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The K-Shaped Recovery: Examining the Diverging Fortunes of Workers in the Recovery from the COVID-19 Pandemic using Business and Household Survey Microdata[†]

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Abstract: This paper examines employment patterns by wage group over the course of the coronavirus pandemic in the United States using microdata from two well-known data sources from the Bureau of Labor Statistics: the Current Employment Statistics and the Current Population Survey. We find that both establishments paying the lowest average wages and the lowest wage workers had the steepest decline in employment and are still the furthest from recovery as of the most recent data for workers in December 2020 and establishments in January 2021. We disentangle the extent to which the effect observed for low wage workers is due to these workers being concentrated within a few low wage sectors of the economy versus the pandemic affecting low wage workers in a number of sectors across the economy. Our results indicate that the experience of low wage workers is not entirely due to these workers being concentrated in low wage sectors – for many sectors, the lowest wage quintile in that sector also has had the worst employment outcomes. For each month from March 2020 to January 2021, at least 20% of the decline in employment among the lowest wage establishments was due to within-industry changes. Another important finding is that even for those who remain employed during the pandemic, the probability of becoming part-time for economic reasons increased, especially for low-wage workers.

Keywords: Closures, Coronavirus, COVID-19, Employment, Income, Inequality, Recession, Unemployment, Wages

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[†] Any analysis, opinions, and conclusions expressed herein are those of the authors and do not necessarily represent the views of the U.S. Bureau of Labor Statistics.

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Introduction

The coronavirus (COVID-19) pandemic plunged the U.S. economy into recession in early 2020 and has fundamentally affected the labor market. As of February 2021, COVID-19 was responsible for more than 450,000 deaths in the United States. The unemployment rate rose from 3.5 percent in February 2020 to 14.7 percent in April before falling to 6.3 percent in January 2021.

At the start of the pandemic, there were strong indications that the lowest-paid workers would be disproportionately affected. Analyzing the Bureau of Labor Statistics' (BLS) Quarterly Census of Employment and Wages and Occupational Employment Statistics data, Dey and Loewenstein (2020) showed that low-paid occupations were heavily represented and high-paid occupations lightly represented in the industry sectors most susceptible to employment losses during the pandemic. Using data from BLS's Current Population Survey (CPS), Dey, Loewenstein, Piccone, and Polivka (2020) found that in 2019, the median hourly wage of workers in highly exposed sectors was $15.00, compared to $21.50 for workers in other sectors. Furthermore, a larger share of workers in highly exposed sectors worked part-time hours in 2019.

Analysis of private data from various sources appears to bear out that low wage workers have borne the brunt of the pandemic induced recession. Using data from ADP, a large payroll processor, to analyze labor market trends through June 2020, Cajner et al. (2020) found employment losses to be largest among workers in the lowest quintile, where quintiles are defined on the basis of workers' hourly wage in February data. In their data, by mid-April workers in the lowest quintile had experienced a decline in employment of about 35 percent relative to mid-

February levels; as of late June, employment had recovered but was still 20 percent lower than mid-February. Bartik, Bertrand, Lin, Rothstein, and Unrath's (2020) findings using Homebase work records provide further evidence that low wage workers have fared poorly during the early part of the recession. Their sample, which is skewed toward lower wage workers in the hospitality/restaurant sector, shows that as of mid-April the number of hours worked by workers with a wage below $15 an hour was about 75% below the level in late January while the hours of workers with wage above $15 was about 60% below the January level. By June, the hours of all workers in their sample had recovered to about 50% to 60% of the January level.

Chetty, Friedman, Hendren, Stepner, and the Opportunity Insights Team (2020) combined payroll processing information from Paychex and Intuit and financial management data from Earnin to analyze employment declines through August 2020 for workers grouped into three wage classes. The Opportunity Insights Economic Tracker indicated that employment bottomed out in the third week of April, at which time the employment level for workers with annual earnings below $27,000 was 37.4% below the level in January. For workers earning between $27,000 and $60,000, this figure was 23.3%, and it was 13.7% for workers earning more than $60,000. By the third week in August, the employment level of workers in the lowest earnings group was still 17.5% below the January level. In contrast, the employment of workers in the middle earnings group was 5.4% below the January level and the employment of high wage workers had nearly recovered completely, as it was only 1% below its level in January.

This paper provides a further look at employment patterns by wage group over the course of the pandemic using microdata from two BLS data sources: the Current Employment Statistics (CES)

and the Current Population Survey (CPS). In contrast to the datasets described above, the CES survey offers a large, representative sample of employers and the CPS offers a large, representative sample of workers. We also present additional evidence from the Business Response Survey to the Coronavirus Pandemic, a special BLS survey that collected establishments' responses to a series of questions related to business experiences during the pandemic.

An important aspect of our work is an exploration of workers within industry sectors. This will allow us to disentangle the extent to which the effect observed for low wage workers is due to these workers being concentrated within low wage sectors of the economy as opposed to the pandemic affecting low wage workers in a number of sectors across the economy. A within industry exploration also will allow us to examine whether there were some industries in which the effects of the pandemic were more uniformly distributed across workers with different levels of earnings than other industrial sectors. The within and across industry analysis has important implications for the effect of the pandemic on evolving earnings inequality and attempts to address the potential widening of earnings disparities in the U.S. economy. If the effects on low wage workers are concentrated in specific industries this may call for more targeted support of specific industries. If instead, low wage workers suffer disproportionately across all industries the pursuit of more economy-wide actions may be warranted.

We present two key findings. First, both establishments paying the lowest average wages and the lowest wage workers had the steepest decline in employment and are still the furthest from recovery as of the most recent data for establishments in January 2021 and workers in December

2020. These results are consistent across two large and representative BLS surveys, one based on establishments (the CES survey) and one based on households (the CPS). The second key finding is that these effects are not entirely explained by industry effects – for many sectors, the lowest wage quintile in that sector also has had the worst employment outcomes. Additional evidence for these findings is provided by the Business Response Survey to the Coronavirus Pandemic (BRS). Corroborating results from the BRS show that even within industry lower wage establishments were less likely to pay employees told not to work, less likely to pay part of health insurance premiums for employees told not to work, and less likely to offer telework for employees before or during the pandemic.

While previous research has shown the long-run consequences of an unemployment spell to a worker during a recession, such as significant lifetime earnings displacement (Davis and Von Wachter 2011) and higher risk of mortality (Sullivan and Von Wachter 2009), many of these negative outcomes may be even worse for low-wage workers whose inequalities in mortality outcomes have already been documented (Chetty et al. 2016). Given the slow jobless recovery seen in recent recessions for the lowest wage workers (Yagan 2019), the potential for significant increases in inequality resulting from the pandemic recession is clear. Heathcote, Perri, and Violante (2020) found that hours and earnings fall the most during recessions and do not fully recover during expansions, hitting low-skilled men extra hard.

Another important finding in this paper is that even for those who remain employed during the pandemic, there is a higher probability of becoming part-time for economic reasons, in particular

for low-wage workers. This is additional evidence showing the multiple pathways through which low-wage workers are struggling over the course of the pandemic.

Using the CES and CPS to Track Employment

To examine employment from an establishment perspective, we use microdata from the Current Employment Statistics survey (CES). The CES is one of the longest running and most relied-upon sources of current data on the U.S. labor market. The CES is a monthly survey that collects data from 145,000 businesses and government agencies representing 697,000 worksites. The survey asks about employment, hours, and earnings in the pay period that includes the 12th of the month. Preliminary estimates at the national level by industry are usually published on the first Friday of the following month, with revisions published in the 2 succeeding months. We track employment changes using monthly data for private-sector establishments starting in March 2020 and going through January 2021. In doing so, we utilize a longitudinal component to the CES that we take advantage of by conditioning the analytical sample on establishments that responded to the survey in both February 2020 and the reference month observed in the figures and tables. Additionally, we use information from the 2019 Quarterly Census of Employment and Wages (QCEW) to get wage information for the establishments interviewed in the CES.[1]

For an examination from the workers' perspective, we use microdata from the Current Population Survey (CPS). Conducted by the U.S. Census Bureau for BLS, the CPS is a monthly survey of 60,000 households that collects information about demographics, labor force status, wage

[1] The QCEW provides the sampling frame for the CES and other BLS establishment surveys. The QCEW program also publishes estimates of employment and wages. QCEW data are collected from the full universe of employers covered by Unemployment Insurance programs in the United States.

information, hours worked, and occupation and industry of jobs. Similar to the CES, the reference period includes the 12th of the month. As with the CES, we track employment changes using monthly data starting in March 2020 and going through December 2020.[2] We again rely on the longitudinal aspect of the data: we are able to observe wage information for surveyed individuals that were interviewed between January 2019 and February 2020 along with other important employment information for an individual prior to the pandemic. We then observe their labor force status and hours worked in 2020 during the pandemic.

CES Analysis

Each establishment is grouped into a wage class, defined as an establishment's average wage per worker in 2019: the establishment's total annual wages in 2019 in the QCEW divided by the establishment's average monthly employment across all 12 months of 2019 in the QCEW. Table 1 shows the proportion of establishments and employment in each category.

The key results constructed for this section are based on the methodology described in Dalton, Handwerker, and Loewenstein (2020). In that paper, estimates for changes in employment by size class are constructed for each month relative to an establishment's reported employment in February 2020, exploiting the panel-sample structure of the CES. An analogous strategy is used here, except instead of dividing establishments by size class, establishments are grouped by wage class.

[2] As a result of the sampling patterns used in the CPS, it is not possible to use the same methodology on data after December 2020 because the sample size and composition would change. For that reason, the CPS results end in December 2020.

The total change in employment for each wage class is the sum of two separate components:

1) The employment change in establishments continuing with positive employment, which is assumed to be the same for both respondents and nonrespondents.

2) Employment decline due to closures. Closures for respondents are based on reported zero employment in the data. Closures for nonrespondents are imputed based on historical data showing an increased likelihood for nonrespondents to be closed.

Closures will only have a negative impact on employment, whereas the component for continuing establishments may be positive or negative.

The employment for establishment i in month M, wage class j, and sector k is designated by E_{iMjk}. Letting R_M denote the set of sampled establishments in month M that responded in February 2020, which is the union of $R_M^{Continuing}$ (the set of responding establishments that continue to be open in month *M)*, R_M^{Closed} (the set of responding establishments that report zero employment in month *M),* and R'_M (the set of establishments that responded in February 2020 but were nonrespondents in month *M).* The percentage employment change for continuing establishments (those with positive employment in month M) who respond in month M, wage class j, and sector k is depicted as

$$\%\Delta E_{RMjk}^{Continuing} = \frac{\sum_{i \in R_M^{Continuing}} E_{iMjk} - E_{iFebjk}}{\sum_{i \in R_M^{Continuing}} E_{iFebjk}} \quad (1)$$

The level of employment change, $\Delta E_{Mjk}^{Continuing}$, for all continuing establishments (including nonrespondents) in month M, wage class j, and sector k is then given by

$$\Delta E_{Mjk}^{Continuing} = \%\Delta E_{RMjk}^{Continuing}\left[\sum_{i\in R_M^{Continuing}}\left[E_{iFebjk}\right] + \left(1-\widehat{c_{Mjk}}\right) * \sum_{i\in R_M^{'}}\left[E_{iFebjk}\right]\right] \quad (2)$$

The first summation is for continuing respondents with a valid response in month M, and the second summation over R_M', all nonresponding establishments, is the imputed employment for nonrespondents that are estimated to be continuing establishments in month M. For the imputed employment, continuing establishments are assumed to have the same percentage change in employment as responding continuing establishments. $\widehat{c_{Mjk}}$ is the estimated probability of closure for nonresponding establishments.[3]

The estimate of the percentage change in employment due to establishments that continue to be open can then be expressed as

$$\%\Delta E_{Mj}^{Continuing} = \frac{\sum_k \Delta E_{Mjk}^{Continuing}}{\sum_k \sum_{i\in R_M} E_{iFebjk}} \quad (3)$$

where the denominator is the employment level at all responding establishments in February 2020 who were still in the sample as of month M.

The estimated change in the employment level for closed establishments is

[3] Details of how this is calculated are explained in Dalton, Handwerker, and Loewenstein (2020). It is the product of the percentage of responding employers that report zero employment in month M and an adjustment based on historical patterns of closures related to nonrespondents in the CES.

$$\Delta E_{Mjk}^{Closed} = \left[\sum_{i \in R_M^{Closed}} \left[- E_{iFebjk} \right] - \widehat{c_{Mjk}} * \sum_{i \in R_M'} \left[E_{iFebjk} \right] \right] \quad (4)$$

and the percentage change is

$$\%\Delta E_{Mj}^{Closed} = \frac{\sum_k \Delta E_{Mjk}^{Closed}}{\sum_k \sum_{i \in R_M} E_{iFebjk}} \quad (5)$$

Finally, the percentage employment change for wage class j in month M (relative to February 2020) is

$$\%\Delta E_{Mj} = \%\Delta E_{Mj}^{Continuing} + \%\Delta E_{Mj}^{Closed} \quad (6)$$

The sample used for our analysis is conditioned on an establishment having a valid employment response in the CES in February 2020 and being in the sample in the displayed month. Figure 1 depicts the two components to the overall employment change each month for that wage class, $\%\Delta E_{Mj}^{Continuing}$ and $\%\Delta E_{Mj}^{Closed}$.

The results in Figure 1 show that for all wage classes, employment loss in continuing establishments was the primary component of employment loss since April. The percentage of employment loss due to closures was fairly steady for all wage classes since July, though employment loss due to closures increased in December for all wage classes, the first time that had happened in 2020 since April. Employment loss for continuing establishments was substantial for all wage classes in April and especially large for low-wage employers. The employment loss

for continuing establishments mostly declined each month in each wage class, with only a few exceptions of increases by no more than a quarter of a percentage point.

Summing the two components in Figure 1, the solid lines in Figure 2 depict the total percentage change in the employment of each wage class every month. The lowest-wage establishments have consistently had the largest employment decline each month since February. Although the lowest-paying establishments have had some bounce back from the 38% fall in their employment in April, their employment in January 2021 was still 12.2% below the level in February 2020. The percentage reduction in employment in January 2021 from the level in February was between 2.9% and 4.5% for the other four wage classes.

For all wage classes, the trough of employment occurred in April. The rate of employment growth for establishments in the lowest wage class was greatest between May and June (37% of lost employment recovered), but since then it has slowed considerably, having recovered in January 2021 only 26% of the employment loss as of July.

As a comparison to the pandemic-exposed employment pattern in 2020, the dashed lines in Figure 2 show analogous results for 2019. It is clear from the figure that the 2020 pattern is not explained by seasonality or systematic pre-pandemic differences between wage classes. The most apparent takeaway from Figure 2 is the magnitude of employment loss experienced in 2020. In 2019, all wage classes showed steady, slow, and positive growth through November 2019, the size of which pales in comparison to the employment loss in 2020. There is a small peak for the lowest-wage class in the summer that falls back towards the other wage classes by October. By January 2020, there is a small dip in employment for all wage classes. The patterns observed in

2019 do not offer much in terms of explaining the magnitude of the results observed during the pandemic.

A natural question is whether the relatively large employment declines at establishments paying lower wages simply reflect a drop in employment in low-wage industrial sectors such as other services and leisure and hospitality. We therefore now repeat our analysis for each of the sectors. Figure 3 shows employment changes within sector for establishments in each of the wage classes, using the same wage cutoffs across sectors. Interestingly, the employment patterns within the various sectors are mostly similar to the overall pattern portrayed in Figure 2. Even within sectors, the lowest wage establishments disproportionately suffered the largest losses in employment. Specifically, in 10 of the 15 sectors, the lowest wage establishments within the sector have the biggest percentage declines in employment as of January 2021. Even within the typically low-wage sectors such as other services, establishments that paid the lowest wages had disproportionately larger declines in employment. Similarly within the higher wage sectors such as information, it was the establishments that paid the lowest wages that had the biggest declines in employment. The fact that low-wage establishments suffered the largest declines in employment across most of the sectors establishes that the aggregate results presented in Figure 2 are not simply due to low-wage industrial sectors of the economy being disproportionally affected by the pandemic.

Decomposition of Employment Change in the CES

In order to quantify how much of the employment loss is due to employment declines at the industry level and how much is due to changing proportions of employment in each wage class

within major industry sector, we construct a decomposition of employment change into these two components.

Let E_{kjt} denote employment in wage class j and sector k in month t, W_{jt} denote the total employment in wage class j in month t, and N_{kt} denote the total employment in sector k in month t. Also, let E_{kj0} denote employment in wage class j and sector k in February 2020, W_{j0} denote the total employment in wage class j in February 2020, and N_{k0} denote the total employment in sector k in February 2020.[4] Then

$$
\begin{aligned}
\Delta W_{jt} &= W_{jt} - W_{j0} \\
&= \sum_k E_{kjt} - \sum_k E_{kj0} \\
&= \sum_k \left[\frac{E_{kjt}}{N_{kt}} N_{kt} - \frac{E_{kj0}}{N_{k0}} N_{kt} + \frac{E_{kj0}}{N_{k0}} N_{it}\right] - \sum_k \left[\frac{E_{kj0}}{N_{k0}} N_{k0}\right] \\
&= \sum_k \left[\left(\frac{E_{kjt}}{N'_{kt}} - \frac{E_{kj0}}{N_{k0}}\right) N_{it}\right] + \sum_k \left[\frac{E_{kj0}}{N_{k0}} (N_{kt} - N_{k0})\right] \\
&= \sum_k \left[\left(s_{kjt} - s_{kj0}\right) N_{kt}\right] + \sum_k \left[s_{kj0} (N_{kt} - N_{k0})\right]
\end{aligned}
\tag{7}
$$

where $s_{kjt} = \frac{E_{kjt}}{N_{kt}}$ is the share of employment in sector k composed of wage class j and $s_{kj0} = \frac{E_{kj0}}{N_{k0}}$ is the share of employment in sector k composed of wage class j in February 2020. Letting

[4] Note that all totals for both month *t* and month *0* are establishments in the month *t* sample that is linked to the sample of establishments that were open in February 2020.

$t = 0$ represent February and dividing both sides of Equation (7) by W_{jo} allows us to express the percentage change in employment for wage class j since February as the sum of two components:

$$\%\Delta W_{jt} = \frac{\overbrace{\sum_k \left[\left(s_{kjt} - s_{kj0} \right) N_{kt} \right]}^{Shifting\ Share\ of\ Wage\ Class}}{W_{j0}} + \frac{\overbrace{\sum_k \left[s_{kj0} (N_{kt} - N_{k0}) \right]}^{Change\ in\ Sectoral\ Employment}}{W_{j0}} \quad (8)$$

The first term on the right side of Equation (8) represents the employment change due to a shift since February in wage class *j*'s share of employment in each industry sector. If sectors across the economy shed low wages workers so that the share of low-wage workers within each sector changed, this would be reflected in the first term. If, instead, the employment change we observed above was entirely explained by specific low-wage sectors decreasing employment and the share of low-wage workers in each sector remaining the same, this first term would be zero.

The second term represents the change in employment due strictly to changes in employment across sectors. This term reflects how much of the decline in low-wage employment is due to the decline in employment for low-wage sectors initially employing a larger share of low-wage workers. The larger the decline in employment for low-wage sectors, the larger the second term will be.

The results from this decomposition are presented in Table 2, where the top portion shows the share of employment lost due to shifting employment across sectors, and the bottom portion of the table shows the share of employment due to shifting employment across wage classes within sectors.

Table 2 shows that only the lowest wage class had a consistently negative employment decline due to shifts in wage-class shares within sectors. Furthermore, the lowest wage class was the only class for which its within-sector employment share resulted in at least a 2-percentage point drop in overall employment. Thus, within sectors, employment has been moving away from the lowest-wage class and holding otherwise steady amongst the other four wage classes. As of January 2021, 24% of overall employment loss for the lowest wage class was due to within-sector change, with across-sector share change accounting for the remaining 76%.

Table 3 shows the decomposition using 4-digit industry instead of sector as the industry grouping. This decomposition should show less employment loss due to within-industry share shifting. This is as expected since presumably 4-digit industries are more homogenous than establishments in the same sector, the latter being a broader classification. Nevertheless, the same pattern observed in Table 2 also holds for Table 3. Even when using the more detailed industry classification, employment loss due to shifts away from the lowest-wage class within industry makes up nearly a fifth of the total 12.2% employment loss as of January 2021. Although across-sector employment change is the dominant factor, within-sector share shifting is sizeable and shows employment loss is happening in low-wage establishments across the economy.

CPS Analysis

Each household in the CPS is scheduled to be interviewed for four consecutive months and then, eight months later, is interviewed for another four consecutive months. Since questions about earnings are asked only in the fourth and eighth interviews, we use information collected in workers' fourth interview between January 2019 and February 2020 to determine, at the time of

the interview, an employed worker's earnings, hours worked, occupation, and industry. We then examine the labor force status and hours of work for these workers for every month between February 2020 and December 2020.[5] This yields a sample of approximately 18,500 individuals from February through November and 14,000 in December. The sample reduction in the final month is caused by the rotational nature of the CPS interview schedule. In December there are fewer individuals that provided earnings data from January 2019 to February 2020; some of those interviewed in December conducted their fourth interview in March 2020, making them ineligible for our sample. To account for the reduction of observations caused by the rotation pattern of interviewing and attrition, we adjusted the weights used in our analysis to preserve the average age, race, and gender distribution of workers in January 2019 to February 2020. Each worker is assigned a wage class on the basis of the weekly earnings they reported in their previous fourth interview.[6]

The sample each month consists of workers who were interviewed that month and also employed at their fourth interview between January 2019 and February 2020.[7] Figure 4 displays the proportion of workers in each earnings quintile who were still employed each month from February 2020 to December 2020, thereby illustrating the evolution of employment during the pandemic by earnings quintile.[8] The proportion of workers who were still employed in February

[5] Cortes and Forsythe (2020) carry out a similar analysis to examine earnings losses during the pandemic.
[6] Earnings quintiles are defined based on real weekly earnings from January 2019 through February 2020. All weekly earnings were adjusted using the CPI-U to a February 2020 reference period.
[7] Throughout the remainder of the discussion we refer to these workers as "still employed" or "remained employed". Despite the use of these terms, we do not mean to imply that these workers were continuously employed, but rather these workers were employed the last time we observed them between January 2019 and February 2020 and in the month under discussion in 2020. Workers could have experienced a period of non-employment in between.
[8] The February 2020 sample consists only of workers who had their fourth interview sometime prior to February 2020. All workers who had their fourth interview in February 2020 were not included in the analysis for February 2020.

2020 increases by earnings quintile. Among those in the lowest earnings quintile, 82.4% were employed in February 2020, compared to 95.1% of those in the highest earnings quintile. As is discussed more below, these February rates are in line with historical rates of those remaining employed by quintile.

However, starting in March 2020, the proportion of workers who remained employed declined for all of the earnings quintiles, with the lowest earnings quintile suffering the largest decline in employment. The proportion of workers in the lowest earnings quintile who remained employed dropped 3.9 percentage points between February and March and fell another 23.6 percentage points between March and April. In comparison, the proportion of those in the second earnings quintile who remained employed fell 1.1 percentage points between February and March and an additional 14.7 percentage points between March and April. The decline for the upper quintile was much less severe, with the proportion of those who remained employed falling 0.1 percentage points between February and March and an additional 5.1 percentage points between March and April.

Between April and November, employment partially recovered for all five quintiles, but as of November, employment loss was still greatest for the lowest two quintiles. By November only 74.3% of those in the lowest earnings quintile were working and 86.7% of those in the second lowest quintile. In comparison 94.1% of those in the highest earnings quintile and 92.4% of those in the fourth earnings quintile were working in November. Between November and December, the proportion of workers who remained employed in the top four wage quintiles stayed mostly unchanged; however, in the lowest wage quintile the proportion who remained employed dropped

2.0 percentage points. Consistent with research based on less representative private data, the estimates from the CPS thus indicate quite clearly that the employment declines during the pandemic have fallen disproportionately on workers in the lowest earnings quintiles. The CPS estimates also are in accord with the CES estimates that indicate that it was the establishments with the lowest average wages that experienced the largest decline in employment.[9]

To provide a frame of reference for the employment pattern in 2020, Figure 5 shows analogous results averaged for 2015 to 2019. The main takeaway is that even during normal economic times the proportion of individuals who are still employed from one year to the next varies across earnings quintiles. Individuals in the lowest quintile are less likely than individuals in the other four quintiles to be employed the following year. From February to December, the 5-year-average proportion still employed in the lowest quintile varies between 79.5% and 81.4% across months, while the proportion still employed for the other four quintiles varies between 89.4% and 95.4%. Figure 4 thus overstates the effect of the pandemic on employment, and this overstatement is largest for low-earning workers.

Figure 6 displays the proportion of workers who remained employed by earnings quintile normalizing the estimates by subtracting off the 5-year-average proportion remaining employed within a quintile. This normalization does not affect the overall pattern across the earnings quintiles. Workers in the lowest earnings quintile suffered the largest losses early in the recession. Although somewhat muted by the normalization, the decline in the proportion of workers who

[9] Even if employment declines were not concentrated among low-wage establishments, we would still see greater declines in the employment of low-wage workers if low-wage workers were more likely to be laid off than their higher-wage co-workers.

remained employed as of December was eight times larger for the lowest earnings quintile than for the highest earnings quintile (-7.8% vs. -1.0%). Given the persistent differences in the proportion of workers remaining employed by earnings quintile, the remaining analysis for 2020 is normalized by subtracting off the appropriate 5-year average proportion of those remaining employed.

Figure 7 shows the employment rate by the major industry group that the respondent worked in during 2019, using the same earnings cutoffs across industries.[10] Similar to the patterns observed in Figure 3 using the establishment data from the CES, and similar to the overall results observed in Figure 6 using the CPS, the key result holds: even within industry, the lowest earnings quintile had the biggest initial drop in its employment rate, as well as the most employment to recover as of December in order to return to the baseline February 2020 employment rate. As of December, the lowest earnings quintile's biggest employment gaps relative to February are in Other Services, Leisure and Hospitality, Education and Health Services, and Information, a similar pattern to that in the CES data. Several of these sectors are low earnings sectors. Nevertheless, the finding that low earnings workers were disproportionately harmed in every sector provides further corroborating evidence that the worse employment outcomes for low earnings individuals are not just due to them being heavily concentrated in hard-hit industries. Low wage workers suffered larger employment losses within industries, too.

[10] In the CES, detailed industries are divided into NAICS sectors, while CPS uses major industry groups. These classifications are not exactly 1 to 1.

Decomposition of Employment Change in the CPS

Similar to our CES analysis, we decompose the change in CPS employment into across-industry and within-industry components. Note, however, that as discussed above, labor turnover means that not all workers employed in a given year will also be employed in the subsequent one even in normal times. Furthermore, the proportion of workers remaining employed varies by earning quintile. To isolate the effect of the pandemic, we normalize by subtracting the average over the previous 5 years of the proportion of workers employed between January (year *t-1*) and February (year *t*) who were still employed the following period through December (year *t*) from the proportion of workers employed between January 2019 and February 2020 who were still employed in 2020 during the pandemic. We modify our decomposition accordingly. Specifically, we perform a decomposition for both the year 2020 and a decomposition for each year from 2015 to 2019 (prior to the pandemic) and then subtract the average of the 2015 to 2019 components of employment change from the same components of change in 2020.

Slightly modifying the notation used above, the shares for the CPS decomposition now have a year component such that the change in industry *k*'s share of still employed in year *y* vs. total employed in year *y-1* for wage quintile *j* in month *t* is given by[11]

$$s_{kjty} - s_{kjty-1} = \frac{E_{kjty}}{N_{kty}} - \frac{E_{kjty-1}}{N_{kty-1}} \tag{9}$$

[11] Similar to CES, the totals for month *t* years *y* and *y-1* are for workers in month *t* and year *y* who were also employed the last time they were in the sample in year *y-1*.

Similarly, the change in still employed in year *y* vs. total employed in year *y-1* in major industry group *k* in month *t* is given by

$$N_{kty} - N_{kty-1} \tag{10}$$

Equation (8) can then be written as

$$\%\Delta W_{jty} = \frac{\sum_k \left[\left(s_{kjty} - s_{kjty-1} \right) N_{kty} \; + \; s_{kjty-1} \left(N_{kty} - N_{kty-1} \right) \right]}{W_{jy-1}} \tag{11}$$

where the denominator, W_{jy-1}, is the annual CPS employment level for individuals in earnings quintile j, in the previous year $y-1$.

Using the same form as Equation (11), the decomposition of the average percentage of workers who were employed a year earlier who are still employed can be written as

$$\%\Delta \bar{W}_{jty-1} = \frac{\sum_k \left[\left(\bar{s}_{kjty-1} - \bar{s}_{kjty-2} \right) \bar{N}_{kty-1} \; + \; \bar{s}_{kjty-2} \left(\bar{N}_{kty-1} - \bar{N}_{kty-2} \right) \right]}{\bar{W}_{jy-2}} \tag{12}$$

where the bar over a variable denotes a 5 year average. For example, $\bar{s}_{kjty-1}$ is the average share of industry k's still employed in wage quintile j, in month t for reference year $y-1$, where *y-1* ranges over 2019 to 2015 and $\bar{s}_{kjty-2}$ is the average share of industry k's total employed in wage quintile j, in month t for prior year $y-2$, where *y-2* equals the ranges over 2018 to 2014.

The final normalized decomposition is the difference between $\%\Delta W_{jty}$ and $\%\Delta \bar{W}_{jty-1}$, which yields

$$\%\Delta W_{jty} - \%\Delta \bar{W}_{jty-1} = \sum_k \left[\frac{\left(s_{kjty} - s_{kjty-1}\right) N_{kty}}{W_{jy-1}} - \frac{\left(\bar{s}_{kjty-1} - \bar{s}_{kjty-2}\right) \bar{N}_{kty-1}}{\bar{W}_{jy-2}} \right] + \sum_k \left[\frac{s_{kjty-1}\left(N_{kty} - N_{kty-1}\right)}{W_{jy-1}} - \frac{\bar{s}_{kjty-2}\left(\bar{N}_{kty-1} - \bar{N}_{kty-2}\right)}{\bar{W}_{jy-2}} \right] \quad (13)$$

The first term in Equation (13) denotes the pandemic-induced employment change in earnings quintile *j* stemming from a shift in the share of employment in each major industry group attributed to earnings quintile *j*. The second term denotes change in employment due to changes in employment across industry groups.

The normalized decomposition results for the CPS are presented in Table 5. Similar to the CES results, for each earnings quintile across months, the majority of the employment loss is explained by changes in sectoral employment. For the two lowest earnings quintiles, the employment loss from shifting sectoral employment has been amplified by a loss stemming from reduced employment within major industry groups. For April, 32% of the decline in employment for workers in the lowest earnings quintile was due to these workers' employment shares declining within industries. This is comparable to the 24% that we see in the CES during that same time period. A reduction in the within industry employment share continued to account for a substantial portion of the lowest wage quintile's employment loss through December, where the percentage was 41%.

Working Part-Time for Economic Reasons in the CPS

Besides information on overall employment, the CPS has additional information that sheds light on workers who remained employed during the pandemic. For example, it is possible that these workers are negatively affected due to their inability to work as many hours as they wish. Figure 8 presents evidence that the pandemic led to an increase in the number of individuals working part-time for economic reasons in 2020.[12] Every earnings quintile experienced an increase in the percentage of those who worked full-time between January 2019 and February 2020 who were working part-time for economic reasons in 2020. However, the upward spike in this percentage was the largest and the most sustained for workers in the lowest earnings quintile. After increasing between February and April, the percentage of individuals working part-time for economic reasons dropped or remained stable cross all five wage quintiles between July and November. However, in December this trend reversed for the lowest two quintiles. Between November and December, the first and second quintiles saw an increase of 0.9 and 1.1 percentage points in the percentage of individuals working part-time for economic reasons, respectively, while the other three quintiles saw a decrease of 0.4 percentage points. This shows that even among those who remained employed, low wage workers were the most adversely affected by the pandemic.

[12] Respondents are classified as working part-time for economic reasons if they report that they want full-time employment (more than 35 hours per week), but work part-time (less than 35 hours per week) due to a lack of opportunity for full-time work.

Additional Evidence from a Special Establishment Survey about the COVID-19 Pandemic

A recent BLS survey provides additional insights into the experience of low wage workers during the pandemic. The Business Response Survey to the Coronavirus Pandemic (BRS) is a special survey of establishments conducted between the months of July and September 2020 using an online instrument to collect responses to a series of questions related to business experiences during and responses to the pandemic.[13] The survey received responses from over 150,000 establishments to seven different questions. The sample was drawn from the QCEW universe of private establishments and was designed to be representative by state, sector, and size class.

Besides presenting responses as to whether some workers were told not to work, we also present responses to three other questions collected in the survey:

- Did this business location continue to pay some or all employees who were told not to work as a result of the Coronavirus pandemic while they were not working?
- Did this business location continue to pay a portion of health insurance premiums for some or all employees who were told not to work as a result of the Coronavirus pandemic?
- Did this business location offer more opportunities for employees to telework (work remotely) as a result of the Coronavirus pandemic?

[13] More information can be found at https://www.bls.gov/brs/. Note, of course, that establishments that closed earlier during the pandemic are not present in the survey.

All responses are weighted using average annual employment from 2019. We classify respondents according to their industry and 2019 average wages recorded in the QCEW, as we did for the CES analysis.

Table 6 summarizes the results. The lowest-wage establishments were approximately 50 percent more likely than the highest-wage establishments to have told employees not to work. The highest-wage establishments were approximately 50 percent more likely than the lowest-wage establishment to have continued paying at least some employees that they told not to work. Furthermore, the highest-wage establishments were more than three times as likely as the lowest-wage establishments to have paid health insurance premiums for employees told not to work. Lastly, the highest-wage establishments were more than four times as likely to report increasing telework opportunities for employees, and for the vast majority of the lowest-wage establishments (74%), telework was not available for their employees.

The BRS results provide additional evidence that low wage workers have been hit very hard by the pandemic induced recession. Figure 9 shows that, again, these patterns are not isolated to one or two sectors – the pattern of hardship holds across most of the sectors. For each BRS response category, the figure shows a pair of up and down arrows corresponding to each sector (denoted by color). The down arrow indicates the percentage of establishments in a sector's lowest wage class fitting into the corresponding category and the up arrow is the same but for the highest wage class. There are significant differences within sectors between the lowest and highest wage classes, providing further evidence that these effects persist throughout a broad portion of the economy and are not isolated to a few sectors. Note too that the option for telework provides a

partial explanation for the employment disparity across wage classes. Telework may be an important pathway for maintaining employment throughout the pandemic. Even within sectors, high wage establishments are considerably more likely than low wage establishments to offer telework and to have increased telework during the pandemic.

Conclusion

Our analysis of the CES establishment data and the CPS worker data demonstrates that the lowest average wage establishments and the lowest earning workers have borne the brunt of the recession induced by the Coronavirus pandemic. The lowest wage establishments and the lowest wage workers both saw the steepest initial declines in employment at the start of the recession and experienced the slowest subsequent recovery in employment. Further, our results indicate that these effects were not confined to a few low wage sectors, but rather that the decrease in employment for the lowest wage workers was widespread throughout the economy – a result particularly evident in the establishment-level data. Within the majority of industries, the lowest wage establishments and the lowest wage workers suffered a larger share of employment declines at the beginning of the recession and continued to experience slower employment growth once employment began to recover.

A decomposition of the overall employment decline of low wage establishments into the reduction stemming from declines in industries' shares of total employment and the reduction stemming from declines in the employment shares of low wage establishments within industries shows that although the majority of the overall employment decline has been due to low wage industries' declining employment shares, declining employment shares of low wage

establishments within industries account for a substantial portion of the overall decline. Specifically, the establishment decomposition indicates that more than a fifth of the decline in employment among establishments in the lowest wage quintile was due to a decrease of these establishments' employment shares within industries as of January 2021, and this percentage has remained fairly steady since April, varying between 20% and 25%.

A decomposition of the overall employment decline of low wage workers yields a similar result. The decline in employment shares within industries was particularly true for both low wage workers and low wage establishments at the start of the recession. As of April, the decomposition for workers shows that 32% of the decline in employment for workers in the lowest earnings quintile was due to these workers' employment shares declining within industries; this percentage has steadily climbed from 23% in September to 41% in December.

The CPS data also indicate that even low wage workers who managed to hold onto their jobs have been hard hit during the pandemic induced recession. Low earning workers have been much more likely to work part time for an economic reasons than have workers in other earnings quintiles.

Examination of data from the Business Response Survey to the Coronavirus Pandemic further illustrates the disparity between low wage and high wage workers. Among establishments that reduced their workforce, low wage establishments were much less likely to pay a portion of workers' health insurance premiums. Low wage establishments were also less likely to pay workers who were told not to work. Analysis by industry again shows that these effects are not confined to establishments in the lowest wage sectors of the economy. A comparison of the lowest and highest average wage establishments within industries shows that even in the same

industry a smaller percentage of the lowest wage establishments paid either wages to or health insurance for workers who were told not to work.

Altogether our findings suggest that the pandemic has increased economic inequality over the nine months we observe in the data. To the extent that lack of employment causes long-term earnings reductions, weakened savings, and loss of human capital, increased inequality due to the pandemic may persist for years to come.

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Table 1. Establishment and Employment Distribution, by Average Wages in the Establishment

Average wage per worker	Proportion of Establishments, as of 2019	Proportion of Employment, as of 2019
<20k	0.28	0.14
20k-40k	0.29	0.27
40k-60k	0.18	0.24
60k-80k	0.09	0.15
80k+	0.17	0.20

Table 2. CES Decomposition by Major Industry Sector

Decomposition component	**Month**	**<20k**	**20k-40k**	**40k-60k**	**60k-80k**	**80k+**
Percentage Employment Change Across Sectors	March 2020	-2.8	-1.7	-1.1	-1.0	-0.9
	April 2020	-29.2	-19.0	-13.2	-11.3	-9.4
	May 2020	-23.9	-15.5	-10.7	-9.2	-8.0
	June 2020	-15.5	-9.8	-7.3	-6.3	-5.7
	July 2020	-13.2	-8.4	-6.6	-5.9	-5.4
	August 2020	-12.6	-7.7	-6.2	-5.5	-5.2
	September 2020	-11.7	-7.3	-5.9	-5.3	-4.9
	October 2020	-10.2	-5.9	-4.8	-4.3	-4.1
	November 2020	-9.7	-4.9	-4.1	-4.0	-4.2
	December 2020	-9.9	-5.1	-4.2	-4.2	-4.4
	January 2021	-9.3	-4.7	-3.9	-3.8	-4.0
Percentage Employment Change Within Sectors, Across Classes	March 2020	-1.7	0	0.3	0.6	0.3
	April 2020	-9.2	-1.6	1.3	3.7	4.2
	May 2020	-7.5	-0.8	1.3	2.2	3.0
	June 2020	-4.3	-0.6	0.6	1.2	2.2
	July 2020	-3.4	-0.4	0.1	1.0	1.9
	August 2020	-3.1	-0.3	0.1	0.9	1.7
	September 2020	-3.7	-0.3	0.3	1.0	1.5
	October 2020	-3.3	0.1	0.4	0.4	1.1
	November 2020	-3.1	0.1	0.6	-0.2	1.1
	December 2020	-3.1	0.1	0.6	-0.2	1.1
	January 2021	-2.9	0.1	0.6	-0.3	1.1

Table 3. CES Decomposition by Detailed (4-digit) Industry

Decomposition component	**Month**	**<20k**	**20k-40k**	**40k-60k**	**60k-80k**	**80k+**
Percentage Employment Change Across 4-Digit Industries	March 2020	-3.4	-1.6	-1.0	-0.8	-0.8
	April 2020	-34.1	-18.9	-12.8	-9.7	-7.8
	May 2020	-27.1	-15.5	-10.3	-8.0	-7.3
	June 2020	-17.3	-9.8	-6.9	-5.7	-5.3
	July 2020	-14.5	-8.6	-6.3	-5.3	-5.0
	August 2020	-13.9	-7.8	-6.0	-5.1	-4.8
	September 2020	-13.0	-7.4	-5.6	-4.9	-4.6
	October 2020	-11.2	-5.9	-4.6	-4.1	-3.9
	November 2020	-10.3	-4.9	-3.9	-4.1	-4.1
	December 2020	-10.5	-5.1	-4.0	-4.2	-4.2
	January 2021	-9.9	-4.6	-3.7	-3.9	-3.9
Percentage Employment Change Within 4-Digit Industries, Across Classes	March 2020	-1.0	0	0.2	0.4	0.1
	April 2020	-4.3	-1.6	1.0	2.1	2.6
	May 2020	-4.3	-0.8	0.9	1.0	2.2
	June 2020	-2.5	-0.6	0.2	0.6	1.8
	July 2020	-2.0	-0.2	-0.1	0.5	1.4
	August 2020	-1.9	-0.2	-0.2	0.5	1.4
	September 2020	-2.4	-0.2	0.1	0.6	1.2
	October 2020	-2.3	0.1	0.2	0.2	0.9
	November 2020	-2.4	0.1	0.4	-0.2	1.0
	December 2020	-2.5	0.1	0.4	-0.2	0.9
	January 2021	-2.3	0.1	0.4	-0.2	1.0

Table 4. CPS Weekly Earnings Quintile Definitions

Quintile	Weekly Earnings
1	Less than $432.39
2	$432.39 - $665.47
3	$665.47 - $960.09
4	$960.09 - $1,493.69
5	More than $1,493.69

Table 5. Normalized CPS Decomposition by Major Industry Group

		Weekly Earnings Quintile				
Decomposition component	**Month**	**1** **Less than $432.39**	**2** **$432.39 to $665.47**	**3** **$665.47 to $960.09**	**4** **$960.09 to $1,493.69**	**5** **More than $1,493.69**
Percentage Employment Change Across Major Industry Groups	February 2020	0.9	0.7	0.6	0.6	0.6
	March 2020	-1.4	-1.2	-0.9	-0.8	-0.7
	April 2020	-16.7	-13.7	-12.7	-12.0	-10.9
	May 2020	-14.1	-10.9	-9.9	-9.2	-8.1
	June 2020	-10.8	-8.2	-7.2	-6.9	-6.0
	July 2020	-9.4	-7.0	-6.0	-5.8	-5.1
	August 2020	-6.9	-5.0	-4.0	-4.1	-3.5
	September 2020	-6.0	-4.4	-3.8	-3.7	-3.5
	October 2020	-5.5	-4.1	-3.7	-3.7	-3.3
	November 2020	-4.5	-3.4	-3.0	-2.9	-2.8
	December 2020	-4.6	-3.7	-3.3	-2.9	-2.9
Percentage Employment Change Within Major Industry Groups, Across Wage Classes	February 2020	1.6	-0.9	-0.4	0.4	-0.7
	March 2020	-0.2	-0.3	-0.4	0.4	0.4
	April 2020	-7.9	-2.5	1.6	3.3	5.4
	May 2020	-5.5	-2.8	0.7	3.4	4.2
	June 2020	-5.3	-1.7	1.4	2.3	3.2
	July 2020	-2.8	-1.5	0	1.9	2.4
	August 2020	-2.8	-1.6	0.4	1.6	2.3
	September 2020	-1.8	-2.4	0.4	1.9	1.9
	October 2020	-2.6	-1.4	0.5	1.3	2.3
	November 2020	-2.2	-0.3	0.3	0.6	1.5
	December 2020	-3.2	0.1	0.6	0.6	1.9

Table 6. Percentage of Establishments Reporting Each in the Business Response Survey

Average Wage per Worker	Told Employees Not to Work	Continued Paying Employees Not Working	Paid Health Insurance for Employees Not Working	Increased Telework for Employees	No Telework Before or During Pandemic
<$20k	60	38	20	13	74
$20k-40k	56	50	39	23	63
$40k-60k	52	58	60	39	46
$60k-80k	47	60	68	52	29
$80k+	39	57	66	58	17

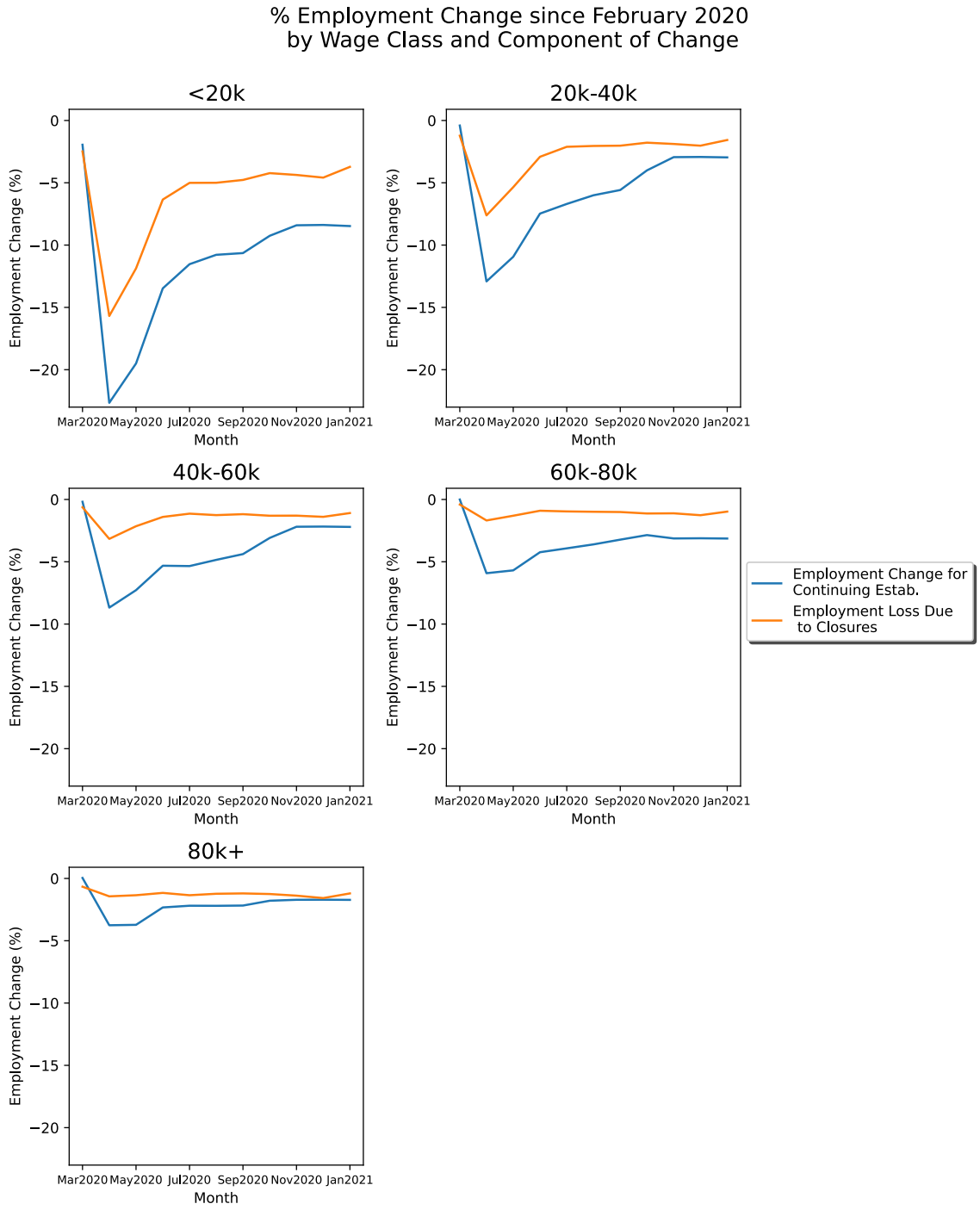

Figure 1. Percentage Employment Change since February 2020, by Wage Class. Results are based on microdata from the Current Employment Statistics survey.

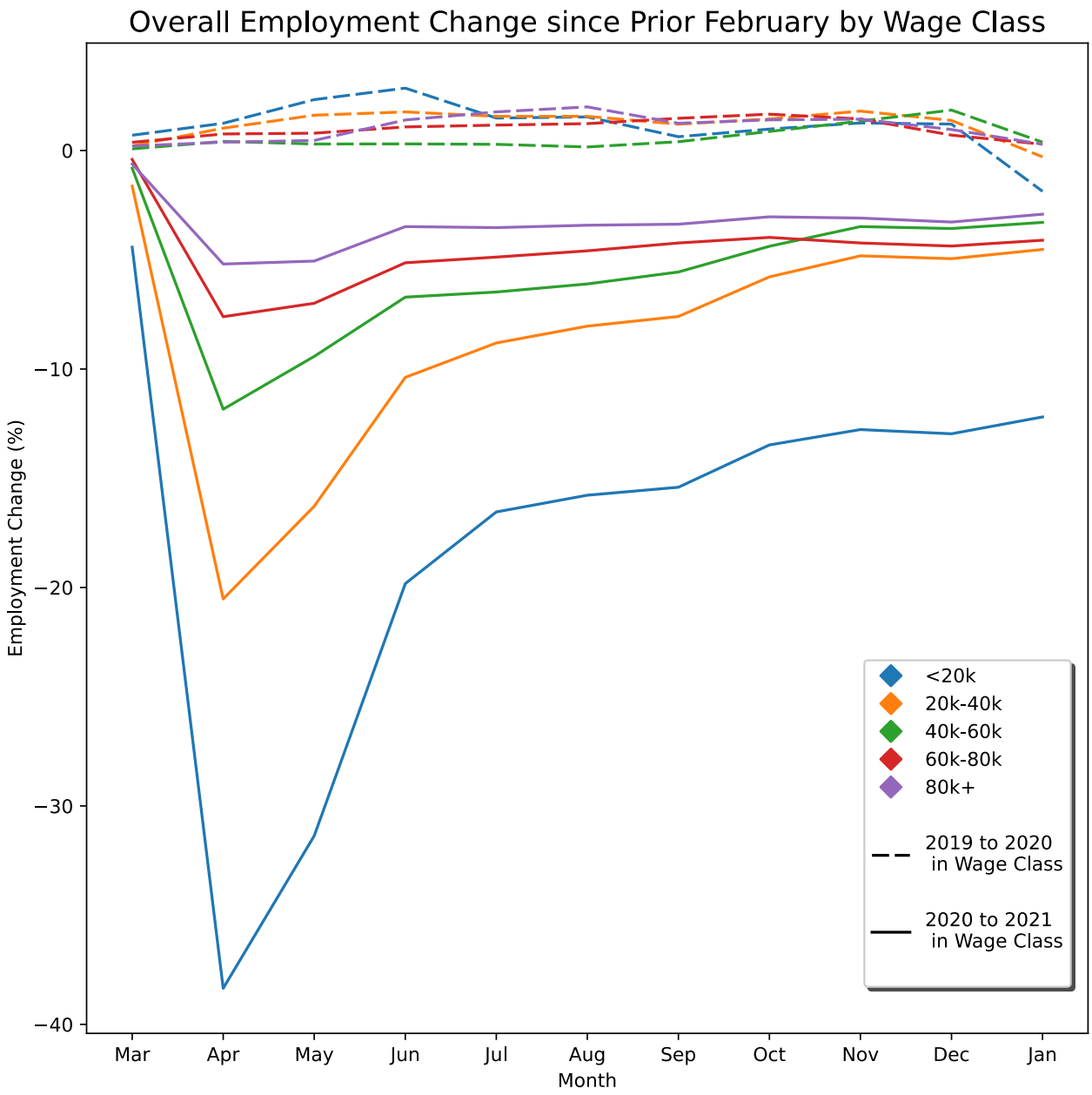

Figure 2. Overall Percentage Employment Change. Using microdata from the Current Employment Statistics survey.

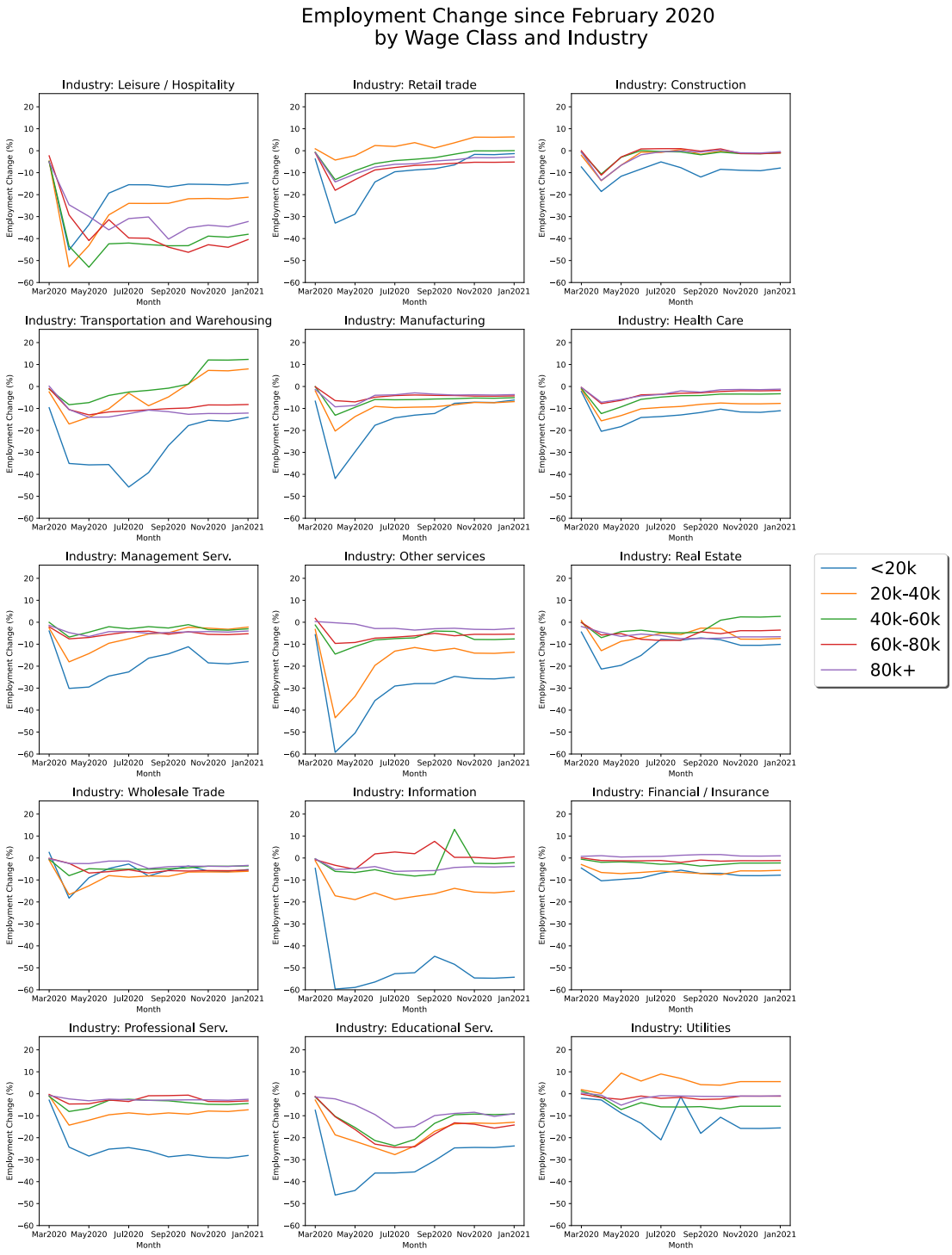

Figure 3. Employment Change since February 2020 by Wage Class and Industry.

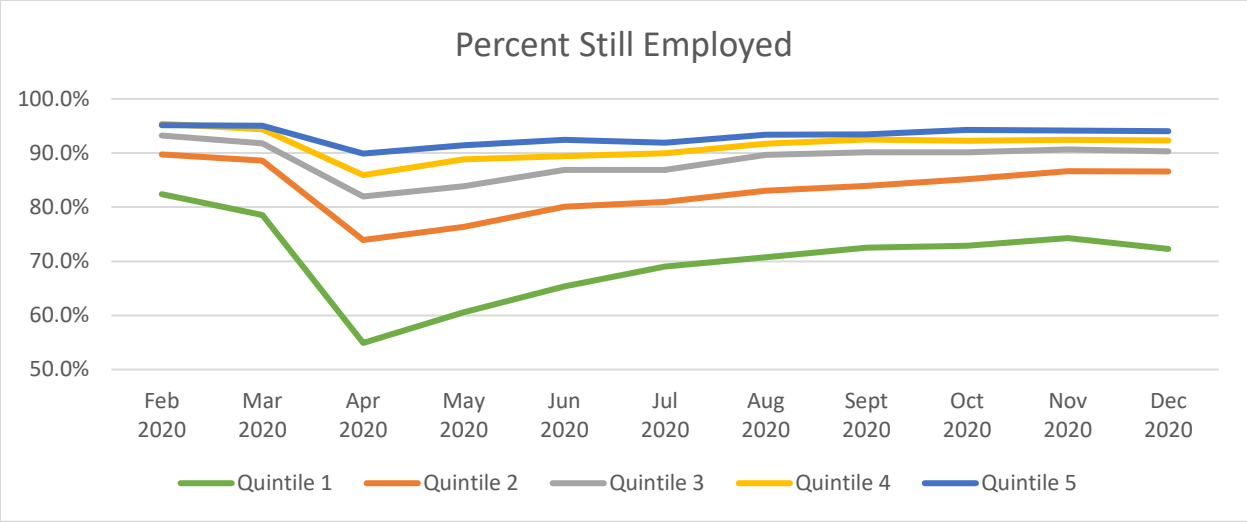

Figure 4. Percent of those Employed between January 2019 and February 2020 who are Employed in 2020 during the Pandemic.

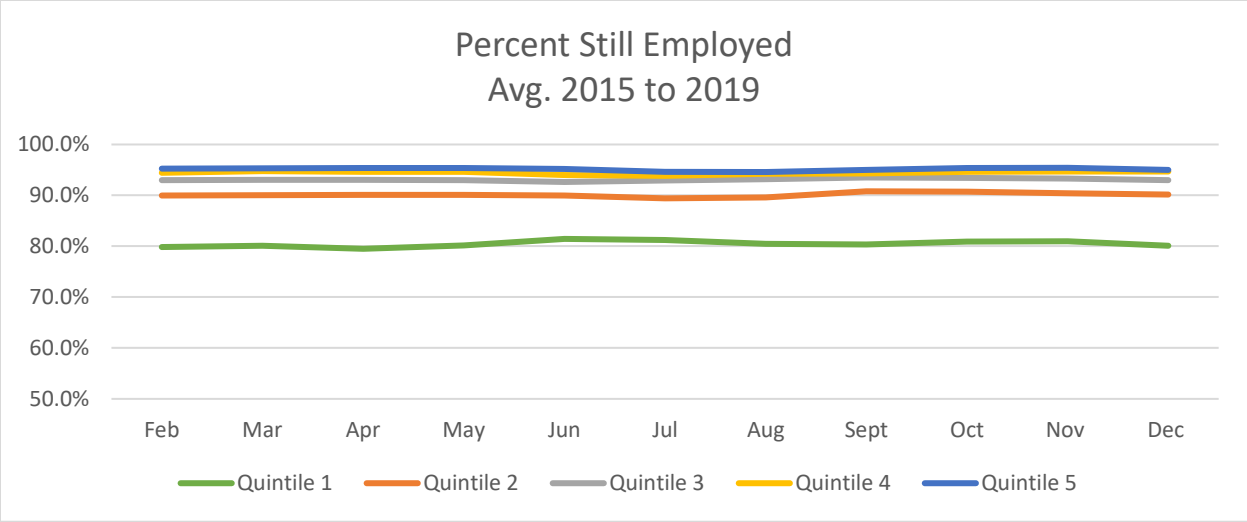

Figure 5. Average from 2015 to 2019 of the Percent of those Employed in the Previous Year who are Employed in the Current Year.

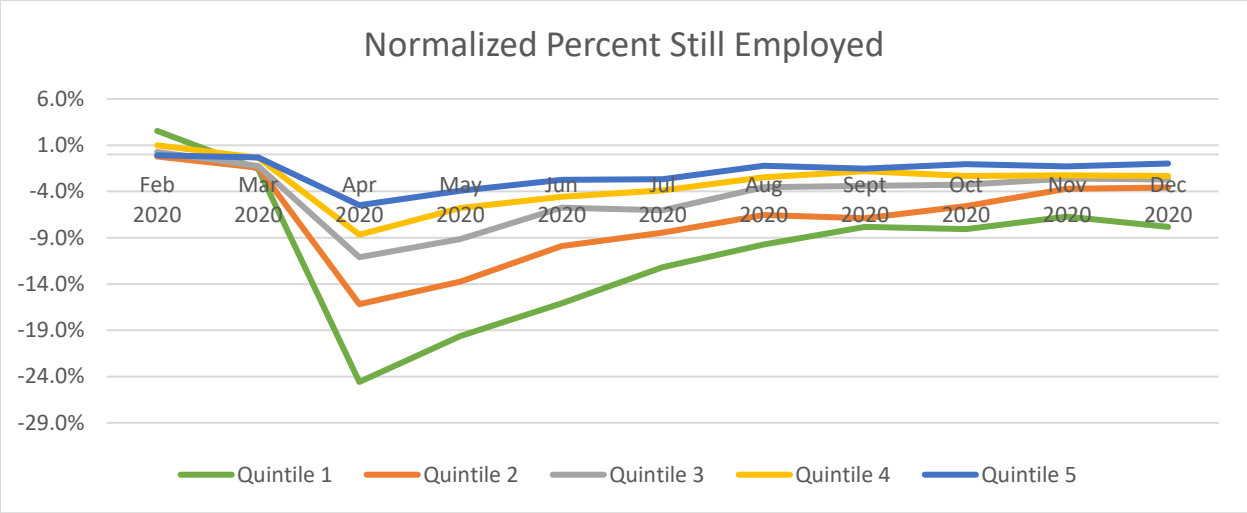

Figure 6. Percent of those Employed in 2019 who are Employed in 2020, Normalized Using Data from 2015-2019.

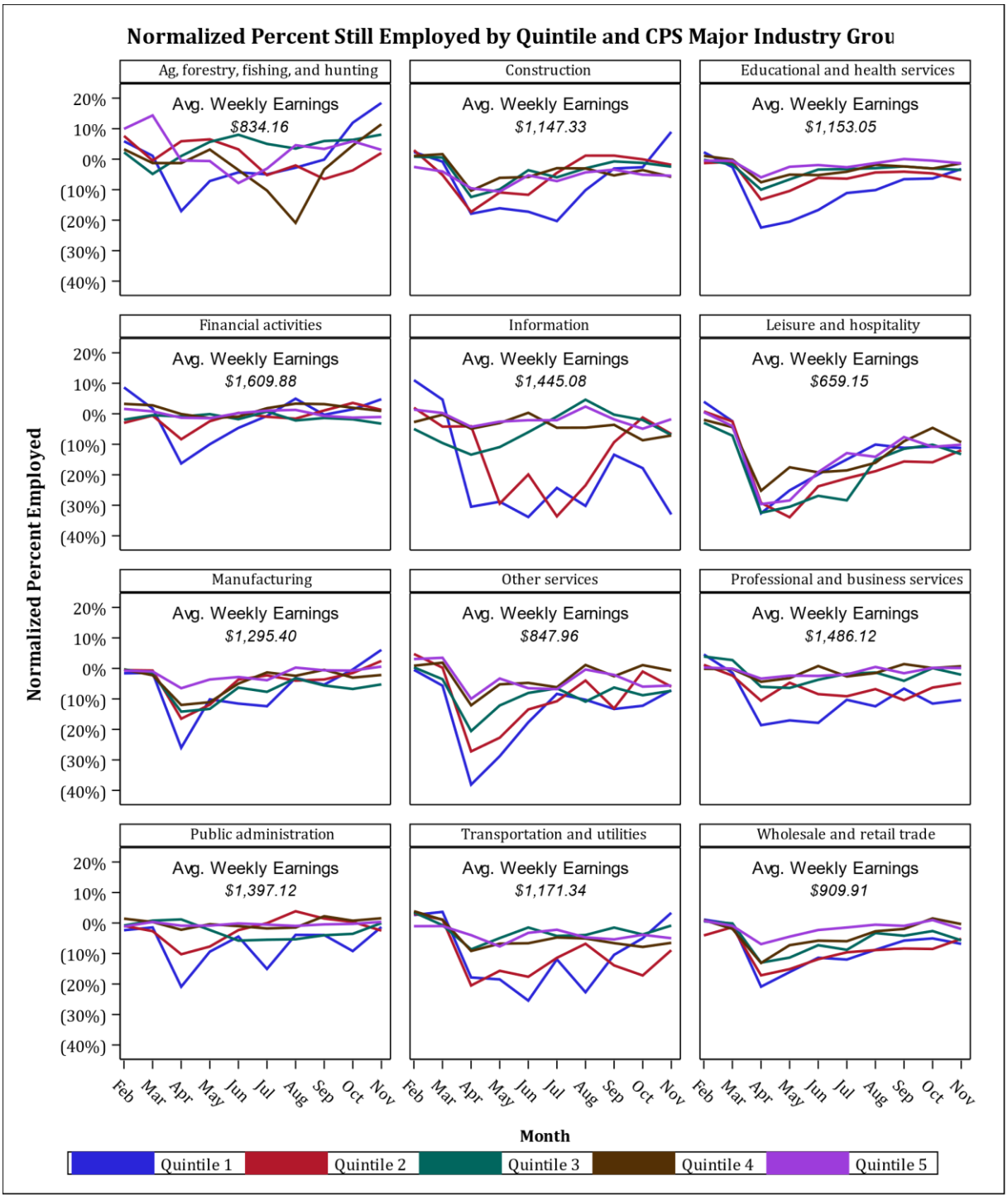

Figure 7. Industry Percent Employed, Normalized Using Data from 2015-2019.

Note: The Mining major industry group is excluded from Figure 7 due to an insufficient amount of sample.

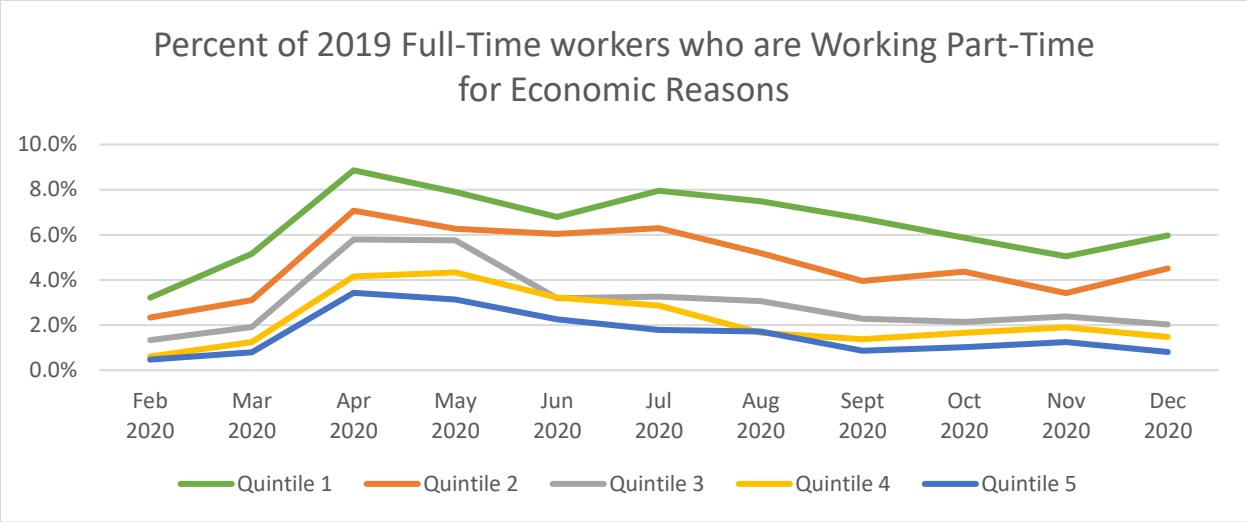

Figure 8. Percent of Individuals who were working Full-Time between January 2019 and February 2020 who are Reporting Working Part-Time for Economic Reasons in 2020 during the pandemic. Data from the Current Population Survey.

Figure 9. Differential Responses within Sector in the Business Response Survey to the Coronavirus Pandemic.