Overpromising Green Jobs? Evidence from the French Energy Efficiency Obligations Program

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No Energy Transition Without **Green Construction Jobs**

- Buildings energy efficiency is a **pillar of the energy transition**
  - The European Commission's *Renovation Wave* (2021) aims to renovate 35 million buildings by 2035

  - In France, 72% of all 2030-targets green investments should go to buildings energy renovation (Pisani-Ferry & Mahfouz 2023)

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  - In France, 72% of all 2030-targets green investments should go to buildings energy renovation (Pisani-Ferry & Mahfouz 2023)
- Energy efficiency faces **major labor shortages**
  - In the EU, half of occupations facing a severe shortage belong to the construction sector (European Labor Authority, 2023)
  - In France, 170 to 250,000 jobs needed in 2030 (France Strat. 2023)

Energy Efficiency Subsidies & **Labor Market Frictions**

- **Popular second-best policy** for environmental externalities
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  - Subsidies raising **wages** make green jobs **more attractive**
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$\Rightarrow$ **Surplus distribution** creates **labor frictions** that may **hinder progress in the energy transition**

Research question

How does **surplus distribution** within firms affect the **cost-efficiency of environmental subsidies**?

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Contributions

- **Labor market effects of the energy transition**
  - Limited green jobs creation (Popp et al. 2021, Fabra et al. 2024)
  - Skill-bias in low-carbon jobs (Vona, et al. 2018, Yip 2018, Marin & Vona 2019, Saussay, et al. 2022, Curtis, et al. 2024)

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  → A **job creation or wage premium** effect for energy retrofits?

- **Incidence of environmental subsidies**
  - Focus on the pass-through from producers / retailers to consumers (Alcott, Shapiro & Tintelnot 2025; Kwon, Allcott & Snyder 2025; Pless & Van Benthem 2019, Lade & Bushnell 2019, Salee 2011)

  → A role for **surplus sharing between firms and workers?**

Data: Monthly Employment, Wages & VA over 2016-2020

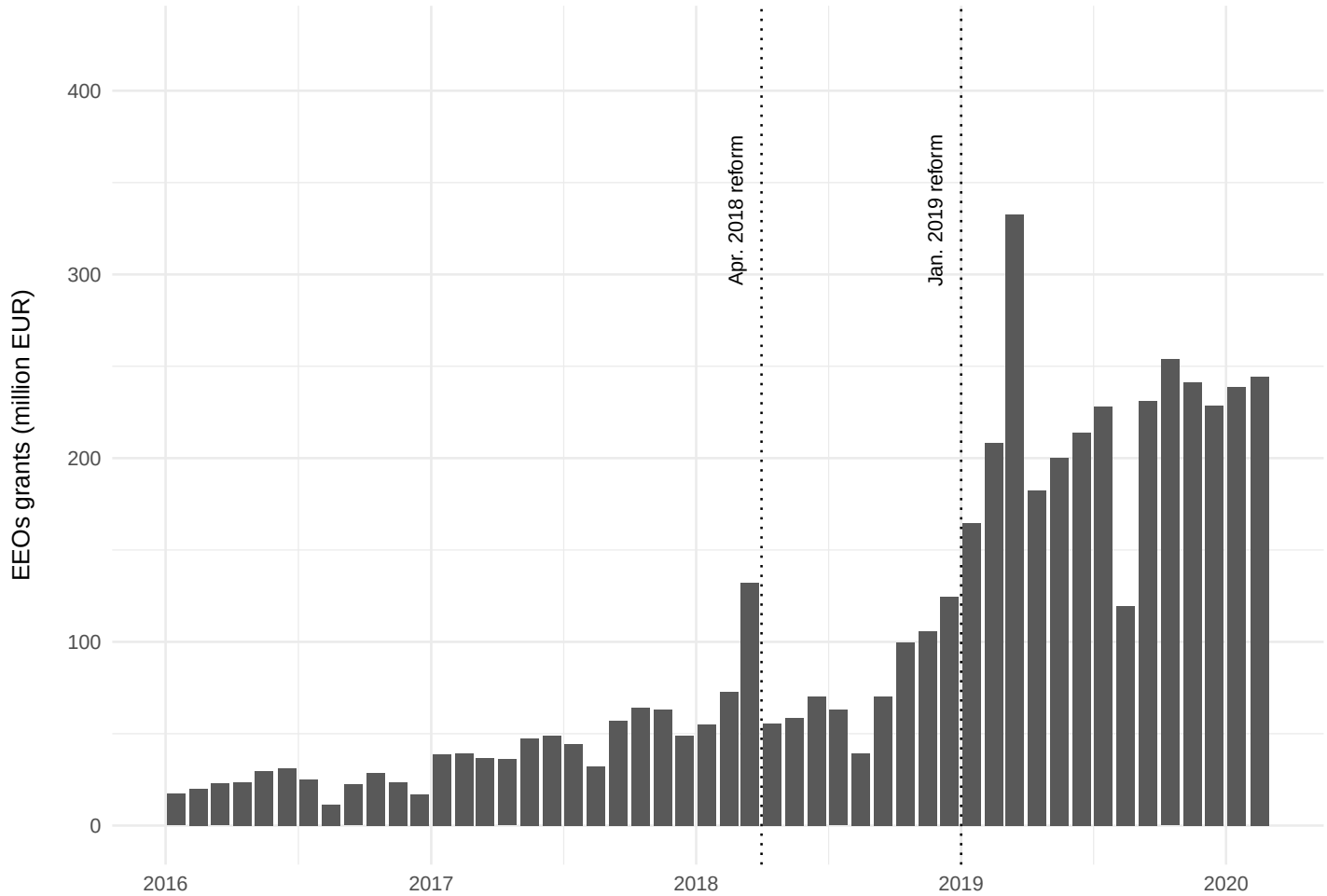
- **Daily entries & exits** from any position in each business in France (Mouvement Main d'Œuvre from Ministry of Labour)
- **Wages** offered to each worker in each business in France (DADS Postes)
- **Monthly Value Added base** (total & 5.5% rate for energy efficiency works, French VAT records)

- Businesses are distributed in **686 activity codes**: our **treated sector** is the sum of **insulation works** (4322B) and **heating systems installation** (4329A) sectors

$\Rightarrow$ We **aggregate the data** at the **region** $\times$ **month** $\times$ **sector** to exploit both **cross-sectional** (13 Metropolitan regions) and **cross-period** variations

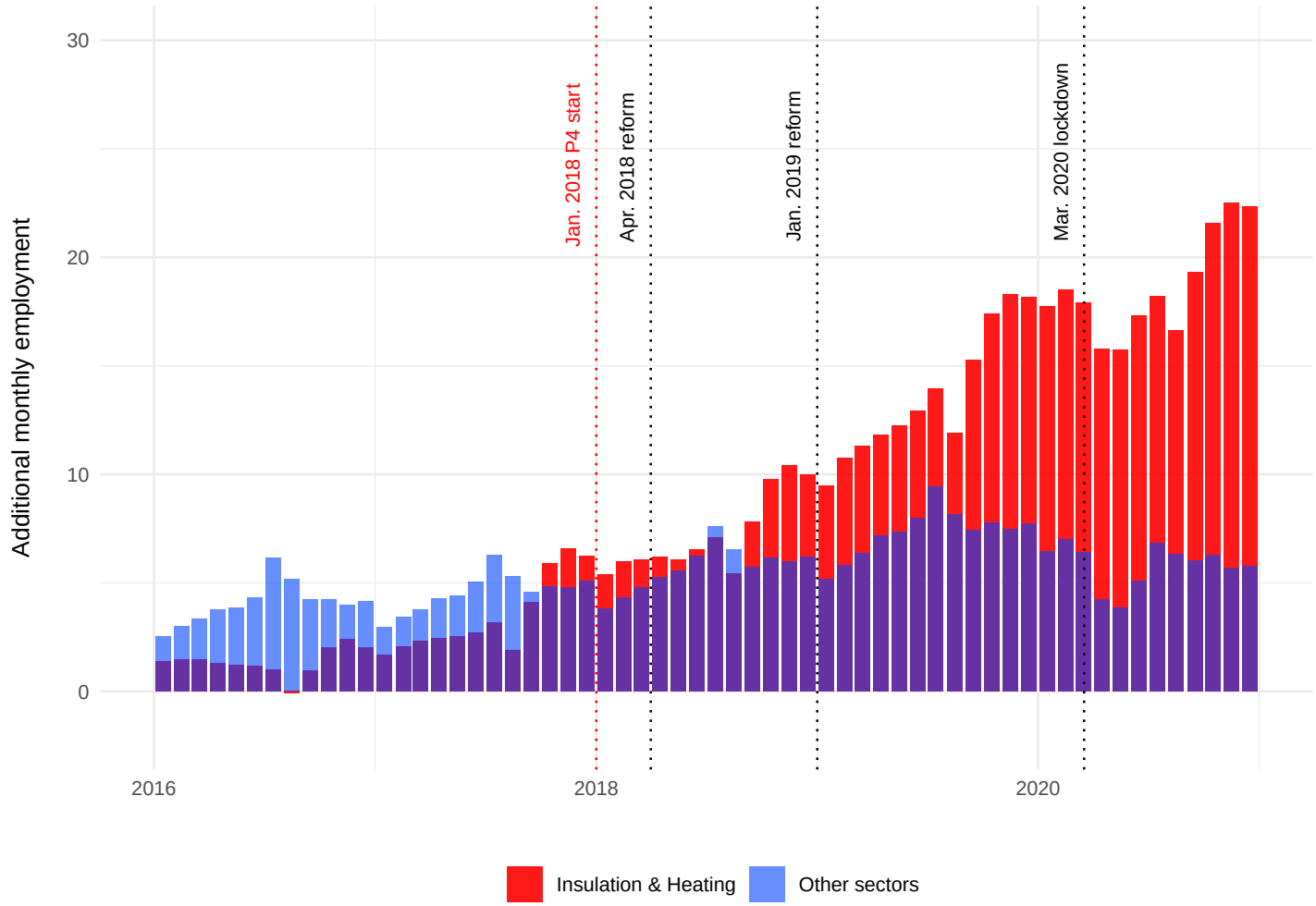
We exploit a **sharp discontinuity** in the **provision of subsidies** to French households

- **5-fold increase** in the **monthly investment** for retrofit operations:



Descriptive statistics

- Comparison of **monthly employment** for the **insulation & heating** sectors, versus **all other sectors**
  (% of Jan. 2016 total employment)



SCM applied to **disaggregated data** (Abadie & L'Hour, 2021)

- **Outcome** is **regional workforce, average wages & value added** in the **renovation industry** in **month m**
- **Counterfactual** is a **weighted average of control sectors**
  - **Weights** are determined by **trends on the pre-reform period**
  - **Construction**-related sectors are dropped (SUTVA)
  - Donor pool gathers sectors with a **relatively closed workforce size** $\pm 33\%$ the treated sector (different filters as robustness check)

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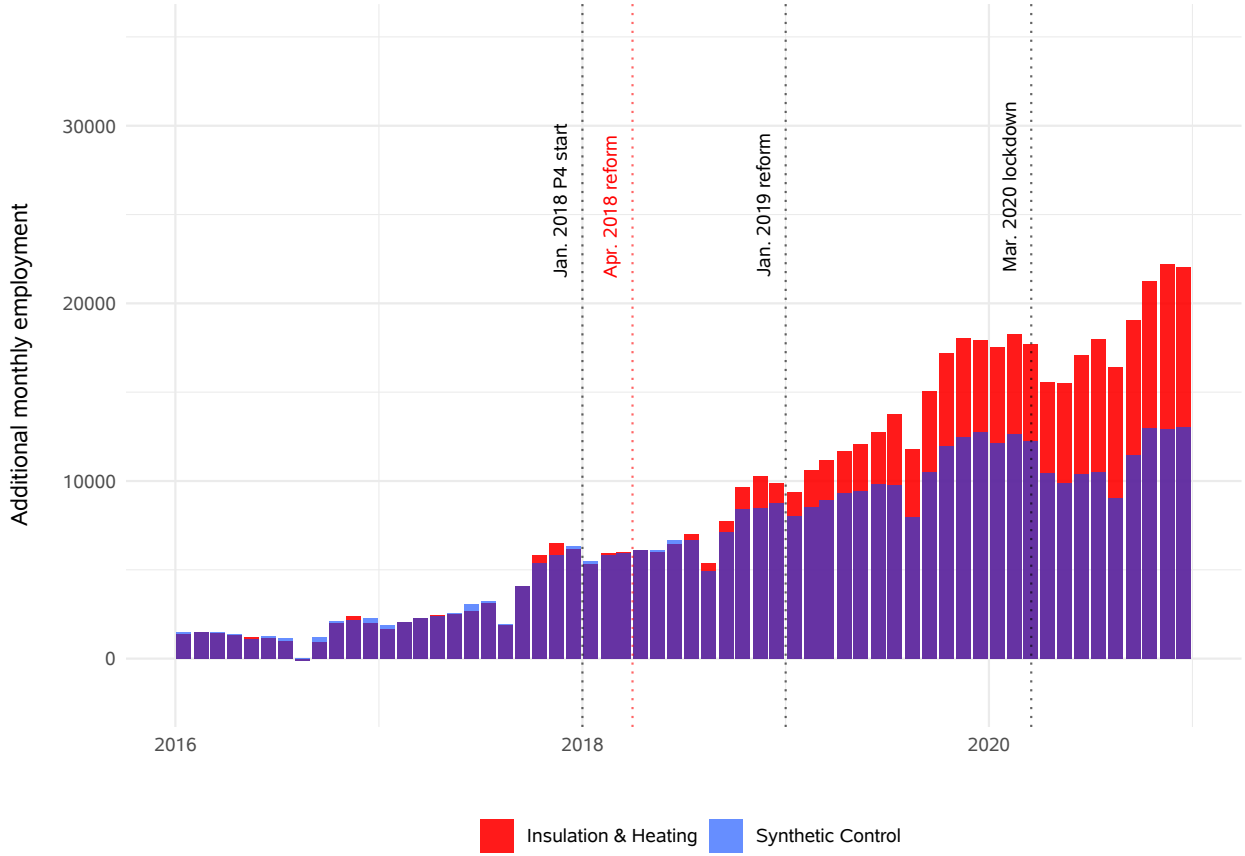
Causal inference relies on an inference score

- **Same experiment** with **100 randomly selected** donors
  - Causal effect iff the **energy renovation sector** records the **largest post-treatment effect** compared to the **placebos**
  - **p-value** is the **rank of treated vs. placebos**

Net employment effect

- **Monthly employment** in **energy renovation** versus its **penalized synthetic control**



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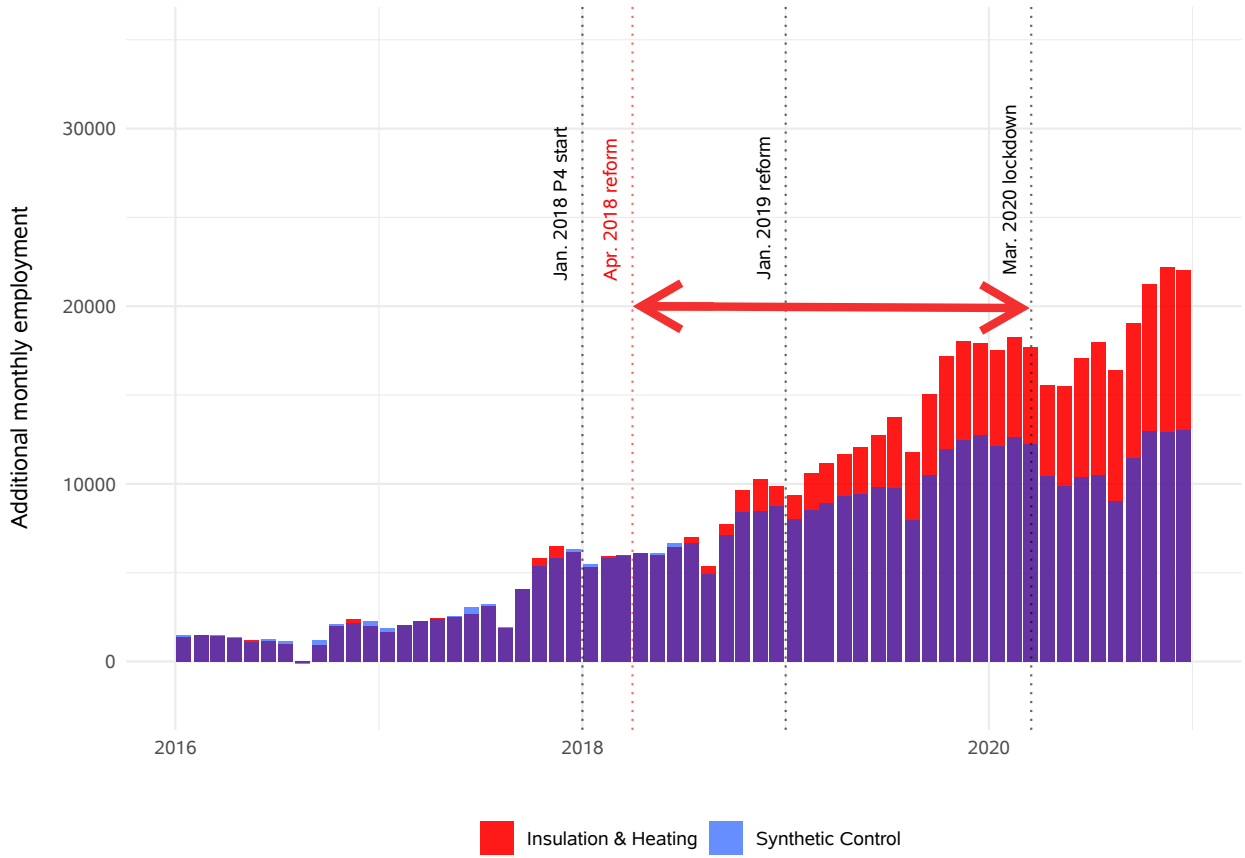
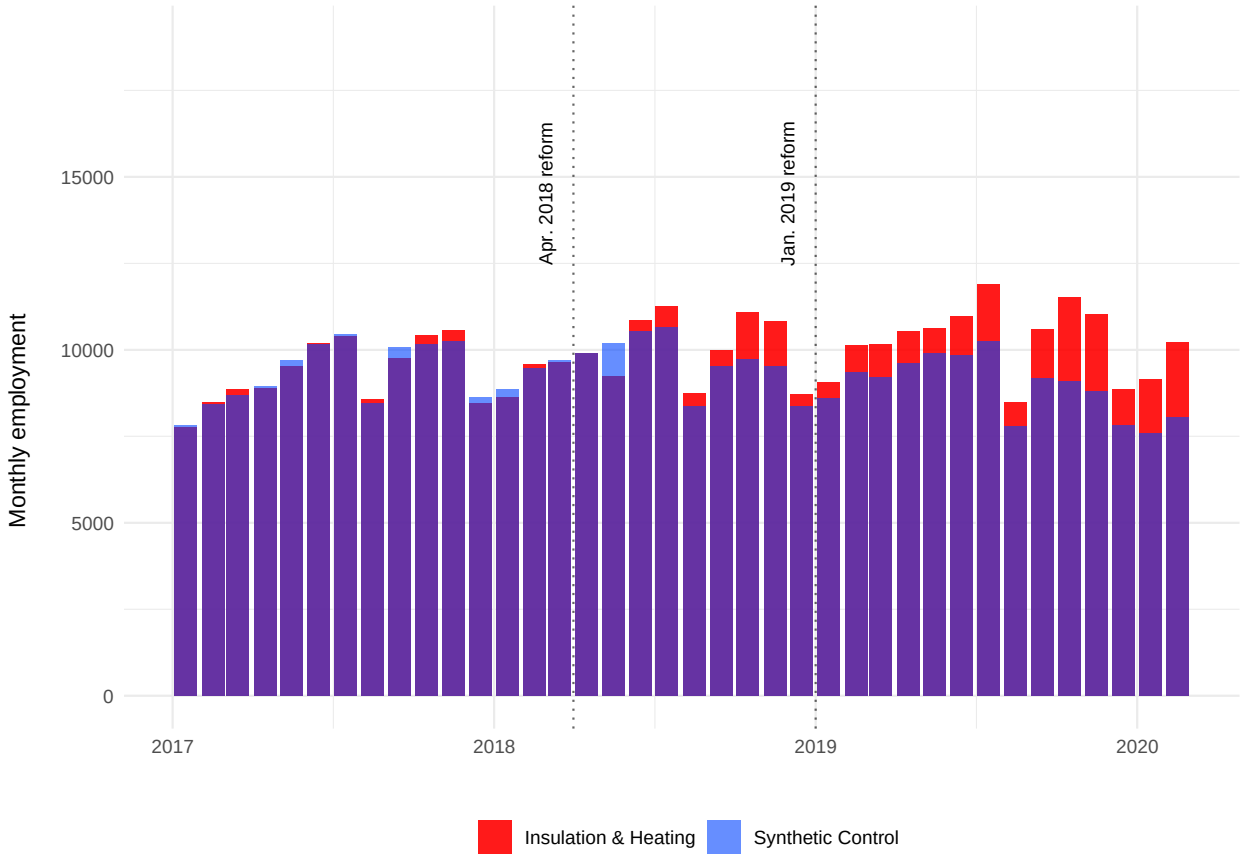


⇒ Reforms increased **monthly employment** by **+58,000** between Apr. 2018 & Feb. 2020, equivalent to **+4,900 job-year** (0.01).

Temp workers (Manpower-style)

- **Temp workers** may be placed to a renovation firm



⇒ **Policy-induced**: +1,800 (0.01) additional job-years.

Job multiplier: **+1.6**–2.2 **job-year per mln. EUR**

- Total subsidy increase: €2,990 mln.
  - **1.6** job-year in the energy renovation industry
  - **0.6** job-year among temp workers
- **In line with previous ex-post estimates on green jobs**
  - *Popp et al (2021)*:
    2-4 job-year/mln. USD in the **construction sector** in the US
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- **Below ex-ante forecasts** (5-10 job-year/mln. EUR, BPIE 2021)

→ Very ambitious **green jobs generation targets** from recovery packages likely to be **missed**.

⇒ How can we explain this **disappointing effect**?

Within the renovation industry (1.6 job-year/mln. EUR)

- 68% jobs at Micro ($<$ 10 workers) vs. 32% at SMEs (10-49 workers)

→ **Micro enterprises largely benefited** from the policy despite their limited ability to respond the increased demand and administrative burden, while **SMEs failed to industrialize**.

- 66% permanent vs. 33% fixed term

→ EEOs grants have **mitigated policy uncertainty** and/or suggested **durable public support** to energy retrofits.

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Including temp workers (2.2 job-year/mln. EUR)

- 28% temp-workers

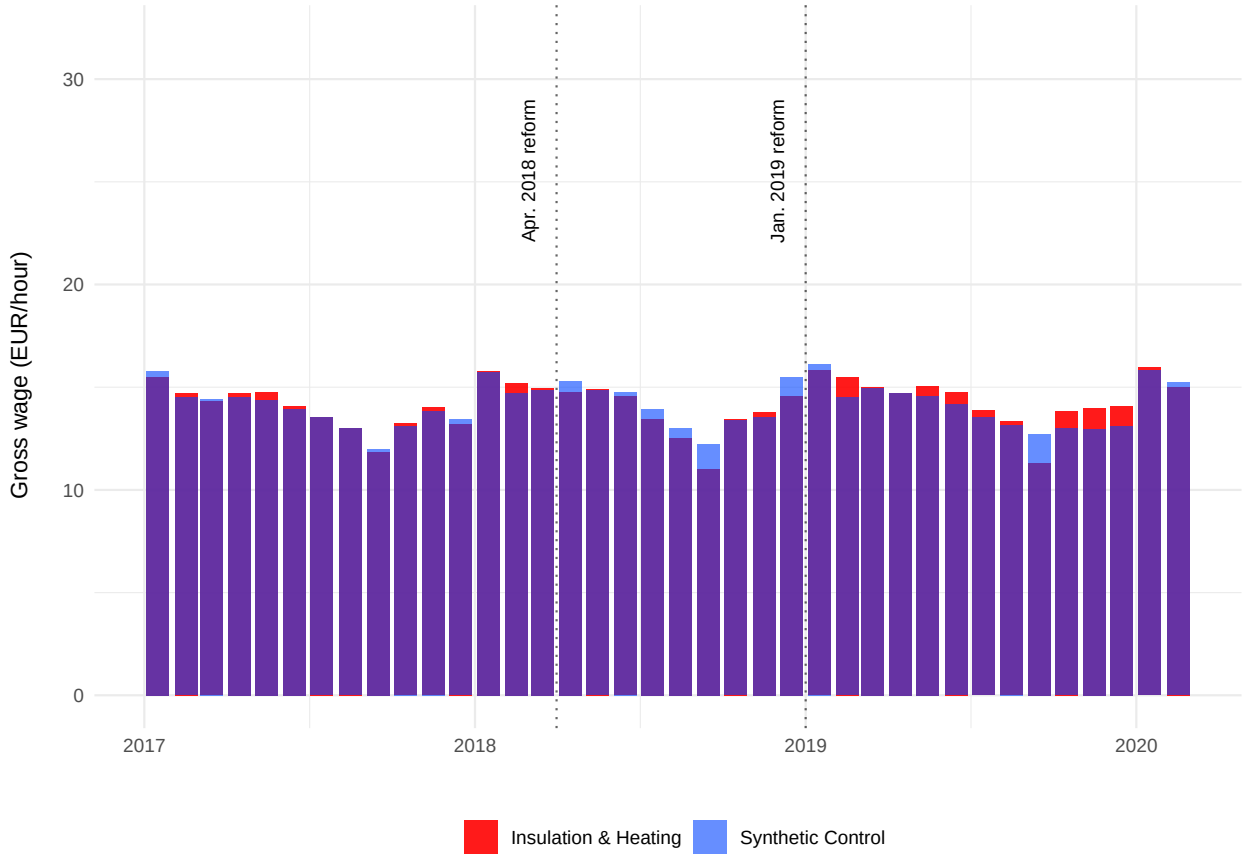
$+$ 12% exits from any unemployment ≥ 1 month

$=$ 40% of net **job creation effect** within the industry

$\Rightarrow$ Evidence of **limited transition costs** for workers, especially in insulation-related tasks (80% of the investments)

No effect on wages

- We run the same experiment on wages offered to newly hired workers (DADS Postes)

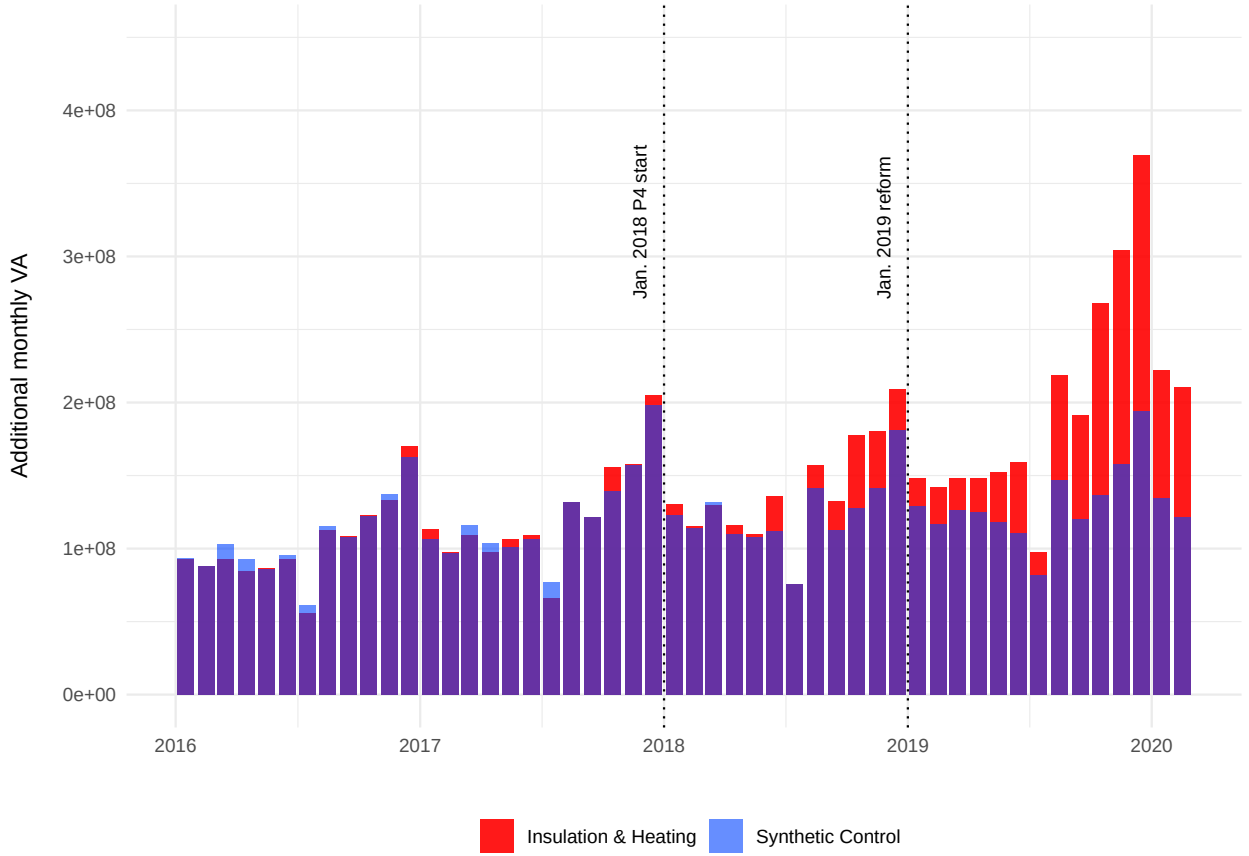


- **No subsidy pass-through** to **wages** in the renovation industry

$\Rightarrow$ Challenges the assumption of a **labor supply shortage**.

Sharp increase in value added

- We run the same experiment on Value Added reported by firms in the industry under the **special 5.5% rate** (energy efficiency)



- **Total increase** in Value Added: +€1.15 bln. (0.01)

Surplus is captured through higher installer margins

- **Pass-through** of energy efficiency subsidies to firms' VA:

$$\frac{€1.15 \text{ bln.}}{€2.99 \text{ bln.}} = \mathbf{38\%}$$

$\rightarrow$ Surplus is shared between labor costs, profits & investments.

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$$\frac{€\,1.15 \text{ bln.}}{€\,2.99 \text{ bln.}} = \mathbf{38\%}$$

→ Surplus is shared between labor costs, profits & investments.

- Increase in **total labor cost** is **26% the total increase in VA**

$$2.2 \text{ jobs-year} \times €\,2{,}990 \text{ mln.} \times 12 \times €\,3{,}760 \simeq \mathbf{€\,300 \text{ mln.}}$$

→ Significantly below the 37% share in the pre-policy period.

⇒ **Low workers' bargaining power** hinders the attractiveness of the industry, undermining the cost-efficiency of energy efficiency subsidies.

Wrap-Up

- Energy efficiency subsidies generate **modest job creation** despite ambitious policy targets and labor shortages
- Firms capture 38% of the rise in subsidies, while labor cost share drops by 11pp.

Policy Recommendation

- **Reward skill content** in subsidy design
  - Re-skilling policies for heating technicians
  - Require certified skilled workers for subsidy eligibility
- **Strengthen workers' bargaining position**
  - Link subsidies to wage standards or collective agreements
  - Support SME industrialization over micro-enterprise fragmentation

$\Rightarrow$ Higher wages will enhance **job attractiveness** and **recognition** of energy renovation works, improving policy cost-efficiency

Thank you!

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☞ I am on the 2025-26 Academic Job Market with a paper entitled: *Wired For Change? Clean Technology Adoption and Labor Market Transitions*

Appendix

Descriptive statistics

Main estimation: Complementary results

Main estimation: Robustness checks

Descriptive statistics: the MMO data

		Headcount	Perm. emp.	FT emp.	Total emp.
Retro. industry					
2016	01	98,672	+957	+430	+1,387
2017	12	111,092	+4,651	+1,505	+6,156
2020	01	130,719	+14,525	+3,736	+18,262
Other sectors					
2016	01	16,139,468	+131,433	+275,265	+406,699
2017	12	17,475,526	+354,258	+466,988	+821,246
2020	01	18,644,580	+739,822	+391,657	+1,131,479

Descriptive statistics: Small & Medium Enterprises

		Headcount	Perm. emp.	FT emp.	Total emp.
Retro. industry					
2016	01	73,770	+547	+200	+748
2017	12	79,287	+1,193	+299	+1,492
2020	01	93,528	+4,194	+1,265	+5,459
Other sectors					
2016	01	12,776,349	+85,783	+176,251	+262,034
2017	12	13,595,409	+138,785	+155,095	+293,880
2020	01	14,380,180	+247,878	+22,658	+270,536

Descriptive statistics: Micro Enterprises

		Headcount	Perm. emp.	FT emp.	Total emp.
Retro. industry					
2016	01	24,902	+410	+230	+639
2017	12	31,805	+3,458	+1,206	+4,664
2020	01	37,191	+10,331	+2,472	+12,803
Other sectors					
2016	01	3,336,121	+45,650	+99,015	+144,665
2017	12	3,882,117	+216,099	+311,919	+528,018
2020	01	4,264,400	+493,229	+369,261	+862,490

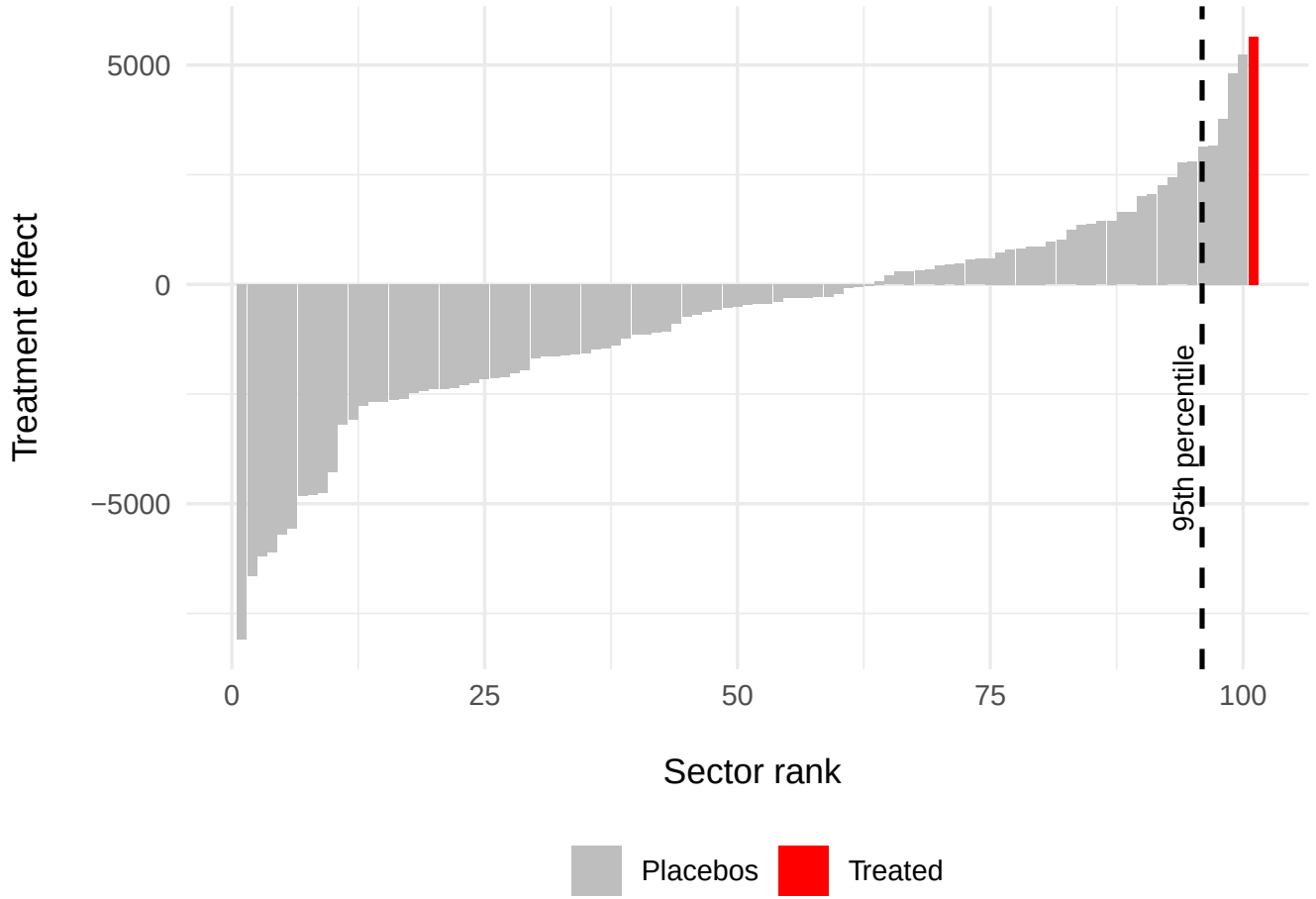
Descriptive statistics

Main estimation: Complementary results

Main estimation: Robustness checks

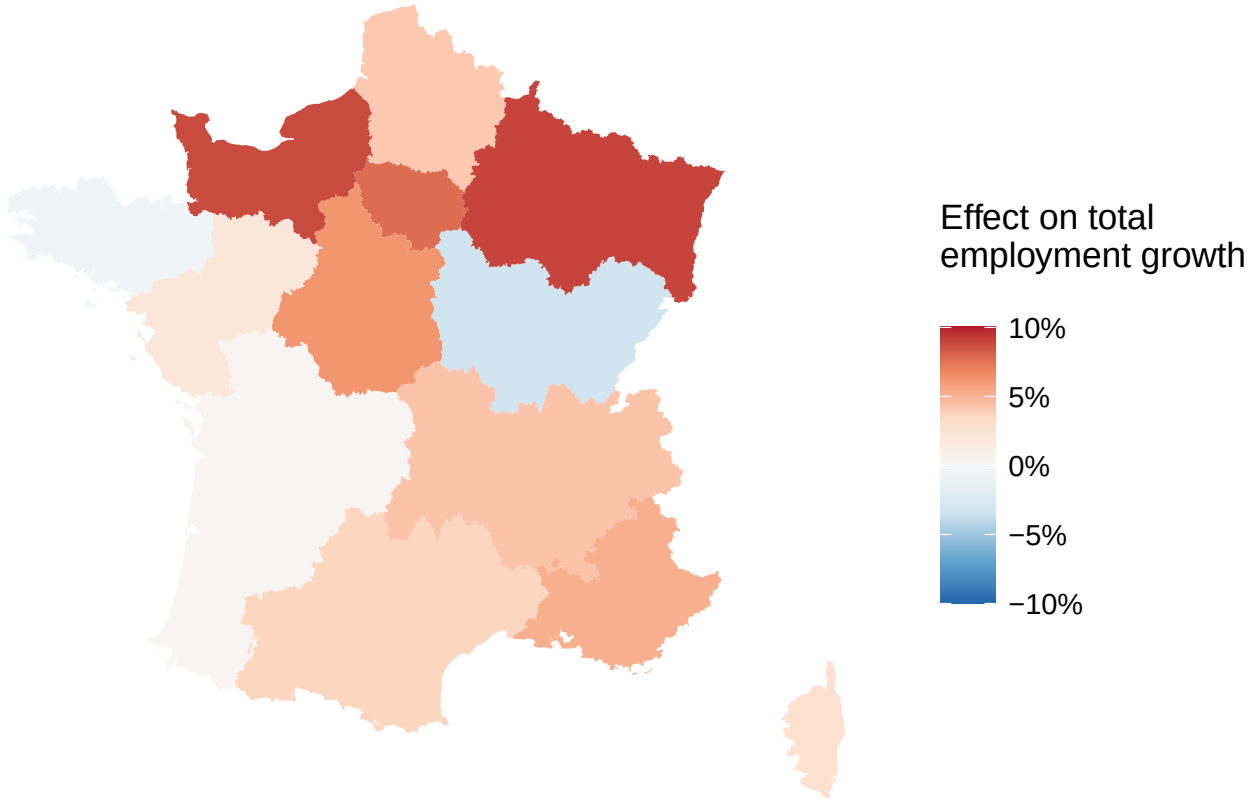
Permutation test for the effect of the policy

- **Treatment** effect **ranks first** against 100 alternative random permutations
- Corresponding **p-value** for the one-sided test: **0.01**



Regional heterogeneity

- Using a synthetic control method that leverages regional variations allows us to plot results at the regional (NUTS 2) level:



⇒ Policy-induced jobs located in **colder/richer regions**

Weights of the Synthetic Control

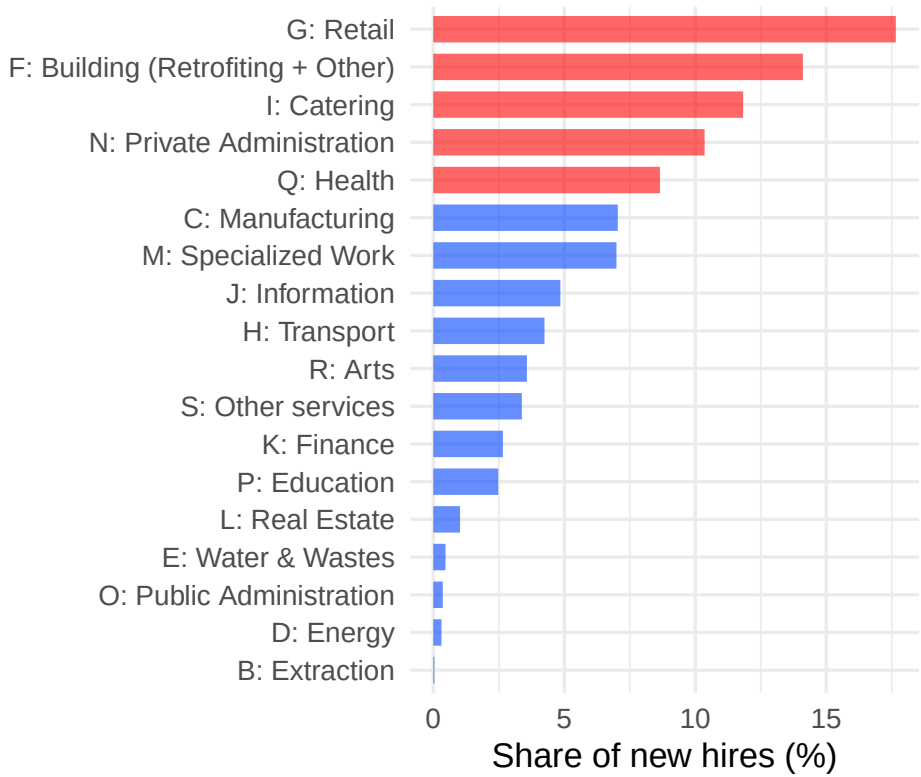
Descriptive statistics

Main estimation: Complementary results

Main estimation: Robustness checks

SUTVA

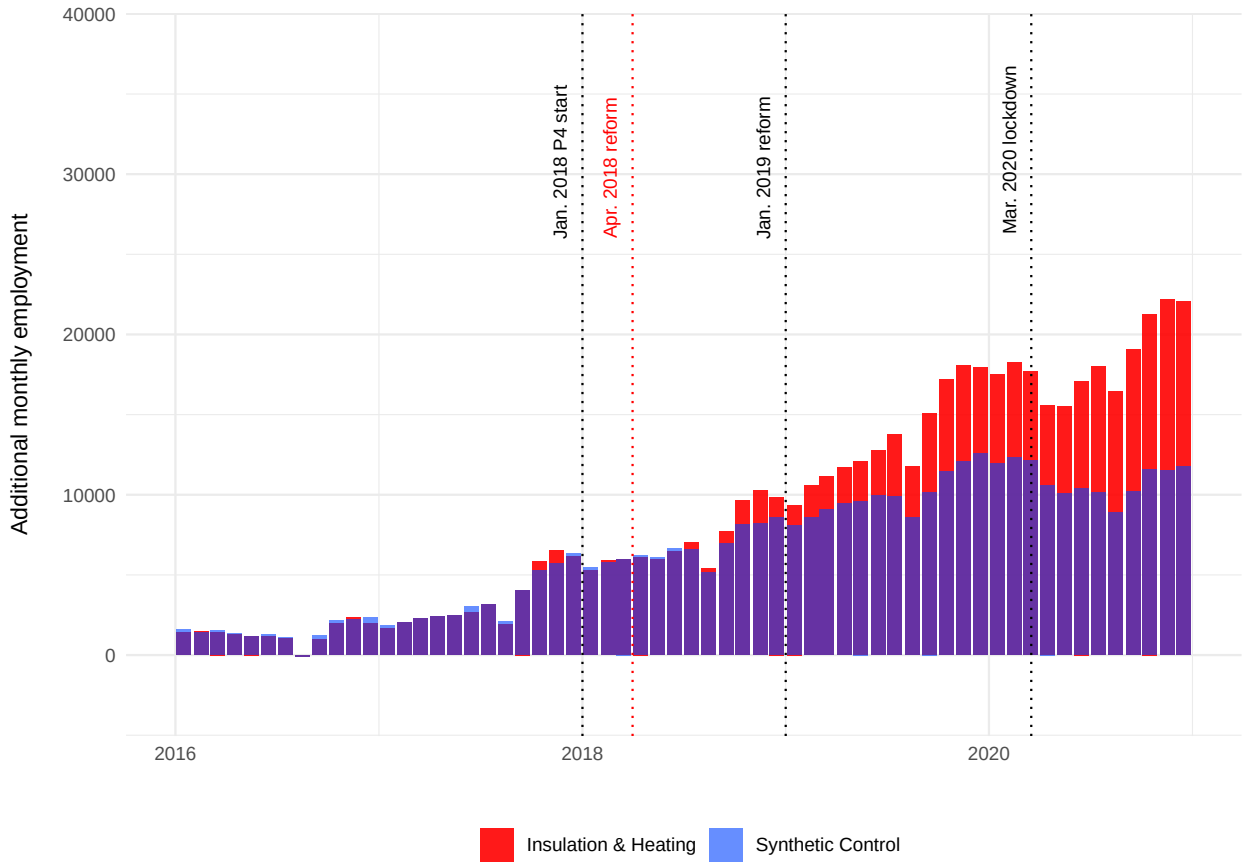
- New workers may come from non-construction sectors, resulting in a violation of the SUTVA
- We group new hires post Apr. 2018 in renovation firms by their sector of origin



$\Rightarrow$ Top 5 sectors account for 62.5% of new hires

SUTVA results

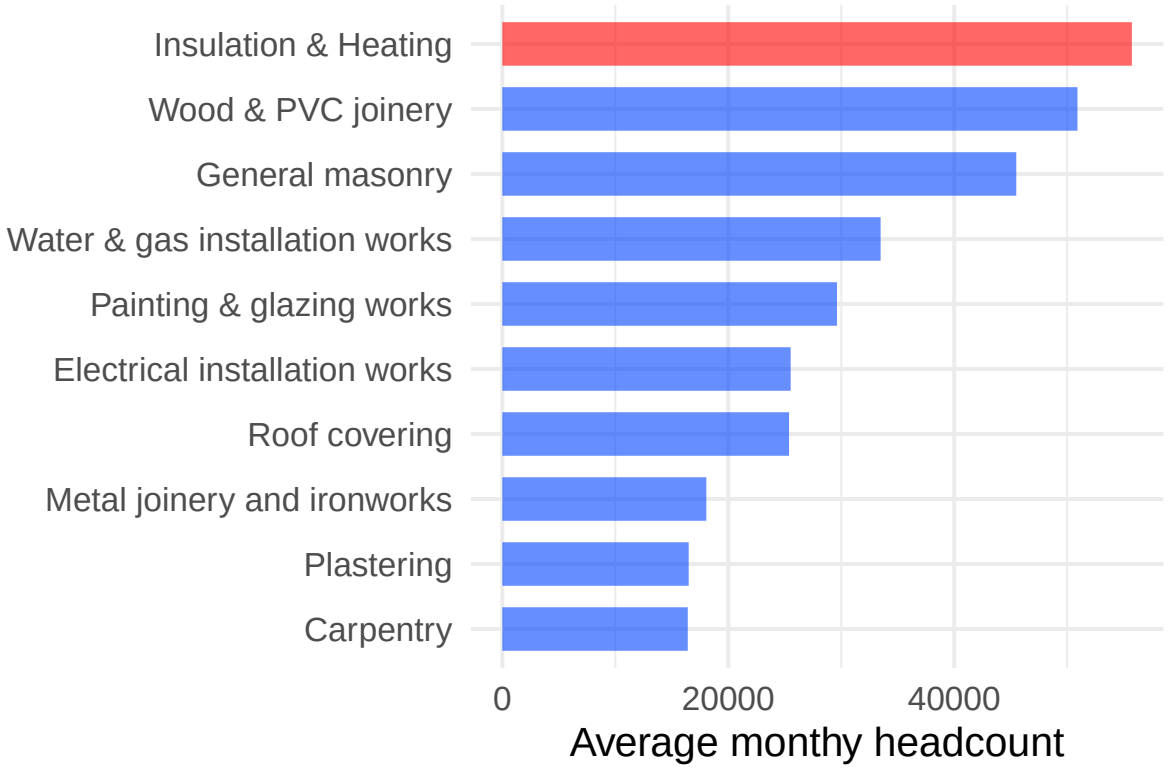
- We exclude the top 5 sectors of origin from the donor pool



⇒ Treatment effect remains strictly unchanged: **+4,900** (0.01)

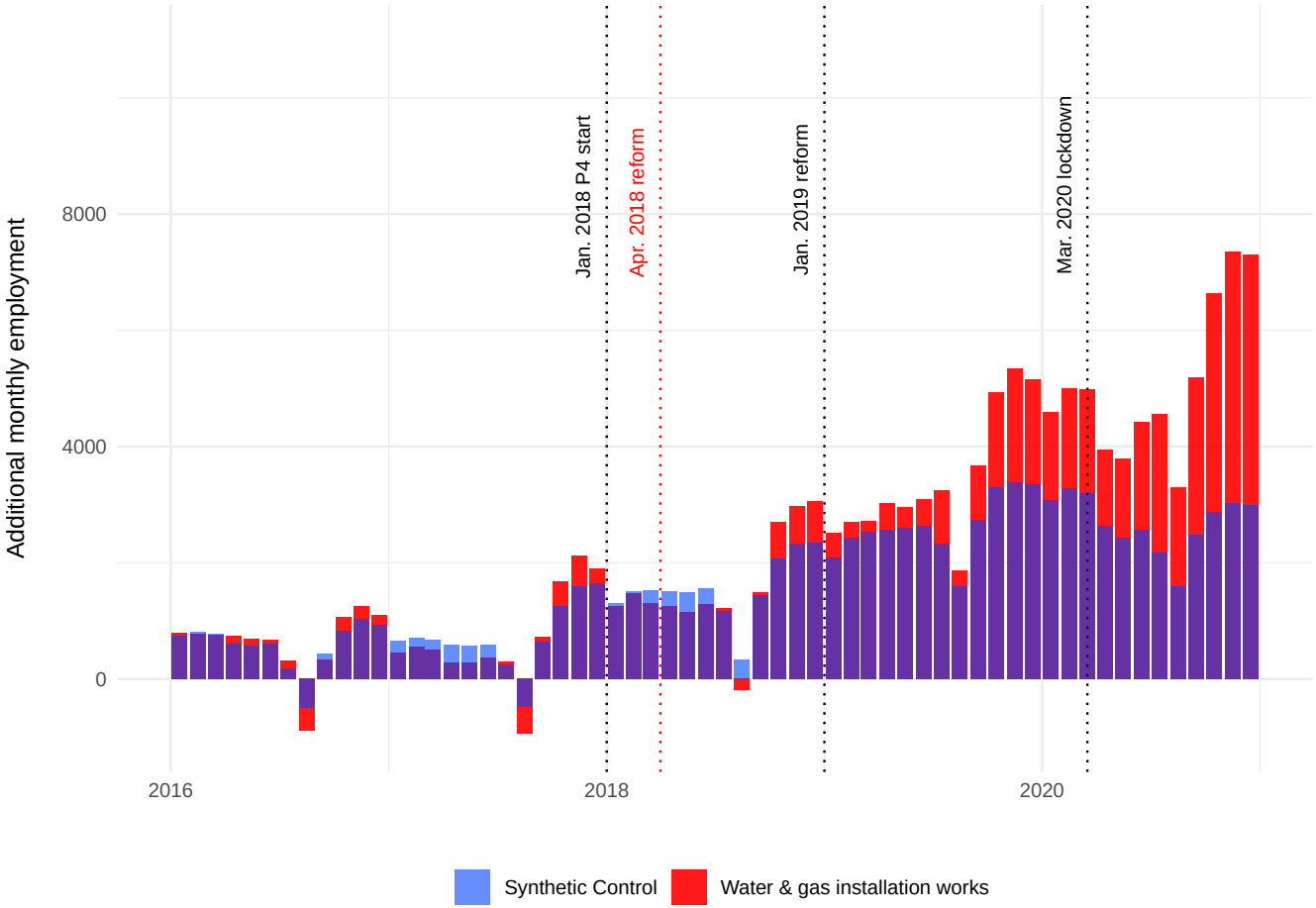
Related sectors

- The *RGE* label is a quality certification for energy renovation firms
- We use this label to identify other sectors involved in the renovation industry



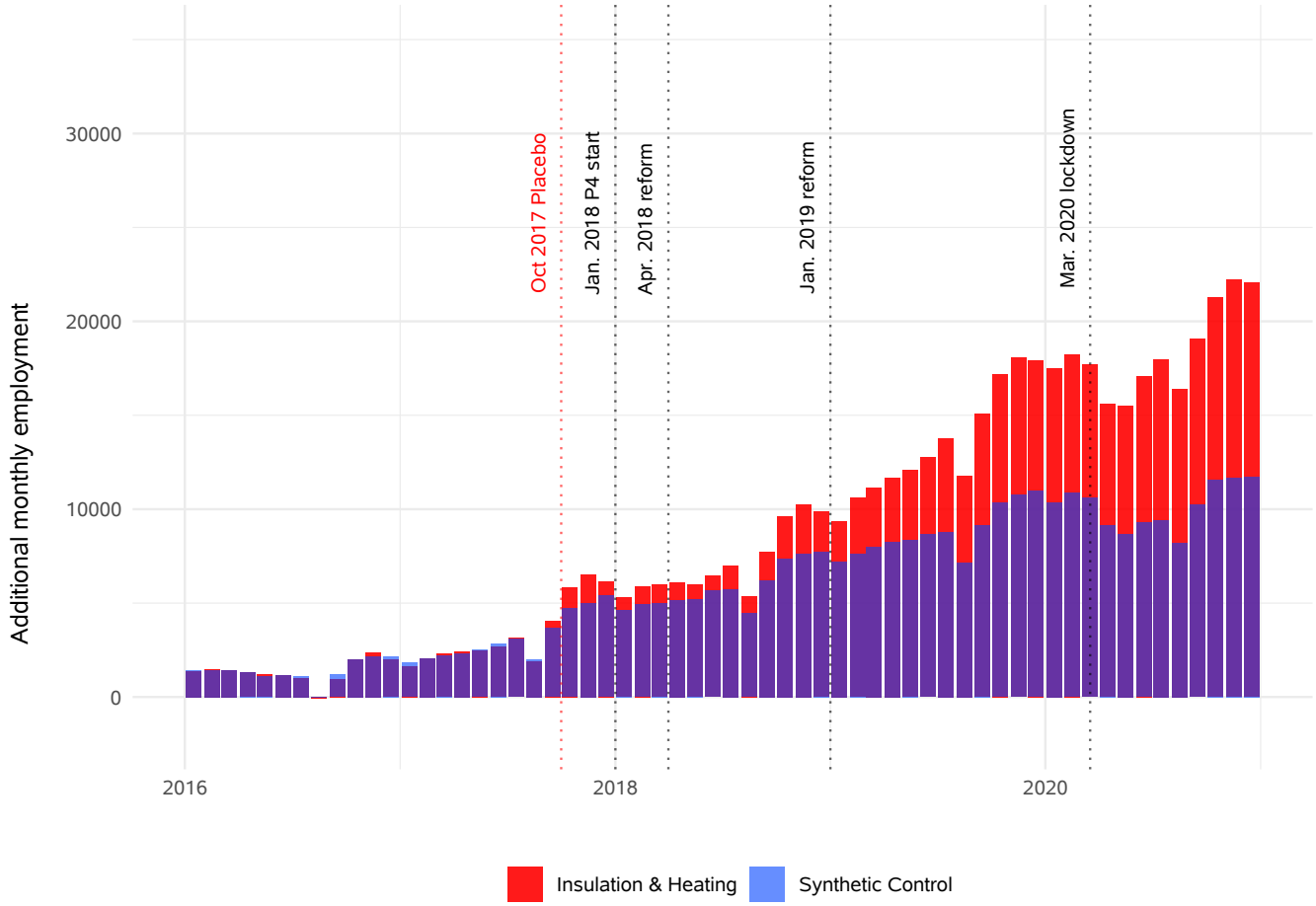
Top 10 sectors by headcount within certified firms

- Only 1 sector with an effect significant at 10%:
  Water & gas installation: **+1,150** (0.08)



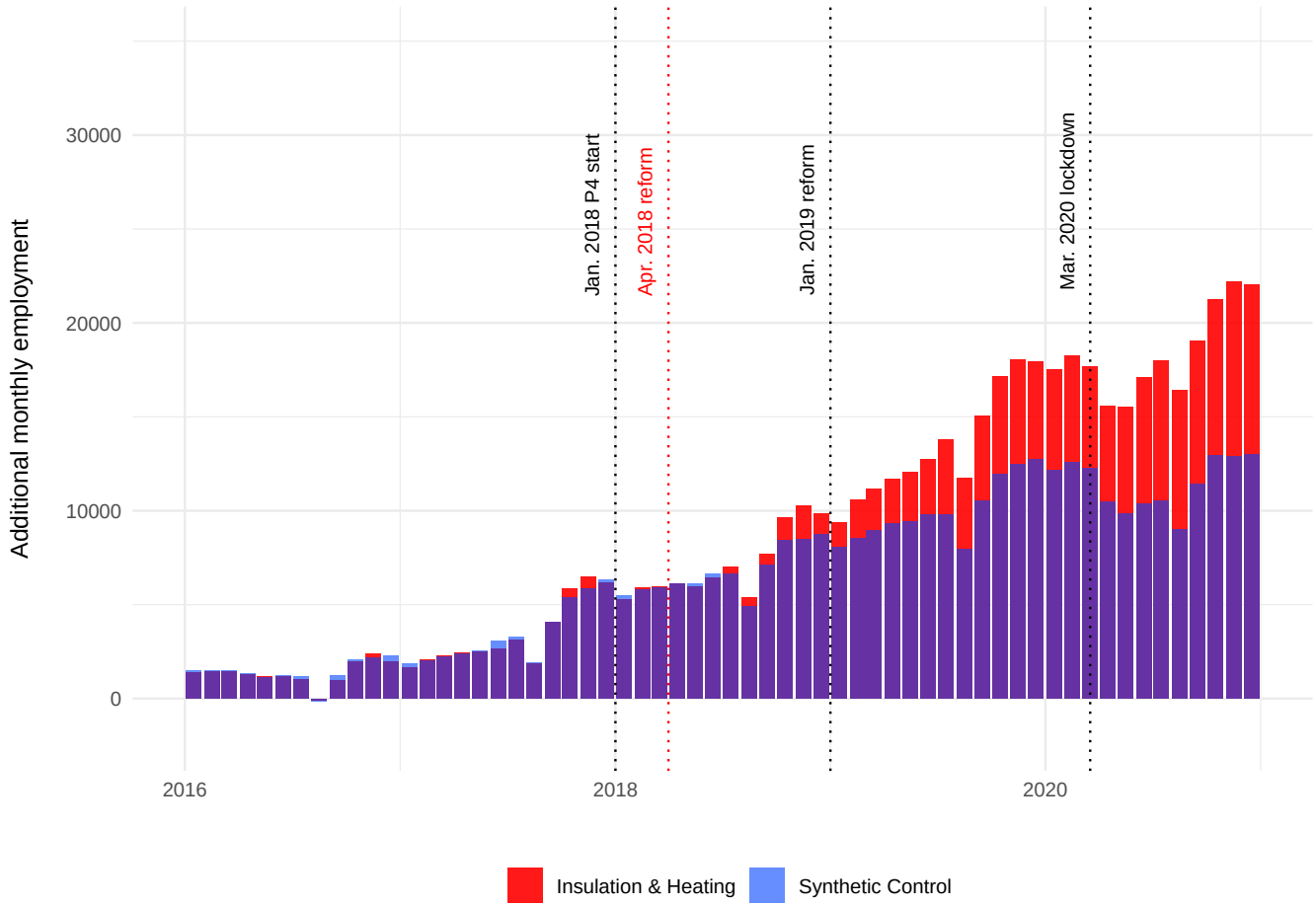
⇒ Effect of the policy concentrated on insulation and heating.

Anticipation test: assuming a policy start in October 2017



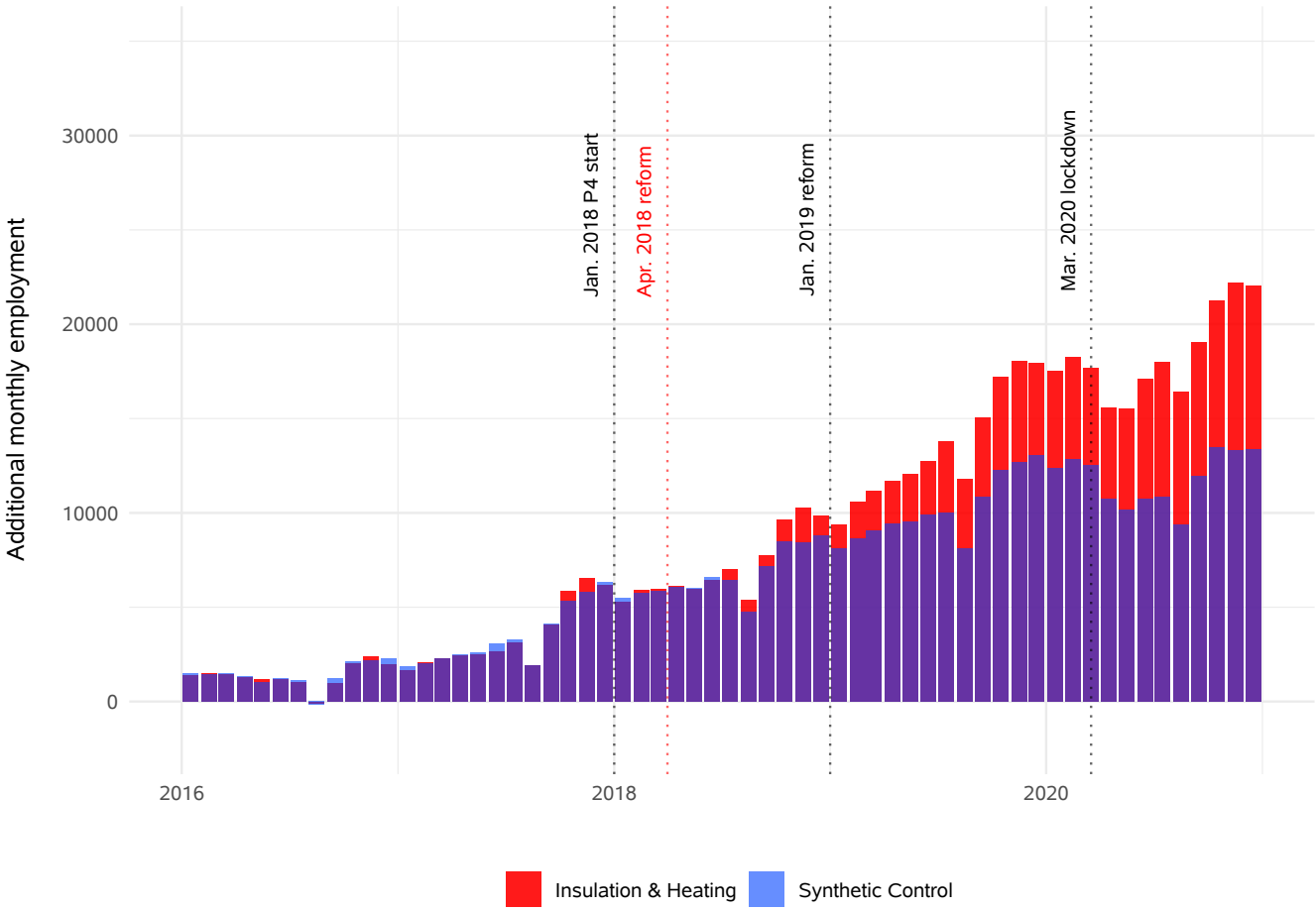
- Effect over 2017-T4 is **small** (about +1,000/year) and may stem from the **end of the third phase** rather than the changes introduced during the fourth phase; p-value $= 0.01$.

Placebo test: assuming a policy start in January 2018



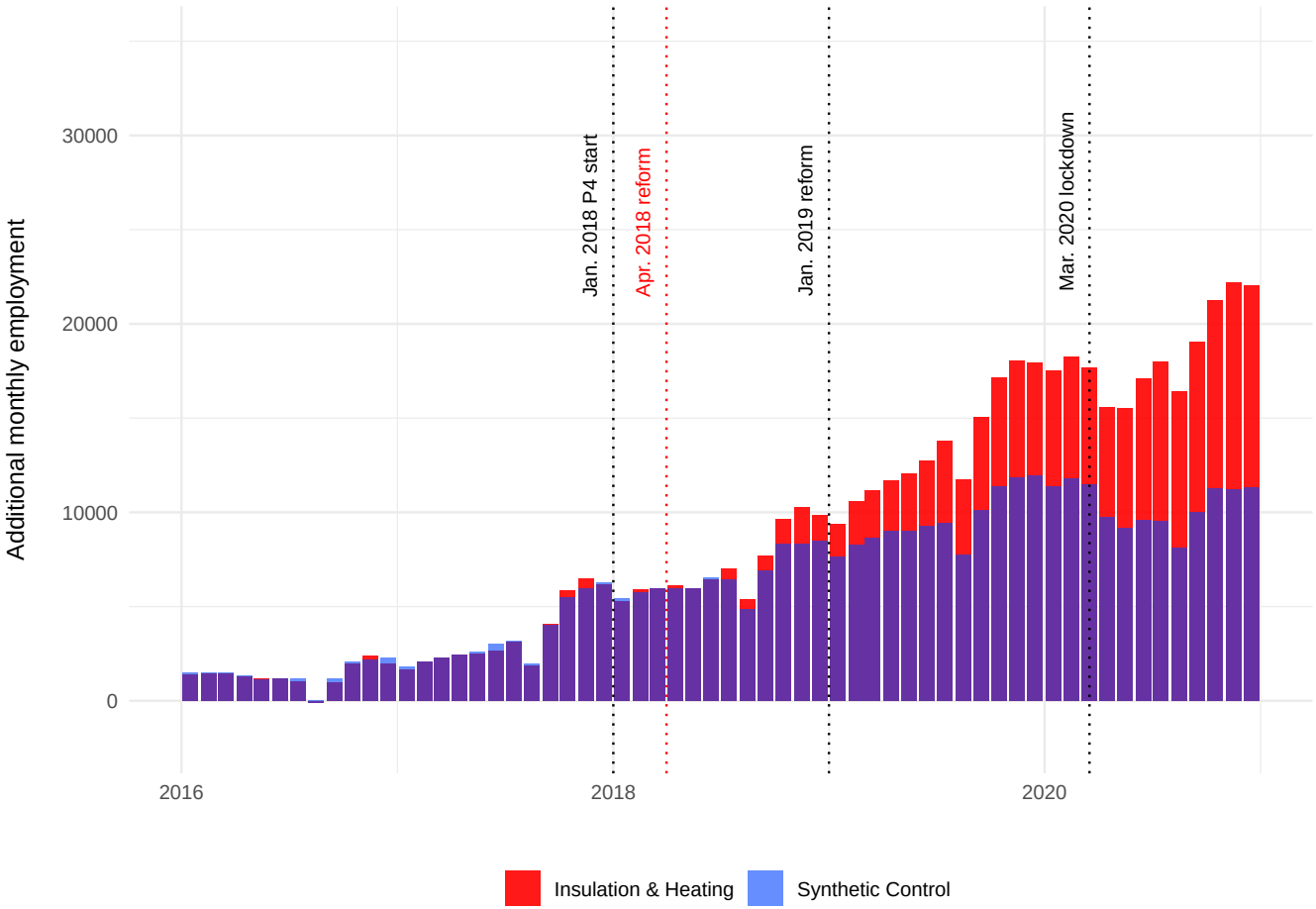
- Effect only starts after the first *implementation reform*, **similar to our baseline** (about +59,000 over 26 months); p-value = 0.03.

Donor pool with workforce size ±25% the treated sector



- Treatment effect slightly below the baseline: **+4,800** (0.02)

Donor pool with workforce size ±50% the treated sector



- Treatment effect slightly above the baseline: **+5,500** (0.01)