

# Remote work, wages, and hours worked in the United States

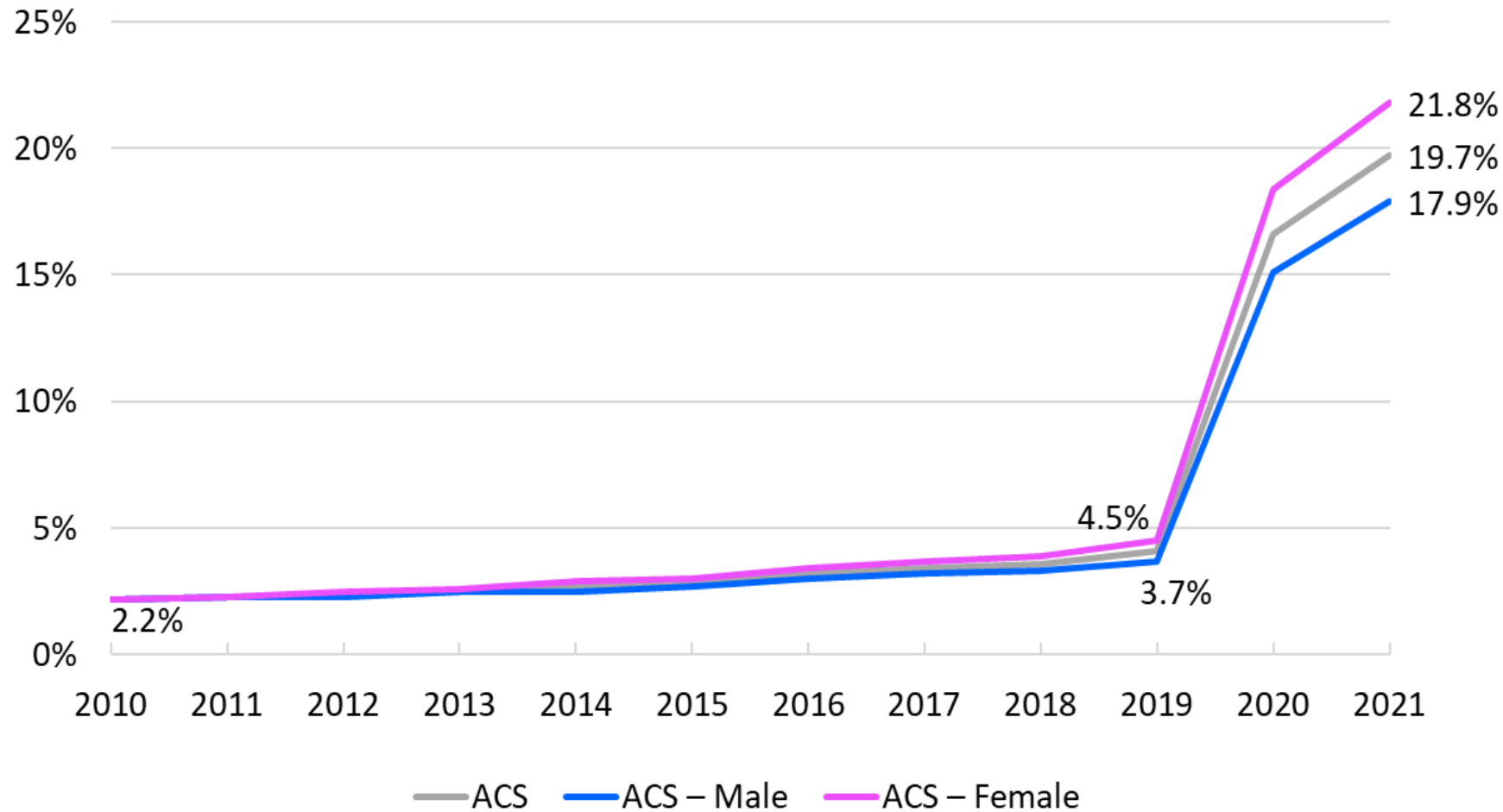
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# Percentage of full-time full-year employees working from home

Remote =home-based = WFH = hybrid mostly from home

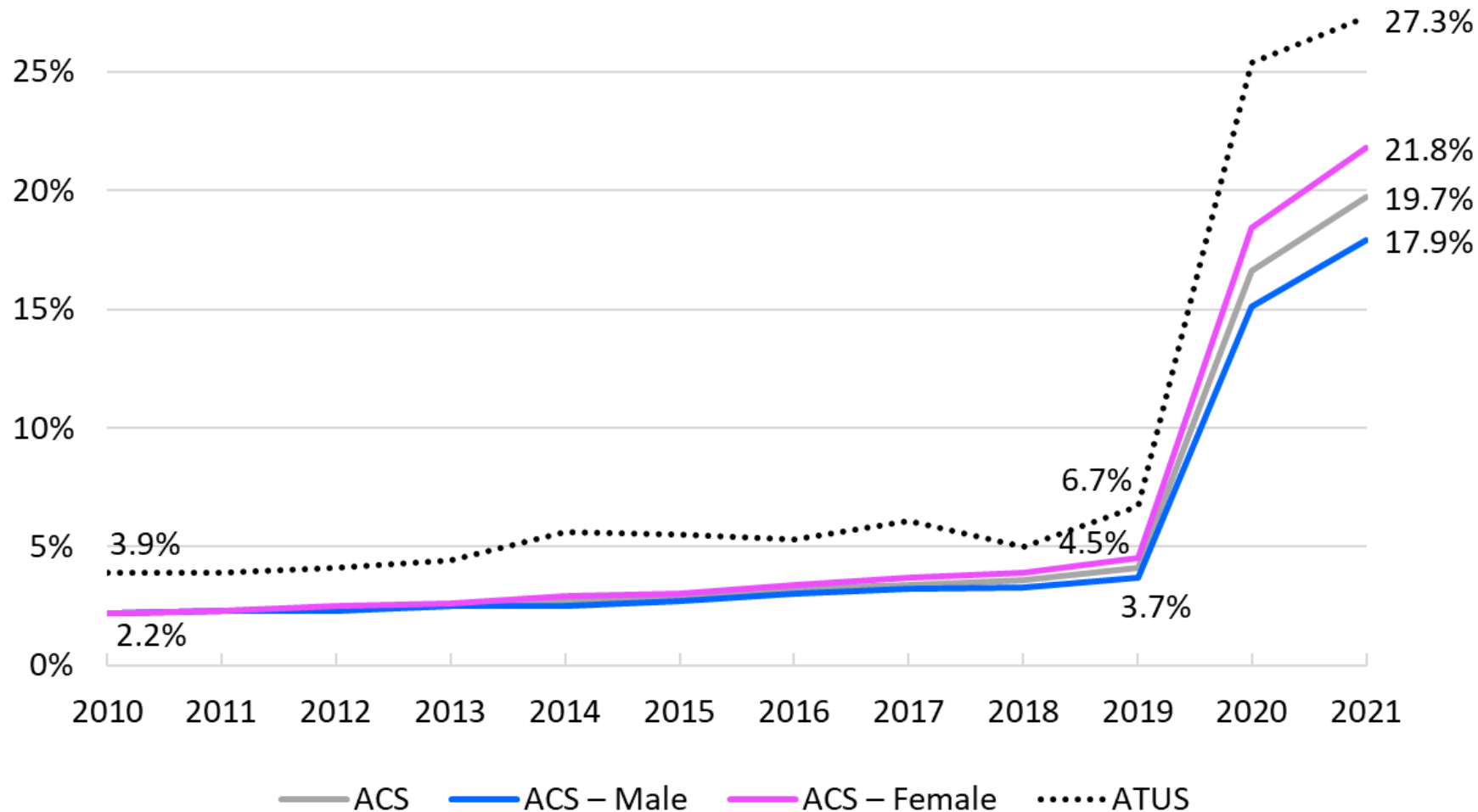


ACS: “How did this person usually get to work LAST WEEK?”

“Worked from home”

ACS 2010–2021 from IPUMS USA version 22.0 (Ruggles et al. 2022).

# Percentage of full-time full-year employees working from home



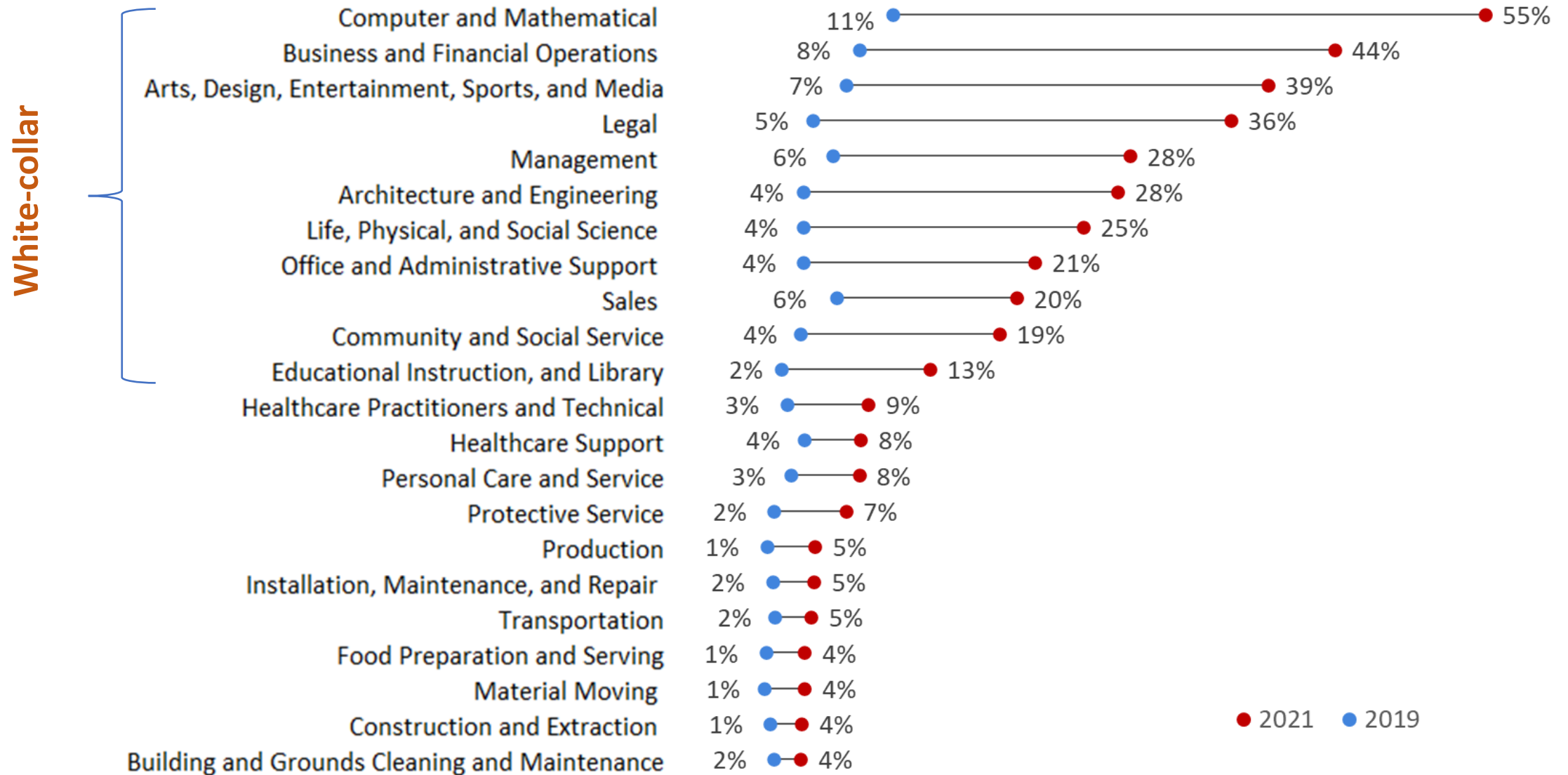
ATUS: Estimates are % working exclusively from home on workdays with at least 4 hours of work

ACS: “How did this person usually get to work LAST WEEK?”

“Worked from home”

ACS 2010–2021 from IPUMS USA version 22.0 (Ruggles et al. 2022).

# Percentage of remote workers in 2021 was uneven across occupations



# Research questions

- Do remote workers earn higher/lower wages? Work longer/shorter hours?
- How did remote/office-based wage differentials change during the pandemic?
- How did hours worked of remote workers change compared to office-based workers?
- Do trends vary by gender, occupation, and other demographic characteristics?
- Did wages of remote workers grow slower or faster than wages of on-site workers?

# Theory: Wage penalty or premium for WFH?

- Penalty

- Compensating differential story: Workers are willing to pay for WFH because WFH = job amenity (Mas & Pallais, 2017)
- Less productive workers may be selected into WFH (Emanuel & Harrington, 2023; Pabilonia & Vernon, 2022)
- Workers are less productive WFH with children present (Pabilonia & Vernon, 2023)

- Premium

- WFH increased worker productivity via reduced commute and better work environment
- WFH reduces costs for employers
- WFH increases costs for workers of maintaining workspace
- WFH is socially isolating - job disamenity

- Oettinger (2011), White (2019) American Community Survey (ACS) 1980 – 2014
  - “Home-based workers” paid a wage penalty, which shifted to a small wage premium by 2014
- Barrero et al. (2022): wage growth is lower in high-WFH jobs → lower inflation

# ACS 2010-21 Sample

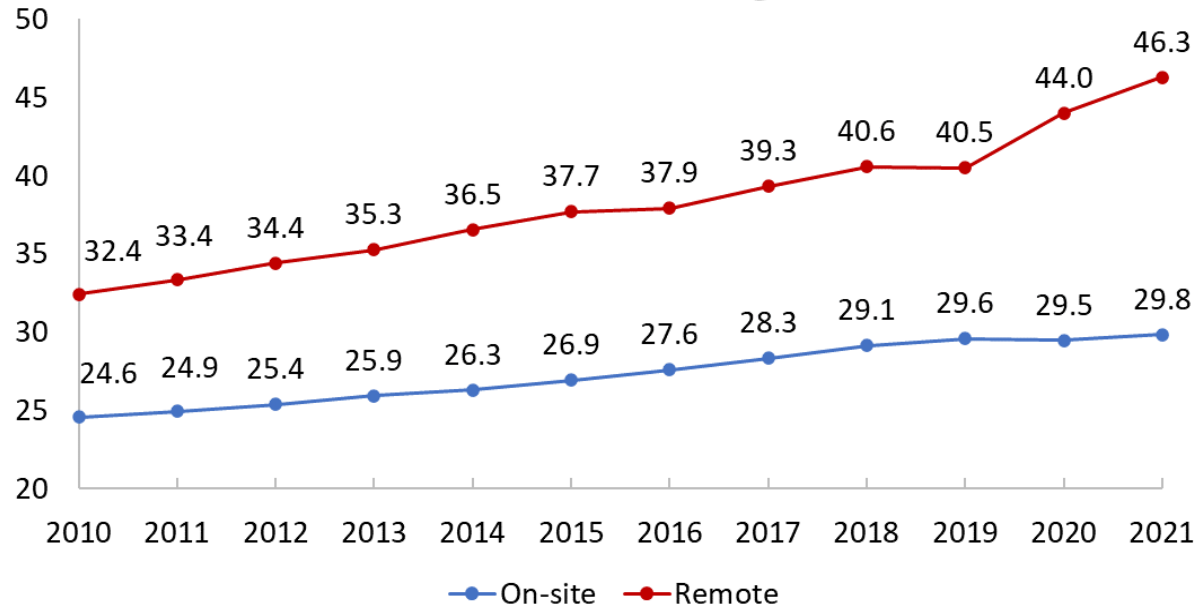
- Civilian non-institutionalized aged 25–64
- Full-time, wage and salary employees who worked at least 48 weeks over the prior 12 months in the nonfarm sector.
- Hourly wages = Total pre-tax wage and salary income for the past 12 months/ the product of weeks worked over the past 12 months and usual hours worked each week
- Hourly wages may be measured with error with respect to remote work because of the different reference period (last 12 months for income versus last week for WFH).
- Nominal wages are converted to real dollars using a two-year moving average of the CPI-U.
- Dropped observations with real hourly wages below \$3.

## Number of observations

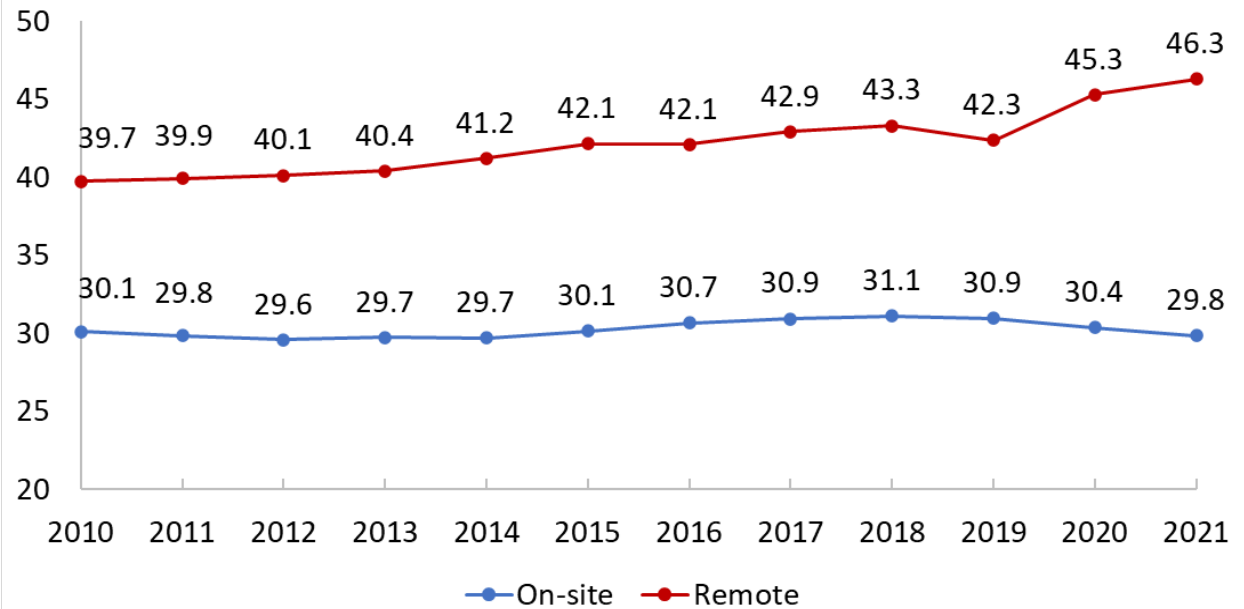
Year	On-site	Remote	Total
2010	756,207	17,097	773,304
2011	738,820	17,153	755,973
2012	751,911	18,847	770,758
2013	770,973	20,793	791,766
2014	774,846	22,071	796,917
2015	789,097	24,160	813,257
2016	796,038	27,269	823,307
2017	815,162	29,815	844,977
2018	825,914	31,858	857,772
2019	831,633	36,618	868,251
2020	560,976	100,982	661,958
2021	651,203	166,316	817,519
Total	9,062,780	512,979	9,575,759

# Widening of the raw wage gap during the pandemic

## Nominal wages



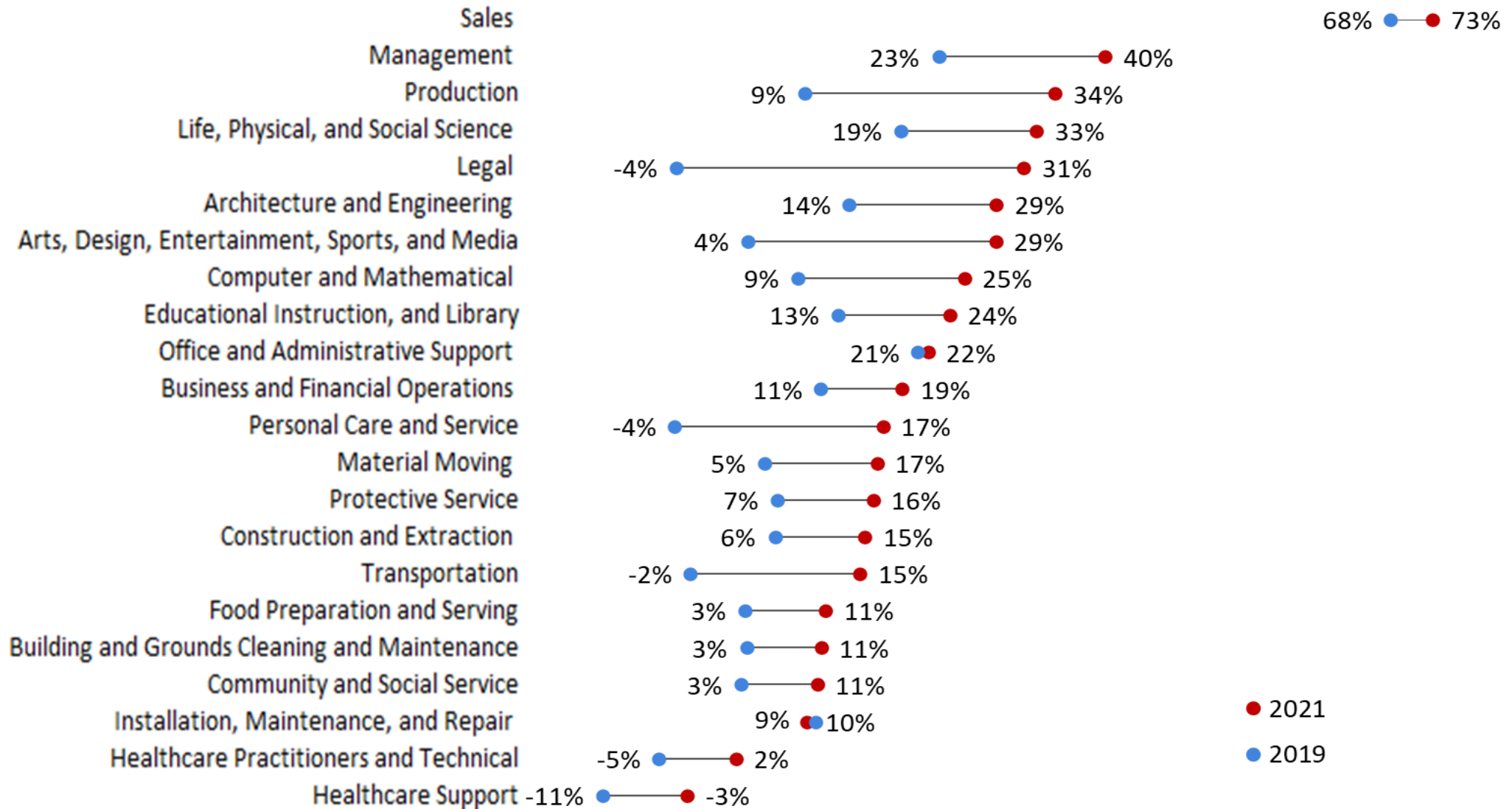
## Real wages



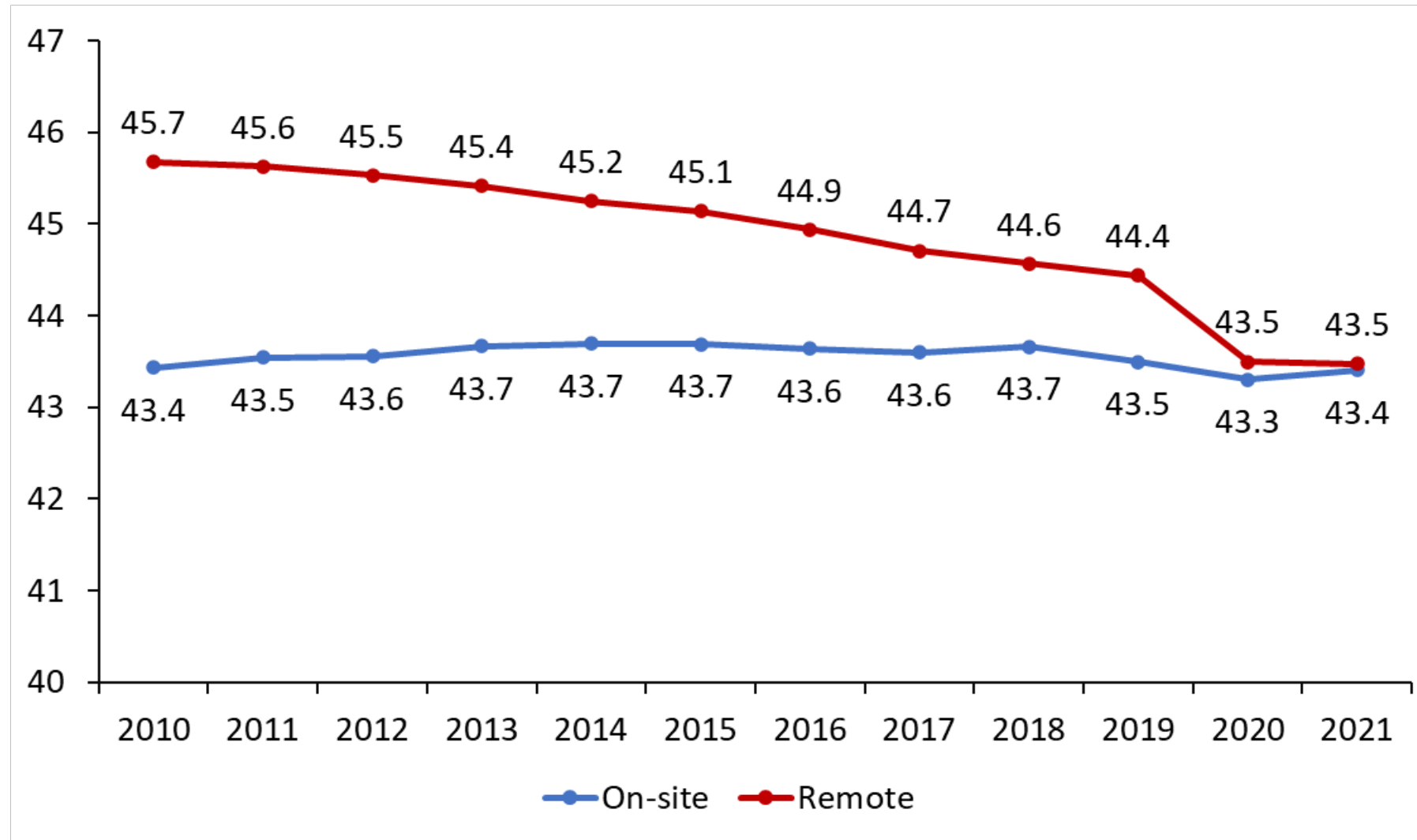
- On average, real wages rose for remote workers but fell slightly for on-site workers



# Unadjusted wage premia for remote workers rose in 22 out of 23 occupations between 2019 and 2021



# Usual hours worked by remote and on-site workers converged



# Log wage and log hours regressions

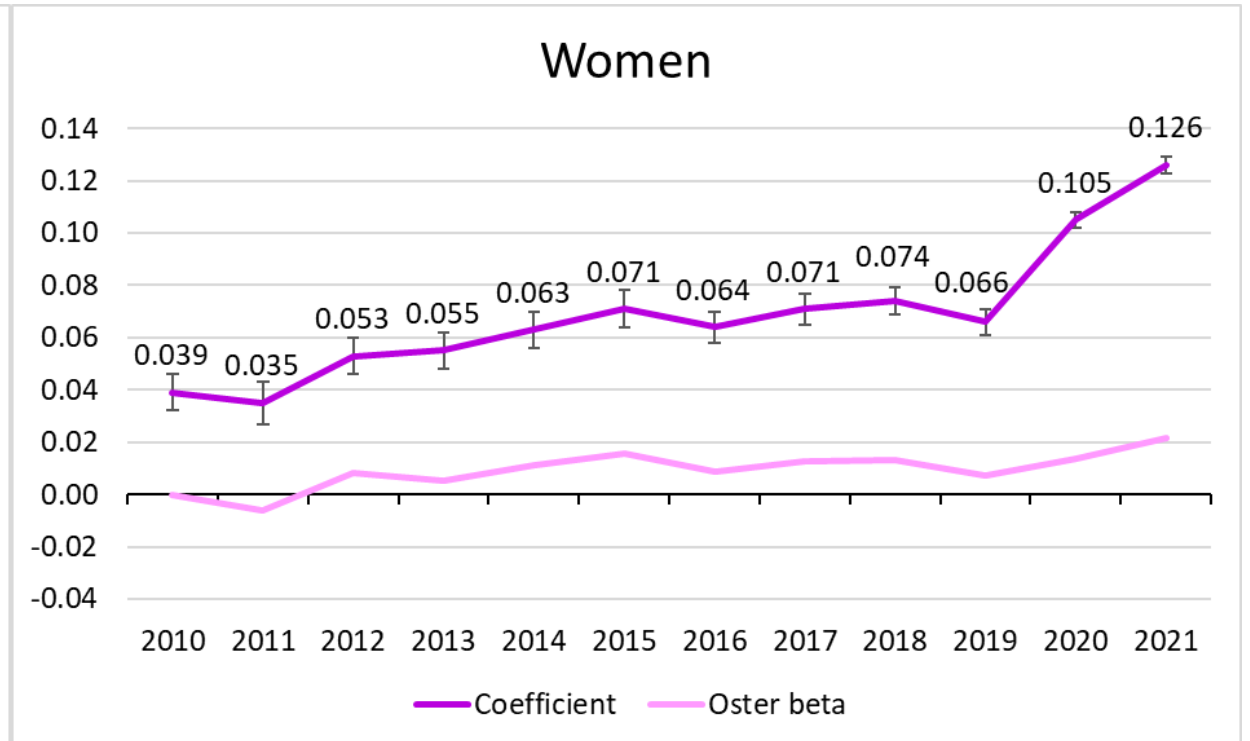
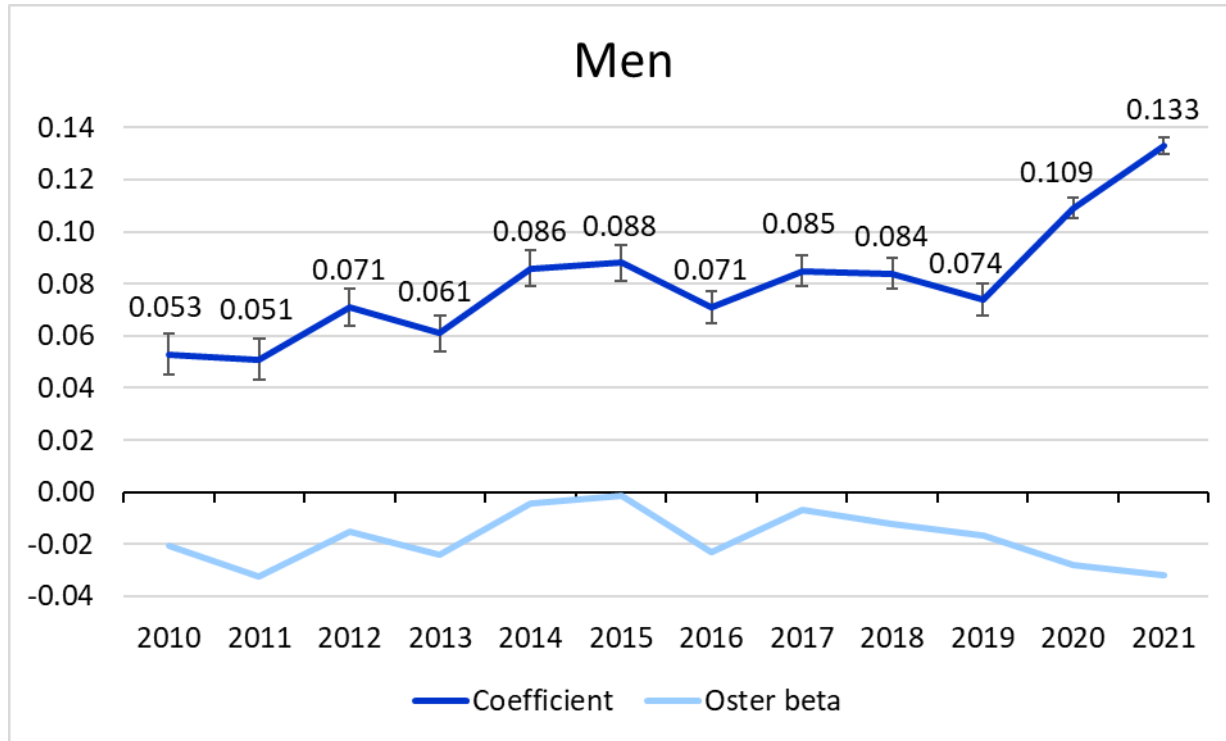
$$\ln(Y_{it}) = \alpha + \beta \text{Remote}_{it} + \gamma X_{it} + \varepsilon_{it}$$

- $Y$  is either hourly wage or hours worked
- $\text{Remote}$  is a binary indicator for working from home from commute question.
- $X$  includes controls for quadratic in age, number of own children under age 5, number of own children aged 5 to 17, number of adult family members, and binary indicators for educational attainment (less than high school, some college, bachelor's degree, and master's degree or higher), race (Black, Asian, and other race), Hispanic, married, cohabiting, disability, living with a partner/parent with a disability, government employee, 21 occupation groups, 19 industry groups, and state fixed effects.

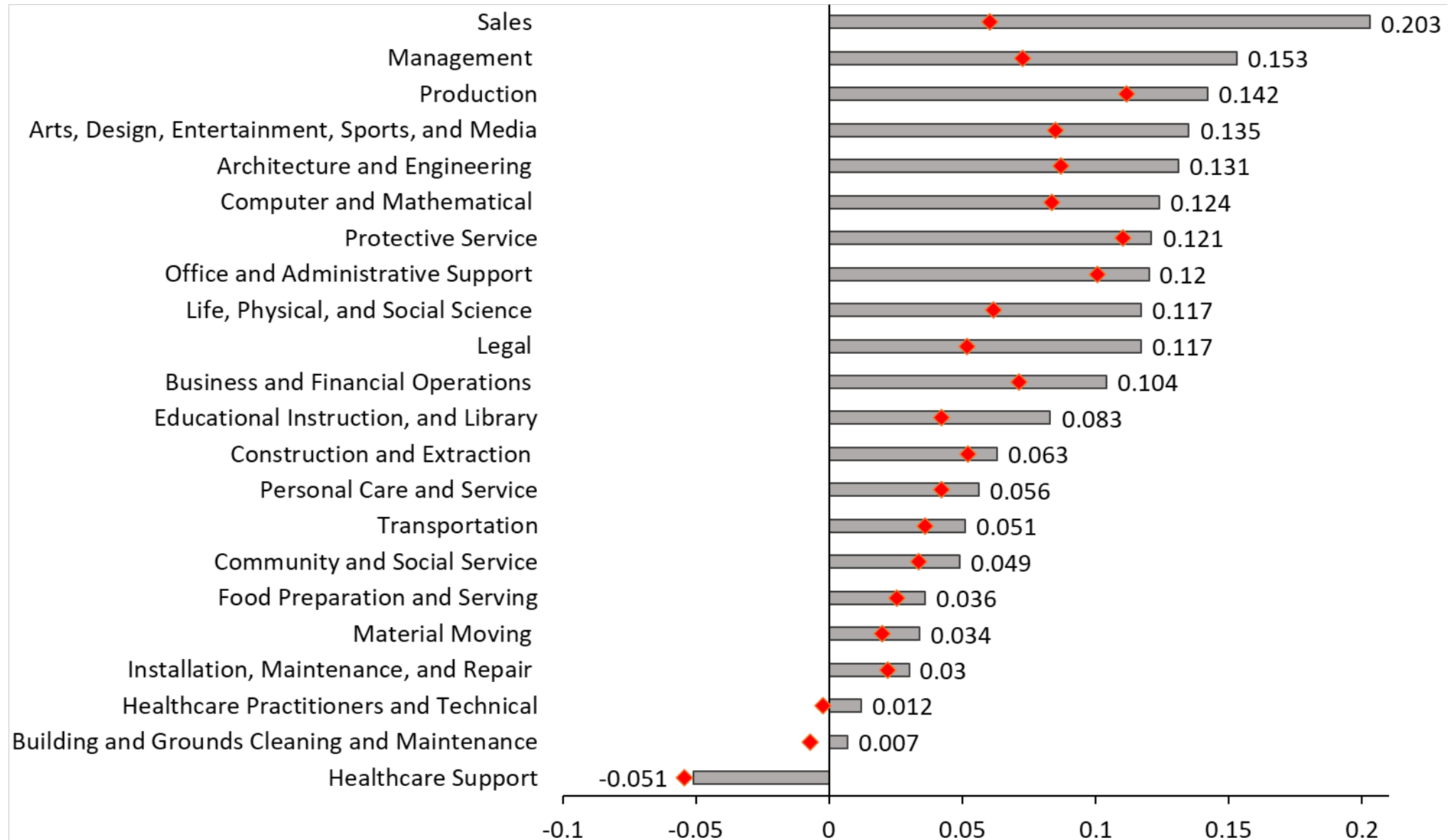
# Correcting for selection

- Our specification does not control for worker motivation or trust, job tenure, firm size, job benefits, etc., which may be correlated with remote work and wages/hours.
- Use Oster's method relating selection on observables to selection on unobservables to assess the importance of omitted variables for our estimates.
  - Calculate Oster betas.
    - Places bounds on the coefficient estimates.
    - In most instances, the Oster beta is a lower bound.
    - Our estimates are robust to omitted variable bias if the bounds do not include zero.

# Wage premia and Oster betas



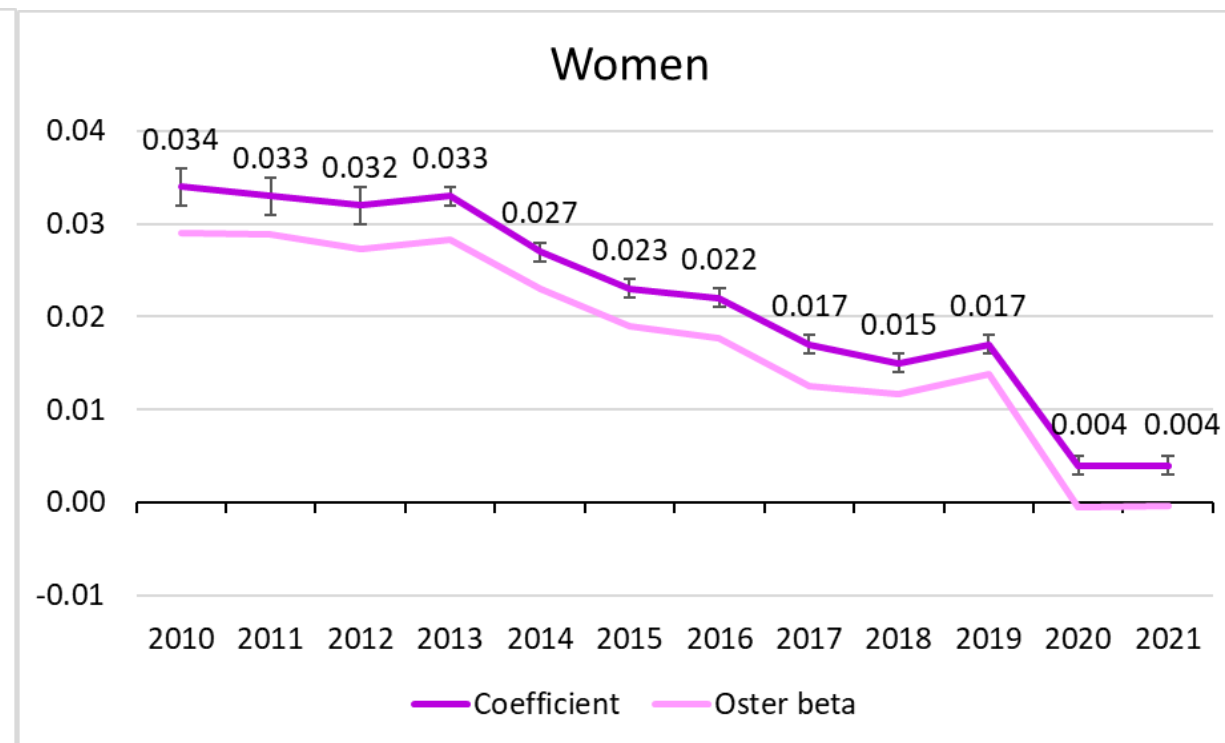
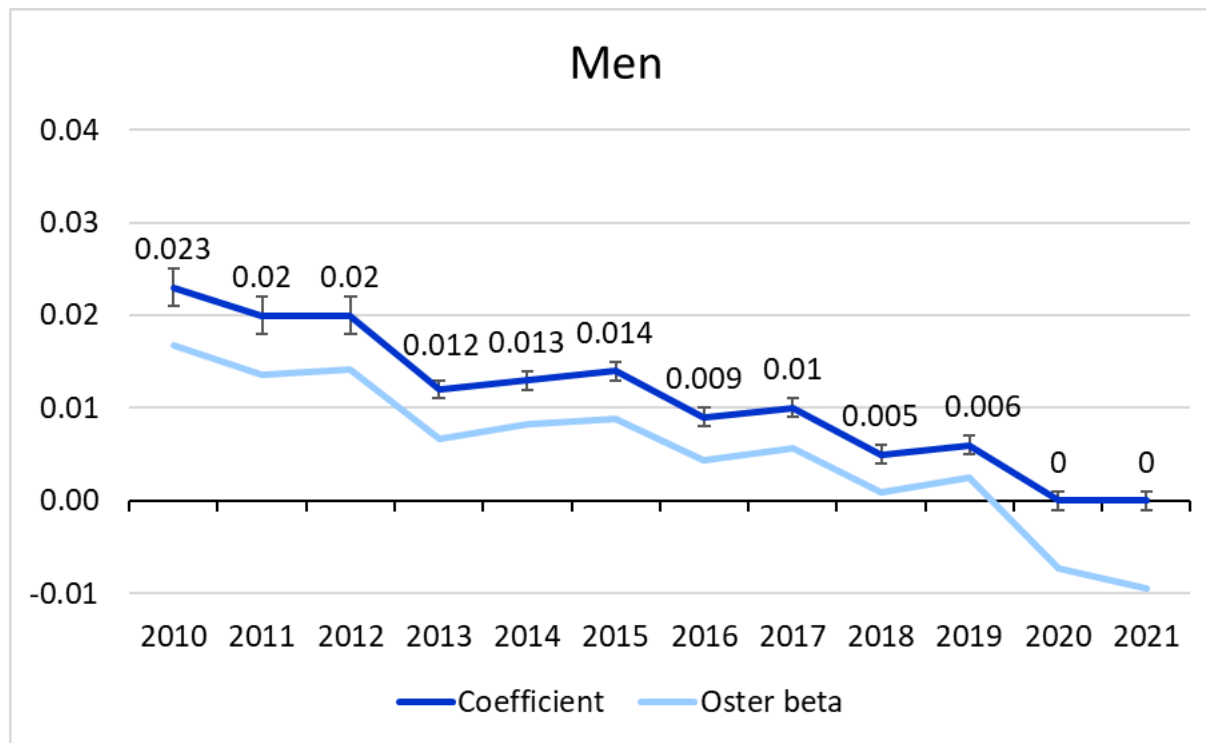
# 2021 Wage differentials and Oster betas by major occupation groups



# Decompositions of changes over time in the remote employment share and the mean log wage gap between remote and on-site workers, by time period

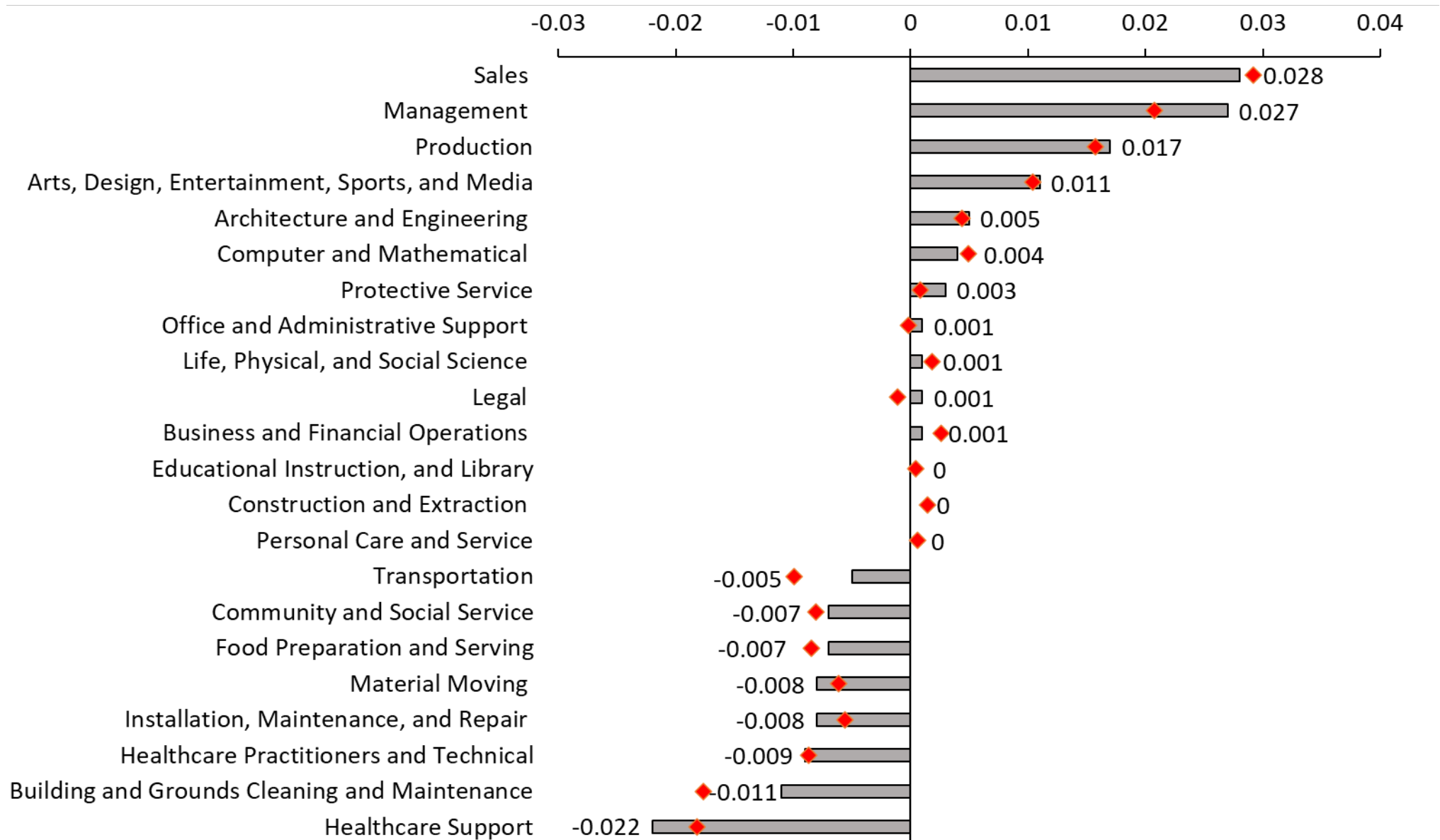
	2010-19	2019-21
<b>Total change in remote employment share</b>	0.0188	0.1560
Part due to changes in the composition of wage and salary employment across occupations	0.0004	0.0057
Part due to changes in remote employment shares within occupations	0.0184	0.1503
<b>Total change in mean log wage gap between remote and onsite workers</b>	0.0643	0.1320
Part due to changes in the mean observed skill gap between remote workers and onsite workers	0.0274	0.0884
Part due to changes in the returns to observed skills, given the mean gap in observed skills	0.0141	-0.0208
Part due to changes in the composition of remote employment across occupations	-0.0028	0.0014
Part due to changes in remote wage premia within occupations	0.0255	0.0630

# Hours differentials and Oster betas



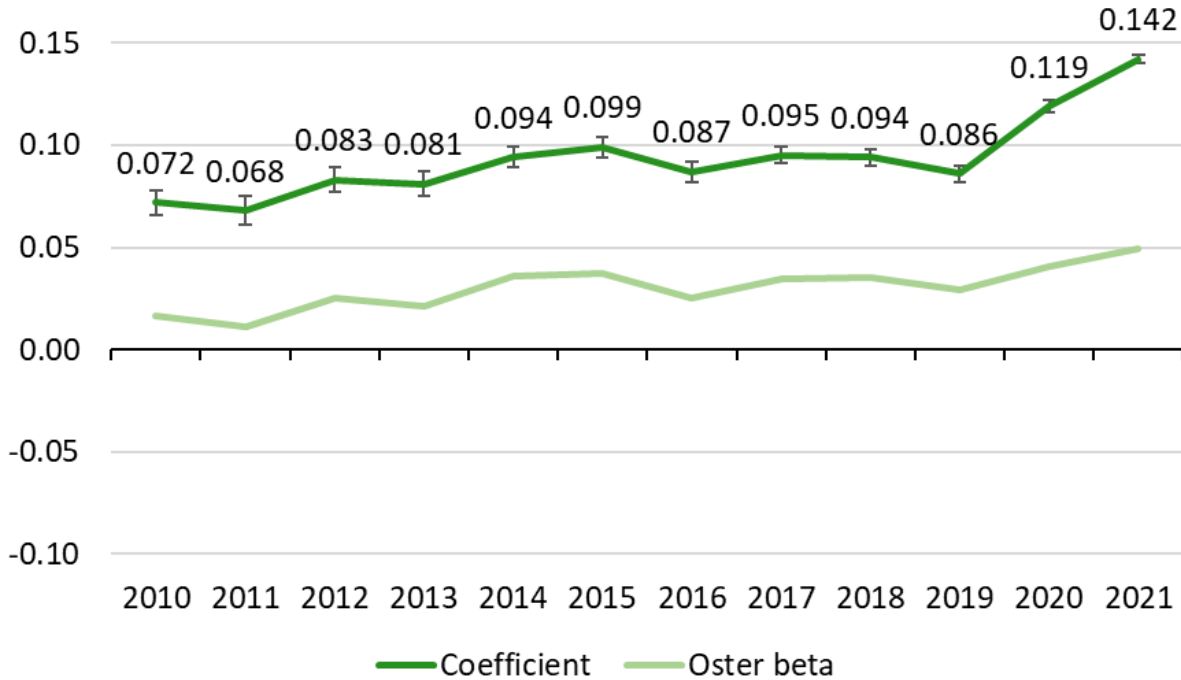


# 2021 Hours differentials and Oster betas by major occupation group

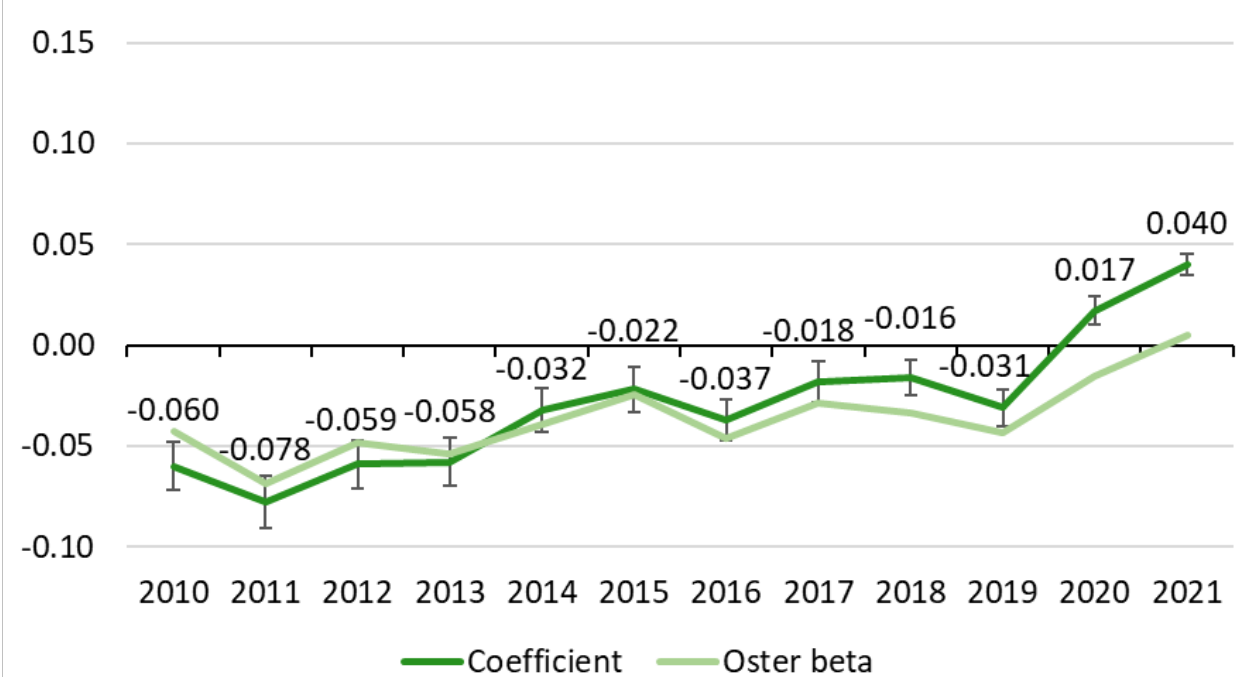


# White-collar and blue-collar wage differentials and Oster betas

## White-collar Occupations

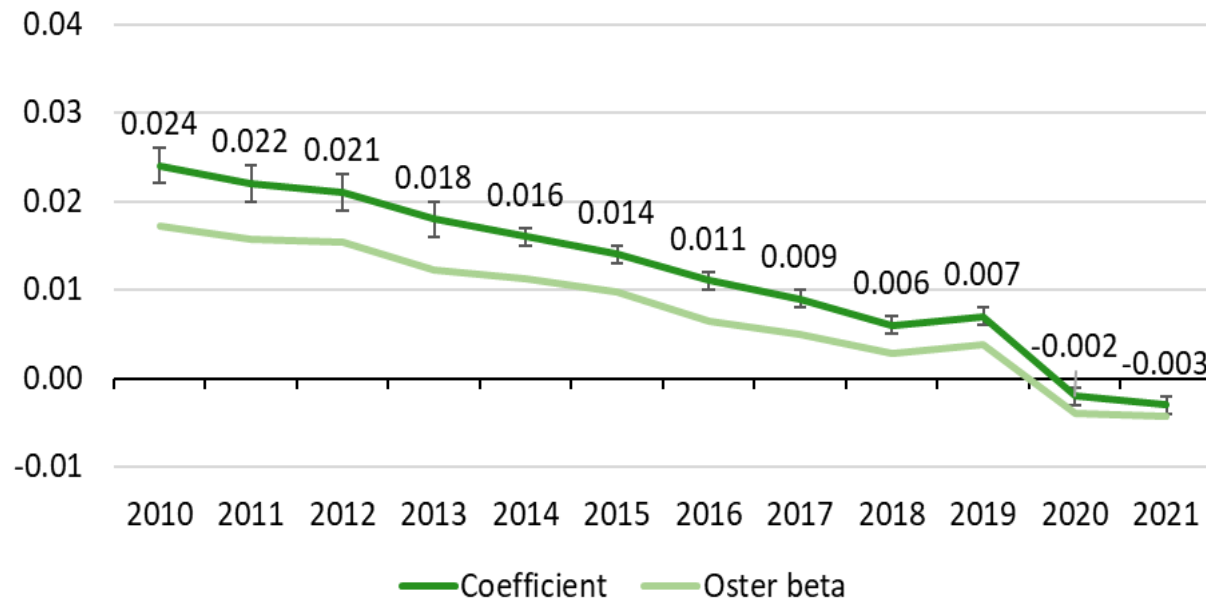


## Blue-collar and Healthcare Occupations

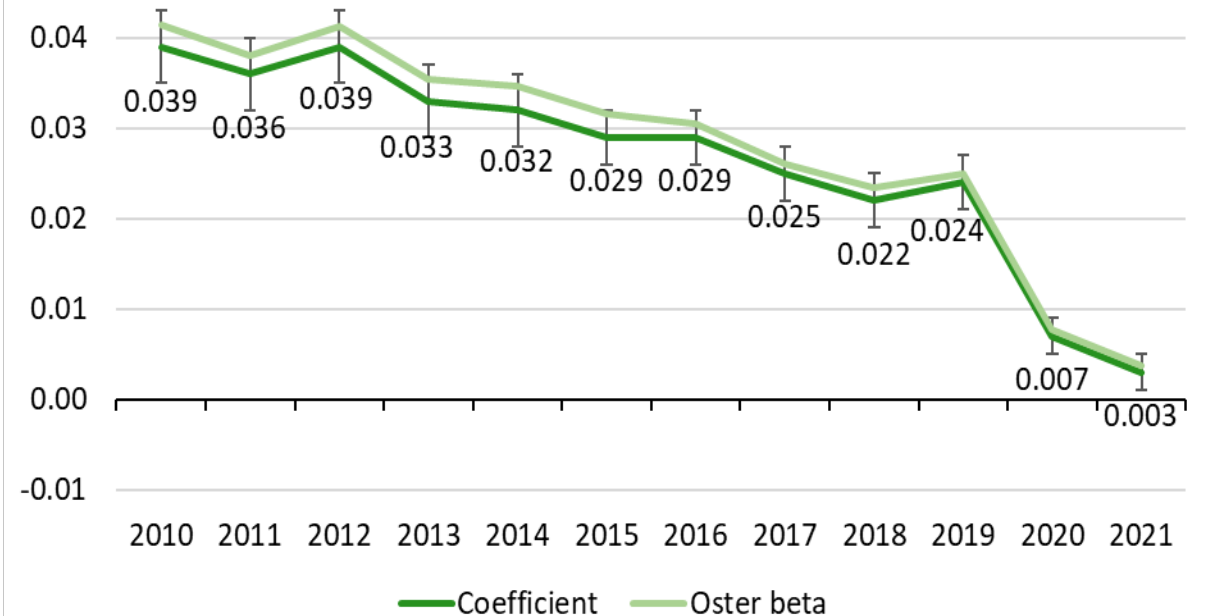


# White-collar and blue-collar hours differentials and Oster beta

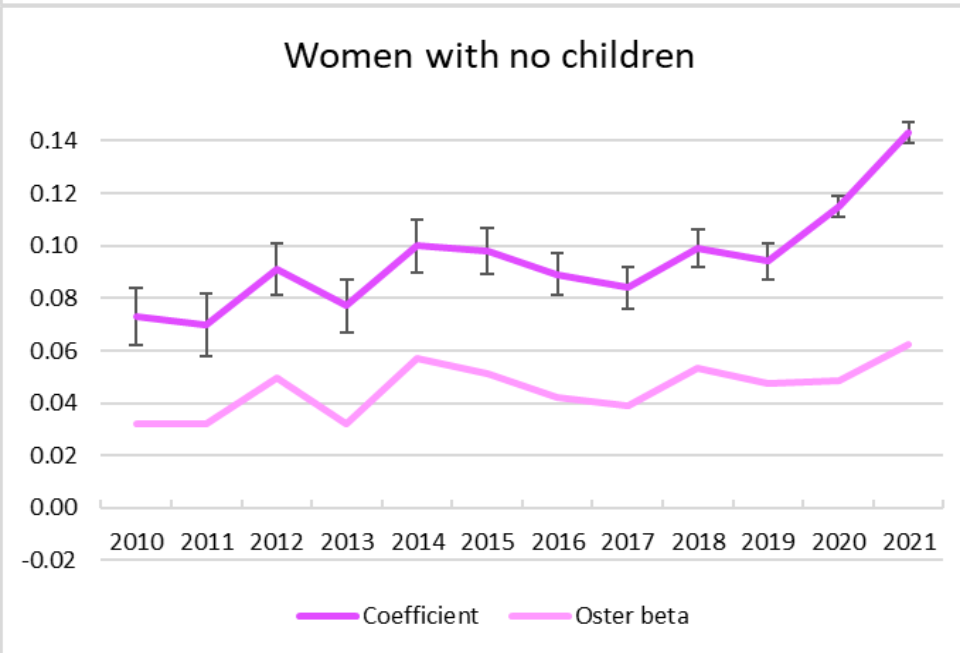
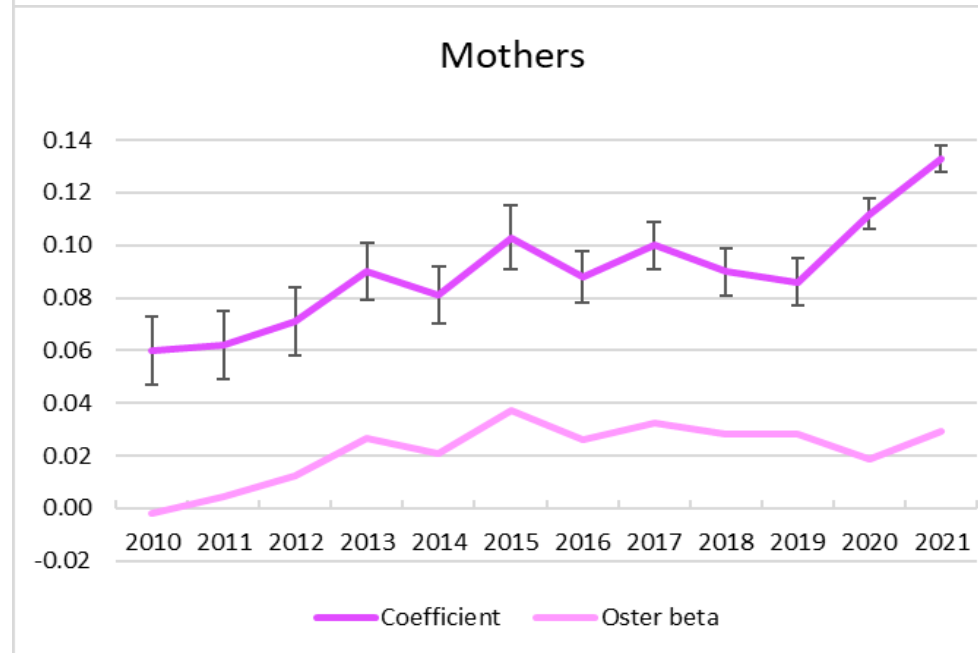
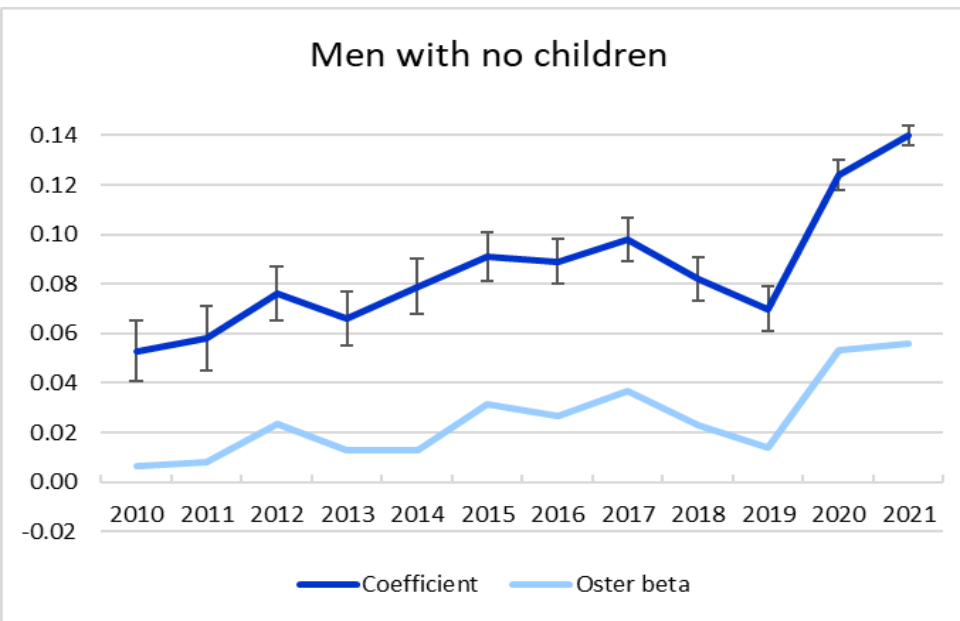
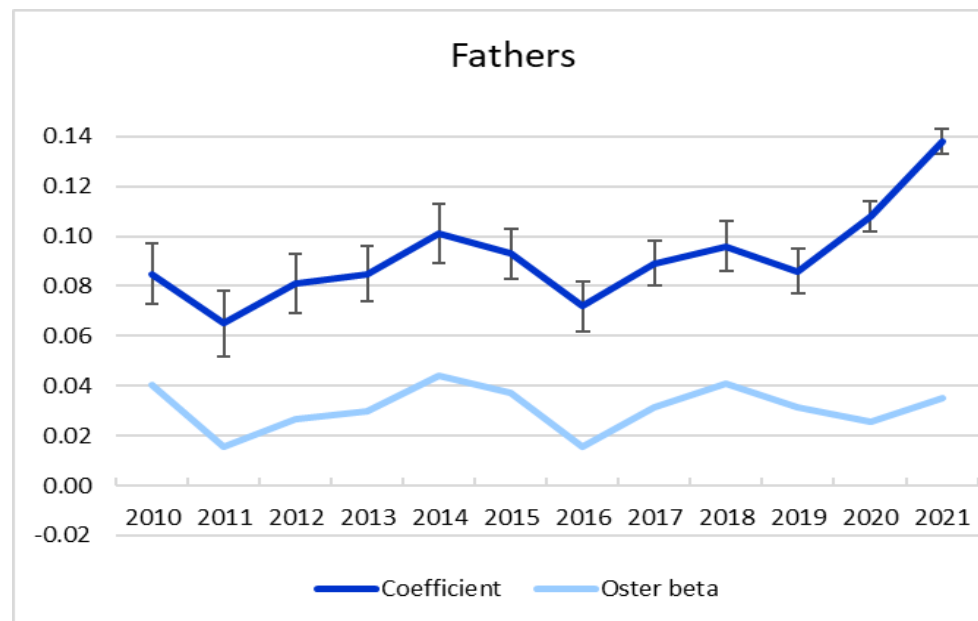
## White-collar Occupations



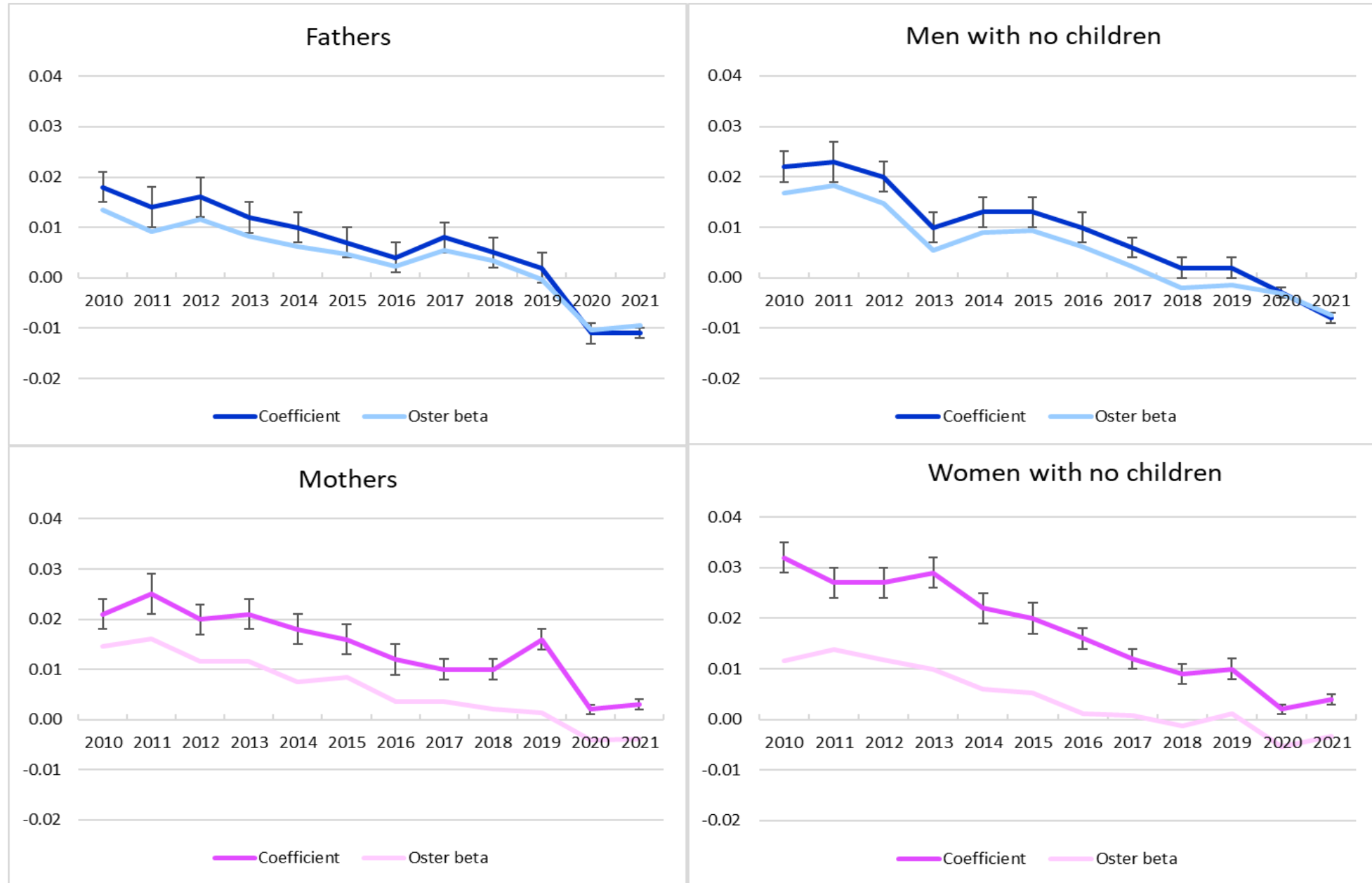
## Blue-collar and Healthcare Occupations



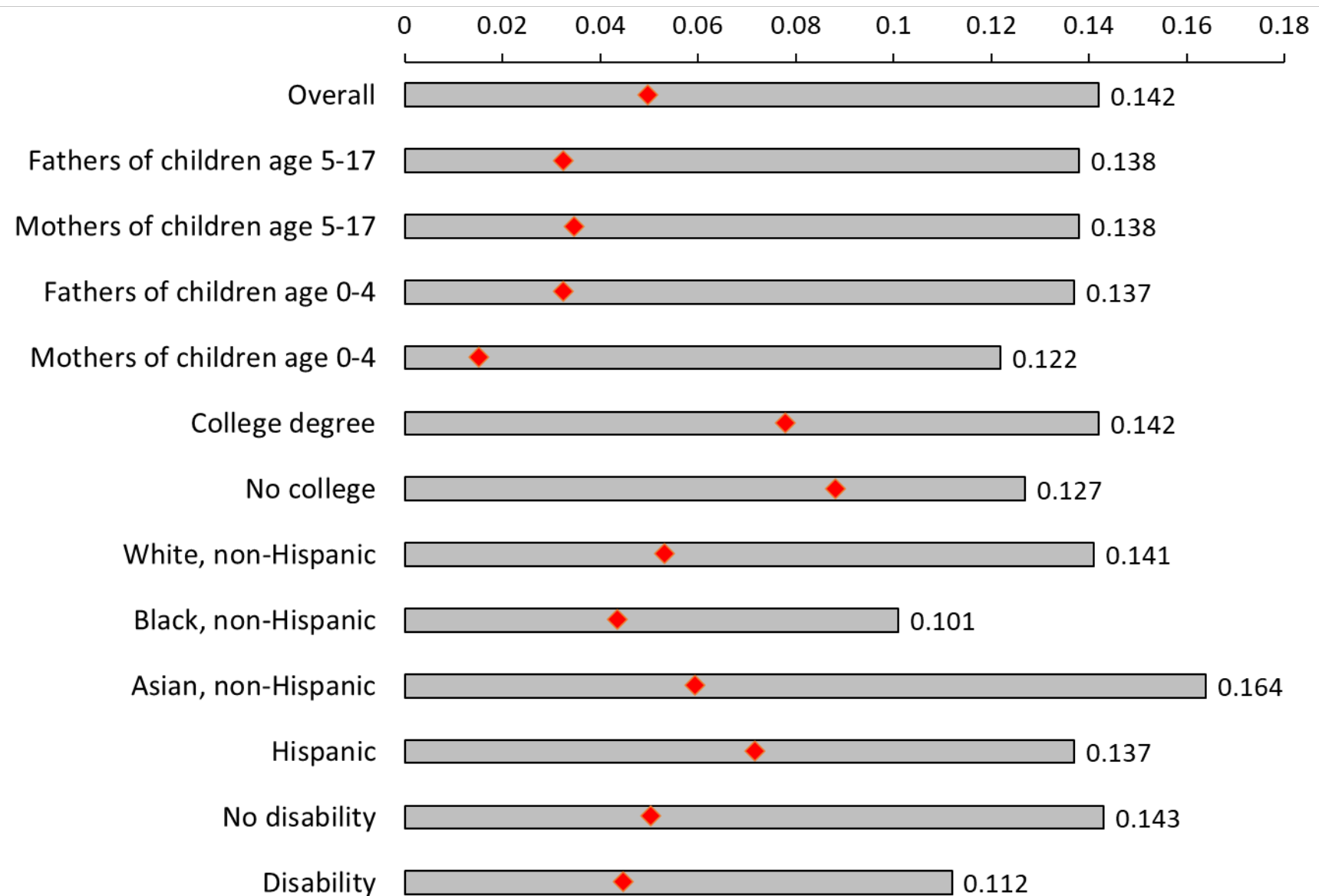
# White-collar workers by parental status: Wage premia and Oster betas



# White collar workers by parental status: Hours differentials and Oster betas



# Wage premia in 2021 and Oster betas, subsamples among white-collar workers



# Detailed Occupation-level Wage Growth Analysis

- Did wages grow faster or slower during the pandemic for remote workers relative to office-based workers within occupations?
  - Between 2019 and 2021, average real wages grew 3.6% faster for remote workers than office-based workers within detailed occupation groups.

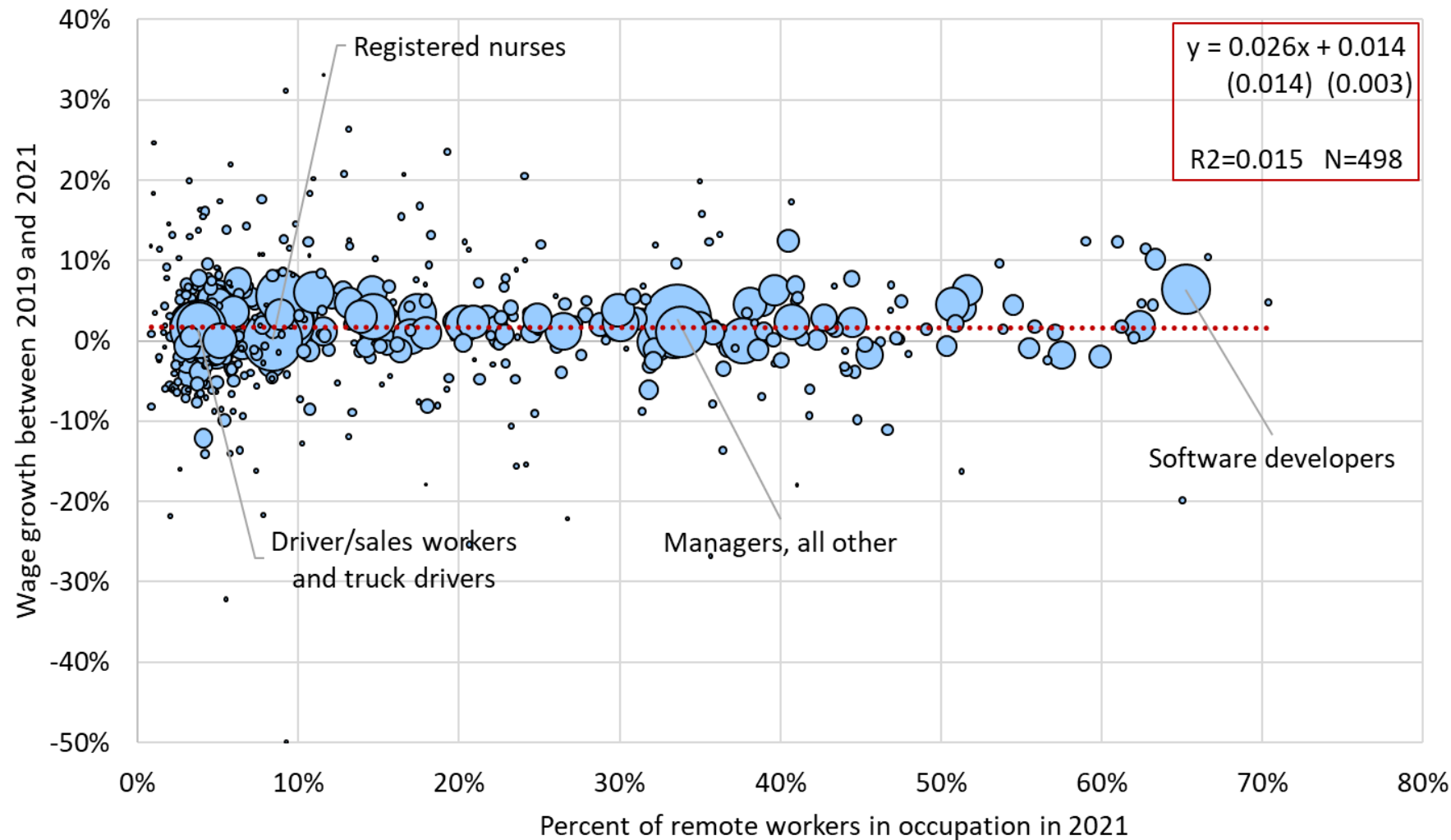
## Occupation-level wage growth between 2019 and 2021 for remote versus on-site workers

	Log Mean Wage (1)	Log Mean Wage (2)
Remote	0.127*** (0.023)	0.008 (0.015)
Year 2021	-0.013*** (0.004)	-0.001 (0.005)
Remote × Year 2021	<b>0.050***</b> <b>(0.017)</b>	<b>0.035**</b> <b>(0.015)</b>
Demographic controls	No	Yes
Industry controls	No	Yes
N	1,180	1,180
R-squared	0.990	0.996

Note: Regressions also include 295 occupation indicators. Observations are weighted using the sum of the person weights for each cell. We cluster the standard errors at the occupation level.



# Wage growth across occupation groups by remote worker intensity



- The average percent of remote workers across occupations increased by **15.4 pp** during the pandemic.
- Thus, the rise in remote work is associated with an **0.4 pp** increase in occupation-level wage growth.
- Mean wage growth = 1.9%

# Key Takeaways

- There was a substantial jump in the wage premium for remote workers during the pandemic.
  - In 2021, on average, primarily remote workers earned 13.9% more than office-based workers, with even larger premia for remote workers in management, computer science and math, legal, and sales occupations.
  - Among white-collar occupations with over 10% of workers working remotely in 2021, fathers of young children working remotely earned 14.7% while mothers of young children working remotely earned 13.0%.
- Between 2019 and 2021, average real wages grew 3.6 percent faster for remote workers than office-based workers within detailed occupation groups.
- The percentage of remote workers during the pandemic is positively correlated with the growth in occupation-level wages.
- Usual hours worked by remote workers decreased steadily over the last 12 years
  - In 2019, men working remotely worked 15 minutes longer than men working on-site. By 2021, men working remotely worked 13 fewer minutes.
  - In 2019, women working remotely worked 46 minutes longer than women working on-site. In 2021, women working remotely worked 10 minutes more.
- The data supports productivity effects and not a compensating differentials story.