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RECOVERY FROM THE COVID-19 RECESSION: UNEVEN EFFECTS AMONG YOUNG WORKERS?

Pinka Chatterji
Yue Li

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ABSTRACT

In this paper, we estimate the effects of the pandemic on work hours among workers aged 15-24-years-old, testing for possible heterogeneity by age (15-19 vs. 20-24). Our empirical findings, based on Current Population Survey (CPS) data spanning January 2016 to December 2021, show differences in work hours trajectories of 15-19-year-olds vs. 20-24-year-olds in the months following the COVID-19 recession. Among those aged 15-19, we observe a return to pre-pandemic levels of work hours starting in September 2020. For 20-24-year-olds, however, work hours did not return to pre-pandemic levels until September 2021, the month in which pandemic UI programs had expired in all states.

Pinka Chatterji
State University of New York at Albany
Economics Department
1400 Washington Avenue
Albany, NY 12222
and NBER
pchatterji@albany.edu

Yue Li
Department of Economics
SUNY Albany
1400 Washington Avenue
Albany, NY 12222
yli49@albany.edu

1. Introduction and Background

Economic downturns tend to harm young workers' labor market outcomes disproportionately, and the COVID-19 recession was no exception. Between February and April 2020, the overall unemployment rate in the U.S. increased by 11.3 percentage points and overall labor force participation fell by 3.1 percentage points (Falk et al., 2021). The unemployment rate among 15-24-year-olds, however, increased by 19.1 percentage points between February and April 2020, and the labor force participation rate in this age group dropped by 6.8 percentage points (Authors' calculations).[1]

Young workers are especially affected by recessions because they tend to work in industries and occupations that are more vulnerable to the business cycle and because they have limited job tenure, education, and experience (Hoynes et al., 2012). During the COVID-19 recession, the magnified negative effects on young workers also can be attributed to the unique nature of this recession. While decreases in aggregate demand have been the driving force behind prior economic downturns in the U.S., the COVID-19 recession was caused by unprecedented shocks on both the demand side and the supply side. On the demand side, aggregate demand decreased due to fear of contagion, stay-at-home and quarantine orders, uncertainty, and loss of income. On the supply side, aggregate supply declined because of illness/deaths of workers, workers' caregiving roles and fear of contagion, and effects of virus containment efforts (Gopinath, 2020; Handwerker et al., 2020). As a result, COVID-19 has had larger effects on industries in which demand for output requires in-person interaction and work,

[1]Between December 2007 and June 2009, the start and end dates of the Great Recession, unemployment rose 4.5 percentage points overall (Falk et al., 2021); between these dates, the unemployment rate rose 9.7 percentage points among workers aged 15-24 years old (Authors' own calculations). Officially, the COVID-19 recession took place in March and April 2020, lasting only two months. (See https://www.nber.org/news/business-cycle-dating-committee-announcement-july-19-2021).

and smaller effects on industries where the nature of work allows for telecommuting (Alon et al., 2020; Baker et al., 2020; Falk et al., 2021). One additional reason for the large effects of the COVID-19 recession on young workers, then, is these workers tend to be disproportionately represented in industries that were particularly vulnerable to COVID, such as leisure and hospitality, and wholesale and retail trade (Aaronson & Alba, 2020; Kochhar & Barroso, 2020).

In response to the pandemic, the US Congress passed the $2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act, the largest relief bill in US history, on March 27, 2020. The new law created Pandemic Unemployment Assistance (PUA) which granted UI eligibility to some groups of workers who previously had been ineligible (e.g. self-employed workers, freelancers). In addition, the CARES Act provided Federal Pandemic Unemployment Compensation (FPUC), a weekly additional payment of $600 per week to calculated state UI benefits between April 5, 2020, and July 26, 2020; and provided Pandemic Emergency Unemployment Compensation (PEUC), an additional 13 weeks of UI once state UI benefits (which typically last 26 weeks) had expired, available until December 31, 2020 (NYS DOL 2021; Mishory & Settner, 2020). The $600 additional UI benefits were extended to September 6, 2021 at a reduced amount of $300 under the Lost Wage Assistance program, the Coronavirus Response and Relief Supplemental Appropriations Act of 2021, and the American Rescue Plan Act of 2021 (BEA, 2021).

Twenty-six states chose to end their participation in either FPUC or PUA early (with eighteen of these states ending both June 2021) out of concern that generous benefits were dampening workers' efforts to find jobs and return to work (Dube, 2021a). The concern about work disincentives stems from the initial FPUC payments of $600 per week which, when combined with mean state UI benefits, were intended to replace mean earnings. Ganong et al.

(2020), show that, between April and July 2020, 76 percent of unemployed individuals had a replacement rate that exceeded 100 percent, meaning that these workers were eligible for UI benefits that exceeded their lost wages.

Empirical research using a variety of data sets and study designs indicates that generous UI benefits during the pandemic had limited or no effects on employment (Altonji et al., 2020; Bartik et al., 2020; Finamor & Scott, 2021; Petrosky-Nadeau & Valletta, 2021; Ganong et al., 2021a-b).[2] Researchers have started to estimate the effect of some states' early termination of FPUC in June and July 2021 on employment, and this work shows mixed effects (Dube, 2021a-b, Coombs et al. 2021). Coombs et al. (2021), for example, find that while about 1.1 million UI recipients lost benefits due to some states' ending FPUC early, only about 1 out of 8 of these individuals had found jobs as of August 2021. Holzer et al. (2021), on the other hand, estimate that early termination of pandemic UI programs is associated with a 14-percentage-point increase in the unemployment-to-employment flow among workers aged 25-54 years old. These latter findings may indicate that the labor market is adjusting to the circumstances of the pandemic and "returning to normal" to some extent.

In this paper, we build on prior work by focusing on the youngest workers, aged 15-24 years old, estimating the effects of the pandemic on work hours and other labor market outcomes in this group, and testing for possible heterogeneity by age (15-19 vs. 20-24). We focus on childless workers who lack a college degree, using CPS data from January 2016 to December 2021. The two age groups (15-19 and 20-24) are similar in that all young workers have relatively low levels of job tenure, skills, and experience, they are often competing for the same jobs in the

[2] Marinescu et al. (2021) find that FPUC was associated with a 3.6 percent decrease in job applications but also was associated with increased labor market tightness (vacancies/applications), which was depressed during the pandemic; this may explain why FPUC had little effect on aggregate employment.

same industries, and all workers in this age group face similarly low risk of severe health consequences from COVID-19. The 15-19 and 20-24-year-old age groups differ in two respects that are particularly relevant to understanding the time-period following the COVID-19 recession. First, compared to young adults (aged 20-24), teenagers (aged 15-19) face higher costs of working since the vast majority are enrolled in school and face time constraints from classes, schoolwork, and school-related activities (Morisi, 2017). In Appendix Figure 1, based on data from the February 2020 Current Population Surveys (CPS), we show that the employment rate and usual work hours among 15-24-year-olds increase monotonically with age. Thus, as would be expected, the share of teenagers (aged 15-19) who were working in the month before the pandemic is lower than the share of young adults (aged 20-24) who were working in the month before the pandemic.

Second, relative to young adults, teenagers are less likely to be eligible for UI because of failing to meet state regulations; examples of failing to meet state regulations include lacking sufficient work history, being a full-time student or not meeting requirements for part-time workers' hours and earnings (Bird & Amado, 2020). Although some of these restrictions were loosened during the pandemic, teenagers still are less likely to qualify for UI than their young adult counterparts in the months following the COVID-19 recession. As we theoretically motivate in the Appendix, the relatively low share of employment and lack of eligibility for enhanced UI among 15-19-year-olds versus 20-24-year-olds may have important implications for heterogeneity within the 15-24-year-old age group during the pandemic recovery period.

Our empirical findings show striking differences in the labor market trajectories of 15-19-year-olds vs. 20-24-year-olds in the months following the COVID-19 recession. In the younger group (age 15-19), we observe a return to pre-pandemic levels of work hours, employment, and

labor force participation starting in September 2020, with outcomes even surpassing pre-pandemic levels in April and May 2021, but in the older age group (20-24-year-olds), these outcomes were still lagging below pre-pandemic levels until September 2021. Starting in September 2021, however, the month in which the FPUC and PUA programs had expired in all states, work hours (as well as employment) of 20-24-year-olds returned to pre-pandemic levels.

Our findings provide some support for the idea that enhanced UI programs have played a role in these differences in the effects of the pandemic by age group. In states that ended FPUC and PUA early, we find that there is a relative decline in work hours among 15-19-year-olds in July and August 2021, suggesting 15-19-year-olds' job opportunities are being taken away by older, more experienced workers rejoining the labor market. For the 20-24 age group, however, we do not observe a clear pattern of differences in states that ended these programs early vs. states that did not. In sum, our findings show that within the 15-24-year-old age group, there is significant heterogeneity in labor market recovery from the COVID-19 recession, and this heterogeneity is consistent with the 20-24-year-old age group's higher likelihood of being eligible for the enhanced UI benefits.

2. Data and Methods

The analysis sample includes respondents aged 15-24 years old who do not have a college degree or children; do not reside in group quarters; and are US citizens who were in a CPS household for at least one month between January 2016 and December 2021. These sample restrictions allow us to focus on low-skilled workers who can legally work in the US and who are not impacted directly by the lack of child-care during the pandemic.[3]

[3] The COVID-19 recession had larger effects on females than males, due to differences in the gender distributions in the occupations impacted by the pandemic, and possibly because disruptions in child-care and school routines affected mothers' labor market outcomes more than those of fathers (Albanesi & Kim, 2021; Alon et al., 2021). Albanesi & Kim (2021), for example, show that the gender gap in

First, we estimate month-by-month effects of the pandemic using Equation 1:

$$y_{iast} = \sum_{\tau=-5}^{-1} \delta^{\tau} D_{it}^{\tau} + \sum_{\tau=1}^{22} \delta^{\tau} D_{it}^{\tau} + \beta t_t + \gamma_{at} + \gamma_s + X_{it}\theta + \epsilon_{iast} \qquad (1)$$

In Equation 1, y_{iast} is a labor market outcome for individual i of age a living in state s in time t. The term D_{it}^{τ} represents a set of indicators for five months before the pandemic (Sep 2019 – Jan 2020) and 22 months after the pandemic (Mar 2020-Dec 2021), with Feb 2020 normalized to 0. Equation 1 includes the full set of interactions between each of the 12 calendar months and each of the 5 age dummies (γ_{at}) to control for differential seasonal patterns by age, in addition to a linear trend in time (t_t) and state fixed effects (γ_s). The time variable (t_t) is set to be unchanged after Feb 2020 to capture the slowdown of economic activities during the pandemic. The individual controls (X_{it}) include dummy variables for: female, Black, Other race/ethnicity, Hispanic origin, and metropolitan status (in central city and outside central city). The estimated coefficients $\delta^1 - \delta^{22}$ capture the month-by-month effects of the pandemic — the difference in outcome variables in each month around the time of the pandemic relative to the corresponding month in previous calendar years. To estimate and evaluate the heterogeneity of the pandemic effect, we use Equation 2 below:

$$y_{iast} = \sum_i \sum_{\tau=-5}^{-1} \zeta_i^{\tau} \, Group_i \times D_{it}^{\tau} + \sum_i \sum_{\tau=1}^{22} \zeta_i^{\tau} \, Group_i \times D_{it}^{\tau} + +\beta t_t + \gamma_{at} + \gamma_s + X_{it}\theta + \epsilon_{iast} \qquad (2)$$

employment was wider for workers with children vs. workers without children between June-November 2020. Furman et al. (2021), however, finds that the slow employment recovery in 2021 cannot be attributed to pandemic-related issues that are specific to parents.

To test for heterogeneity in the effects, we include interaction terms between D_{it}^{τ} and the variable $Group_i$. In Equation 2, $Group_i$ are a set of subgroup indicators, and the estimated coefficients ζ_i^1-ζ_i^{22} capture the effects of the pandemic in each sub-group. The sub-groups are defined by: demographic characteristics (race/ethnicity, age) and geographic characteristics (metropolitan status and states' decisions to terminate FPUC and PUA early). In all models, we apply CPS person weights, and estimate robust standard errors with two-way clustering on state and year-month.

Our primary outcome of interest is "usual work hours" which captures hours usually worked per week at all jobs, or the number of hours worked last week if the respondent reports having a flexible work schedule (including zeros). We examine usual work hours in total and also by occupation; specifically, we create three additional dependent variables measuring usual work hours in food preparation and serving, usual work hours in sales and related occupations, and usual work hours in all other occupations.[4] Food preparation and serving and sales and related occupations are the two largest occupations reported in our analytic sample, comprising 27 percent and 21 percent of the sample respectively.[5] Usual hours are set to zero for respondents who do not have any work hours, or who do not have any work hours in the occupation group being considered (when we consider work hours by occupation). As secondary

[4] The occupation groups reflect a person's primary occupation and are defined using the Census Bureau's 2010 occupation classification scheme. The dependent variables are defined by multiplying usual working hours with occupation group dummies.

[5] These two occupations are the largest regardless of whether we consider occupations among those employed or work hours within occupations among those employed, or whether we consider the full sample of 15-24-year-old childless respondents without a college degree, or whether we restrict this sample to 15-19-year-olds.

outcomes, we consider: whether or not the individual is employed; whether or not the individual is in the labor force; weekly earnings; and hourly earnings.[6]

Table 1 shows summary statistics for each age group (15-19 and 20-24) for the entire analysis period (January 2016 – December 2021), for the "Before" pandemic period (January 2016 – February 2020), and for the "After" pandemic period (March 2020 – December 2021). The socio-demographic variables (age, sex, race/ethnicity, urban) appear to be stable across the Before and After periods in both age groups; there are small changes in the proportions of respondents in each race/ethnicity category, but these changes are consistent across the two age groups.

For the labor market outcomes, however, there are substantial differences across the two age groups. First, 15-19-year-olds work an average of 6.0 hours weekly (including zeros) over the whole time-period, while 20-24-year-olds work an average of 21.0 hours weekly (including zeros) over the whole time period. As expected, the older age group has substantially higher rates of employment, labor force participation, weekly earnings and wages compared to the younger age group (columns 1 and 4, Table 1). Second, we see a striking difference in the Before/After change in labor market outcomes in the younger age group vs. the older age group, which foreshadows our regression findings. Overall work hours, as well as work hours by occupation, increase slightly (aside from a reduction in the Sales and related occupation) from the Before to the After period among 15-19-year-olds, but there are reductions in work hours among 20-24-year-olds. We generally observe reductions in employment and labor force participation over

[6] Weekly earnings and hourly earnings are only available for the outgoing rotation groups. For weekly earnings, this information is only collected for civilians 15 years old and older who are currently employed as wage/salary workers and were asked the "earner study" questions. This question excludes self-employed persons. For hourly earnings, this information is only collected for civilians 15 years old and older who are currently employed as wage/salary workers and who are paid hourly. This question excludes self-employed persons.

time, as well as increases in weekly earnings and wages over time, for both age groups, but the magnitudes of the reductions tend to be larger for the older age group (Table 1).

Figure 1 shows average usual work hours by age group, and by age group and occupational category, for the whole time-period (January 2016 – December 2021). Prior to March 2020 (marked by a vertical line), the plots show the expected seasonal pattern of work hours for both age groups (albeit less pronounced for the older age group), with average work hours increasing during the summer months when school is not in session. We observe the expected plunge in work hours for both age groups at the start of the pandemic in March 2020, which is magnified for the 20-24-year-old age group (Figure 1). For the 15-19-year-olds, there appears to be significant recovery in work hours in the first half of 2020, but, for 20-24-year-olds, overall work hours just approach the February 2020 baseline in September 2021. In the food preparation and serving occupation, there is a striking difference between the two age groups by the end of the study period; as of December 2021, work hours are far below the February 2020 baseline for 20-24-year-olds, but, among 15-19-year-olds, work hours in this occupation appear to have reached typical pre-pandemic levels (and actually exceeded pre-pandemic levels in most months from late 2020).

3. Results

Figures 2 and 3 show estimates of the pandemic on usual work hours for all occupations, and then for usual work hours by occupational category: food preparation and serving occupations; sales and related occupations; and the other occupation category, respectively (Equation 1). Figure 2 shows these estimates for the 15-19-year-old sample, while Figure 3 shows the estimates for the 20-24-year-old sample. The figures show the estimated coefficients on each month during the pre-pandemic period (Sept 2019 – Jan 2020) and during the post-

pandemic period (March 2020 – December 2021), thus mapping out the effects of the pandemic on work hours during this time-period (Equation 1).

Figure 2 shows that overall work hours, which were slightly higher than typical prior to the start of the pandemic, plunged by about 1.65 hours in April 2020; this sudden drop represents about a 28 percent decrease evaluated at the pre-pandemic mean among 15-19-year-olds (5.94 hours, shown in Table 1). Work hours among 15-19-year-olds returned to pre-pandemic norms by September 2020. Between April and December 2021, work hours in this age group exceeded typical levels, often by about 10 percent evaluated at the pre-pandemic mean. In short, the pandemic had an initial strong, negative effect on overall work hours among the youngest workers (aged 15-19), but there was a brisk, strong recovery in this age group that has been sustained as of December 2021. As seen in Figure 2, the magnitudes of the effects varied across occupational categories from month-to-month, and work hours among 15-19-year-olds working in the sales and related services sector returned to pre-pandemic norms earlier than in the other two occupational categories (Figure 1).

Figure 3 shows the same estimates, but for the 20-24-year-old age group. We note three differences across the two age groups. First, the magnitudes of the effects are larger for 20-24-year-olds vs. 15-19-year-olds. In March 2020, work hours among 20-24-year-olds were about 1.8 hours below pre-pandemic levels (there was no effect on 15-19-year-old work hours in this month), but by April 2020, work hours had fallen to 6.85 hours below pre-pandemic levels; these effects represent about 9 and 32 percent reductions in overall work hours relative to the pre-pandemic mean of 21.5 hours per week among 20-24-year-olds. Second, although overall work hours steadily recovered from April 2020 until November 2020, progress started to lag at that point. Even in August 2021, work hours were still 2.0 hours below normal levels, which is about

a 9 percent lower level than the pre-pandemic mean overall work hours of 21.5 hours for the 20-24-year-old age group. Third, we note that there appears to be a sharp bounce back of overall work hours starting in September 2021, which coincides with the expiration of pandemic UI benefits in all states; we did not observe this bounce back among 15-19-year-olds. From September to December 2021, work hours among 20-24-year-olds were steadily rising to about 0.8 hours greater than the typical level but work hours among 15-19-year-olds were steadily falling from a significant 0.5 hours greater to an insignificant 0.3 hours greater than the typical level. As was the case for 15-19-year-olds, the magnitudes of these effects vary by occupational category across the months of the pandemic. The bounce back of work hours in September 2021 among 20-24-year-olds is apparent in the food preparation and serving and other occupations categories but not in the sales occupation category.

In Appendix Figures 2-3, we show the same models for 15-19-year-olds (Appendix Figure 2) and for 20-24-year-olds (Appendix Figure 3) but we consider four additional labor market outcomes: an indicator of whether the individual is employed; an indicator of whether the person is in the labor force; weekly earnings; and hourly wages. Appendix Figure 2 shows a pattern in these outcomes that is consistent with the pandemic's effects on work hours shown in Figure 2. The pandemic initially reduced work hours among 15-19-year-olds, with employment and labor force participation dropping in April 2020 by 9 percentage points and 4 percentage points, respectively, below pre-pandemic levels; these effects represent 35 and 13 percent reductions at the pre-pandemic means of 0.26 and 0.30 for employment and labor force participation for this age group. Employment and labor force participation levels, however, had fully recovered by September 2020 among 15-19-year-olds, and by the last two quarters of 2021,

this age group was experiencing higher-than-typical levels of employment and labor force participation.

Weekly earnings and hourly wages among 15-19-year-olds were volatile throughout the pandemic period, but, towards the end of our study period, we observe a steady upward trend in these outcomes compared to pre-pandemic levels. By December 2021, weekly earnings were about $72 higher (28 percent higher at the pre-pandemic mean of $256 for 15-19-year-olds) than pre-pandemic norms for that month, and hourly wages were about $2.17 higher (21 percent higher at the pre-pandemic mean of $10.46 for 15-19-year-olds) than pre-pandemic norms for that month.

In Appendix Table 3, we see a somewhat different pattern for 20-24-year-olds. In this age group, employment and labor force participation were 4 and 2 percentage points lower than pre-pandemic levels for that month, respectively, in March 2020; by April 2020, employment and labor force participation were 21 and 9 percentage points than pre-pandemic norms, respectively, which are 33 percent and 13 percent reductions measured at the pre-pandemic sample means for 20-24-year-olds. These magnitudes are similar for 20-24-year-olds and 15-19-year-olds. Weekly earnings and hourly wages among 20-24-year-olds followed a qualitatively similar pattern to those of 15-19-year-olds – there was volatility, with an upward trend towards the end of our study period, particularly in hourly wages which exceeded pre-pandemic levels by $1.50 (about a 12 percent increase at the pre-pandemic mean hourly wage of $12.52 for 20-24-year-olds).

Appendix Figures 4-5 show estimates from Equation 2, which allow one to identify heterogeneity in the effects of the pandemic on work hours. We focus on heterogeneity by race/ethnicity, by age, by urbanicity, and by whether the state ended both FPUC and PUA in June 2021 or ended neither before September 2021 (this categorization follows that of Holzer et al.

2021). Appendix Figure 4 shows findings for the 15-19-year-old sample, while Appendix Figure 5 shows results for individuals aged 20-24.

For 15-19-year-olds, individuals of all race/ethnicities followed a similar trajectory for work hours during the pandemic, with Non-Hispanic Whites generally impacted the least and making a stronger and faster recovery compared to the other racial/ethnic groups (Appendix Figure 4). In the 20-24-year-old age group, Hispanic workers made a faster recovery in work hours compared to other racial/ethnic groups.

Within the 15-19-year-old age group, the effect of the pandemic on hours worked was driven by effects among 18-19-year-olds, probably because younger adolescents aged 15-17 tend to work fewer and more flexible hours. In the 20-24-year-old age group, effects on work hours were similar by age. In both age groups (15-19 and 20-24), the pandemic had greater impact on work hours among those living inside or outside central cities, with smaller effects and earlier recovery (in the 15-19-year-old group) among those living in other areas. Among 20-24-year-olds, by December 2021, work hours had surpassed the pre-pandemic levels among those living inside or outside central city and had fully recovered to the pre-pandemic levels among those living in other areas (Appendix Figure 5). Finally, when we compare effects of the pandemic in states that ended both FPUC and PUA in June 2021 vs. states that ended neither before September 2021, we note that there is a relative decline in work hours in the 15-19-year-old group in July and August 2021 in states that ended the programs early, suggesting their job opportunities were being taken away by older, more experienced workers rejoining the labor market. In the 20-24 age group, however, we do not observe differences across these two groups of states that supports this explanation. (Appendix Figures 4-5).

4. Discussion and Conclusions

Our findings show heterogeneity by age group in the effects of the pandemic among young, childless workers without college degrees. The youngest workers, aged 15-19, were more resilient than their 20-24-year-old counterparts. There was a brisk, full recovery in labor market outcomes among 15-19-year-olds, with work hours and other labor market outcomes even exceeding pre-pandemic levels in recent months. Among 20-24-year-olds, however, the recovery was more sluggish, with work hours lagging below pre-pandemic norms until September 2021, when they returned to typical levels.

One explanation for the heterogeneity by age group may be the enhanced UI benefits, which are more accessible to 20-24-year-olds vs. 15-19-year-olds. Enhanced UI benefits may have made it possible for workers to turn down employment offers, perhaps to hold out for more favorable terms, or invest in education and training (Levitz, 2021; see theoretical motivation in Appendix). The heterogeneity may stem from other reasons as well. Fear of contagion may be a more pressing issue for 20-24-year-old workers, because they work more hours than 15-19-year-olds and are more likely to be living with non-relatives, and as a result have greater exposure to COVID-19. In addition, 20-24-year-old workers have more experience than 15-19-year-old workers and thus may have jobs that involve more person-to-person contact and greater COVID-19 exposure risk.

Fear of contagion is likely to have been an important factor in the initial waves of the pandemic, when vaccinations were not widely available, and disease was relatively severe. With widespread vaccination and the emergence of the milder (albeit more infectious) Omicron variant, fear of contagion may have been less of a concern for workers by the second half of 2021. The expiration of enhanced UI benefits in all states in September 2021, therefore, may

have induced 20-24-year-old workers to return to their pre-pandemic work hours in this month; our findings are consistent with this story.

As of March 2022, COVID-19 continues to chart an unpredictable course throughout the world. In this challenging environment, it is critical to inform policymakers by estimating the impact of the pandemic on young workers, and by exploring heterogenous effects within this group.

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Table 1: Summary Statistics						
Age group:	15-19			20-24		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Before	After	All	Before	After
Age	16.92	16.92	16.92	21.68	21.70	21.65
Female	0.49	0.49	0.49	0.45	0.45	0.46
Black	0.15	0.15	0.15	0.16	0.16	0.16
Other race	0.11	0.11	0.12	0.10	0.10	0.11
Hispanic	0.22	0.22	0.23	0.21	0.21	0.22
In central city	0.25	0.25	0.26	0.30	0.30	0.30
Outside central city	0.48	0.48	0.47	0.44	0.44	0.44
Hours, all occupations	6.02	5.94	6.22	21.00	21.49	19.88
-Food preparation and serving	1.51	1.48	1.58	2.78	3.00	2.30
-Sales and related	1.20	1.23	1.15	3.02	3.13	2.79
-Other occupations	3.31	3.24	3.48	15.19	15.37	14.79
Employment rate	0.26	0.26	0.25	0.63	0.64	0.59
Labor force participation	0.30	0.30	0.30	0.69	0.70	0.67
Weekly earnings	272.49	256.33	309.70	464.53	444.06	515.60
Hourly wage	10.95	10.46	12.08	13.04	12.52	14.33
Obs	501698	368450	133248	322516	237084	85432

Note: Data come from the CPS, 2016 Jan-2021 Dec, with 2016 Jan-2020 Feb being the before-pandemic time period, and 2020 Mar-2021 Dec being the after-pandemic time period. The data on weekly earnings and hourly wage are based on the outgoing rotation sample. Weekly earnings are available only for wage/salary workers, and hourly wage is available only for wage/salary workers who receive hourly rates.

Figure 1:

Raw plot of average usual working hours by age group

Note: Vertical line marks 2020 March. The dash lines indicate level of each series in Feb 2020.

Figure 2:

Effect of the COVID-19 pandemic on usual working hours of age group 15-19

Note: Figure shows estimated coefficients on month indicators in Eq. 1. Blue shading indicates the 95% CI for the estimated coefficient.

Figure 3:

Effect of the COVID-19 pandemic on usual working hours of age group 20-24

Note: Figure shows estimated coefficients on month indicators in Eq. 1. Blue shading indicates the 95% CI for the estimated coefficient.

APPENDIX

Theoretical Motivation

Consider two groups of agents young (ages 15-19) and old (ages 20-24) working in the unskilled (or low-skilled) labor market. Let superscript $g \in \{y, o\}$ index the group. Two groups of agents face the same wage rate and UI benefit schedule, but the younger group on average has a greater cost of working. Assume agents who work have the following linear utility function:

$$w_t - \epsilon - \eta P_t$$

Where w_t is the wage rate at time t, with $t = b$ denoting the before pandemic period, and $t = a$ denoting the post pandemic period. The term ϵ represents the idiosyncratic disutility cost of working and is drawn from a uniform distribution $\left[\underline{\epsilon^g}, \underline{\epsilon^g} + z\right]$. The lower bound $\underline{\epsilon^g}$ can be less than 0 to capture that some individuals may have non-pecuniary incentive to work, e.g., worker identity and opportunity for on-the-job training. We assume $\underline{\epsilon^y} > \underline{\epsilon^o}$, reflecting the higher demand of schoolwork for younger workers aged 15-19. In each period, agents receive an independent draw of ϵ from this distribution. The term η represents the utility cost of working after the pandemic and P_t is a 0-1 indicator for the post pandemic period.

Now consider the time before the pandemic. The utility for those who do not work and are eligible for unemployment insurance (UI) benefits is the benefit level b_b, and is normalized to 0 for ineligible agents. Thus, an agent eligible for UI benefits will work if and only if $w_b - \epsilon \geq b_b$ and an agent ineligible for UI will work if and only if $w_b - \epsilon \geq 0$.

We can derive the share of agents in group g who are eligible for UI—those work in the previous period—by solving the following equation. Note that for the pre-pandemic period, the share of agents who work is a constant number, denoted by x_b^g.

$$x_b^g = x_b^g \int_{\underline{\epsilon^g}}^{w_b - b_b} \frac{1}{z} d\epsilon + (1 - x_b^g) \int_{\underline{\epsilon^g}}^{w_b} \frac{1}{z} d\epsilon$$

$$\Rightarrow x_b^g = \frac{w_b - \underline{\epsilon^g}}{z + b_b}$$

As younger agents on average have greater cost of working ($\underline{\epsilon^y} > \underline{\epsilon^o}$), before the pandemic young agents are less likely to work and are less likely to be eligible for UI than older agents ($x_b^y = \frac{w_b - \underline{\epsilon^y}}{z + b_b} < x_b^o = \frac{w_b - \underline{\epsilon^o}}{z + b_b}$).

After the pandemic, the share of agents eligible for UI benefits is determined by the pre-pandemic employment status. Let $b_a > b_b$ denote the enhanced UI benefit amount, and w_a denote the post pandemic wage. An agent eligible for UI benefits will work if and only if $w_a - \epsilon - \eta \geq b_a$ and an agent ineligible for UI will work if and only if $w_a - \epsilon - \eta \geq 0$. The share of group g who will work after the pandemic is:

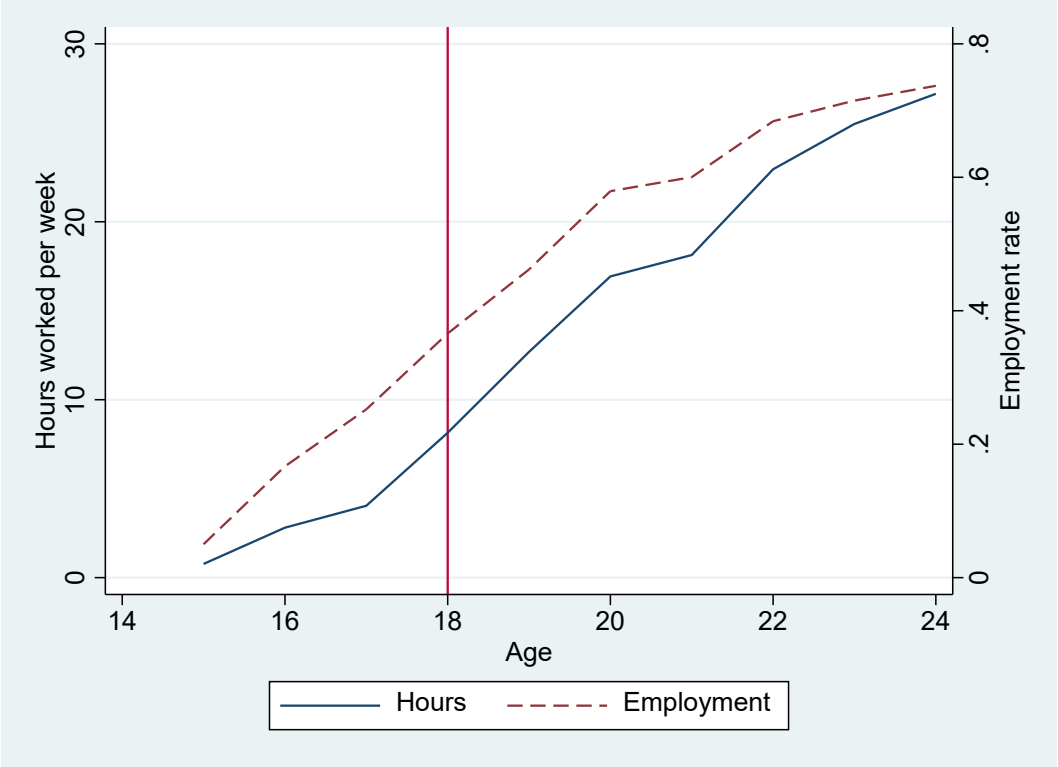
$$x_a^g = x_b^g \int_{\underline{\epsilon^g}}^{w_a - \eta - b_a} \frac{1}{z} d\epsilon + \left(1 - x_b^g\right) \int_{\underline{\epsilon^g}}^{w_a - \eta} \frac{1}{z} d\epsilon = \frac{w_a - \eta - \underline{\epsilon^g} - x_b^g b_a}{z}$$

The effect of pandemic on employment is:

$$\begin{aligned} x_a^g - x_b^g &= \frac{w_a - \eta - \underline{\epsilon^g} - x_b^g b_a}{z} - x_b^g = \frac{w_a - \eta - \underline{\epsilon^g} - x_b^g (b_a + z)}{z} \\ &= \frac{w_a - \eta - \underline{\epsilon^g} - \frac{w_b - \underline{\epsilon^g}}{z + b_b}(b_a + z)}{z} = \frac{1}{z}\left[w_a - w_b - \eta - (b_a - b_b)\frac{w_b - \underline{\epsilon^g}}{z + b_b}\right] \\ &= \frac{1}{z}\left[\underbrace{w_a - w_b}_{wage\ change} \quad \underbrace{-\eta}_{Pandemic\ risk} \quad \underbrace{-(b_a - b_b)x_b^g}_{enhanced\ UI\ benefits}\right] \end{aligned}$$

This implies that the change in employment due to the pandemic positively reacts to the change in wage rate, and negatively reacts to pandemic risk, the increase in UI benefits, and most importantly, the share of people working before the pandemic. The above condition implies that without enhanced UI benefits $b_a = b_b$, the young and old group should experience the same change in employment, and the enhanced UI benefits ($b_a > b_b$) will cause a decrease in

employment among the old group and an increase in employment among the young group if and only if $x_b^y < \frac{w_a - w_b - \eta}{b_a - b_b} < x_b^o$.



Appendix Figure 1:

Appendix Figure 2:

Note: Figure shows estimated coefficients on month indicators in Eq. 1. Blue shading indicates the 95% CI for the estimated coefficient.

Appendix Figure 3:

Note: Figure shows estimated coefficients on month indicators in Eq. 1. Blue shading indicates the 95% CI for the estimated coefficient.

Appendix Figure 4:

Heterogeneous Effect of the COVID-19 pandemic on usual working hours of age group 15-19

Note: Figure shows estimated coefficients on the interaction terms between group dummies and month indicators in Eq. 2. Blue shading indicates the 95% CI for the estimated coefficient.

Appendix Figure 5:

Heterogeneous Effect of the COVID-19 pandemic on usual working hours of age group 20-24

Note: Figure shows estimated coefficients on the interaction terms between group dummies and month indicators in Eq. 2. Blue shading indicates the 95% CI for the estimated coefficient.