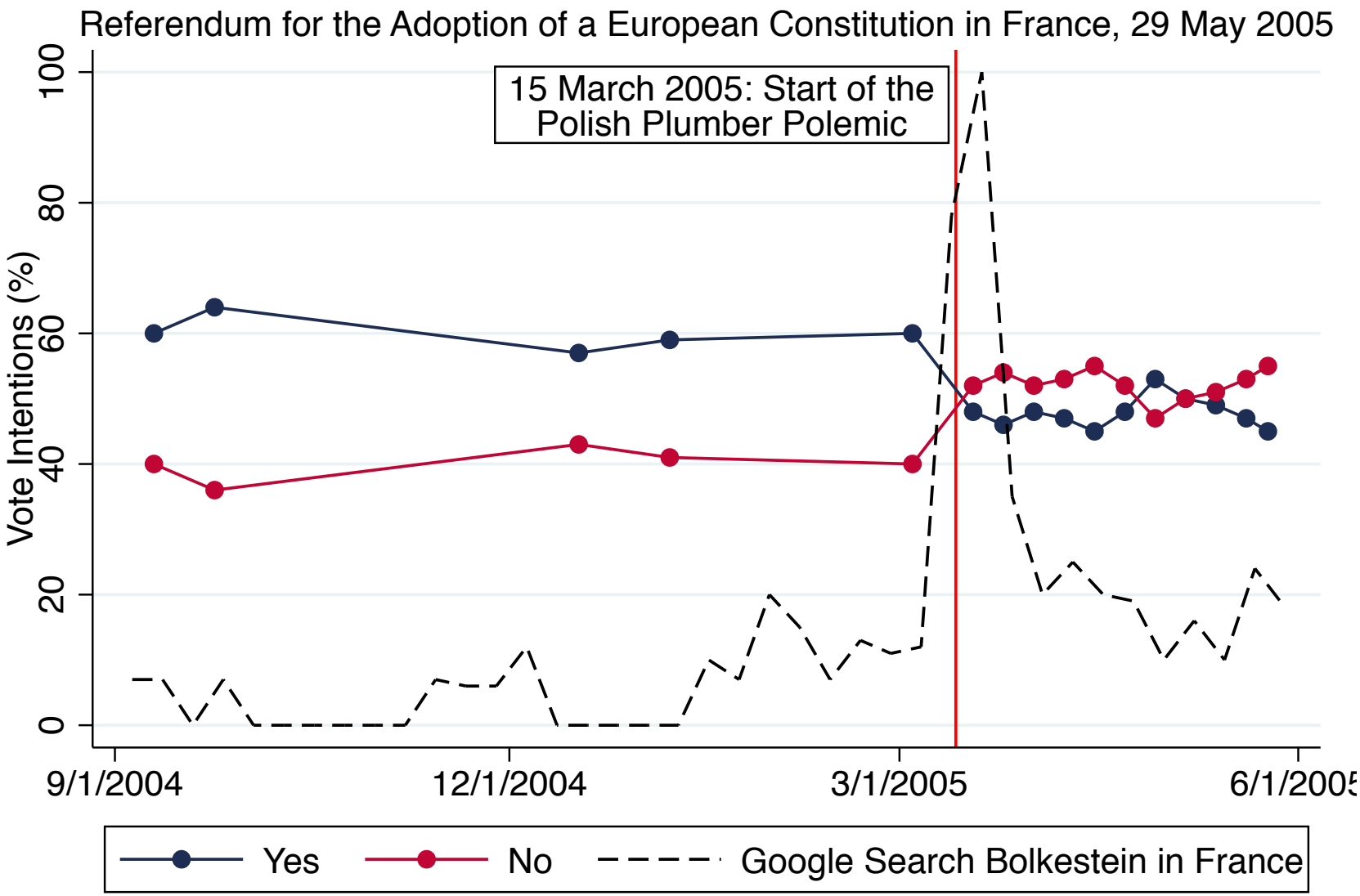
Posting Duration and Tax Residency Threshold

Back



Political Backlash against Posting Policy Liberalization

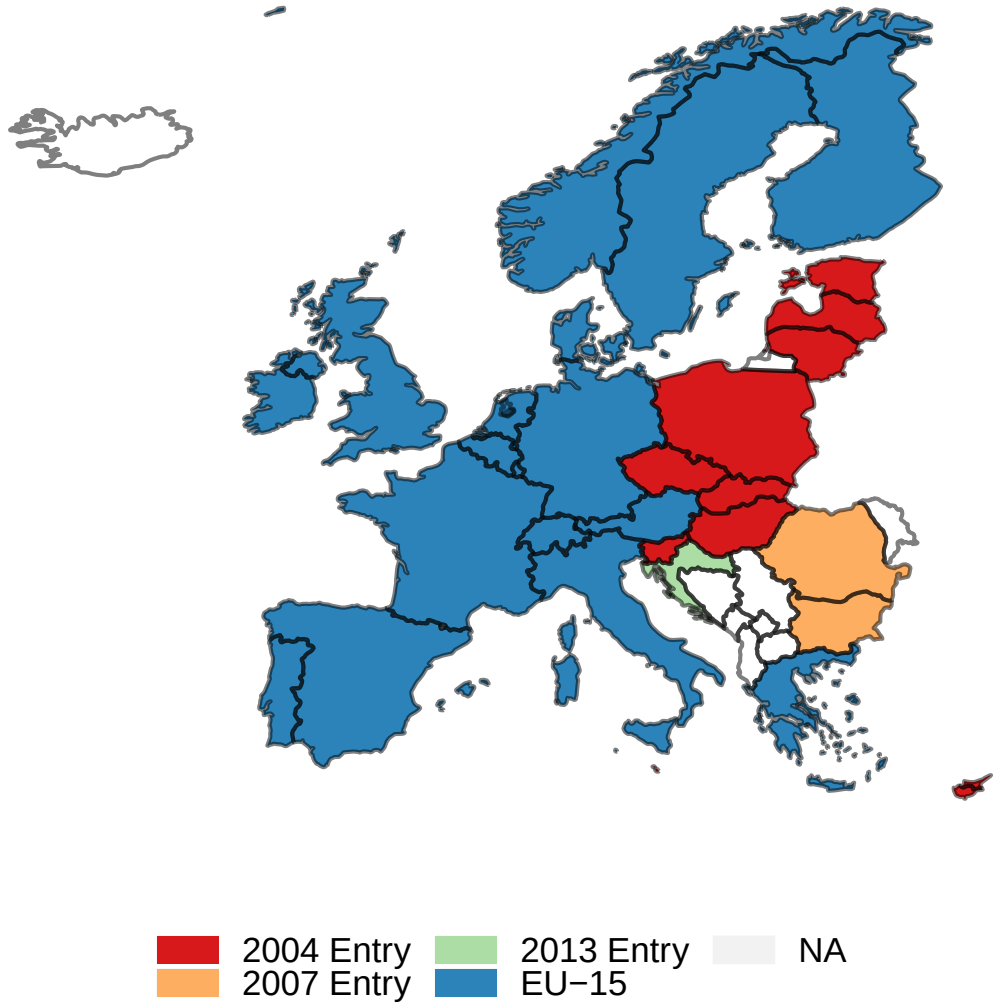
Bolkestein directive proposed to abolish destination-level minimum wage rule Back



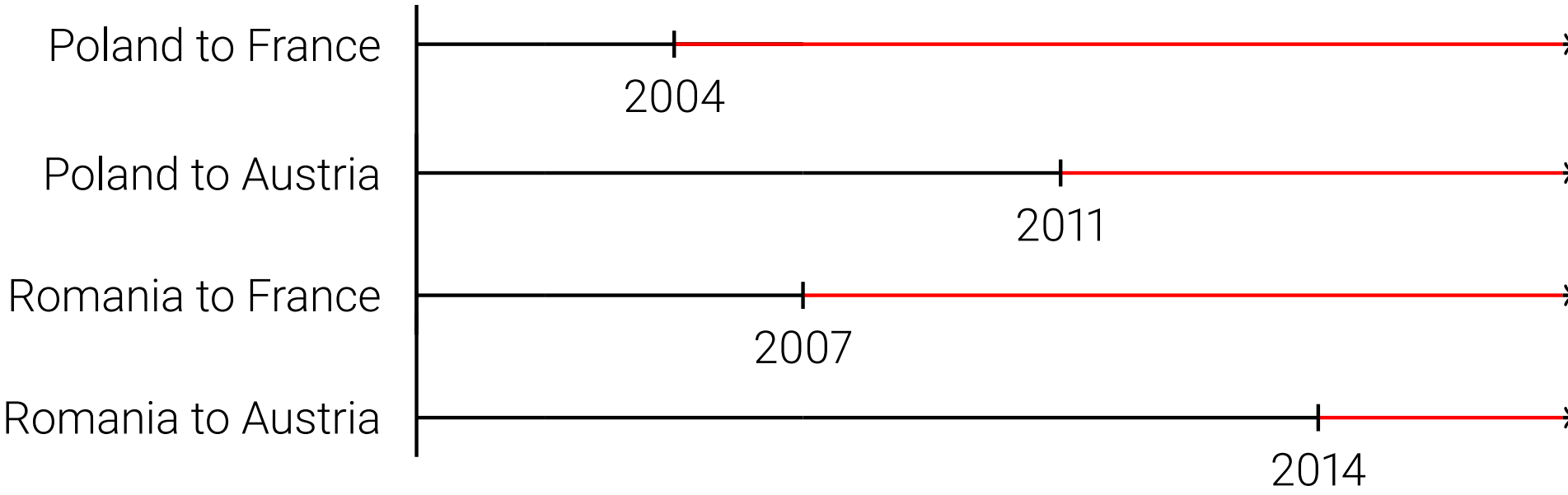
Source: IPSOS Polls and Google Search Trends

EU Enlargement Timing

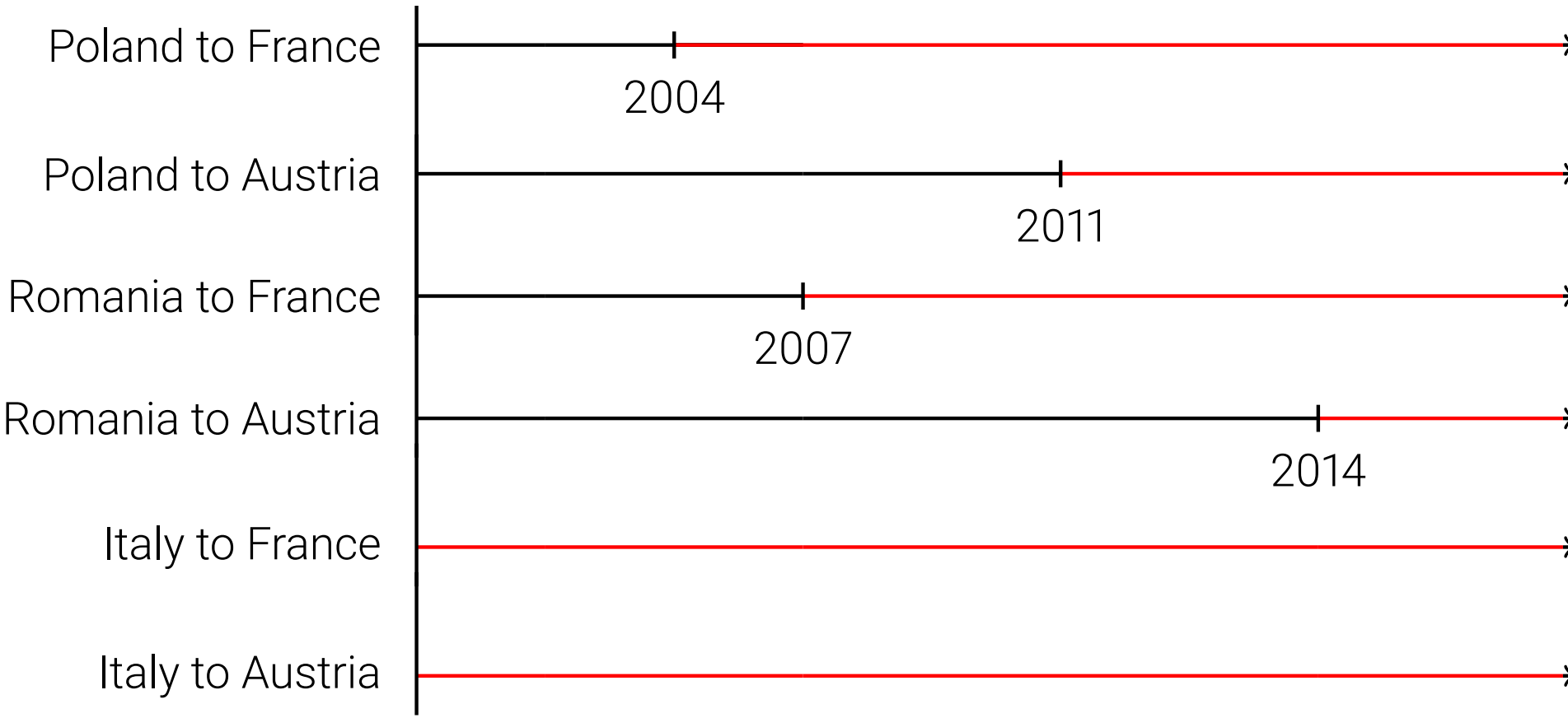
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Staggered Posting Liberalization Reforms: Illustration

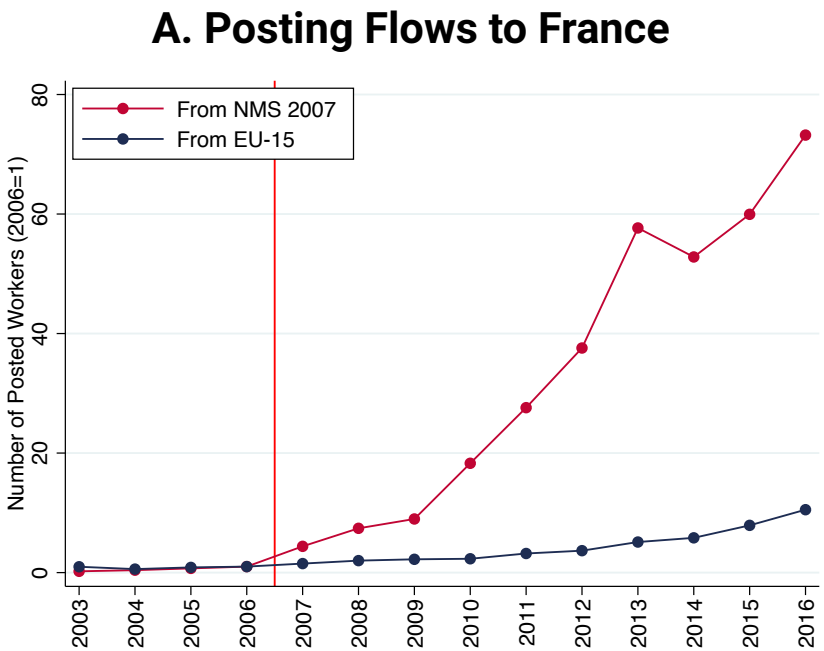


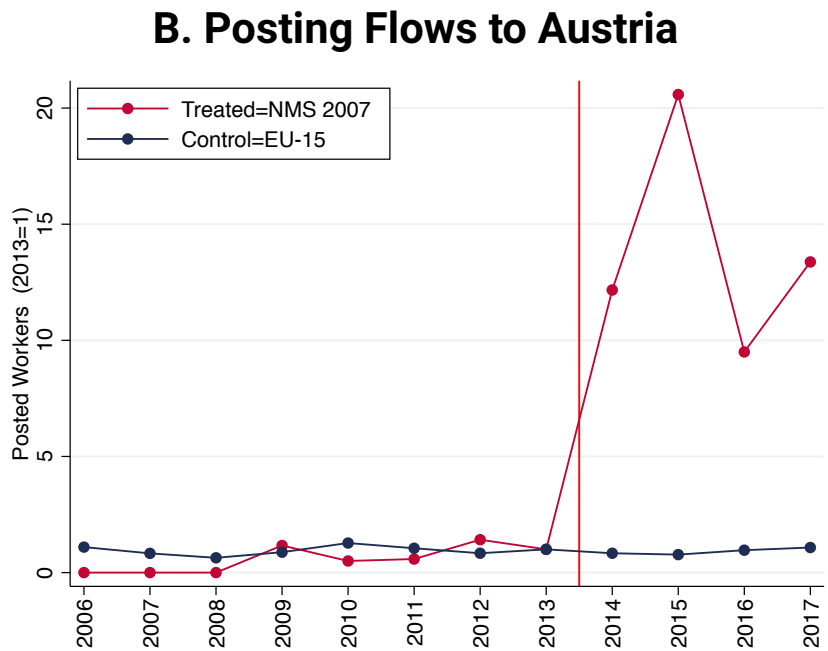
Staggered Posting Liberalization Reforms: Illustration



NMS 2007 to France and Austria

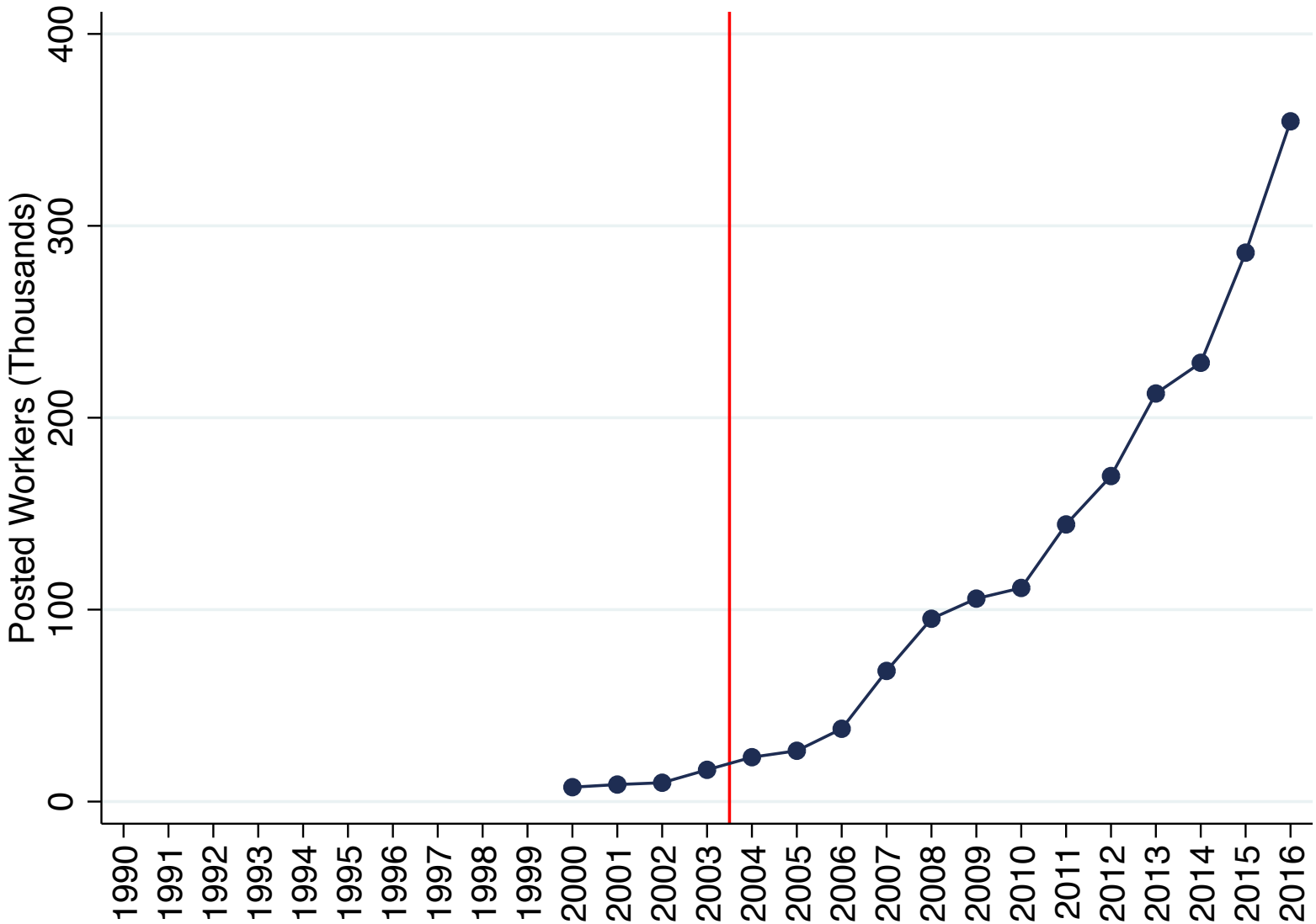
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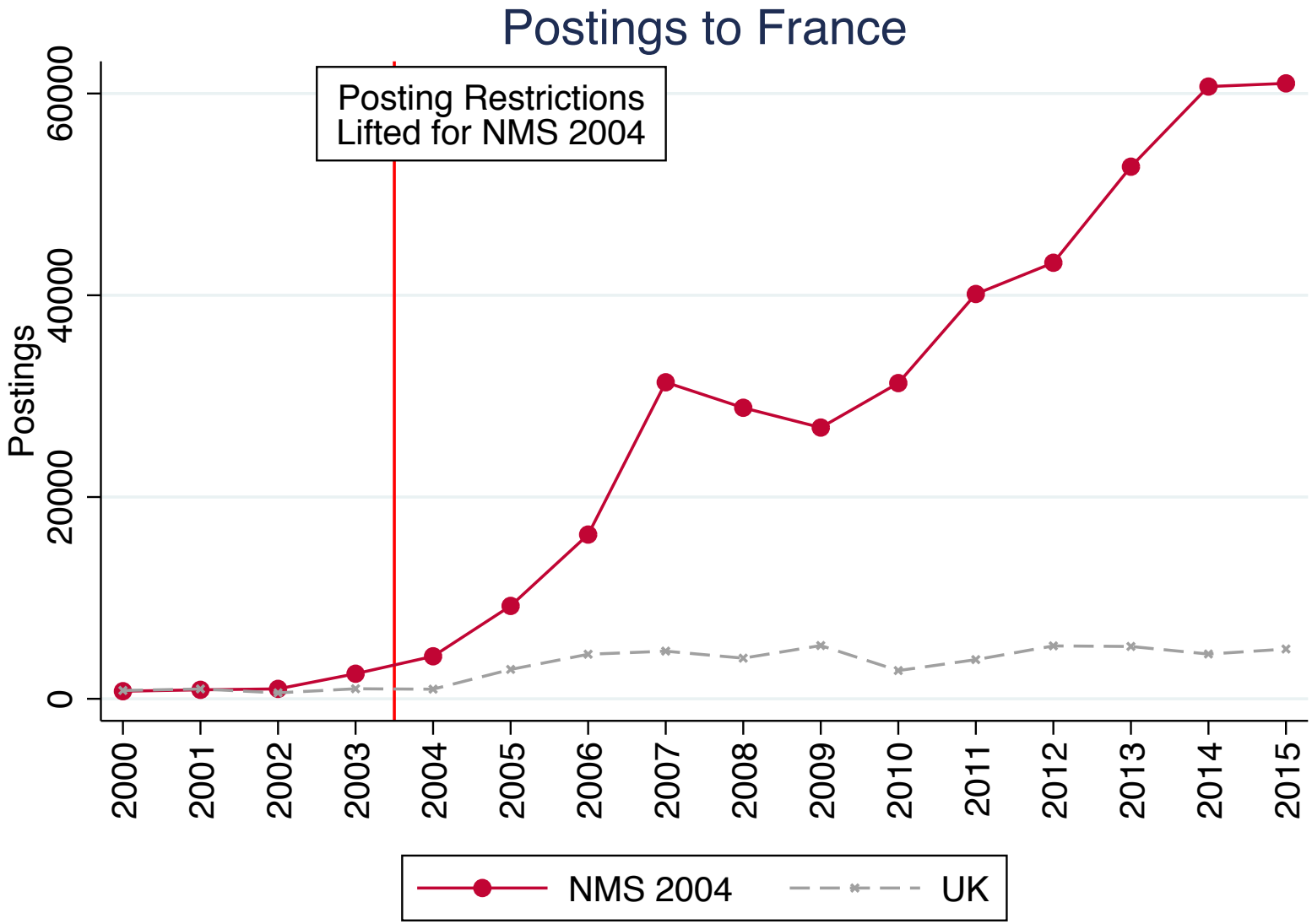
Posting Policy Increased Trade-Migration Flows

Posting Flows to France BACK



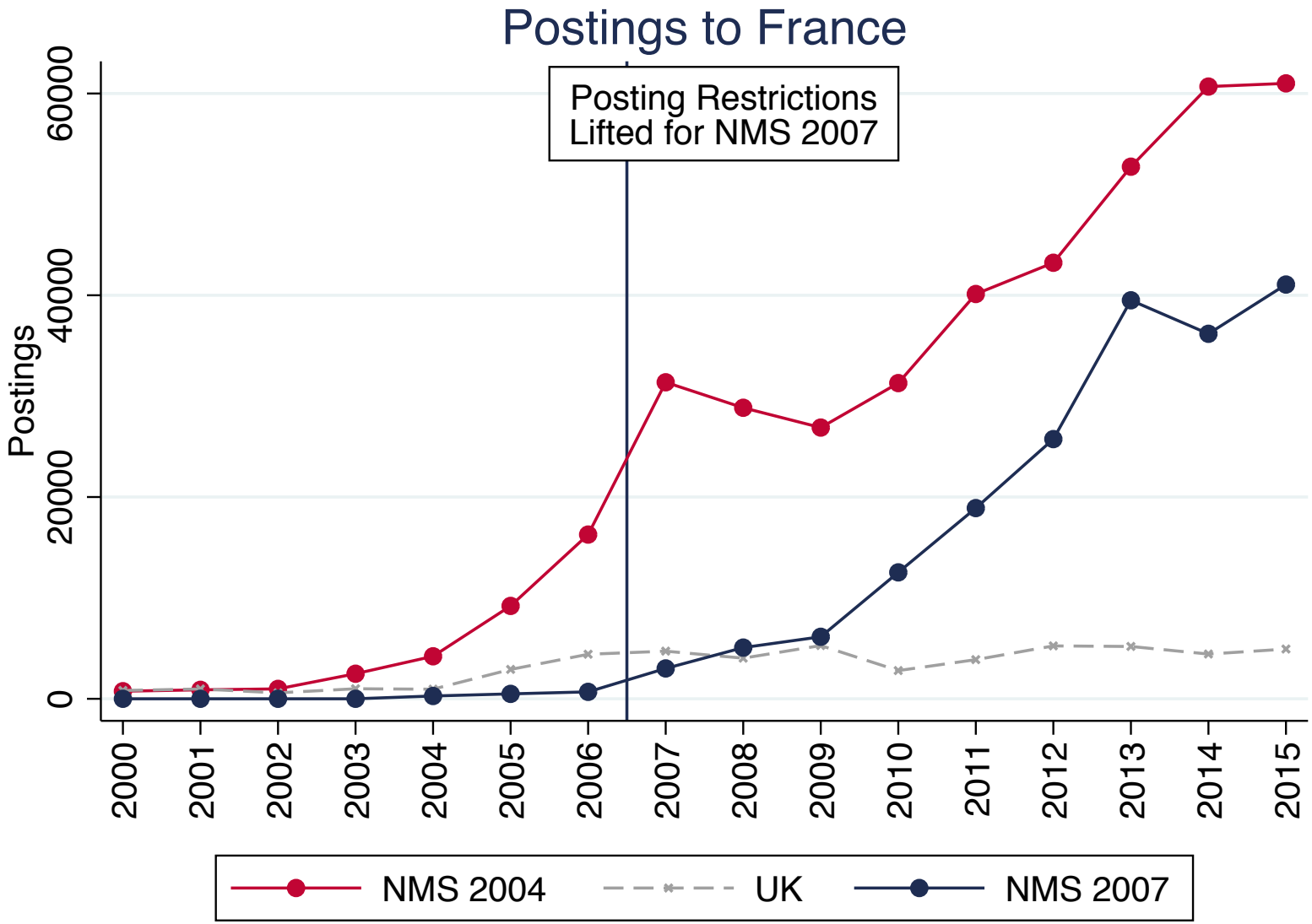
Posting Policy Increased Trade-Migration Flows

Posting Flows to France



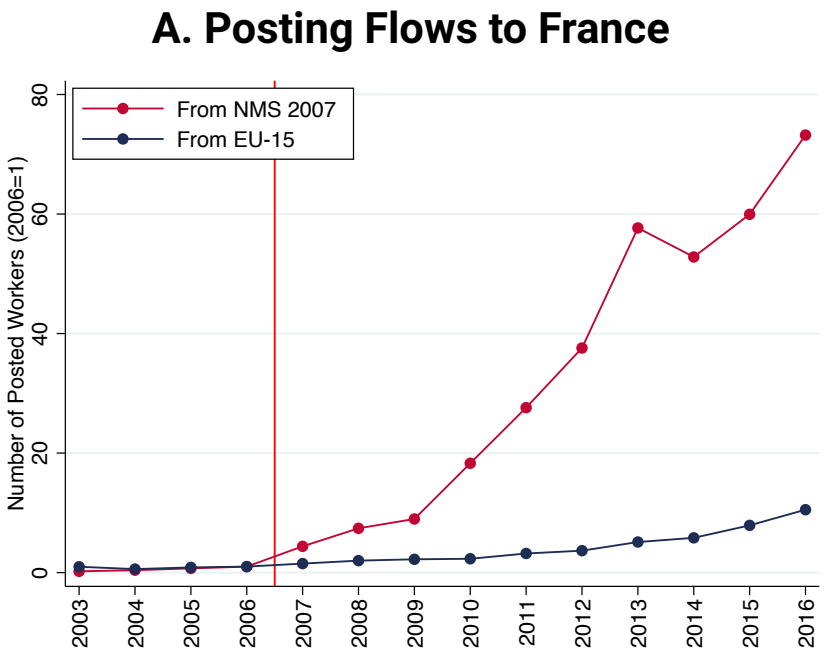
Posting Policy Increased Trade-Migration Flows

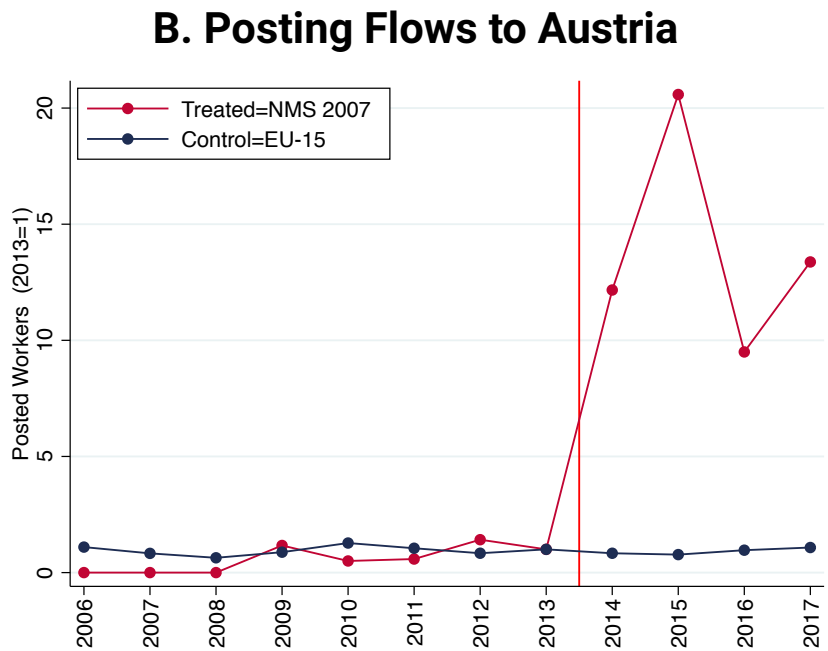
Posting Flows to France



NMS 2007 to France and Austria

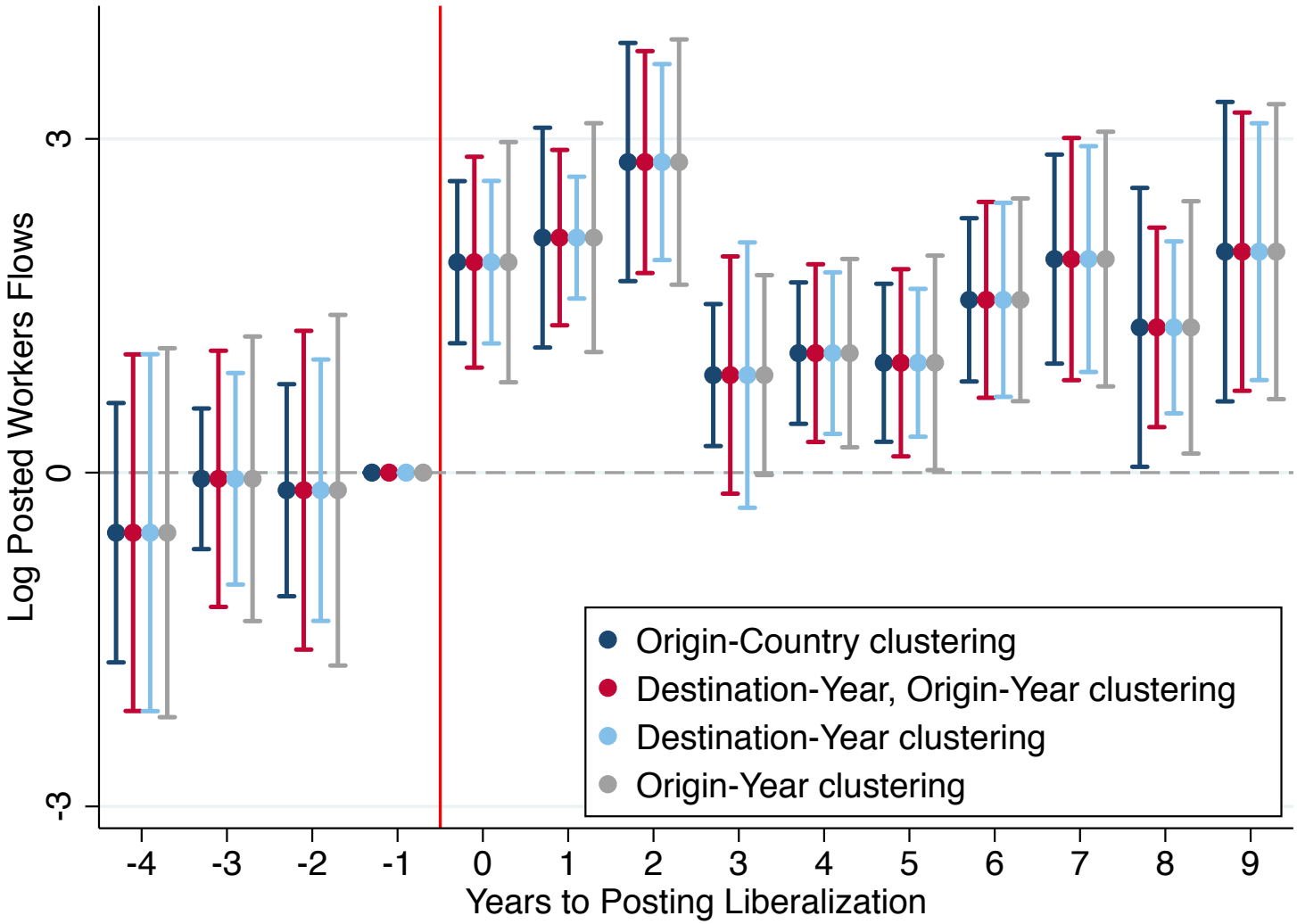
BACK





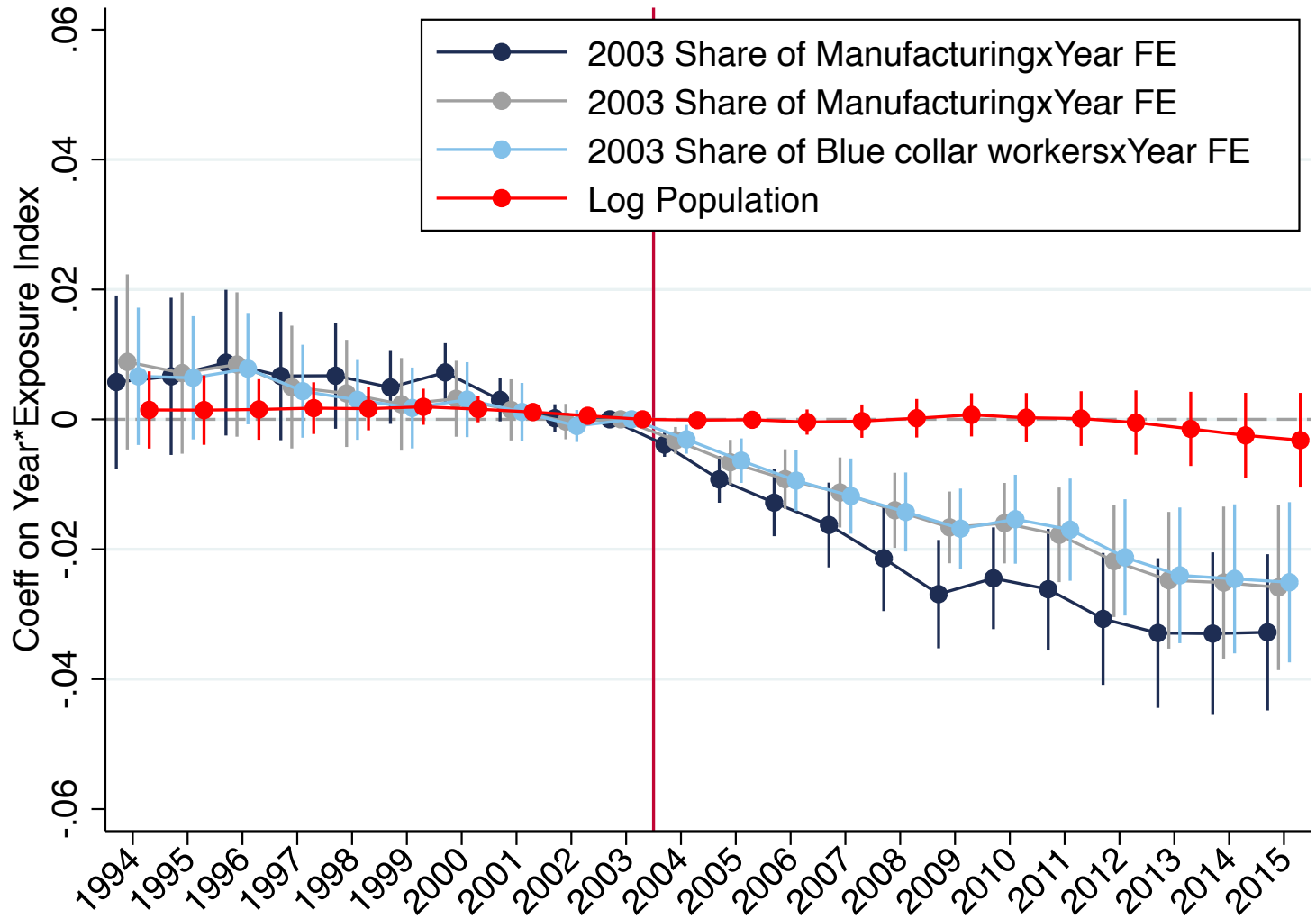
Alternative Clustering

Back



Exposed Employment by Predicted Exposure

Back



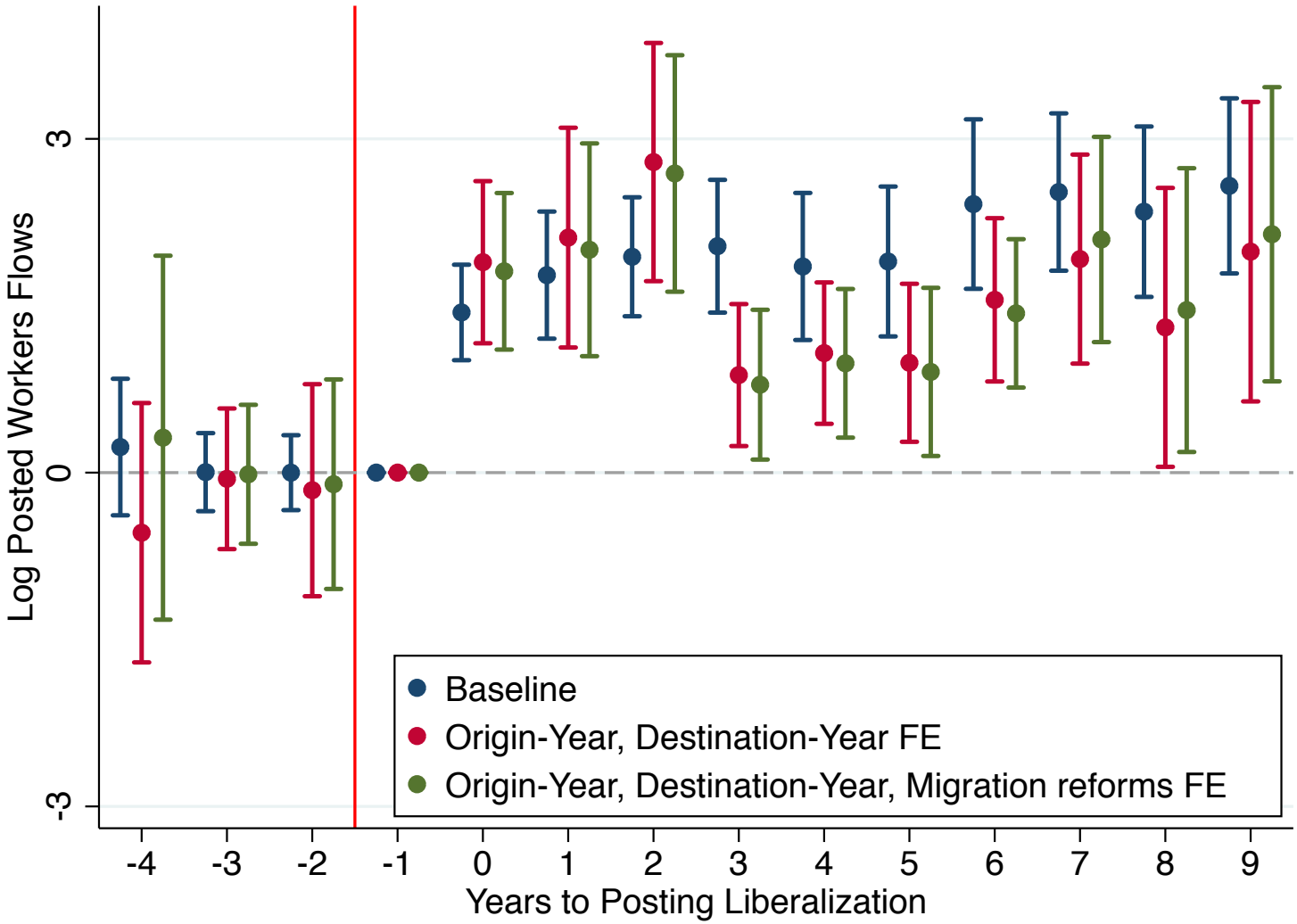
Estimates

Back

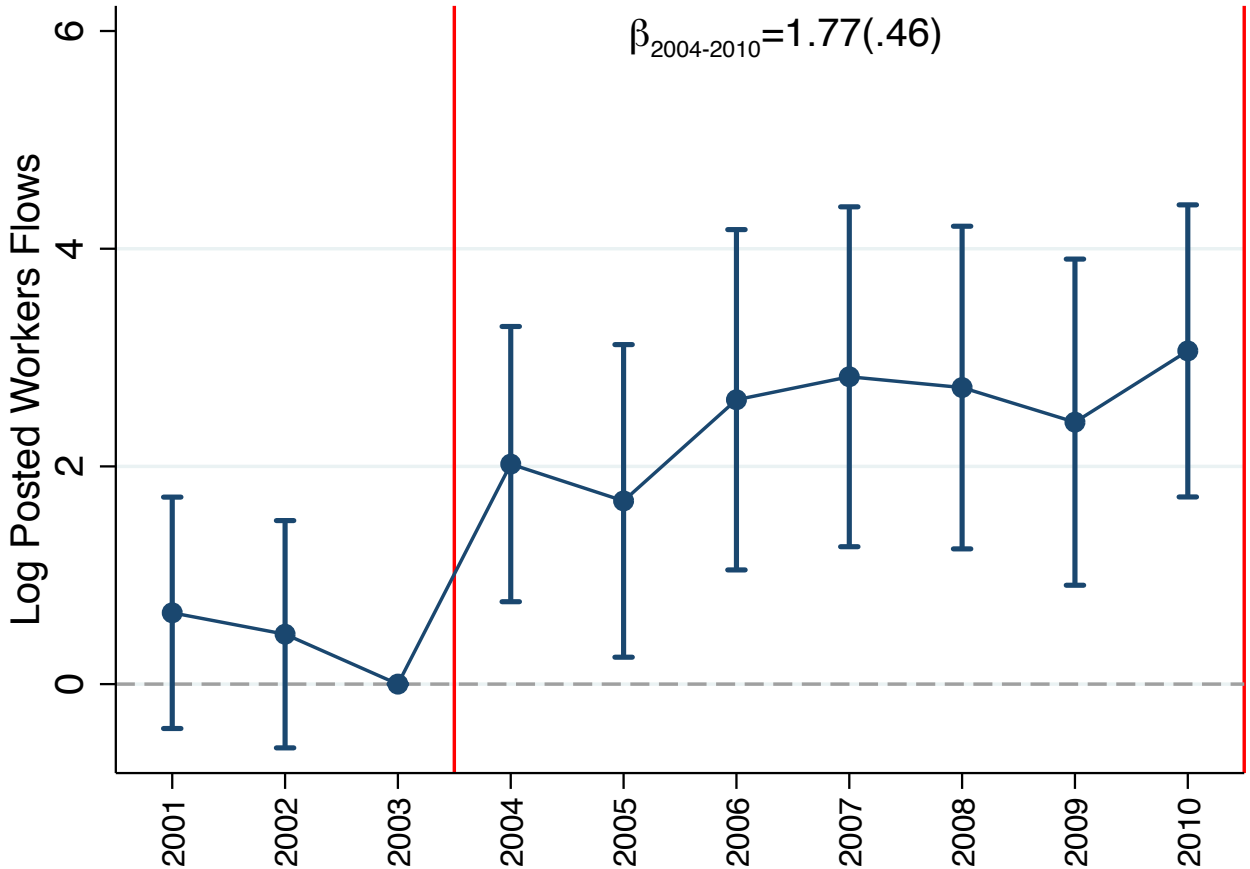
	(1)	(2)	(3)
4 years before liberalization	-.53		
	(.58)		
3 years before liberalization	-.05		
	(.31)		
2 years before liberalization	-.15		
	(.47)		
Year of liberalization	1.89***		
	(.35)		
1 year after liberalization	2.11***		
	(.49)		
2 years after liberalization	2.79***		
	(.53)		
3 years after 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 (β)		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

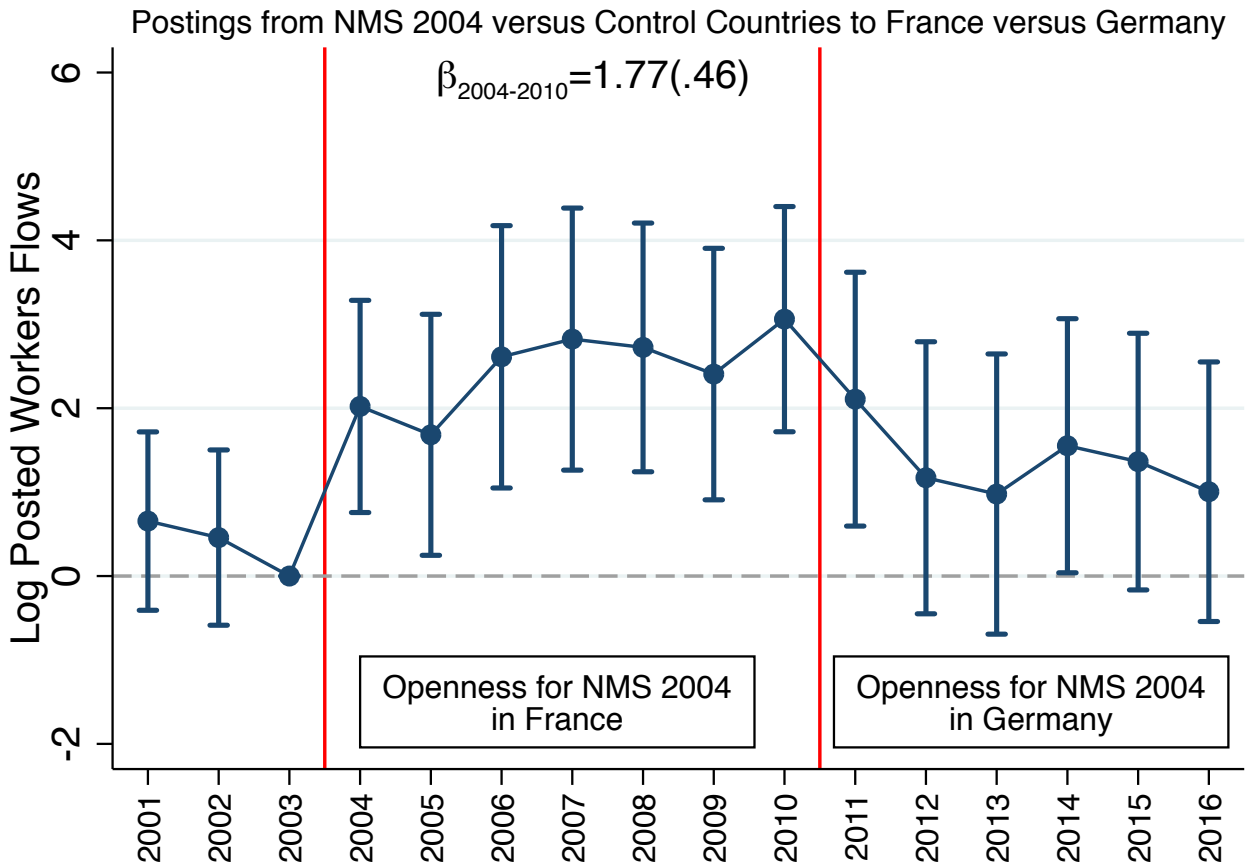


Case Study: France vs Germany Liberalization Back



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

Case Study: France vs Germany Liberalization Back

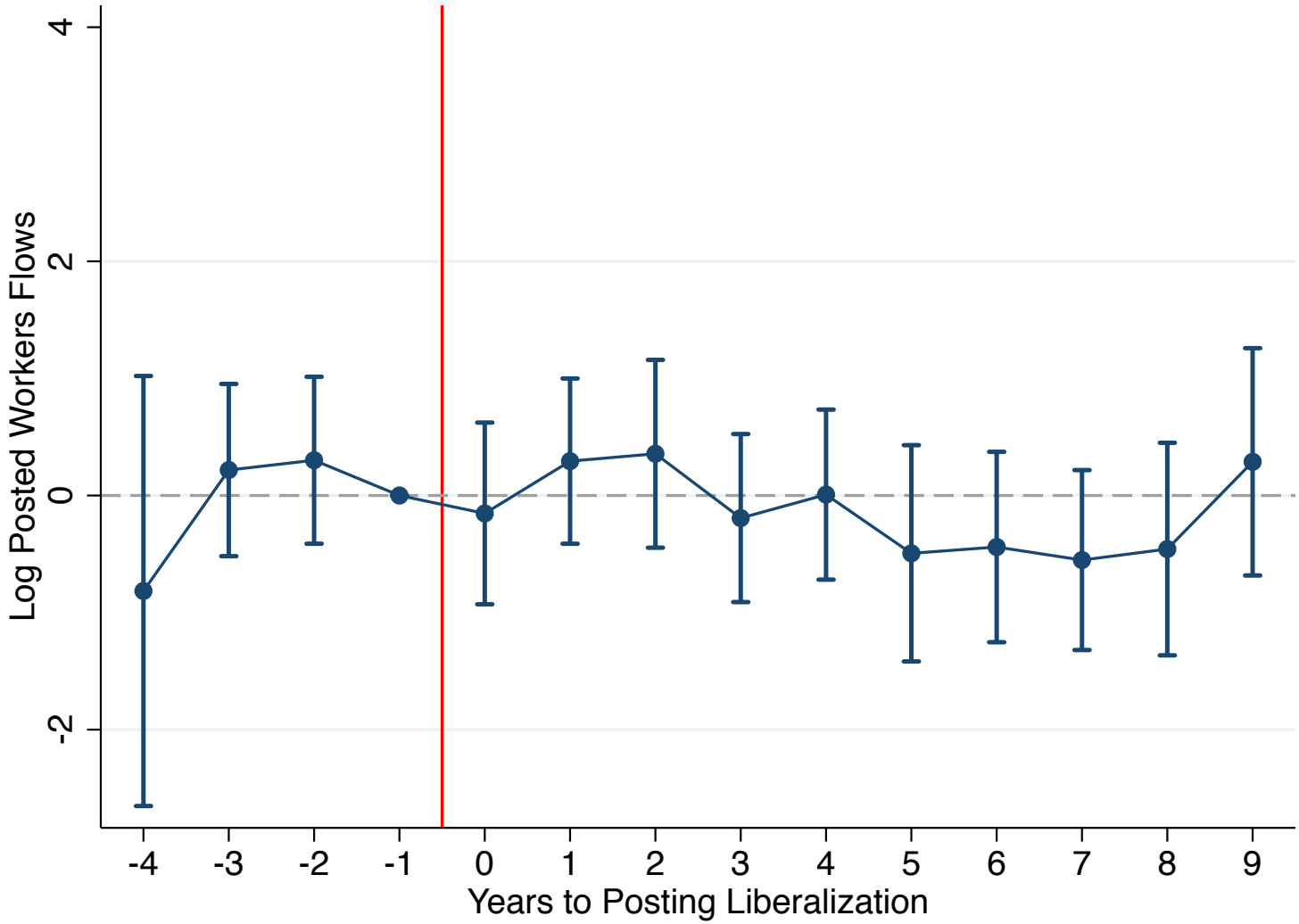


- Triple difference: before and after 2004, from NMS 2004 vs others, to France versus Germany Back

Placebo Liberalization Event

Back

Using Croatia as a Placebo Treated Country for the 2004 event



Can Posting Crowd-Out Standard Migration? BACK

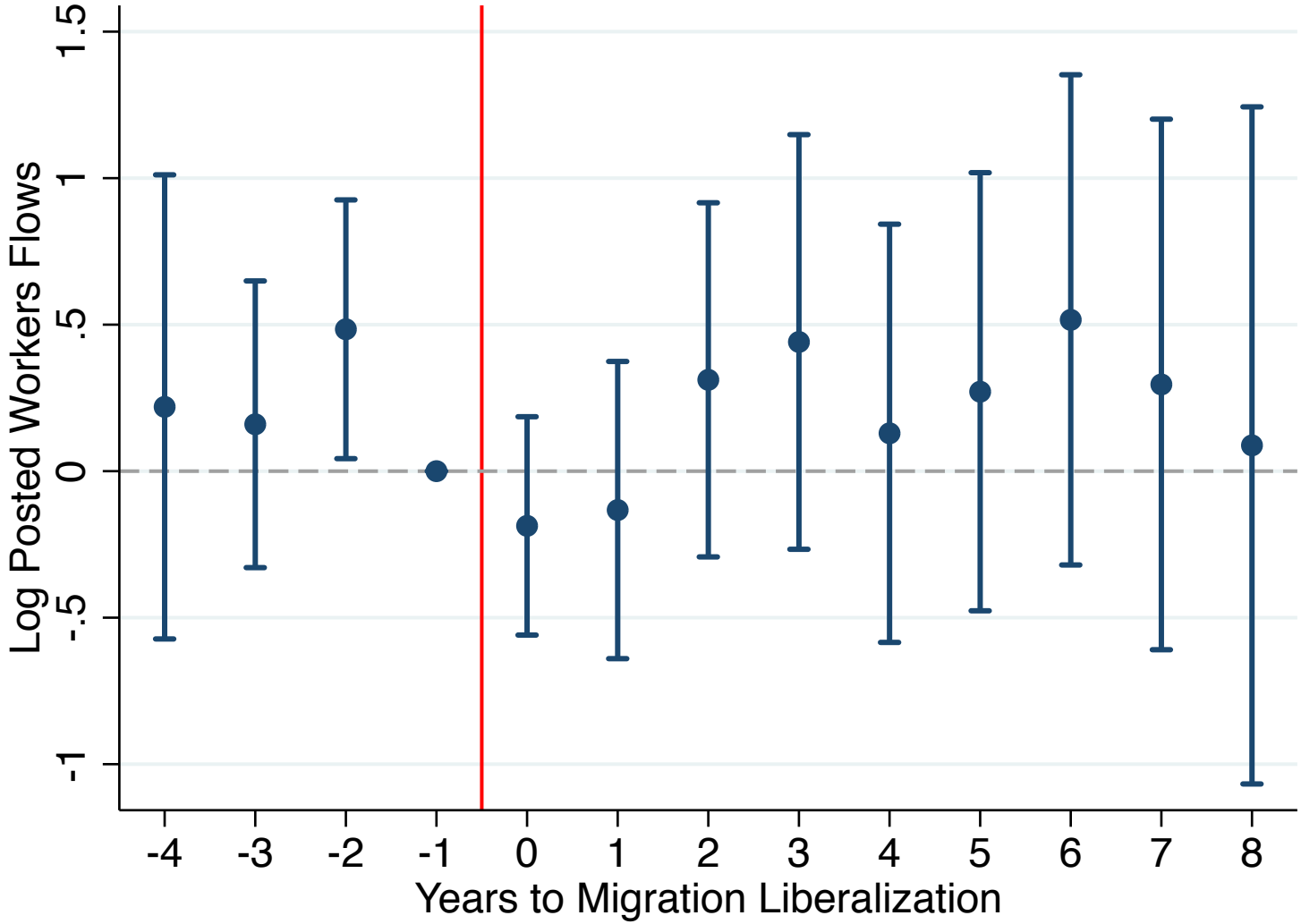
Substituability and complementarity between posting and migration

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

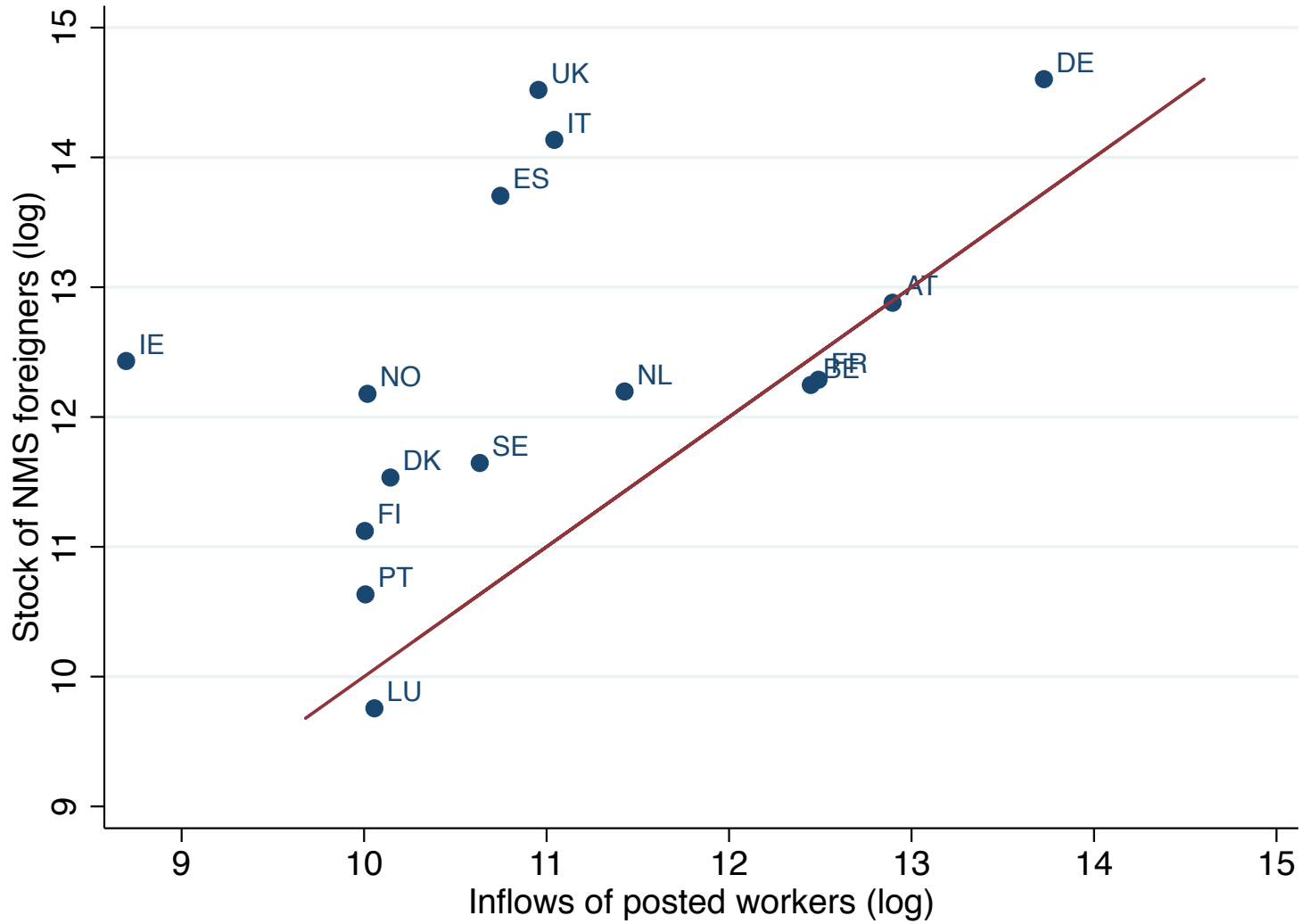
Back

Posted Workers Do Not React to Change in Standard Migration Rules



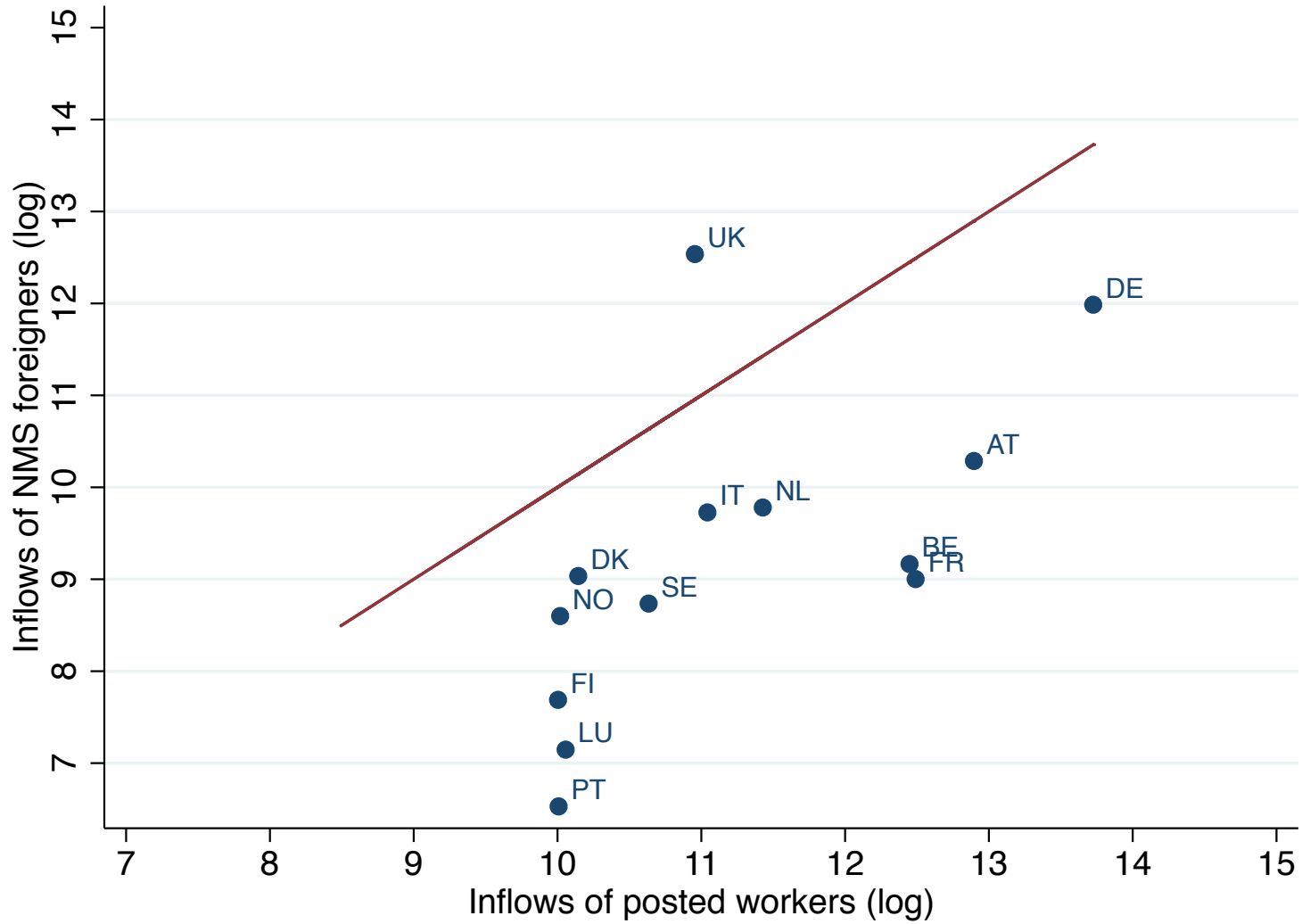
Posted Workers and Immigrants

Back



Posted Workers and Immigrants

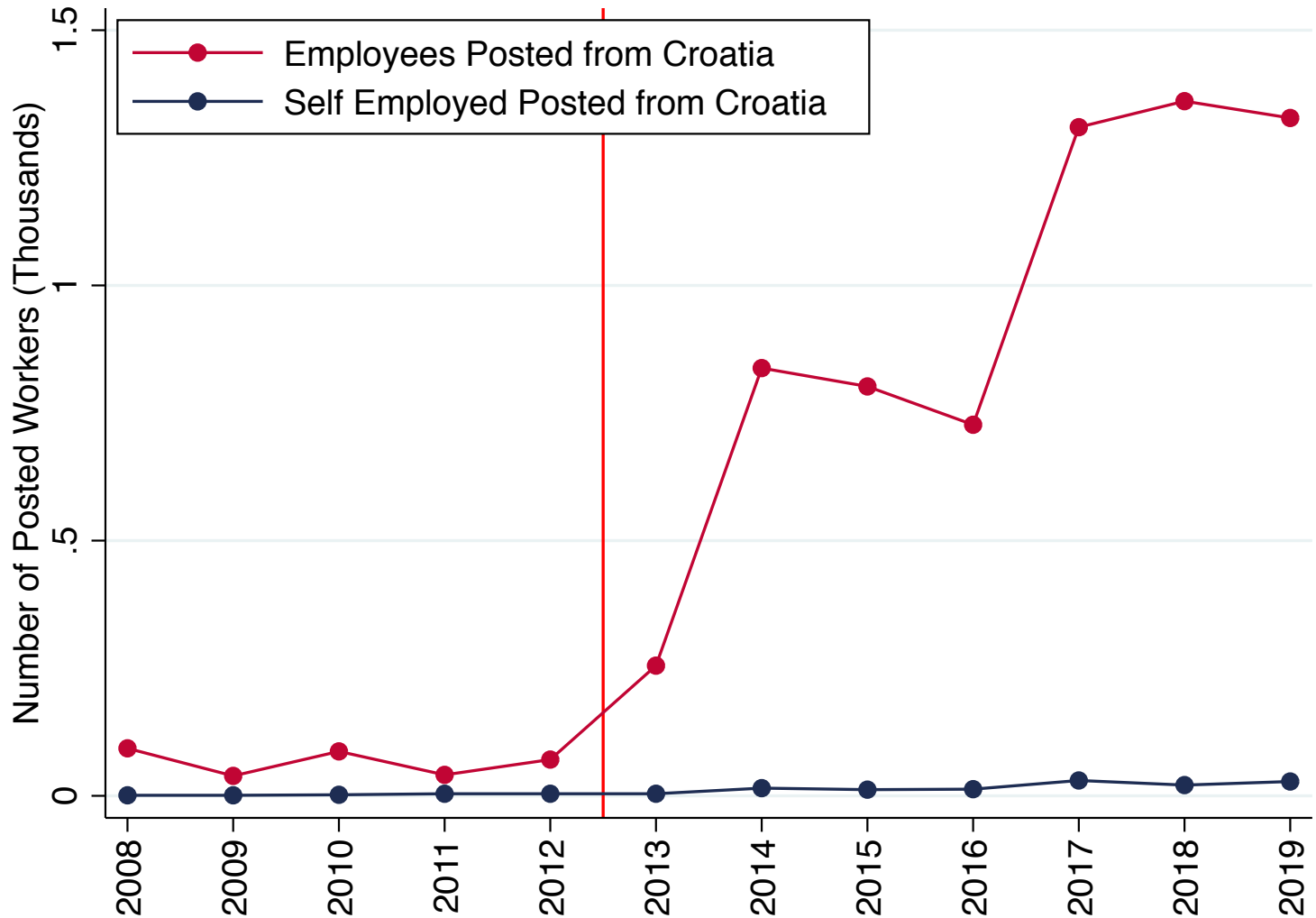
Back



Response to Posting Liberalization

Back

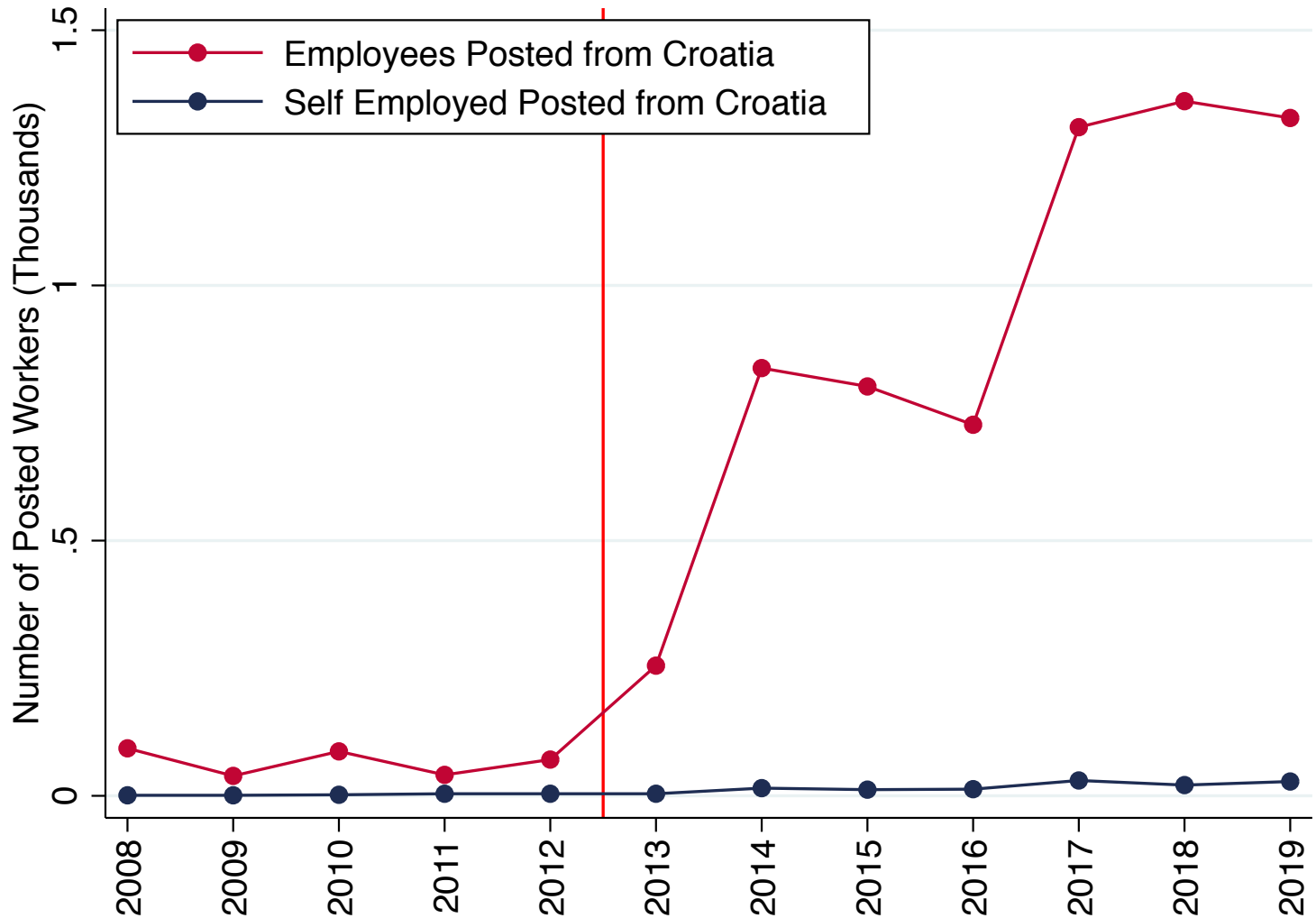
Employees Rather than Self-Employed Respond to Posting Liberalization



Response to Posting Liberalization

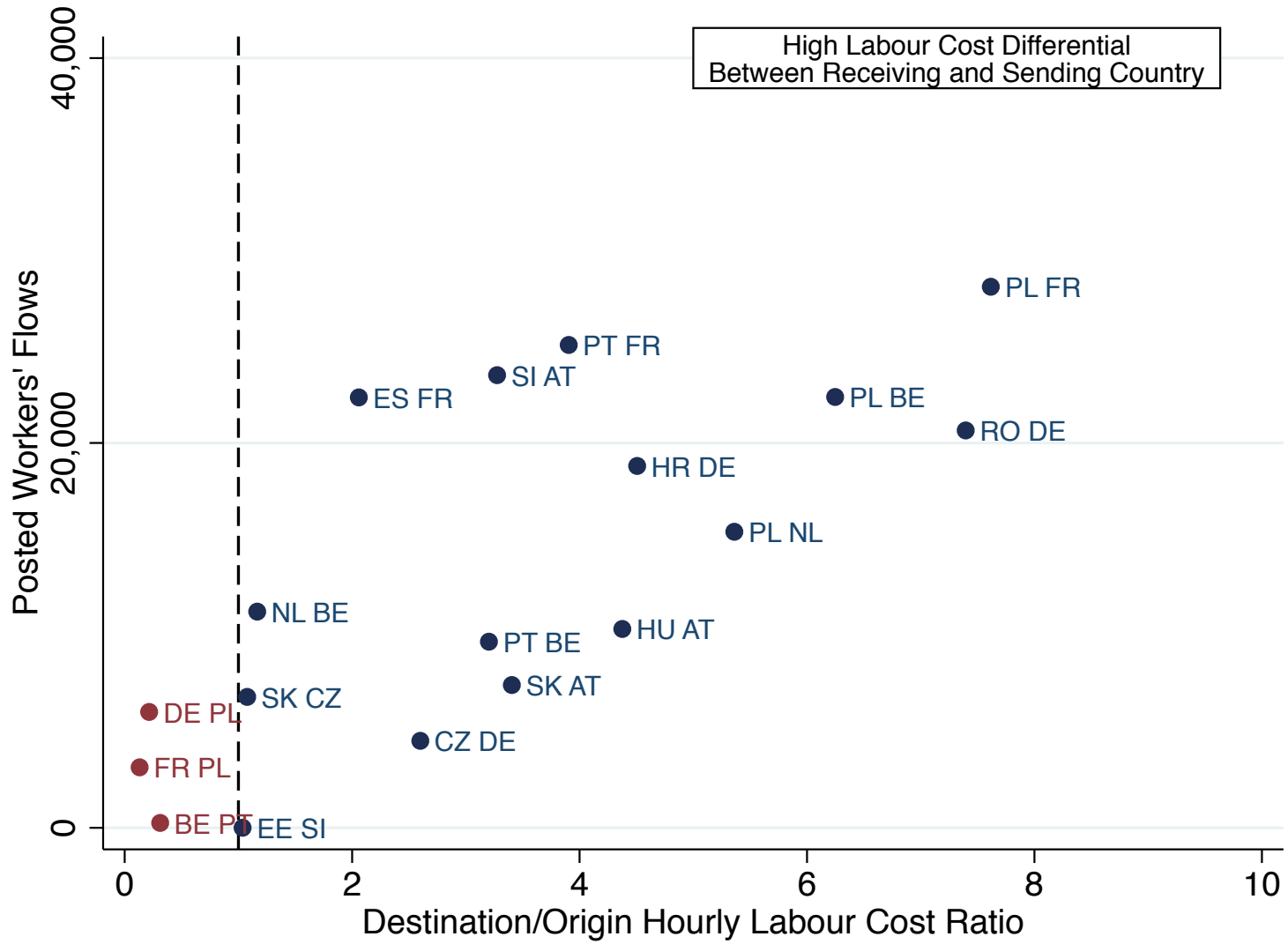
Back

Employees Rather than Self-Employed Respond to Posting Liberalization



Posting Flows and Labor Cost Differentials

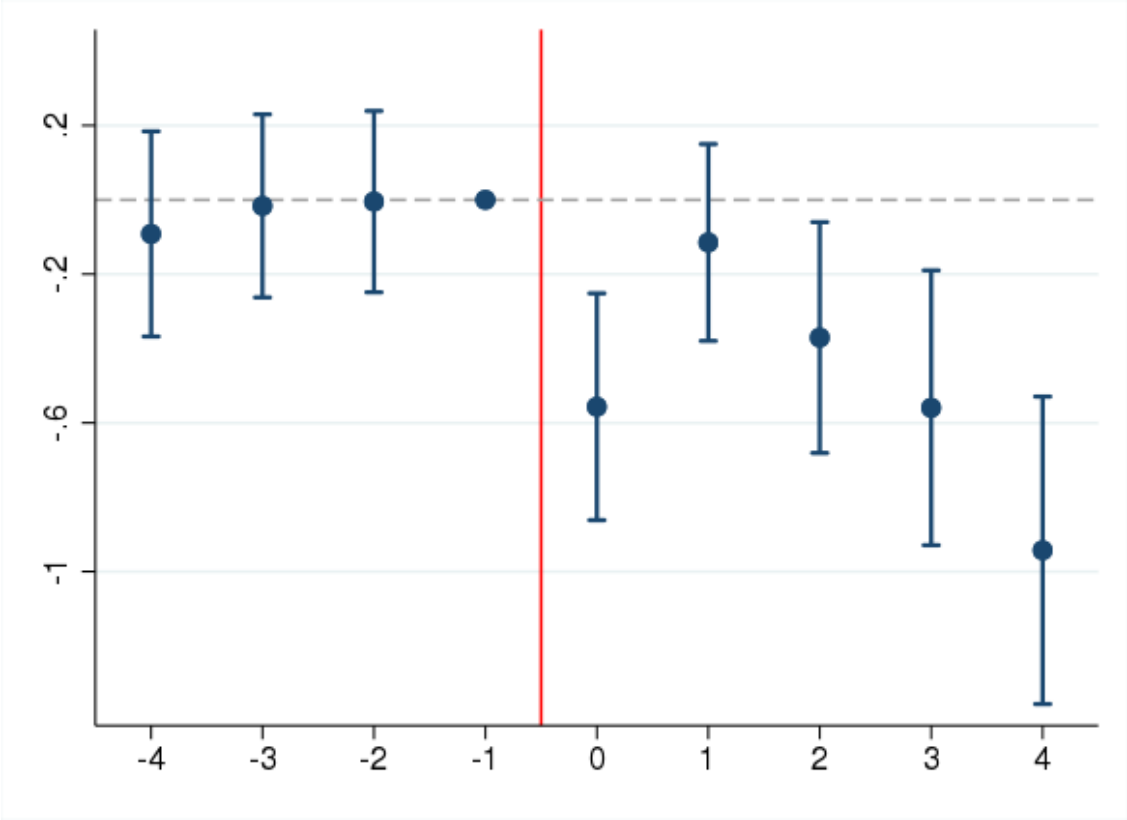
Back



Domestic Sales After First Posting Event

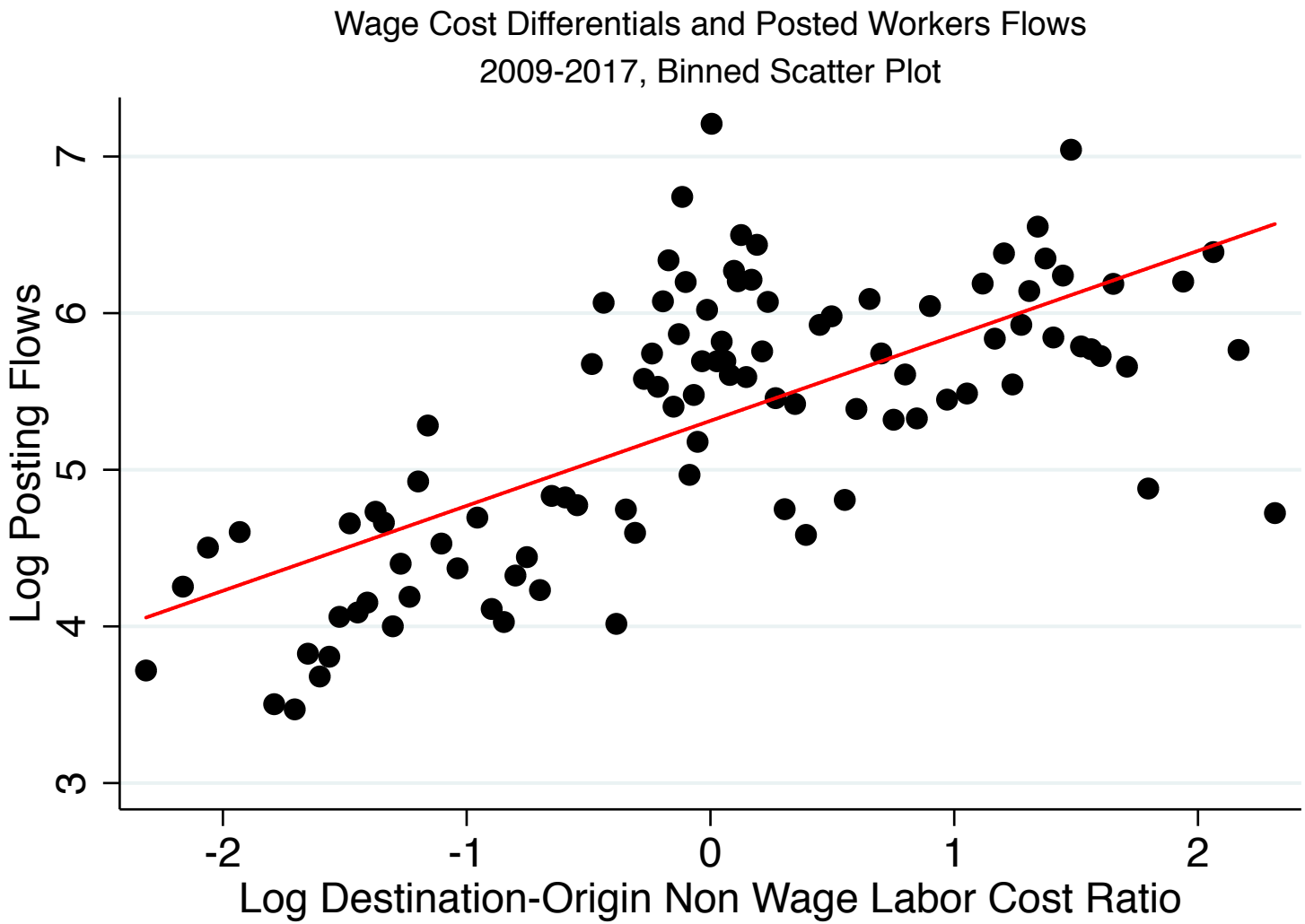
Back Back2

Sending firms decrease domestic activity when starting to serve foreign markets



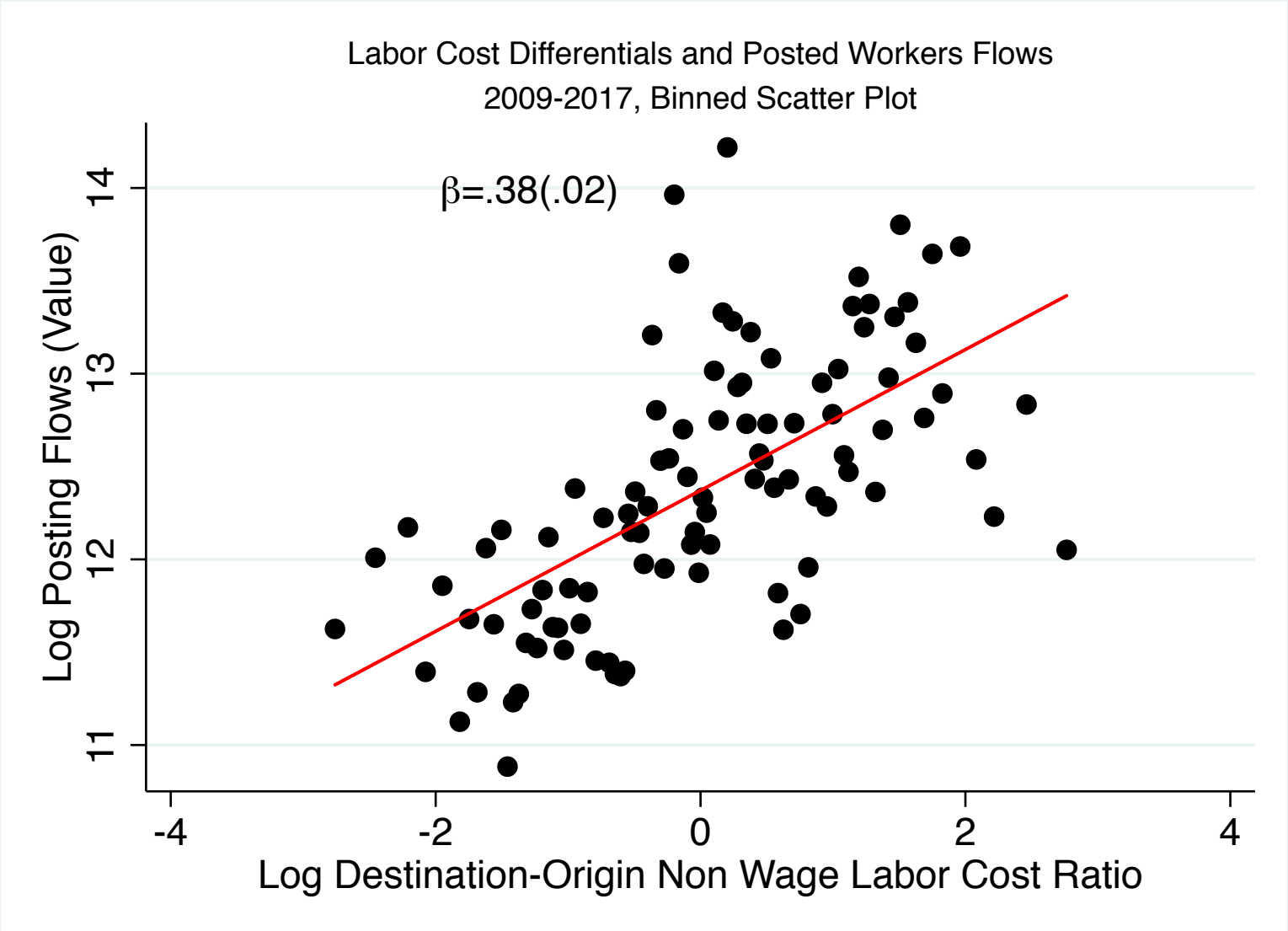
Posting Flows and Total Wage Cost Differentials

Back



Posting Flows and Total Wage Cost Differentials

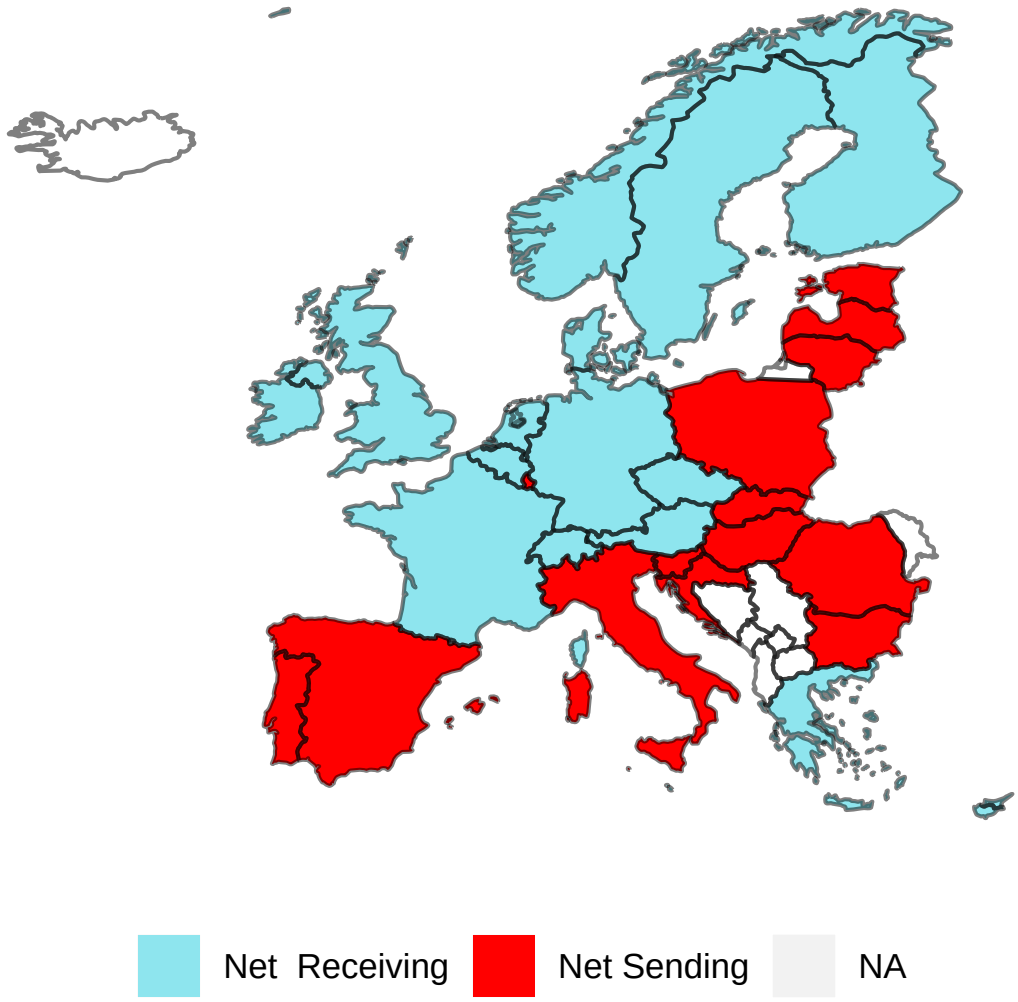
Back



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

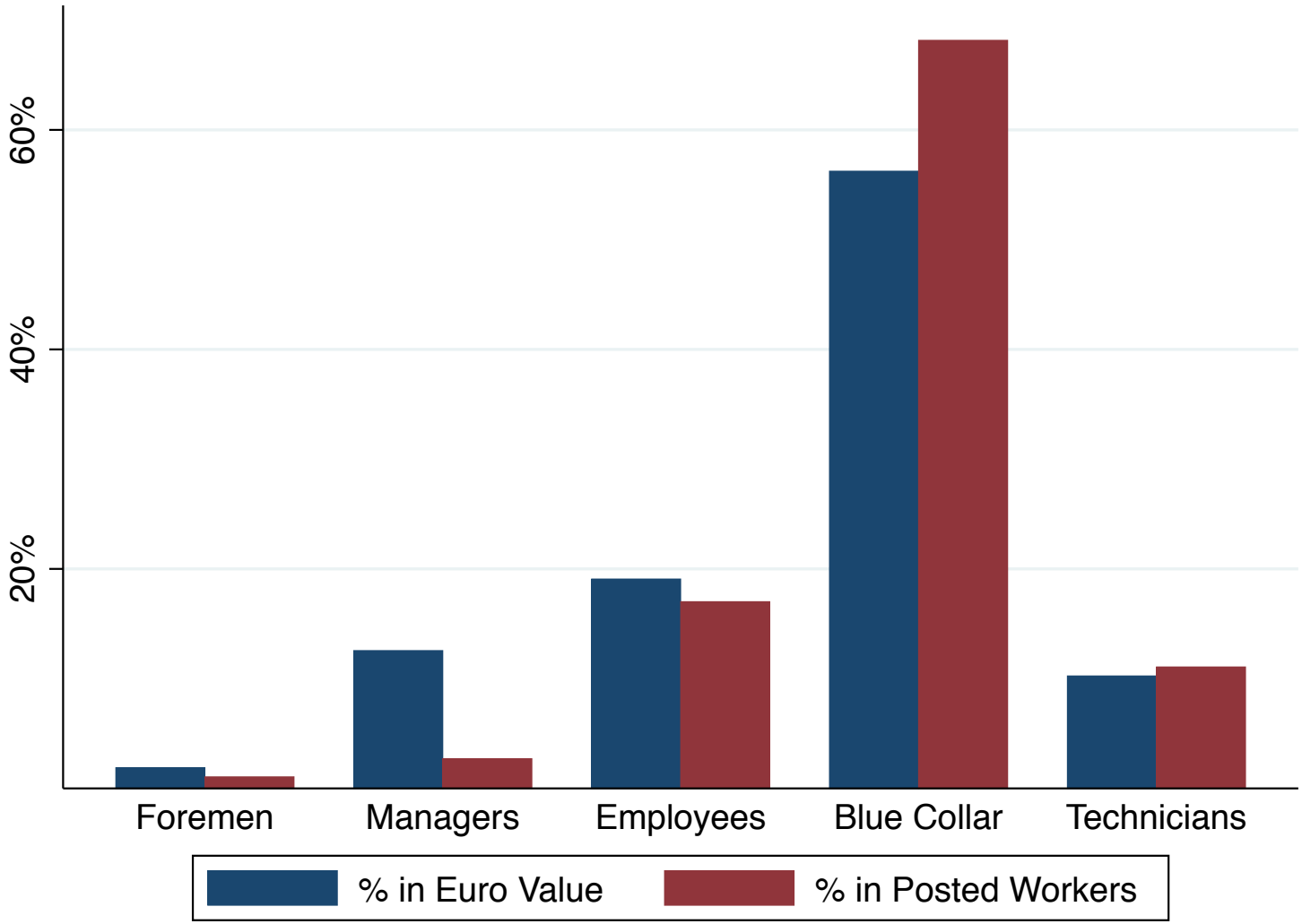
Firms that use posted workers pay ≈ 20% higher wages to domestic workers

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 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

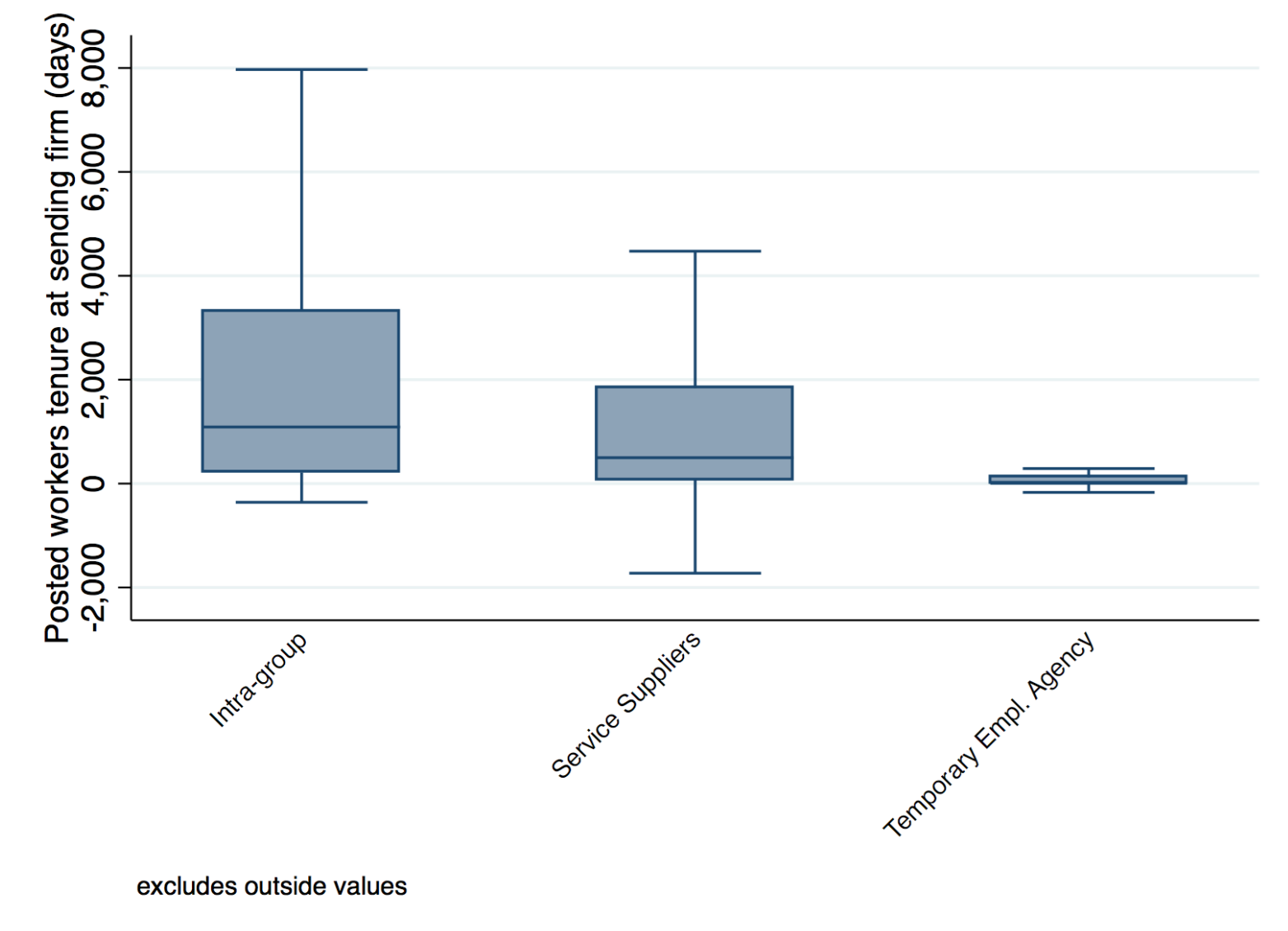
Posted workers are mostly blue-collar workers



Posted Workers Tenure

Back

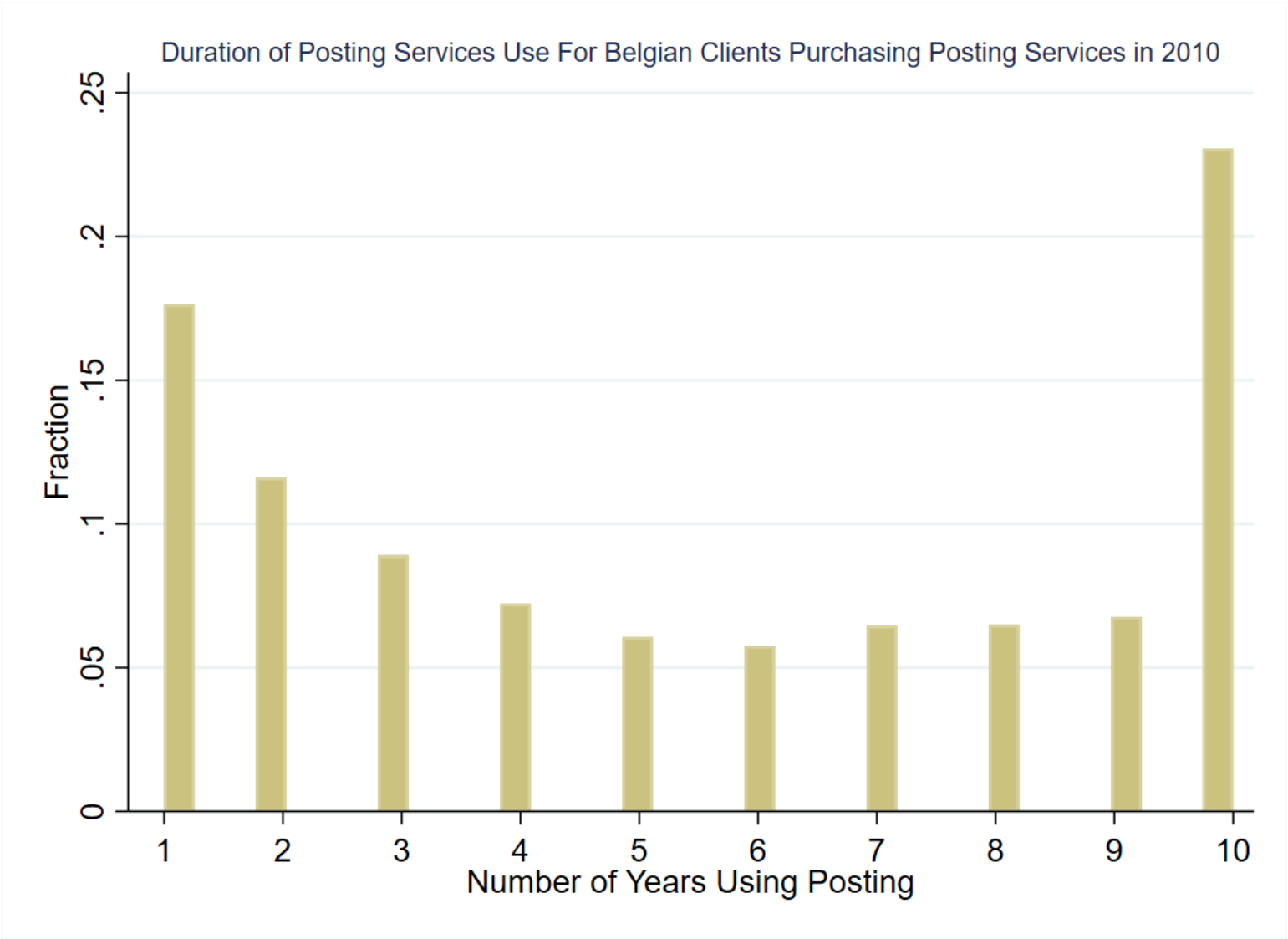
10% of all workers posted to France are "hired to be posted" in sending countries



Persistence of Posting Use

Back

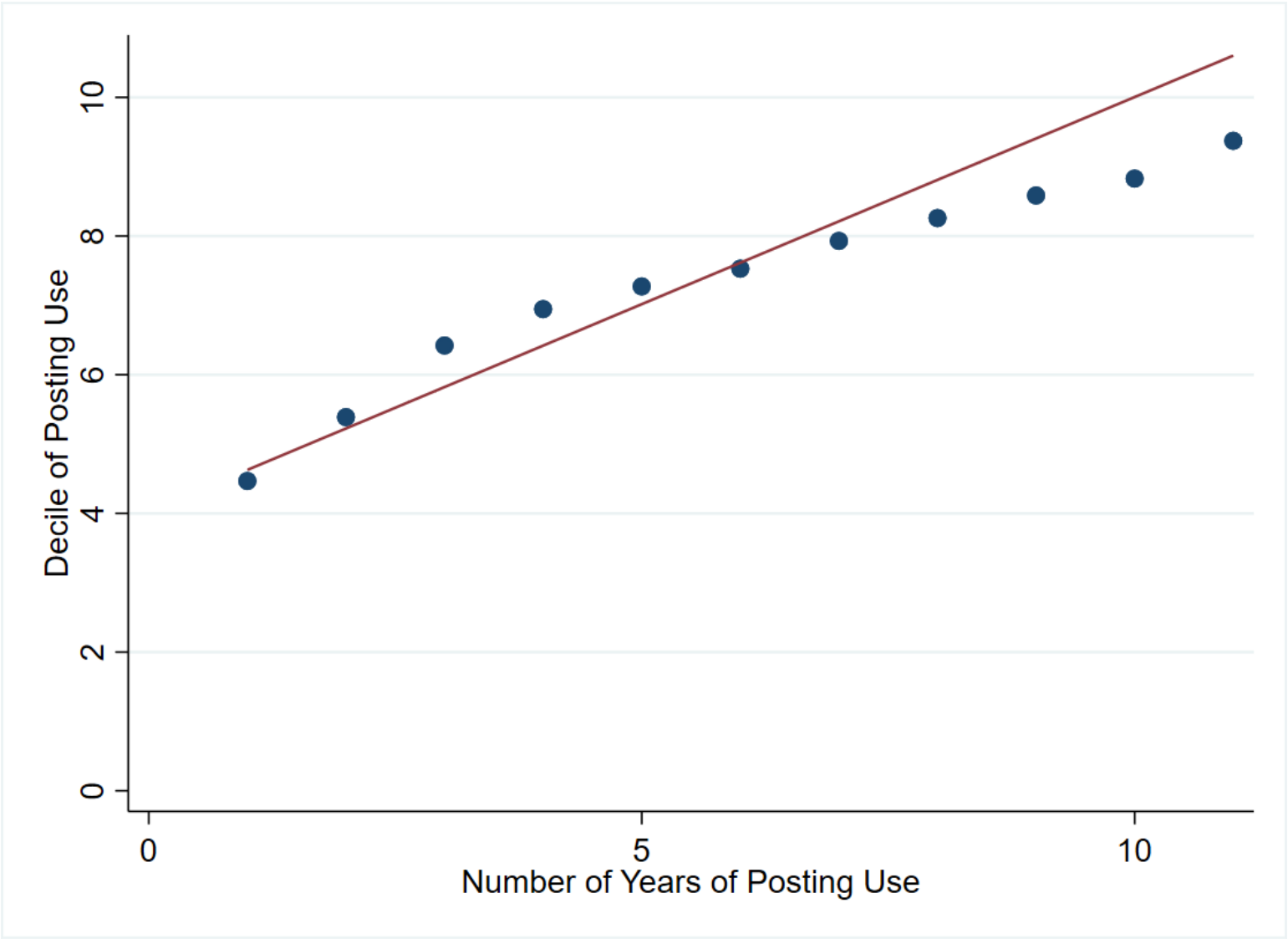
25% of Firms Using Posted Workers in 2010 use them each year until 2020



Persistence and Intensity of Posting Use

Back

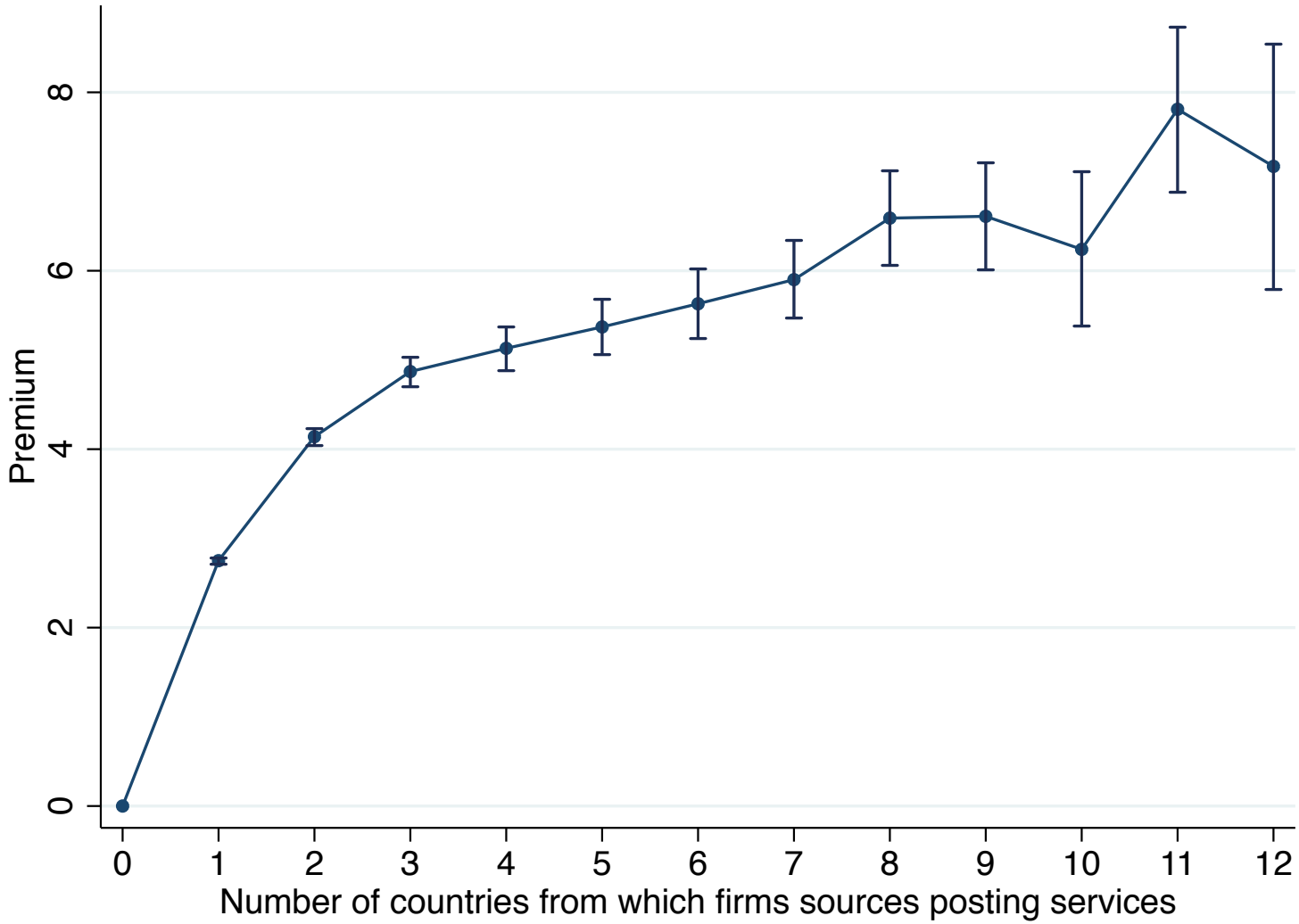
Permanent users import more posted workers



Trade costs in Subcontracting Posting Services

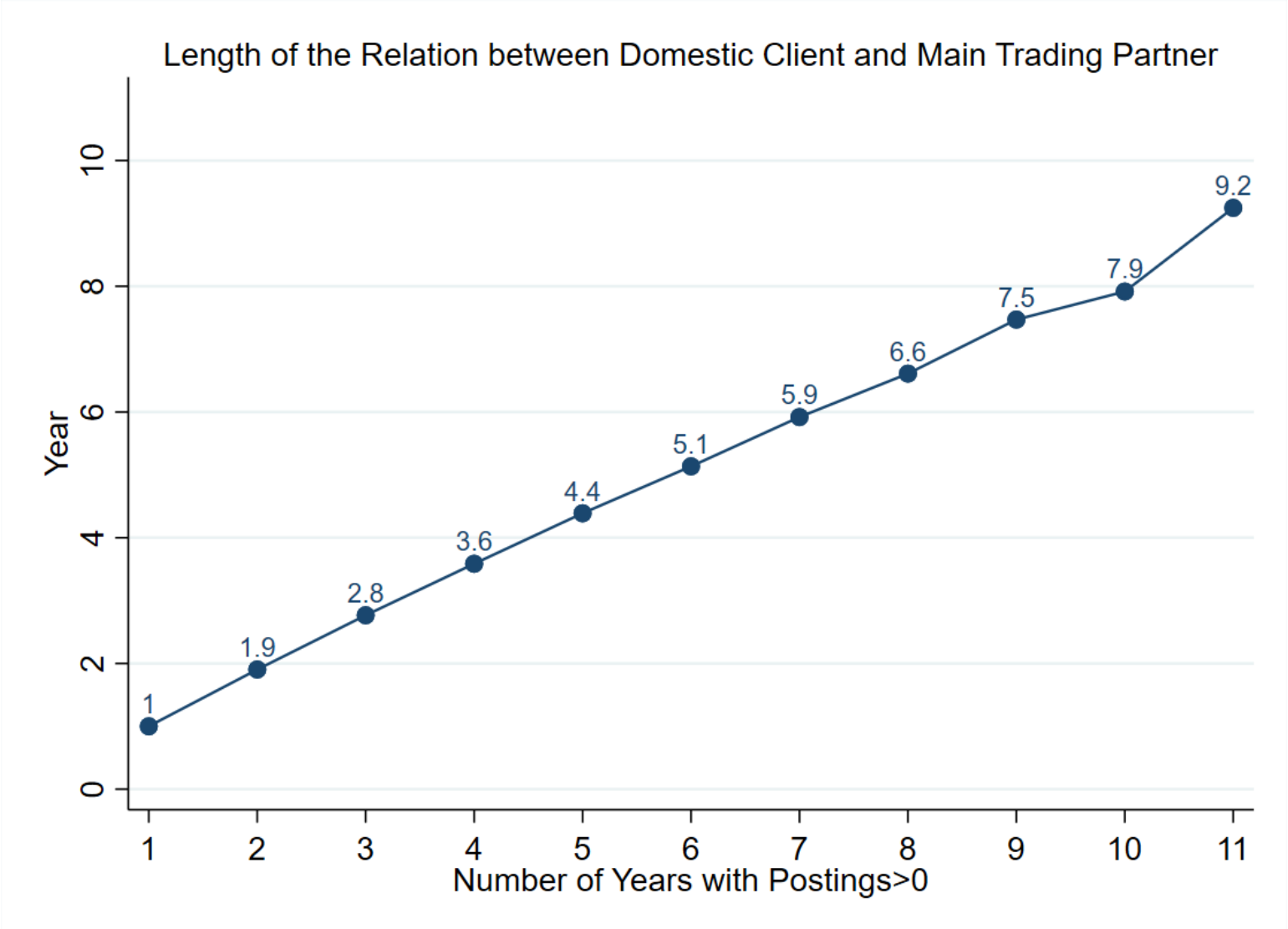
Back Back2

Trade costs increase with number of clients



Posting Relationships Are Sticky

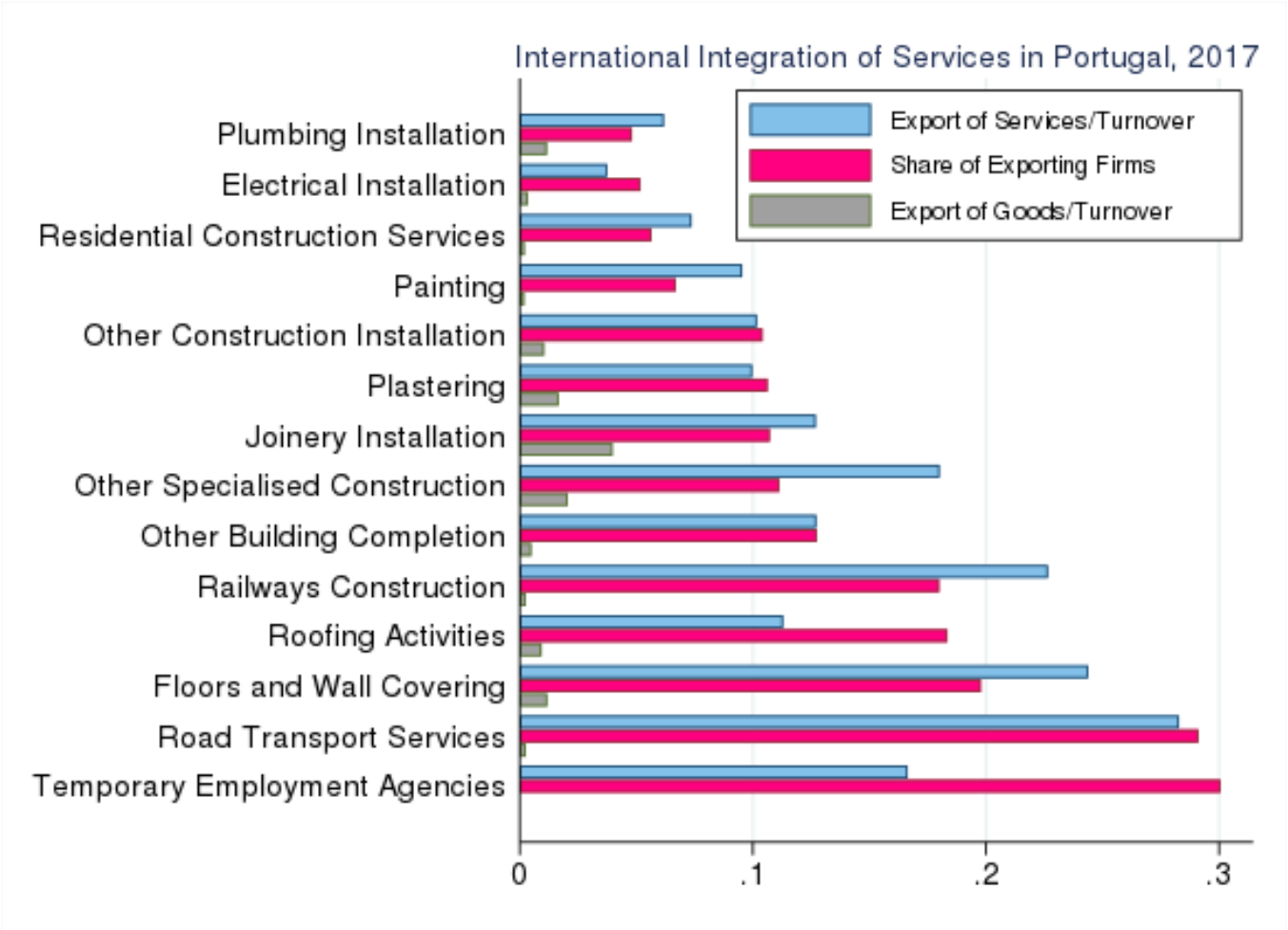
Back2



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

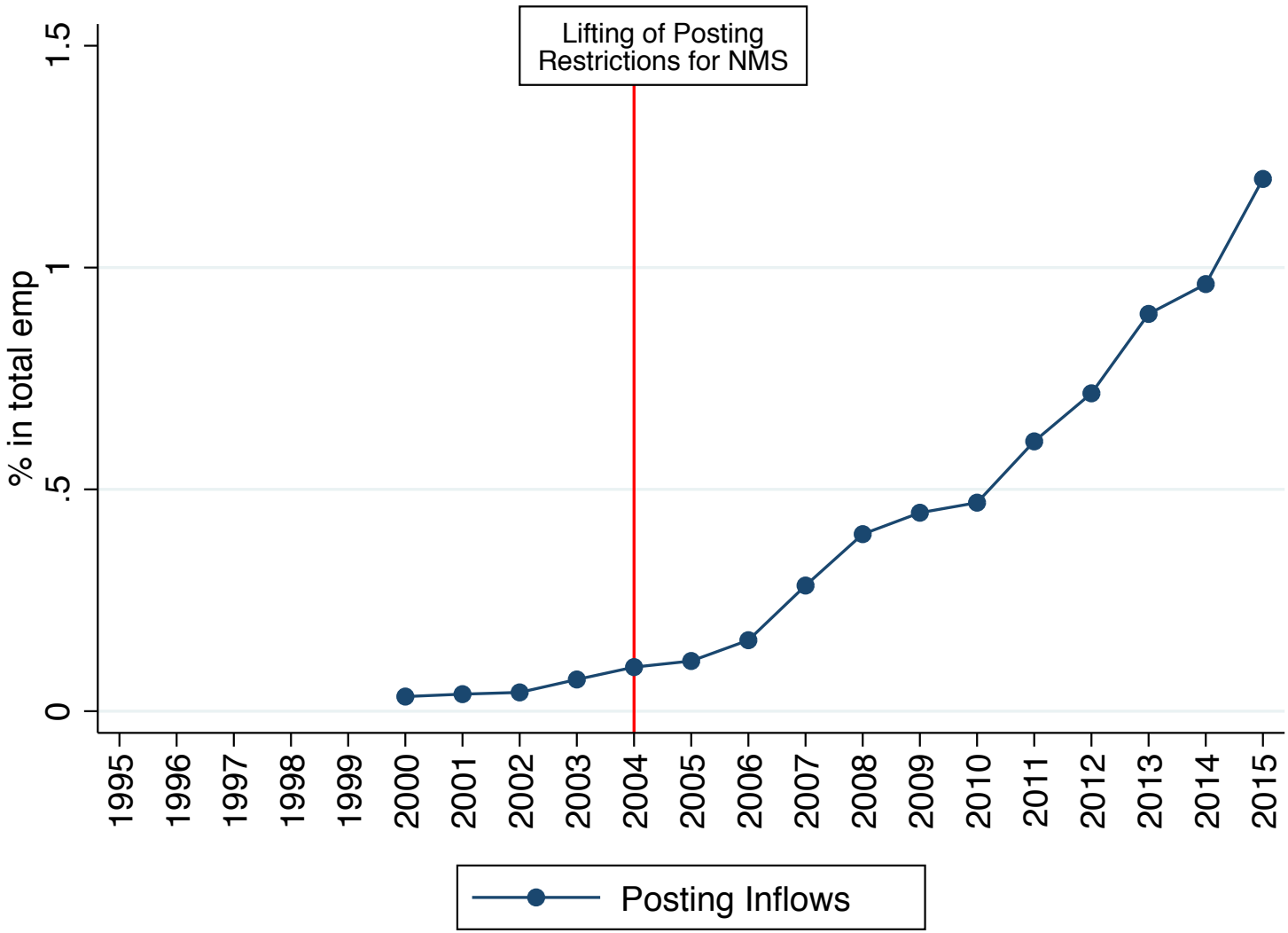
	Exporters vs Non Exporters		Exporters
	Manufacturing	Non Trad. Services	Manufacturing vs Non Trad Services
	(1)	(2)	(3)
Log Turnover	1.57***	.84***	.68***
	(.01)	(.01)	(.01)
Log Employment	.91***	.63***	.55***
	(.01)	(.01)	(.01)
Log Wage	.18***	.22***	-.04***
	(.00)	(.00)	(.00)
Log Capital/Worker	.64***	-.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

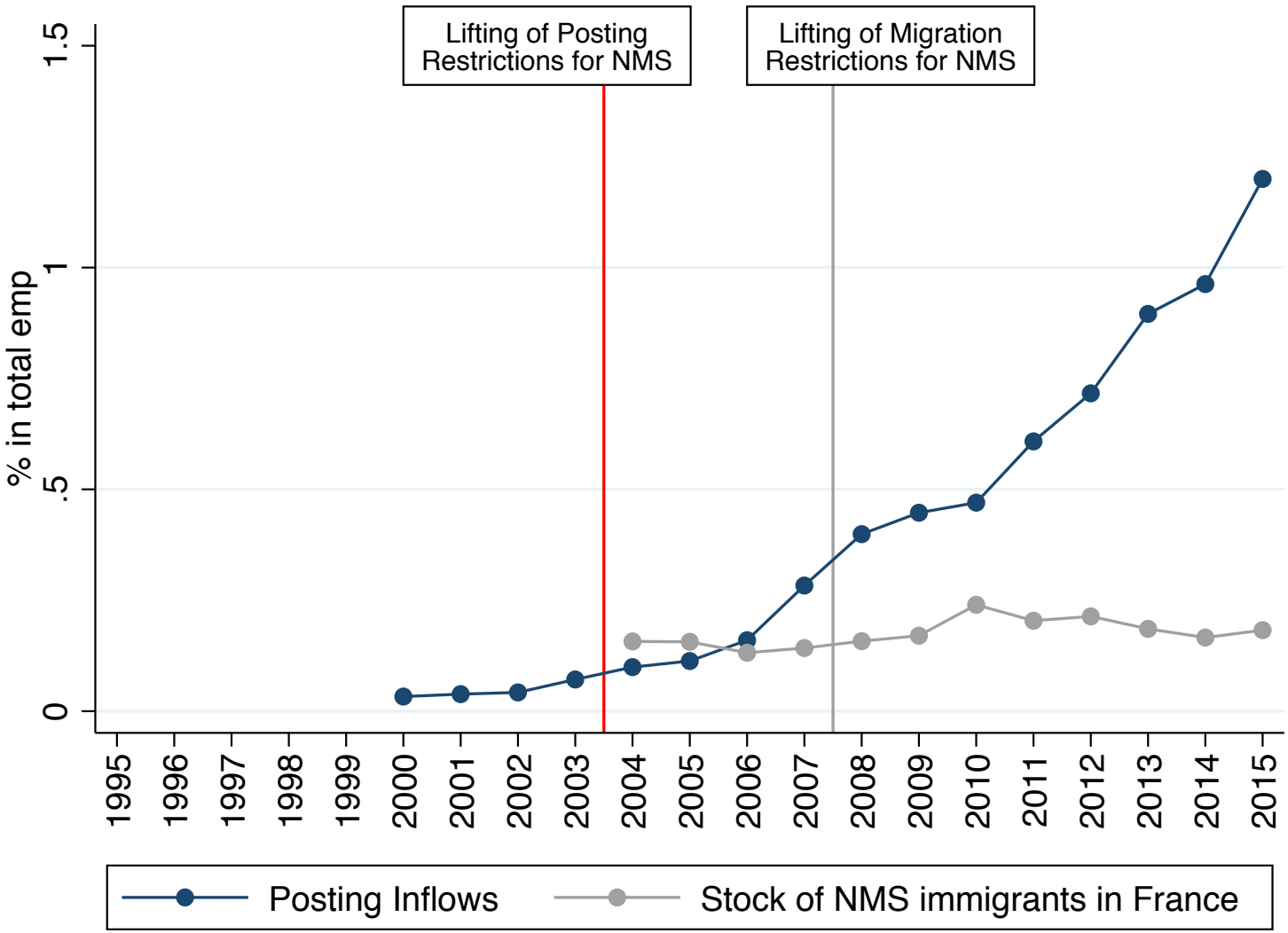
	Manufacturing (1)	Non Trad. Services (2)
Exports in Turnover	25%	45%
% Shifting Full Activity Abroad	3%	19%
% Exporting in Founding Year	9%	21%
Average Export Duration (years)	5	3.2
% Permanently Exporters	41%	37%

The Polish Plumber Shock



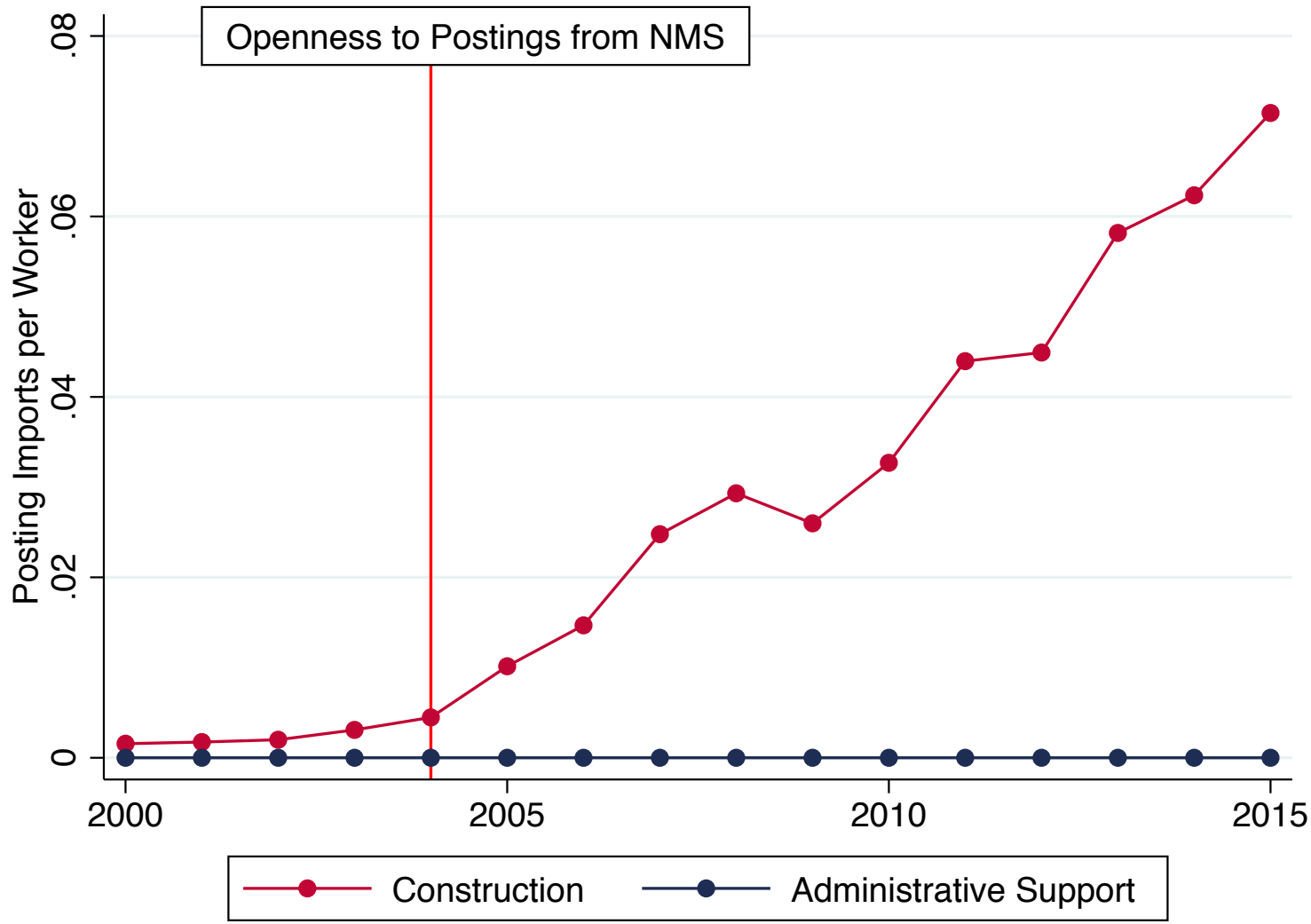
Back

The Polish Plumber Shock



Back

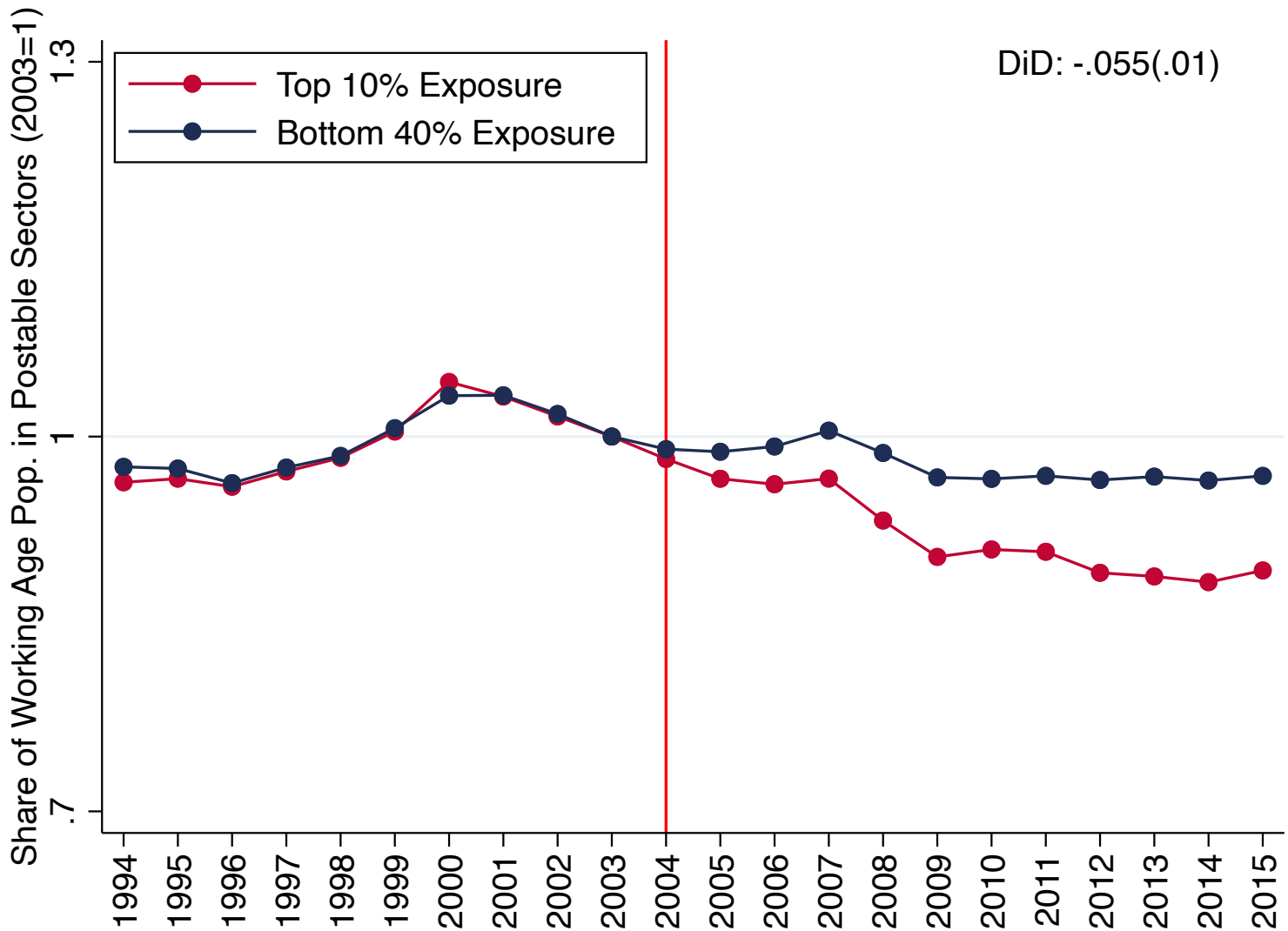
The Polish Plumber Shock



Back

Employment Decreased In Exposed Labor Markets

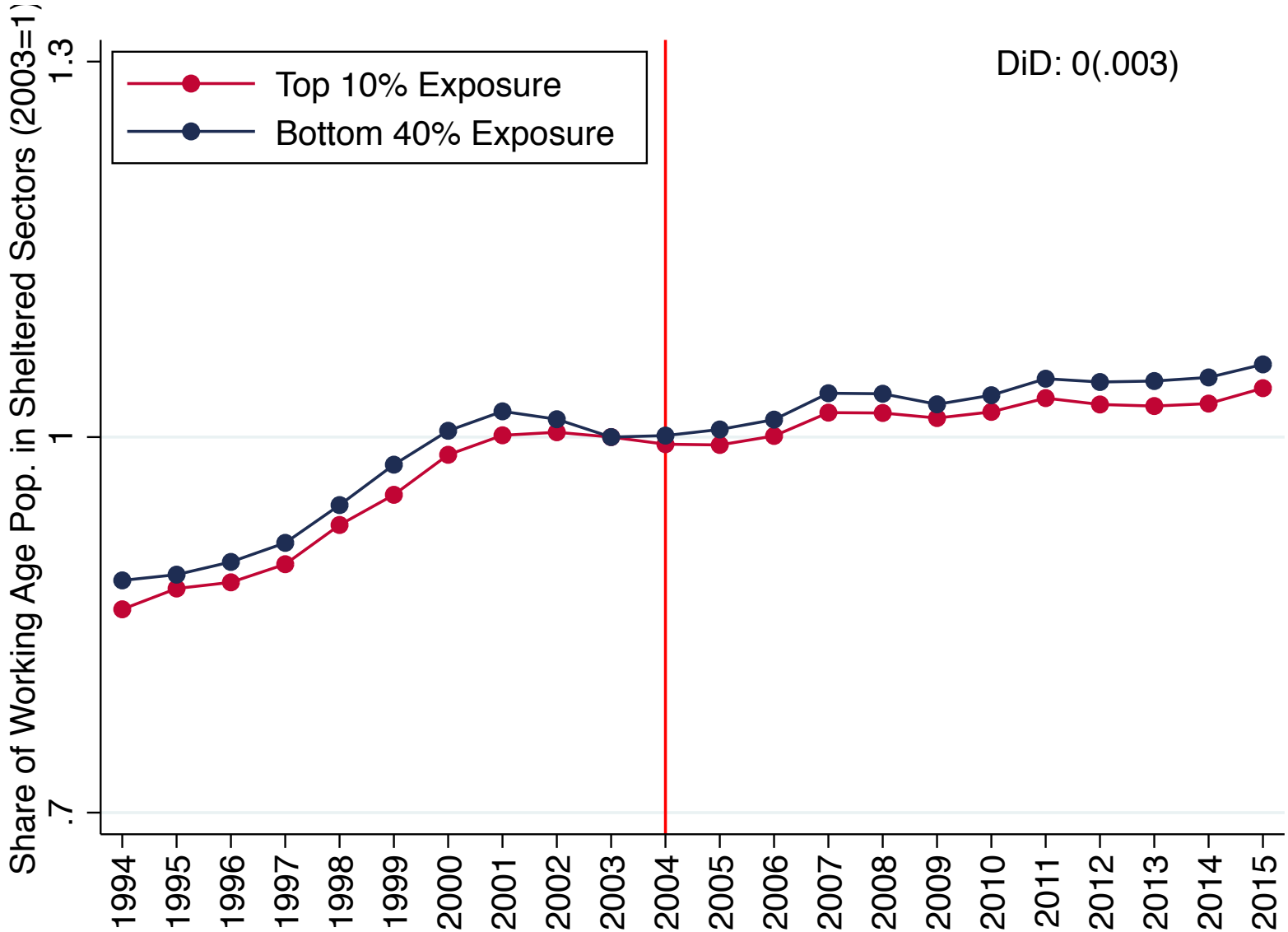
Differential decrease by 6% after the shock Top20vsBot20 Top10vsBot30 Top20vsBot30 Back



Emp Levels Excl Neighbors Distance NMS DiD

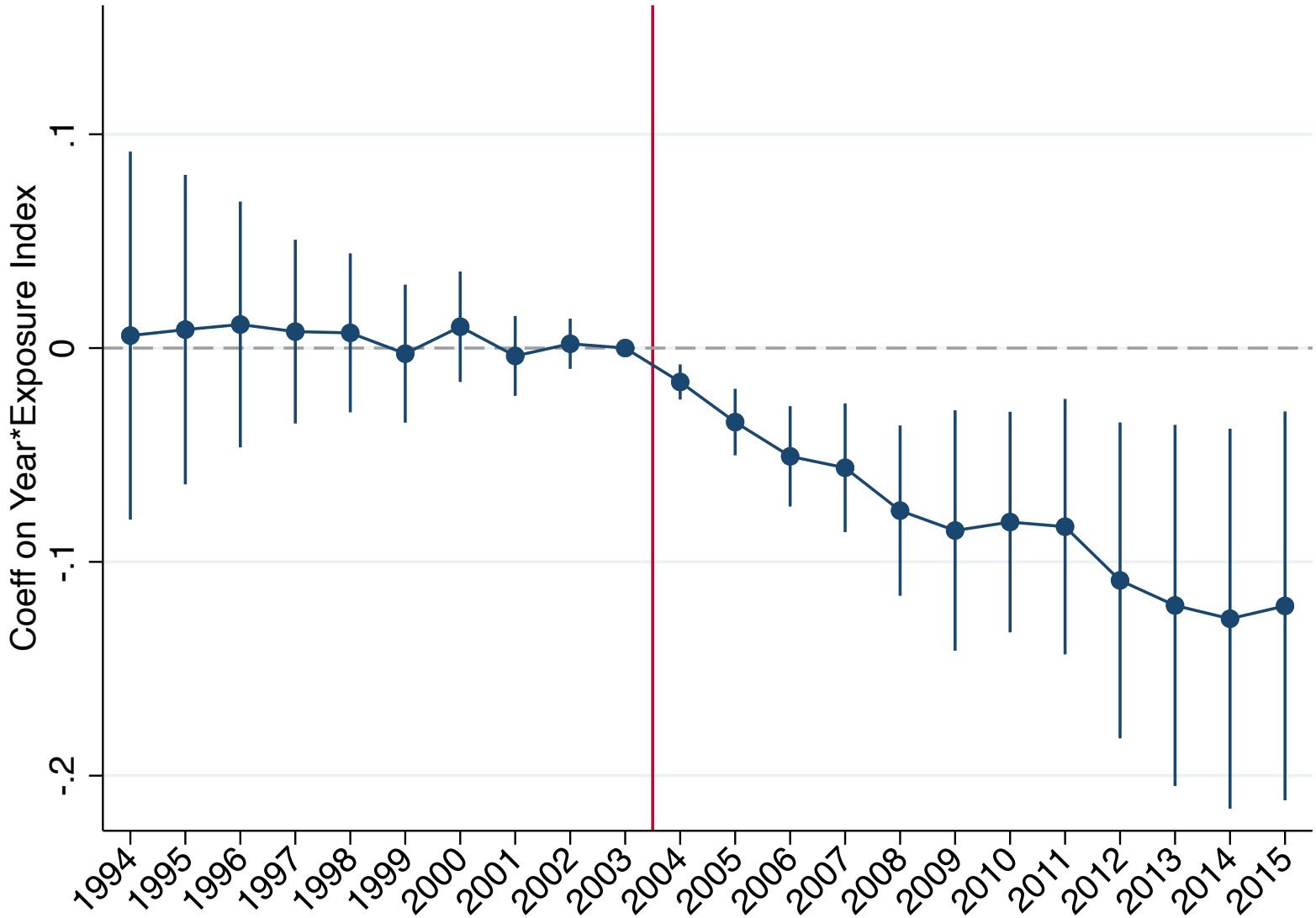
Employment in Sheltered Sectors

No differential evolution in sheltered sectors within exposed labor markets Back



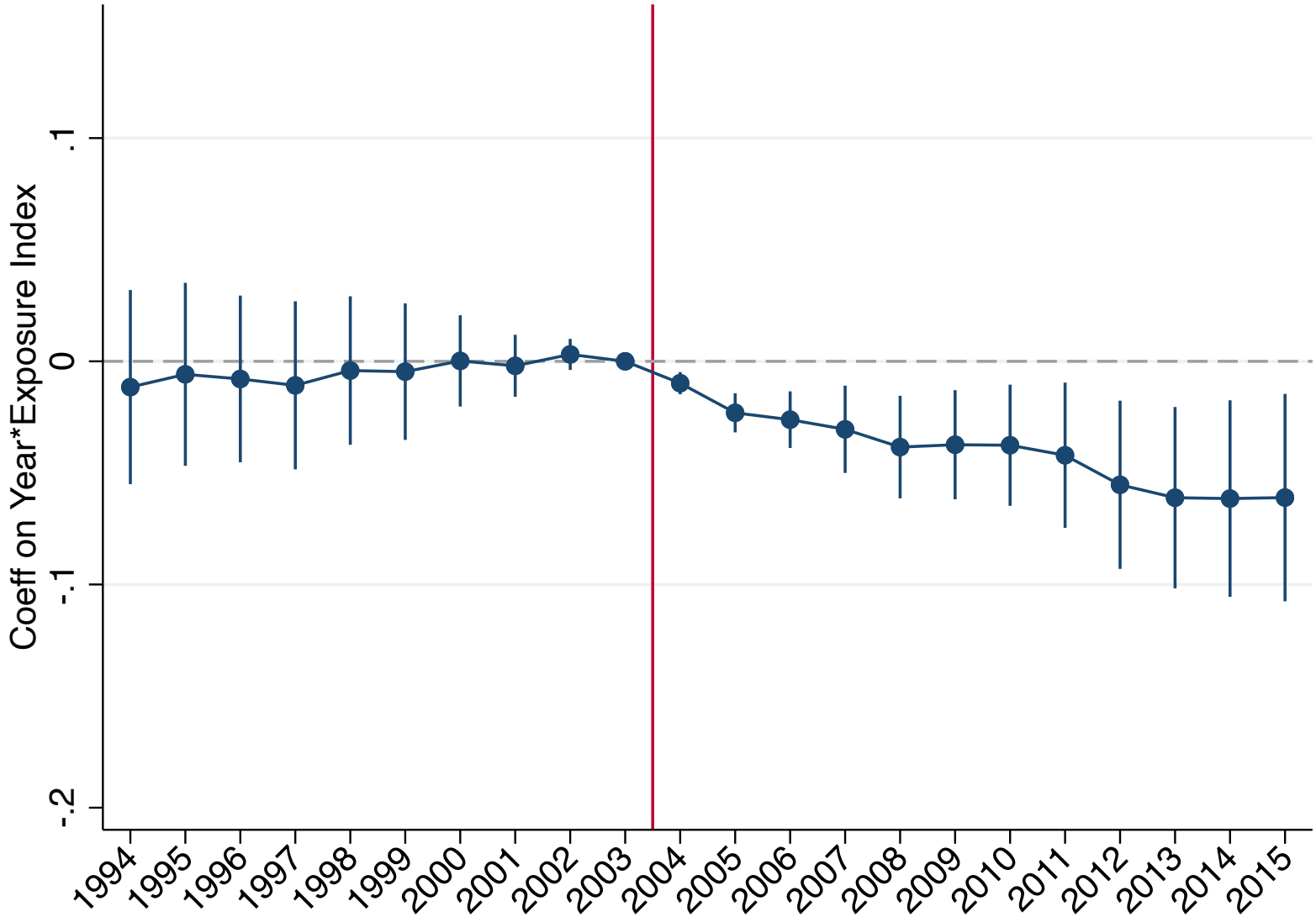
Clustering standard errors at the region level

Back



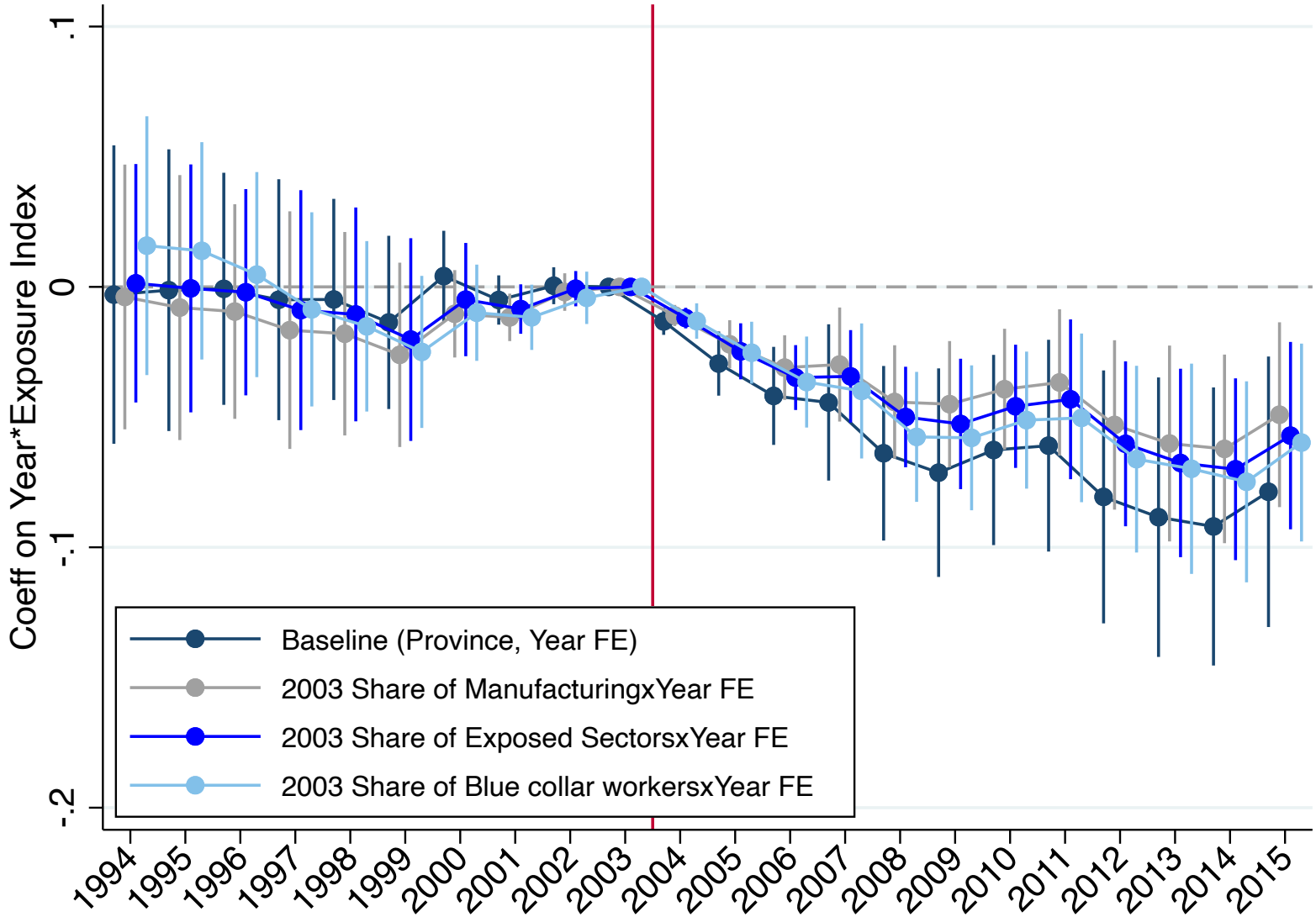
Log Total Employment by Exposure to Posting

Back



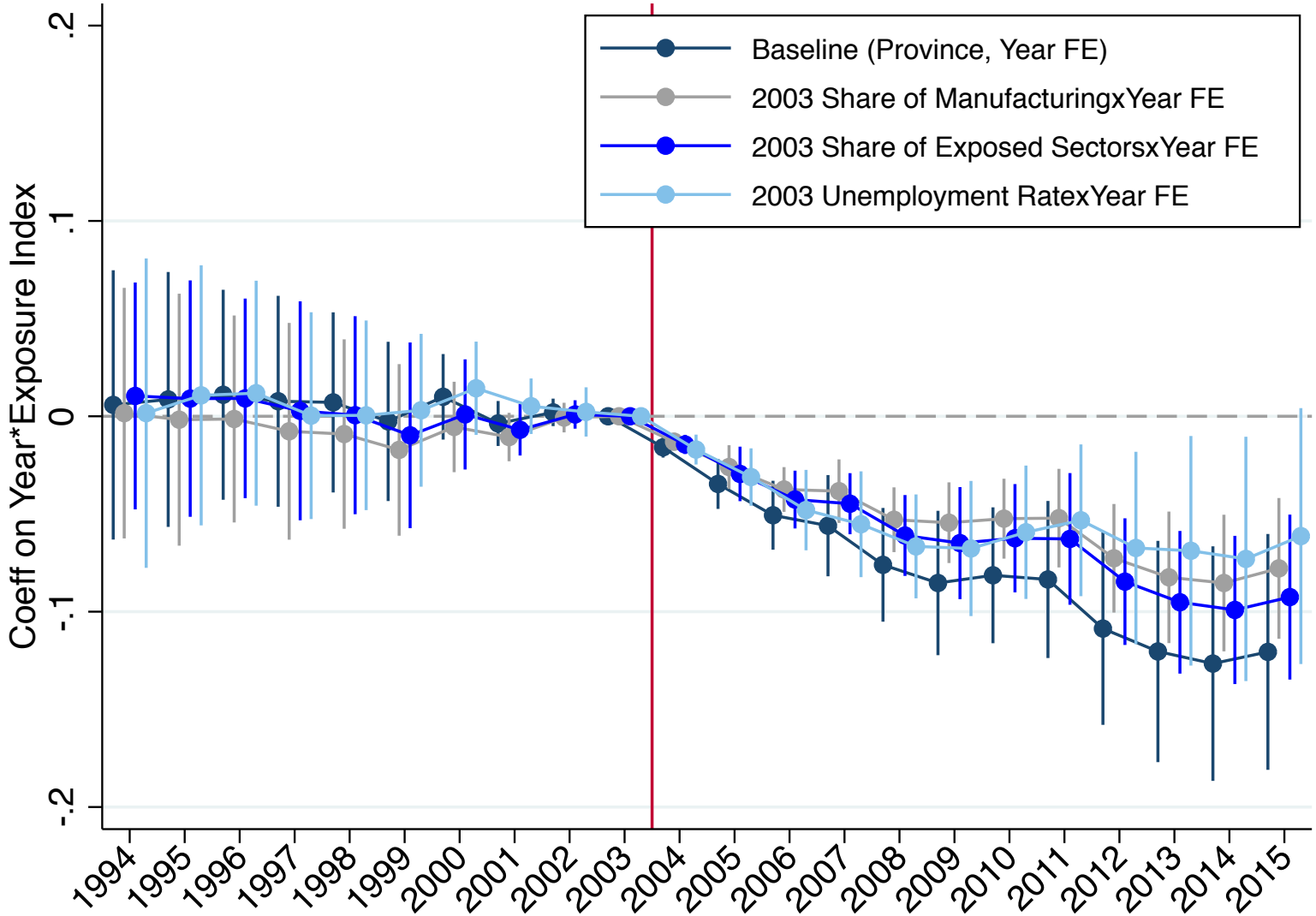
Log Exposed Employment in Working Age Pop

Back



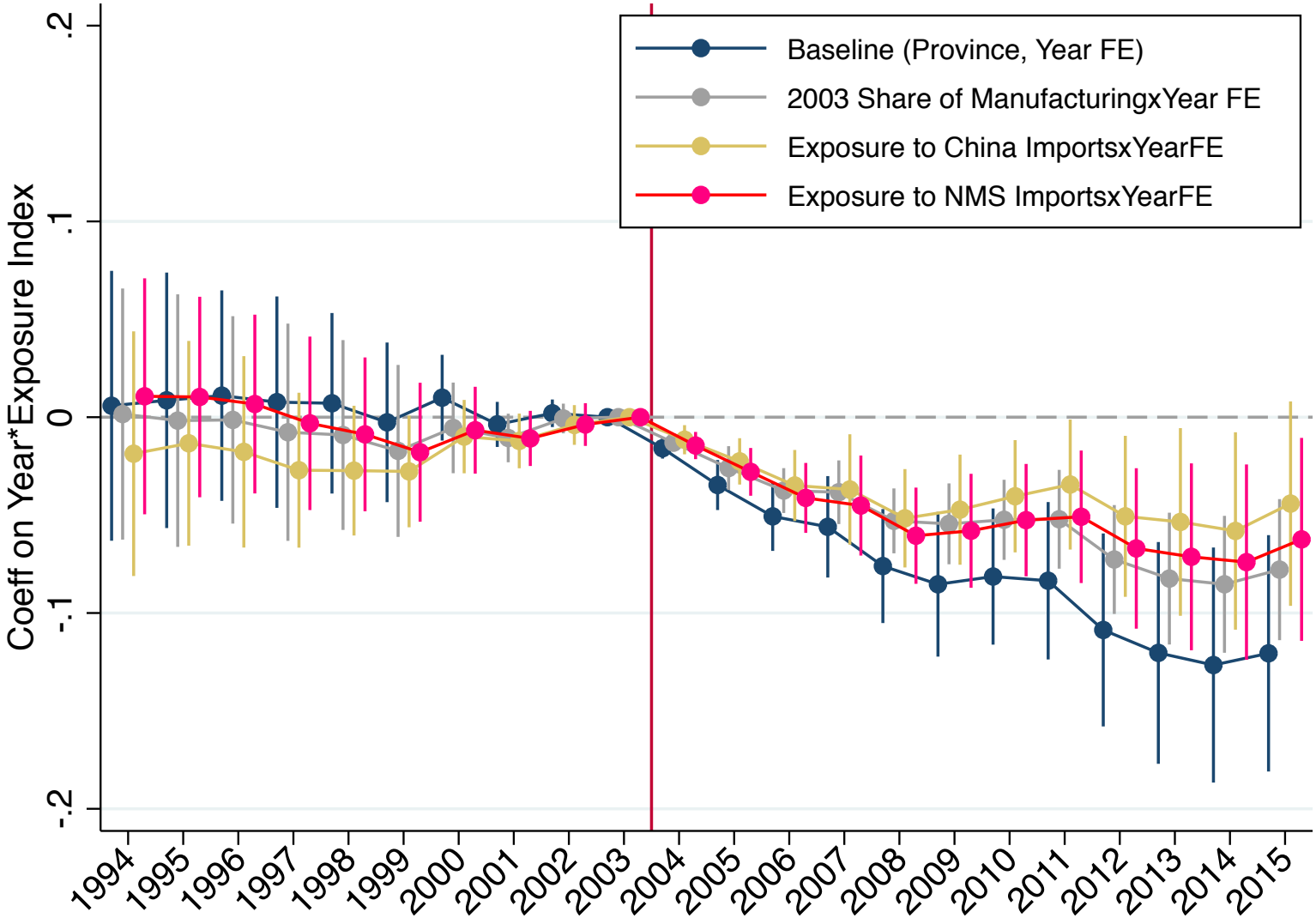
Log Exposed Employment by Exposure to Posting

Back



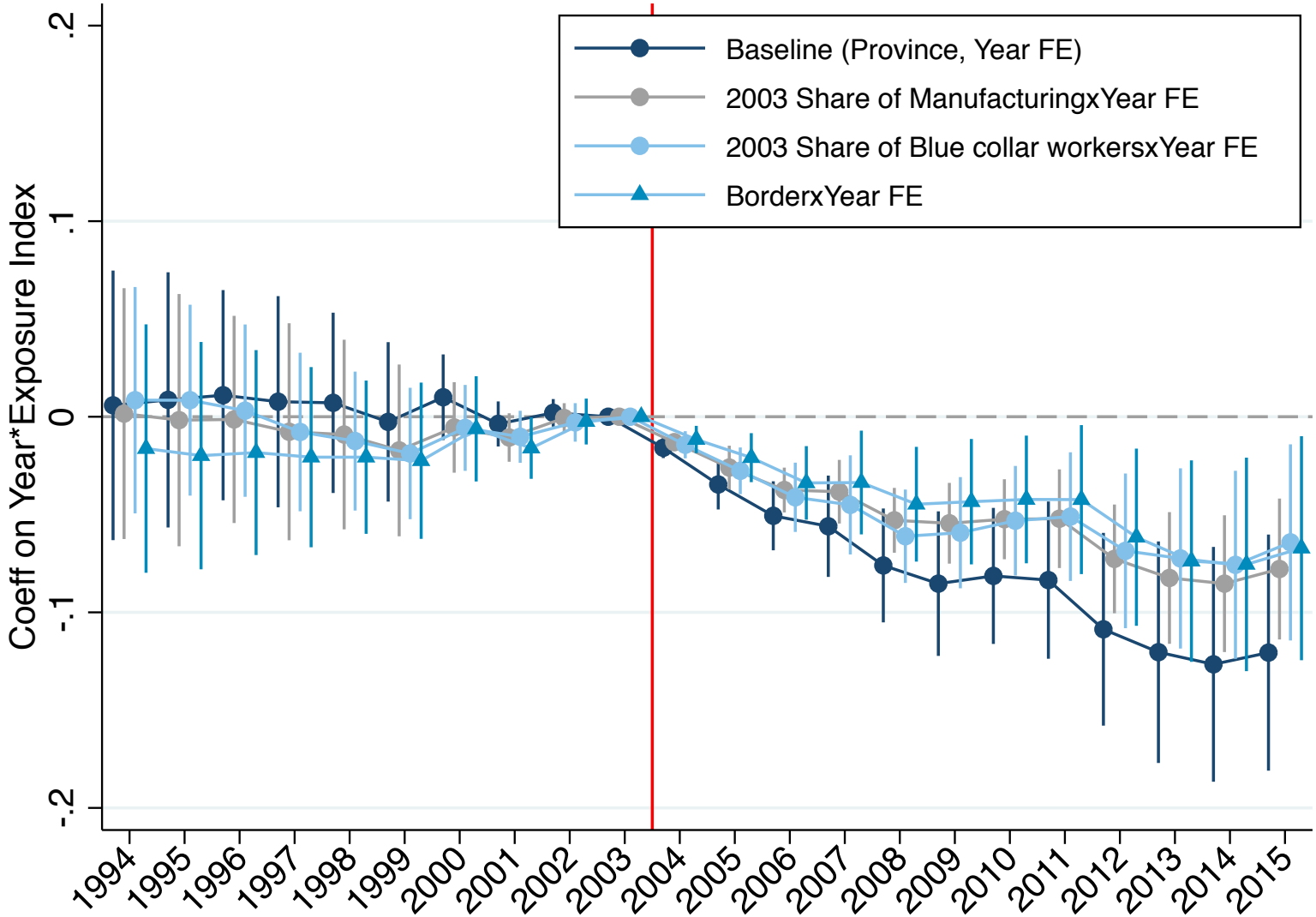
Log Exposed Employment by Exposure to Posting

Back



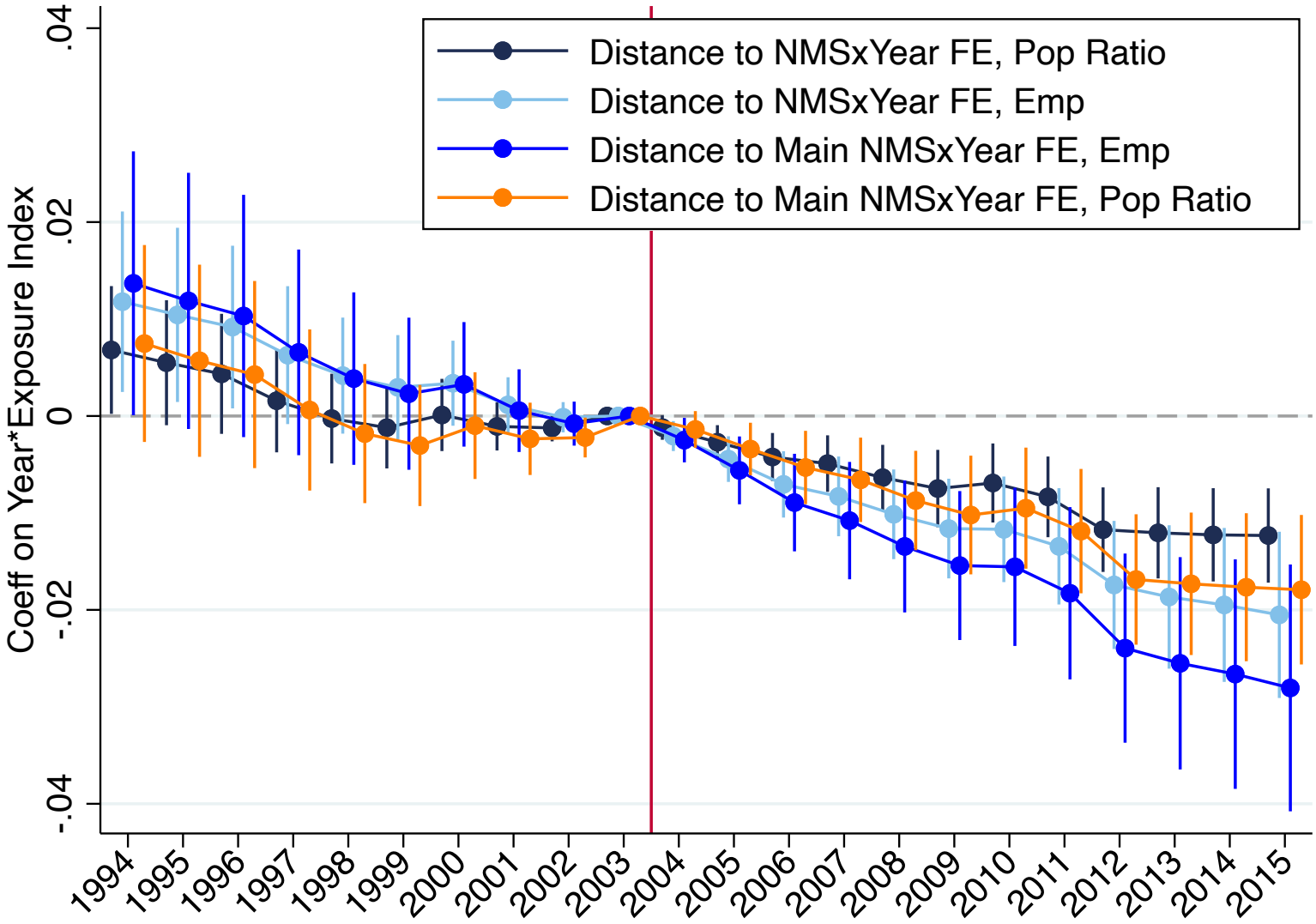
Log Exposed Employment by Exposure to Posting

Back



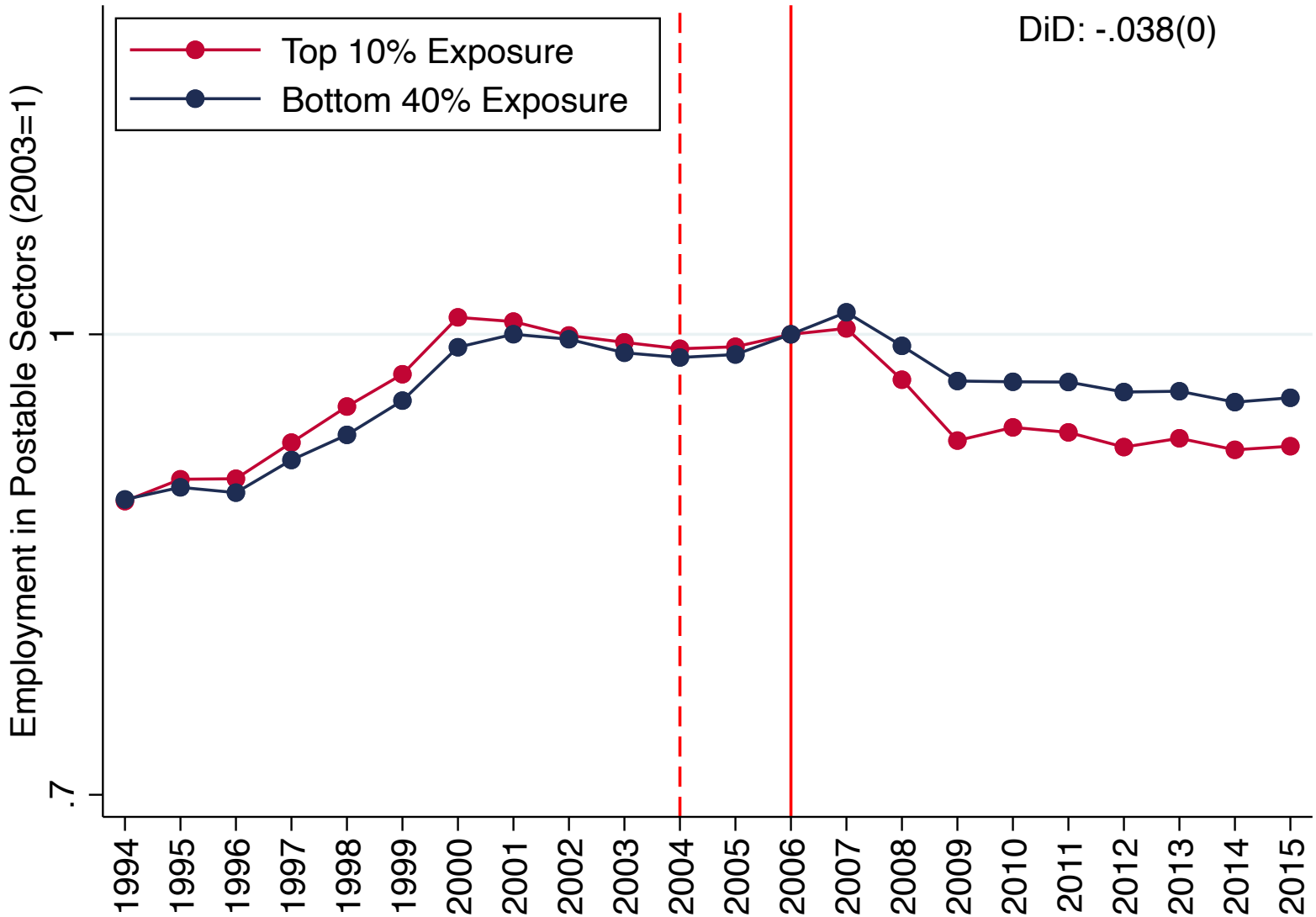
Log Exposed Employment by Exposure to Posting

Back



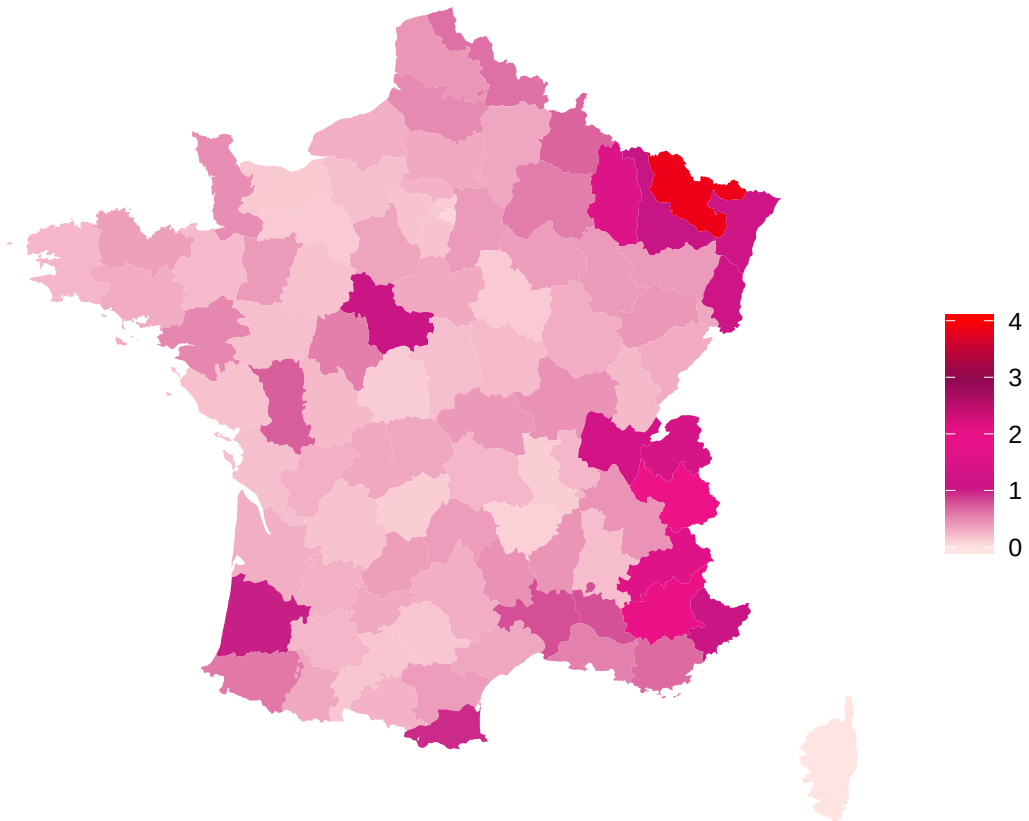
Log Exposed Employment by Exposure to Posting

Back



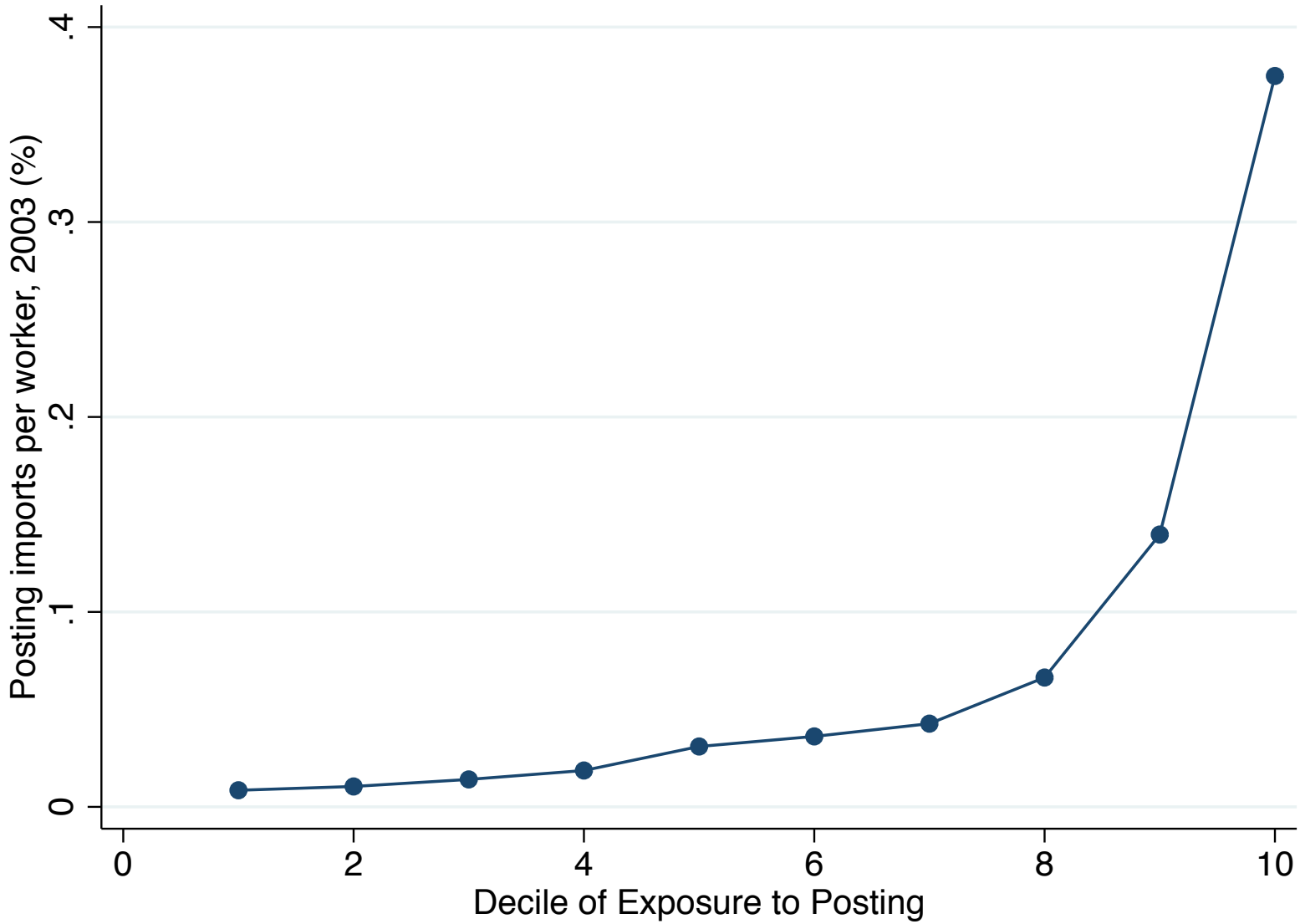
Posting Imports per Worker, 2005-2015

Back



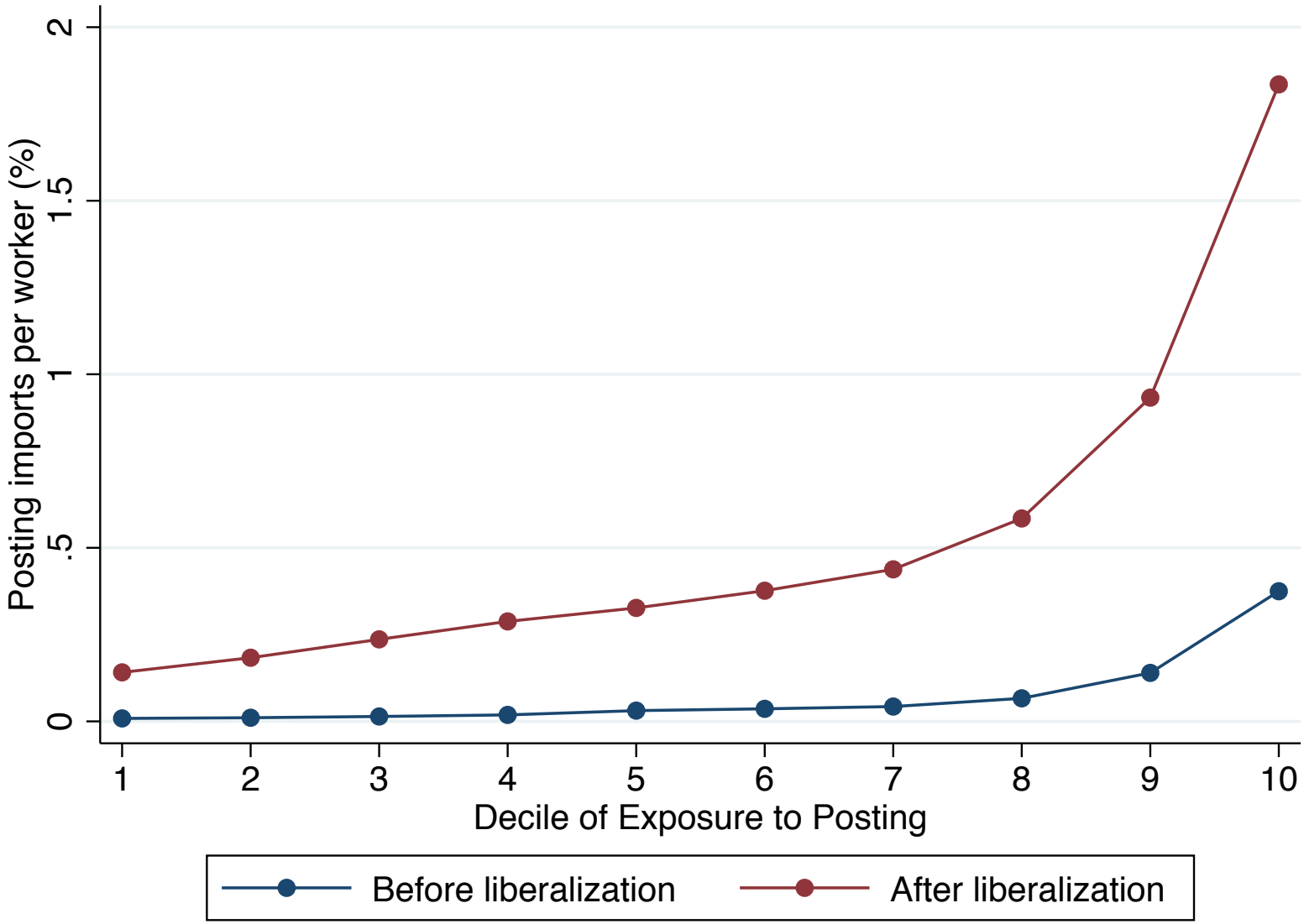
Spatial heterogeneities in Posting Imports per Worker

High imports of posting concentrated in a set of provinces Back

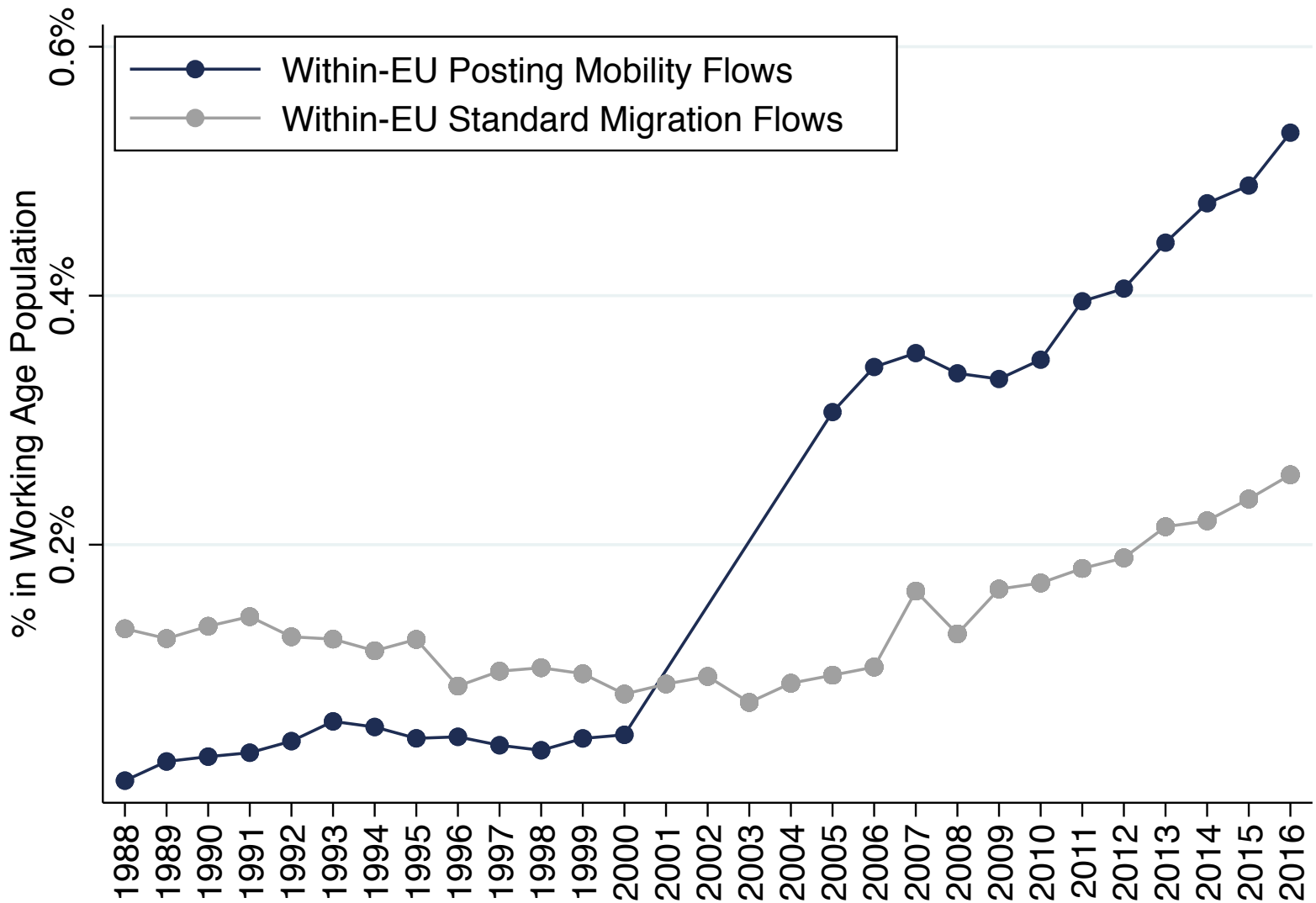


Spatial heterogeneities in Posting Imports per Worker

High imports of posting concentrated in a set of provinces Back



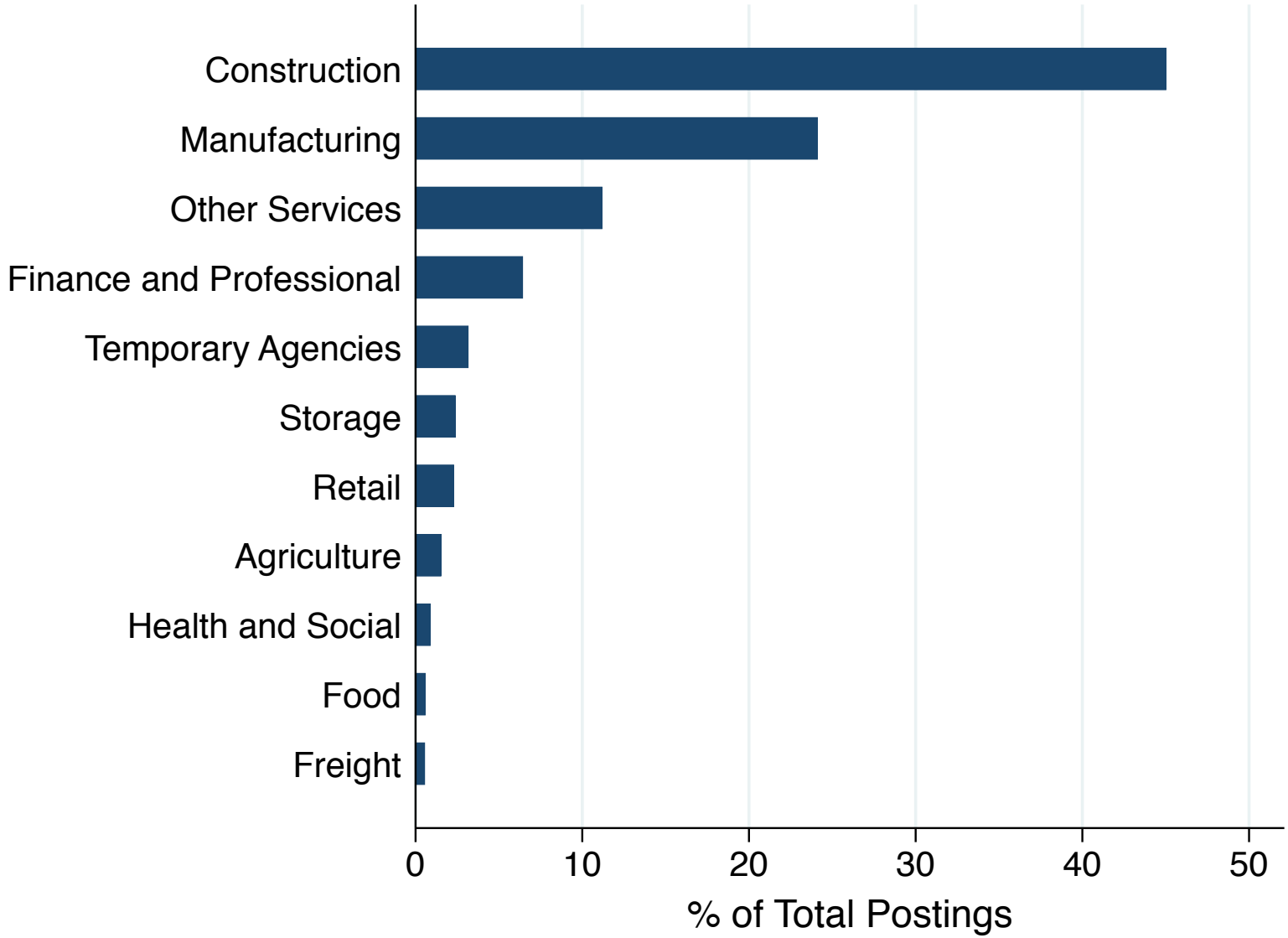
Migration and Posting Flows



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

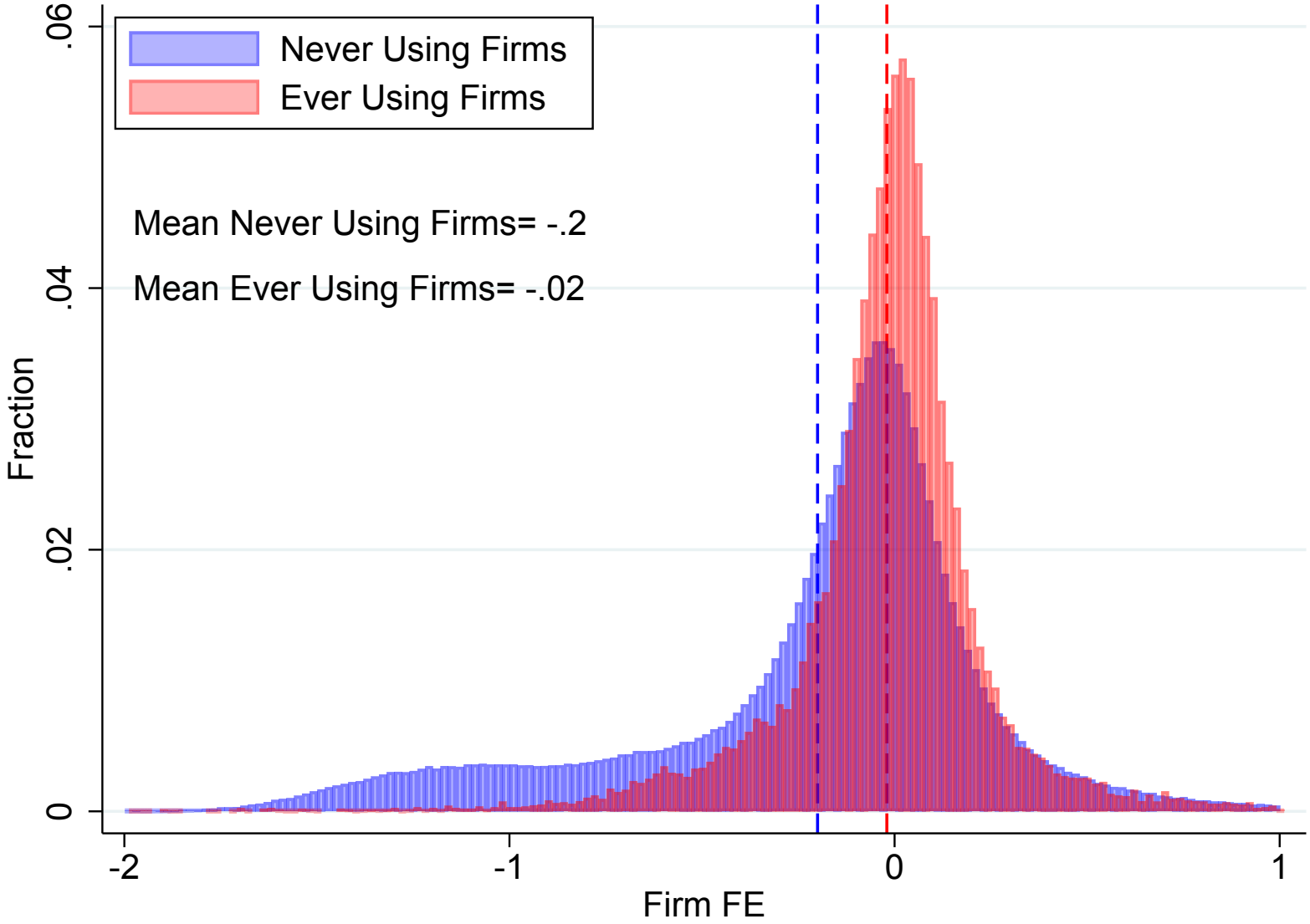
Sectoral Decomposition, All EU

Back



Cost-Saving Motives

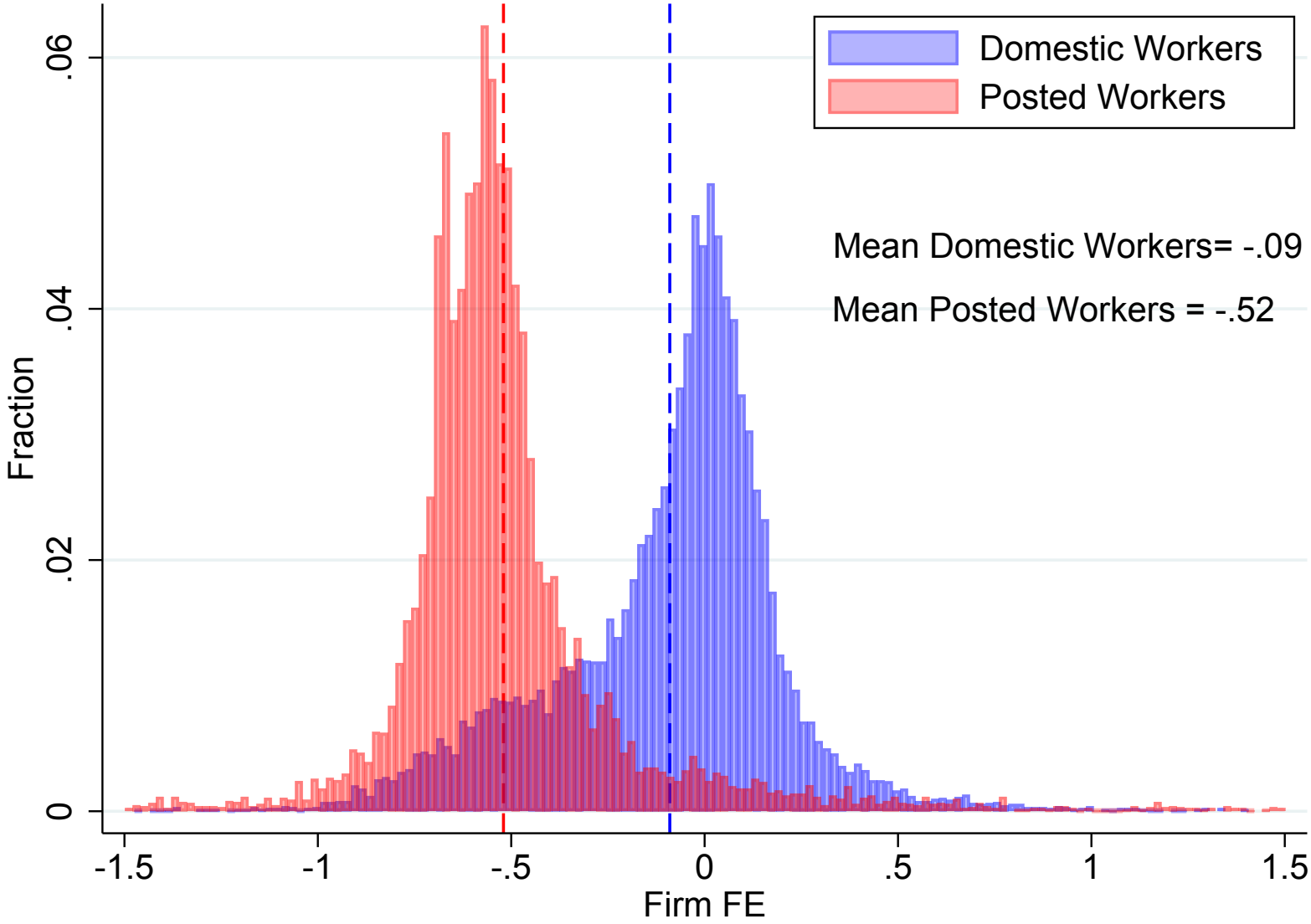
Posting services are used by high-wage firms



Wage Penalty of Posted Workers

BACK

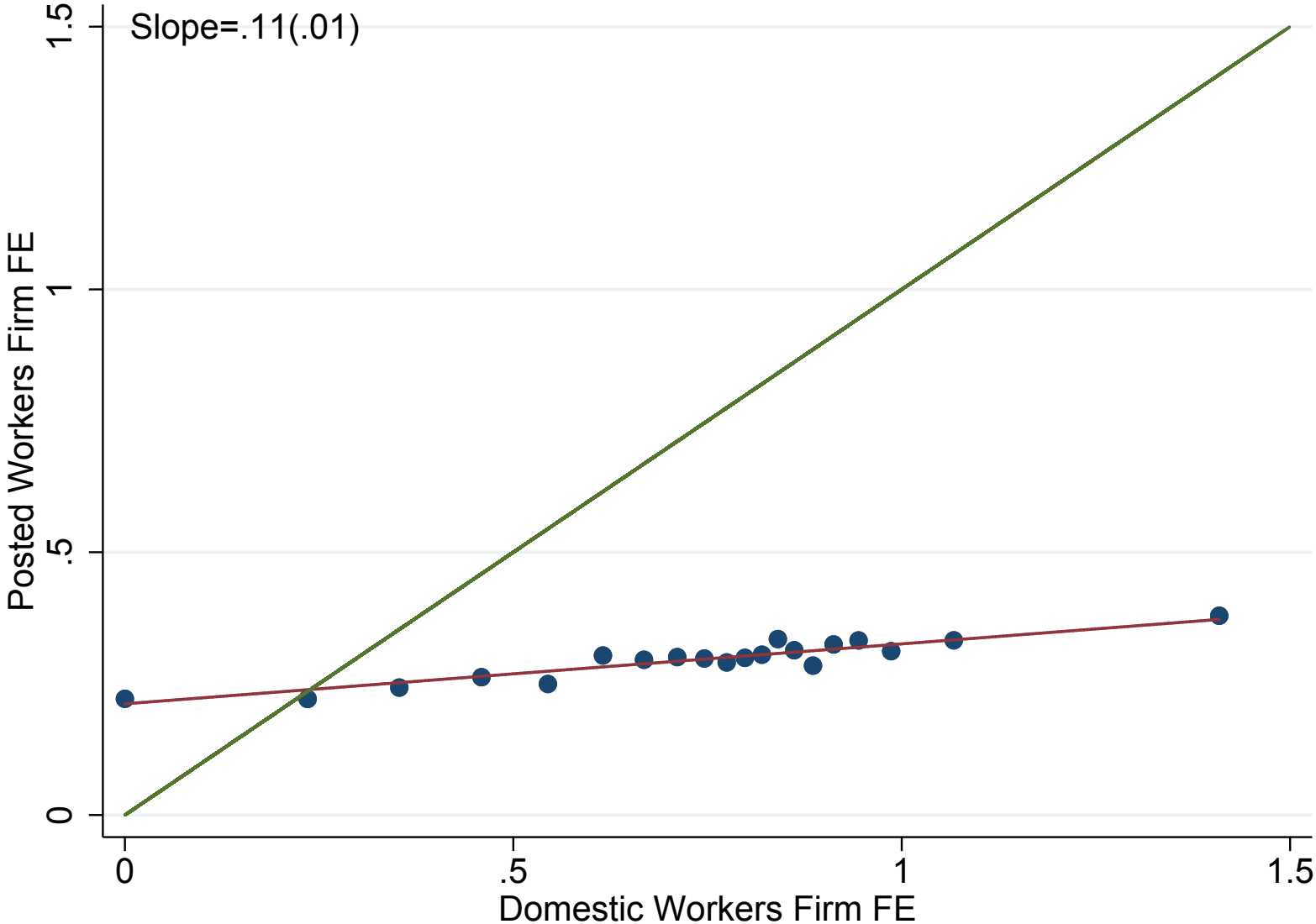
Receiving firms save on high domestic wage premia through posting



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

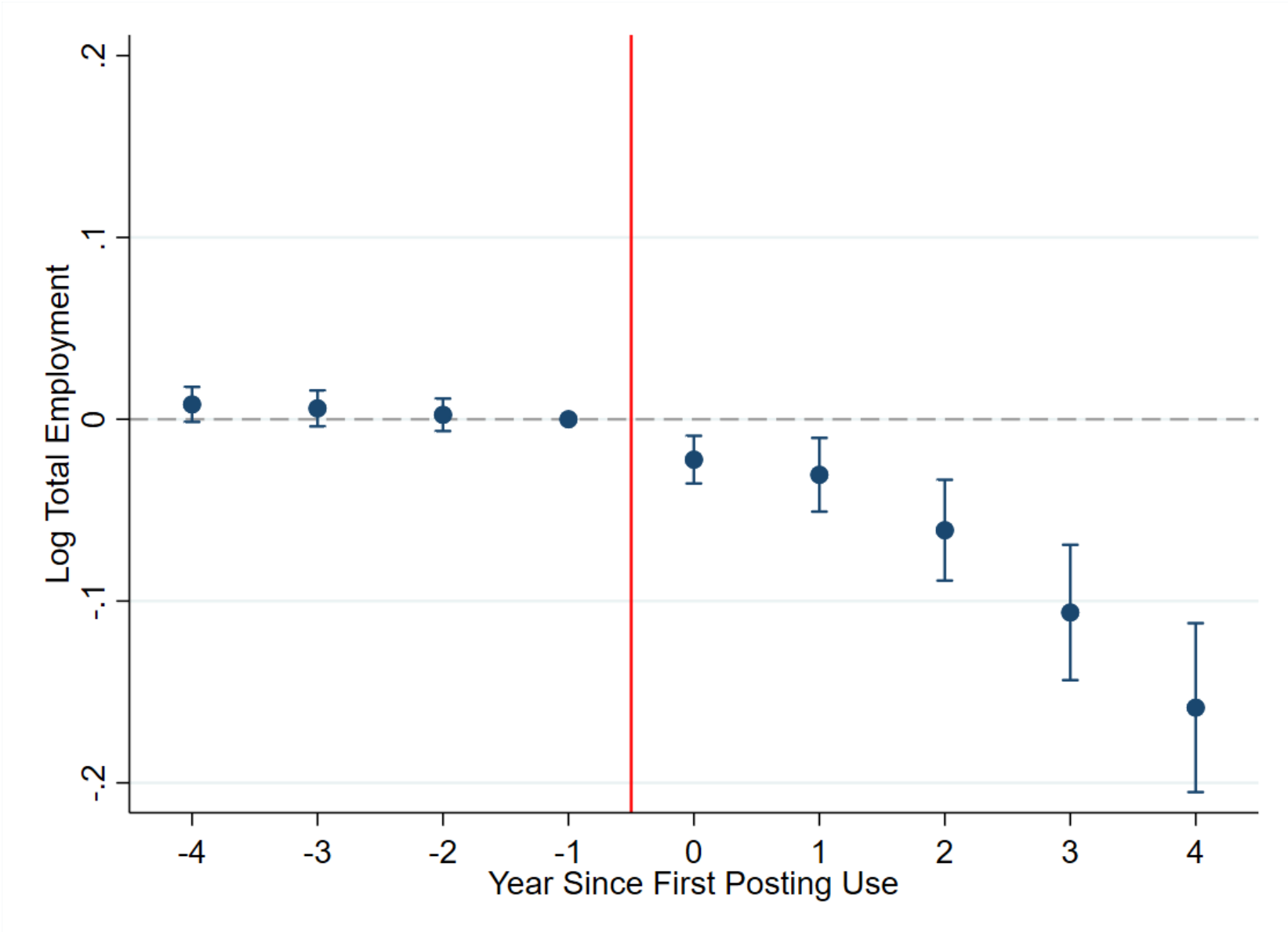
$$\underbrace{\ln y_{it}}_{\text{using firm employment}} = \alpha_i + \underbrace{\lambda_{st}}_{\text{3 digit sector-year FE}} + \sum_{k=\underline{T}}^{\overline{T}} \gamma_k \times \underbrace{D_{it}^k}_{\mathbb{1}.[t = d_i + k]} + \varepsilon_{it}$$

- γ_k describes employment before and after firms start using posting

Substitution of Foreign for Domestic Inputs

HTE estimator BACK

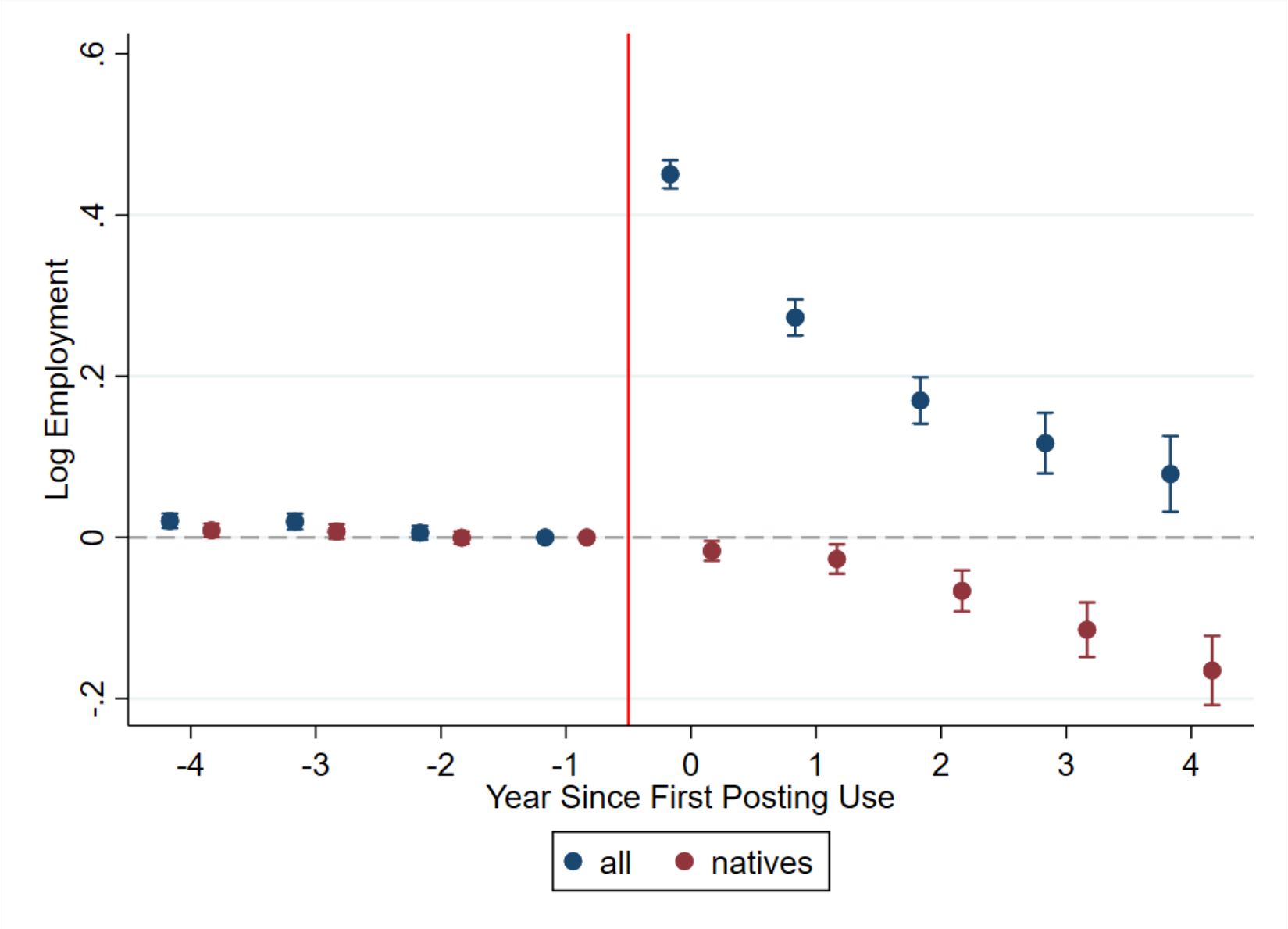
Receiving firms decrease domestic employment by 16% four years after posting use



Substitution of Foreign for Domestic Inputs

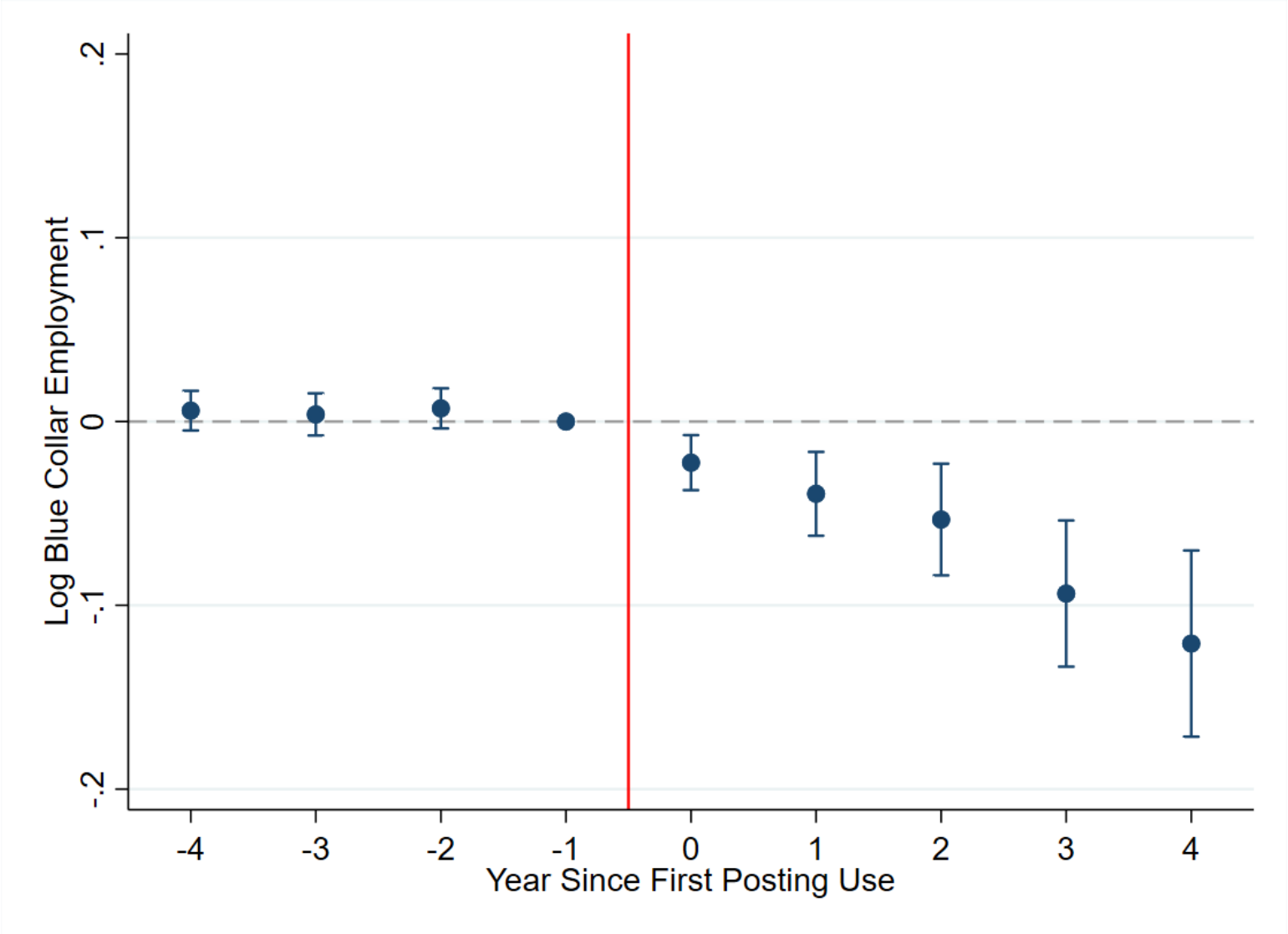
HTE estimator BACK

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



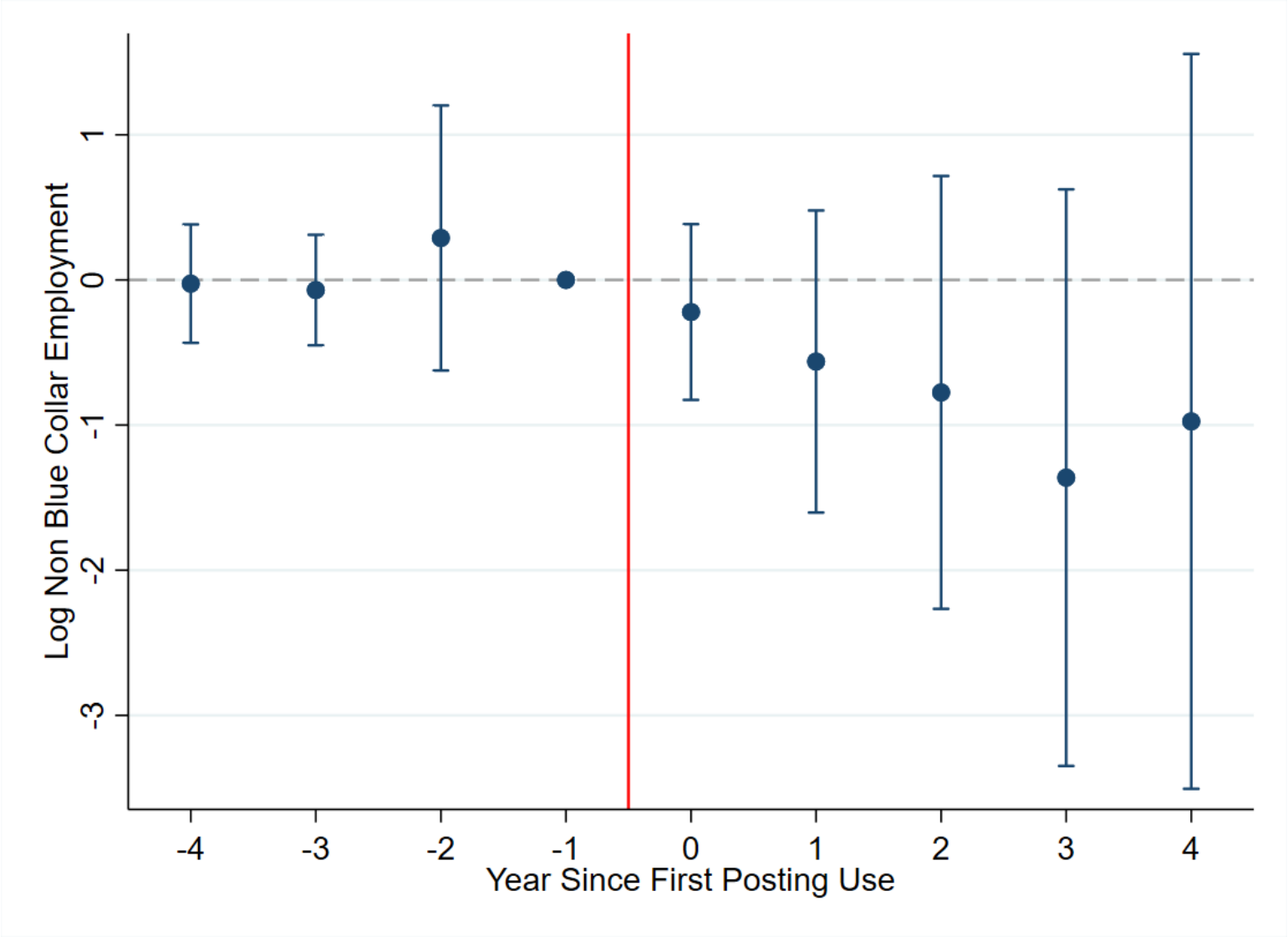
Blue Collar Employment at Receiving Firms After Posting Use

BACK



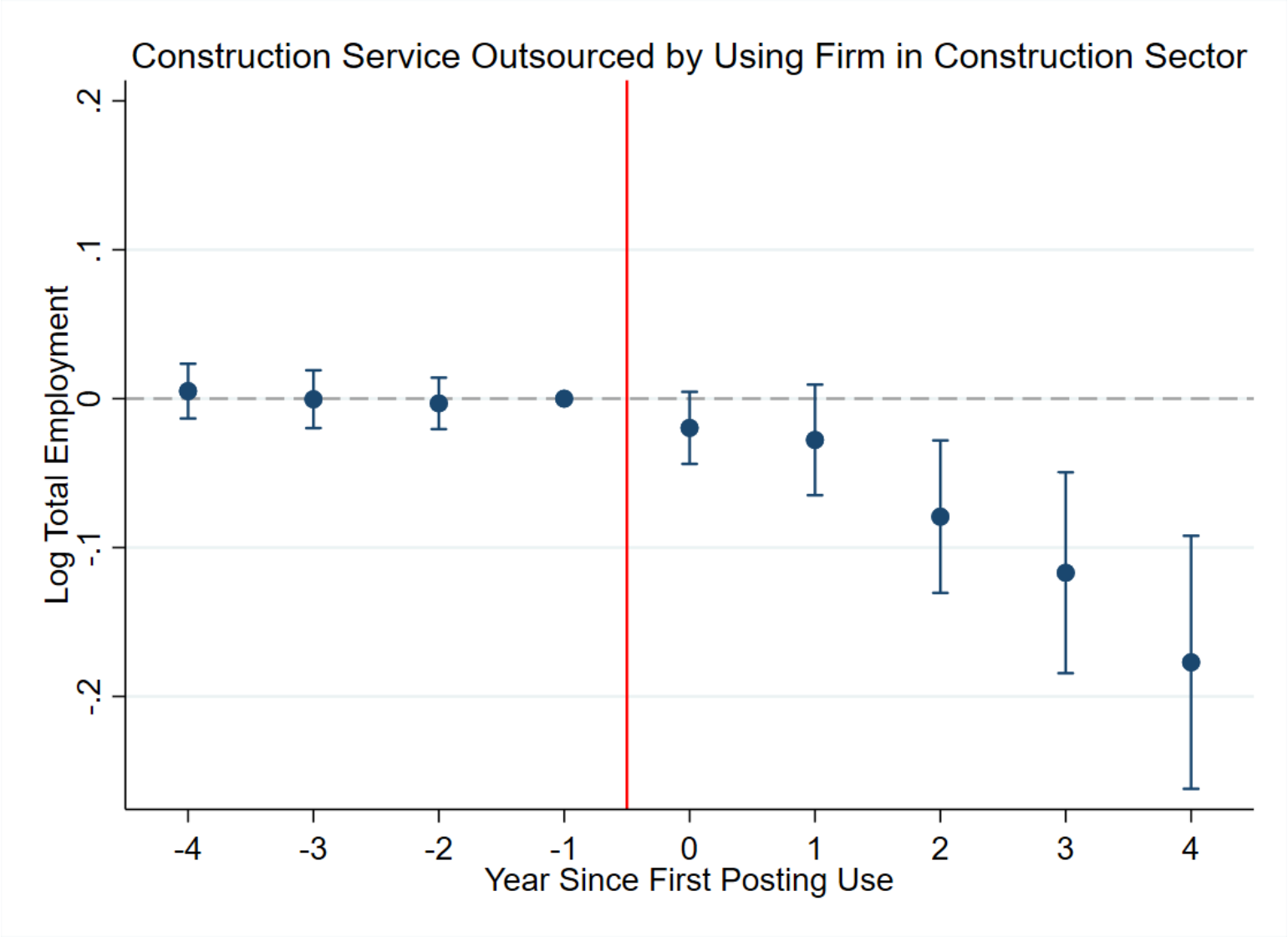
Other Employment at Receiving Firms After Posting Use

BACK



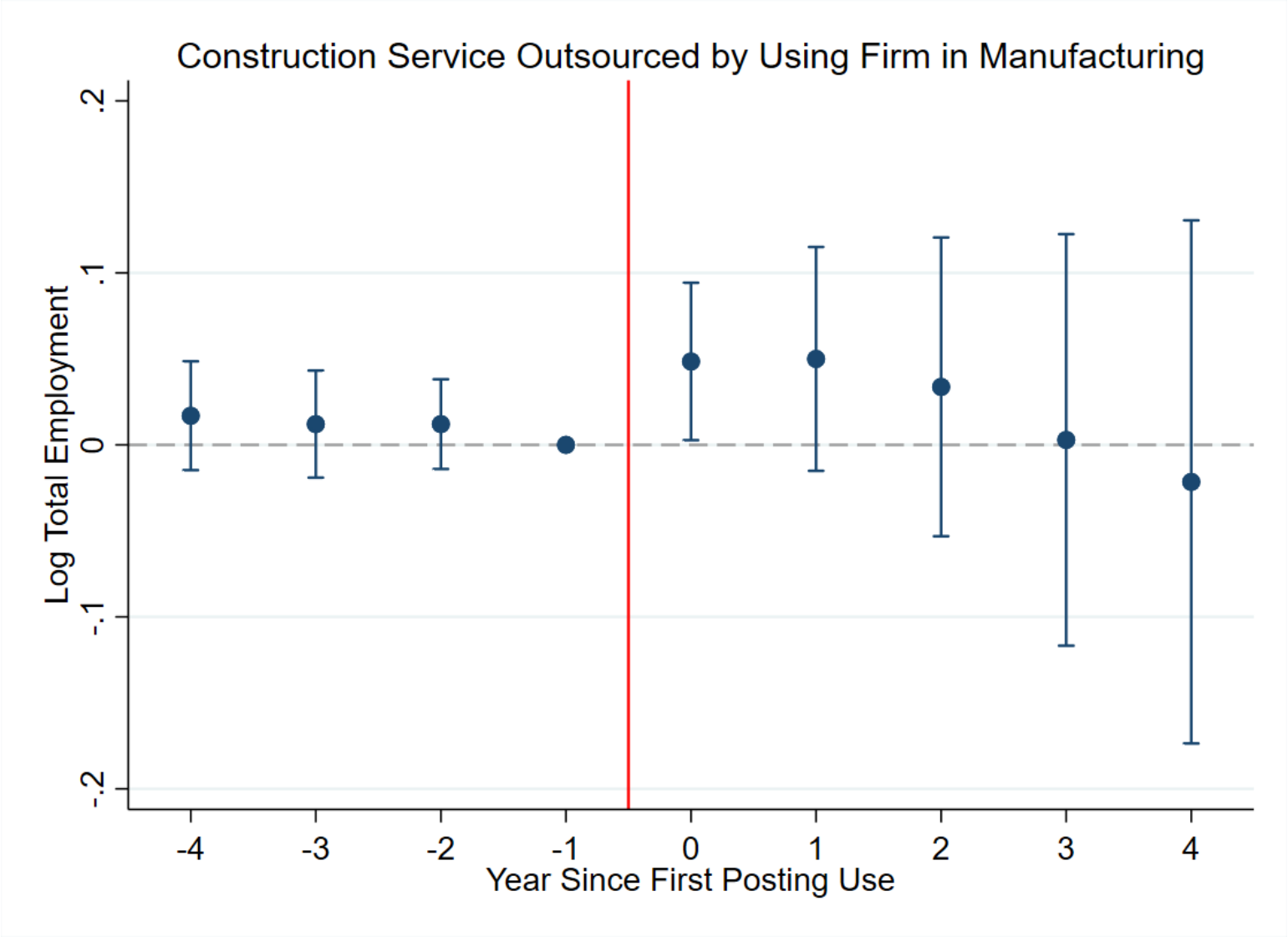
Posted Workers Performing Same Tasks than Domestic Workers

BACK



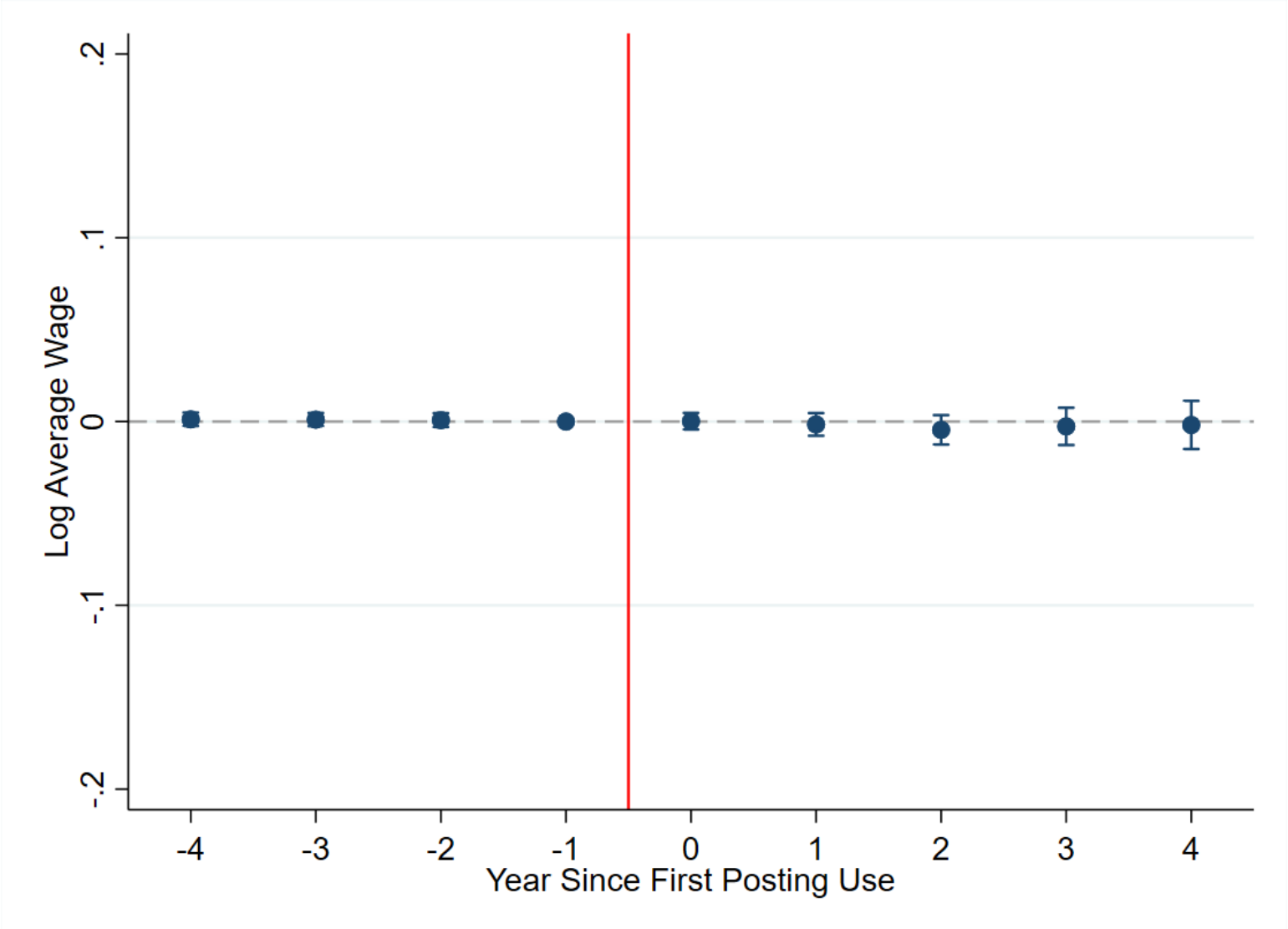
Posted Workers Performing Different Tasks than Domestic Workers

BACK



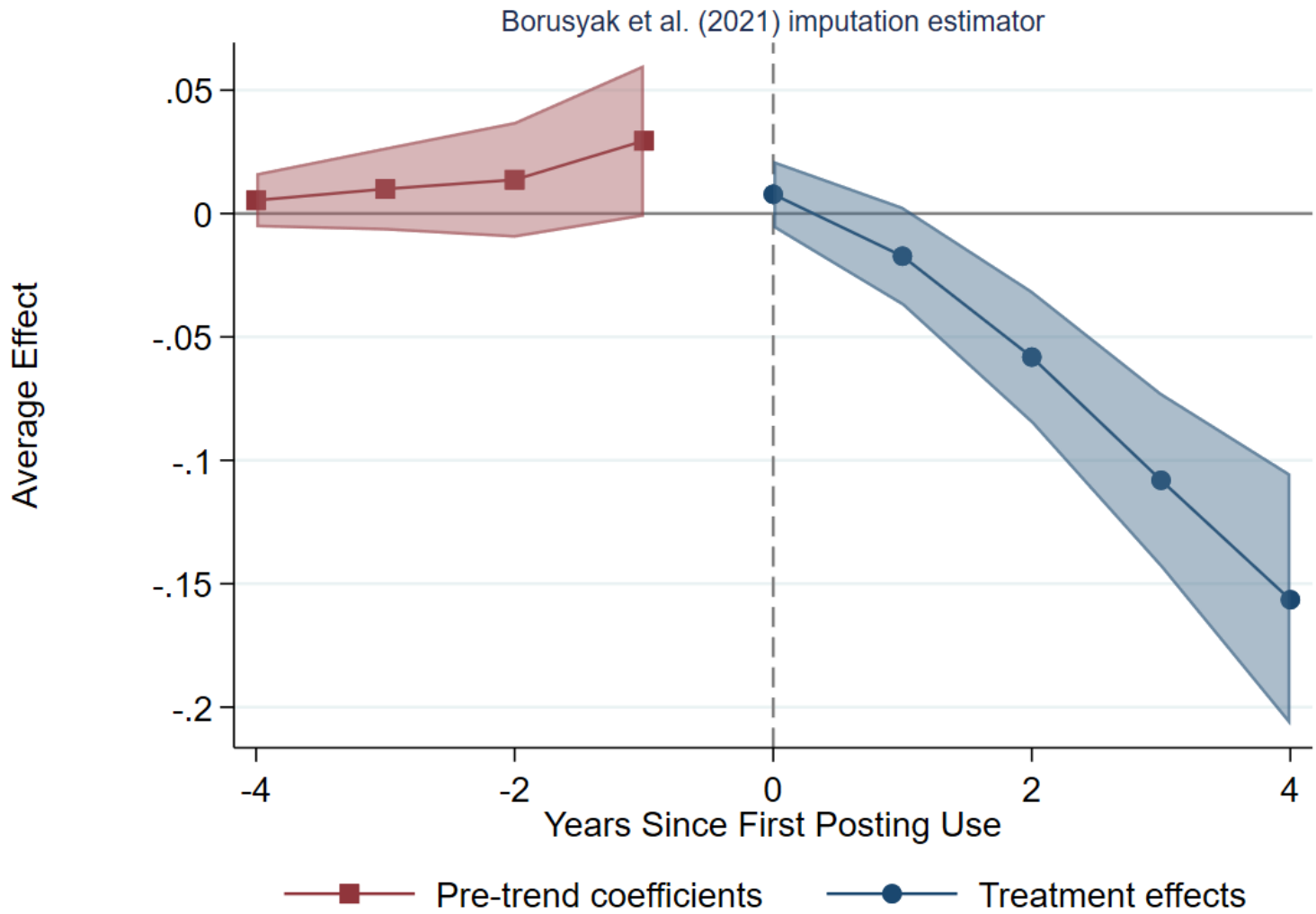
Incumbent Wages At Receiving Firms

BACK



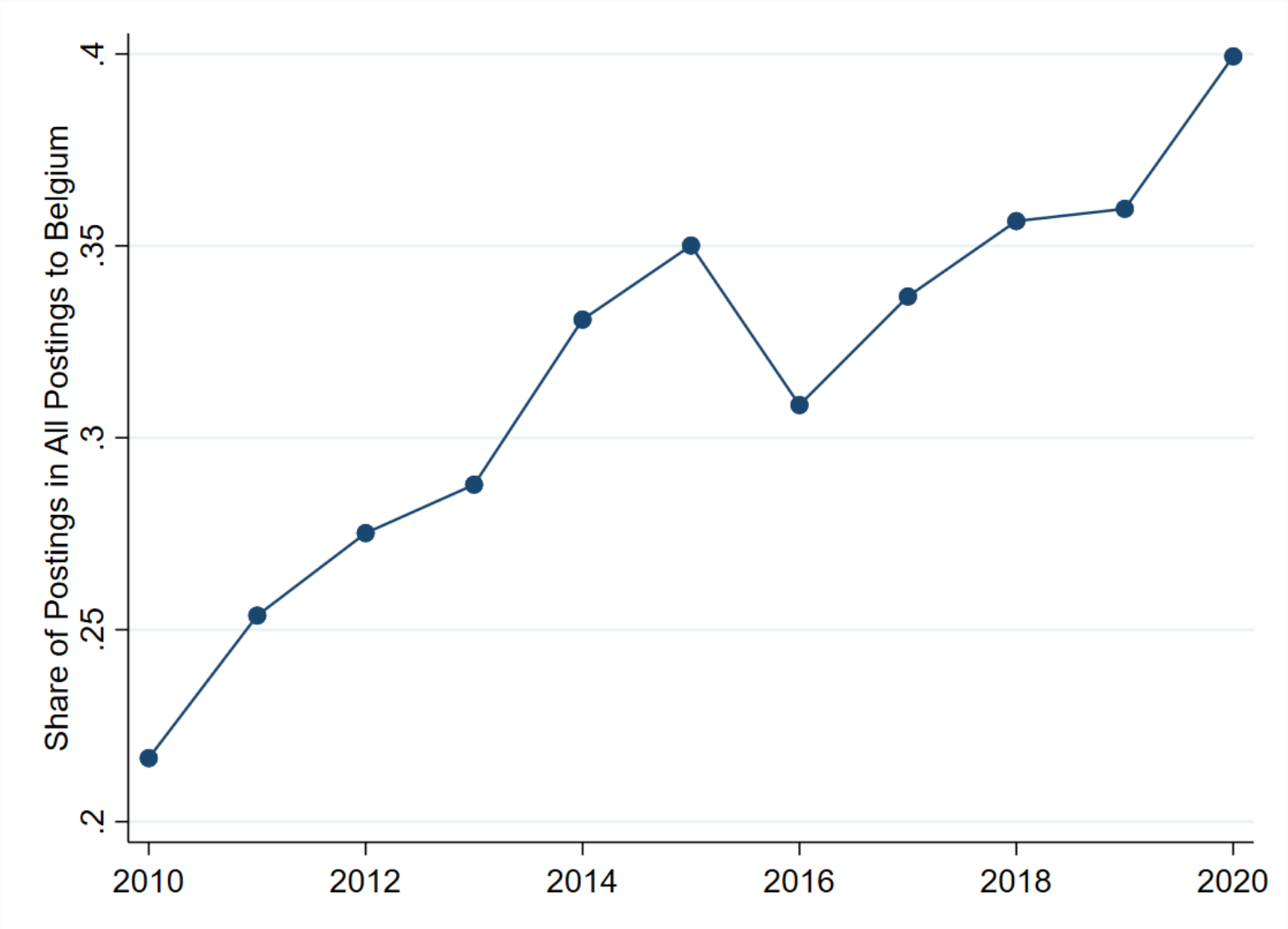
Imputation Estimator

BACK



Growing NMS Supply to Belgium

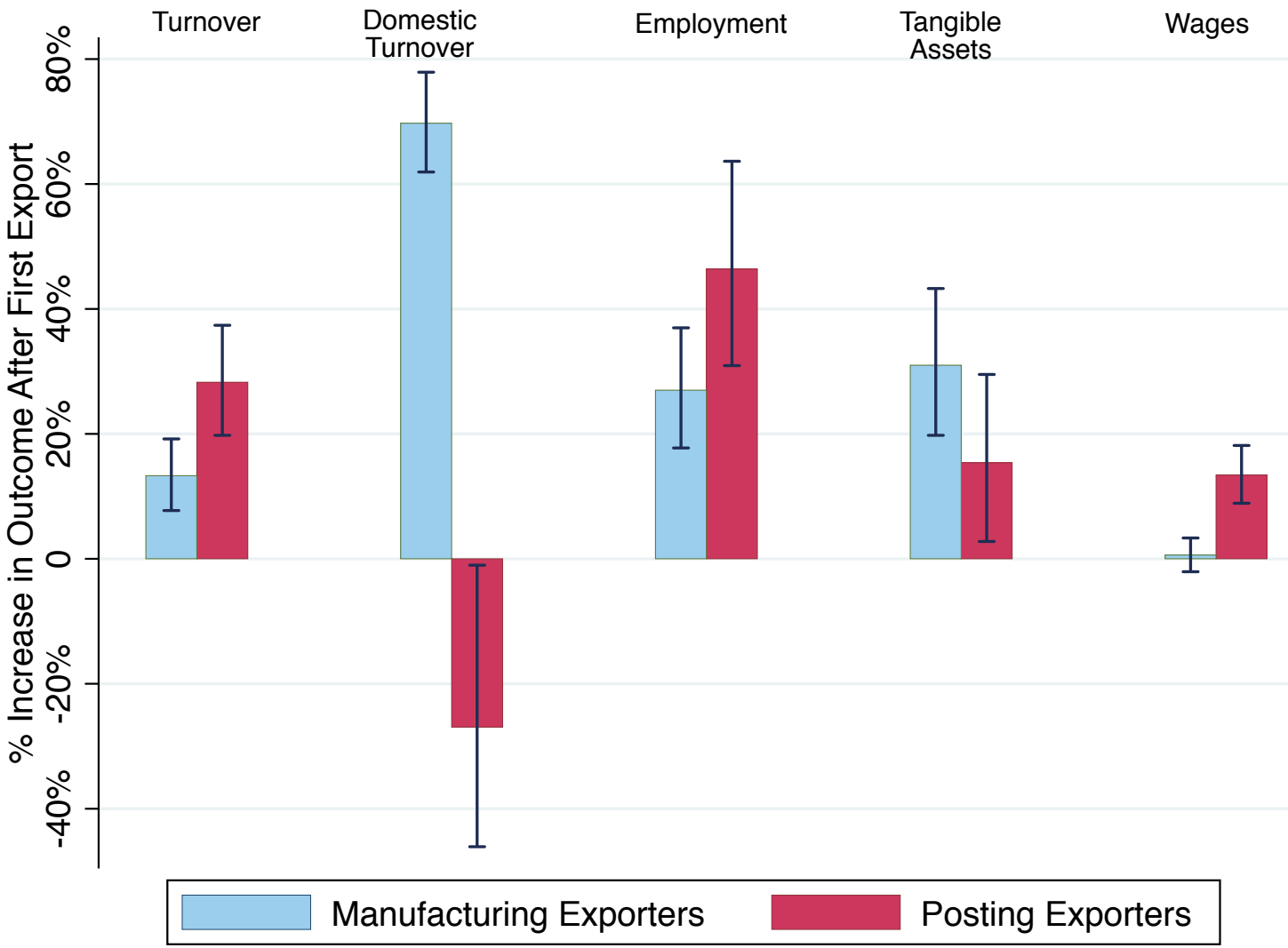
BACK



Export Gains: Manufacturing vs Non-Tradables

Back

Similar magnitude except for domestic sales



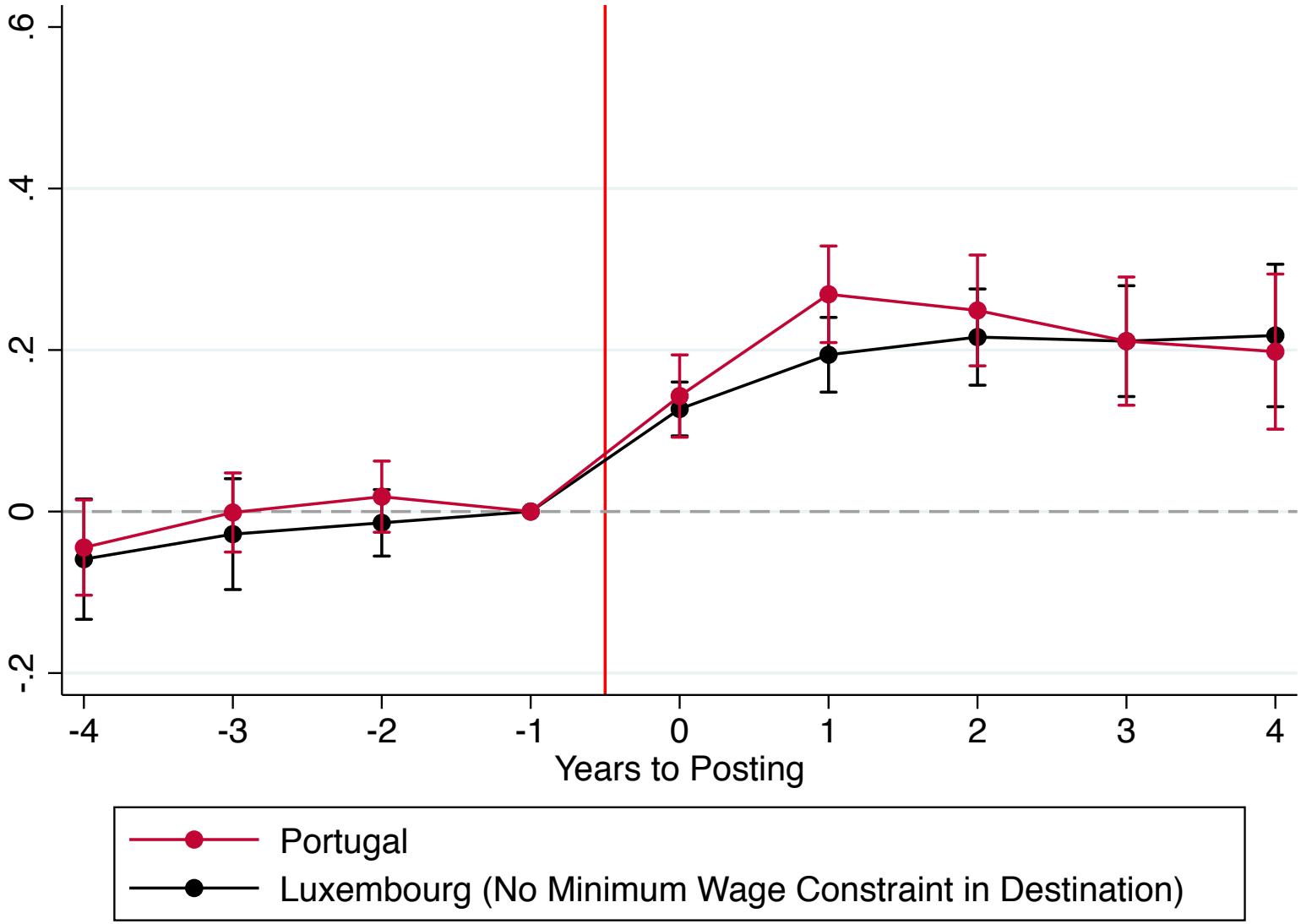
Are wage gains explained by destination-level rules?

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



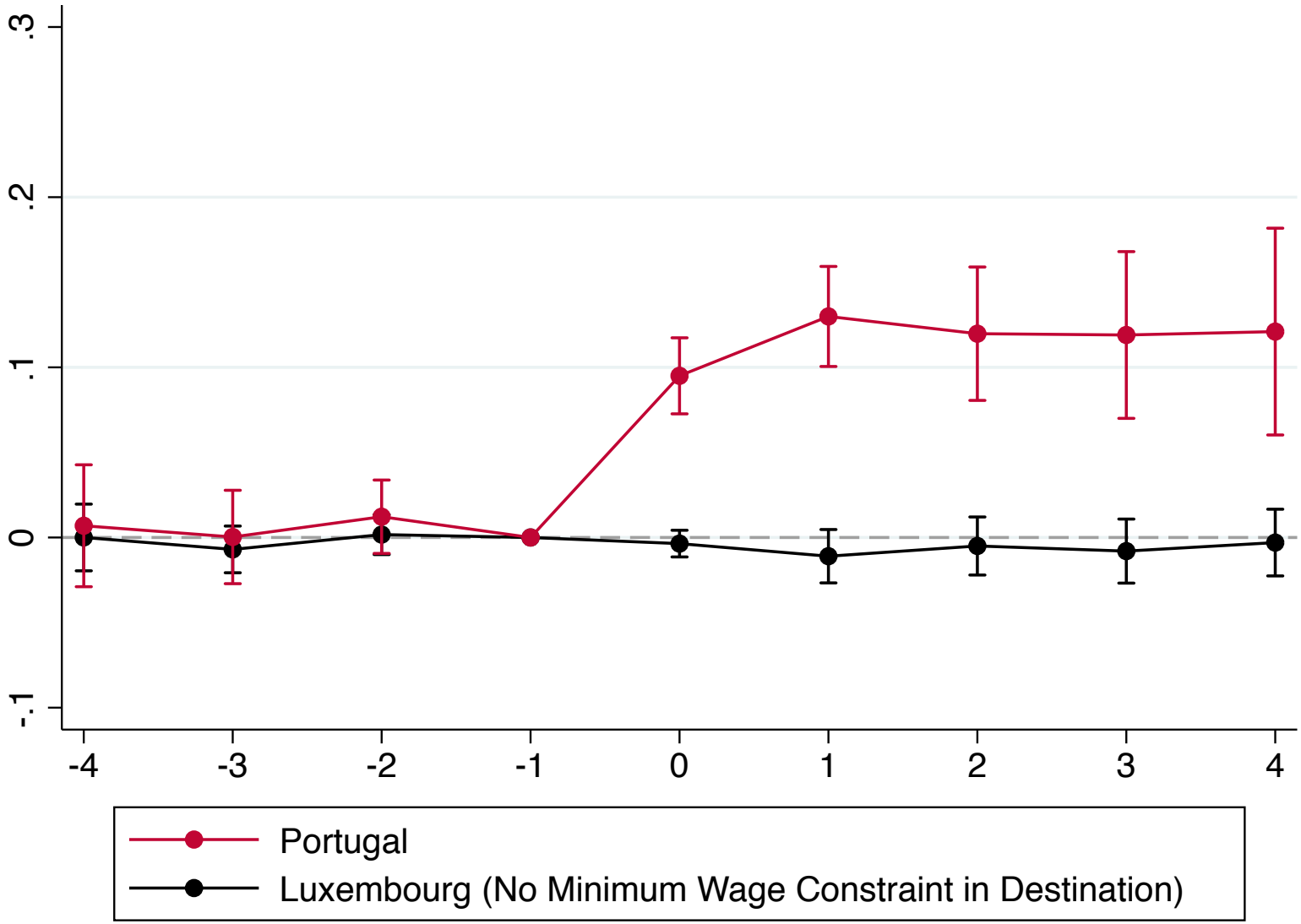
Surplus Sharing or Destination-Level Rules?

Similar increase in total hours of work at sending firms Back



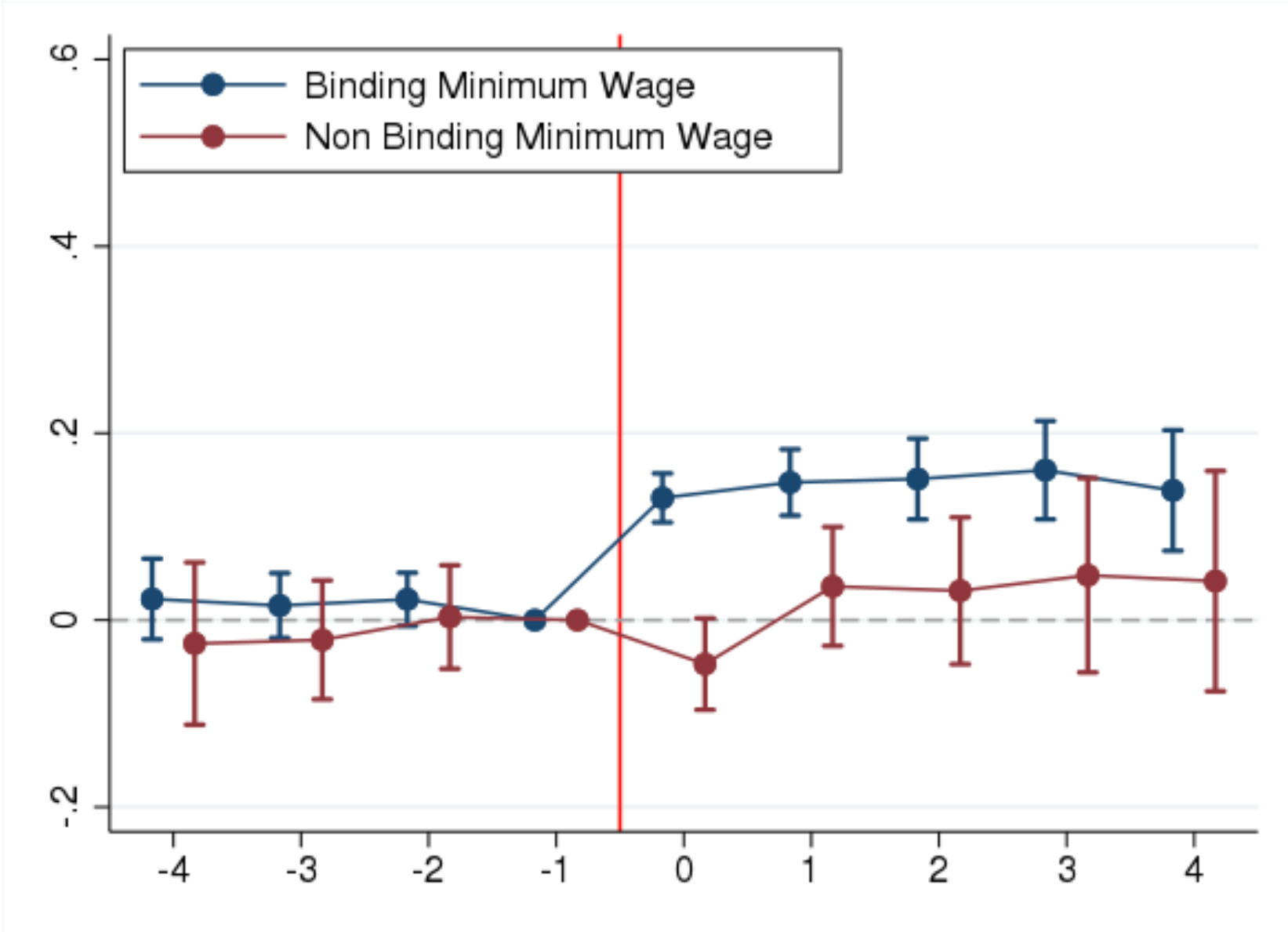
Surplus Sharing or Destination-Level Rules?

Only Portuguese workers benefit from wage gains Back



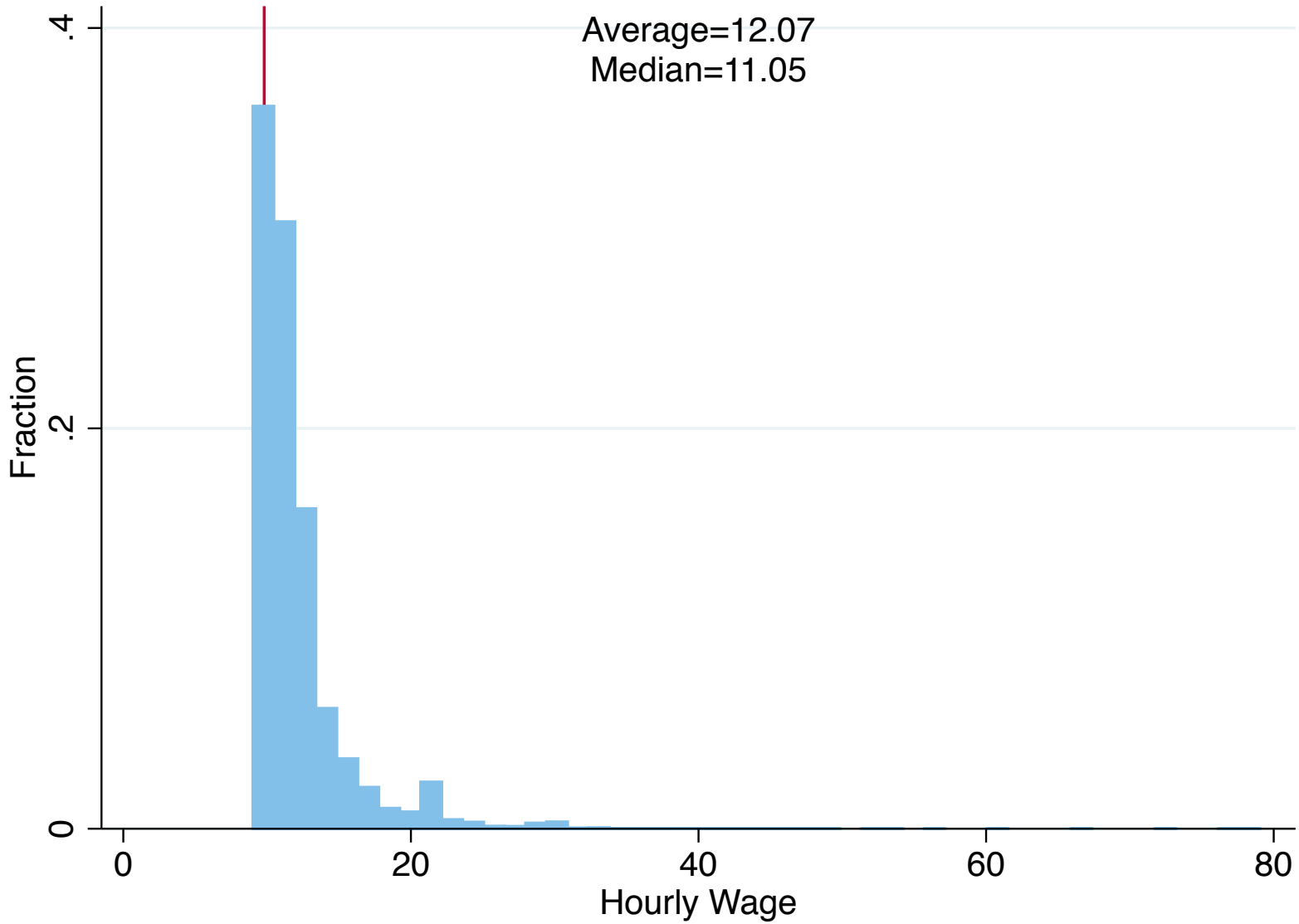
Wage gains by pre-posting wage level

Back



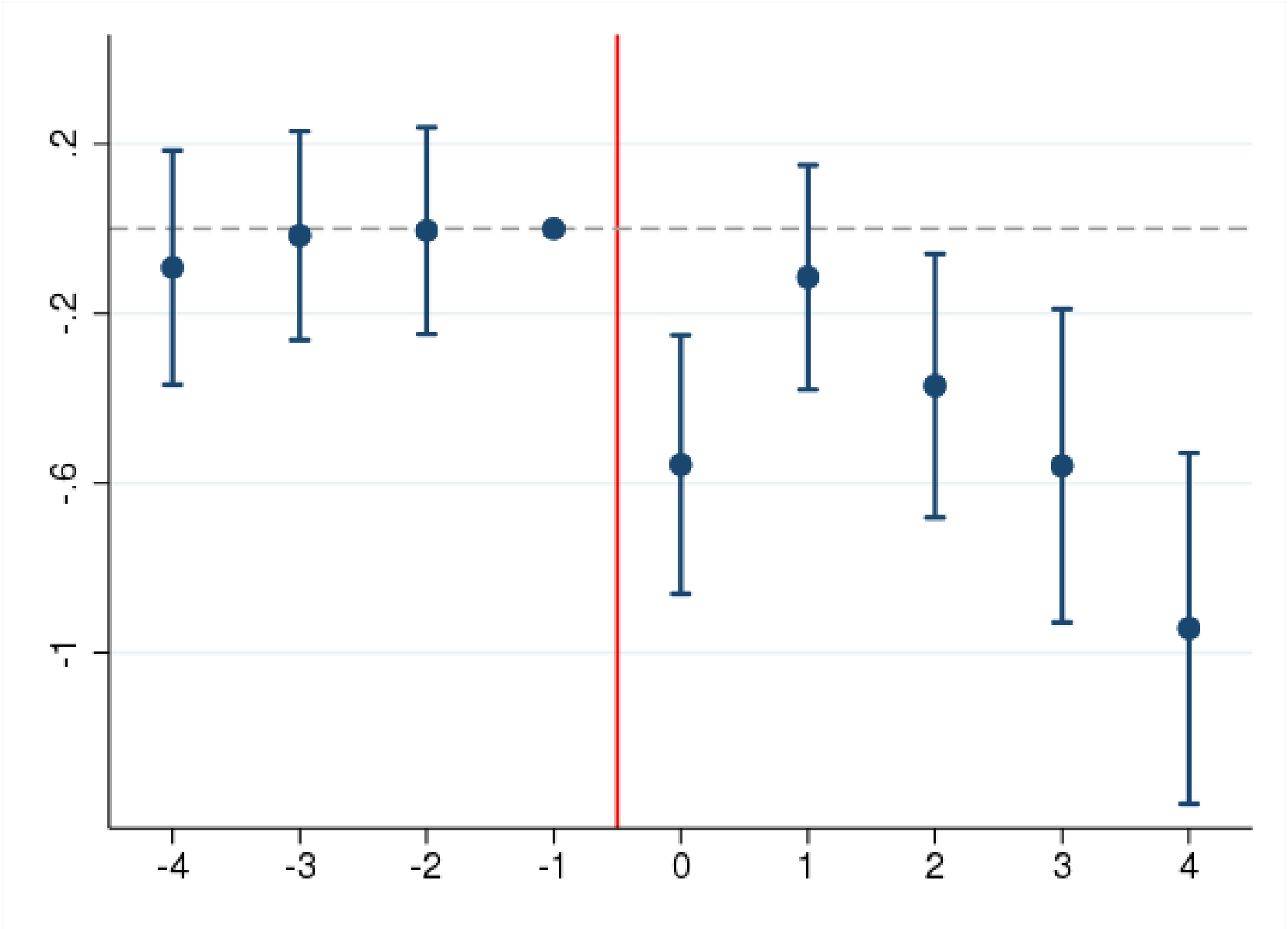
Wage Distribution of Portuguese Employees Posted to France

Back



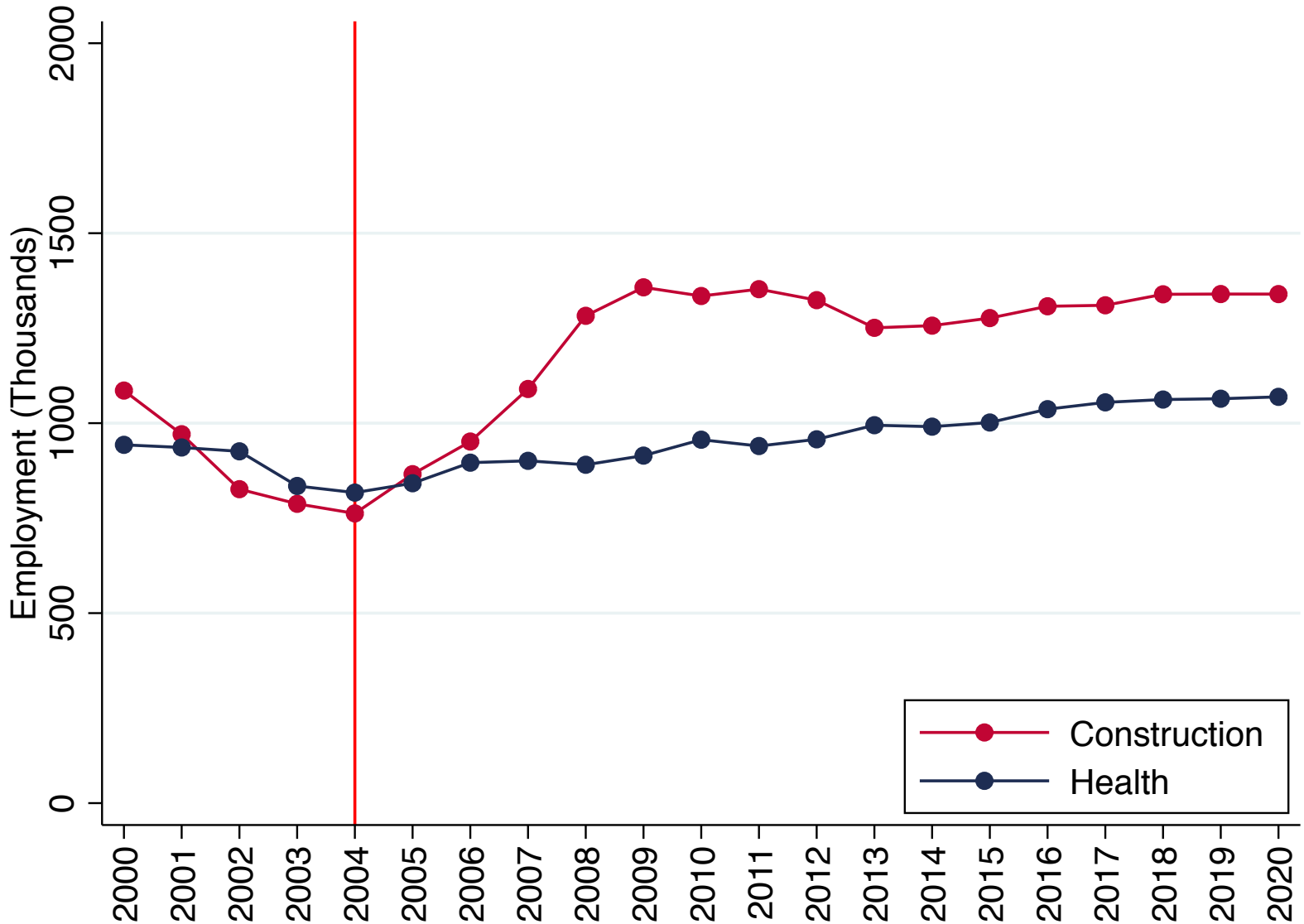
Domestic Sales After Posting

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



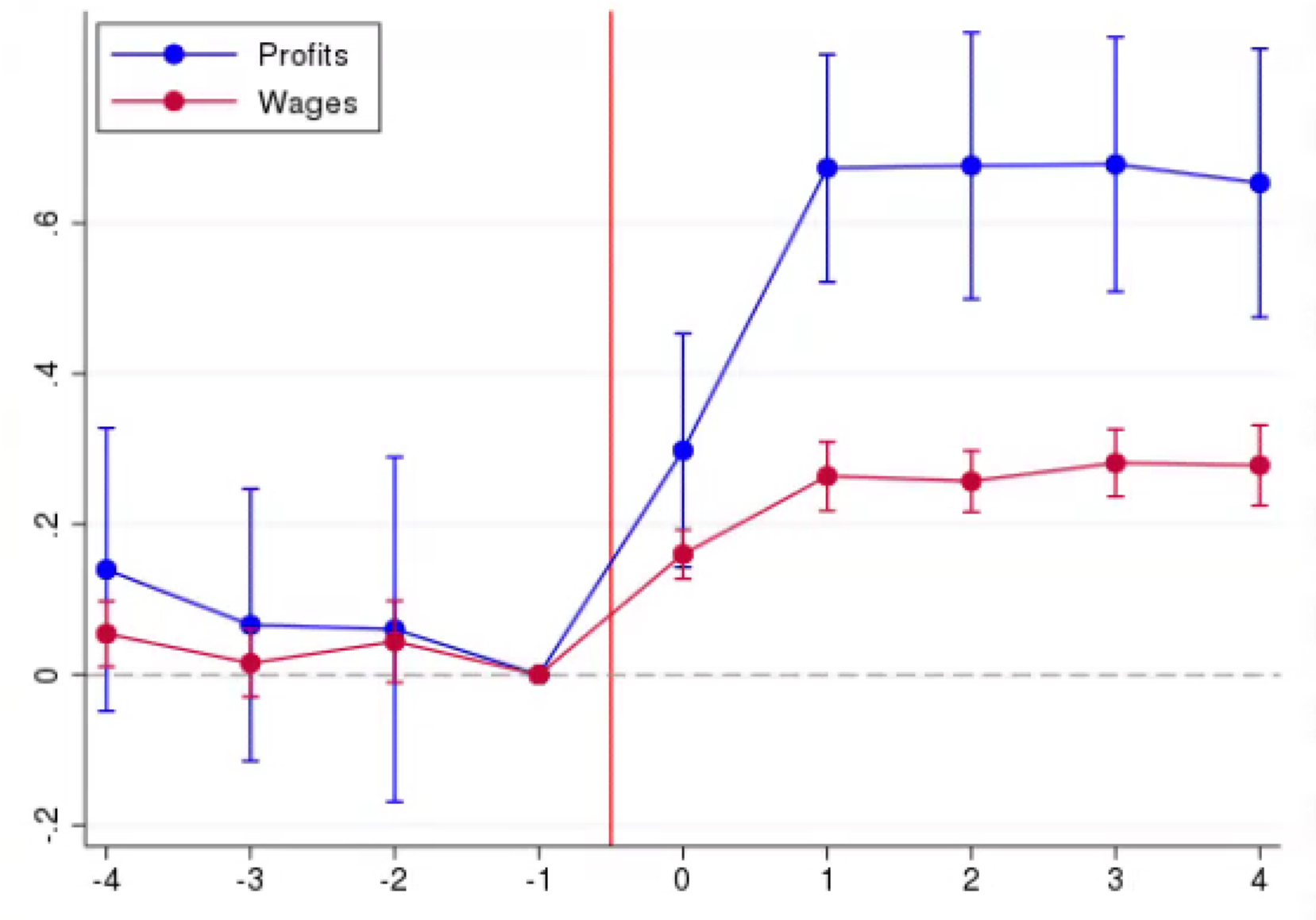
Employment After Liberalization in Poland

Employment in construction increased by 16% after 2004 Back



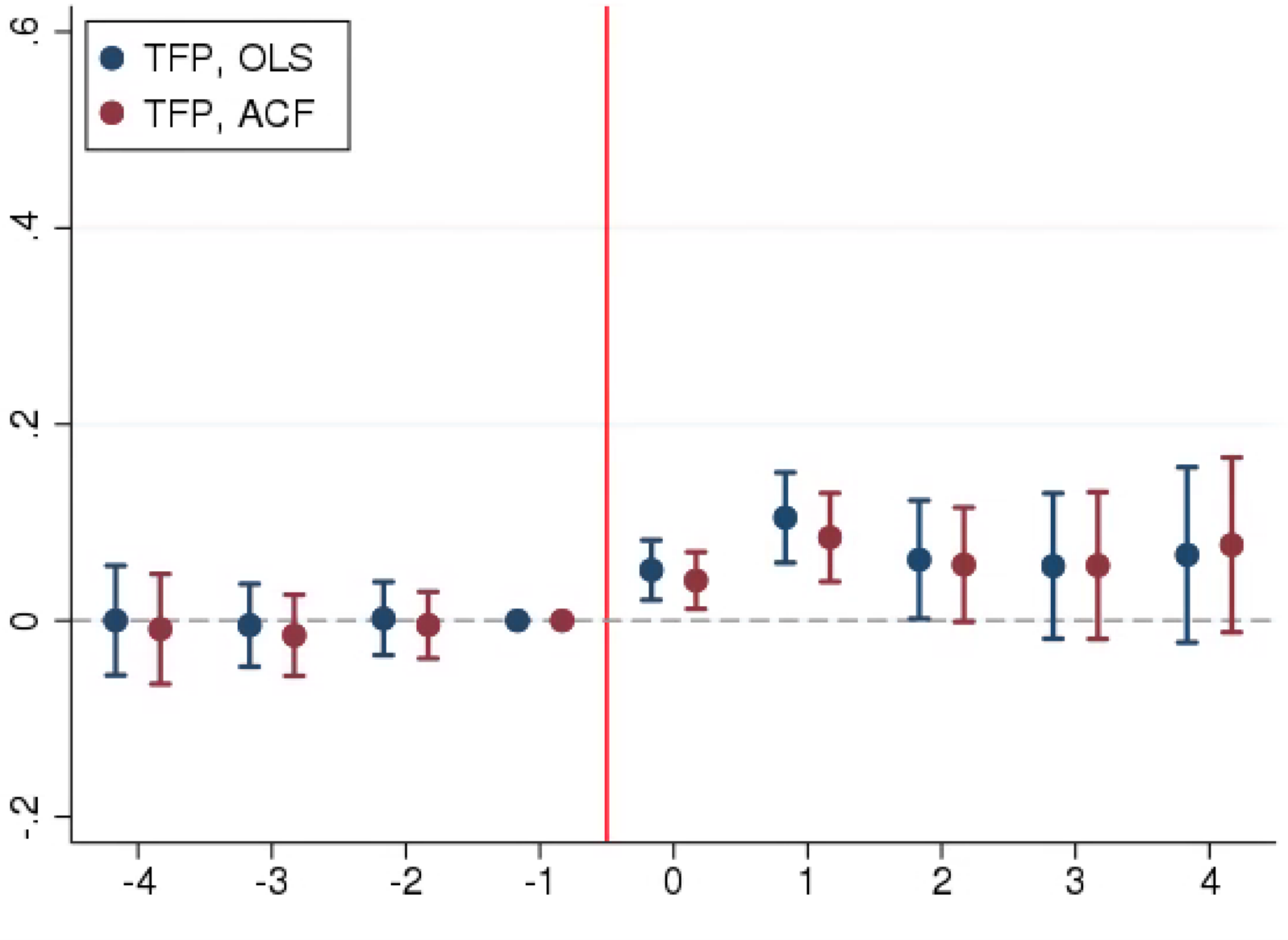
Profit-Wage Split At Permanent Posting Firms

Back



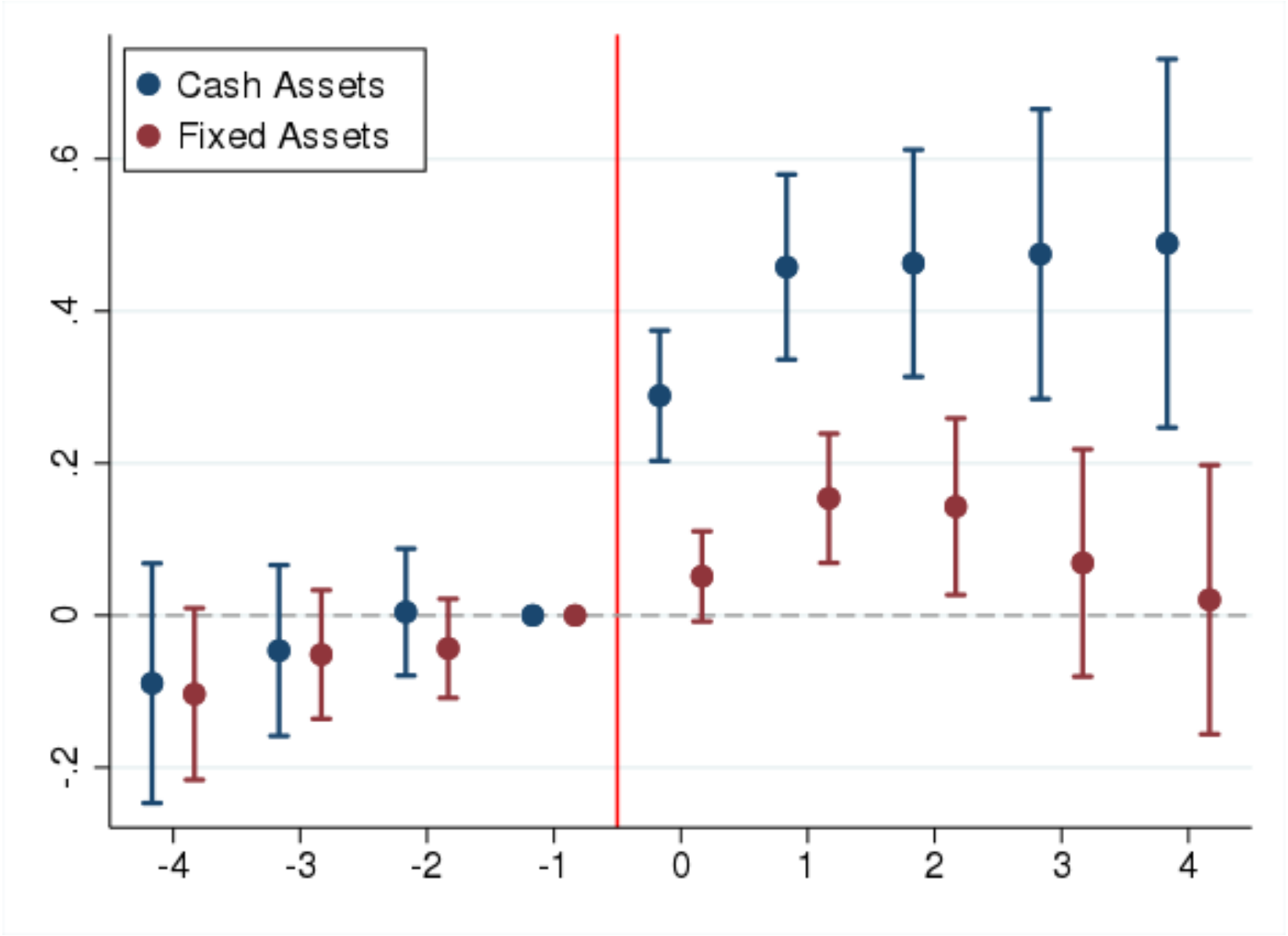
Effect of Posting on Sending Firms Productivity

Back



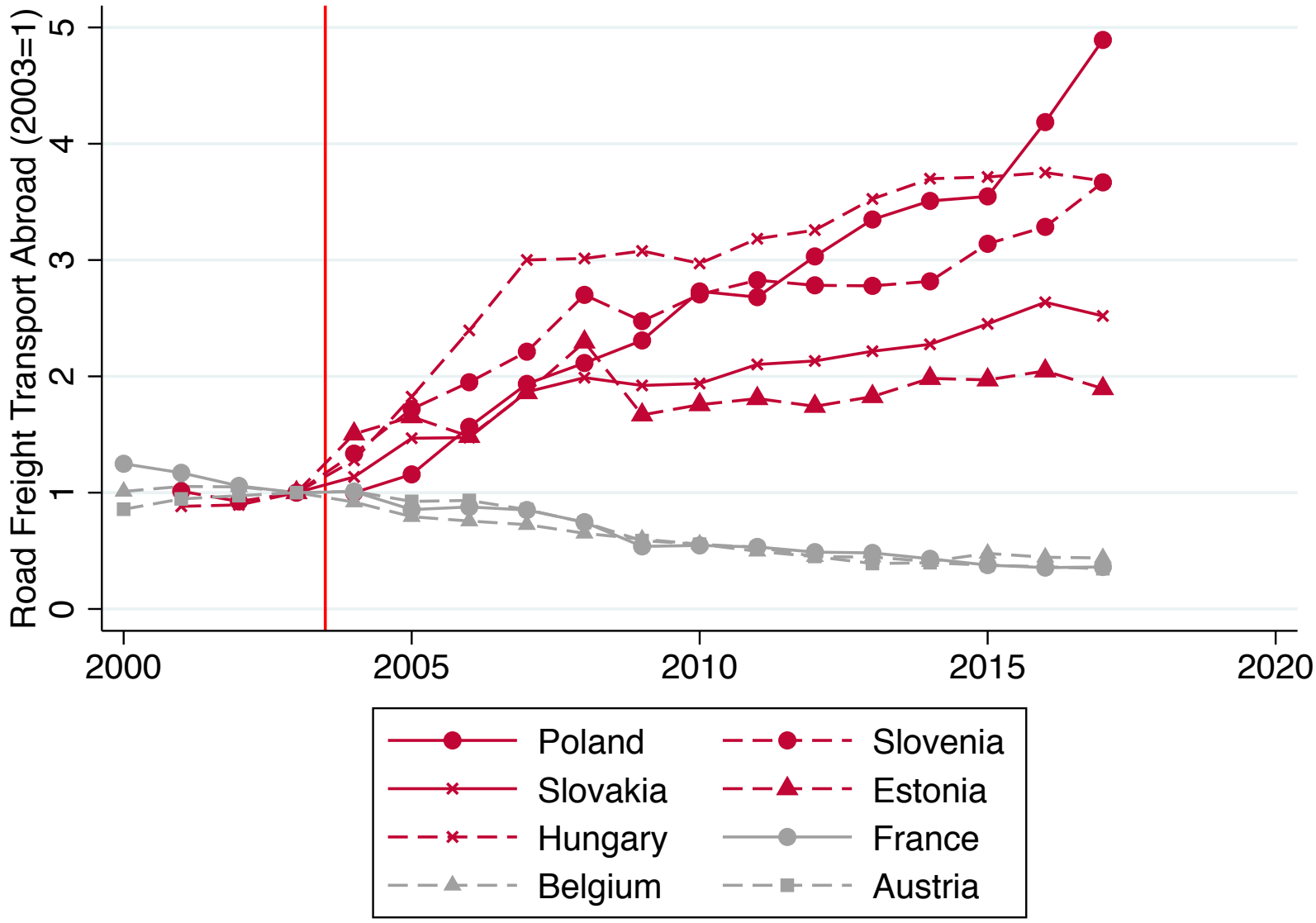
Effect of Posting on Sending Firms Assets

Back



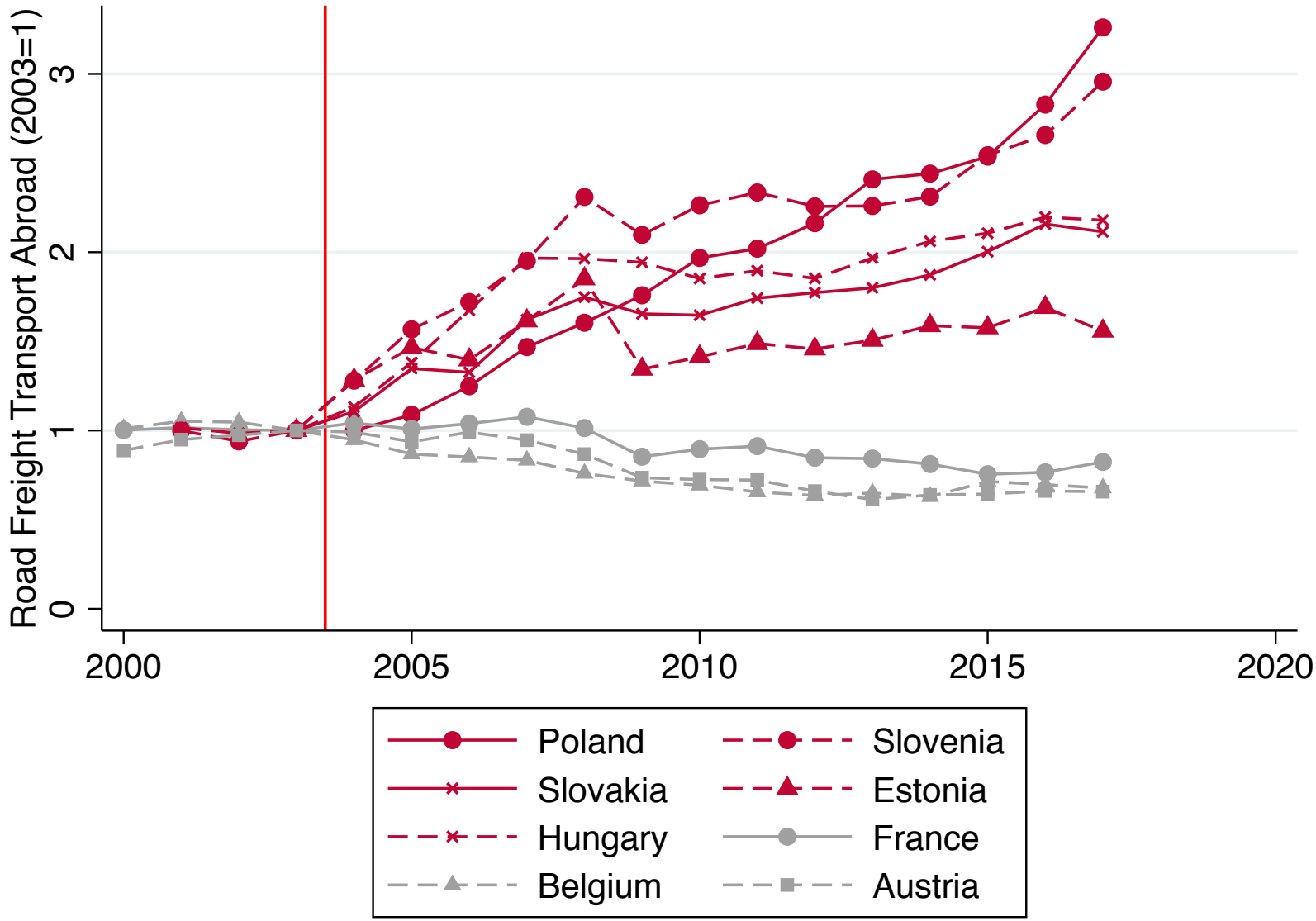
NMS Export of Truck Services After Liberalization

Market shares of NMS in road transport boomed after liberalization Back



NMS Total Sales of Truck Services After Liberalization

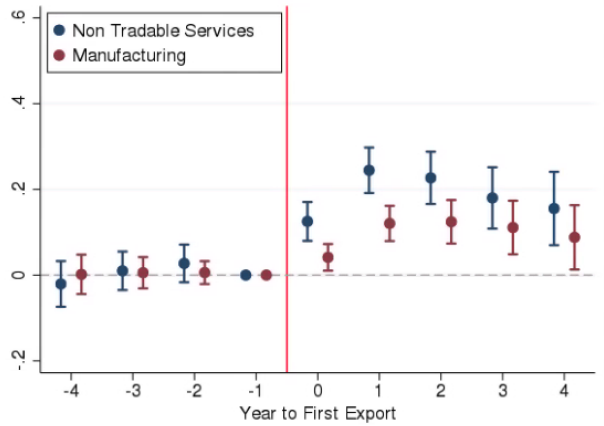
Overall activity in road transport sectors boomed after liberalization Back



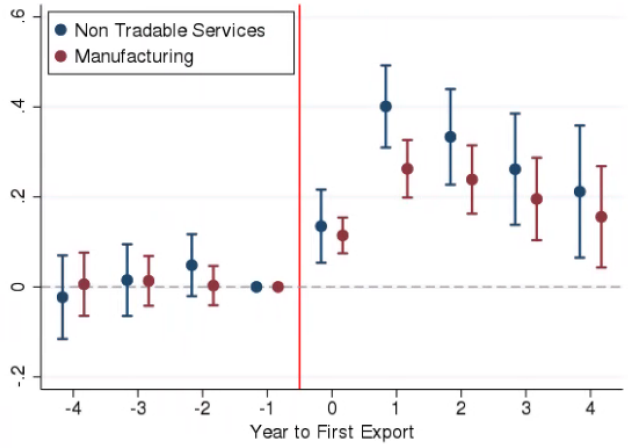
Non Tradable Vs Manufacturing

Back

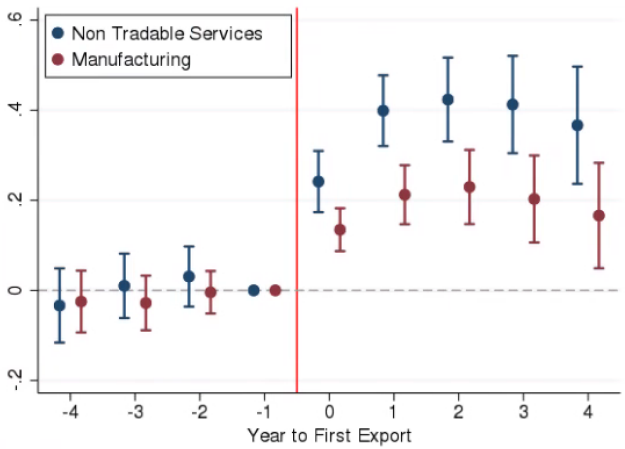
A. Log Total Employment



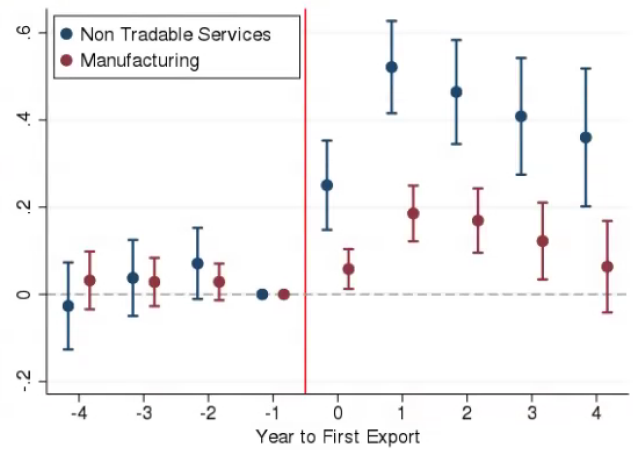
B. Log Total Turnover



C. Log Total Assets



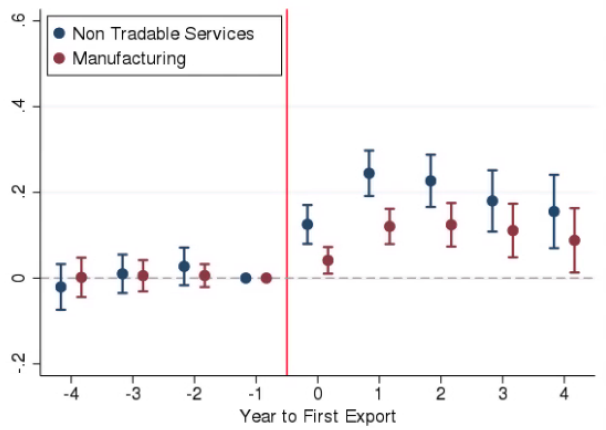
D. Log Total Wage Bill



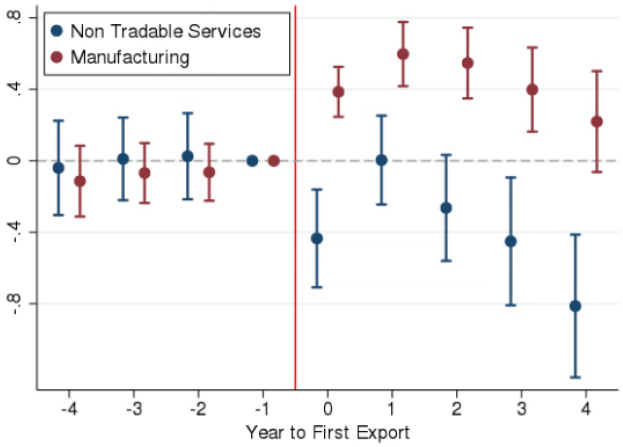
Non Tradable Vs Manufacturing

Back

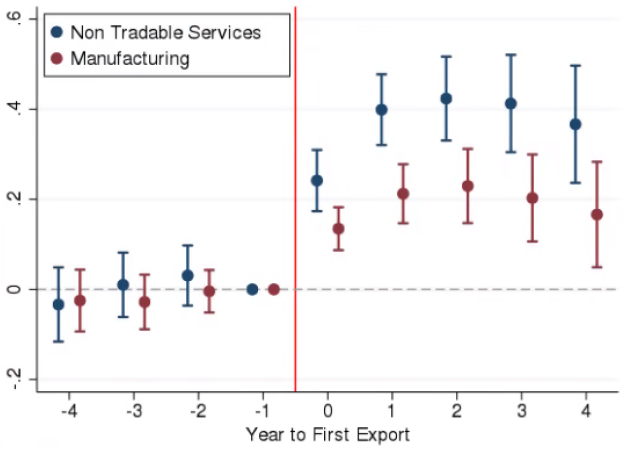
A. Log Total Employment



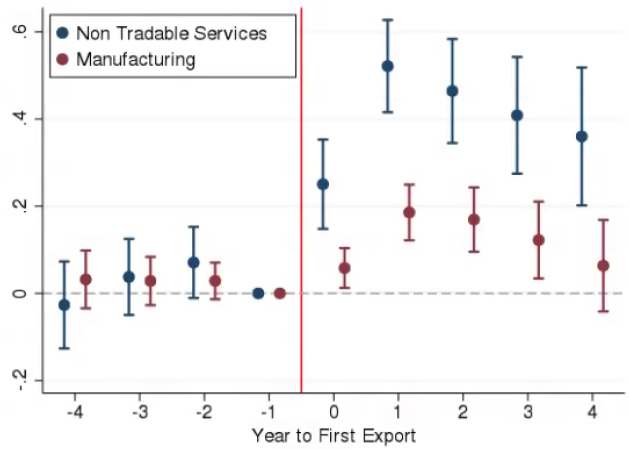
B. Log Internal Turnover



C. Log Total Assets

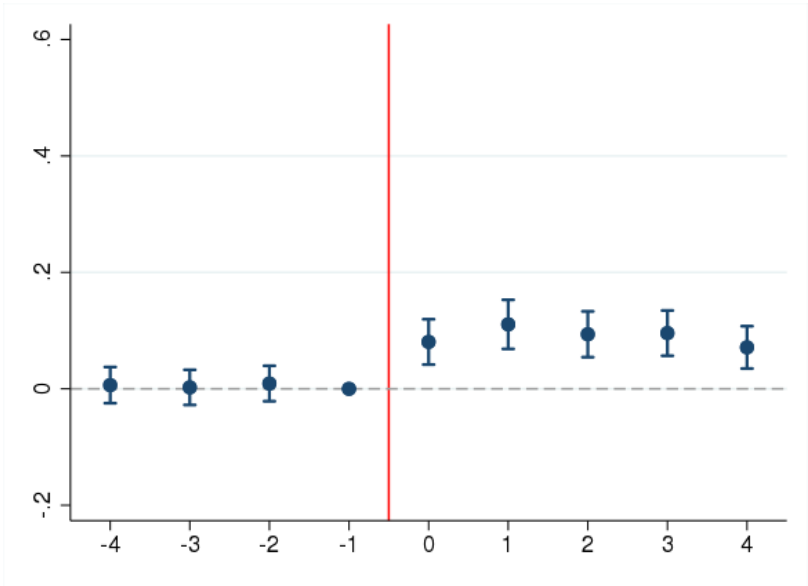


D. Log Total Wage Bill

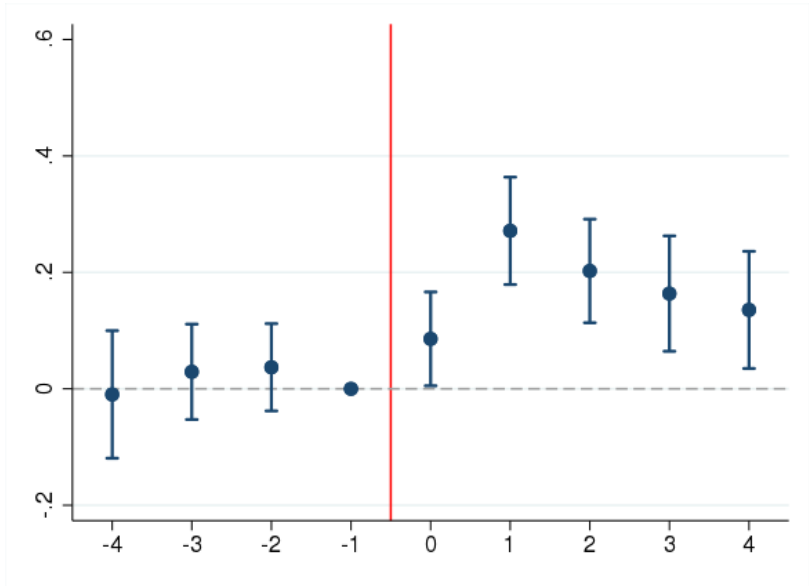


Mobility Surplus: Firms in Non Postable Sectors

A. Log Wage



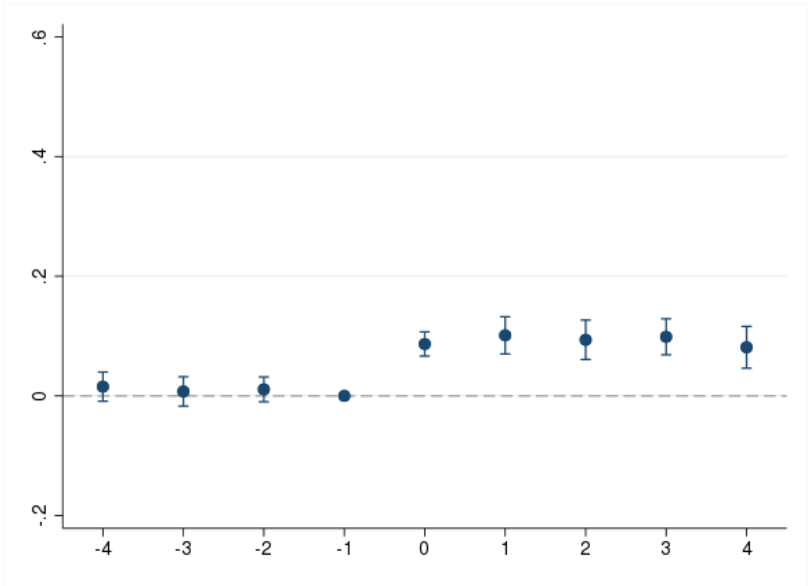
B. Log Profit



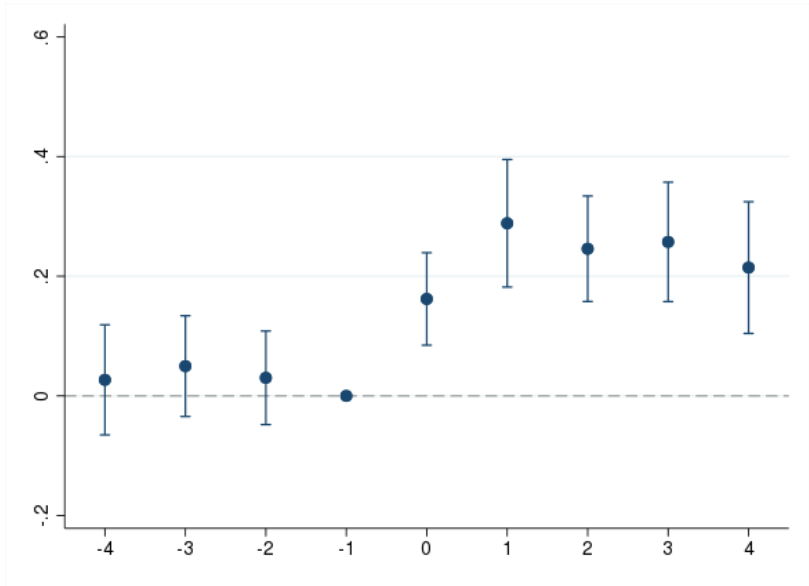
Back

Mobility Surplus: Matching on Past Outcomes

A. Log Wage



B. Log Profit

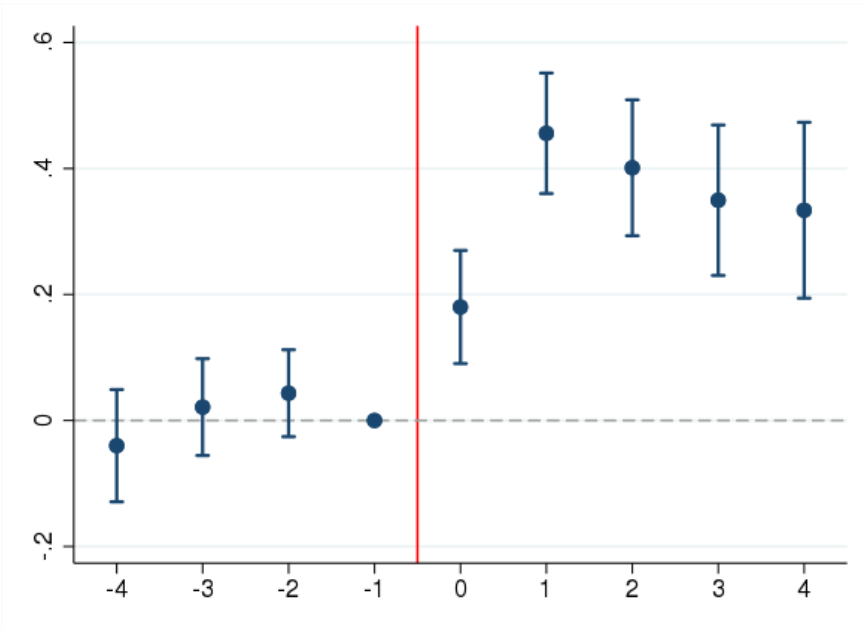


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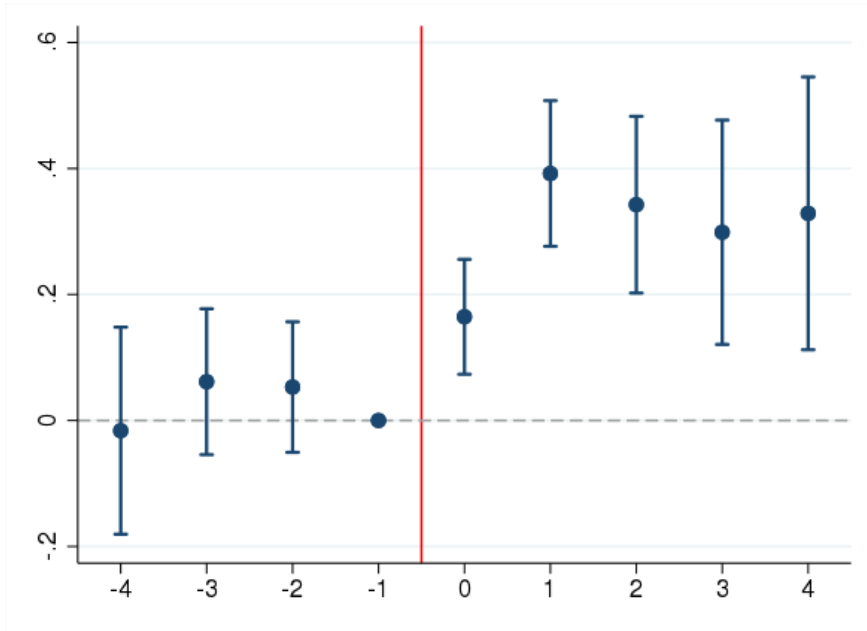
The Fiscal Externality of Posting in Sending Countries

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

A. Log SSC

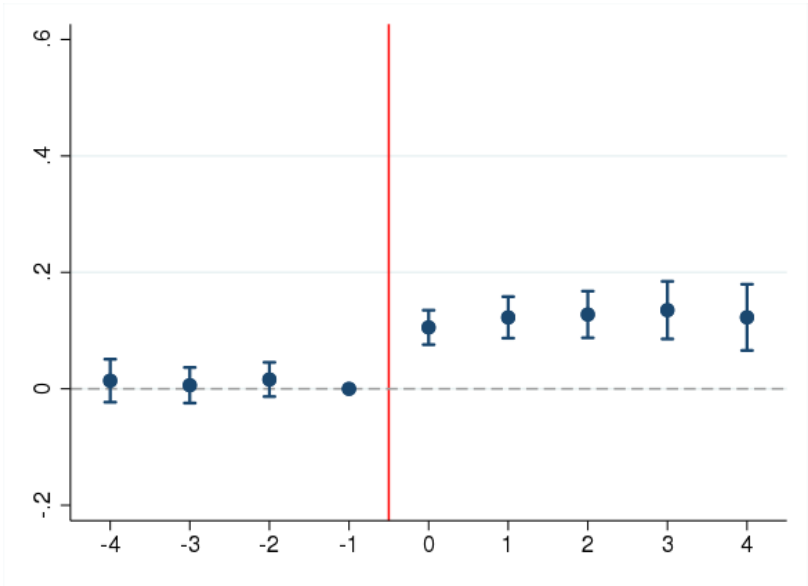


B. Log CIT

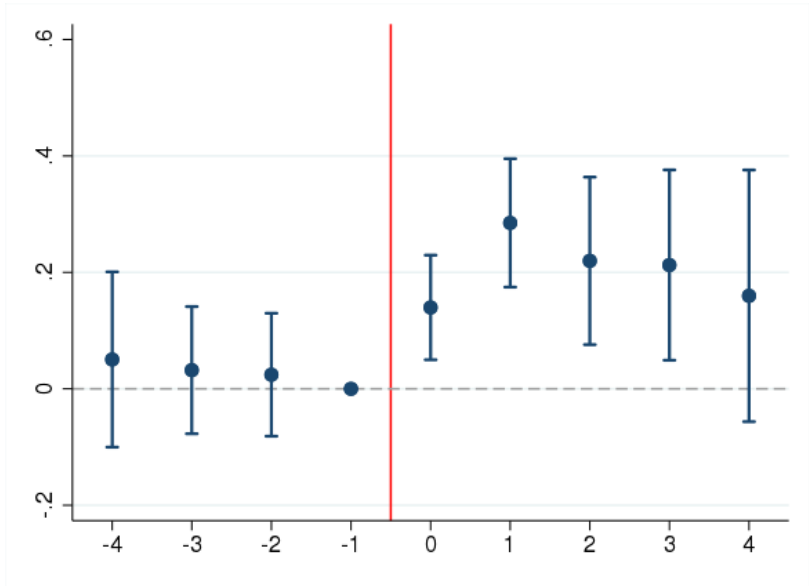


Mobility Surplus: Balancing Sample Around Event Time

A. Log Wage

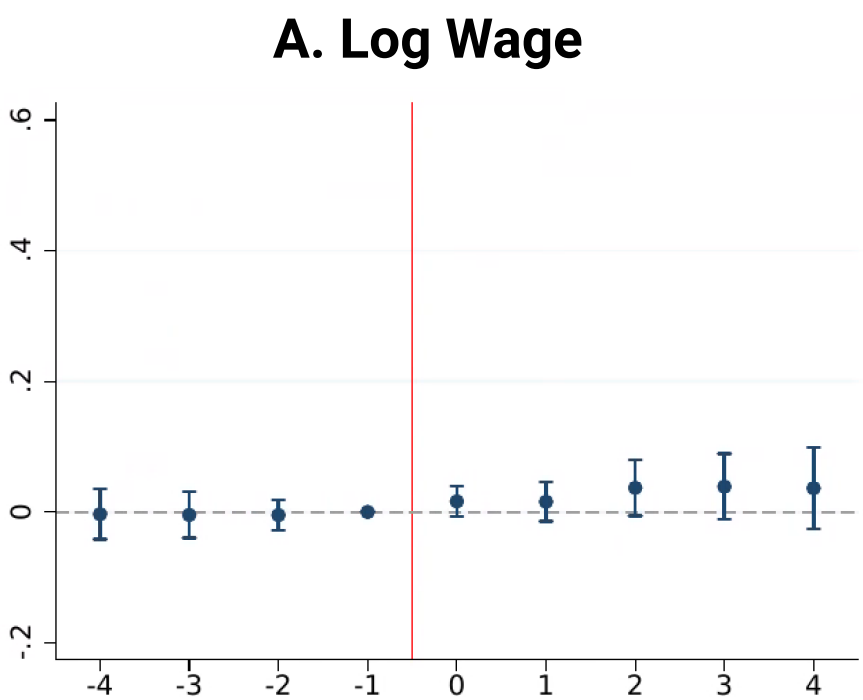


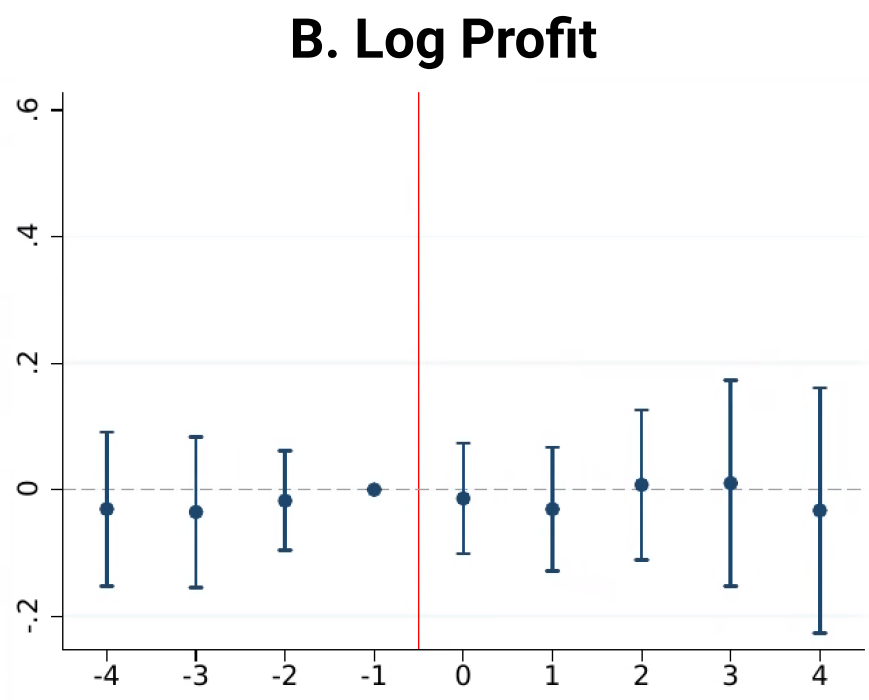
B. Log Profit



Back

Mobility Surplus: Placebo

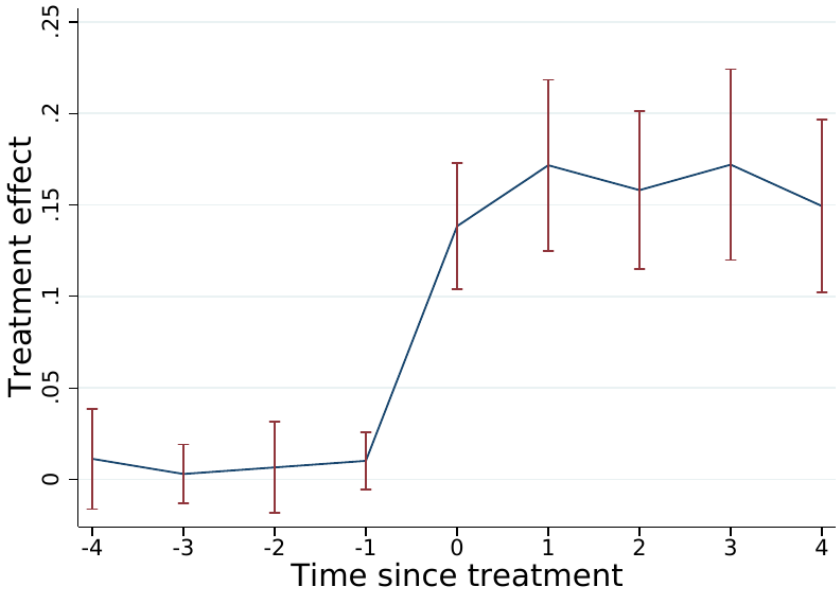




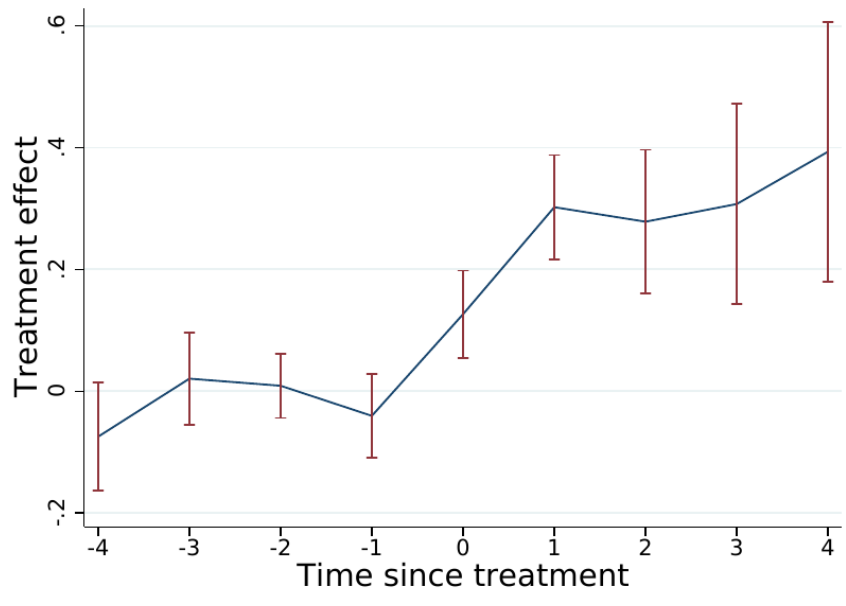
Back

Mobility Surplus: Heterogenous Treatment Effects

A. Log Wage



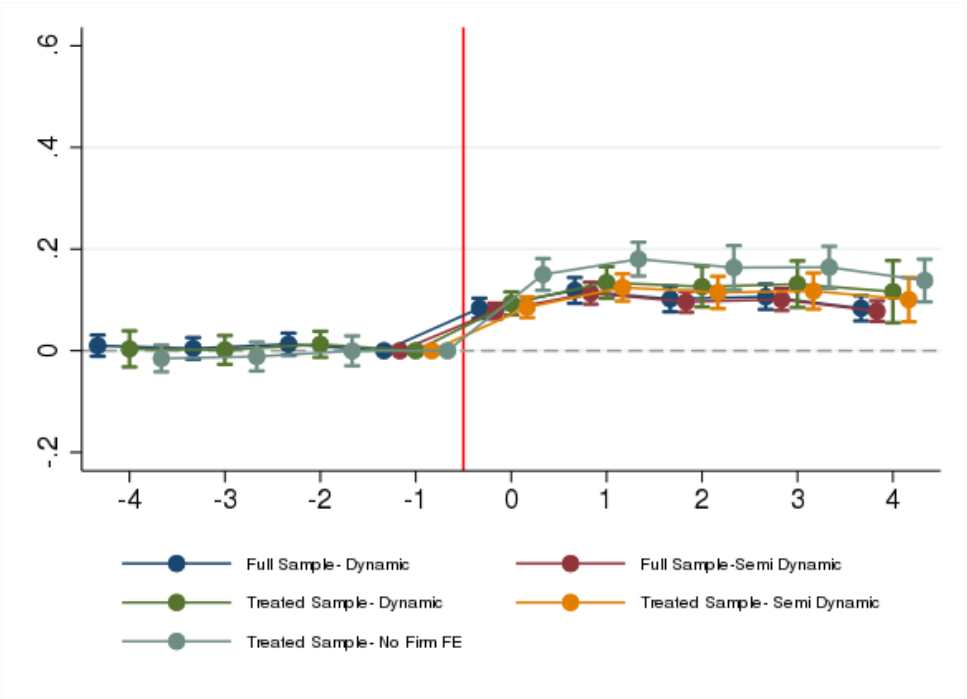
B. Log Profit



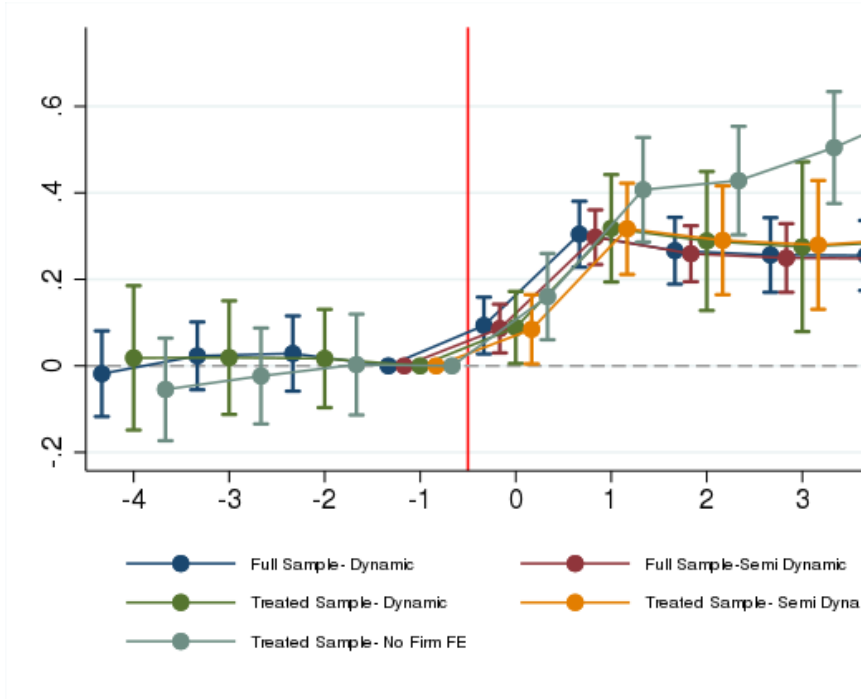
Back

Mobility Surplus: Heterogenous Treatment Effects

A. Log Wage



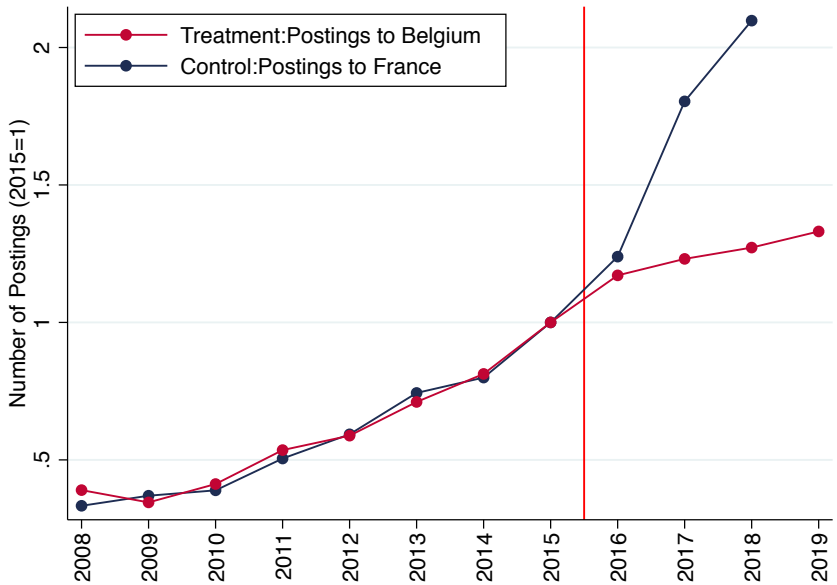
B. Log Profit



Back

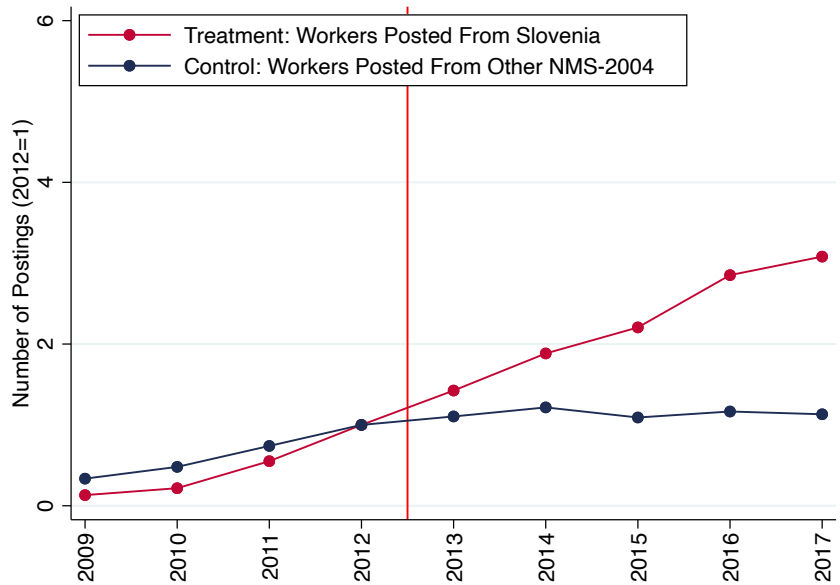
Effects of Employers Tax Cut on Posting Flows

A. Belgian Tax Shift
Tax cut in destination



→ Elasticity=1.4(.4)

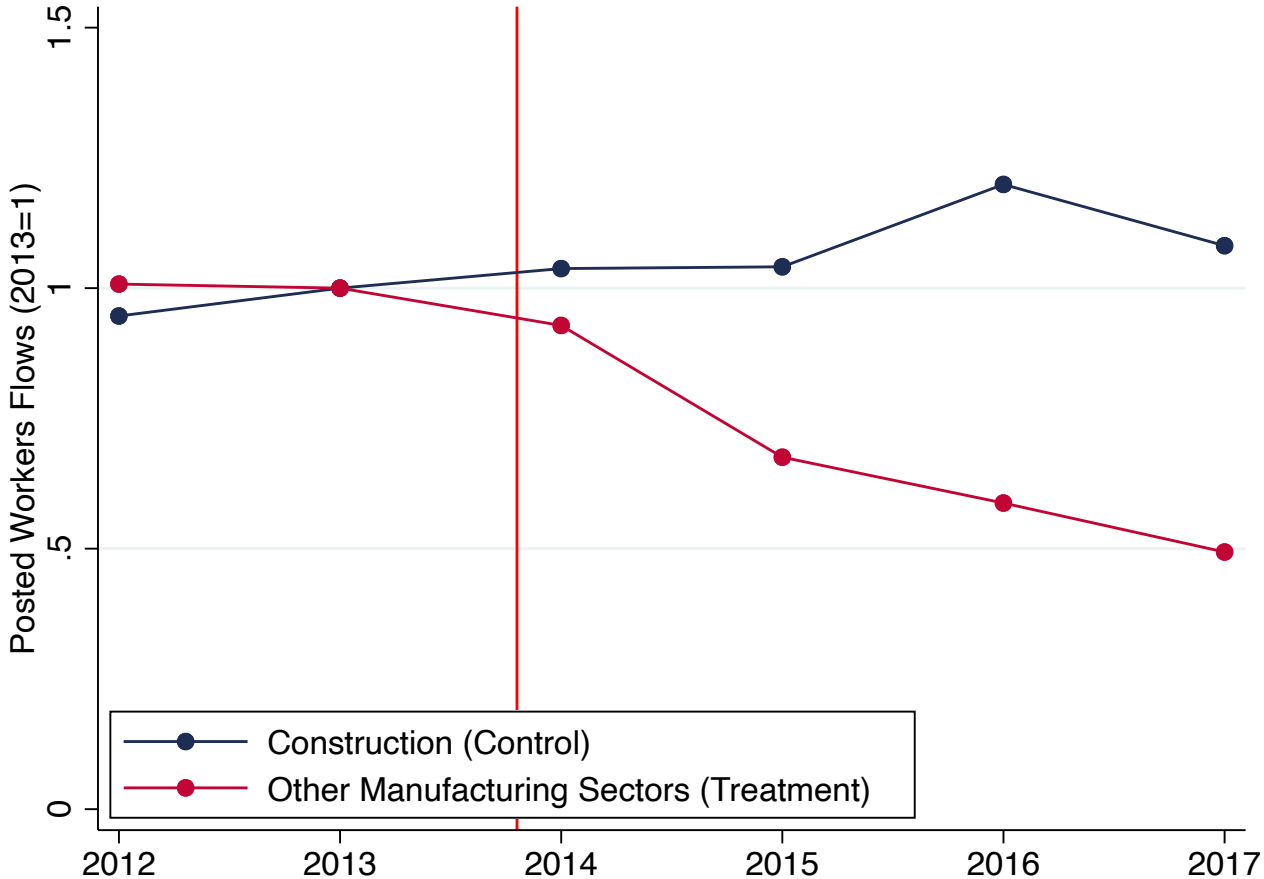
B. Slovenian Posted Bonus
Tax cut in origin



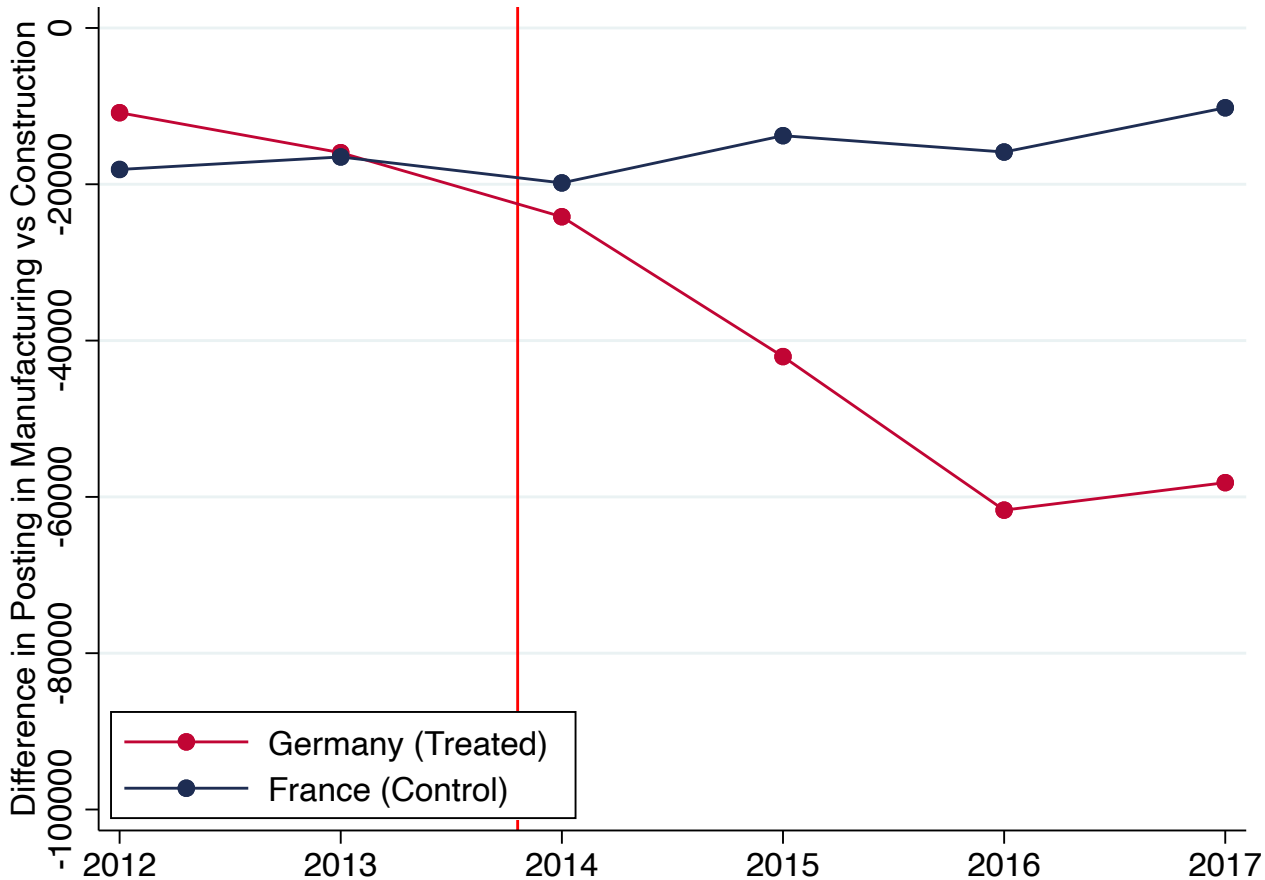
→ Elasticity=-1.6(.3)

Back

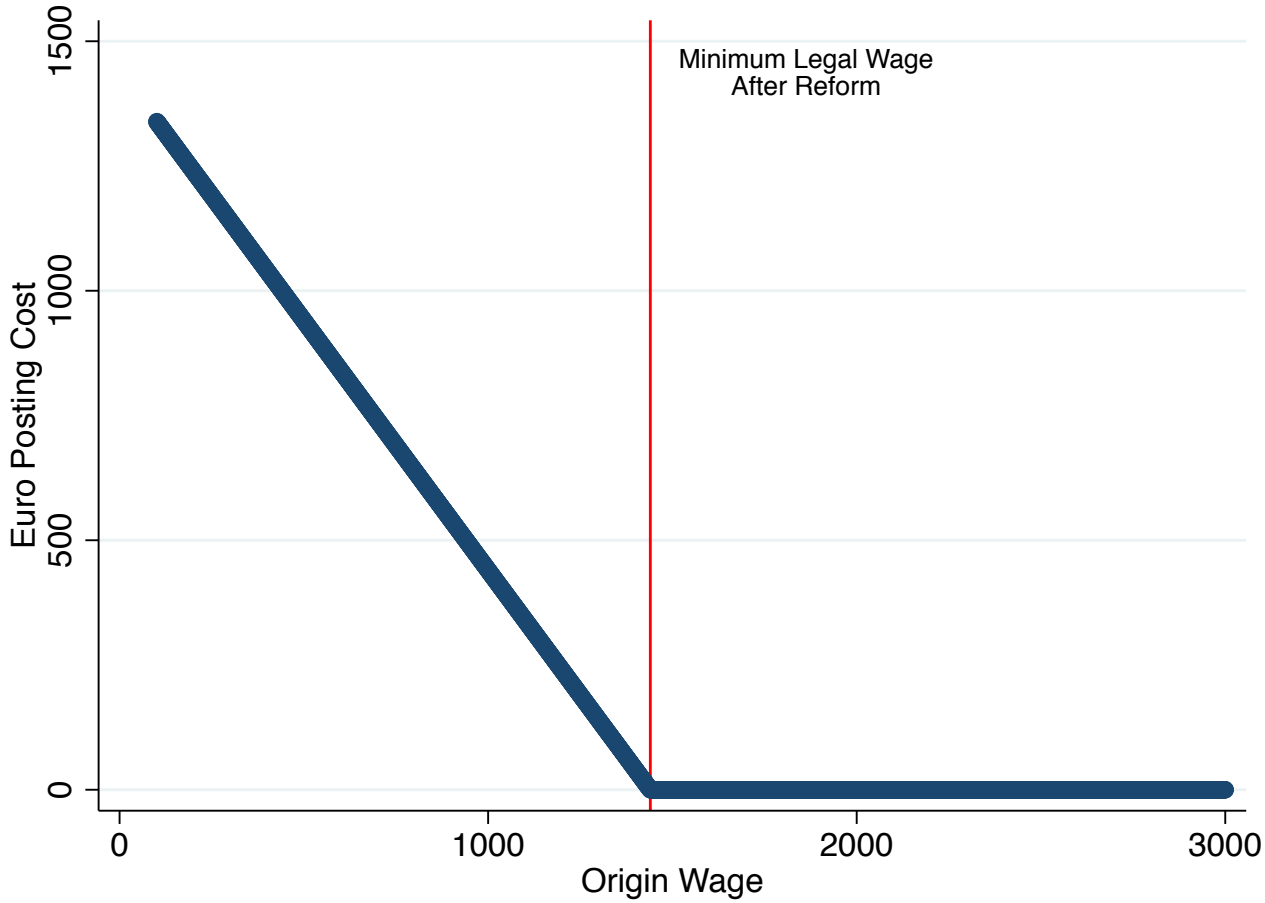
Postings in Treated vs Control Sector



Treated vs Control Sector in Treated vs Control Destination



Heterogeneity by Origin Country



Back

Heterogeneity by Origin Country

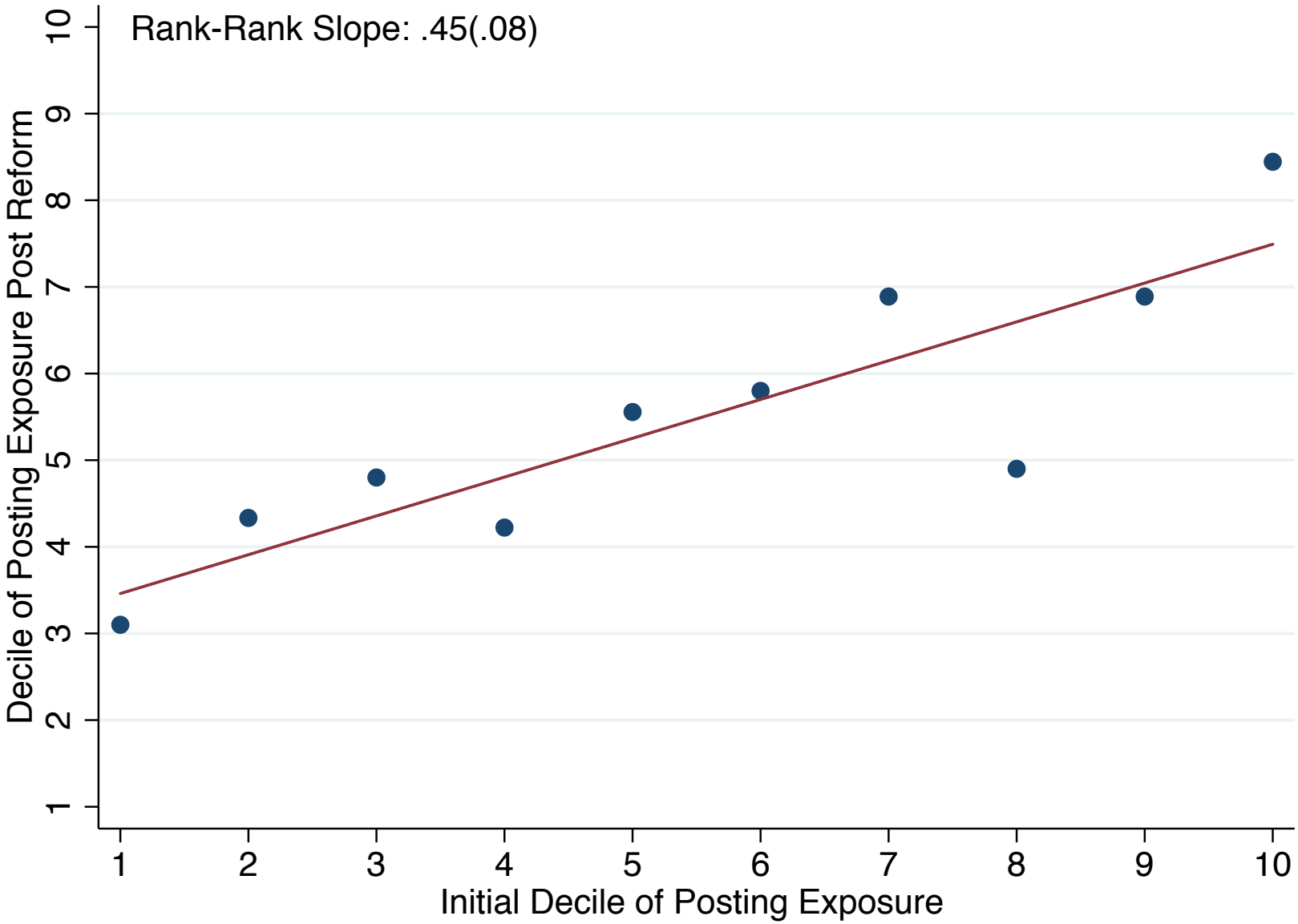


Back

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

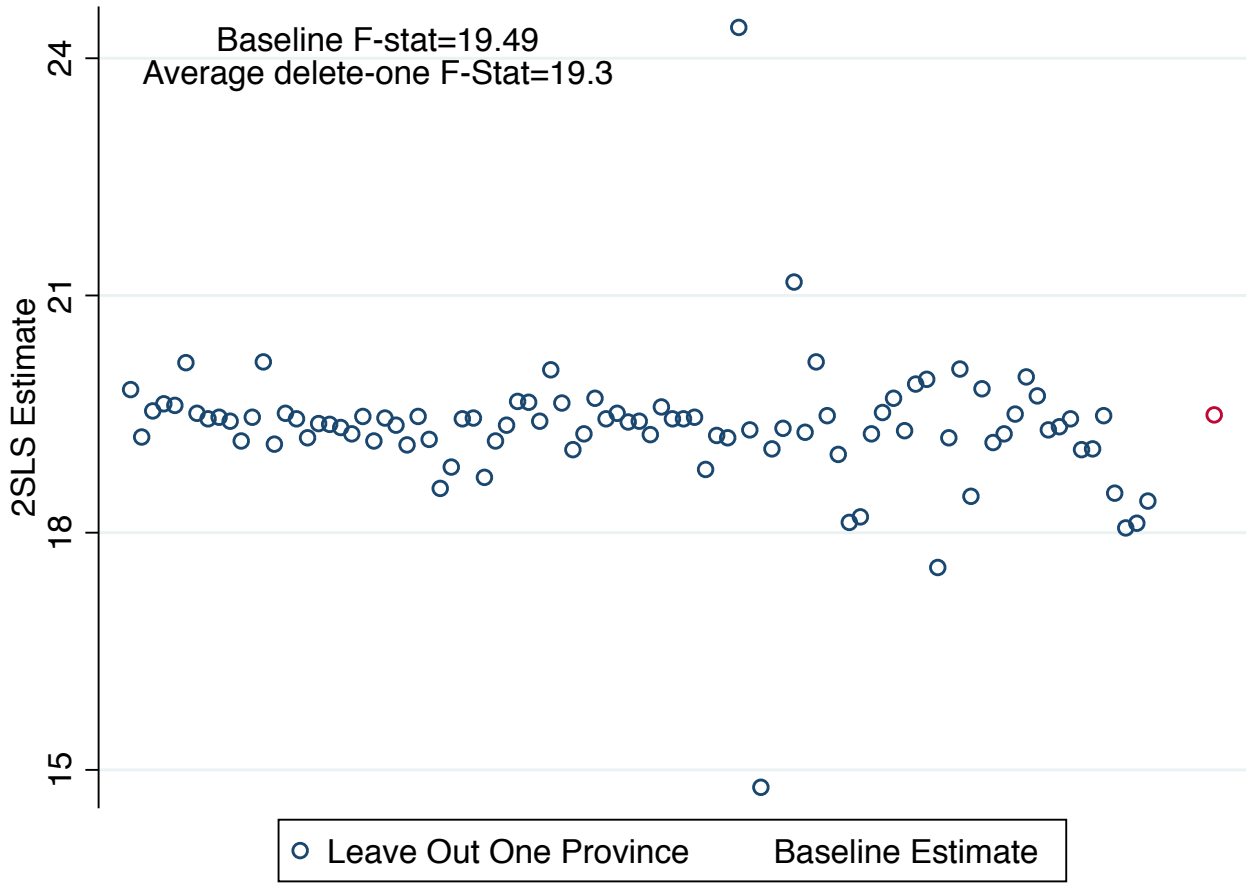
Back

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%

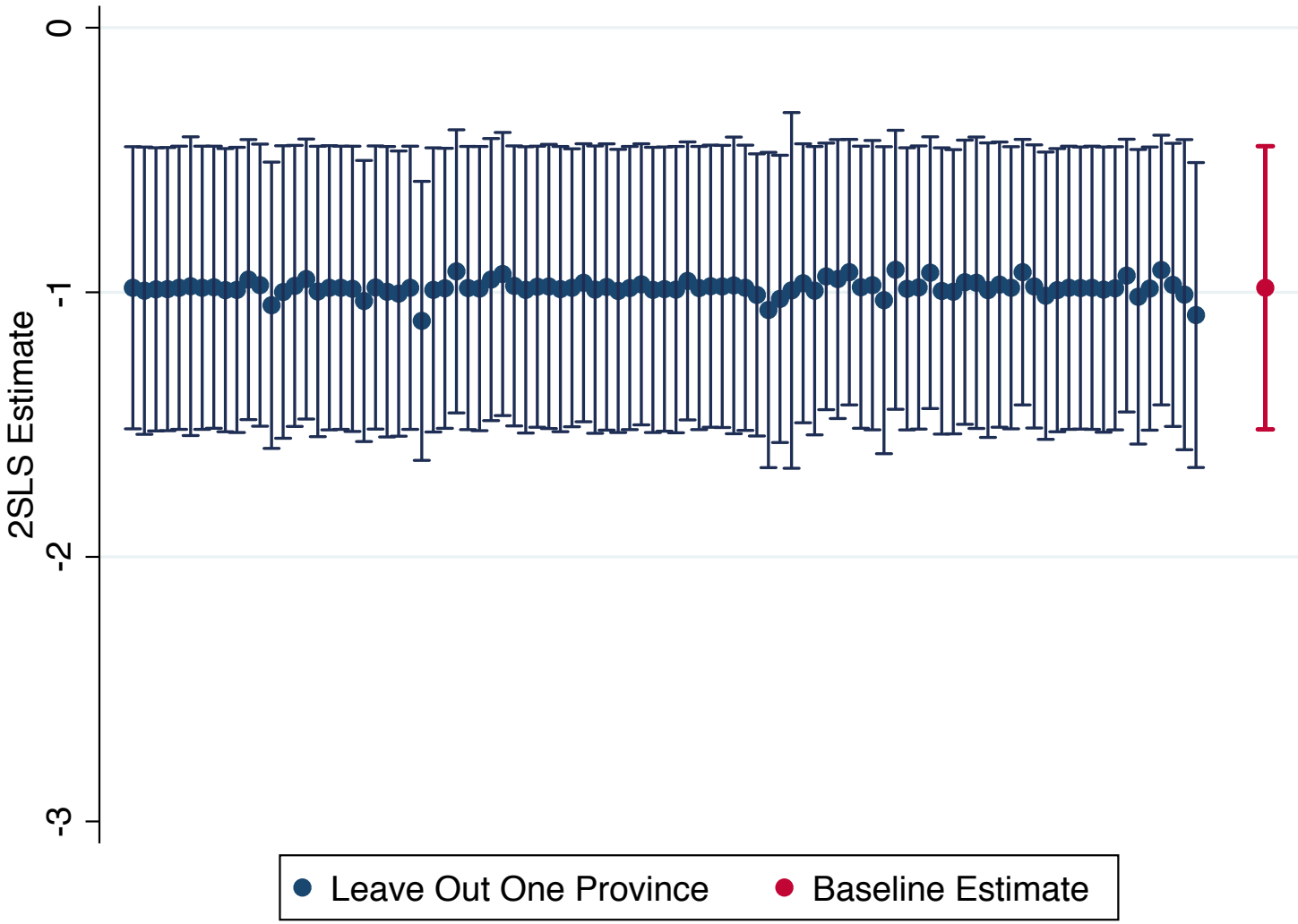
Robustness to Delete-One Test

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
ρ	-.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
ρ	-.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

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

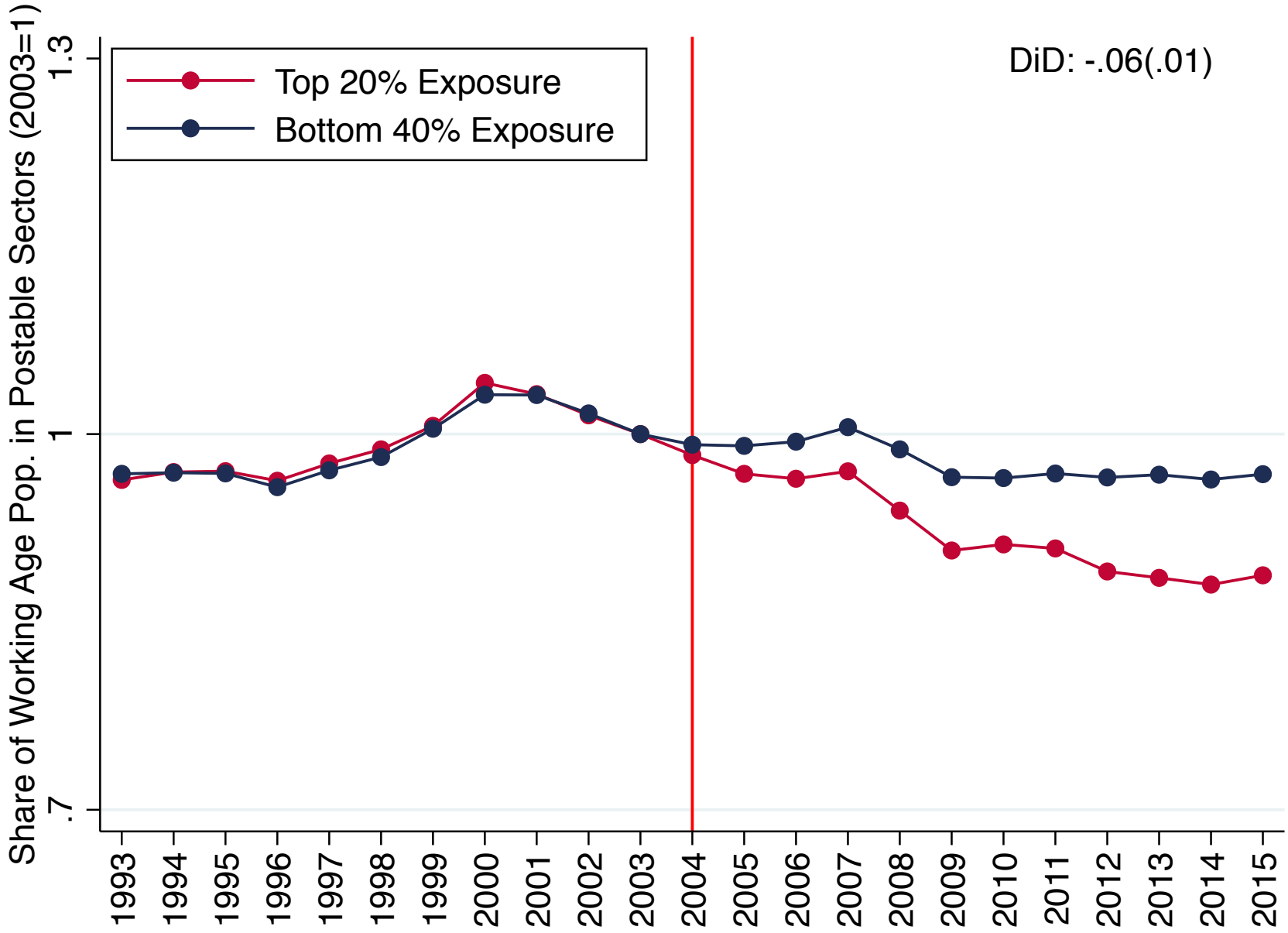
	(1) 2000 Industry Shares	(2) Distance to NMS Exposure	(3) Excluding Industrial Services	(4) Regional Exposure
ρ	-.06***	-.07***	-.05***	-.05***
	(.01)	(.01)	(.01)	(.01)
Observations	46	46	46	46
DiD Graph	Go	Go	Go	Go

	$\Delta \ln(Emp_{pt})$ 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.

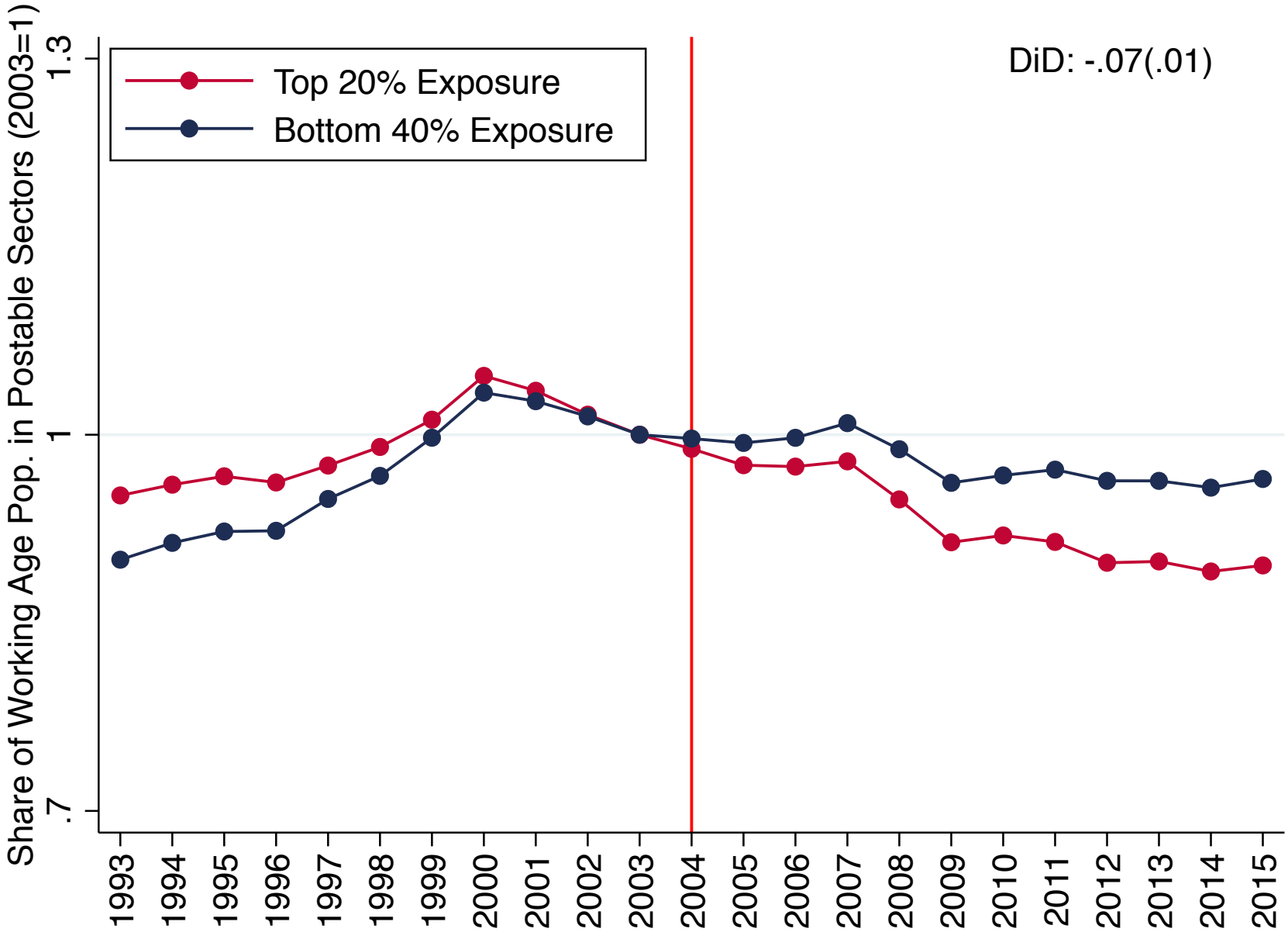
2000 Industry Share

Back



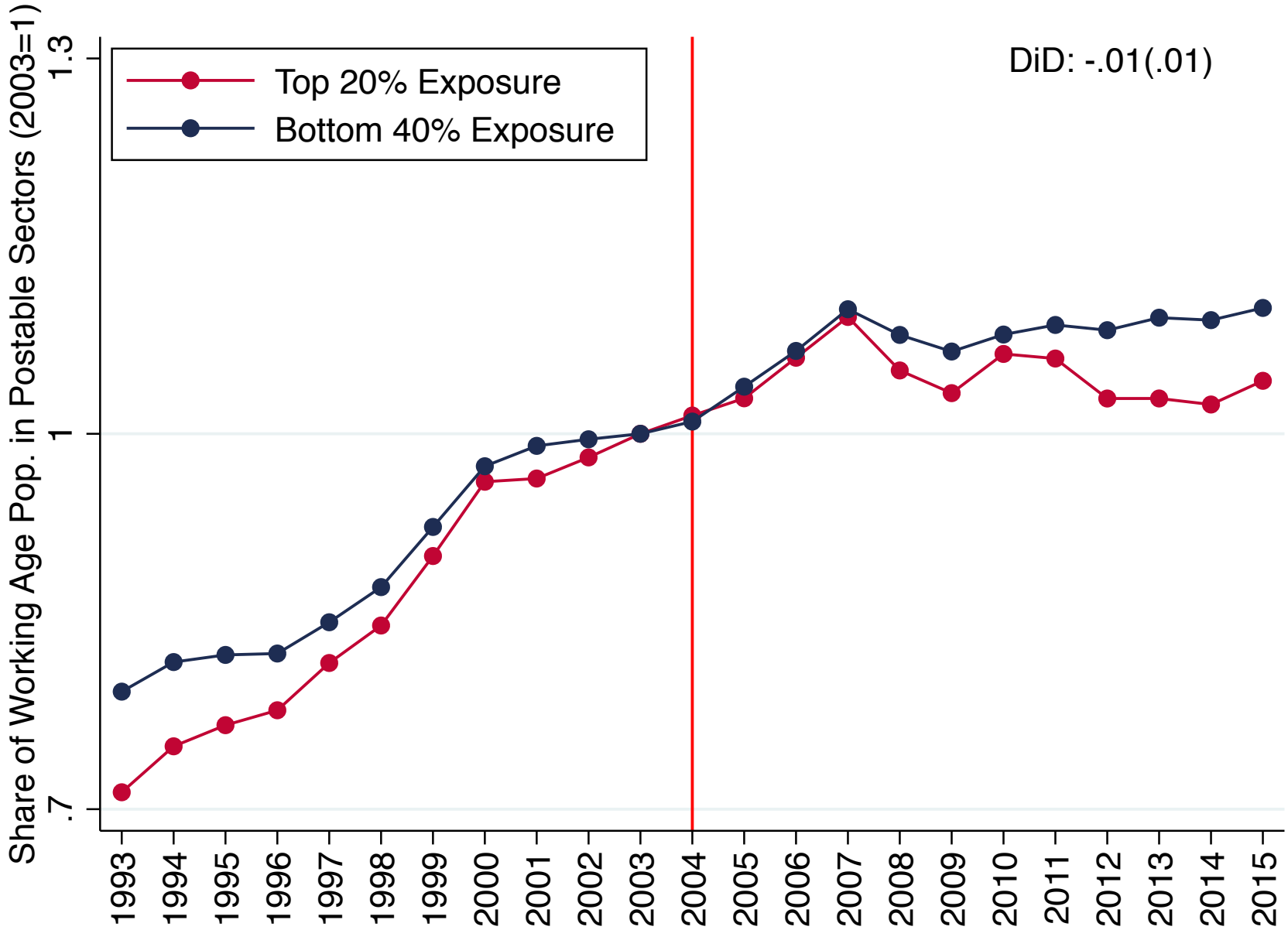
Distance to NMS as Exposure Measure

Back



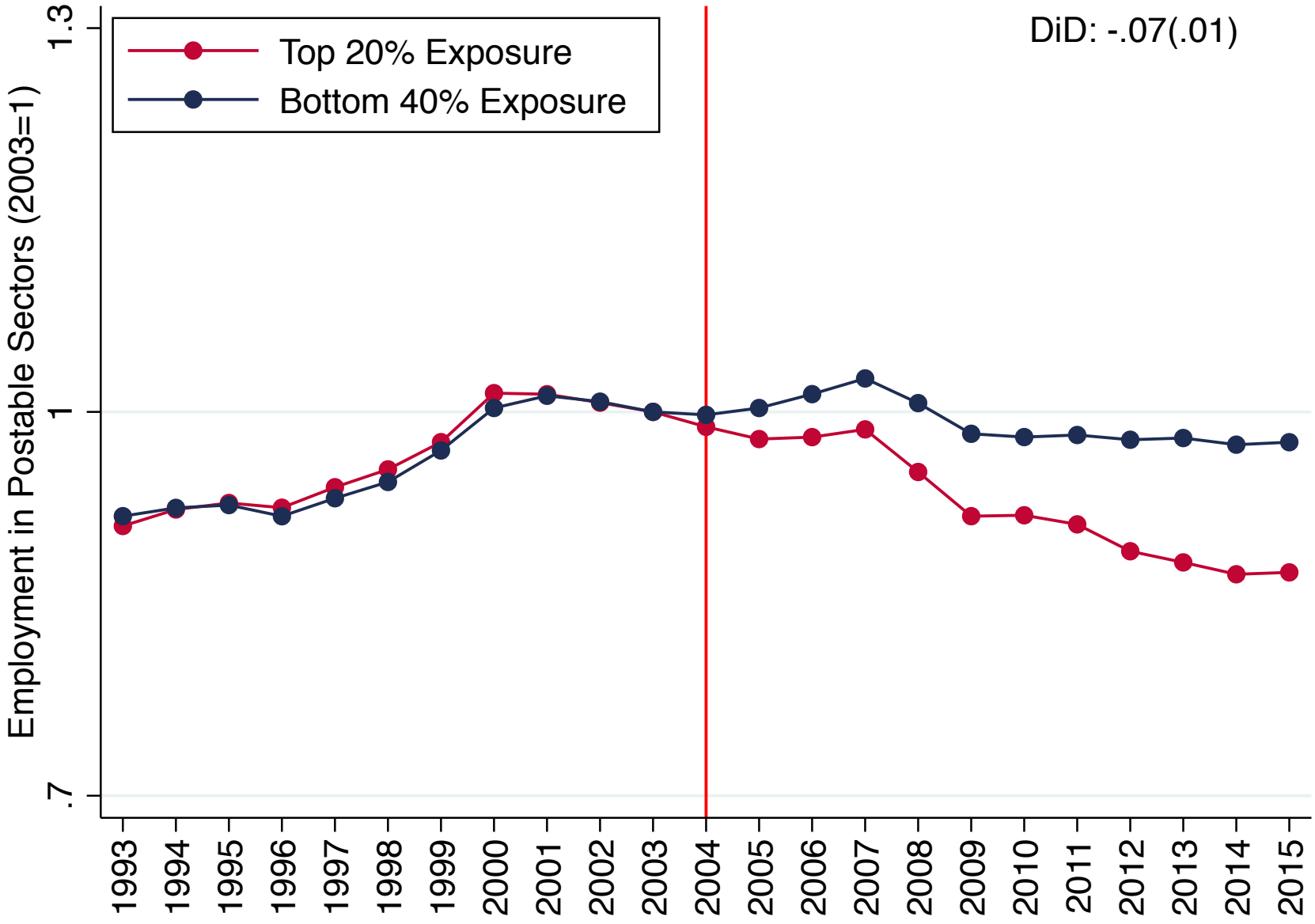
Excluding Industrial Services

Back



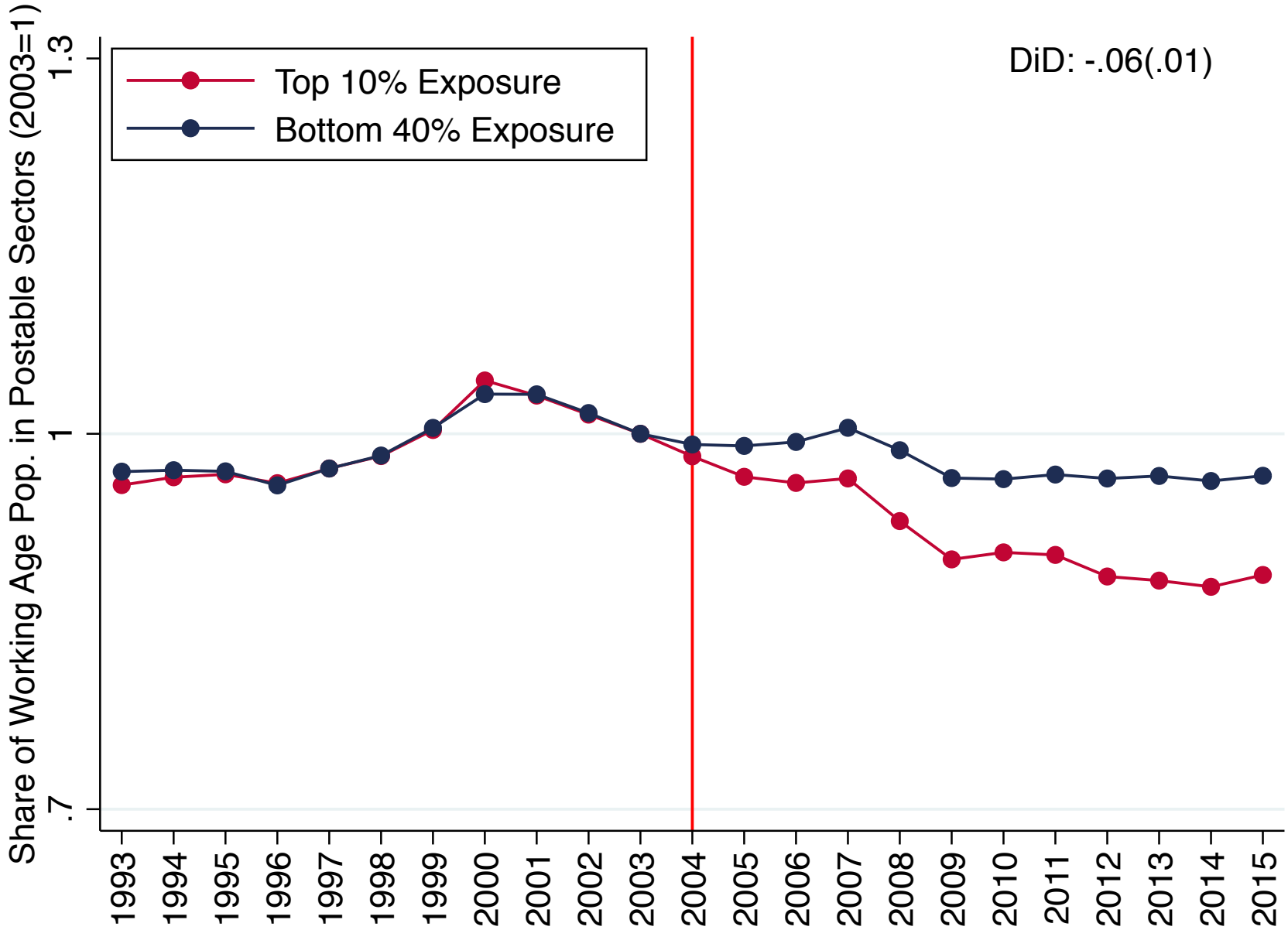
Employment Level

Back



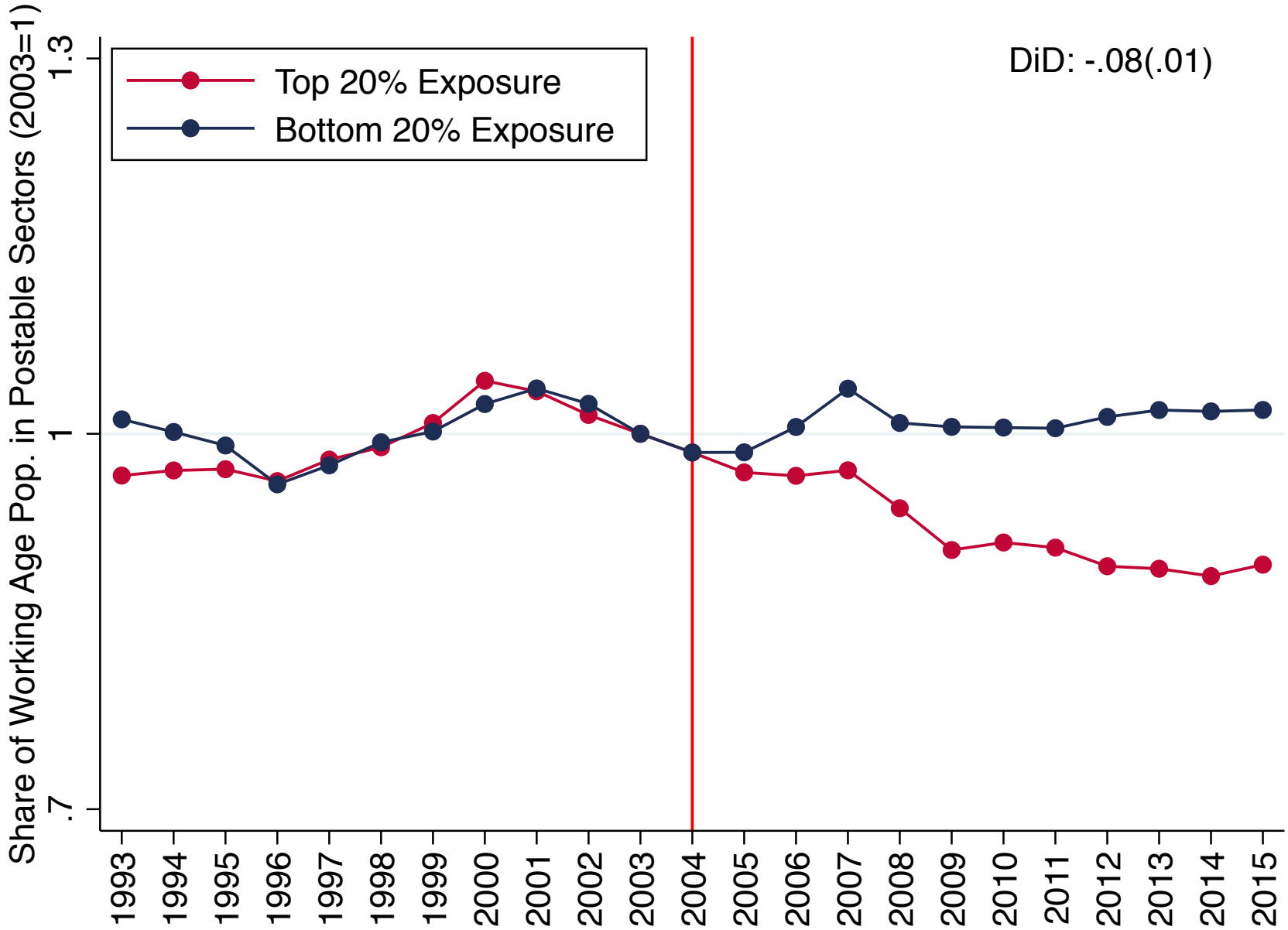
Top 10% Exposure Only

Back



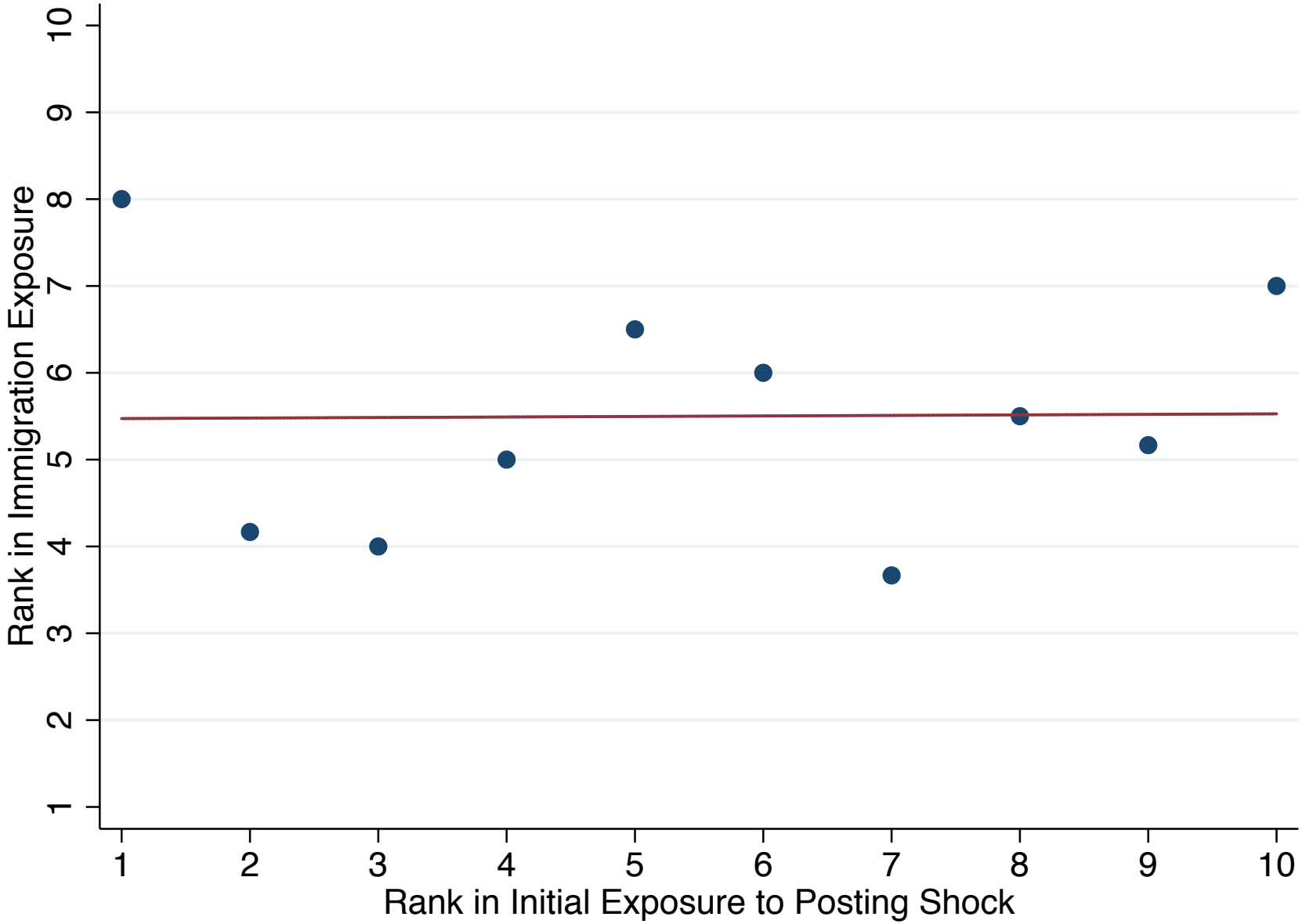
Excluding Neighbouring Provinces

Back



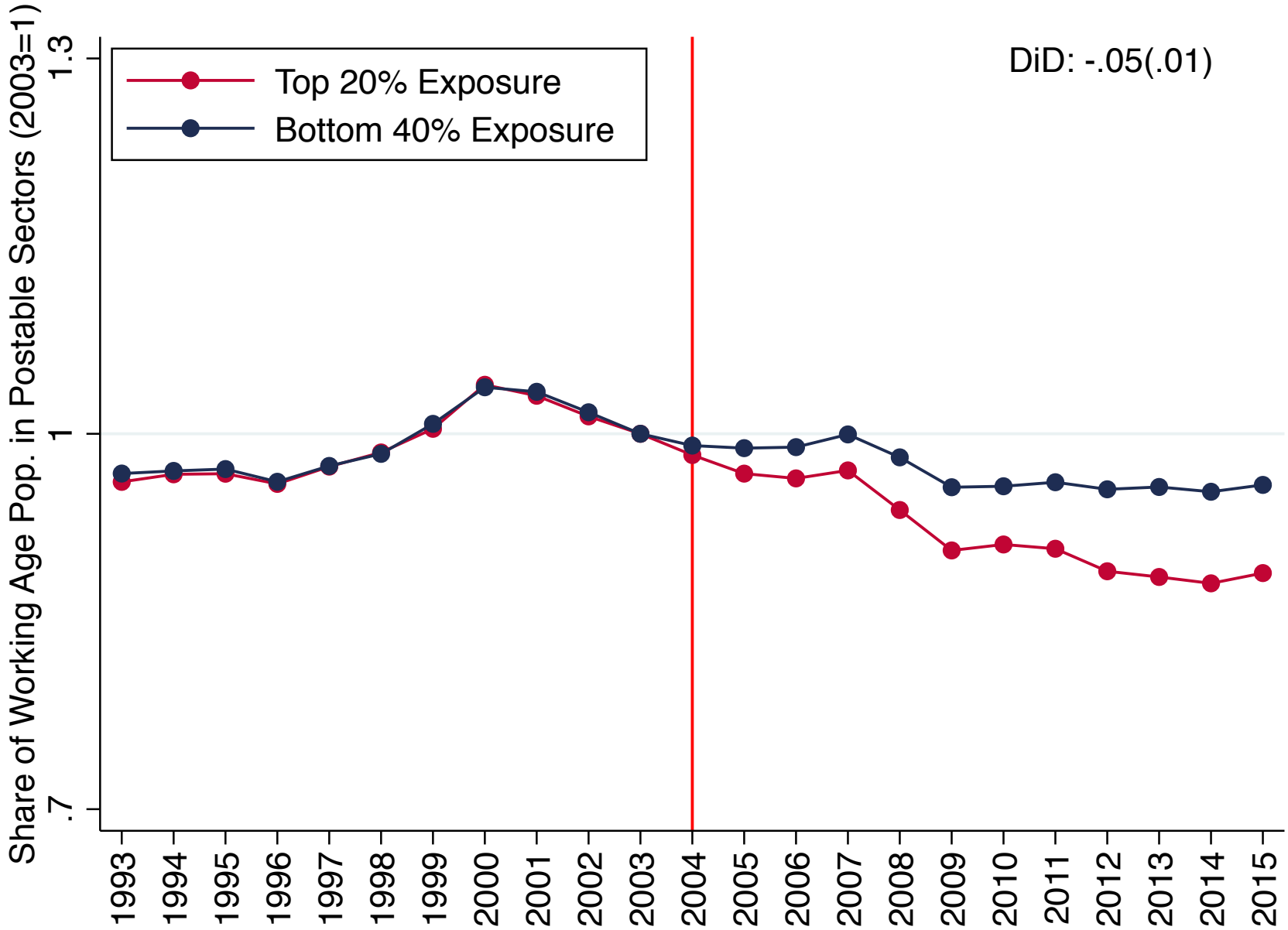
Exposure to Posting and Immigration

Back



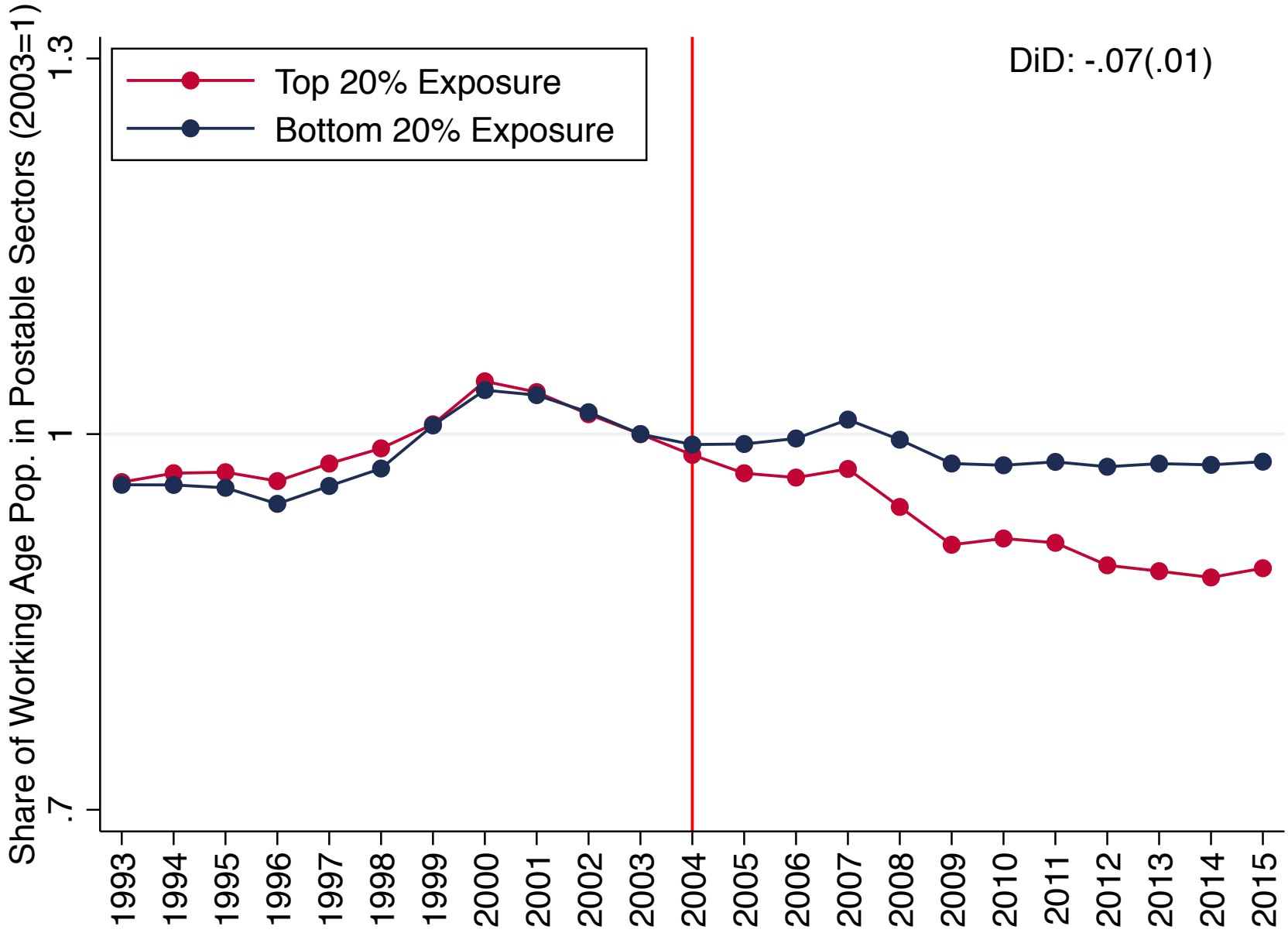
Region-Level Exposure

Back



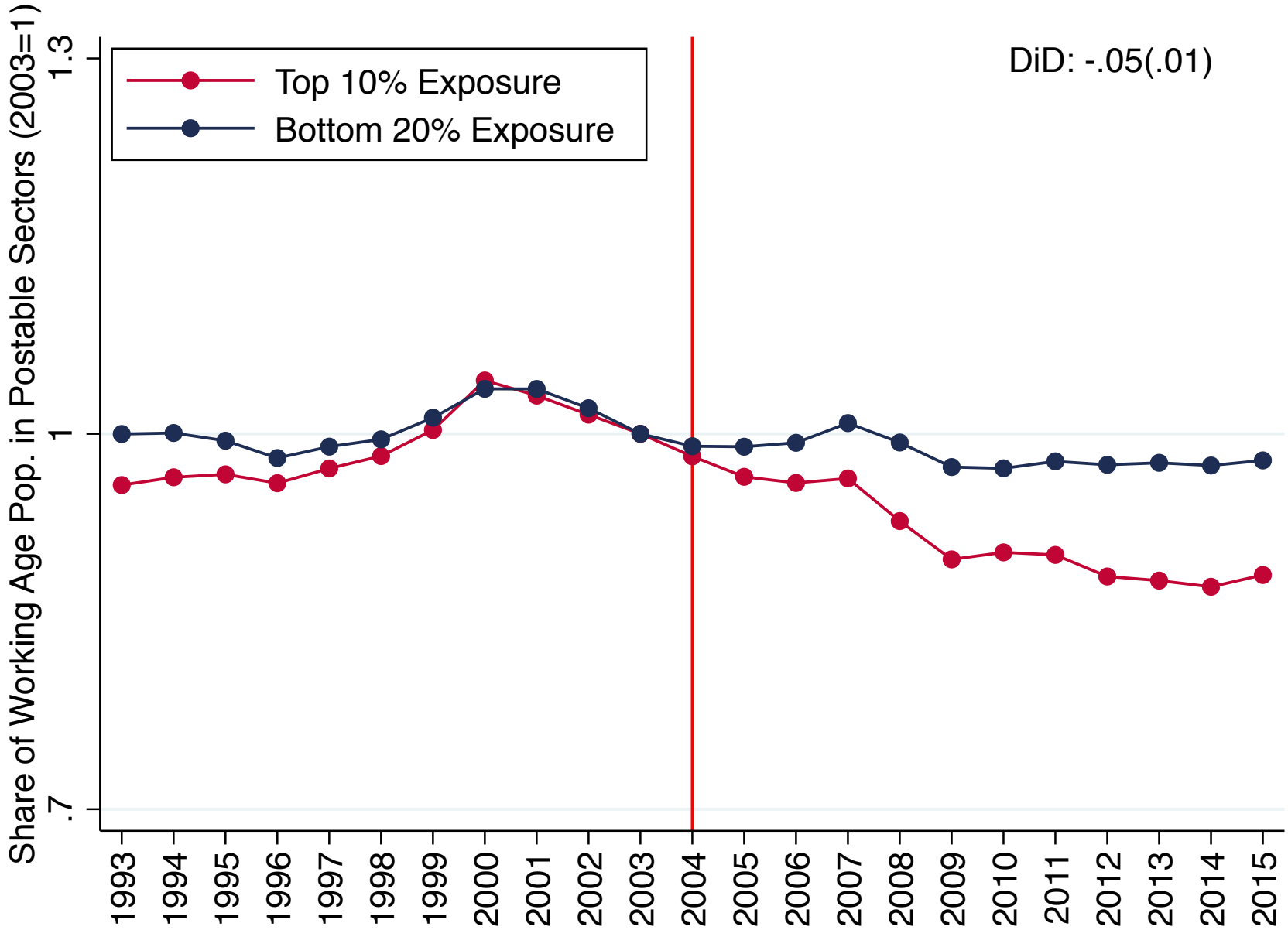
Top 20% vs Bottom 20%

Back



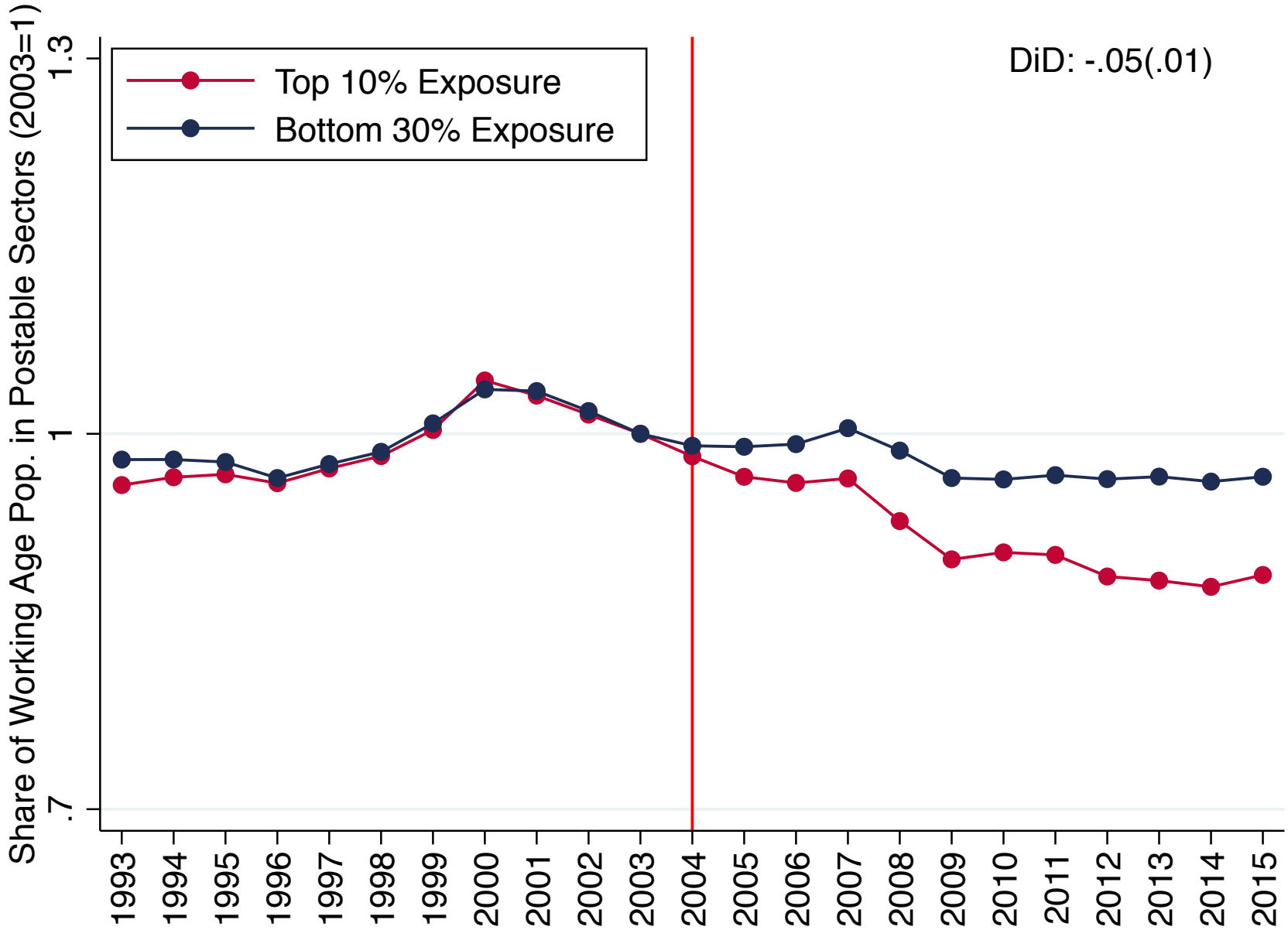
Top 10% vs Bottom 20%

Back



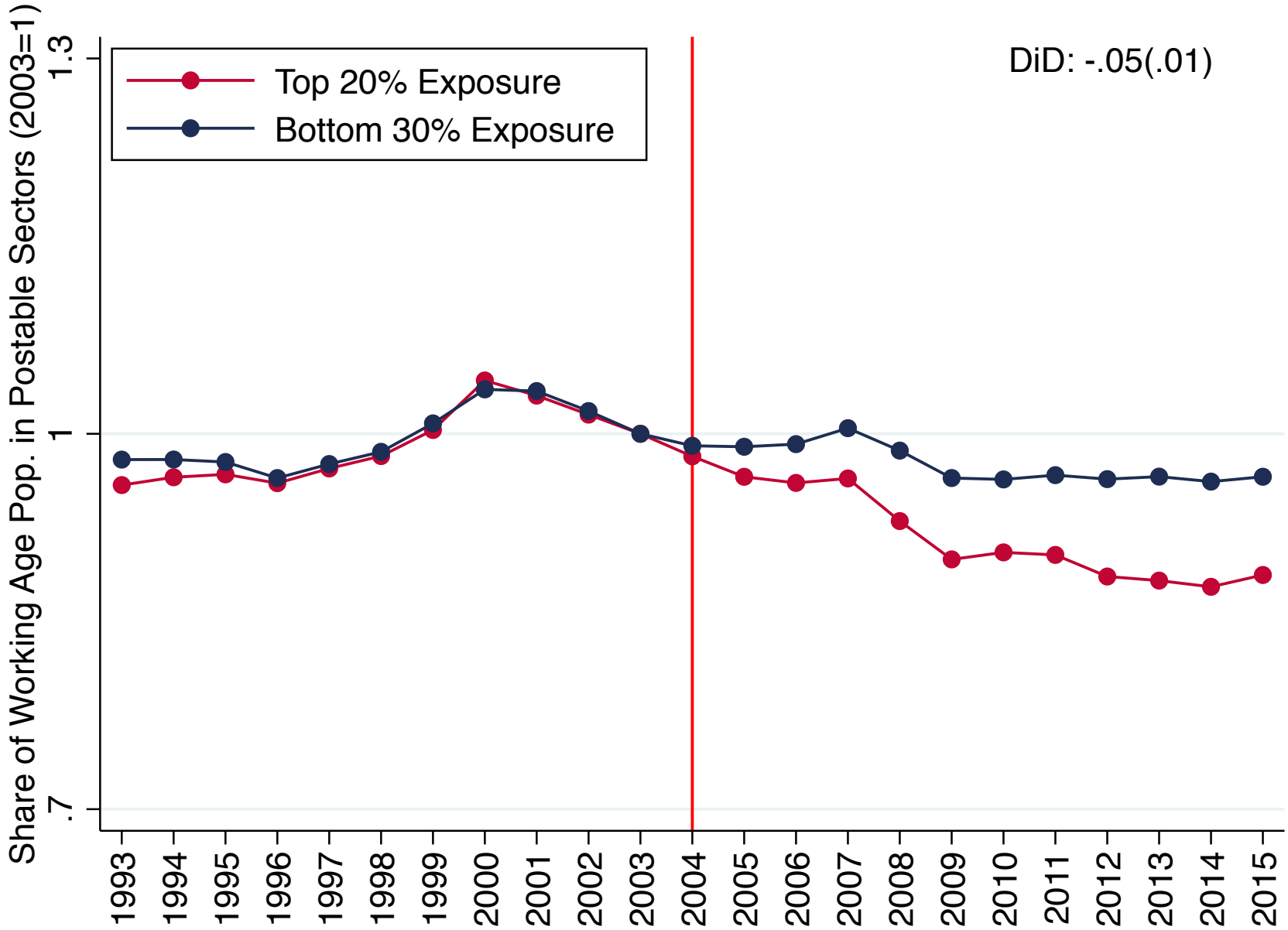
Top 10% vs Bottom 30%

Back



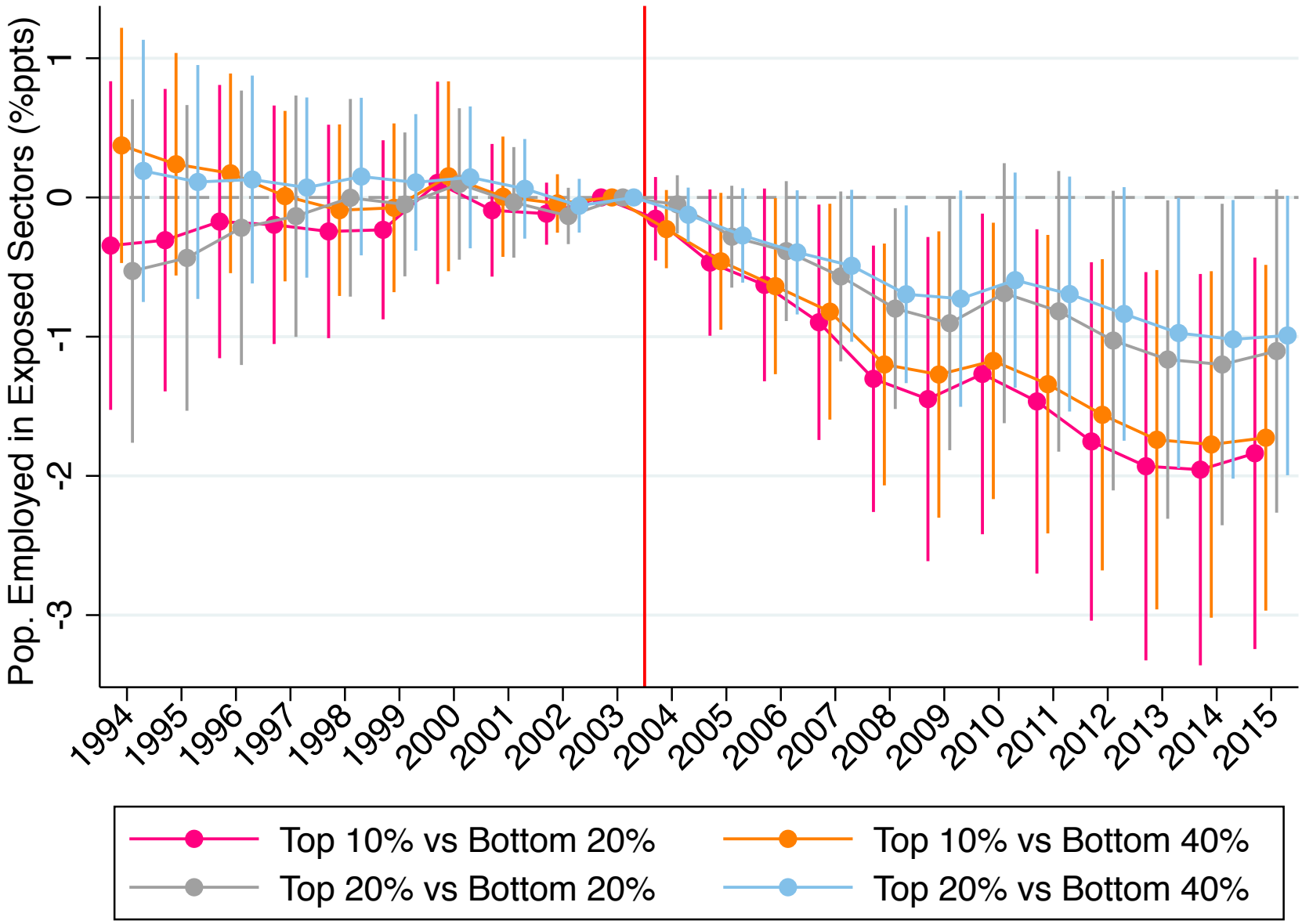
Top 20% vs Bottom 30%

Back

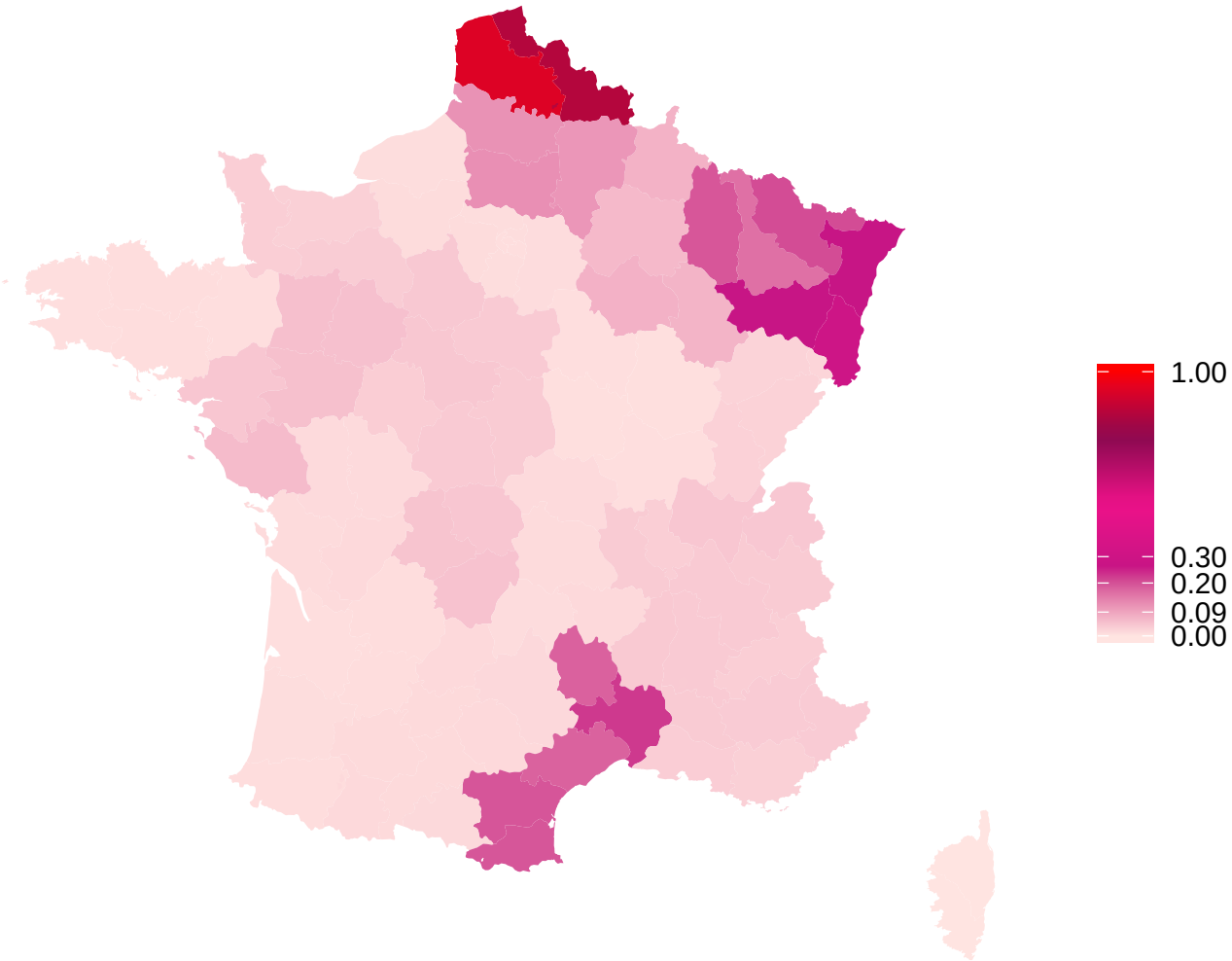


Diff-Diff Estimates

Back

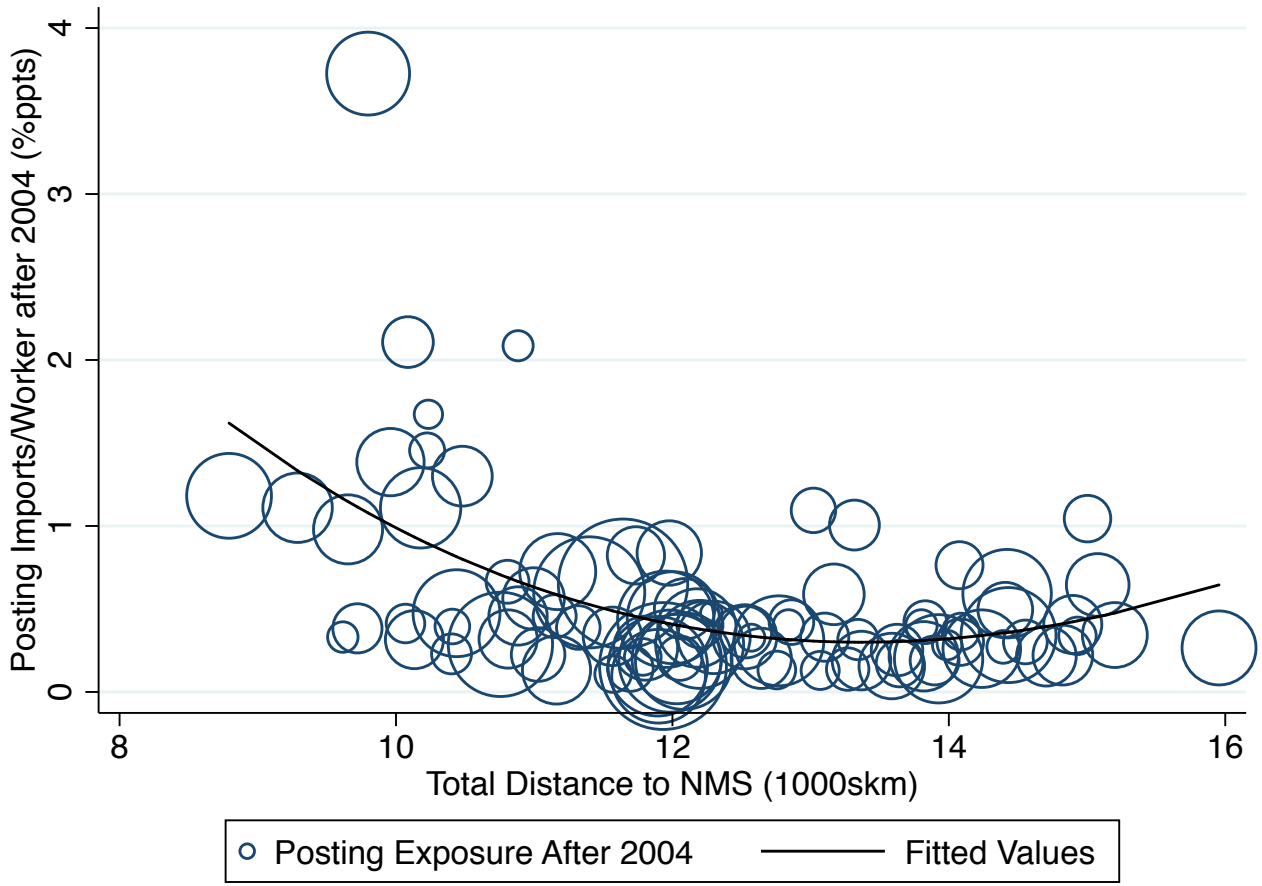


Spatial Distribution of Posting Exposure pre Liberalization



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 (θ)
  - 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 θ from tax reforms
  2. Convert reduced form estimate of NMS liberalization with θ to get $\hat{m_{ij}}$
  3. Combine (1) and (2) with current (λ_{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	Pre-shock Falsification Test 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, Kolosar & 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 ≈ 0 Go