Hours of Work during the COVID-19 Pandemic: Implications for Labor Productivity Measures

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Disclaimer: All views expressed in this paper are those of the authors and do not necessarily reflect the views or policies of the U.S. Bureau of Labor Statistics.

How are Hours Measured for Productivity?

- Employee **hours paid** come from the Current Employment Statistics (CES) survey.
  - ▶ Adjusted to hours worked
    - Paid-time-off (PTO) ratio
      - Derived from December data about **annual** leave and applied quarterly after interpolation
    - Off-the-clock (OTC) ratio—new in November 2022
- Hours worked by the unincorporated self-employed and unpaid family workers from the Current Population Survey (CPS).

Changes in the Labor Market and Work Arrangements during COVID

■ Surge in remote work

|	% of Full Workdays Worked From Home
2019	7.9%
May 10–Dec 31, 2020	28.5%
2021	24.4%

Source: American Time Use Survey

■ Paid furloughs through Paycheck Protection Program (PPP loans)

# Changes in the Labor Market and Work Arrangements during COVID

- Jobs losses, especially in industries with limited paid leave

- Increase in work absences (paid and unpaid)
  - ▶ Rise in illnesses
  - ▶ Schools and daycares closed

- First national paid sick leave policy (Families First Coronavirus Response Act)
  - ▶ 2 weeks full pay April 1 – Dec 31, 2020
    - – Own illness or care of child when school is closed
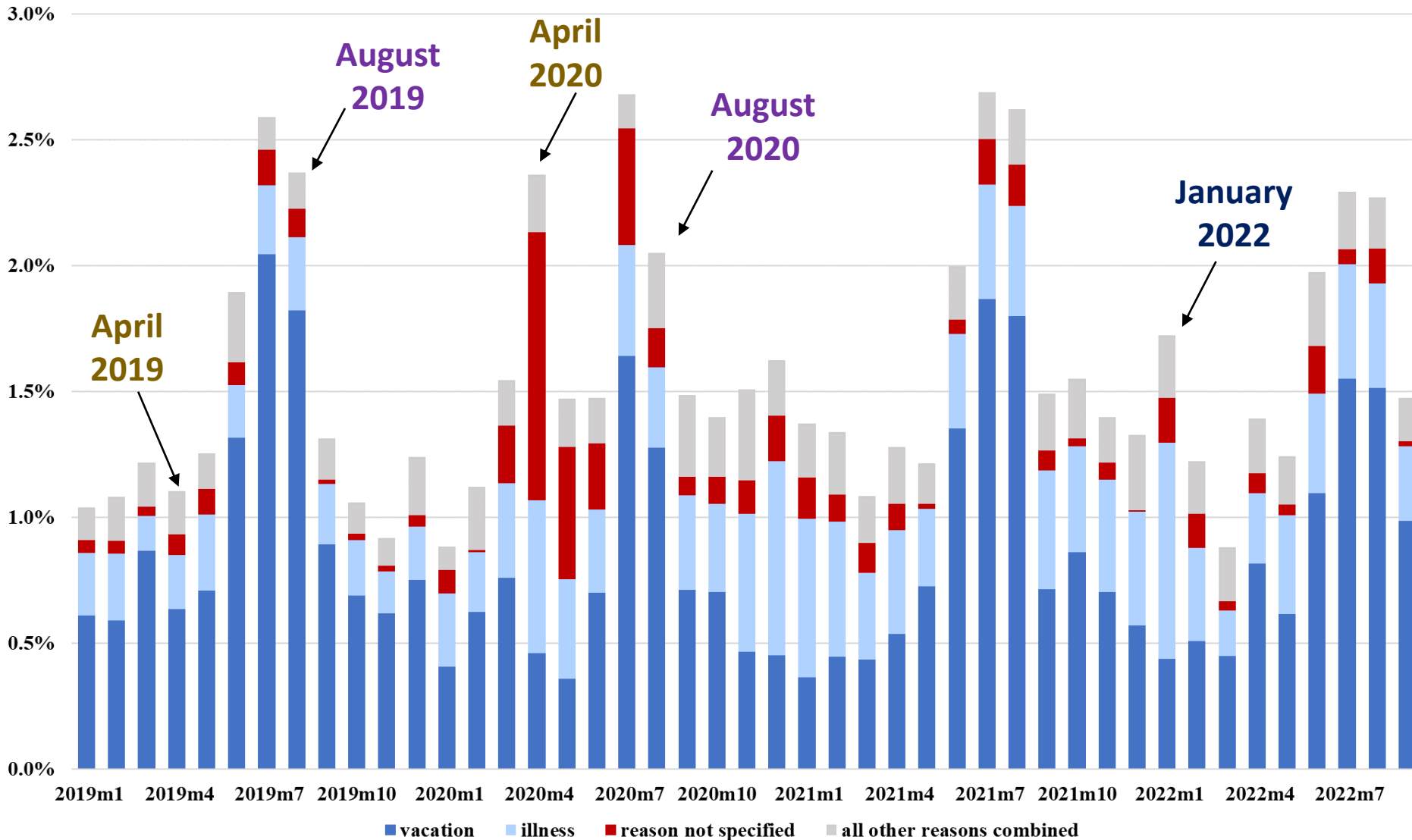 - ▶ Partial pay for 10 weeks

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Percentage of Wage and Salary Employees Who were Absent from Work in the Prior Week and Who Were Paid for Time Off, Private Nonfarm Sector, 2017–21, Not Seasonally Adjusted, Current Population Survey

Legend: April (gray bars) — Absent — Paid Time Off
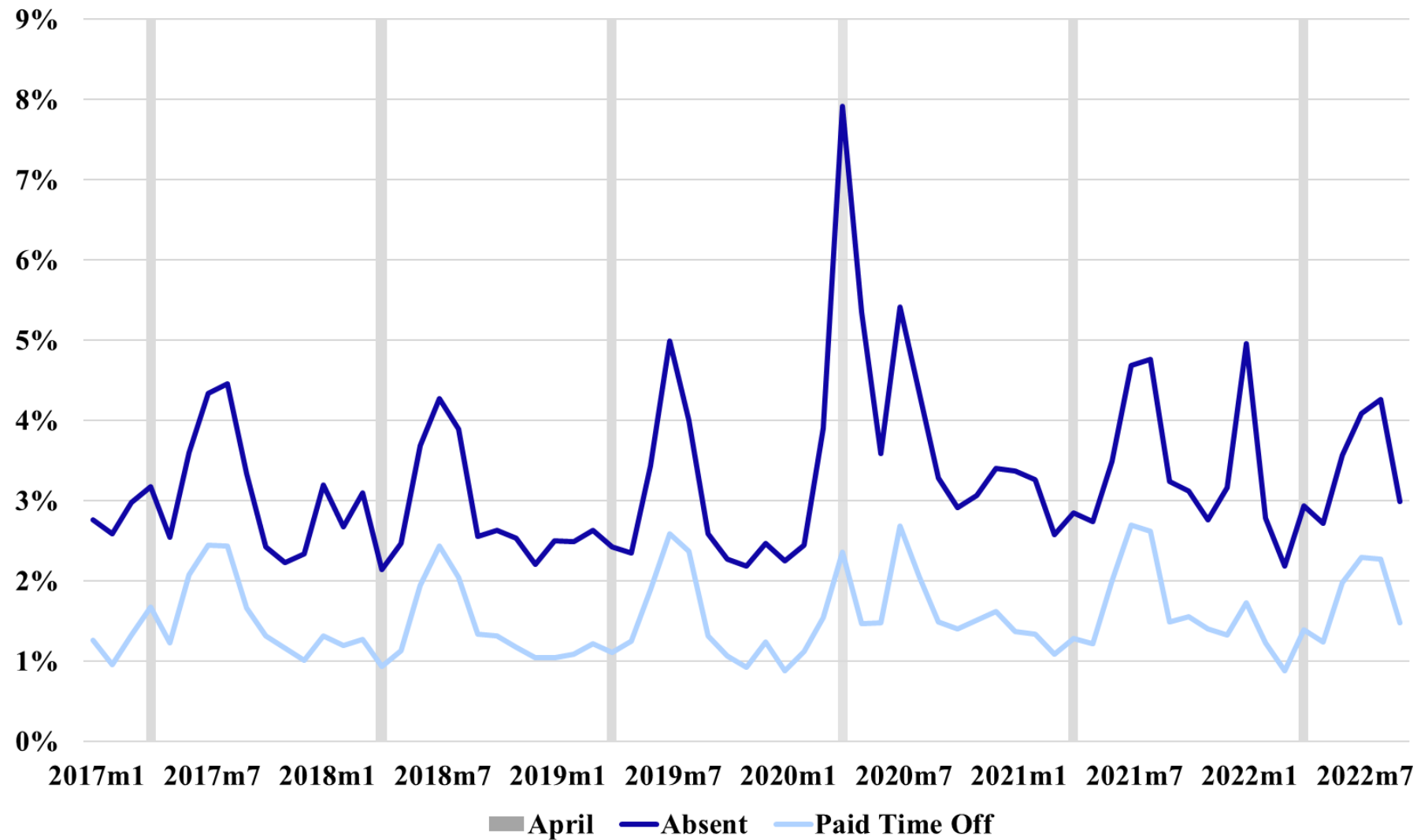
Percentage of Wage and Salary Employees Who were Absent from Work in the Prior Week by Paid Leave Status, Private Nonfarm Sector, 2019–20, Not Seasonally Adjusted, Current Population Survey
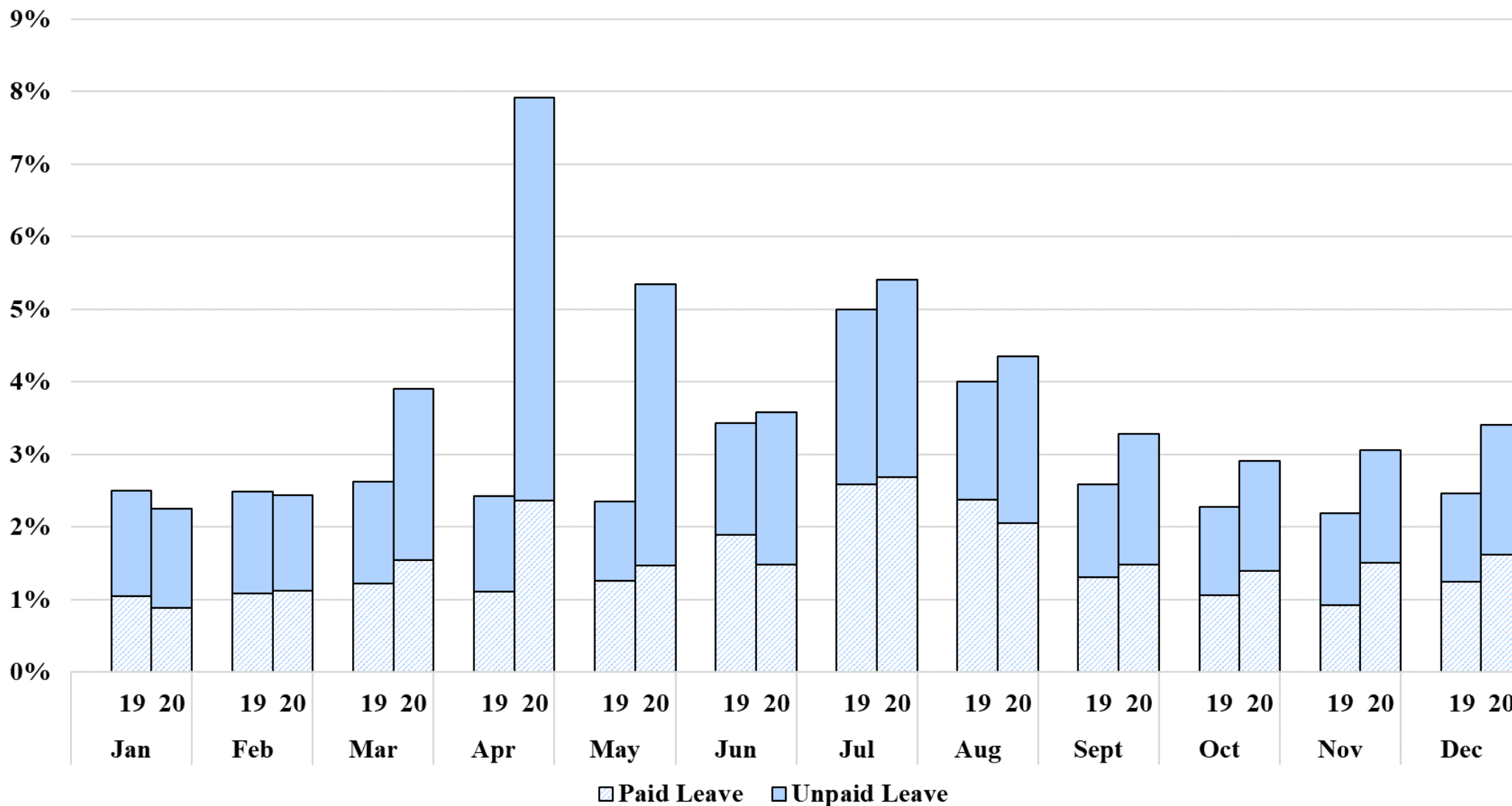
Percentage of Paid Absences and Reasons, Wage & Salary Employees in the Private Nonfarm Sector, 2019–22, Current Population Survey

April 2019

August 2019

April 2020

August 2020

January 2022

■ vacation   ■ illness   ■ reason not specified   ■ all other reasons combined

Research Question

- What is the impact on hours and productivity of adjusting for quarterly variation in paid leave?
  - ▶ Construct a new quarterly paid-time-off ratio
  - ▶ Focus on the pandemic period
  - ▶ Consider changes around the Great Recession
    - – Employees may use less leave and put forth more effort as they try to keep their jobs.
    - – Employers may grant more leave when less work needs to be done (less costly to employer).
    - – In an expansion, employers may restrict leave usage if hiring doesn't keep up with customer demand.
    - – Paid leave can change as the composition of the workforce changes
      - • Not all workers receive the same paid leave benefits in the US

New Method for Measuring Hours Worked for Quarterly Labor Productivity (Nov 2022)

$$Hours\ Worked = Hours\ Paid^{CES} \times PTO\_ratio^{NCS} \times OTC\_ratio^{CPS} \times 52$$

$Hours\ Paid^{CES}$ - quarterly average of all-employee weekly hours paid from the Current Employment Statistics (CES) survey

PTO_ratio^{NCS} - a paid-time-off ratio constructed from December data about annual leave earned/usual sick leave granted from the National Compensation Survey (NCS)

OTC_ratio^{CPS} - an off-the-clock hours ratio constructed from the Current Population Survey (CPS)

NCS Paid-time-off Ratio Adjustment

$$PTO\_ratio^{NCS} = \frac{Hours\ Paid - Hours\ of\ Paid\ Time\ Off}{Hours\ Paid}$$

Numerator

Paid Hours Worked = $\begin{cases} \text{hours worked if hourly worker} \\ \text{standard workweek} - \text{paid time off if salaried worker} \end{cases}$

Denominator

Hours Paid = $\begin{cases} \text{hours worked} + \text{hours of paid time off if hourly worker} \\ \text{standard workweek if salaried worker} \end{cases}$

NCS asks about annual leave <u>earned</u> and <u>usual</u> sick leave taken

- ▶ No information on actual leave taken
- ▶ Use ratios from December of each year (establishments rotated in and out of sample, response rate high)
- ▶ Interpolate to convert the annual ratios to quarterly ratios (Denton procedure)
- ▶ Ratios tend to be constant over time
- ▶ Unclear how respondents would report "usual" sick leave for 2020

CPS Captures Actual Leave Taken

- Replicate NCS PTO ratio using CPS to capture quarterly variation in leave

- CPS reference week was chosen to avoid holidays so paid time off may be understated

- Apply changes in the CPS ratio to the NCS level

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CPS Paid-time-off Ratio

$$PTO\_ratio^{CPS} = \frac{\sum\Big(\big(AHW \times (1-MFN)\big) + \big((UHP - PTO) \times MFN\big)\Big)}{\sum\Big(\big(AHW \times (1-MFN)\big) + \big((UHP - PTO) \times MFN\big) + PTO\Big)}$$

AHW = actual hours worked

UHP = max(usual hours worked, 40)

PTO = probability(PTO) × max(0, UHP − AHW)

MFN = I(Main job) × I(Full-time worker) × probability(Non-hourly), where $I(\cdot)$ is an indicator function

Assumptions:

1. Hourly and PT workers and those on second jobs are paid for the hours they work and can be paid for hours of time off.

2. Full-time, salaried workers are paid for standard workweek and can be paid for hours of time off.

- We only know PTO if the respondent is absent the entire week and hourly status in outgoing rotations and we want to use the full CPS.

  ▶ We use random forest models to predict probability (PTO) for partial-week workers and probability(non-hourly).
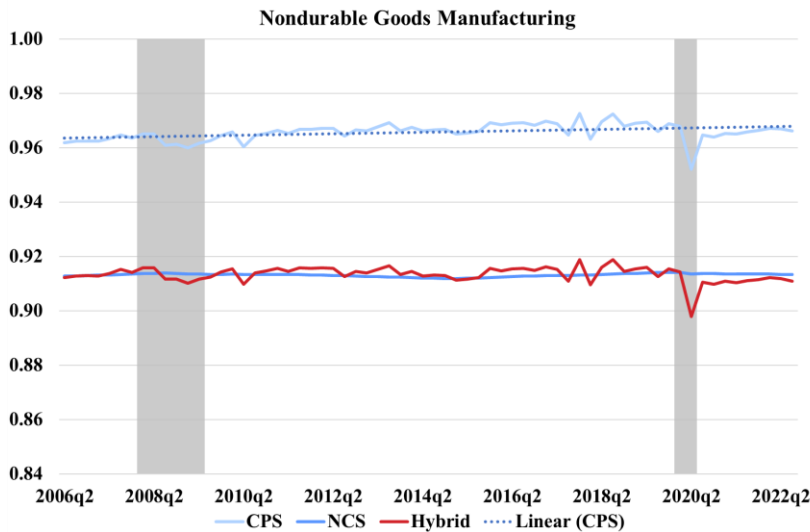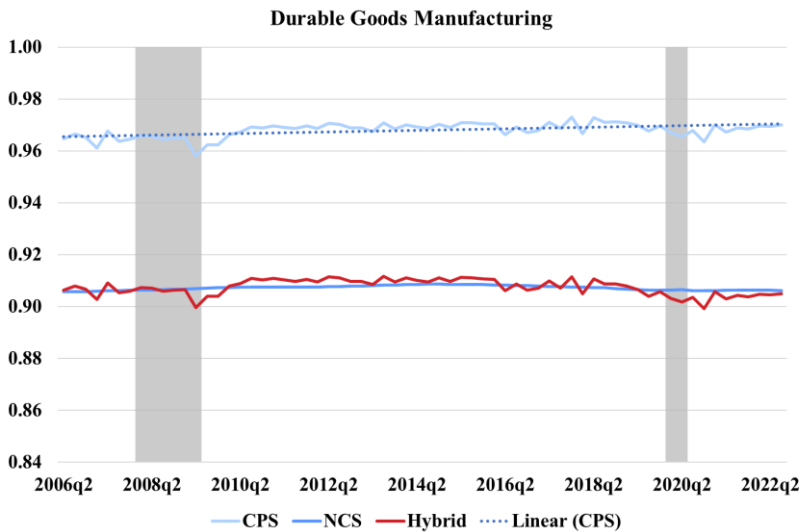
Hybrid Paid-time-off Ratio

$$PTO\_ratio^{Hybrid} = PTO\_ratio^{NCS} + \left(PTO_{ratio}{}^{CPS} - Trend^{CPS}\right)$$

1. Seasonally adjust the PTO_ratio^{CPS}
2. Estimate the trend in the PTO_ratio^{CPS}
3. Calculate deviations from trend
4. Add deviations to the NCS level

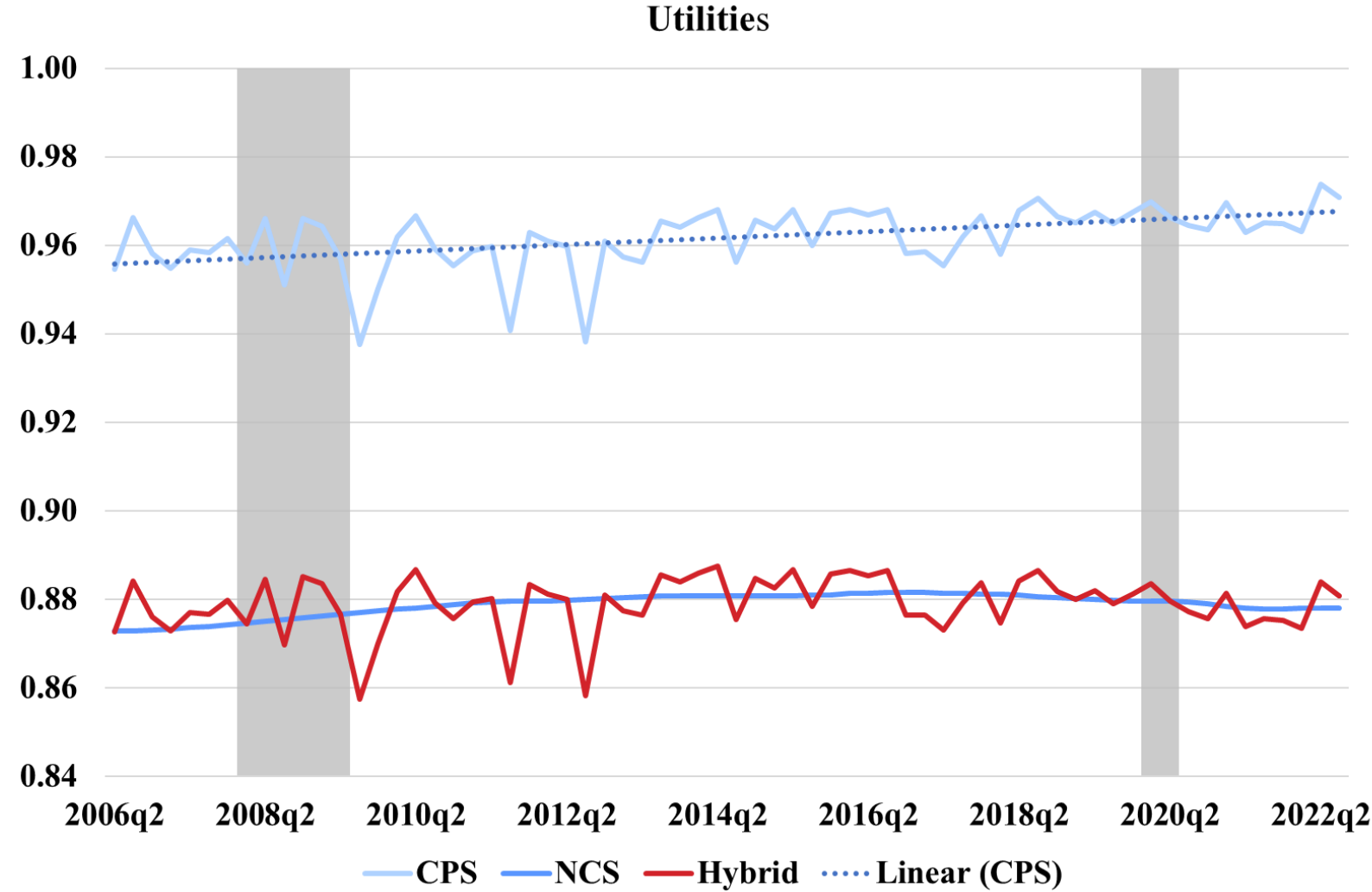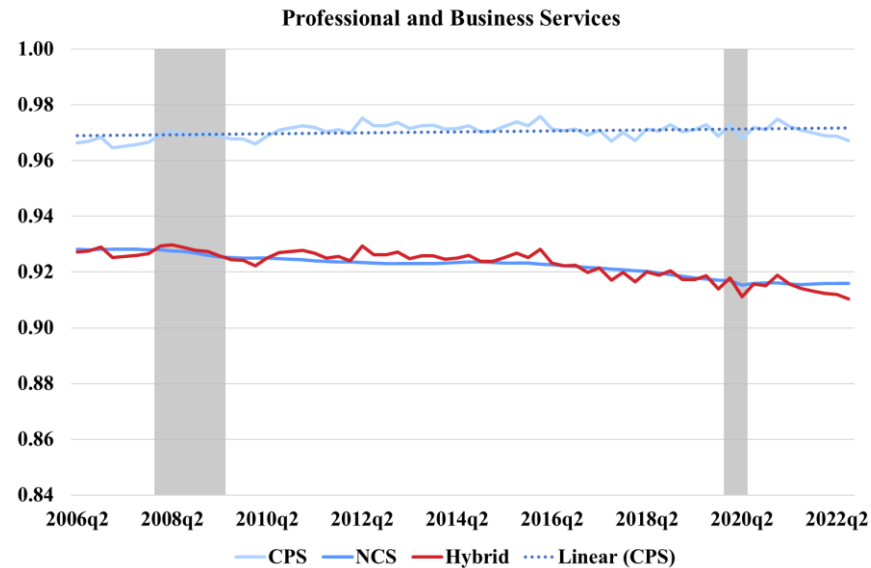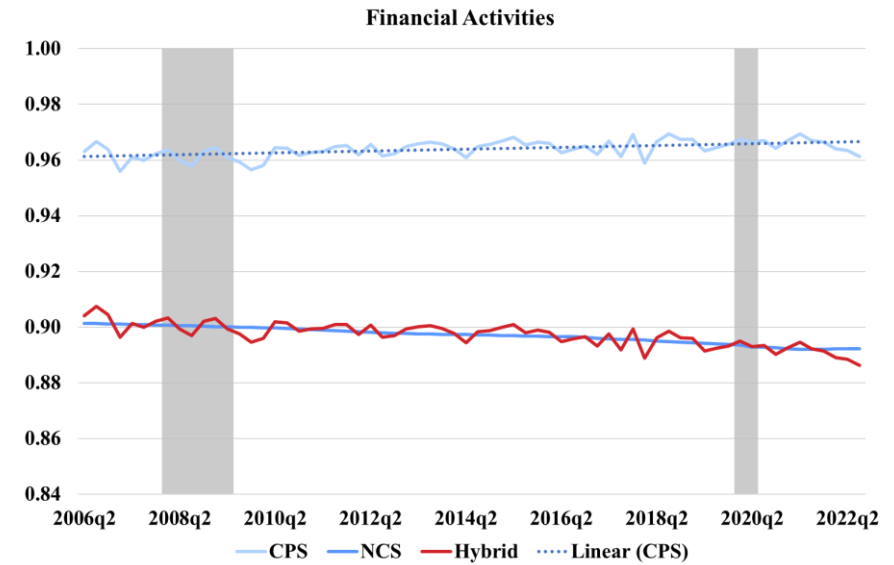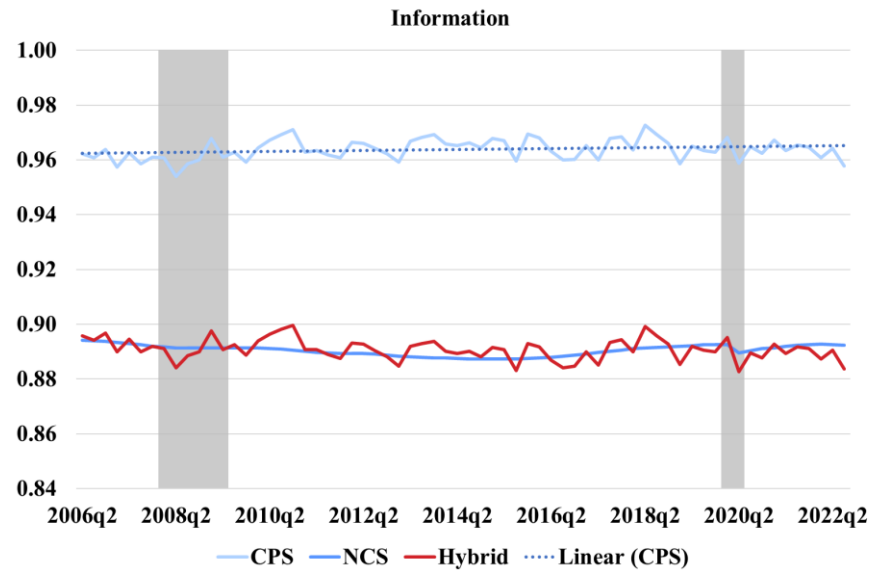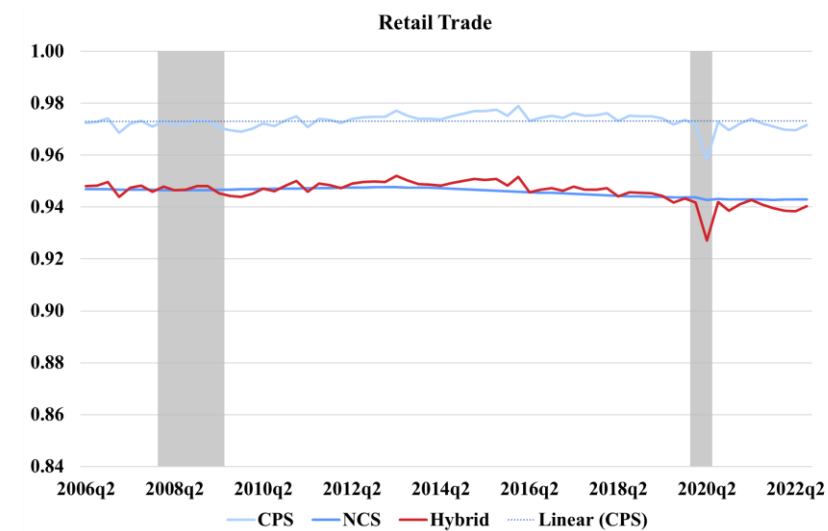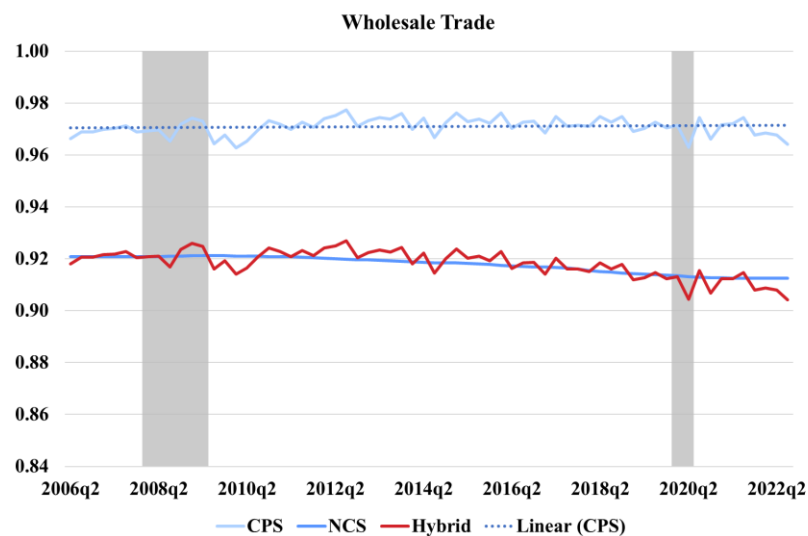# PTO Ratios for Goods-producing Industries, 2006q2–2022q3

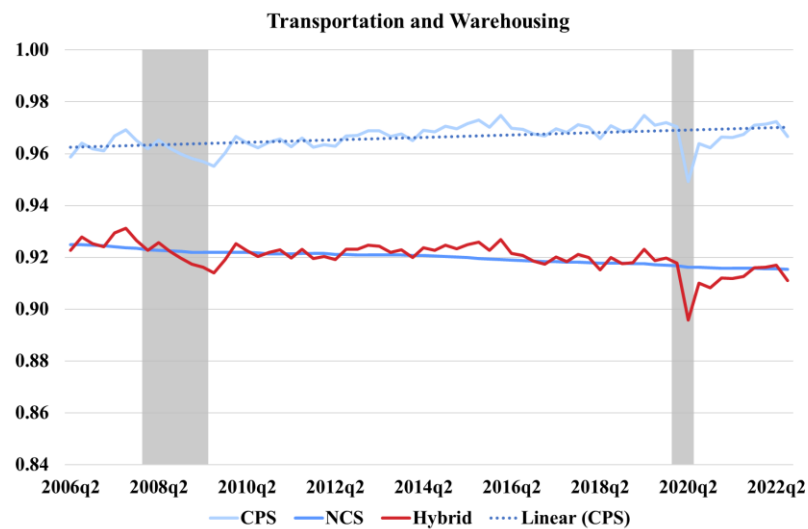# PTO Ratios for Goods-producing Industries, 2006q2–2022q3

Utilities
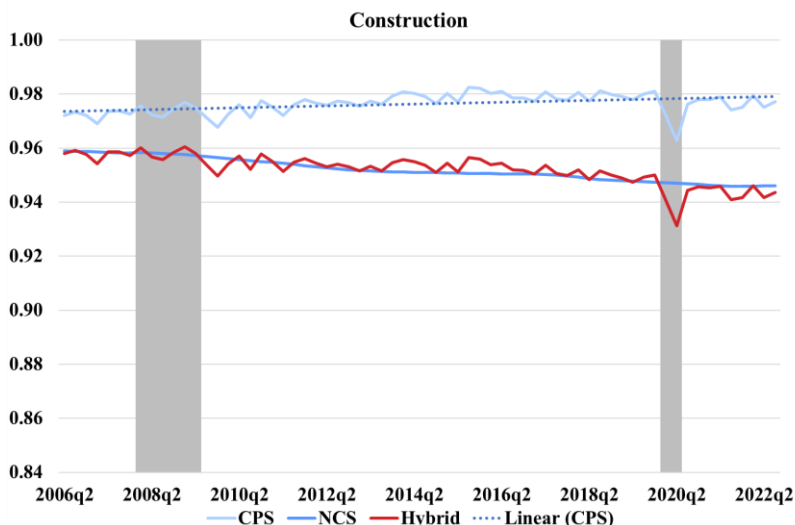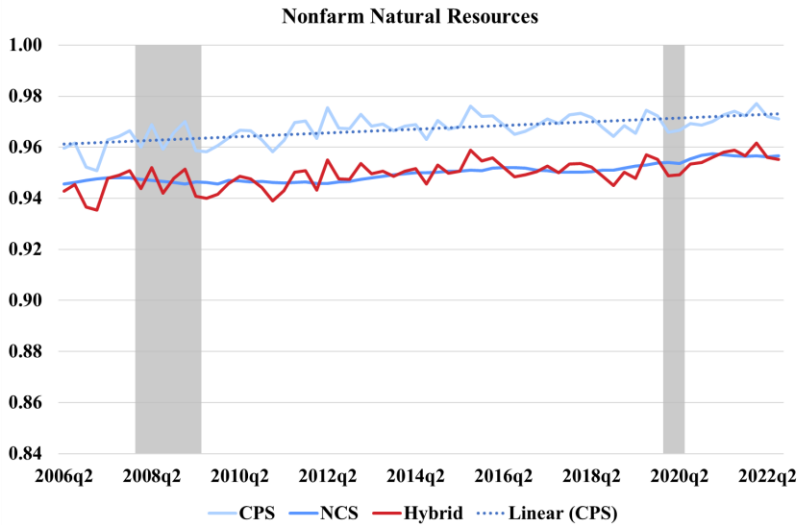
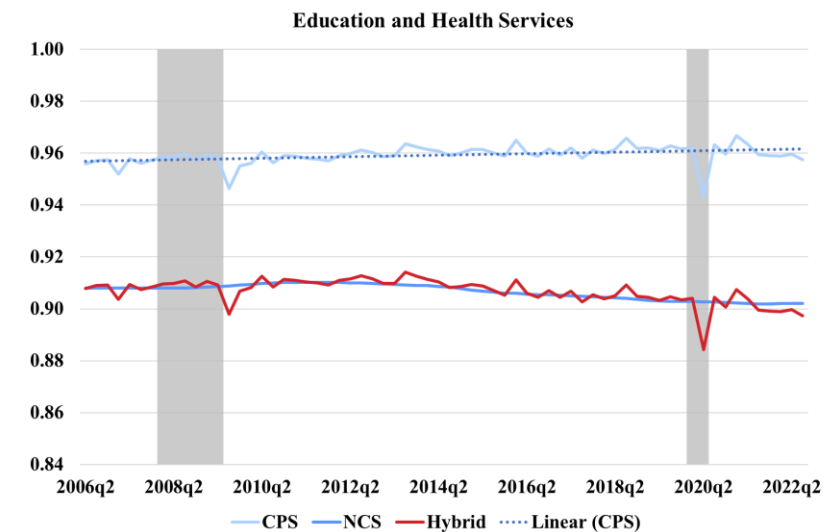# PTO Ratios for Work-from-home Service Industries, 2006q2–2022q3

PTO Ratios for Contact-intensive Service Industries, 2006q2–2022q3

Wholesale Trade
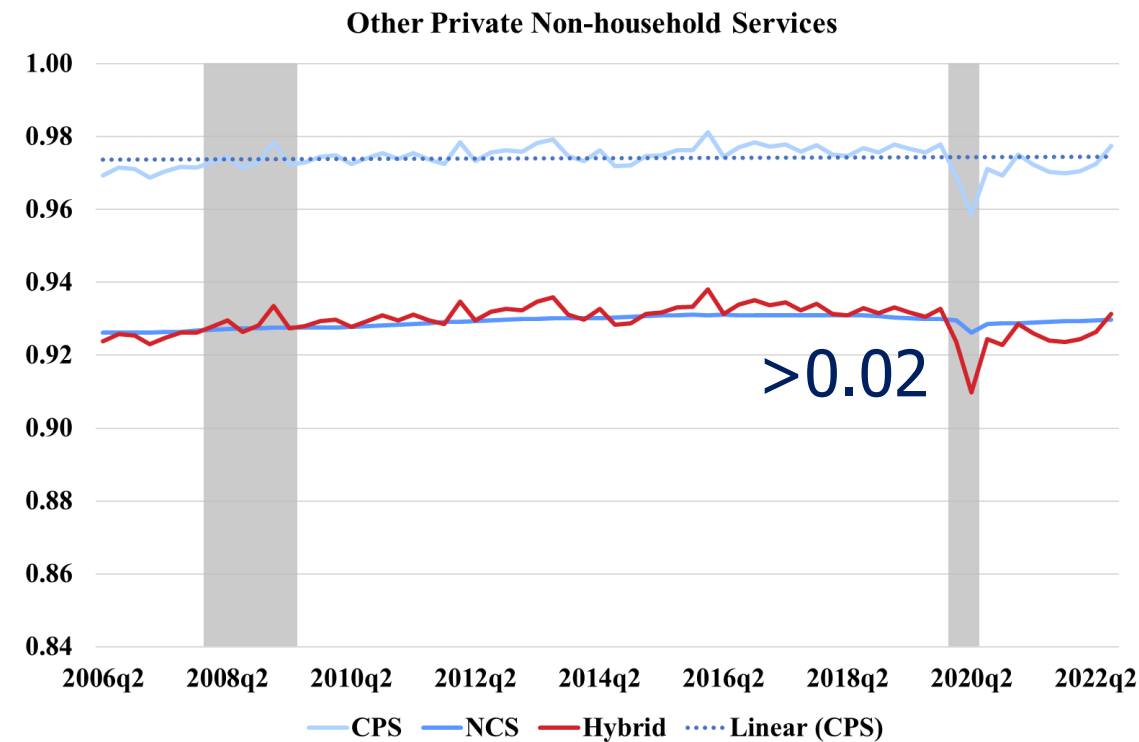
Retail Trade

>0.01

Transportation and Warehousing

>0.02

Education and Health Services

=0.02

PTO Ratios for Contact-intensive Service Industries, 2006q2–2022q3

Leisure and Hospitality
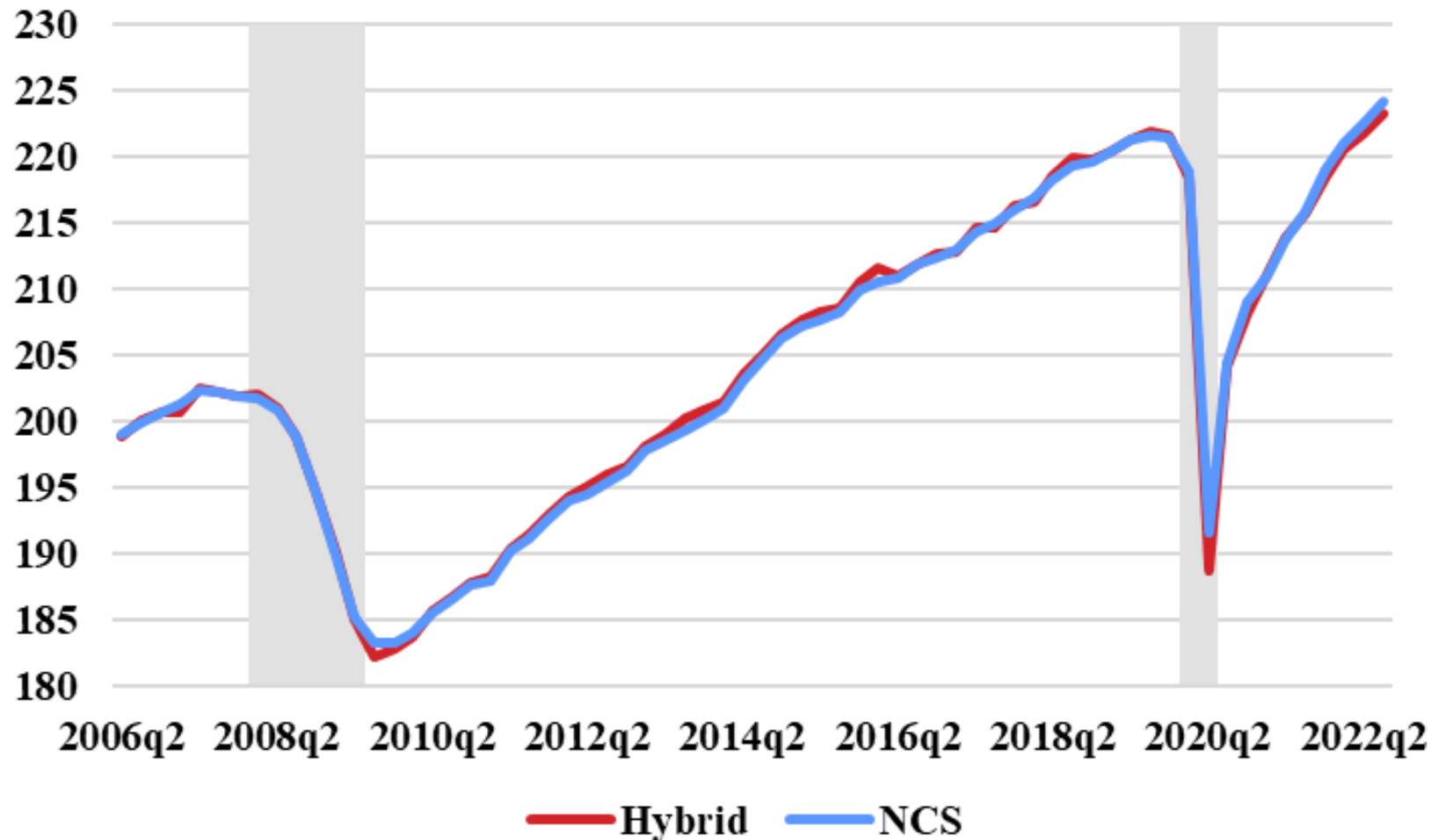
>0.03

Other Private Non-household Services

>0.02

CPS — NCS — Hybrid ···· Linear (CPS)
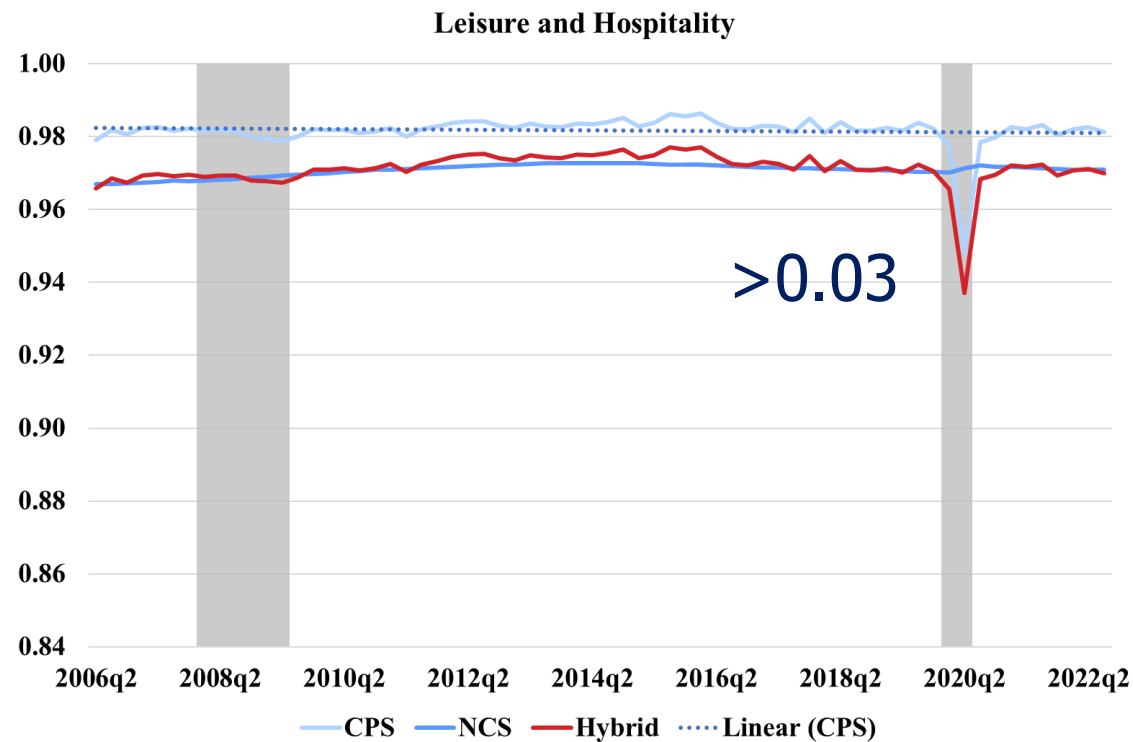
Employee Hours Levels, by Paid-time-off Ratio
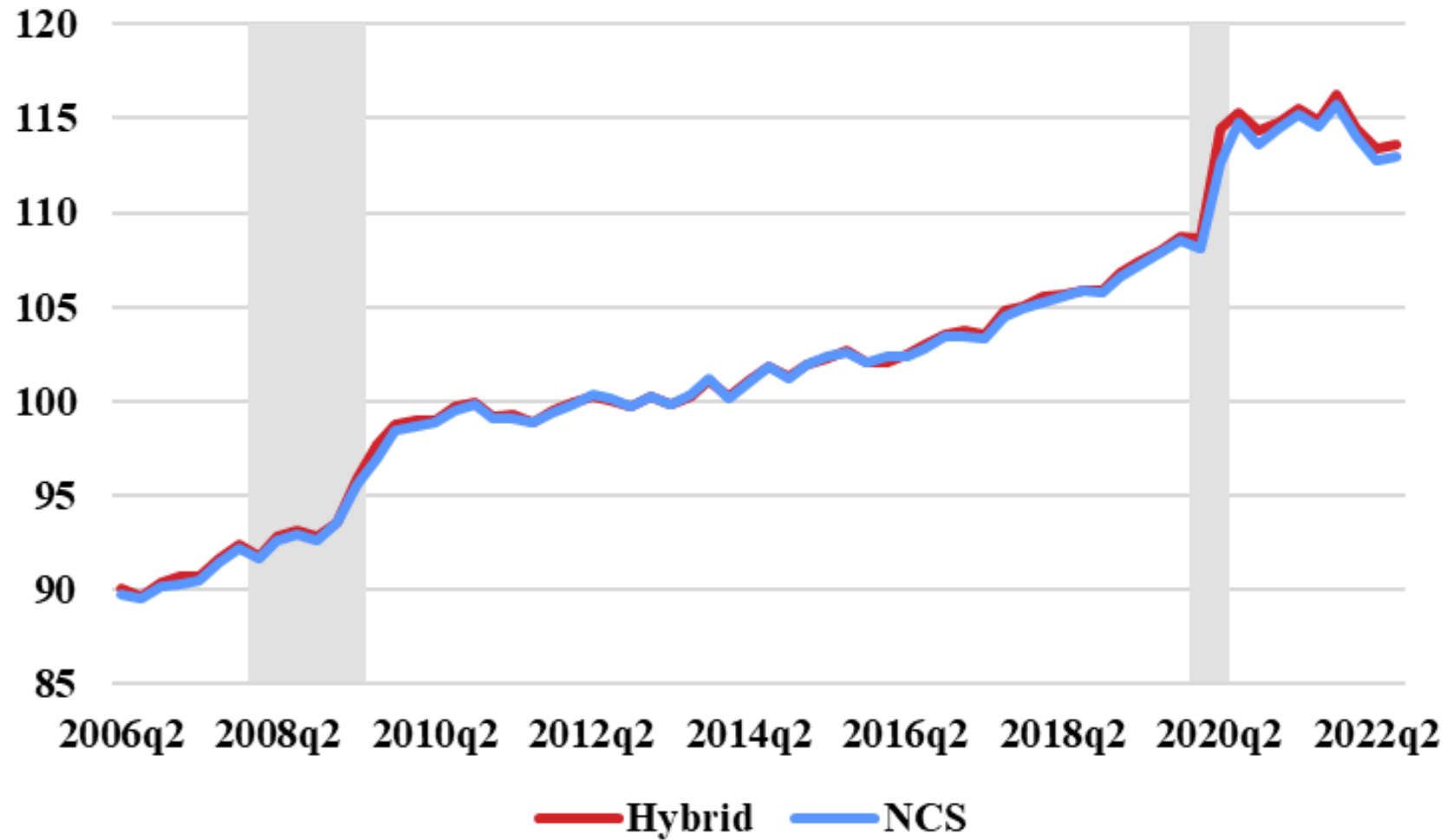## (Private Nonfarm Sector)

Billions of hours

Labor Productivity
(Nonfarm Business Sector)

Comparison of Using Alternative Paid-time-off Ratios on Productivity Growth in the Nonfarm Business Sector

	Hybrid	NCS	Difference (Hybrid–NCS)
2020q1	-0.3	-1.3	1.0
2020q2	23.3	18.0	5.3
2020q3	2.8	7.5	-4.7
2020q4	-3.0	-3.8	0.9
2021q1	1.3	3.1	-1.8
2021q2	2.5	2.6	-0.1
2021q3	-2.2	-2.4	0.2
2021q4	5.2	4.4	0.8
2022q1	-6.0	-5.9	-0.1
2022q2	-3.8	-4.2	0.4
2022q3	0.7	0.5	0.3

Note: Percentage change from the previous quarter at an annual rate.

Conclusion

- There was greater quarterly variation in leave during the COVID-19 pandemic than before.

- The CPS quarterly PTO ratio shows a large increase in paid leave (decrease in the PTO ratio) in the second quarter of 2020 for many industries.

- In addition, there were large job losses among workers who were less likely to have a paid leave benefit.

- Hours fell faster in 2020q2 and increased faster in 2020q3 than in the official hours series.

Conclusion

- The difference between the productivity growth rates using the NCS and the productivity growth rates using the hybrid ratios varied considerably throughout the pandemic.

  - Labor productivity growth was higher in 2020q2 and lower in 2020q3 than in the official series.

- At the end of the Great Recession when the unemployment rate peaked, the hybrid PTO ratios dipped in industries suffering substantial job losses, though less dramatically.

  - Labor productivity rose more quickly than official estimates.

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Contact Information

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EXTRA SLIDES

NCS Paid-time-off Ratio for Private Nonfarm Sector Employees, Second Quarter 2006 to Third Quarter 2022

NCS PTO ratio