Is technology skill-biased?

The case of green technological change

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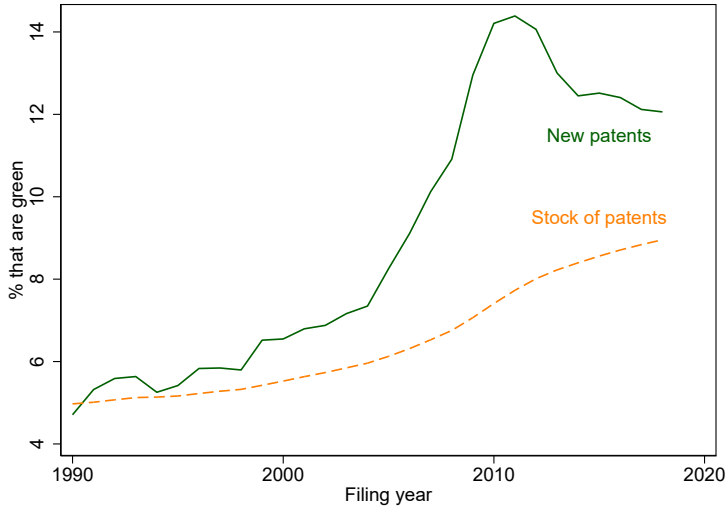

% that are green
4
6
8
10
12
14
1990
2000
2010
2020
Filing year
New patents
Stock of patents

Is green technology skill-biased?

Identify the impact of firm-level green technological change on

(a) relative wages of highly educated workers in the firm (*wage premium*)

(b) ratio of highly educated employees among the firm's workers (*skill ratio*)

Use linked worker-firm administrative data from Norway to:

1. Document that green technology and skill are *complements*
   → Using a model of self-reported firm-level technological change (endogenous)
2. Document *heterogeneous effect* of imported green technology on skill demand
   → Construct an IV which treats global innovations (patents) as shocks to which firms are differentially exposed through their import mix (exogenous)

Endogenous technological change

Inspired by Lindner et al. (2022): Same coefficient on both wage premium and skill ratio to rules out increased high-skilled labour supply or firm demand shocks

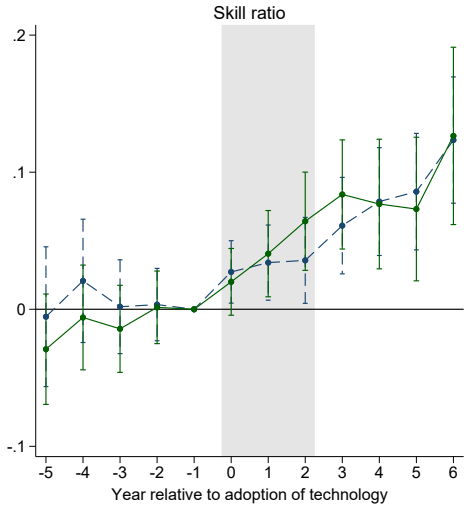
Exploit richness of data to absorb many potential confounders

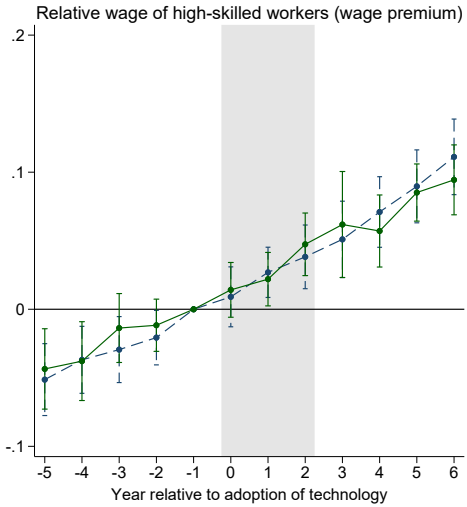
$$\ln \text{skill ratio}_{jt} = \sum_{\tau=-5}^{5} \text{GI}_{j,t-\tau} \beta_{\tau}^{ss} + \delta_{nt} + \alpha_j + \nu_{jt}$$

$$\ln \text{wage}_{ijt} = \sum_{\tau=-5}^{5} \text{GI}_{j,t-\tau} \times \mathbb{1}[\text{higher education}_{ij,t-\tau}] \beta_{\tau}^{wp} + \sum_{\tau=-5}^{5} \text{GI}_{j,t-\tau} \beta_{\tau}^{GI} + \delta_{nt} + \alpha_j + \psi_i + \nu_{ijt}$$

for worker i in firm j, industry n and time t. $\text{GI}_{jt} = \text{technological change}_{jt} = 1$ if firm j has adopted new technology during the current wave, 0 otherwise. Standard errors cluster on firm level.

Technology-skill complementarity





Shift-share instrumental variable construction

While previous strategy identifies the complementarity between skill and technology, there could still be reverse causality

Source of exogenous variation in incentives for (green) technological change: Exogenous global technology shocks (patents) to which firms are differentially exposed depending on what and from where they import

Firms that trade more in goods with novel technology are more likely to innovate or adopt

- Direct technology adoption through import of more advanced capital goods
- Changed production possibilities from more advanced intermediate inputs
- Indirect learning from technology embodied in the good

Exposure to (green) technological advancement

Exposure to (green) technological advancement

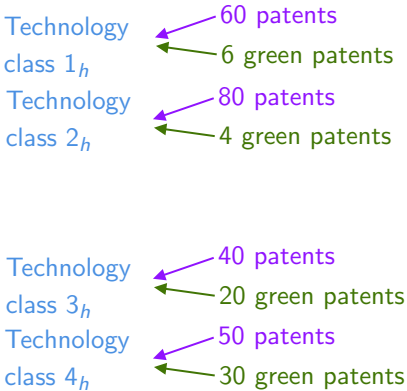
Technology class 1_h

Technology class 2_h

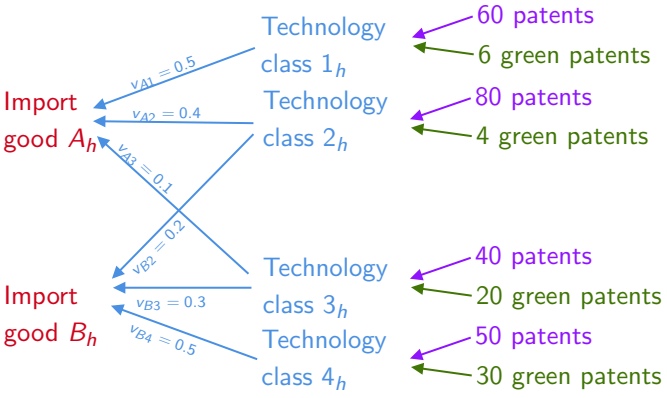
Technology class 3_h

Technology class 4_h

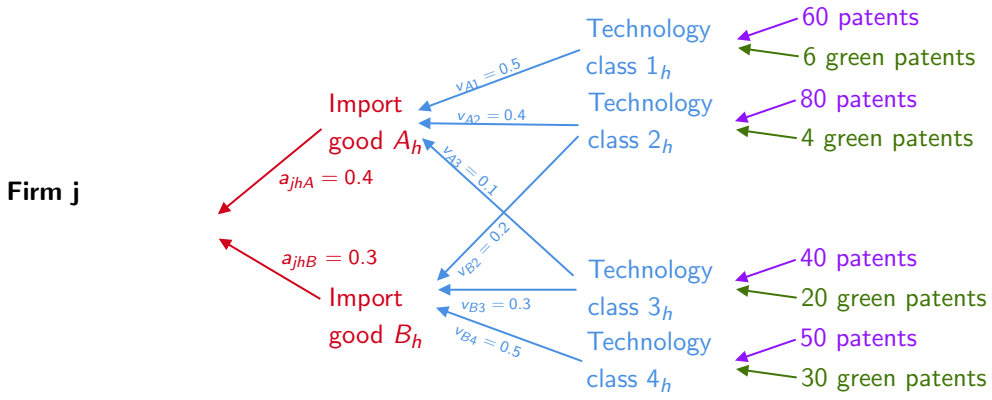
Exposure to (green) technological advancement



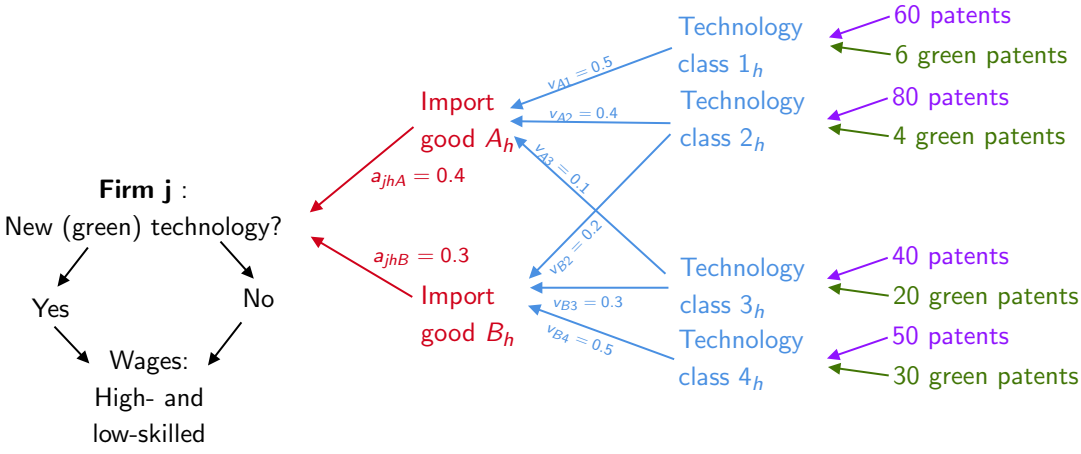
Exposure to (green) technological advancement



Exposure to (green) technological advancement



Exposure to (green) technological advancement



Green patents: CPC Climate mitigation technologies (EPO)

CPC code	Name
Y02A	Adaptation to climate change
Y02B	Buildings
Y02C	Capture and storage of greenhouse gases
Y02D	ICT aiming at the reduction of own energy use
Y02E	Production, distribution and transport of energy
Y02P	Industry and agriculture
Y02T	Transportation
Y02W	Waste and wastewater

▸ Share of green in CPC technology classes

Formal definition of instrument(s)

Captures the *variation in global technological advancement* that the firm is exposed to through its historical import mix. Instrument for *any* technological change using all patents, and *green* technological change using green patents.

SSIV: $z_{jt} = \sum_k s_{jk} g_{kt}$ (Borusyak, Hull and Jaravel 2022). Here:

$$z_{jt} = \sum_{g,h} \text{import share}_{jgh,0} \sum_k v_{ghk} * \ln \text{stock of (green) patents}_{hkt}$$

- j denotes firm, t year, g import good, h (foreign) country and k CPC technology class
- Import share: Average share of import value from each good g, country h pair for firm j in the pre-period ($\frac{\text{import value}_{jgh0}}{\sum_{g,h} \text{import value}_{jgh0}}$) – excludes consumption imports
- v_{gk} are probabilistic importance weights from Goldschlag, Lybbert and Zolas (2016)
- Patent stock is the sum of triadic patent families (filed in EU, Japan and US) filed in each country and technology class, every year since 1980

Specification: Reduced form IV

$$\Delta^4 \ln \text{skill ratio}_{jt} = \Delta^4 z_{jt} \beta^{ss-IV} + \delta_{nt} + \Delta^4 \nu_{jt}$$

$$\Delta^4 \ln \text{wage}_{ijt} = \Delta^4 z_{jt} \times \mathbb{1}[\text{higher education}_{ijt}] \beta^{wp-IV} + \Delta^4 z_{jt} \beta^{GI-IV} + \delta_{nt} + \Delta^4 \nu_{ijt}$$

where $\Delta^4 x_t = x_t - x_{t-4}$ denotes the four-year long-difference. δ_{nt} are industry-by-time fixed effects.

Three types of shocks:

Δz_{jt}	Definition	Interpretation
Δz_{jt}^{P}	$\Delta \ln(\text{patent stock}_{hk,t})$	Innovation in imported goods
Δz_{jt}^{GP}	$\Delta \ln(\text{green patent stock}_{hk,t})$	Green innovation in imported goods
Δz_{jt}^{GS}	$\Delta \ln\left(\text{green patent stock}_{hkt} / \text{patent stock}_{hk,t}\right)$	Green share of innovation in imported goods

Specification: Reduced form IV

$$\Delta^4 \ln \text{skill ratio}_{jt} = \Delta^4 z_{jt} \beta^{ss-IV} + \delta_{nt} + \Delta^4 \nu_{jt}$$

$$\Delta^4 \ln \text{wage}_{ijt} = \Delta^4 z_{jt} \times \mathbb{1}[\text{higher education}_{ijt}] \beta^{wp-IV} + \Delta^4 z_{jt} \beta^{GI-IV} + \delta_{nt} + \Delta^4 \nu_{ijt}$$

where $\Delta^4 x_t = x_t - x_{t-4}$ denotes the four-year long-difference. δ_{nt} are industry-by-time fixed effects.

Identification follows Borusyak, Hull and Jaravel (2022)

- Exclusion restriction: Global patenting is not correlated with unobserved firm-level shocks in Norway (many and uncorrelated shocks)
- Relevance: Global patenting affects firm technology + assumption on shares

First stage: Impact on probability of firm adopting/innovating in green tech

	(1)	(2)	(3)	(4)
Green patents	0.139***		0.140***	
	(0.0511)		(0.0513)	
Green share		0.0757		0.0841
		(0.0643)		(0.0646)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Mean outcome	0.418	0.418	0.418	0.418
Mean z	0.154	0.0664	0.154	0.0664
Observations	5439	5439	5386	5386

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Other outcomes: ▸ Any technology ▸ R&D ▸ Firm patent ▸ Capital stock ▸ Capital stock (z^{GP})

Reduced form results: Skill ratio

	(1)	(2)	(3)	(4)
Green patents	-0.0358		-0.0440	
	(0.0270)		(0.0282)	
Green share		-0.0551		-0.0642*
		(0.0353)		(0.0366)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Mean outcome	0.108	0.108	0.108	0.108
Mean z	0.154	0.0664	0.154	0.0664
Observations	42855	42855	39096	39096

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

▸ Any patents

Reduced form results: Worker wages

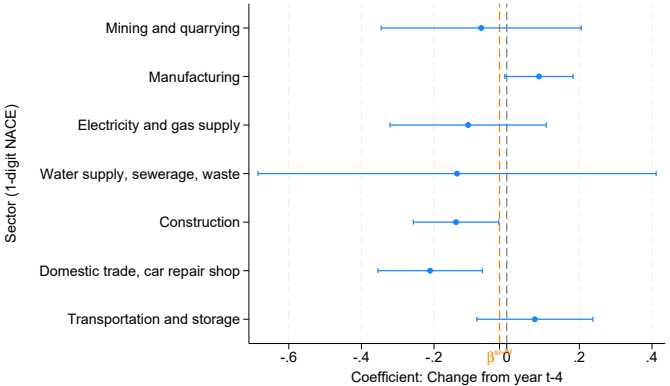
	(1)	(2)	(3)	(4)
Green patents	-0.00746		-0.00474	
	(0.00893)		(0.00972)	
Education × Green patents	0.00713		0.00301	
	(0.0171)		(0.0164)	
Green share		-0.0248**		-0.0196
		(0.0116)		(0.0124)
Education × Green share		0.0222		0.00500
		(0.0229)		(0.0206)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Mean outcome	0.167	0.167	0.167	0.167
Mean z	0.177	0.0820	0.177	0.0820
Observations	1121280	1121280	1119686	1119686

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

▸ Any patents

Skill bias varies by sector

Impact of imported green patent shock on firm skill ratio



▸ Wage premium ▸ Any patents ▸ Green share of patents

Additional heterogeneities and robustness

- New recruits vs leavers vs stayers
  - recruit: skill ratio
  - recruit: wage premium
  - leaver: skill ratio
  - leaver: wage premium
  - stayer: skill ratio
  - stayer: wage premium
- Complementarity
  - alternative threshold
- Dynamics & pre-trends
  - capital stock
  - skill ratio
  - wage premium
  - Alternative lags
    - 2 year lag: capital stock
    - 2 year lag: skill ratio
    - 2 year lag: wage premium
    - 6 year lag: capital stock
    - 6 year lag: skill ratio
    - 6 year lag: wage premium
- Borusyak, Hull and Jaravel (2022) tests
  - shocks
  - weights

- 2-digit industries
  - skill ratio
  - wage premium
- Firm size
  - skill ratio
  - wage premium
- Skill ratio
  - skill ratio
  - wage premium
- Import intensity
  - skill ratio
  - wage premium
- Education level
  - ratio
  - wage
- Education field
  - ratio
  - wage
- Occupation
  - ratio
  - wage
- Occupation change
  - change
  - up
  - down
- Industry by education level
  - ratio
- Industry by education field
  - ratio
- Industry by occupation
  - ratio

Conclusion

Green technology is associated with increased skill demand

The complimentary relationship between green technology and skill demand is similar to that of other types of technology
$\rightarrow$ Whether a green transition increases the demand for skill is likely to depend on whether green technology comes *in addition to* or *crowds out* other technologies

Being exposed to more green technology shocks increases the probability of a firm adopting green technology

Imported green technology change leads to higher skill demand in some sectors and lower in others
$\rightarrow$ Distributional effects of green technological change depends on the sector where it occurs

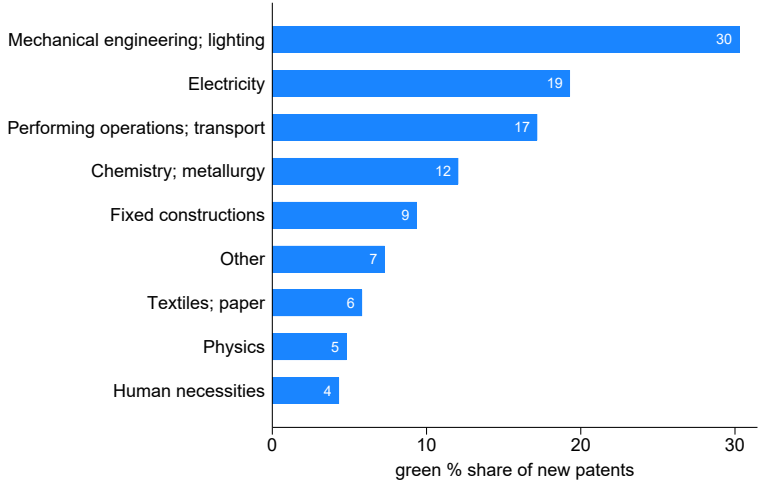
References i

Borusyak, Kirill, Peter Hull and Xavier Jaravel. 2022. "Quasi-Experimental Shift-Share Research Designs". *The Review of Economic Studies* 89 (1): 181–213. https://doi.org/10.1093/restud/rdab030.

Goldschlag, Nathan, Travis J. Lybbert and Nikolas Jason Zolas. 2016. "An 'Algorithmic Links with Probabilities' Crosswalk for USPC and CPC Patent Classifications with an Application Towards Industrial Technology Composition". Pre-published, 2016. SSRN Scholarly Paper. https://doi.org/10.2139/ssrn.2749287.

Lindner, Attila, Balazs Murakozy, Balazs Reizer and Ragnhild Schreiner. 2022. "Firm-Level Technological Change and Skill Demand", https://www.dropbox.com/s/u4495zon0vpooaf/SkillTechChange_Final.pdf?dl=0.

Share of green in CPC technology classes (1980–2018)



back

First stage: Any patents and any technological change

	(1)	(2)
Patents	0.144**	0.143**
	(0.0692)	(0.0702)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	2-digit
Import control		Value
Mean outcome	0.499	0.499
Mean z	0.114	0.114
Observations	8229	8042

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

First stage: Any patents and R&D

	(1)	(2)
Patents	0.146**	0.176***
	(0.0586)	(0.0630)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	2-digit
Import control		Value
Mean outcome	0.376	0.376
Mean z	0.114	0.114
Observations	23306	21673

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

First stage: Any patents and probability of firm patenting

	(1)	(2)
Patents	0.0193***	0.0207***
	(0.00495)	(0.00551)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	2-digit
Import control		Value
Mean outcome	0.00694	0.00694
Mean z	0.114	0.114
Observations	86619	76097

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

First stage: Any patents and capital stock

	(1)	(2)
Patents	0.193***	0.196***
	(0.0631)	(0.0657)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	2-digit
Import control		Value
Mean outcome	0.146	0.146
Mean z	0.114	0.114
Observations	77525	69208

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

First stage: Green patents and capital stock

	(1)	(2)	(3)	(4)
Green patents	0.0850**		0.0968**	
	(0.0384)		(0.0403)	
Green share		0.0575		0.0677
		(0.0524)		(0.0543)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Mean outcome	0.146	0.146	0.146	0.146
Mean z	0.154	0.0664	0.154	0.0664
Observations	77525	77525	69208	69208

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

Reduced form results: Skill ratio

	(1)	(2)
Patents	0.000758	-0.0124
	(0.0476)	(0.0505)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	2-digit
Import control		Value
Mean outcome	0.108	0.108
Mean z	0.114	0.114
Observations	42855	39096

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

return

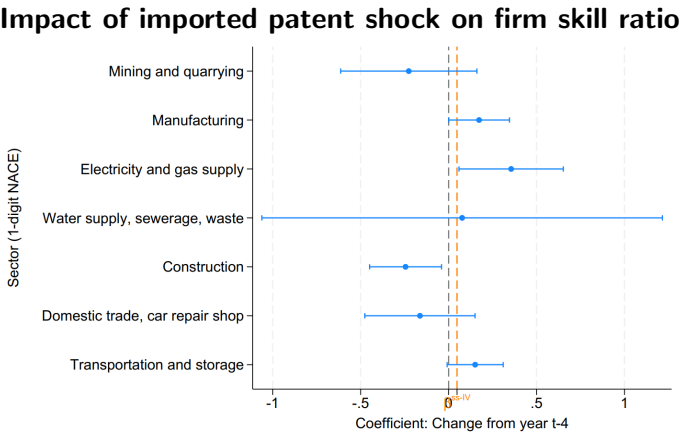
Reduced form results: Worker wages

	(1)	(2)
Patents	-0.00201	0.00570
	(0.0137)	(0.0130)
Education × Patents	0.0230	0.0143
	(0.0307)	(0.0241)
Specification		
Long diff & time FE	✓	✓
Industry x year FE	2-digit	4-digit
Import controls		Value + intensity
Mincer controls		✓
Mean outcome	0.167	0.167
Mean z	0.114	0.114
Observations	1121280	1119686

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

return

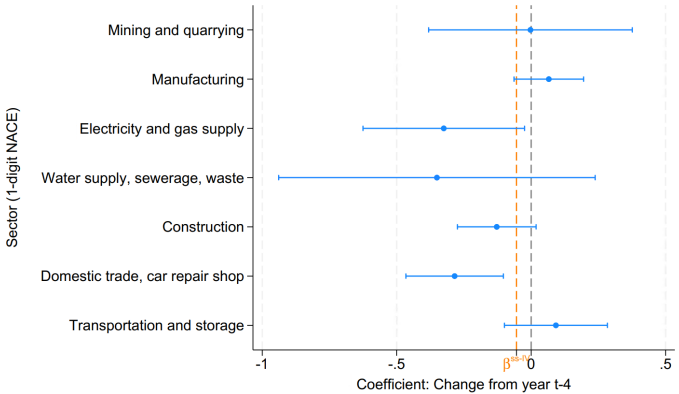
Skill bias varies by sector



Back

Skill bias varies by sector

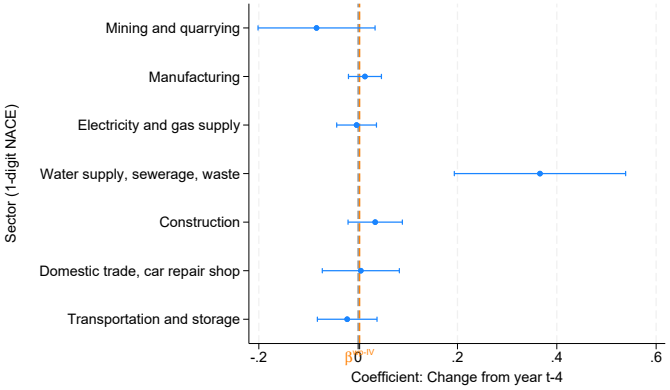
Impact of green share of imported patent shock on firm skill ratio



Back

Skill bias varies by sector

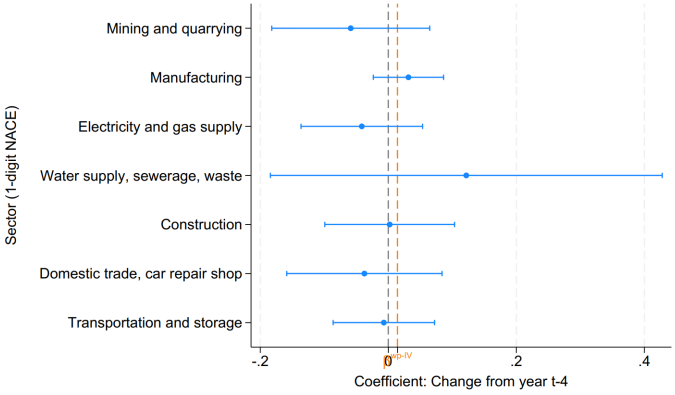
Impact of imported green patent shock on relative wage of high-skilled workers



▸ Any patents ▸ Green share of patents ◂ Back

Skill bias varies by sector

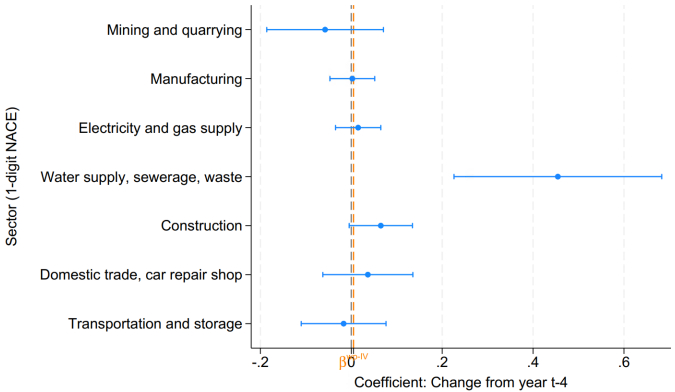
Impact of imported patent shock on relative wage of high-skilled workers



Back

Skill bias varies by sector

Impact of green share of imported patent shock on relative wage of high-skilled



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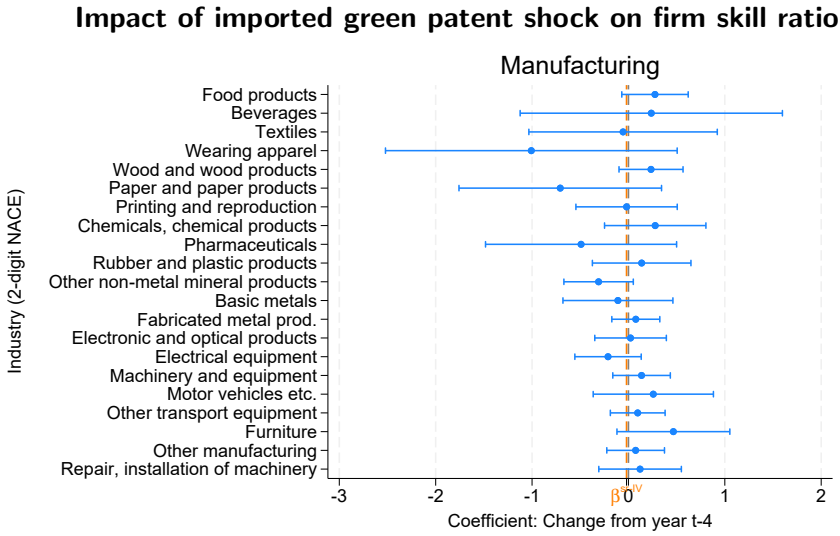
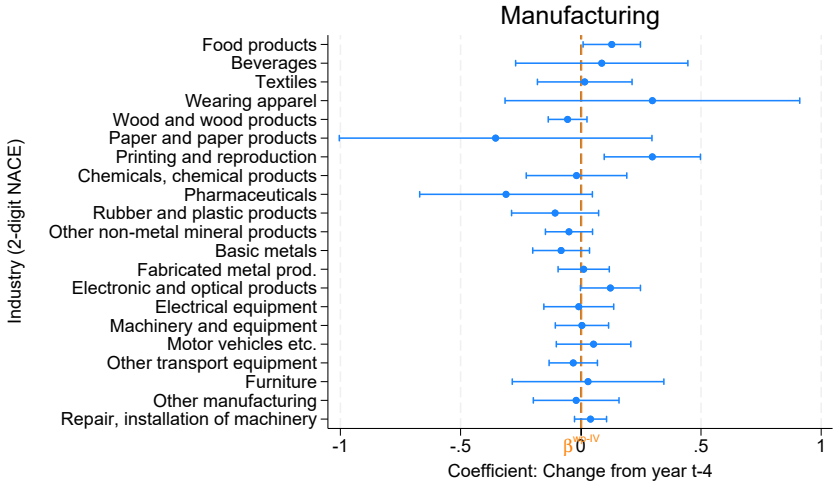
. . . and within sector (manufacturing)

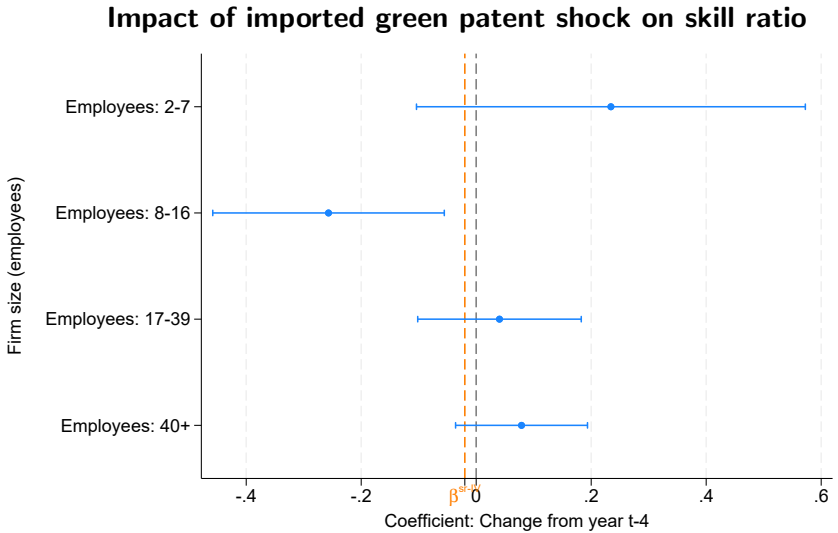


. . . and within sector (manufacturing)

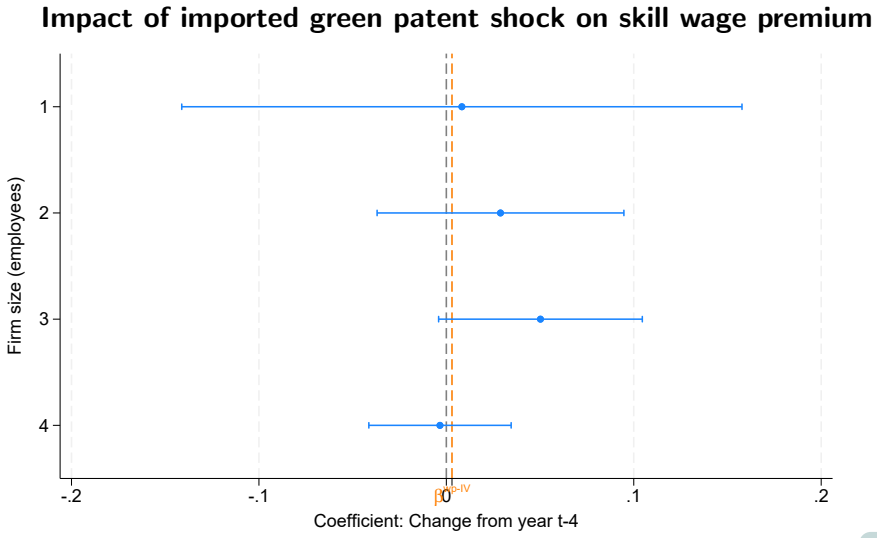
Impact of imported green patent shock on relative wage of high-skilled workers



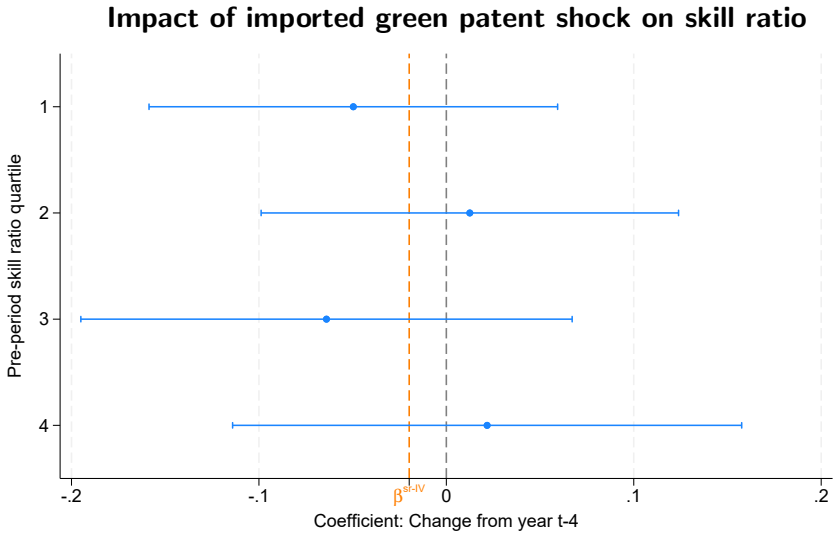
By firm size


Impact of imported green patent shock on skill ratio
Employees: 2-7
Employees: 8-16
Employees: 17-39
Employees: 40+
Firm size (employees)
-.4
-.2
0
.2
.4
.6
Coefficient: Change from year t-4

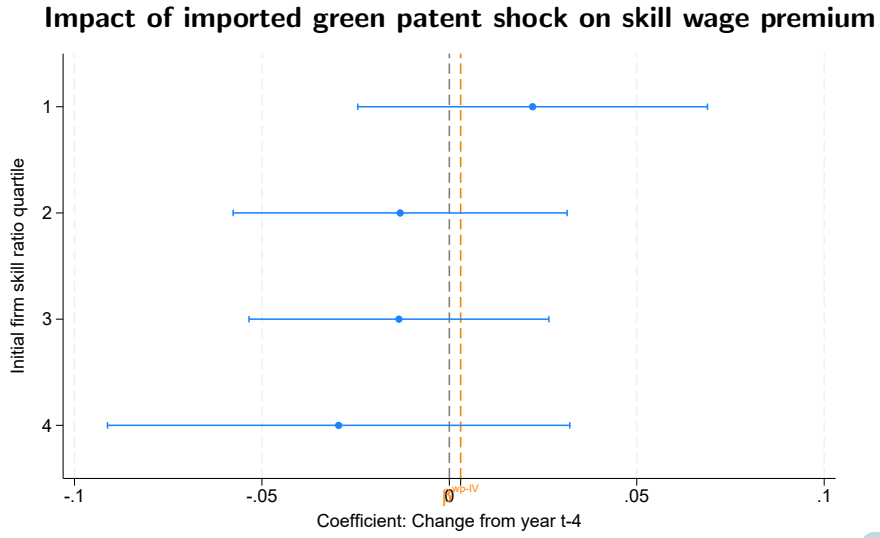
By firm size


Impact of imported green patent shock on skill wage premium
Firm size (employees)
1
2
3
4
-.2
-.1
0
.1
.2
β^IV
Coefficient: Change from year t-4

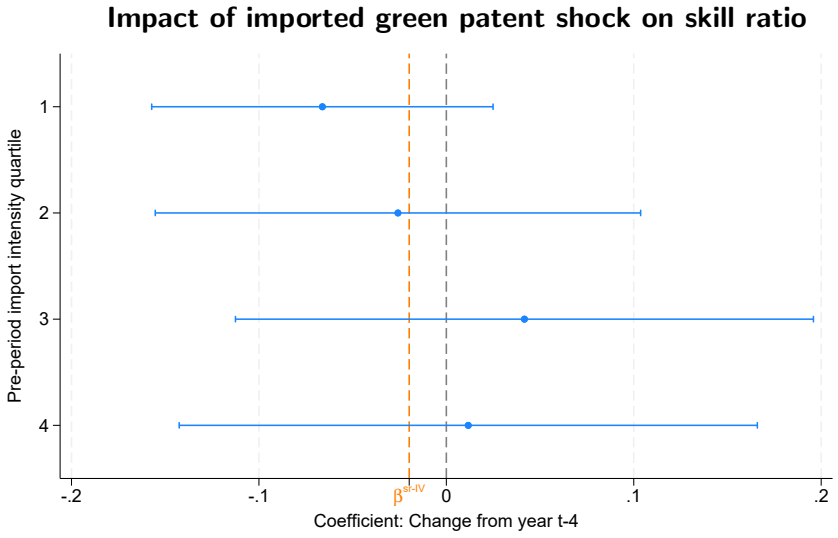
By initial firm skill ratio



By initial firm skill ratio

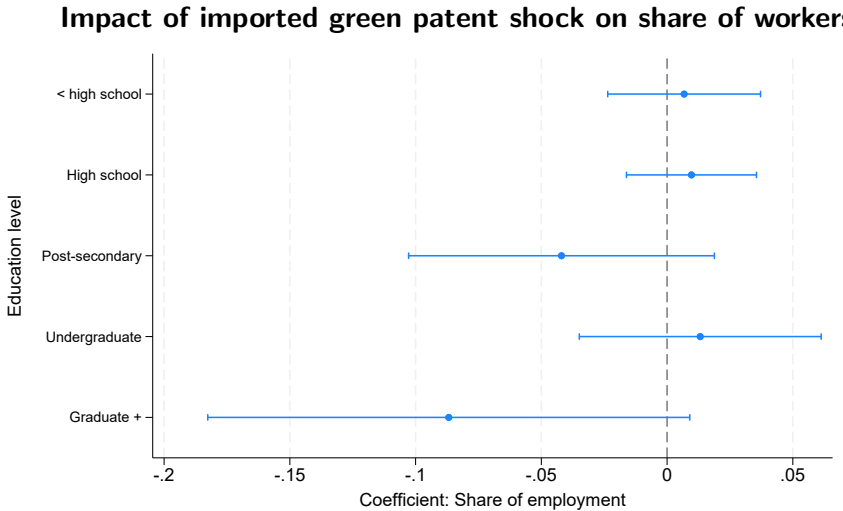


By initial firm import intensity

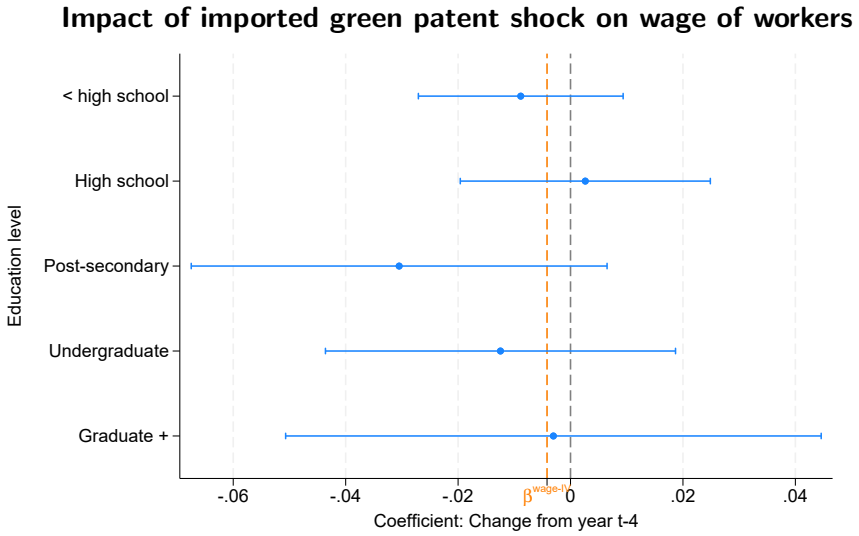


By initial firm import intensity

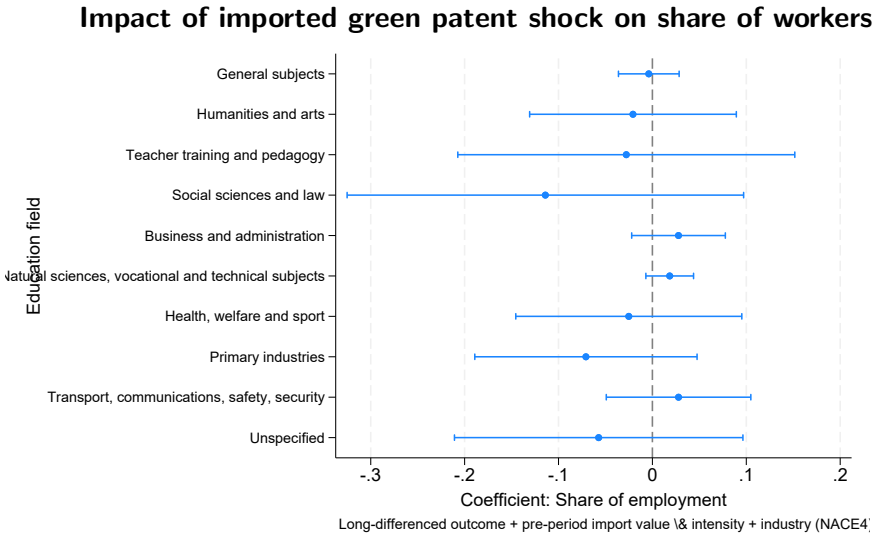
By education level



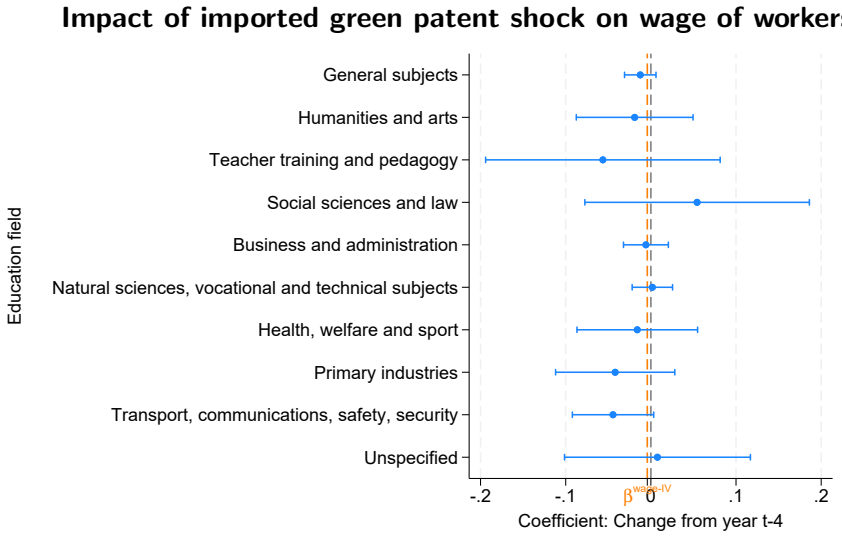
By education level



By education field



By education field

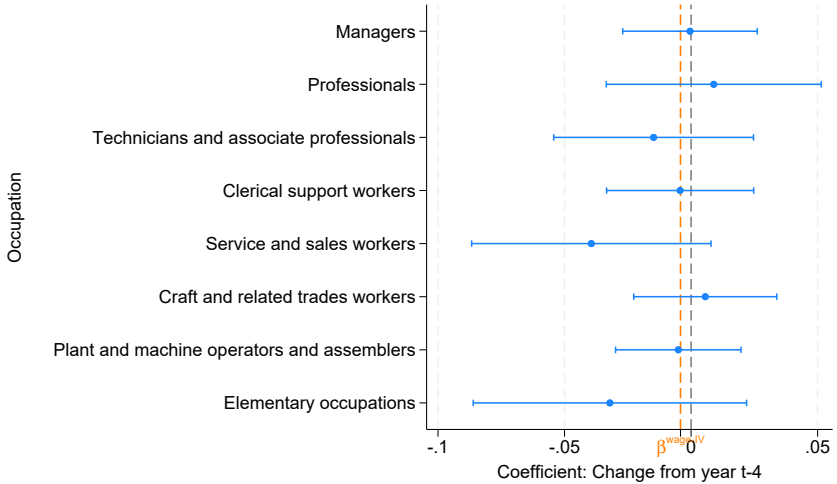


By occupation

Impact of imported green patent shock on share of workers in each occupation

By occupation

Impact of imported green patent shock on wage of workers in each occupation



Probability of changing occupation

	(1)	(2)	(3)	(4)
Green patents	0.0615***		0.0587***	
	(0.0233)		(0.0211)	
Green share		0.0484*		0.0469**
		(0.0268)		(0.0223)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Mean outcome	0.162	0.162	0.162	0.162
Mean z	0.177	0.0820	0.177	0.0820
Observations	1087168	1087168	1085042	1085042

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

Probability of increasing occupation level

	(1)	(2)	(3)	(4)
Green patents	0.0486***		0.0537***	
	(0.0161)		(0.0160)	
Green share		0.0396**		0.0443***
		(0.0195)		(0.0172)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Mean outcome	0.116	0.116	0.116	0.116
Mean z	0.177	0.0820	0.177	0.0820
Observations	993962	993962	957477	957477

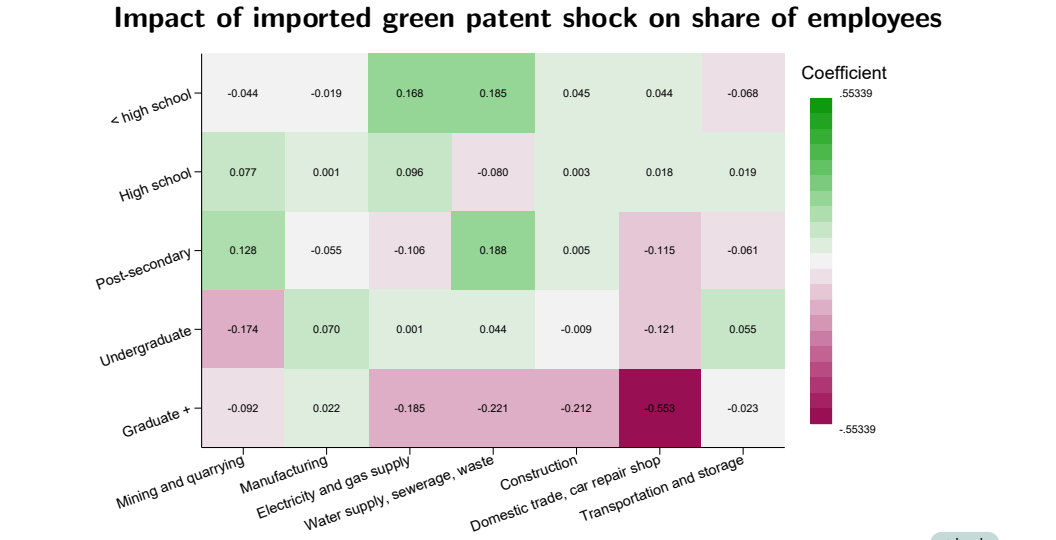
Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ ◂ back

Probability of decreasing occupation level

	(1)	(2)	(3)	(4)
Green patents	0.0234**		0.0132	
	(0.0112)		(0.0101)	
Green share		0.0230*		0.00991
		(0.0124)		(0.0106)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Mean outcome	0.0557	0.0557	0.0557	0.0557
Mean z	0.177	0.0820	0.177	0.0820
Observations	1091034	1091034	1054698	1054698

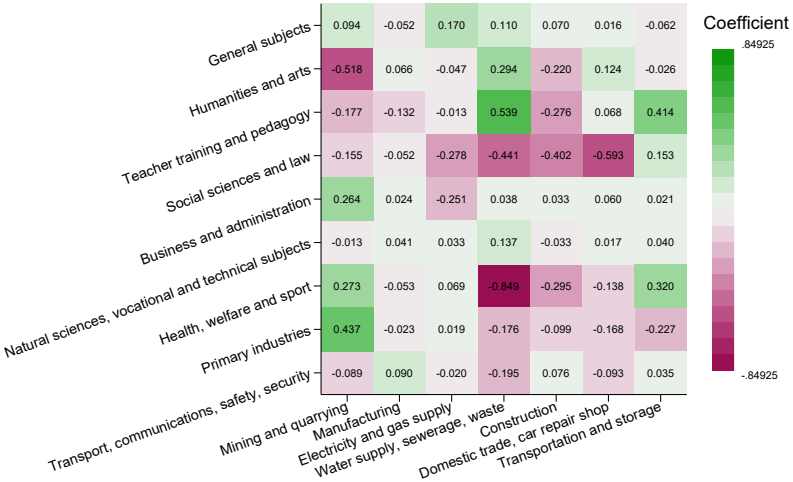
Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

By industry and education level



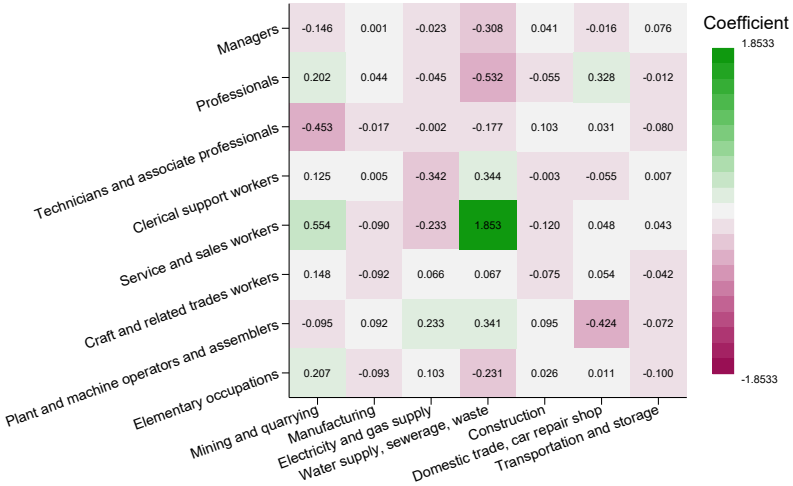
By industry and education field

Impact of imported green patent shock on share of employees



By industry and occupation

Impact of imported green patent shock on share of employees



Recruits: Skill ratio

	(1)	(2)	(3)	(4)
Green patents	0.0204		-0.00888	
	(0.0767)		(0.0797)	
Green share		0.00392		-0.00116
		(0.110)		(0.114)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Group	recruit	recruit	recruit	recruit
Mean outcome	0.0753	0.0753	0.0753	0.0753
Mean z	0.154	0.0664	0.154	0.0664
Observations	11803	11803	10836	10836

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

Recruits: Wage premium

	(1)	(2)	(3)	(4)
Green patents	0.00699		0.00821	
	(0.0183)		(0.0187)	
Education × Green patents	0.0367*		0.0390*	
	(0.0201)		(0.0201)	
Green share		-0.0179		-0.0118
		(0.0260)		(0.0249)
Education × Green share		0.0402		0.0452*
		(0.0269)		(0.0266)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Group	recruit	recruit	recruit	recruit
Mean outcome	0.179	0.179	0.179	0.179
Mean z	0.175	0.0752	0.175	0.0752
Observations	658264	658264	614973	614973

Standard errors in parentheses. * $p<0.1$, ** $p<0.05$, *** $p<0.01$. Standard errors clustered at the industry level.

Leavers: Skill ratio

	(1)	(2)	(3)	(4)
Green patents	-0.0737		-0.0952	
	(0.0796)		(0.0833)	
Green share		-0.158		-0.161
		(0.114)		(0.119)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Group	leaver	leaver	leaver	leaver
Mean outcome	0.0322	0.0322	0.0322	0.0322
Mean z	0.154	0.0664	0.154	0.0664
Observations	10910	10910	10042	10042

Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

Leavers: Wage premium

	(1)	(2)	(3)	(4)
Green patents	-0.0398*		-0.0384	
	(0.0230)		(0.0251)	
Education × Green patents	0.0131		-0.00642	
	(0.0307)		(0.0311)	
Green share		-0.0184		-0.0140
		(0.0252)		(0.0265)
Education × Green share		0.0342		0.00601
		(0.0416)		(0.0416)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Group	leaver	leaver	leaver	leaver
Mean outcome	0.179	0.179	0.179	0.179
Mean z	0.169	0.0718	0.169	0.0718
Observations	204926	204926	189268	189268

Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01, stayers

Stayers: Skill ratio

	(1)	(2)	(3)	(4)
Green patents	-0.00677		-0.0104	
	(0.0309)		(0.0316)	
Green share		-0.00388		-0.00841
		(0.0400)		(0.0403)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	2-digit	2-digit
Import control			Value	Value
Group	stayer	stayer	stayer	stayer
Mean outcome	0.123	0.123	0.123	0.123
Mean z	0.154	0.0664	0.154	0.0664
Observations	37030	37030	34508	34508

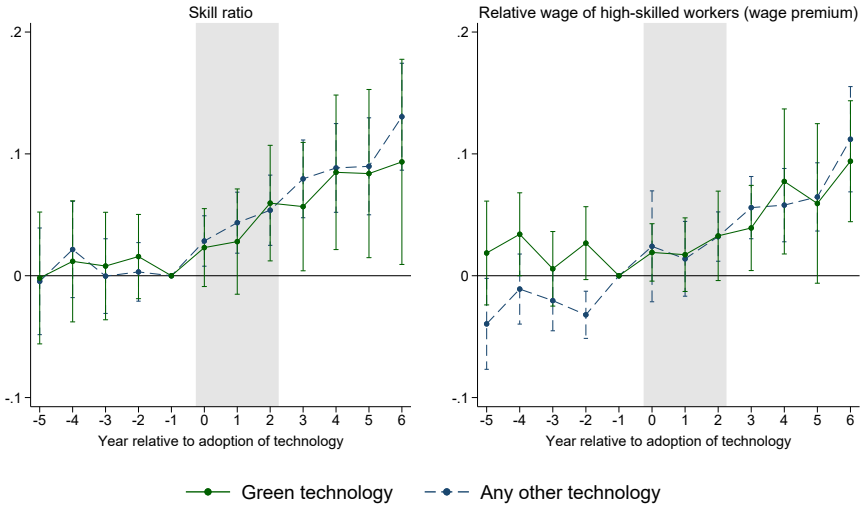
Standard errors clustered on firm. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ back

Stayers: Wage premium

	(1)	(2)	(3)	(4)
Green patents	0.0119		0.00898	
	(0.00729)		(0.00742)	
Education × Green patents	0.00393		0.0101	
	(0.0137)		(0.0124)	
Green share		-0.00188		-0.00246
		(0.00977)		(0.0101)
Education × Green share		0.00644		0.00941
		(0.0195)		(0.0168)
Specification				
Long diff & time FE	✓	✓	✓	✓
Industry x year FE	2-digit	2-digit	4-digit	4-digit
Import controls			Value + intensity	Value + intensity
Mincer controls			✓	✓
Group	stayer	stayer	stayer	stayer
Mean outcome	0.194	0.194	0.194	0.194
Mean z	0.171	0.0721	0.171	0.0721
Observations	1819398	1819398	1725468	1725468

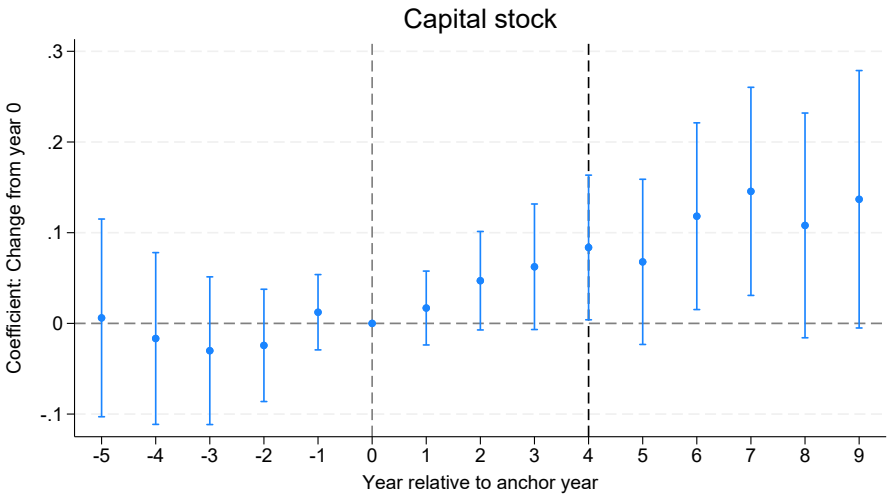
Standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01 clustered

Technology-skill complementarity (alternative green threshold)



back

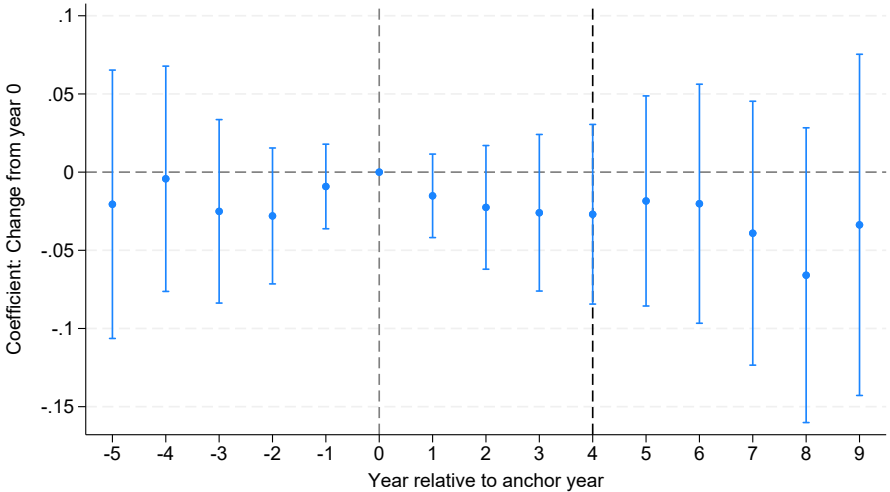
Dynamics: Capital stock



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

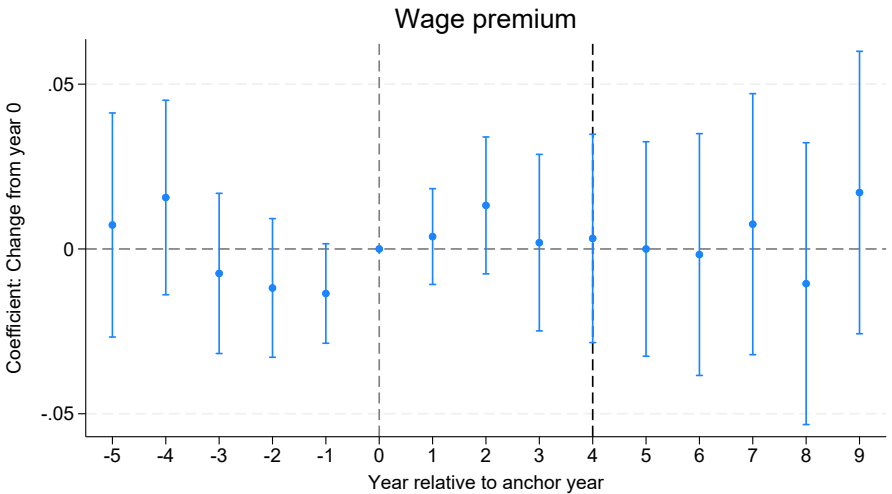
Dynamics: Skill ratio



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

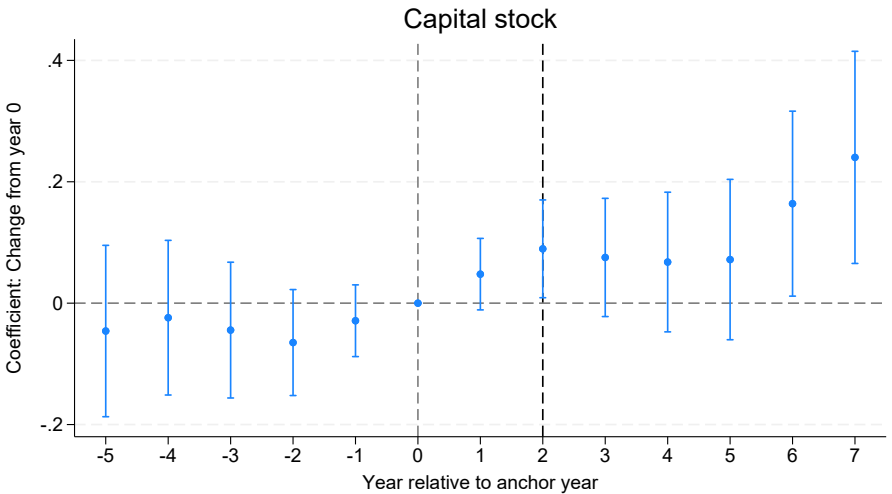
Dynamics: Wage premium



Long-differenced outcome + worker controls + firm pre-period import value and import intensity + industry (NACE4) x time

back

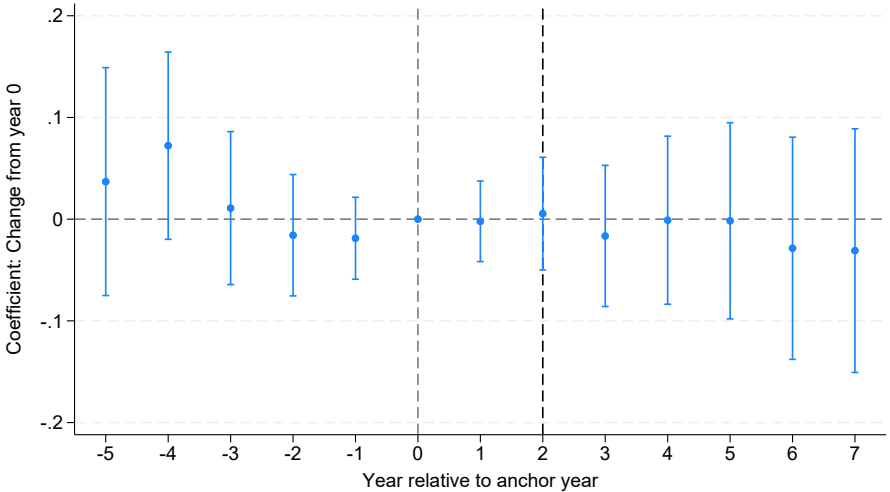
Dynamics: Capital stock (2-year differences)



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

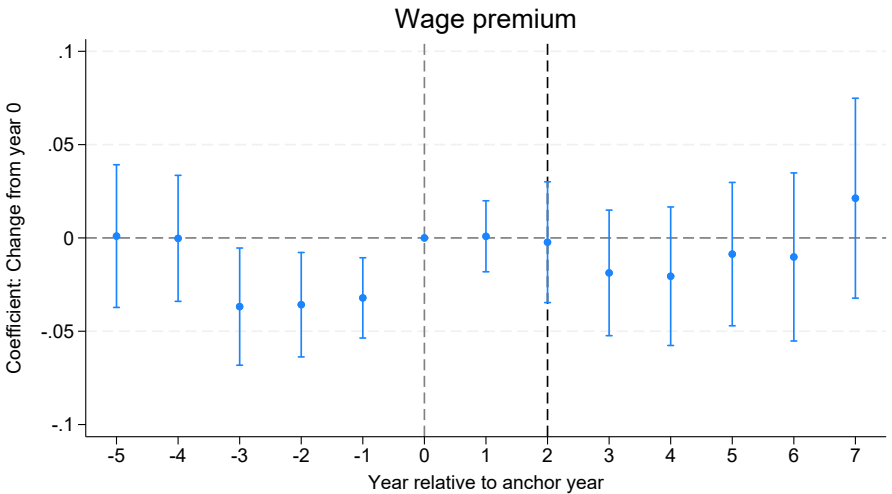
Dynamics: Skill ratio (2-year differences)



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

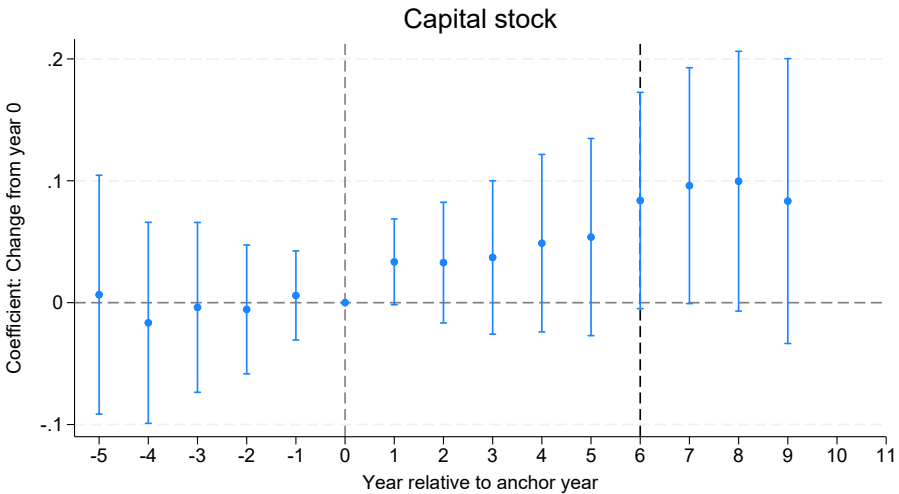
Dynamics: Wage premium (2-year differences)



Long-differenced outcome + worker controls + firm pre-period import value and import intensity + industry (NACE4) x time

back

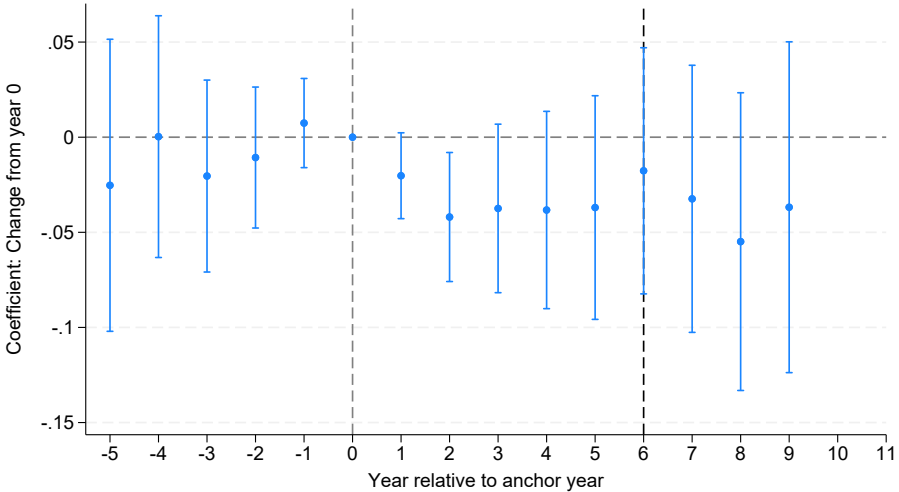
Dynamics: Capital stock (6-year differences)



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

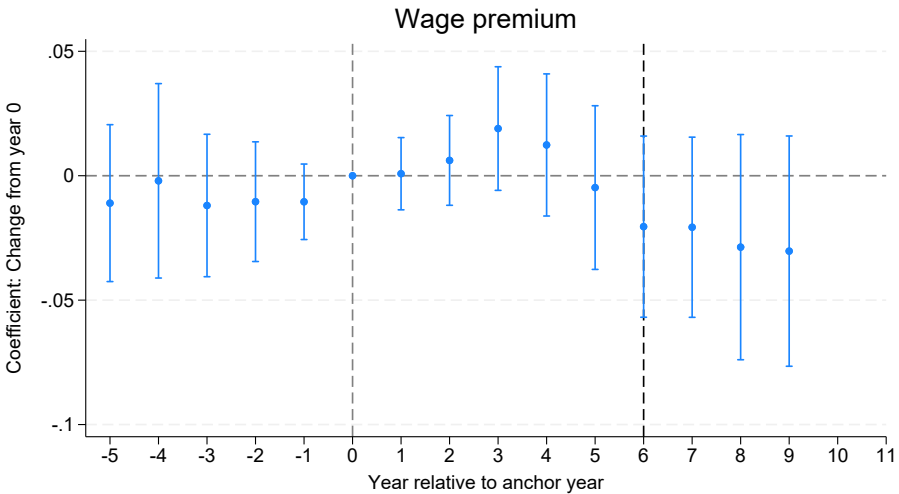
Dynamics: Skill ratio (6-year differences)



Long-differenced outcome + pre-period import value \& intensity + industry (NACE4) x time FE

back

Dynamics: Wage premium (6-year differences)



Long-differenced outcome + worker controls + firm pre-period import value and import intensity + industry (NACE4) x time

back

Shock summary statistics (for $\ln(\textbf{shock}_{hkt})$)

	Mean	SD	IQR
Patent stock z^P			
Base (log)	4.83	2.12	2.78
Residualised on year FE	0.00	2.12	2.81
Long-differenced	0.18	0.22	0.19
Long-differenced & year FE	0.00	0.20	0.15
Green patent stock z^{GP}			
Base (log)	2.47	1.90	2.73
Residualised on year FE	-0.00	1.90	2.90
Long-differenced	0.35	0.44	0.54
Long-differenced & year FE	-0.00	0.39	0.41
Green share of patent stock z^{GS}			
Base (log)	-3.05	1.19	1.60
Residualised on year FE	-0.00	1.19	1.59
Long-differenced	0.15	0.32	0.28
Long-differenced & year FE	-0.00	0.31	0.27
Observations	193310	193310	193310

◂ back

Weight summary statistics

Largest weight	0.0150
Effective sample size	55.17
No. of technology classes	623
No. of countries	94
No. of tech class x countries	27921

back