Hours of Work during the COVID-19 Pandemic:

Implications for Labor Productivity Measures

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Abstract: The BLS measures hours worked for its estimates of productivity growth using hours-paid data from its establishment survey adjusted for off-the-clock work, annual paid leave granted, and average sick leave taken. However, these adjustments miss quarterly variation in paid time off. Although this variation is mainly due to seasonal patterns in paid annual and sick leave, a number of factors related to the COVID-19 pandemic (illness, the Payroll Protection Program, changes in leave policies, and increased telework) could have caused average weekly hours worked to vary to a much greater extent during that time. Using detailed household data, we develop an alternative hours-worked-to-hours-paid adjustment ratio that accounts for variations in actual paid time off. We then assess the impact of making this adjustment on aggregate hours and labor productivity measures. We find that, in 2020, this ratio fell considerably in some industries in the second quarter and subsequently rose in the third quarter, resulting in a meaningful impact on measured work hours and labor productivity.

Keywords: productivity, paid leave, hours measurement, COVID-19

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1. Introduction

The labor market and work arrangements underwent dramatic changes because of the coronavirus pandemic. Initially, to contain its spread, millions of office workers began to work remotely in March 2020, while many U.S. workers in high-contact service industries were on paid furlough supported by the Paycheck Protection Program (PPP) or lost their jobs as nonessential businesses were ordered to stay closed (Autor et al., 2022; Bartik et al., 2020a, 2020b; Bick et al., 2022; Dalton, 2021). In addition, many workers were home sick or caring for others who were sick, especially workers in occupations that were unsuitable for remote work or those working in essential industries (Lyttelton and Zang, 2022). Others were caring for children at home because schools were closed (Heggeness, 2020). Many employers also allowed workers more flexibility in scheduling their hours to handle the increased demand for household-provided childcare (U.S. Bureau of Labor Statistics, 2021).

Absences from work shot up in April and May of 2020. The majority were unpaid, as paid leave policies vary widely by industry and are especially limited in the leisure and hospitality sector that was severely impacted by social distancing policies (figure 1). Moreover, prior to the pandemic, the average worker would not have had enough paid sick leave days to cover one 14-day COVID-19 quarantine (U.S. Bureau of Labor Statistics, 2020a).[1] However, many establishments increased the amount of paid sick leave that they provided to employees because of the COVID-19 pandemic, although the number of employees covered by these increases again varied considerably by industry; see figure 2 (U.S. Bureau of Labor Statistics, 2020b). Among employees in the entire private nonfarm sector, paid absences were substantially

[1] Workers with paid sick leave plans have about eight days available per year, and 53% of those in private industry in 2020 were not permitted to carry over sick leave to the next calendar year (U.S. Bureau of Labor Statistics, 2022a).

higher in April when compared to normal seasonal patterns (figure 3). This was likely due in part to a temporary national paid sick leave policy (the Families First Coronavirus Response Act, or FFCRA) that mandated that employers with fewer than 500 employees provide additional paid leave for their employees. From April 1st, 2020 through the end of that year, the FFCRA allowed employees up to two weeks of paid leave for own illness or care of a child home due to a school closure, and up to ten weeks of expanded family and medical leave at two-thirds their regular pay (Andersen et al., 2020; U.S. Department of Labor, 2022).[2] Compared to the same month in the prior year, absences and paid absences were substantially higher in the spring and fall of 2020 (figure 4). According to the Current Population Survey (CPS), the top reasons for paid absences throughout 2020 included vacation leave, own illness, and "other reason not specified" (figure 5). The "other reason not specified" response rose in March of 2020 and shot up in April and May of 2020. Some of this increase likely captures workers who were on paid furlough.[3] Compared to prior summers when many Americans vacationed, many stayed home in the summer of 2020, using less of their annual vacation leave and perhaps saving up leave for times when they could travel again more safely. There was also a spike in paid leave during December of 2020, when U.S. deaths from coronavirus soared, and again during the first Omicron wave in January of 2022 (Centers for Disease Control and Prevention, 2022).

[2] Maclean et al. (2021), Callison and Pesko (2020), Schneider (2020), and Colla et al. (2014) all find that paid sick leave mandates increase workplace absences. The paid leave tax credits were extended under the American Rescue Plan Act until September 30, 2021, but on a voluntary basis (Internal Revenue Service, 2021).

[3] Beginning in March 2020, CPS interviewers were instructed to classify workers who were not working during the entire survey reference period due to COVID-related business closures as unemployed on temporary layoff, but there appears to be some misclassification of these workers as employed but absent (U.S. Bureau of Labor Statistics, 2020c). It is possible that some of the unpaid (and paid) absences should have been classified as unemployed. In the Current Employment Statistics (CES) survey, those who are not working but are paid are counted as employed.

U.S. productivity measures are estimated as the quotient of an index of output and an index of hours worked. The latter is based primarily on hours paid data from the Current Employment Statistics (CES) survey, with ratio adjustments for paid leave and unpaid overtime to convert hours paid to hours worked. However, during the pandemic (as described above), the use of paid leave deviated substantially from past years. In this paper, we develop and implement a ratio adjustment that accounts for the large quarterly variation in paid absences during the pandemic. This is important, because producing reliable quarterly labor productivity estimates—a principal federal economic indicator closely watched by policymakers, businesses, and researchers—requires accurately measuring hours worked, and our approach allows us to tell an alternative story of productivity during the pandemic. Accurately capturing cyclical movements in hours worked is also important for measures of firms' costs of adjusting labor, compensation per hour, markups of price over marginal cost, and returns to scale, as well as being an important macroeconomic indicator by itself (Aaronson and Figura, 2010).

We find that several major industries in the private nonfarm sector (nondurable goods manufacturing, transportation and warehousing, education and health services, leisure and hospitality, and other private non-household services) experienced large drops in their paid-time-off (PTO) ratios in the second quarter of 2020 and a subsequent rise in the third quarter of 2020.[4] Applying these ratios, we find that aggregate hours worked fell faster and then rose to a greater extent than documented in the official hours series. Thus, labor productivity in the nonfarm business sector rose substantially faster in the second quarter of 2020 and slower in the third quarter than reported in the official estimates.

[4] As will be shown later, the PTO ratio is equal to "paid hours worked" divided by "paid hours." Therefore, a decline in the PTO ratio implies that workers are taking more paid time off.

We also looked at the effects of applying these adjustments during the Great Recession. During recessions, workers might use less leave and put forth more work effort to keep their jobs, or they may be asked to do the jobs of three persons when others are laid off (Arai & Thoursie, 2005; Lazear et al., 2016; Siegenthaler, 2015). On the other hand, they may take more leave because there is less work to be done, making the leave time less costly to their employers. Conversely, during expansions, firms may grant less leave or restrict leave usage if they have not expanded their hiring quickly enough to meet the increase in customer demand. In addition, paid leave can change as the composition of the workforce changes because not all workers receive the same paid leave benefits. We find that changes in paid leave were more gradual around the time of the Great Recession. Paid leave increased in industries that were hardest hit by the recession, and the increases were closer to the peak in the national unemployment series in 2009. Labor productivity rose slightly faster when we applied these ratios.

2. Measuring Hours for Productivity

In November 2022, the BLS Productivity Program released major sector productivity estimates based on a new method for measuring hours worked by wage and salary employees. Because our analysis uses the new hours series as a starting point, it is useful to briefly describe the new method here.[5] We then describe how we adjust the new method to capture the quarterly variation in paid time off during the pandemic.

The new method is designed to adjust the CES all-employee hours estimates from an hours-paid concept to an hours-worked concept. For each quarter, BLS measures annualized hours worked for wage and salary employees as follows:

$$Hours\ Worked = Hours\ Paid^{CES} \times PTO\_ratio^{NCS} \times OTC\_ratio^{CPS} \times 52 \quad (1)$$

[5] For more detail on the new hours method, see Eldridge et al. (2022).

where $Hours\ Paid^{CES}$ is a quarterly average of all-employee weekly hours paid from the CES survey; PTO_ratio^{NCS} is a paid-time-off ratio constructed from the National Compensation Survey (NCS); and OTC_ratio^{CPS} is an off-the-clock hours ratio constructed from the CPS. To annualize the data, BLS multiplies these weekly hours estimates by 52. The PTO ratio adjusts for hours paid but not worked, while the OTC ratio adjusts for hours worked but not paid.[6]

2.1. Paid-time-off (PTO) ratio adjustment from NCS

Conceptually, the PTO_ratio^{NCS} is a ratio of paid hours worked to paid hours and is measured as

$$PTO\_ratio = \frac{Hours\ Paid - Hours\ of\ Paid\ Time\ Off}{Hours\ Paid} \quad (2)$$

For hourly workers, "hours paid" is equal to hours worked plus hours of paid time off, while for salaried workers hours paid is simply the standard workweek (usually 40 hours). The numerator, which we refer to as "paid hours worked," is equal to hours worked for hourly workers and the standard workweek minus paid time off for salaried workers.

The NCS is an establishment survey that asks establishments about annual leave earned and usual sick leave taken—there is no information on actual leave taken. The productivity program uses data reported in December of each year, which is when establishments are rotated into and out of the sample, and the response rate is at its highest point during the year. Thus, there is no quarterly variation. This is generally not an issue, because most variation in actual leave taken is seasonal. However, it is potentially an issue in times of economic disruption, such as the pandemic recession. For example, given how unusual 2020 was, it is not clear how NCS respondents would update their estimates of usual sick leave taken. Comparing the change in the

[6] The CES survey asks respondents to report hours paid for salaried and commission-only workers based on their standard workweeks.

NCS ratios (which the BLS productivity program applies at the 3-digit NAICS industry level) between December 2019 and December 2020, we find that most of the ratios changed at only the third decimal place; exceptions were support activities for mining (NAICS 213), sporting goods, hobby, book, and music stores (NAICS 451), and broadcasting (NAICS 515). For these industries, the ratio rose by between 0.011 and 0.020, indicating a decrease in paid leave. Because some of the ratios are based on a small sample of establishments, the NCS ratio series are first smoothed with a five-year moving average. These annual ratios are converted to quarterly ratios using the Denton procedure and they tend to be fairly constant over time (Denton, 1971).

2.2. Paid-time-off (PTO) ratio adjustment from CPS

Our goal is to replicate the PTO_ratio^{NCS} using CPS data. We use the CPS to calculate the PTO ratio described in equation (2) because the CPS does a better job of capturing changes in actual leave taken. However, the CPS does not collect all the information needed to do the calculations using the full CPS, so it is necessary to make some additional estimations.

The CPS collects information about hourly/non-hourly status and paid time off, but not for all workers. Hourly/non-hourly status is collected as part of the earner study and is collected for one-quarter of the sample.[7] Information on whether leave is paid or unpaid is collected only if the individual was employed and did not work during the reference week. There is no information on whether leave was paid if the individual took off only part of the week and worked the other part. Thus, it is necessary to estimate the probability that the individual is paid

[7] Non-hourly workers include workers receiving a salary, commissions, or who are paid in kind from a private employer.

non-hourly for the other three-fourths of the sample and the probability that the individual was paid for any time off. Details of this estimation are in Eldridge et al. (2022).

Putting these pieces together, we measure the PTO_ratio^{CPS} as follows:

$$PTO\_ratio^{CPS} = \frac{\sum\Big(\big(AHW \times (1 - MFN)\big) + \big((UHP - PTO) \times MFN\big)\Big)}{\sum\Big(\big(AHW \times (1 - MFN)\big) + \big((UHP - PTO) \times MFN\big) + PTO\Big)} \quad (3)$$

where AHW is actual hours worked; UHP is usual hours paid for full-time, non-hourly workers on their main job and is constructed as usual hours worked topcoded at 40; PTO is hours of paid time off calculated as probability(PTO) × max(0, UHP – AHW); and MFN = *I*(Main job) × *I*(Full-time worker) × *prob*(Non-hourly), where *I*(·) is an indicator function.[8] Thus, we assume that hourly workers, part-time workers (defined as having usual hours worked < 35), and those working second jobs are paid for all of the hours they work. In addition, they can be paid for hours of time off. Full-time, non-hourly workers (also referred to as salaried workers) are paid for their standard workweek, and their paid hours worked equal paid hours minus hours of paid time off.[9]

The final step in the process is to adjust the PTO_ratio^{CPS} so that the level is consistent with that of the PTO_ratio^{NCS}. We found that the PTO_ratio^{CPS} is higher than the PTO_ratio^{NCS}. One reason for this is that the CPS reference week was chosen to avoid holidays,

[8] Given that the sample weights in the CPS are equal to the number of people the observation represents, the probabilities are best thought of as fractions of the individuals represented by the observation. For example, if the sample weight of an observation is 2,400 and probability(non-hourly) is 0.25, then the observation represents 1,800 hourly workers and 600 non-hourly workers.

[9] Note that this ratio is related to the new OTC_ratio^{CPS} in equation (1). The numerator of PTO_ratio^{CPS} is paid hours worked, which is identical to the denominator of the new OTC_ratio^{CPS}, which is:

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

See Eldridge et al. (2022) for details.

and thus paid time off may be understated. Evidence presented in Frazis and Stewart (2004) shows that individuals work more hours (and presumably take less paid leave) during CPS reference weeks compared to non-reference weeks.[10] Thus, the PTO_ratio^{NCS} likely does a better job of capturing the level of paid leave. For this reason, we do not use this PTO_ratio^{CPS} directly. Instead, we construct a hybrid ratio that combines the CPS variation with the NCS level.

2.3. Hybrid paid-time-off (PTO) ratio adjustment

To incorporate the key features of paid time off from each series, the hybrid ratio combines the two ratios into a single measure that exhibits CPS variation around the NCS level. Our first step was to estimate the trend in the seasonally-adjusted PTO_ratio^{CPS} and calculate deviations from this trend.[11] We then added these deviations to the PTO_ratio^{NCS} to arrive at PTO_ratio^{Hybrid}. Thus, the PTO_ratio^{Hybrid} can be written as:

$$PTO\_ratio^{NCS} + (PTO\_ratio^{CPS} - Trend^{CPS}) \quad (4)$$

3. Comparison of PTO Ratios

Figure 6 shows the three ratios for the 14 major industry groups in the private nonfarm sector along with the CPS trend line.[12] There are several things to note. First, as expected, the PTO_ratio^{NCS} lies below the PTO_ratio^{CPS}. The difference in levels also varies across industries. The smallest difference is in nonfarm natural resources (about 0.02) and the largest is

[10] Similarly, Lachowska et al. (2022) finds that quarterly hours worked using CPS reports are overstated compared to administrative records from Washington State.
[11] Using X-13ARIMA-SEATS, we seasonally adjusted the series using ratios constructed for the 2000–2022 period (except for the wholesale electronic markets and agents and brokers industry, for which the series starts in 2003); however, we present data here only from the second quarter of 2006 forward, during which time CES all-employee hours paid data are available, because we are examining the impact of this ratio on the new hours method. Movements in the older hours data are linked to the new series in the second quarter of 2006.
[12] The NCS ratios are imputed from the three-digit ratios using CES hours paid as weights.

in utilities (about 0.08). Second, the PTO_ratio^{CPS} exhibits substantially more quarter-to-quarter variation than the PTO_ratio^{NCS}, which reflects the difference between leave granted and leave actually taken. Third, the PTO_ratio^{CPS} trends upward slightly, while the PTO_ratio^{NCS} trends downward slightly for the majority of the industries (construction, wholesale trade, retail trade, transportation and warehousing, financial activities, professional and business services, education and health services). In manufacturing, utilities, and information, the PTO_ratio^{CPS} trends upward slightly, while the PTO_ratio^{NCS} is relatively flat. In nonfarm natural resources, both series trend upward. In leisure and hospitality and other private non-household services, both series are flat.

The graphs in figure 6 suggest that there was no change in the aggregate PTO_ratio^{NCS} during the pandemic. In fact, the PTO_ratio^{NCS} decreased sharply from 0.922 in the first quarter of 2020 to 0.919 in the second quarter of 2020 (figure 7). The PTO_ratio^{NCS} then increased by 0.001 to 0.920 between the second and third quarter. These are large changes, considering that the magnitude of the change averaged just 0.0001 from 2006 through the end of 2019. The sharp decline in the second quarter was likely a composition effect due to the massive job losses in the leisure and hospitality sector and other low-wage sectors where paid leave is less prevalent—the PTO ratio in leisure and hospitality is around 0.97 compared with 0.92–0.93 overall. The moderate increase in the third quarter of 2020 was likely due to a higher fraction of these workers receiving paid leave through the PPP or under the FFCRA.

The behavior of the hybrid PTO ratios was quite different during the pandemic, compared to earlier periods and varied across major industries. Half of the 14 major industries experienced declines in the PTO_ratio^{Hybrid} of 0.01 or more between 2019q4 and 2020q2 (construction, nondurable goods manufacturing, retail trade, transportation and warehousing, education and

health services, leisure and hospitality, and other private non-household services).[13] A fall in the ratio of 0.01 is a one-percentage point decline and is much larger than we would expect to see given the historical time series. Nonfarm natural resources, durable goods manufacturing, wholesale trade, information, and professional and business services saw smaller declines in the ratio, although it is difficult to distinguish these from the usual variations in the ratio. There were no noticeable drops in utilities and financial activities.

The largest drops in the ratio were in transportation and warehousing (0.024), education and health services (0.020), leisure and hospitality (0.033) and other private non-household services (0.023). The large drops in some industries could be the result of two separate factors. First, workers in industries where PTO is less common, such as leisure and hospitality, other private non-household services, and retail trade, may have been paid for time off financed by the PPP or covered under the FFCRA—both designed to aid those in small and medium-sized businesses. Second, it is possible that workers who do not receive PTO may have been disproportionately laid off.

In the third quarter of 2020, the ratios subsequently rose by about as much as they had fallen in the prior quarter. In utilities, information, and financial activities, changes in the ratio were of about the same magnitude as we found outside the pandemic period. For financial activities and information, this was likely due to the industries' quick shift to remote work (Dalton & Groen, 2022). In the fourth quarter of 2020, the ratio again dropped in wholesale trade, perhaps due to the spike in COVID cases in December 2020.

Looking at how the ratios changed around the time of the Great Recession, we find that as the U.S. unemployment rate continued to rise to a peak of 9.9% in the fourth quarter of 2009,

[13] We compare 2020q2 to 2019q4 because changes in the ratio began to show up in 2020q1 in some industries.

industries that were particularly hard-hit in the recession experienced a drop in their ratios (U.S. Bureau of Labor Statistics 2022b). This finding is consistent with the hypotheses that taking leave at times of slack work is less costly to employers and that workers with less paid leave experienced larger employment declines. For example, in construction, the ratio fell by 0.004–0.005 in the two consecutive quarters ending in 2009. The ratio for durable goods manufacturing fell by 0.007 in the second quarter of 2009. The ratio for nondurable goods manufacturing fell by 0.004 in the third quarter of 2008 and stayed lower until the unemployment rate began to fall. The ratio in transportation and warehousing fell for five consecutive quarters beginning in the third quarter of 2008. And the ratio in education and health services fell by over 0.01 in the third quarter of 2009.

4. Comparison of Hours and Productivity

Applying the PTO_ratio^{Hybrid} to hours, we find that in the private nonfarm sector, all-employee hours fell in the second quarter of 2020 and then rose in the third quarter of 2020 to greater extents than when using the PTO_ratio^{NCS} (figure 8). Similarly, during the Great Recession, hours fell in the third quarter of 2009 to a greater extent.

Figure 9 shows the differences in the annualized quarter-to-quarter growth rates between the hours series using the PTO_ratio^{Hybrid} and the hours series using the PTO_ratio^{NCS} (Hybrid minus NCS). The differences between the series were quite large during the pandemic period. In the second quarter of 2020, hours fell by 2.8 percentage points more using the PTO_ratio^{Hybrid}. In the third quarter of 2020, hours rose by 6.9 percentage points more. In the fourth quarter of 2020, the increase in hours was 1.2 percentage points lower using the PTO_ratio^{Hybrid}. This difference reversed in the first quarter of 2021, when the increase in hours was 2.1 percentage points higher using the PTO_ratio^{Hybrid}. The hours growth rates were

more similar in the second and third quarters but again diverged in the last quarter of 2021, with hours using the PTO_ratio^{Hybrid} rising by 0.8 percentage points less. Growth rates remained similar for the first three quarters of 2022.

In Figure 10, we show the impact of using the PTO_ratio^{Hybrid} on labor productivity in the nonfarm business sector. The most notable difference between the hybrid and NCS series is during the COVID-19 pandemic, especially in the second quarter of 2020, when labor productivity increased sharply. Table 1 shows the percentage changes in productivity from the previous quarter at an annual rate using the PTO_ratio^{Hybrid} and PTO_ratio^{NCS}. The NCS (official) estimates and the hybrid series-based estimates tell different stories about the timing of productivity growth in the second and third quarters of 2020. Using the PTO_ratio^{Hybrid}, we find that productivity grew by 23.3 percent in the second quarter but only 2.8 percent in the third quarter. When using the PTO_ratio^{NCS}, growth was more evenly split between the second and third quarters (18 percent and 7.5 percent, respectively). The quarter-to-quarter growth rates also differed substantially between the two series in the fourth quarter of 2020 and the first quarter of 2021. In the last quarter of 2021, we find that official estimates of productivity were again understated because of higher paid leave than was accounted for by the annual ratios.

These estimates also change the story about the role of labor composition in labor productivity growth in the second quarter of 2020. Using official estimates prior to the introduction of the new hours method, Stewart (2022) found that labor composition accounted for 71 percent of the increase in productivity in the second quarter of 2022 (7.3 percentage points of the 10.3 percent increase in labor productivity calculated using the old method for estimating hours worked). Using the NCS hours series (that is, the new method), the 7.3 percentage point labor composition contribution falls to 41 percent of the 18.0 percent increase in labor

productivity calculated using the new method.[14] And using the hybrid hours series, the labor composition contribution falls to 31 percent of the 23.3 percent increase in labor productivity in the second quarter of 2020. It is worth noting that a 31 percent contribution is still economically significant. In previous quarters with high productivity growth, which occurred around recessions, labor composition accounted for no more than 6 percent of labor productivity growth.

5. Conclusion

The correct measurement of hours worked is critical for accurately measuring productivity. Yet, it is very hard to properly measure hours worked because the ideal data do not exist. BLS currently uses changes in leave policies reported by establishments to adjust hours paid data to hours worked. This adjustment is sufficient in normal times because most of the variation in annual and sick leave is seasonal. However, the COVID-19 pandemic was not a normal time.

Using household survey data, we developed an adjustment ratio to account for quarterly variation in paid time off. We find a large drop in the PTO ratio in the second quarter of 2020 in many industries, indicating that paid leave increased substantially in that quarter. We found a similar, but much less pronounced, pattern during the Great Recession. As the unemployment rate peaked around the end of the Great Recession, the ratio dropped in industries that suffered substantial job losses, which is consistent with employers granting their employees more leave when there is less work to do and with large employment declines among workers who are less likely to have a paid leave benefit.

[14] Stewart's estimates were based on labor productivity growth calculated using the old method for estimating hours worked.

Applying these ratios, we find that hours worked fell faster in the second quarter of 2020 and increased faster in the third quarter than the official hours series reports. Thus, we estimate that labor productivity growth was higher than the official estimate in the second quarter and lower in the third quarter of 2020. We find a similar, but much smaller, difference near the trough of the Great Recession.

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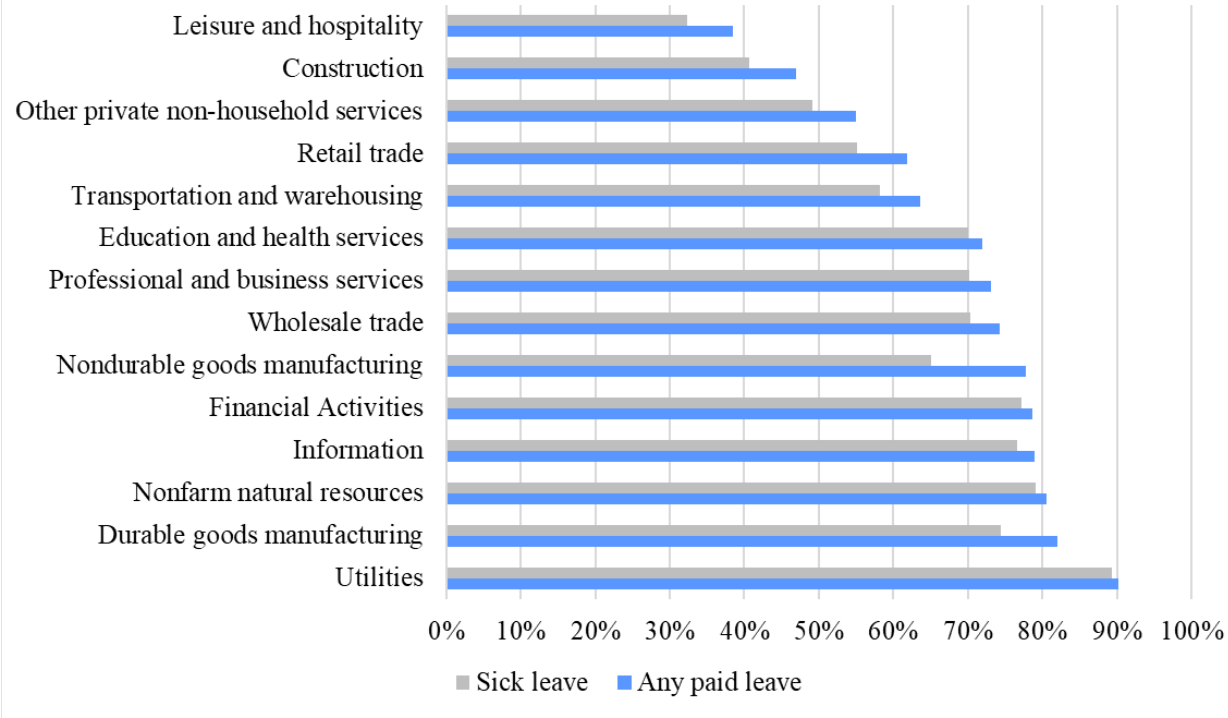
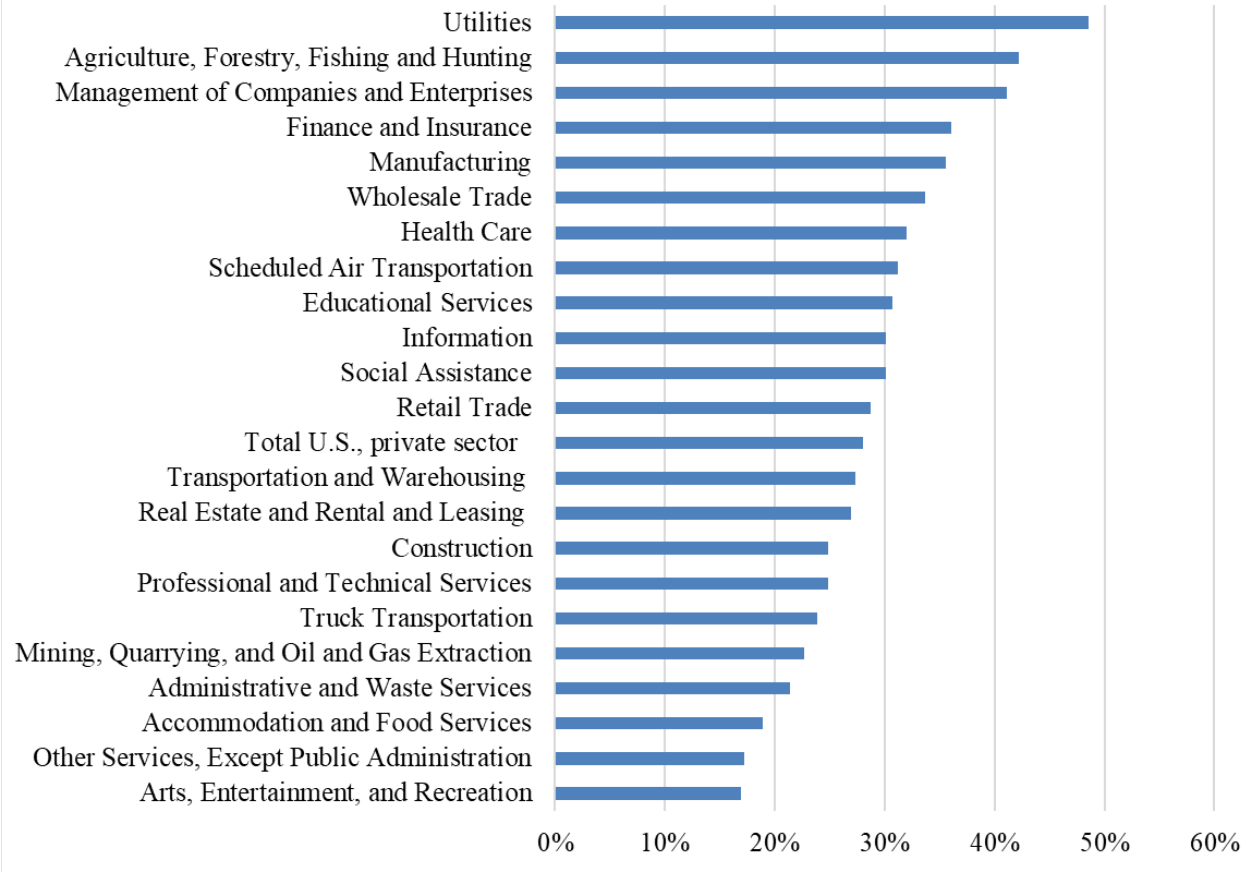
Figure 1. Percentage of Wage and Salary Employees Who Receive Paid Leave and Sick Leave in the Private Nonfarm Sector by Major Industry Group, 2017–18



Source: Authors' calculations on the 2017–18 American Time Use Survey Leave Module

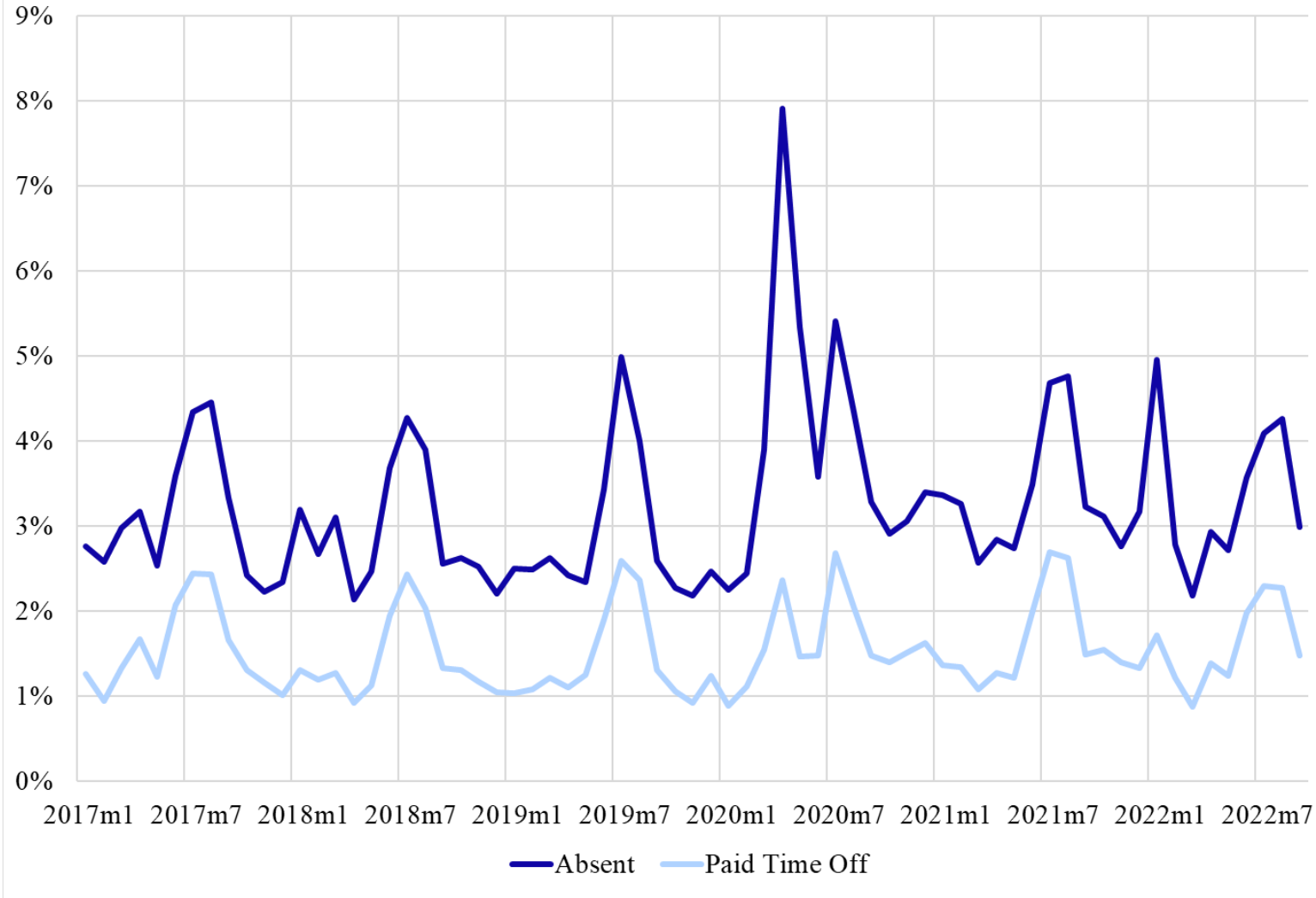
Figure 2. Percentage of Employment in Establishments that Increased Paid Sick Leave Because of the COVID-19 Pandemic by Industry, 2020



Note: Transportation and Warehousing excludes Scheduled Air Transportation and Truck Transportation. Survey data were collected from July 20 through September 30, 2020.

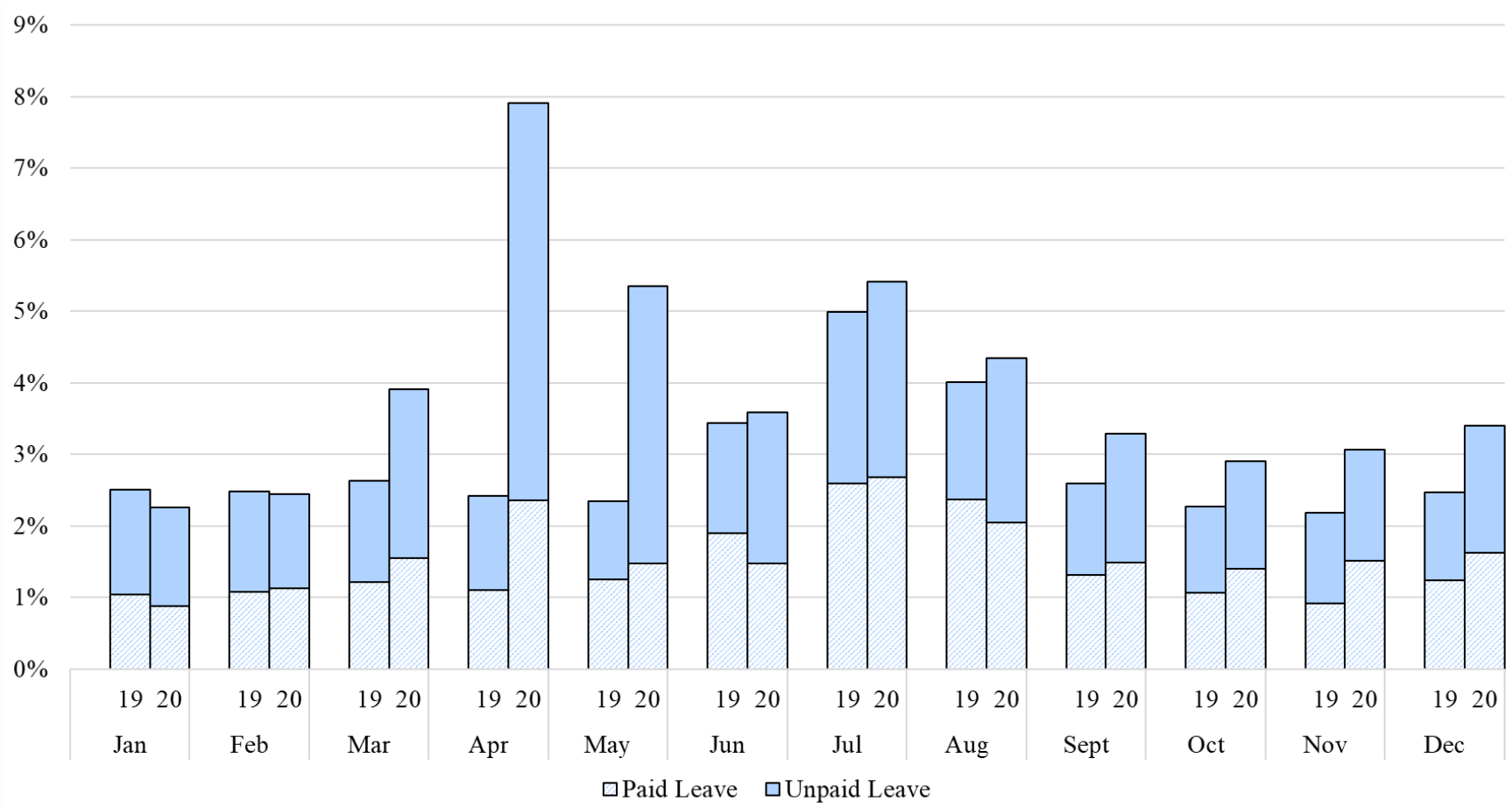
Source: 2020 Business Response Survey (U.S. Bureau of Labor Statistics, 2020b)

Figure 3. Percentage of Wage and Salary Employees Who Were Absent from Work in the Prior Week and Who Were Paid for Time Off in the Private Nonfarm Sector, 2017–22



Note: Not seasonally adjusted
Source: Authors' calculations on the Current Population Survey Outgoing Rotation Groups

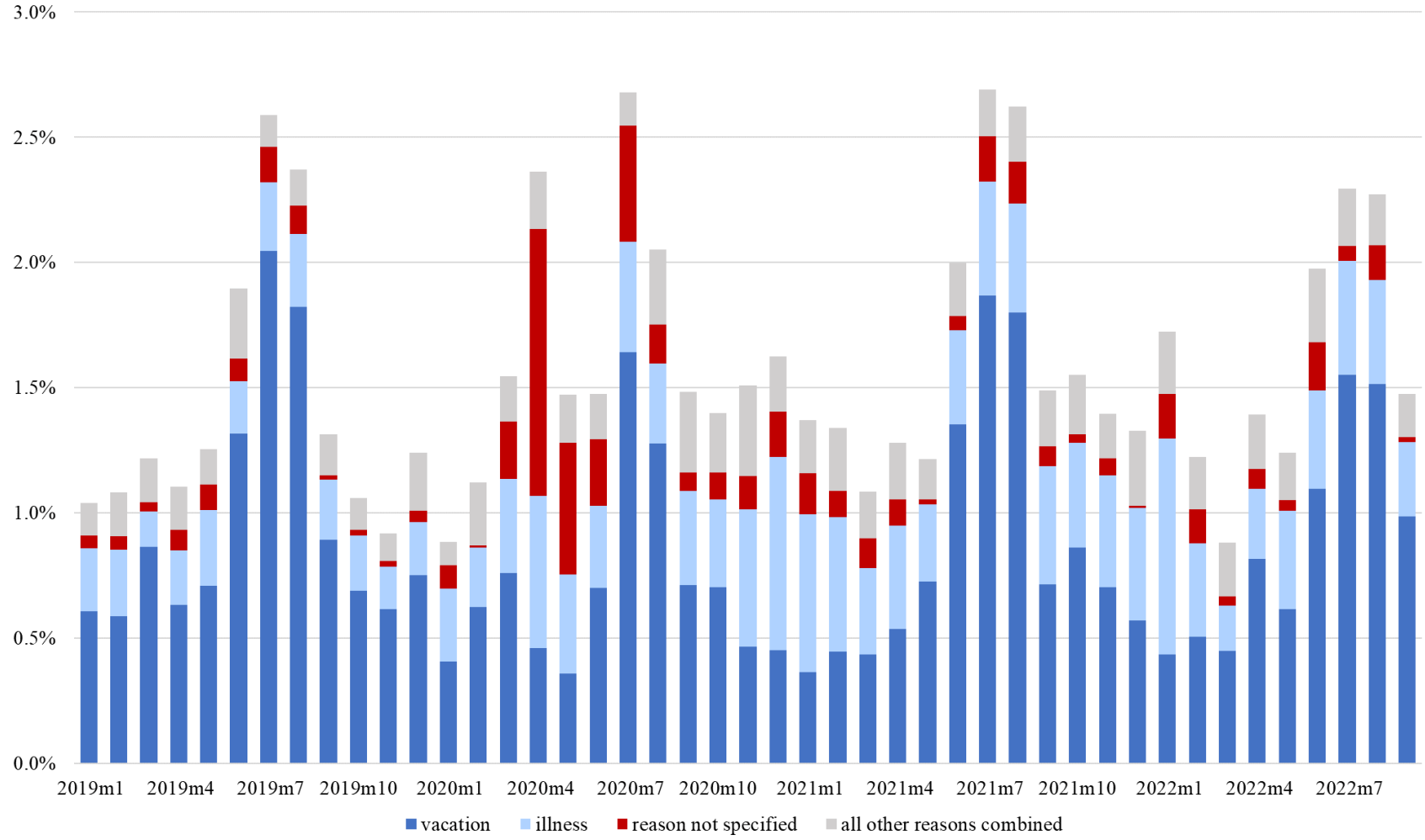
Figure 4. Percentage of Employees Who Were Absent from Work in the Prior Week by Paid Leave Status, Private Nonfarm Sector, 2019–20



Notes: Not Seasonally adjusted

Source: Authors' calculations on the Current Population Survey Outgoing Rotation Groups

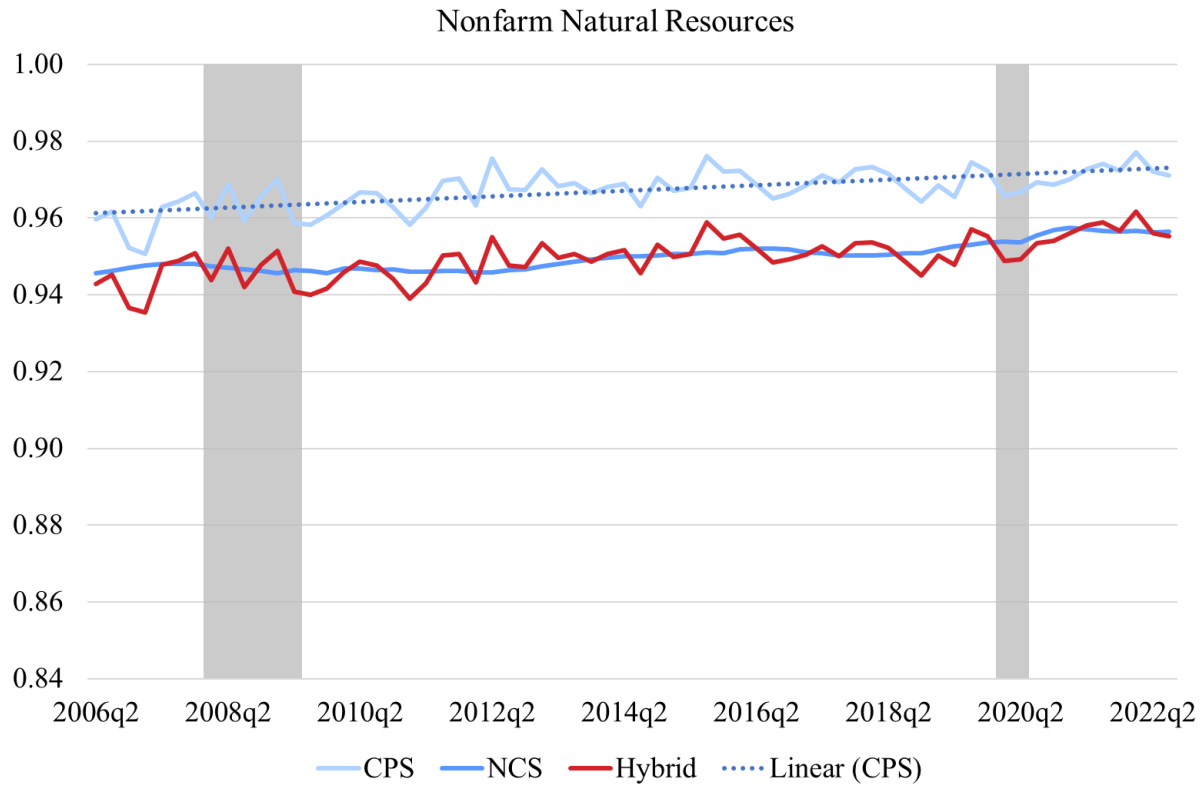
Figure 5. Percentage of Paid Absences and Reasons for Absences, Wage & Salary Workers in the Private Nonfarm Sector, 2018–22

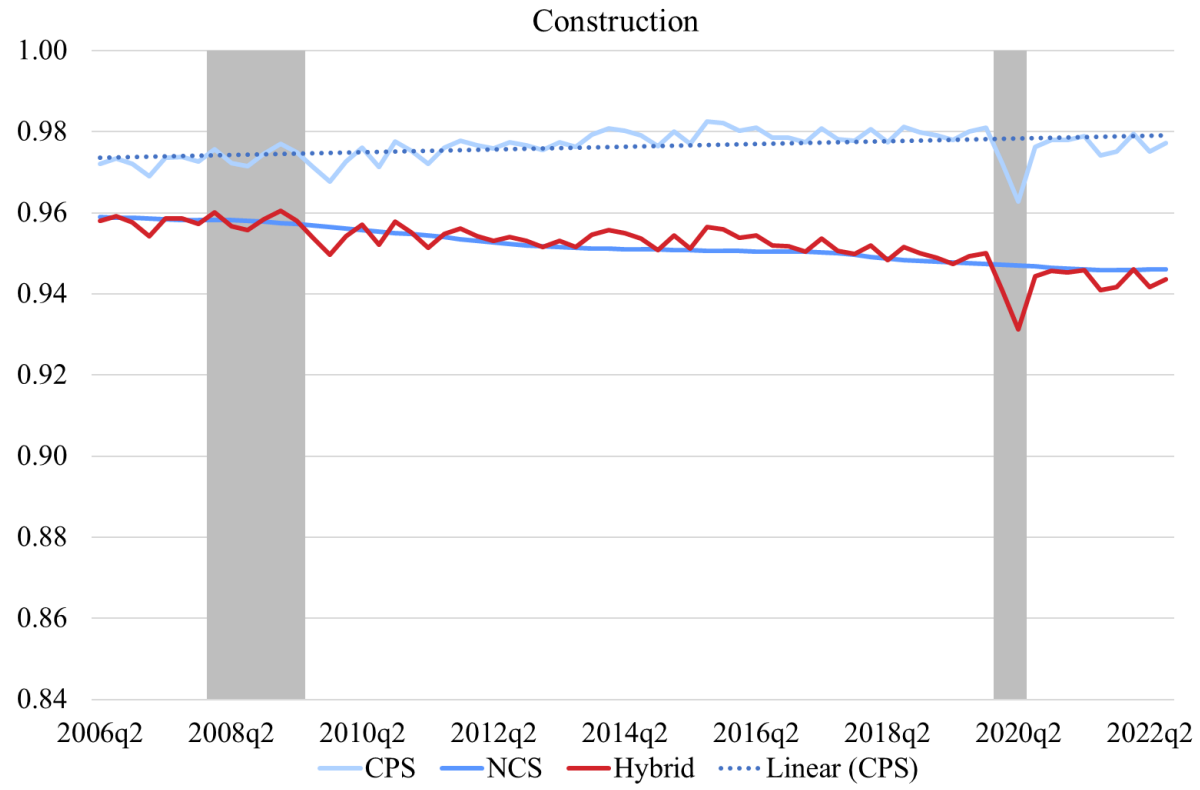


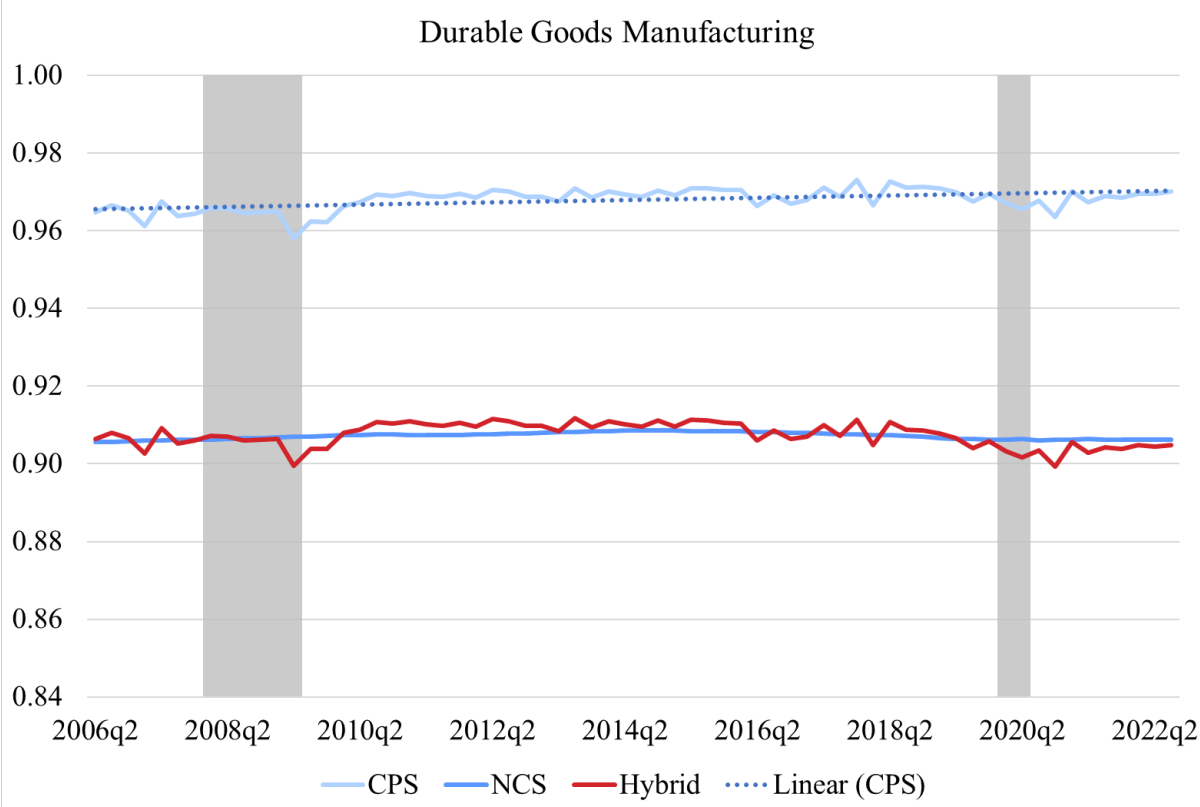
Note: Not seasonally adjusted

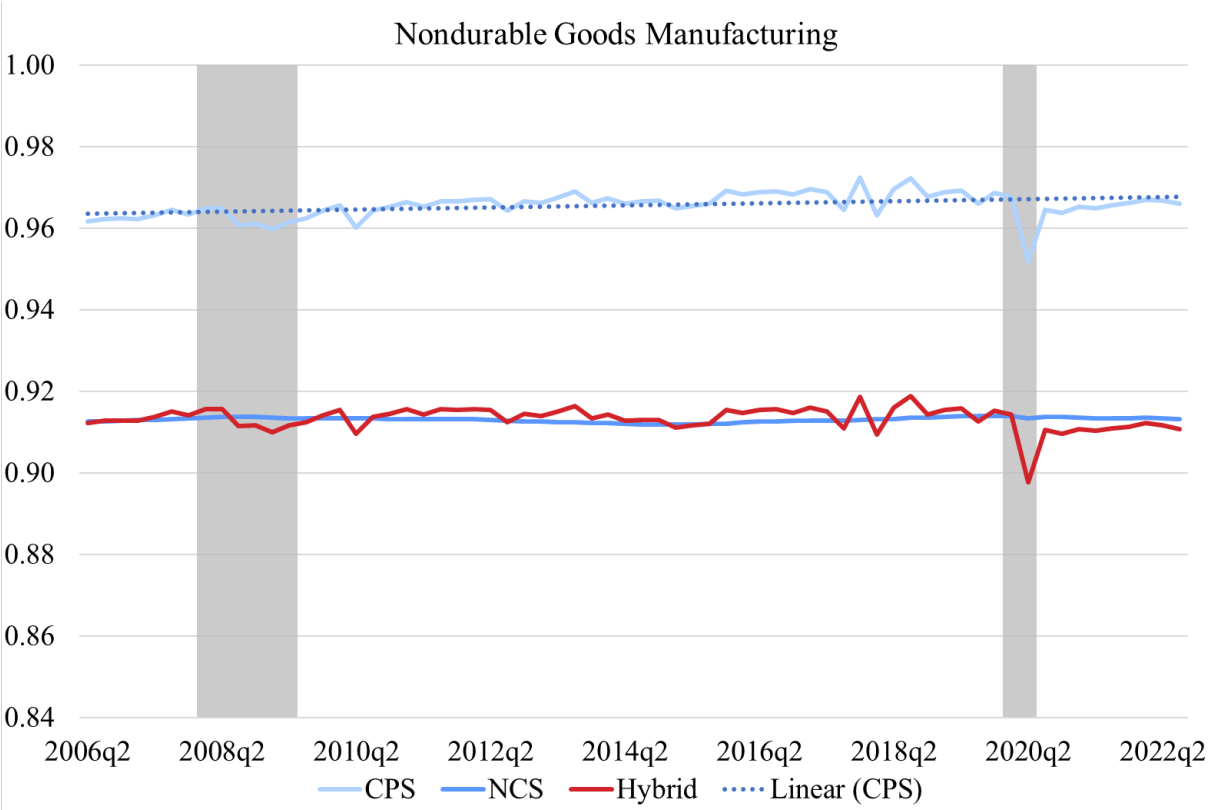
Source: Authors' calculations on the Current Population Survey Outgoing Rotation Groups

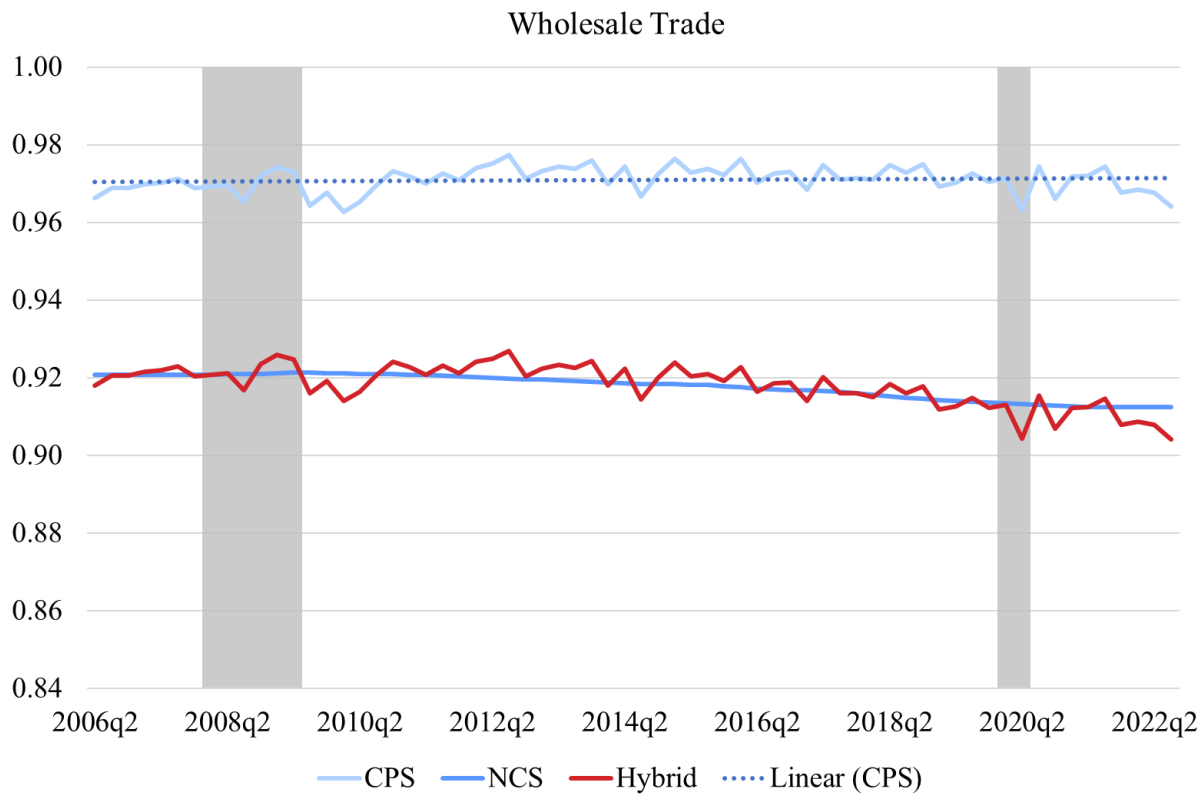
Figure 6. Paid-time-off Ratios by Industry, Second Quarter 2006 to Third Quarter 2022

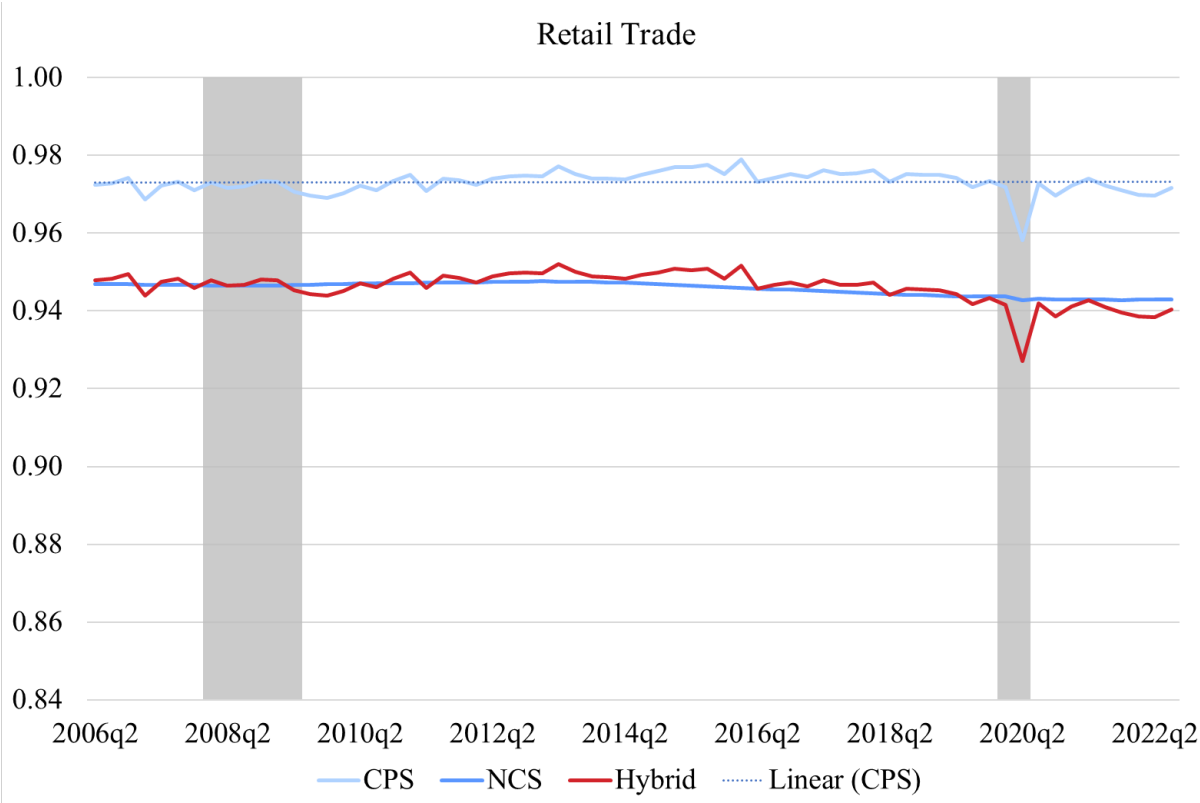


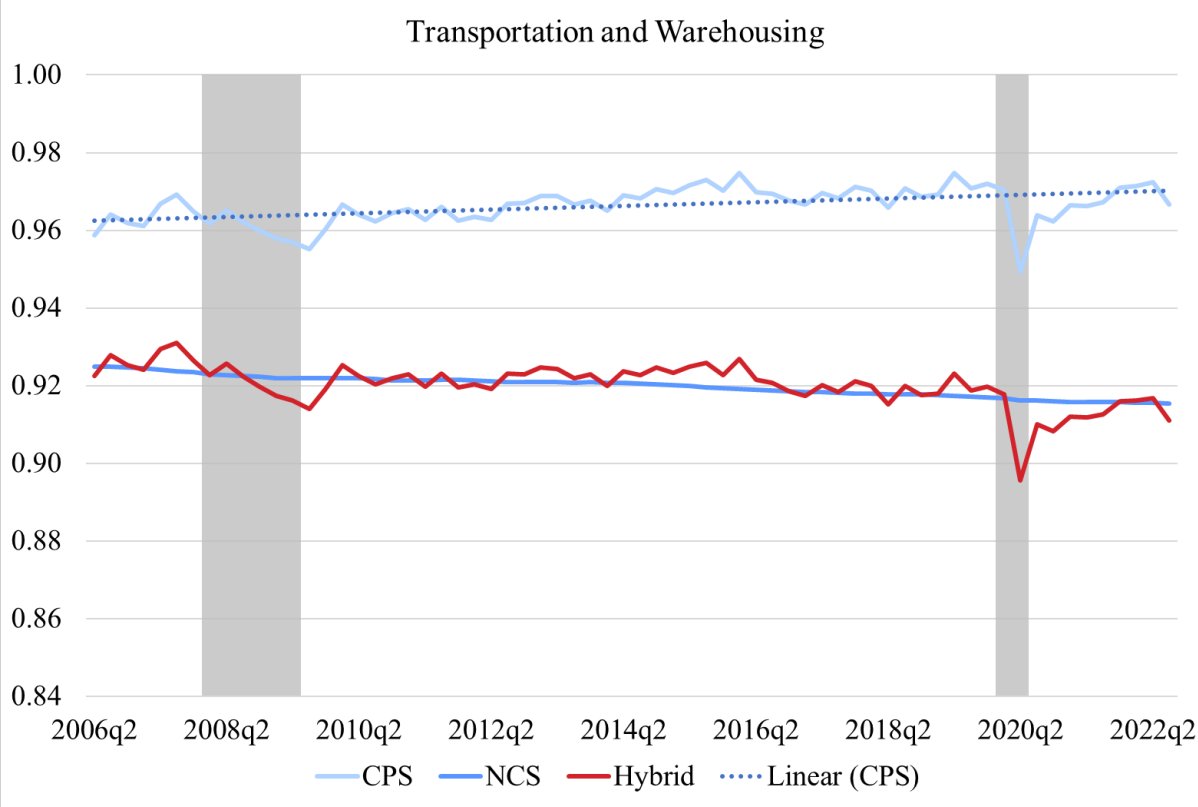


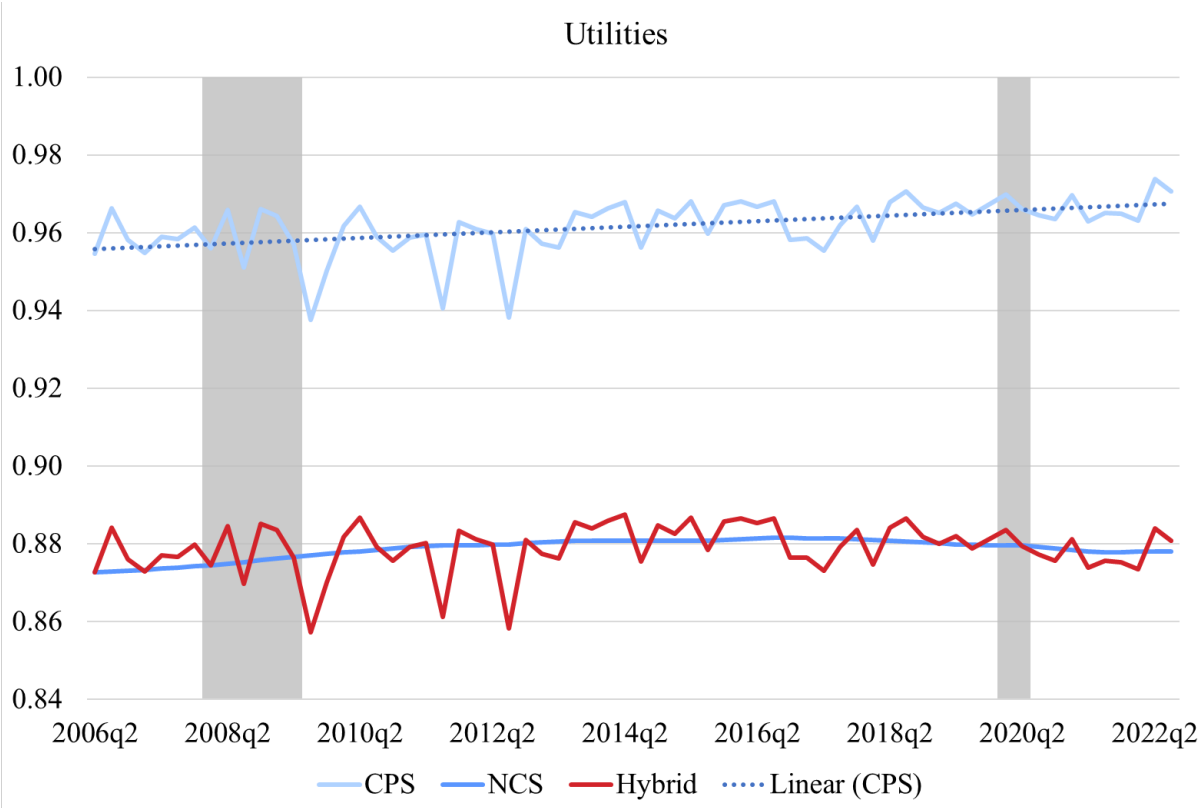

Durable Goods Manufacturing
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

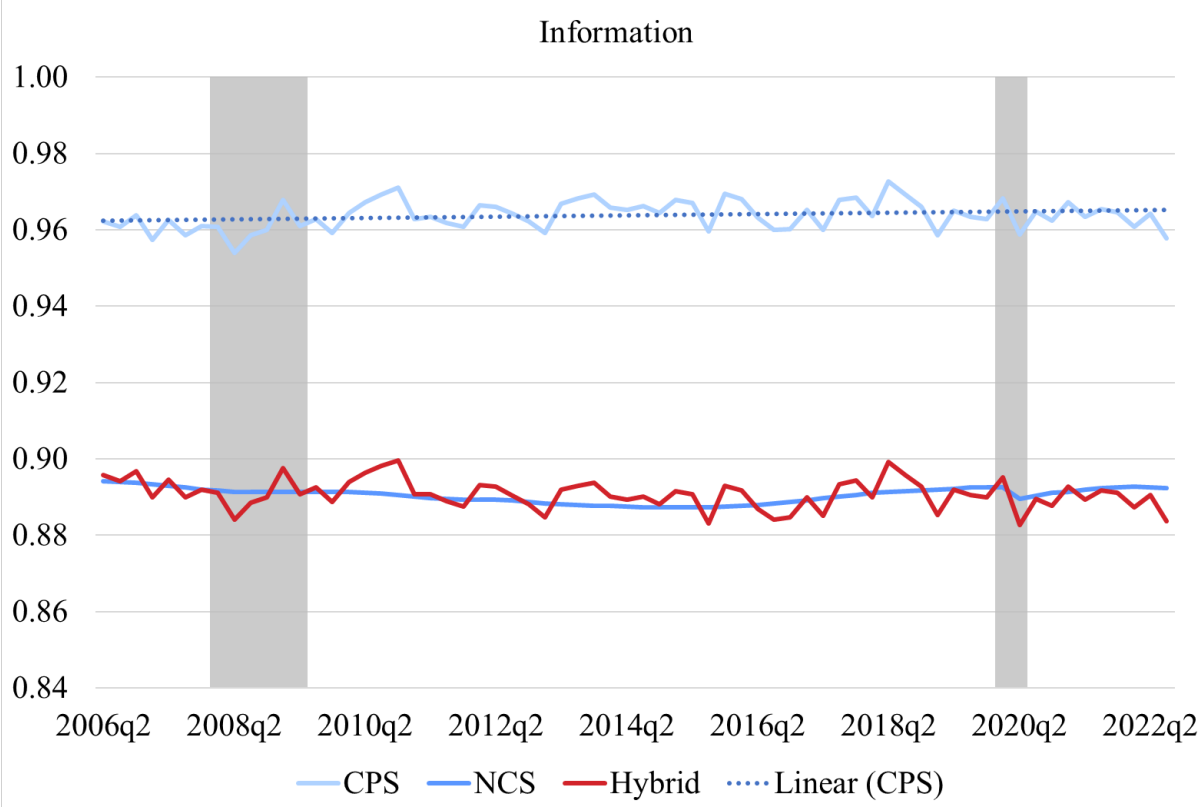

Nondurable Goods Manufacturing
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

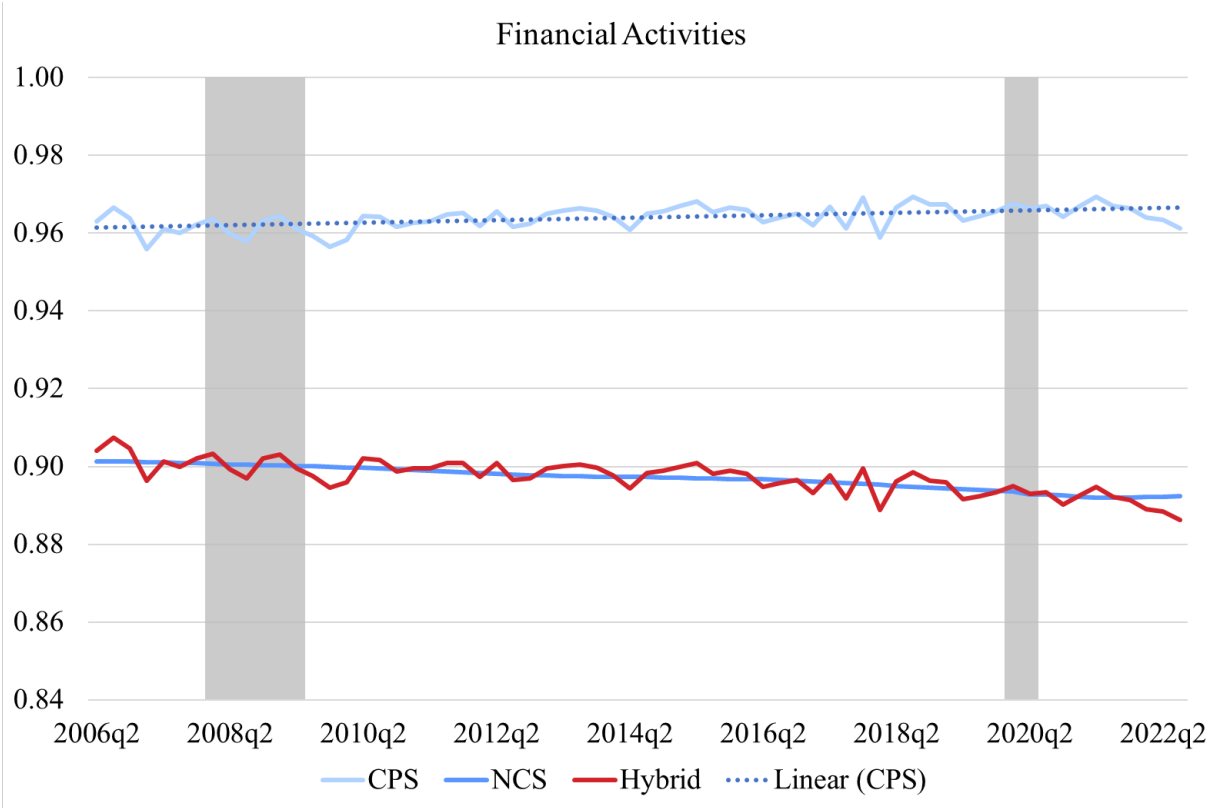

Wholesale Trade
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)


Retail Trade
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

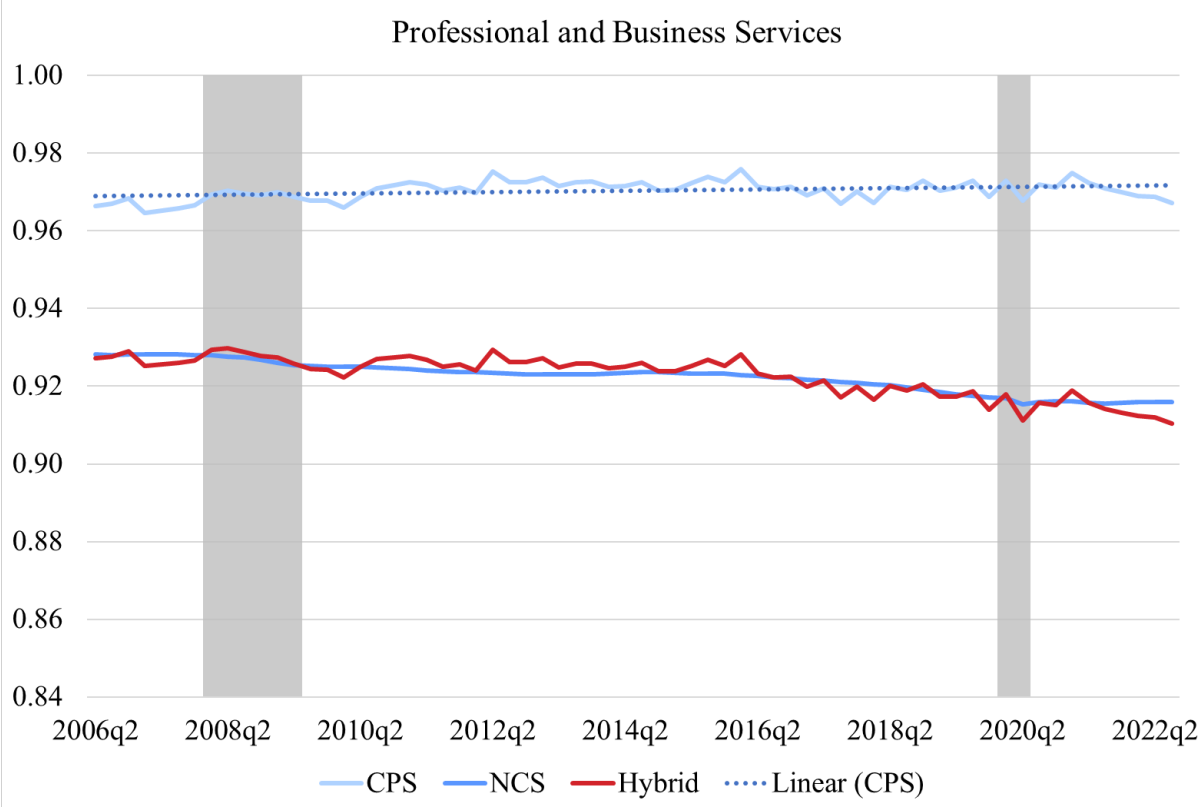

Transportation and Warehousing
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

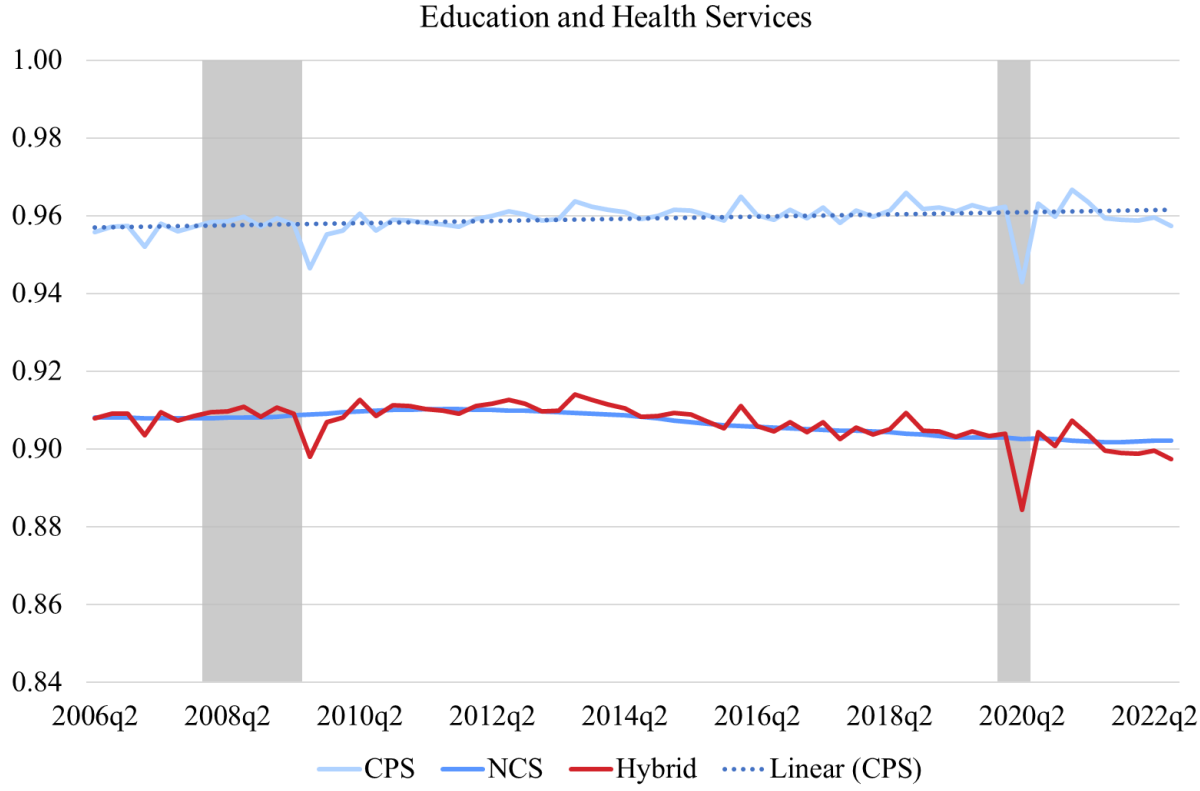

Utilities
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

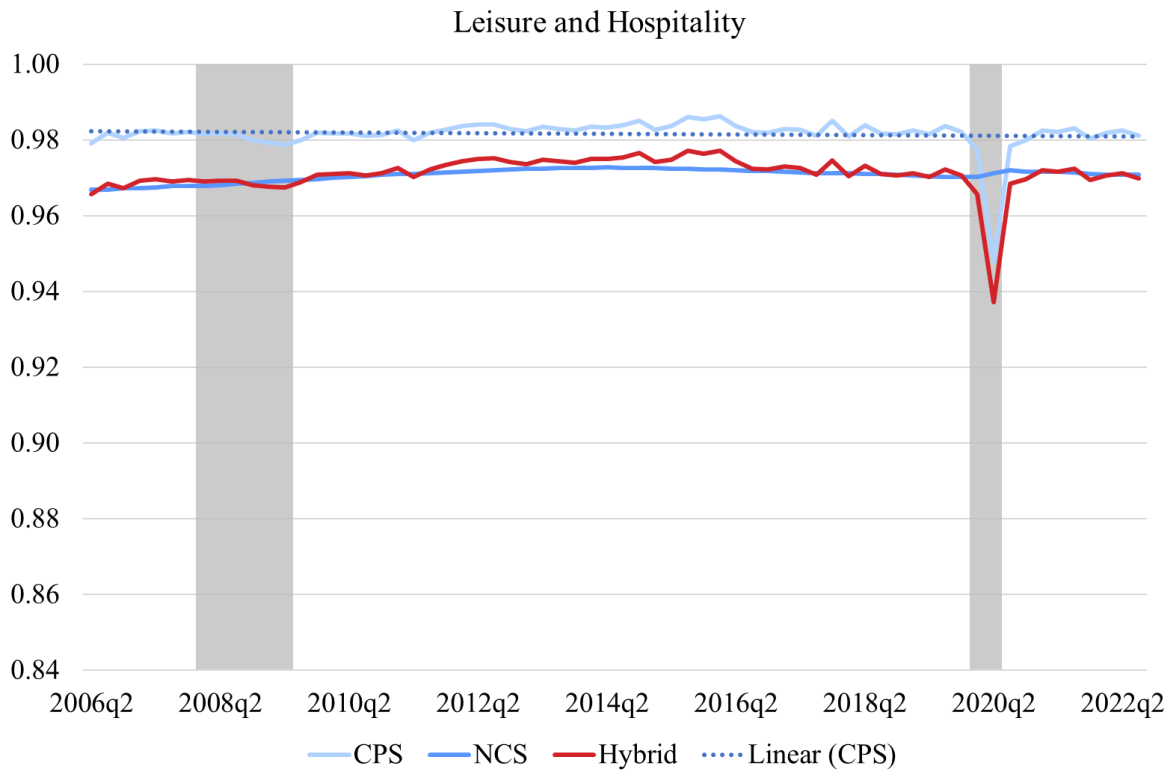

Information
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

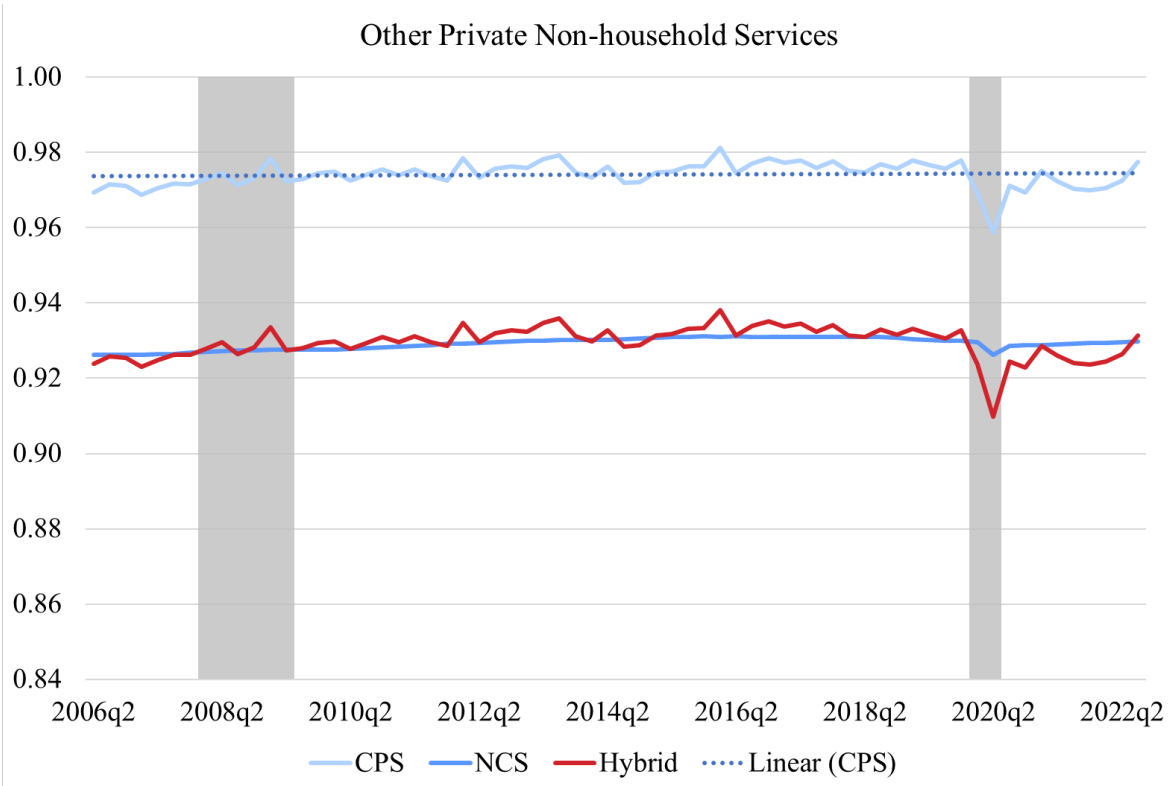

Financial Activities
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

Note:


Professional and Business Services
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)

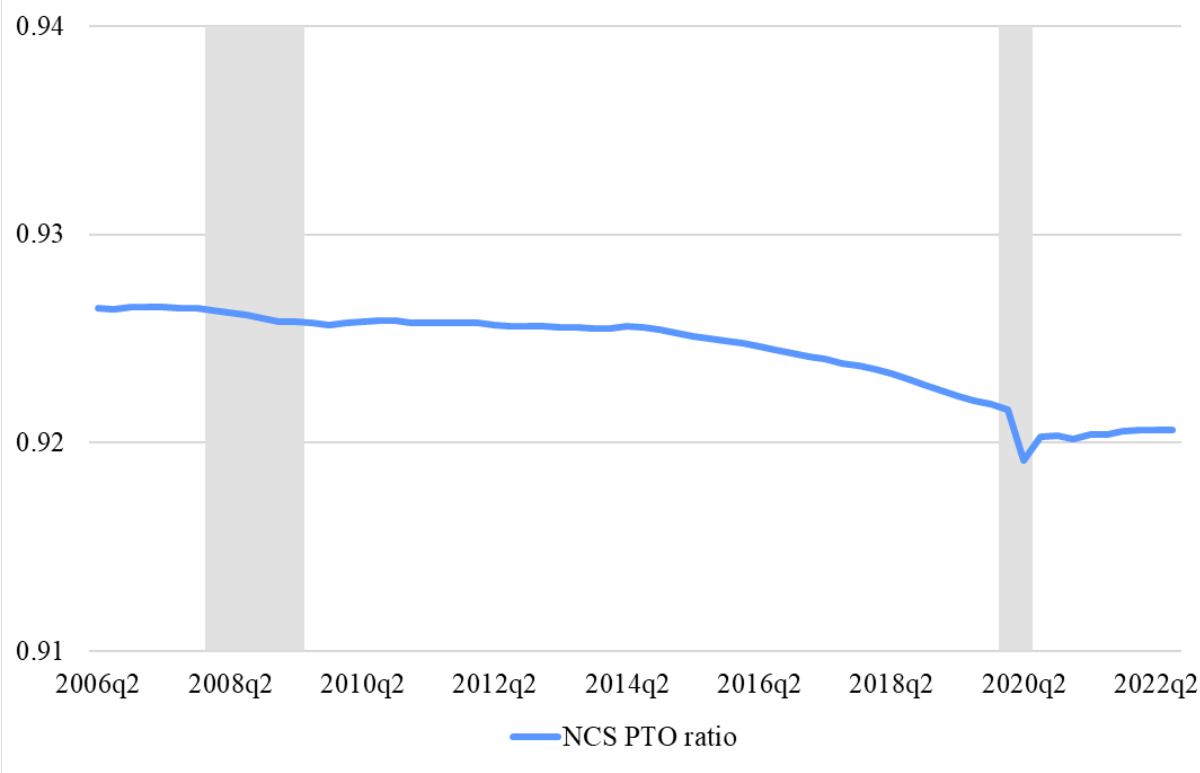

Education and Health Services
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
2006q2
2008q2
2010q2
2012q2
2014q2
2016q2
2018q2
2020q2
2022q2
CPS
NCS
Hybrid
Linear (CPS)





Note: The shaded bars denote National Bureau of Economic Research (NBER)-designated recessions.
Source: Authors' calculations on the Current Population Survey and National Compensation Survey

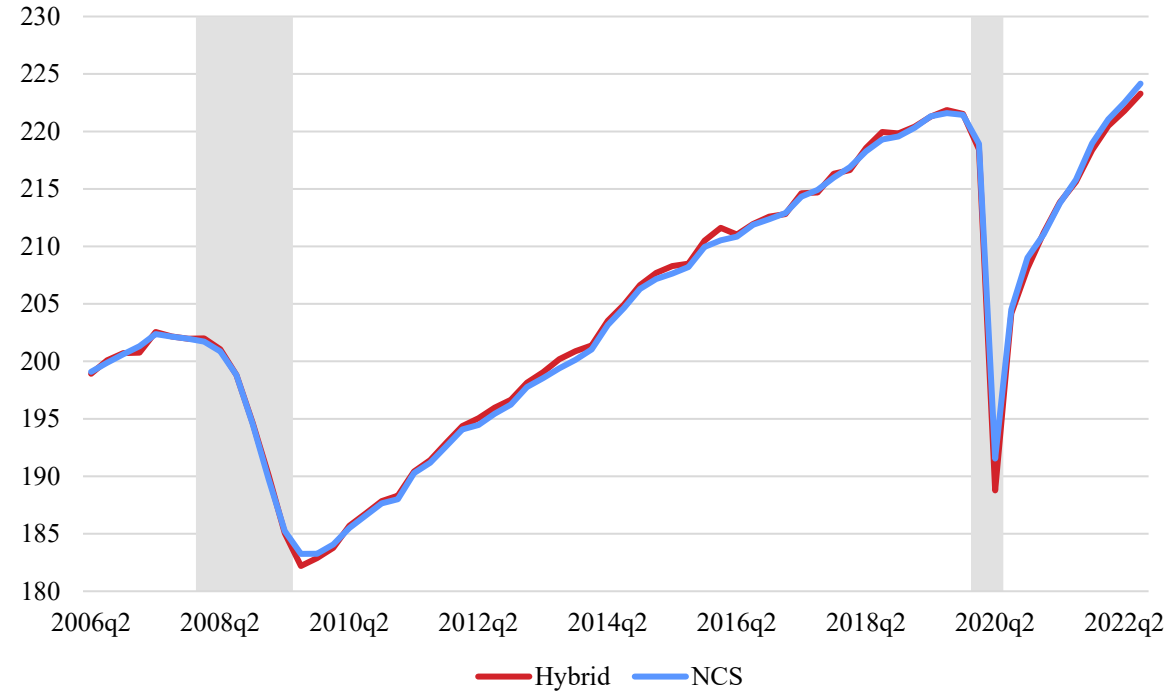
Figure 7. NCS Paid-time-off Ratio for Private Nonfarm Sector Employees, Second Quarter 2006 to Third Quarter 2022



Note: The shaded bars denote National Bureau of Economic Research (NBER)-designated recessions.

Source: Authors' calculations on the Current Employment Statistics and National Compensation Survey

Figure 8. All-employee Hours Levels in the Private Nonfarm Sector, by Paid-time-off Ratio, Second Quarter 2006 to Third Quarter 2022

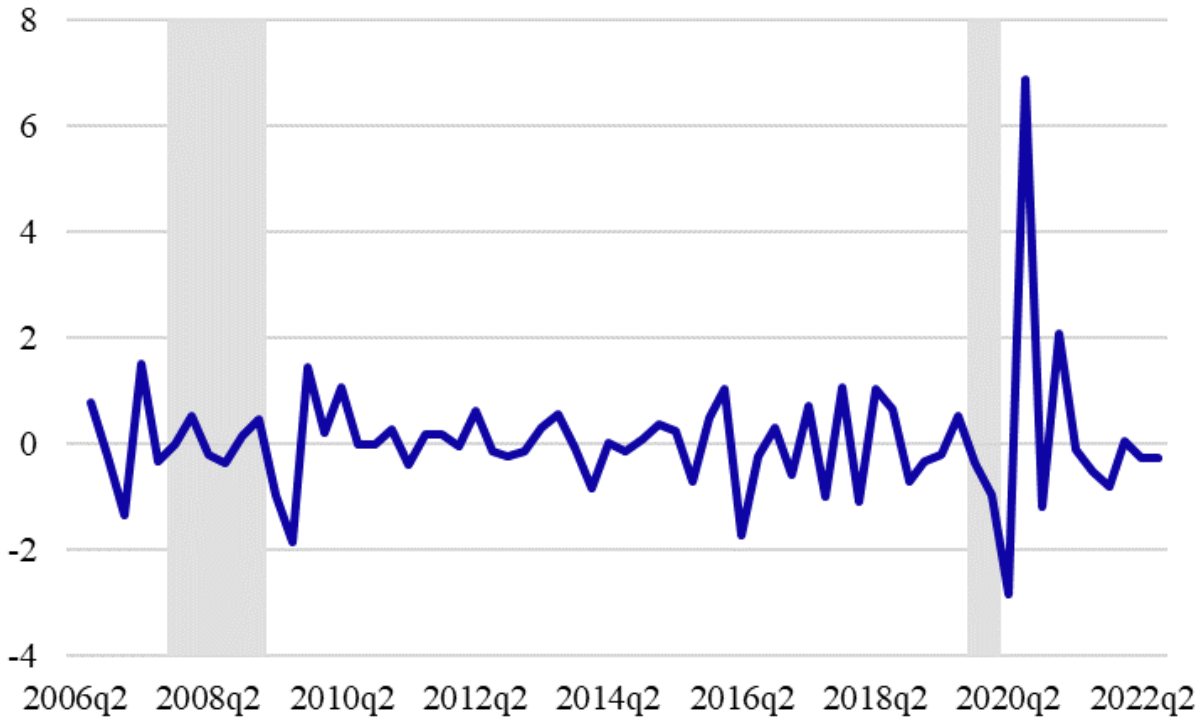


Note: Seasonally adjusted. The shaded bars denote National Bureau of Economic Research (NBER)-designated recessions.

Source: Authors' calculations on the Current Employment Statistics, Current Population Survey, and National Compensation Survey

Figure 9. Difference in the Annualized Quarter-to-quarter Hours Growth for Employees in the Private Nonfarm Sector, Hybrid Ratio Adjustment minus NCS Ratio Adjustment, Second Quarter 2006 to Third Quarter 2022

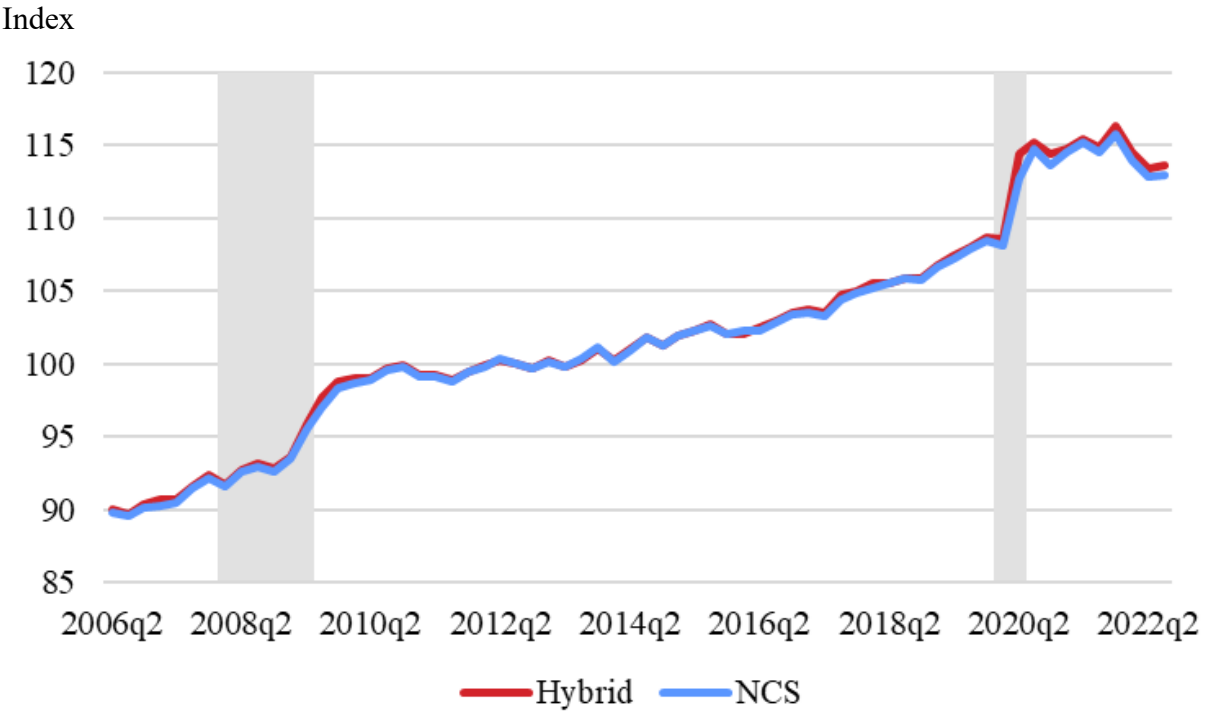
Percentage points



Note: The shaded bars denote National Bureau of Economic Research (NBER)-designated recessions.

Source: Authors' calculations on the Current Employment Statistics, Current Population Survey, and National Compensation Survey

Figure 10. Labor Productivity in the Nonfarm Business Sector, Second Quarter 2006 to Third Quarter 2022



Note: 2012=100. The shaded bars denote National Bureau of Economic Research (NBER)-designated recessions.

Source: Authors' calculations on the BLS Productivity Program, Current Employment Statistics, Current Population Survey, and National Compensation Survey

Table 1. Comparison of Using Alternative Paid-time-off Ratios on Productivity Growth in the Nonfarm Business Sector during the COVID-19 Pandemic

	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.

Source: Authors' calculations on the BLS Productivity Program, Current Employment Statistics, Current Population Survey, and National Compensation Survey