# Does Telework Widen the Abstract-Task Wage Premium?

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# Outline

# 1

# Motivation

# Research Question

**Central Question:**

- Did the post-2020 telework expansion **amplify or compress** the abstract-task wage premium?

**Why It Matters:**

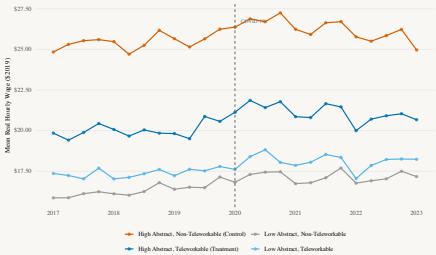
- Abstract-task premium drives upper-tail inequality
- Telework reshapes who benefits from cognitive work
- Policy: return-to-office mandates

**Theory Is Ambiguous:**

$+$ Productivity gains, monopsony reduction

$-$ Supply expansion, compensating differentials

$\Rightarrow$ **Empirical question**



## Identification Strategy

**Key Insight: Not all abstract-task occupations are equally teleworkable.**

### Treatment: Teleworkable Abstract

- Management analysts
- Software developers
- Financial analysts, economists

**52,771 obs, 110 occupations**

### Control: Non-Teleworkable Abstract

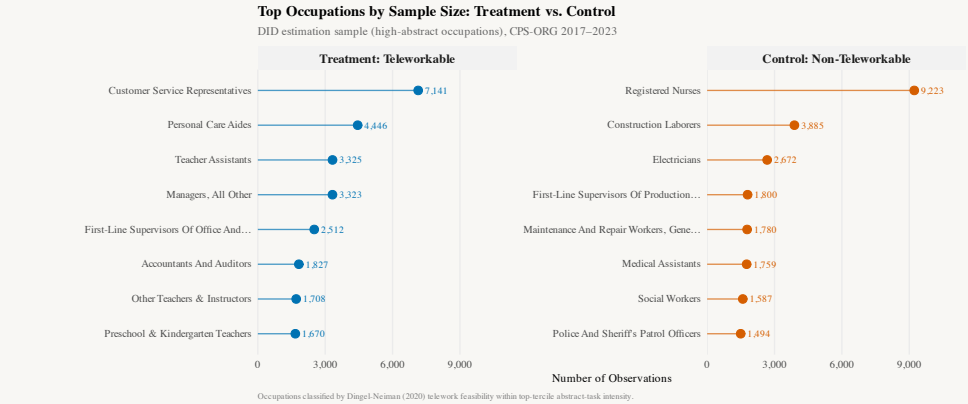
- Surgeons, dentists
- Veterinarians
- Chemical engineers

**41,627 obs, 75 occupations**

### Within-Abstract-Task Comparison

Both groups: college-educated, high-wage, cognitively intensive, pandemic-exposed.
Only difference: **telework feasibility** (Dingel-Neiman 2020).

# Who Are the Treatment and Control Occupations?




Borderline occupations (Customer Service Reps, Personal Care Aides) absorbed by occ. FE; above-median abstract restriction: $\hat{\beta} = 0.028$ ($p = p < 0.05$).

# 2

## Literature & Contribution

## Related Literature

This paper connects to **three strands** of literature:

**Task-Based Inequality**

- Autor, Levy, Murnane (2003)
- Autor & Dorn (2013)
- Deming & Noray (2020)
- Acemoglu et al. (2022)

**Economics of Telework**

- Bloom et al. (2015)
- Barrero et al. (2023)
- Dingel & Neiman (2020)
- **Gap we fill**

**Monopsony & Wages**

- Manning (2003)
- Azar et al. (2022)
- Mas & Pallais (2017)
- Bloom et al. (2024)

**Contribution:** A causal estimate of how telework access mediates the abstract-task wage premium, distinct from existing studies, using within-task variation in telework feasibility.

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# Research Design

## Difference-in-Differences Specification

### Baseline Specification:

$$\ln(w_{i,o,t}) = \alpha + \underbrace{\beta \cdot (\text{Teleworkable}_o \times \text{Post}_t)}_{\text{Treatment Effect}} + \gamma' X_{i,t} + \alpha_o + \alpha_t + \varepsilon_{i,o,t}$$

- $w_{i,o,t}$: real hourly wage; $\text{Teleworkable}_o$: Dingel-Neiman (2020) binary, time-invariant
- $\text{Post}_t$: indicator for $\geq$ 2020Q1; $\alpha_o$, $\alpha_t$: occupation and YQ FE
- SEs clustered at occupation level (185 clusters)

**Identifying Assumption**

Parallel trends: absent telework shock, wages in teleworkable and non-teleworkable abstract-task occupations would have evolved along parallel paths.

## Seven Progressively Saturated Specifications

| Col. | Specification | Key Addition |
|---|---|---|
| (1) | Occupation + Year-Quarter FE only | Baseline |
| (2) | + Demographics | Experience, gender, marital |
| (3) | + Education + Race FE | Human capital controls |
| (4) | + Industry FE | Sector shocks |
| (5) | + State FE | **Preferred specification** |
| (6) | RPP-adjusted wages | Regional price levels |
| (7) | + Industry × YQ FE | Saturated (lower bound) |

**Extensions:**

- Event study: quarter-specific interactions for dynamic effects
- Continuous treatment: DN feasibility score $\in [0, 1]$; Triple-difference

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## Data & Summary Statistics

# Data Sources

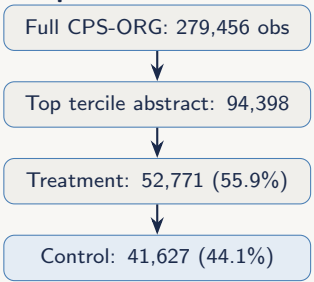
**Primary Data:**

- CPS-ORG, 2017Q1–2023Q1 (25 quarters)
- Civilian employed, age 18–64
- Real 2019 dollars (CPI-U-RS)
- Imputed wages dropped (Hirsch-Schumacher)

**Supplementary Data:**

- O*NET v29.1: task content indices
- Dingel-Neiman: telework feasibility
- BEA RPPs: regional price adjustment

**Sample Construction:**



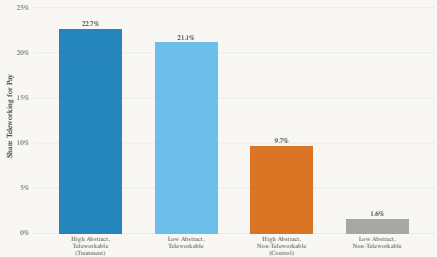
# First-Stage Evidence

**CPS Telework Supplement (Oct 2022+):**

| Group | Telework Rate |
|---|---|
| Treatment (TW-feasible) | 22.7% |
| Control (non-TW) | 9.7% |
| **Gap** | **13 pp** |

Dingel-Neiman classification predicts realized telework adoption.

Treatment is **intent-to-treat**: feasibility, not actual adoption.

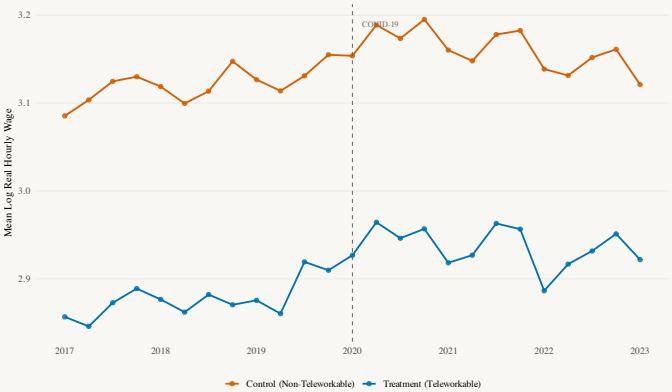



Actual telework rates by task-TW quadrant, CPS 2022+.

# 5

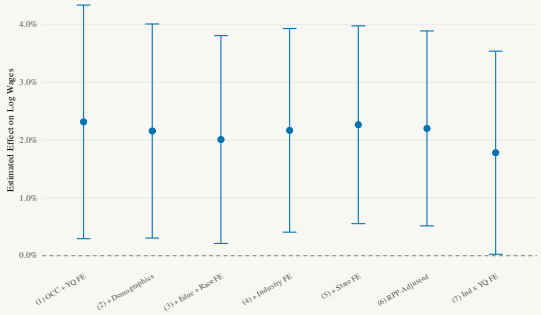
# Results

# Descriptive Evidence: Parallel Pre-Trends




Mean log real hourly wages for DID sample. Treatment = teleworkable high-abstract. Control = non-teleworkable. Vertical line = 2020Q1.

# Baseline DID: Stable Across Seven Specifications




Coefficient on Treated × Post across specifications with 95% CIs.

**Preferred estimate (Col. 5):**

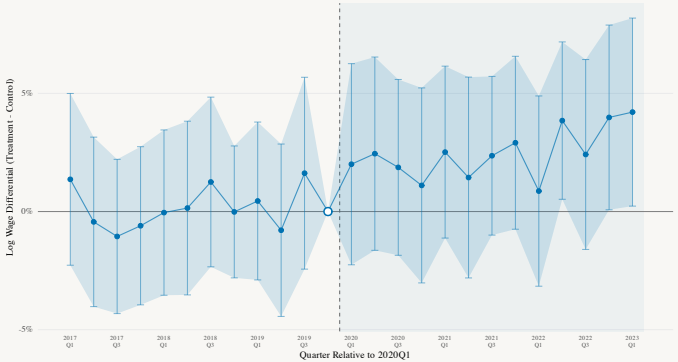
$$\hat{\beta} = 0.023$$
$$(SE = 0.009,\ p < 0.05)$$

- **2.3% wage premium**
- Range: 1.8–2.3% across 7 specs
- $R^2$: 0.392 → 0.544; $N$ = 94,398

**Oster (2019) stability:**

- $\delta = 49.43$ (need $> 1$ to explain away)
- Bias-adjusted $\hat{\beta}$: 2.2%

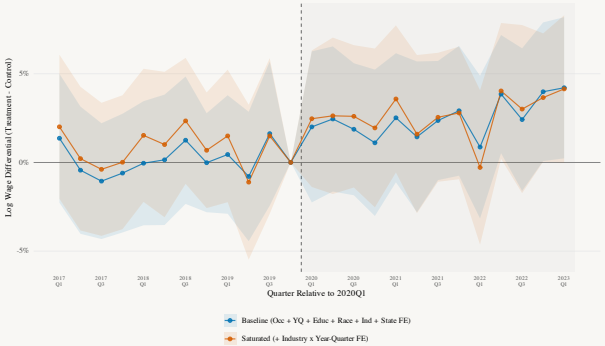
# Event Study: Gradual Post-Treatment Divergence




- ✓ Pre-trend F-test: $p = 0.886$
- ✓ Flat pre-period coefficients
- ✓ Gradual emergence post-2020
- ✓ Avg post-period: 2.5%

Event-study coefficients. Reference: 2019Q4. 95% CIs. Preferred spec with occ, YQ, educ, race, ind, state FE.

# Event Study: Baseline vs. Saturated




- Ind $\times$ YQ FE absorbs sector shocks; attenuated but same pattern
- Lower bound: 1.8%; saturated pre-trend $p = 0.703$

Blue = preferred. Orange = saturated (+ ind $\times$ YQ FE). 95% CIs.

# Continuous Treatment and Triple-Difference

**Continuous DID (high-abstract):**

$\hat{\beta} = 0.025$ $(p < 0.05)$

One-unit TW feasibility $\rightarrow$ **2.5% premium**

**Triple-Difference (full sample):**

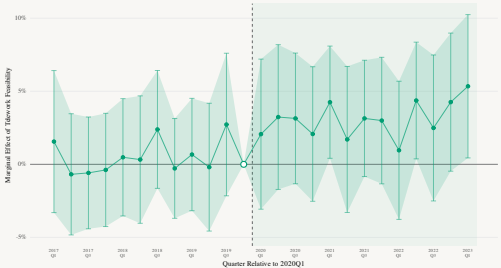
$\hat{\beta} = 0.020$ $(p < 0.05)$

Premium is **specific to abstract occupations**

**Tercile Analysis:**

Mid: $0.025^{***}$ $(0.008)$; High: $0.022^{**}$ $(0.010)$

$\rightarrow$ Threshold effect, not dose-response




Marginal effect of TW feasibility at each quarter. Ref: 2019Q4.

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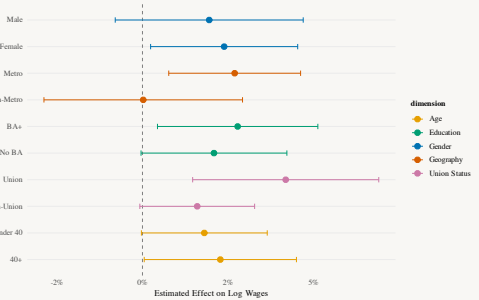
# Heterogeneity

# Heterogeneity: Metro/Non-Metro Is the Key Split




Split-sample estimates with 95% CIs. Preferred specification.

**Geographic:**

- Metro: **2.7%** ($p < 0.01$)
- Non-metro: 0.0% ($p = 0.99$)

$\rightarrow$ **Monopsony reduction** in dense markets

**Gender:**

- Female: 2.4% ($p < 0.05$); Male: 2.0% ($p = 0.17$)

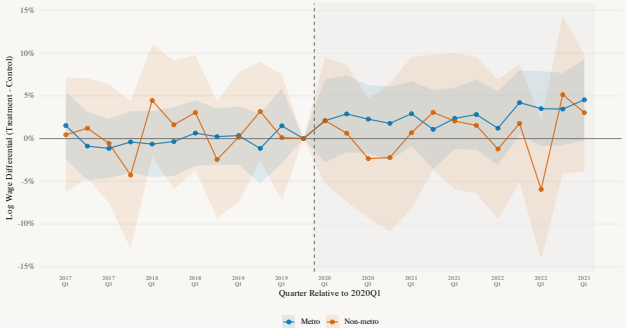
**Union:**

- Union: **4.2%** ($p < 0.01$); Non-union: 1.6% ($p < 0.10$)

**Age:**

- Under 40: 1.8%; 40+: 2.3%

# Metro vs. Non-Metro Event Studies




- Metro: clear post-2020 divergence with flat pre-trends
- Non-metro: no discernible pattern in either period

Separate event studies for metro (blue) and non-metro (orange) subsamples. Reference: 2019Q4.

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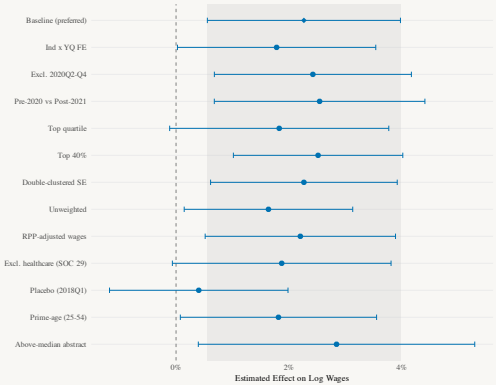
# Robustness

# Robustness Checks




Each point = separate specification. Shaded band = preferred 95% CI.

**Specification Tests:**

- Placebo: 0.004 ($p = 0.62$) ✓
- No peak: 0.024 ($p < 0.01$) ✓
- Top quartile: 0.018 ($p < 0.10$) ✓
- Unweighted: 0.016 ($p < 0.05$) ✓

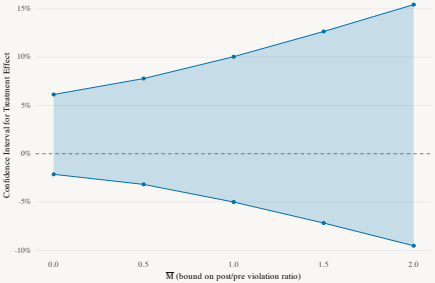
**Sample Restrictions:**

- No healthcare: 0.019 ($p < 0.10$)
- Prime-age: 0.018 ($p < 0.05$)
- Above-med. abstract: 0.028 ($p < 0.05$)

All within **1.8–2.3% range**.

# Honest DID: Sensitivity to Parallel Trends Violations

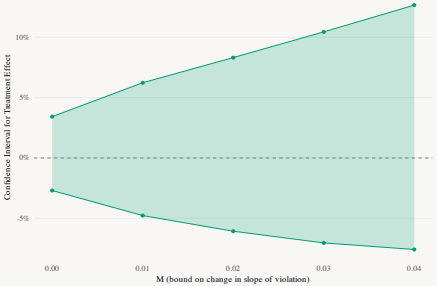
### Relative Magnitudes




At $\bar{M} = 0$: [-0.021, 0.061]

→ **Robust for moderate $\bar{M}$**

### Smoothness Restriction




At $M = 0$: [-0.027, 0.034]

CI includes zero; more fragile

Rambachan & Roth (2023). RM bounds post-treatment violations relative to pre-treatment.

# 8

# Conclusion

## Summary & Takeaways

1. **Main finding:** Teleworkable abstract-task occupations earned a **2.3% premium** post-2020
   - \$855–\$1,090/yr; stable at 1.8–2.3% across 7 specs
   - Oster $\delta = 49.43$; flat pre-trends ($p = 0.886$)
2. **Mechanism:** Monopsony reduction dominates
   - Metro: 2.7% vs. non-metro: null; Union: 4.2% vs. non-union: 1.6%
3. **Policy:** RTO mandates may restore employer wage-setting power
   - Amazon 5-day RTO (Sept. 2024); 1.8–2.3% premium benchmarks the tradeoff

### Future Work

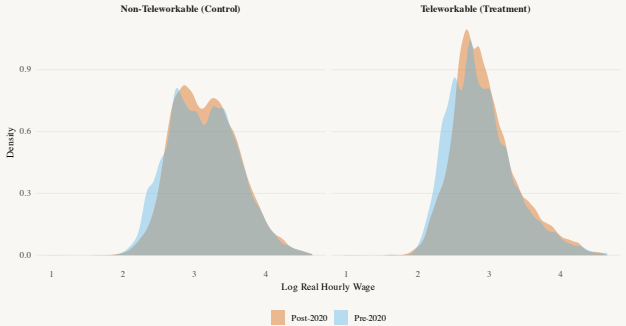
- Extend CPS-ORG window to assess persistence
- Firm-level matched employer-employee data for mechanism decomposition

# *Thank You*

Questions & Discussion

# *Appendix*

# A1: Wage Distribution Shifts




- Treatment group: rightward shift post-pandemic; control: smaller shift
- Consistent with DID capturing genuine distributional change

Kernel density estimates of log real hourly wages, CPS-ORG 2017Q1–2023Q1. CPS earnings weight.

# A2: Dollar Premium and Wald Estimate

**Exact semi-elasticity:** Premium $= (\exp(\hat{\beta}) - 1) \times \overline{w}$

| | Coefficient | Mean Wage | Premium |
|---|---|---|---|
| Lower bound (Col. 7) | 0.018 | \$23/hr | \$0.41/hr (\$855/yr) |
| Preferred (Col. 5) | 0.023 | \$23/hr | \$0.52/hr (\$1,090/yr) |

*Note:* ITT is the policy-relevant parameter. Naive Wald rescaling (17.5%) is too large to be credible — thin first-stage (13 pp gap), substantial non-compliance (9.7% of controls telework).

# A3: Full Baseline DID Table

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Treated × Post | 0.023 | | | | 0.023 | 0.022 | 0.018 |
| Occ FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| YQ FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Demographics | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Educ + Race FE | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry FE | | | | ✓ | ✓ | ✓ | |
| State FE | | | | | ✓ | ✓ | ✓ |
| RPP-adjusted | | | | | | ✓ | |
| Ind × YQ FE | | | | | | | ✓ |
| $R^2$ | 0.392 | | | | 0.541 | | 0.544 |
| $N$ | | | | 94,398 | | | |

All specs: SEs clustered at occ. level (185 clusters). Preferred = Col. 5.