

Effects of the COVID-19 Recession on the US Labor Market: Occupation, Family, and Gender

Stefania Albanesi and Jiyeon Kim

Recessions in the United States are usually associated with a larger employment drop for men than for women. But during the COVID-19 recession, employment losses were larger for women. Figure 1 shows the employment-to-population ratio for men and women during the last four business cycles. The drop in the ratio was higher for men than for women in each previous cycle, but not in the pandemic recession.

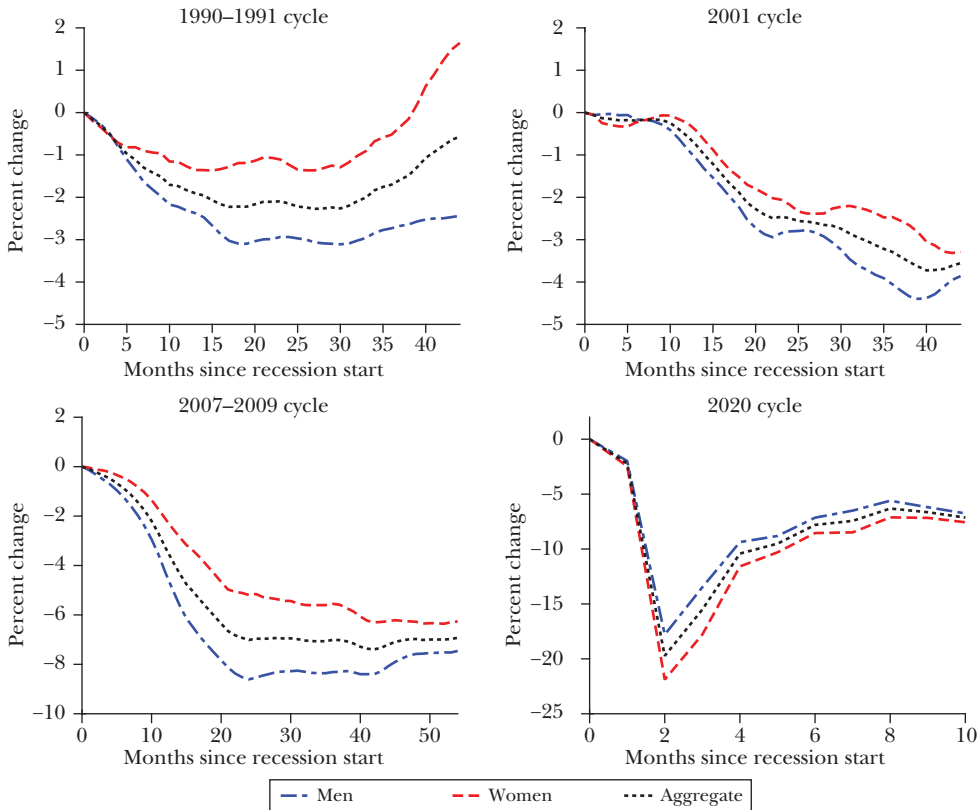
There are demand-side and supply-side reasons why the pattern of employment changes during recessions is different for men and women, and these patterns have not been the same during the pandemic as in previous recessions. On the demand side, the asymmetry is partly explained by gender differences in the occupation distribution, with men primarily employed in production occupations and women concentrated in service occupations, which tend to be less cyclical (Albanesi and Şahin 2018; Olsson 2019). During the pandemic, however, there has been a sizable drop in the demand for services as a result of both the mitigation measures enacted to contain the pandemic and consumers' response to the risk of infection (Chetty et al. 2020). Given the concentration of women in service occupations, they have been disproportionately hit by the corresponding employment losses. On the supply side, married women have, in the past, tended to increase their attachment to the

■ *Stefania Albanesi is Professor of Economics, University of Pittsburgh, Pittsburgh, Pennsylvania. She is also a Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts, and a Research Fellow, Centre for Economic Policy Research, London, United Kingdom. Jiyeon Kim is an Associate Fellow, Korea Development Institute, Yeongi-gun, South Korea. Their email addresses are stefania.albanesi@gmail.com and jik51@kdi.re.kr.*

For supplementary materials such as appendices, datasets, and author disclosure statements, see the article page at <https://doi.org/10.1257/jep.35.3.3>.

Figure 1

Percentage Change in the Employment-to-Population Ratio since the Start of Each Recession for the Four Most Recent Business Cycles



Source: Authors' calculations based on Current Population Survey.

Note: Recession dates based on the National Bureau of Economic Research business cycle dates.

labor force during economic downturns relative to expansions as a form of household insurance that reduces the impact of recessions (Ellieroth 2019). Before the pandemic, the lower cyclicality of women's employment led to a reduction in the cyclical volatility of aggregate employment as the share of women in the workforce increased from the 1970s onward (Albanesi 2019). During the pandemic, limited availability of in-person childcare and schooling options led many parents—and women in particular—to exit the labor force.

In this essay, we first focus on the differences in supply-side employment responses of men and women during business cycles, in part using a comparison between the Great Recession and the pandemic recession to illustrate. We then turn to occupational differences and how they influenced employment for men

and women using monthly data in 2000. To do so, we classify occupations by their exposure to the pandemic, based on contact intensity and ability to work remotely and show that women are overrepresented in high-contact and inflexible occupations most affected by the pandemic.

We then explore the relative importance of the supply-side and demand-side responses in two ways. First, we use a regression approach to analyze the employment changes of women and men during the pandemic. We focus on differences in family status but also show that controlling for occupations attenuates the decline in employment and the gender differences by about one-third. We then look at gross flows of labor. For example, the flow from employment to nonparticipation can be viewed as a supply-side withdrawal from the labor market, while the flow from employment to unemployment can be viewed as driven from the demand-side of the labor market. We find that employment to nonparticipation flows more than double during the pandemic and also show sizable gender gaps pointing to a greater rise for women with children.

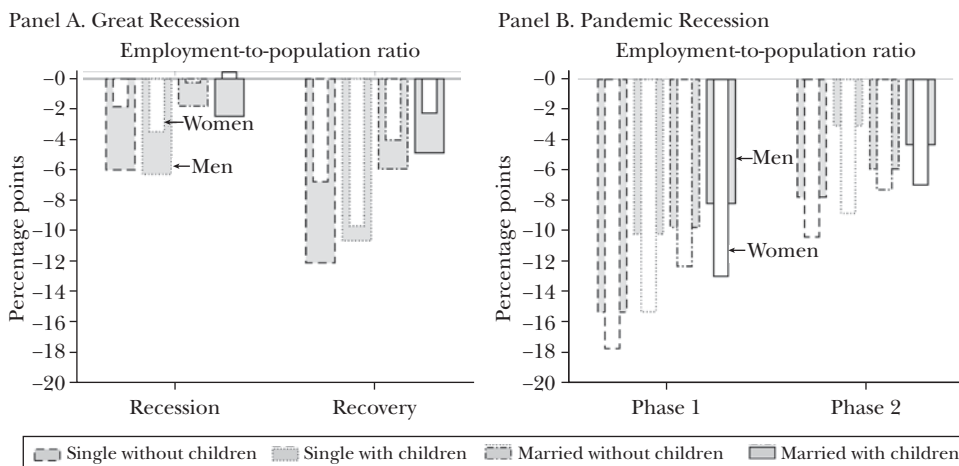
We conclude by discussing some of the continuing impacts of the pandemic on the labor market. In particular, we focus on what the elements of family status, occupation, and gender might foretell about whether the US economy is likely to experience another “jobless recovery,” and how the newly established patterns of remote work may affect gender wage gaps looking forward.

Employment by Gender and Family Status

On the supply side of the labor market, the lower cyclicity of female employment applies to married individuals during past recessions. It is related to household insurance via labor supply, sometimes also known as the “added-worker” effect. The premise of this mechanism is that when one partner is at risk of earnings loss or unemployment, for example during a recession or because of a plant closing, the other partner increases their labor supply. Since the first study isolating this mechanism, Lundberg (1985), a variety of contributions have confirmed the importance of this channel. Those looking for more recent starting points in this literature might begin with Shore (2010), who examines risk sharing within marriage over the business cycle and finds that incomes of husbands and wives are less positively correlated in recessions. Additionally, in cohorts of couples who had been married through relatively bad times, high-earning husbands tend to be married to low-earning wives and vice versa, with a large and statistically significant effect. Blundell, Pistaferri, and Saporta-Eksten (2016) examine the link between wage and consumption inequality using a structurally estimated life-cycle model incorporating consumption and family labor supply decisions, and find a sizable role for household insurance via wives’ labor supply.

At the macroeconomic level, Albanesi (2019) shows that this channel renders women’s labor supply countercyclical. Ellieroth (2019) finds that married women are less likely to leave the labor force in recessions. She shows that this form of

Figure 2
Change in the Employment-to-Population Ratio Relative to Pre-Recession during the Great Recession and the Pandemic Recession by Gender and Family Status



Source: Author's calculations from CPS.

Note: For the Great Recession, pre-recession corresponds to March–November 2007, Recession to December 2007–June 2009, and Recovery to July 2009–July 2012. For the pandemic recession, pre-recession corresponds to February 2020, Phase 1 to March–May 2020 and Phase 2 to June–November 2020.

precautionary labor supply in response to the higher threat of job loss experienced by their husbands accounts for 30 percent of women's low cyclical employment.¹

Employment Declines in the Pandemic and the Great Recession

To illustrate how the employment losses of men and women during the pandemic recession differed from earlier recessions, we compare the pandemic recession to the Great Recession, which had a typical pattern. Figure 2 shows the change in the employment-to-population ratio by gender and family status during the pandemic recession in 2020 and the Great Recession. For each period, two changes are shown. For the Great Recession, the first change is from the pre-recession phase corresponding to the period between March 2007 and November 2007 to the recession phase from December 2007 to June 2009 (which corresponds to the dates determined by the Business Cycle Dating Committee of the National Bureau of Economic Research). The recovery phase is the change from the original pre-recession period all the way to the following recovery from July 2009 to July 2012. For the pandemic recession, both changes are relative to February 2020. We consider two time periods: Phase 1, comprising March, April,

¹Other recent papers develop quantitative models capturing the implications of marital risk-sharing for consumption smoothing and welfare. See Albanesi (2019) for a review of this literature.

and May 2020, when the pandemic started and the strictest mitigation measures were in place, and Phase 2, from June to November 2020, with less stringent mitigation measures. Each of these changes are broken down into four categories by family status: single without children, single with children, married without children, and married with children. Then within each of these family categories, the inner portion of the bar shows the change for women, while the outer portion shows the change for men.

During the Great Recession (as in the previous recessions before that), the decline in women's employment is sizably smaller than men's for every family group. In the recession phase, among single workers without children, employment falls by 6 percentage points for men and only by 2 percentage points for women. Among single with children, the decline is 6.1 percentage points for men and 2.7 percentage points for women. For married men without children, the decline is 2 percentage points whereas women in this category employment is virtually unchanged. For married men with children, the employment-to-population ratio declines by 2.4 percentage points, while it rises by 0.2 percentage points for women. In looking at the change from the pre-recession period to the recovery phase, both women and men experience larger declines in employment, but the decline for women is one-half to one-third smaller in magnitude compared to men in each demographic group.²

During the pandemic recession, the decline in employment is larger for women than for men in every family group in both comparisons. In the Phase 1 comparison, single men without children employment declines by approximately 15 percentage points, whereas the decline is 18 percentage points for comparable women. For single men with children, the decline is 10 percentage points, while it is 15.5 percentage points for single women with children. For married men without children, the decline is 10 percentage points, but it is equal to 12.5 percentage points for married women without children. Finally, for married men with children, the decline is 8.5 percentage points, while for comparable women the employment-to-population ratio declined by 13 percentage points. In the Phase 2 comparison, employment continues to be well below pre-pandemic levels. For men, employment ranges between 8 and 3 percentage points below pre-pandemic levels depending on family status, and for women between 11 and 8 percentage points lower, with the largest gender gaps among workers with children. Among single workers with children, the employment decline for women relative to pre-pandemic levels is more than twice as large as for men, while for married workers with children it is approximately 50 percent larger.

²In the online Appendix available with this paper at the *JEP* website, we use yearly data on prime-age workers from the Current Population Survey to capture the variation in the employment-to-population ratio associated with cyclical variations in GDP in 1976–2019. We confirm the standard finding of lower cyclicity for women's employment. We also examine the cyclicity of men and women by marital status and presence of children, and confirm the patterns of recessions discussed in the text and in the context of the Great Recession.

Discussion

During 2020, women—especially those with children—experienced a substantial reduction in employment compared to men, contrary to the pattern that prevailed in previous recessions. Both labor demand and supply factors likely contributed to this behavior. Women are more likely to be employed in service-providing industries and service occupations. These tend to be less cyclical compared to goods-producing industries and production occupations that employ a larger share of men, and Albanesi and Şahin (2018) show that this accounts for most of the difference in the loss of employment during recessions since 1990. The occupation and industry distribution by gender does not vary by marital status (Cortes and Pan 2018), and thus can help explain why both for single and married workers employment is less cyclical for women. However, during the COVID-19, infection risk was most severe in the service sector, leading to a large reduction in demand for services, due to government imposed mitigation measure and customer response to infection risk. The overrepresentation of women in service jobs likely accounts for a sizable fraction of their decline in employment relative to men.

Another unique factor associated with the pandemic recession was the increased childcare needs associated with the disruptions to school activities, which may have contributed to a reduction in labor supply of parents. Why was it mothers in particular who responded to the lack of predictable in-person schooling activities in households where fathers were also present? Gender norms likely played a role. But from the perspective of an economic model of the family, this response should also be driven by differences in the opportunity cost as measured by wages. In the United States and other advanced economies, there is a substantial “child penalty” that reduces wages for women when, and even before, they become mothers and throughout the course of their lifetime. The penalty is driven by a combination of occupational choices, labor supply on the extensive and intensive margin, that begin well before women have children (Kleven, Landais, and Søgaaard 2019; Adda, Dustmann, and Stevens 2017). The mean child penalty can be decomposed into explained effects, such as differences in mean values of background characteristics like education and race, and unexplained effects, which include the child penalty and different returns on non-child characteristics for mothers, compared to non-mothers or men. In a recent sample of such work, Cortes and Pan (2020) estimate that the long-run child penalty—three years or more after having the first child—for US mothers is 39 percent, and they also find that child-related penalties account for two-thirds of the overall gender wage gap in the last decade.

Given the child penalty, most working mothers at the start of the pandemic were likely to be earning less than their partners, and for those couples the optimal response to the increased child supervision needs was for mothers to reduce labor supply.³ In addition, Cajner et al. (2020) show that employment losses were

³ It is hard to test the implications of this hypothesis, given the unavailability of real time data on earnings by labor market transitions at high frequency. Our own preliminary work looking at monthly data on earnings from the Current Population Survey earners’ study suggests that the wife/husband earning

concentrated disproportionately among lower wage workers at the beginning of the pandemic, and Chetty et al. (2020) find that by the fall of 2020, lower wage workers' employment was still more than 20 percent below pre-pandemic values, with a much larger recovery for higher wage workers. Given that the child penalty tends to relegate women to jobs and occupations at the lower end of the wage distribution, it may have also played a role in their disproportionate loss of employment. The next section considers gender differences in occupations during the pandemic recession.

Exposure to the COVID-19 Recession by Occupation

To determine exposure to the COVID-19 recession, we classify occupations along two dimensions based on their flexibility and contact intensity. The distinction between flexible and inflexible occupations is made according to whether the occupation can be carried out remotely: flexible occupations include occupations that allow their employees to work remotely, whereas inflexible occupations involve outdoor activities or require operating on site equipment. The distinction between high-contact and low-contact occupations is based on workers' physical proximity to customers or coworkers while on the job. We then document the distribution by gender across these groups of occupations.

We then measure flexibility and contact intensity using data from the Occupational Information Network (O*NET). The O*NET survey started in 1998 and we use the most recent version published in February 2020. O*NET asks a random sample of US workers in each occupation various questions about typical work activities required in their occupations. To measure occupations' flexibility, we consider 15 questions designed to elicit whether workers are performing tasks that can be executed remotely, or whether they are bound to their work location by the need to operate or inspect equipment. Respondents answer each question on an ordinal scale of one to five, and we take the average across respondents' answers. To compute the contact intensity measure, we use a question asking about physical proximity to other people while working. Again, respondents answer on a scale of one to five, described as follows: 1) beyond 100 ft., 2) private office, 3) shared office, 4) at arm's length, 5) near touching.⁴

ratio for two-earner couples increased from 84 percent in Jan–Feb 2020 to 88 percent in summer 2020, which was 5 percentage points above the 83 percent level in summer 2019. In addition, the average weekly earnings for married men whose wives are not in the labor force increased by 11 percent in summer 2020 compared to a year prior, while it only increased by 7 percent for married men whose wives are employed, which could have resulted from the fact that wives of higher-earning men left the labor market during the pandemic. This evidence is consistent with the hypothesis that mothers' lower wages can explain their departure from the workforce in response to the child care demands driven by the pandemic, but a deeper analysis is warranted as more data becomes available.

⁴Table 6 in the online Appendix presents the measures of flexibility and contact intensity by occupations' major groups.

Table 1

Occupation Classification

	<i>Flexible</i>	<i>Inflexible</i>
High-contact	Education, Training, and Library	Healthcare Practitioners and Technical Healthcare Support Food Preparation and Serving Personal Care and Service
Low-contact	Management Business Computer and Mathematical Architecture and Engineering Life, Physical, and Social Science Community and Social Services Legal Arts, Design, Entertainment, Sports, and Media Sales and Related Office and Administrative	Protective Service Building and Grounds Cleaning and Maintenance Farming, Fishing, and Forestry Construction Trades, Extraction Installation, Maintenance, and Repair Production Transportation and Material Moving

Source: Author's calculations based on O*NET.

Note: Occupations are inflexible if their inflexibility score is above the median and flexible otherwise. Occupations are high-contact if the contact intensity score corresponds to a distance of less than 6 feet. Flexibility scores and contact intensity scores are reported in Table 6 in the online Appendix.

We classify occupations as inflexible if their inflexibility score is above the median and as flexible otherwise. Similarly, we consider the occupation to be high-contact occupation if an average respondent says that they work at arm's length or closer to other people, which is closer than safe social distancing distance of 6 feet. Based on these two criteria, we aggregate occupation groups into four categories: flexible and high-contact, flexible and low-contact, inflexible and high-contact, or inflexible and low-contact. This grouping is reported in Table 1.⁵ Flexible/high-contact occupation comprise mainly education jobs, while flexible/low-contact occupations comprise managerial and professional occupations. Inflexible/high-contact occupations are dominated by healthcare and services, both personal and hospitality. Finally, the inflexible/low-contact category comprises most production, protection, and transportation occupations, as well as construction and farming.

Table 2 reports the distribution of workers by gender across occupations for four categories defined in Table 1. The inflexible/high-contact occupations are the most vulnerable to the COVID-19 shock and are dominated by female workers. We find that 26 percent of female workers are employed in occupations that are inflexible/high-contact, while only 6 percent of men work in these occupations, corresponding to a female share of employment in these occupations of 73 percent. Flexible/high-contact occupations also exhibit a high female share at 76 percent. Male workers

⁵Dingel and Neiman (2020) classify occupations based on the ability of working remotely. Mongey, Pilossoph, and Weinberg (2020) also consider how workers in different occupations are affected by social distancing policies.

Table 2

Occupational Distribution by Gender

<i>Group</i>	<i>Employed women</i>	<i>Employed men</i>	<i>Total employed</i>	<i>Female share</i>
Flexible, High-contact	10	3	6	76
Flexible, Low-contact	53	48	51	50
Inflexible, High-contact	26	9	17	73
Inflexible, Low-contact	11	40	26	19

Source: Author's calculations based on February 2020 CPS.

Note: All values in percentage.

are disproportionately represented in inflexible, low-contact occupations, with 40 percent of male workers but only 11 percent of female workers employed in these occupations, with a female share of employment of only 19 percent in this category. Flexible/low-contact occupations are the largest category, accounting for 51 percent of overall employment, specifically 53 percent of female employment and 48 percent of male employment, with a female share of 50 percent.

We calculated the variation in employment-to-population ratio for these four sets of occupations starting in February 2020 and comparing each month in 2020 to the corresponding month in the previous year, which should help to account for any seasonality in employment variation by occupation.⁶ Figure 3 displays the results in the aggregate and by gender for each group of occupations. Inflexible/high-contact occupations show the largest overall decline in employment, reaching a trough of –38 percent in April, and only recovering to –12 percent by September 2020, with further declines by the end of the year. Men's employment fell by 8 percentage points more in April compared to women. Though it recovered to approximately 18 percentage lower relative to one year prior by July, it stayed at that level or lower through the fall. By contrast for women, employment was only 13 percent lower relative to one year prior by August 2020, and it remained mostly stable through fall 2020.

Inflexible/low-contact occupations are the second worst hit, with an overall decline in employment of close to 30 percent in April 2020, though employment for these occupations is only 5 percent lower than one year prior by the fall. For these occupations, women's employment dropped to 42 percent relative to one year prior in April, much larger than the 25 percent fall for men. Men's employment recovered slowly but steadily, reaching a level 10 percent lower than one year prior by September 2020. Women's employment also eventually recovered to that level, though there was a period of further reduction in early fall. Inflexible/high-contact and inflexible/low-contact occupations comprise most workers deemed essential, even if this designation varies by state (Blau, Koebe, and Meyerhofer 2020). Yet, these two categories experience the biggest decline in employment.

⁶Of the four categories here, flexible/high-contact occupations—which are the main location for teaching-related occupations—are the only category displaying seasonal variation.

Employment in flexible/high-contact occupations dropped to a low of -17 percent relative to one year prior in April 2020 but recovered rapidly, and has remained 2–8 percent lower than one year prior in the summer and fall. Employment for women fell by approximately 5 percentage points more in April and in the fall compared to men, though the drop in employment for women was smaller than for men in the summer.

Finally, flexible/low-contact occupations, which account for the biggest share of employment, were the least impacted, with a drop in employment of -9 percent relative to one year prior in April, and a recovery to 2–4 percent lower relative to one year prior from June onward. The drop in employment in the spring was similar for men and women, though female employment remained approximately 1 percentage point lower in the summer and fall 2020 compared to men.

Two patterns emerge from these results. First, for flexible/low-contact occupations, the recovery in employment was smaller for women. Though the percent difference by gender is small, it is still notable as this category accounts for the largest share of female employment and therefore affects a large segment of the female workforce. Second, for inflexible occupations, workers with the lowest representation by gender lost more jobs. This pattern may arise due to negative selection of male workers into female-dominated inflexible/high-contact occupations and of female workers into the male-dominated inflexible/low-contact occupations. Additionally, essential frontline workers are concentrated in inflexible/low-contact occupations and because, as documented in Blau, Koebe, and Meyerhofer (2020), they are more likely to be men—this may contribute to the greater decline of employment for women in this category.

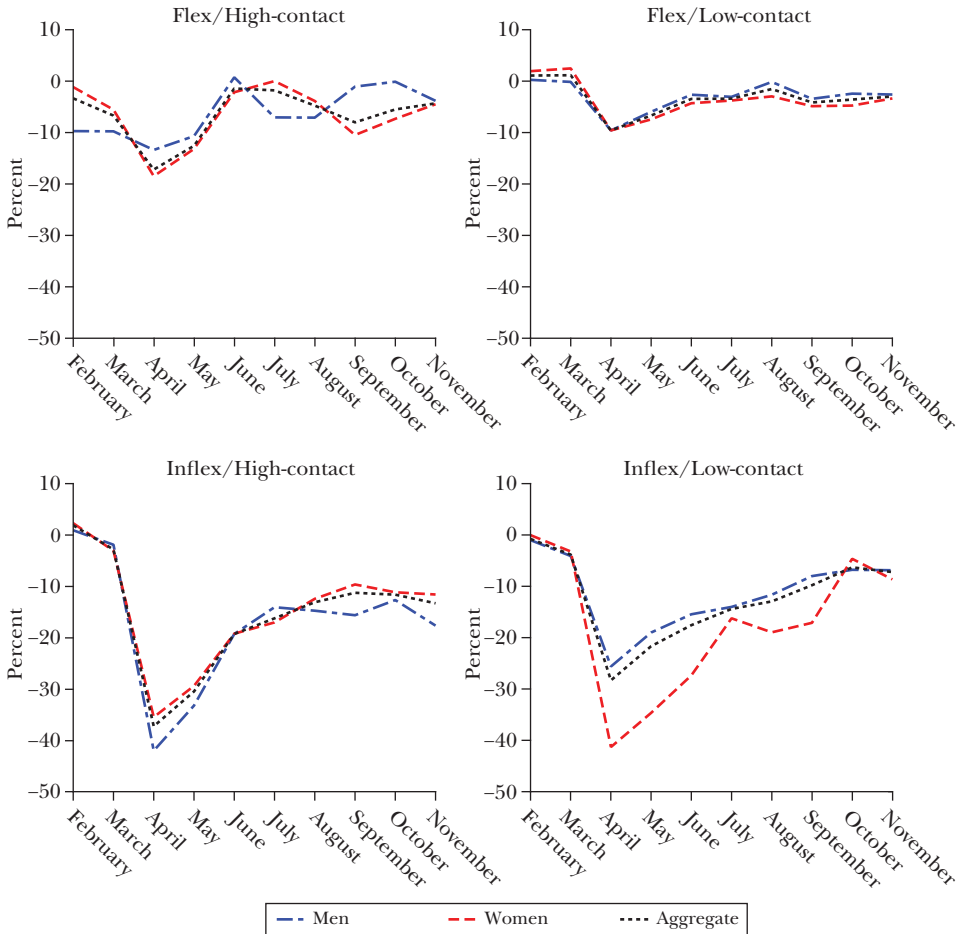
In the next section, we consider interactions between occupation and family status. The online Appendix provides more details, documenting the cyclical behavior of employment for the occupational categories we define by gender and marital status. Flexible/low-contact occupations are the least cyclical for all workers, followed by inflexible/high-contact occupations, whereas inflexible/low-contact occupations display the highest cyclicity. Albanesi et al. (2020) show that this variation is driven by differences in the skill distribution, with workers without a college degree disproportionately represented in inflexible/low-contact occupations. Additionally, workers in high-contact occupations tend to be employed in service-providing industries, which are less cyclical than goods-producing industries. However, large differences remain within occupations by gender and marital status, reflecting the aggregate pattern documented for the Great Recession.

Comparing Demand and Supply Effects

The behavior of employment over the course of the pandemic is driven by a combination of demand and supply factors that likely differ by gender and are influenced by age and education, in addition to the presence of children. In this section,

Figure 3

Percentage Change in the Employment-to-Population Ratio from One Year Prior in 2020



Source: Authors' calculations based on CPS.

we suggest two ways of disentangling these effects. One approach looks at the data on employment by marital and parental status presented earlier and asks how much of that variation would be eliminated by adding control variables for occupation. The second approach examines flows between employment, unemployment, and participation.

The overall lesson that emerges is that while both supply-side and demand-side effects play a role in explaining the drop in employment-to-population ratio for women during the pandemic recession, supply-side factors related to marriage

Table 3

Change in Employment, Unemployment, Nonparticipation by Demographic Groups

<i>Change since February 2020</i>	<i>Employment</i>		<i>Unemployment</i>		<i>Nonparticipation</i>	
	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 1</i>	<i>Phase 2</i>
Average without occupation controls	-5.3	-3.8	5.0	3.5	0.3	0.3
Share women	64.3	62.2	63.7	61.1	72.7	78.0
Average with occupation controls	-3.6	-3.1	3.5	3.0	0.1	0.1
Share women	65.9	61.6	65.8	60.0	69.5	121.6

Source: Authors' calculations based on CPS.

Note: The table reports selected estimates from the equation in the text for employment, unemployment, and nonparticipation. The full set of estimates are reported in the online Appendix. Phases of the pandemic correspond to March to May for Phase 1, June to November for Phase 2. The average effect is obtained by summing the contribution of each demographic group, obtained by multiplying the corresponding estimated effect for each phase of the pandemic with the group's population share in February 2020. The average effect is reported for the specification without and with occupational controls. In each case, "Share women" is the sum of all female contributions divided by the average effect for the specification with occupation controls. Population shares in February 2020 are reported in the online Appendix. All values in percentage.

and children are associated with roughly about two-thirds of the shift, while occupational changes are associated with the other one-third.

Regression Framework

To examine the dynamics of employment over the course of 2020, we estimate the following regression:

$$Y_{i,t} = \alpha + \sum_{\tau=1}^2 \beta_{\tau} \times I(\tau) + \gamma I^i(f) + \delta I^i(m) + \eta I^i(c) + \nu X_t^i + \epsilon_{i,t}.$$

where i indexes an individual and τ is an indicator variable for one of two phases of the pandemic, which are the same as defined earlier for Figure 1, with $\tau = 1$ corresponding to March to May, $\tau = 2$ corresponding to June to November. The variable $I^i(f)$ is a dummy for gender, equal to 1 for female, $I^i(m)$ is a dummy for marital status, equal to 1 for married, and $I^i(c)$ is a dummy for children under the age of 12 present, equal to 1 if they are, and X_t^i include a set of controls for age, educational attainment and, in some specifications, occupation, as categorized in the previous section. Additionally, we include a full set of interactions between the phase effects and the gender, marital status, and presence of children dummies, and the age, education and occupation controls.

With this approach, the coefficients β_{τ} estimate the effect of each phase of the pandemic on the dependent variable. The coefficients on the interactions estimate the differential impact of the pandemic on individuals by gender, marital status and presence of children in each phase of the pandemic. The estimated value of α will

be the average value of the dependent variable for male, single, childless individuals in February 2020. A full description of the regression framework, data and results is reported in the online Appendix available with this paper at the *JEP* website.

We focus here on differences between female and male employment in each of the phases of the pandemic, relative to February 2020, and calculated from the change for each demographic group weighted by the corresponding population shares for February 2020. In Table 3, we report these estimates for the specification with and without occupation controls. We also report the share of the change accounted for by women for each specification.

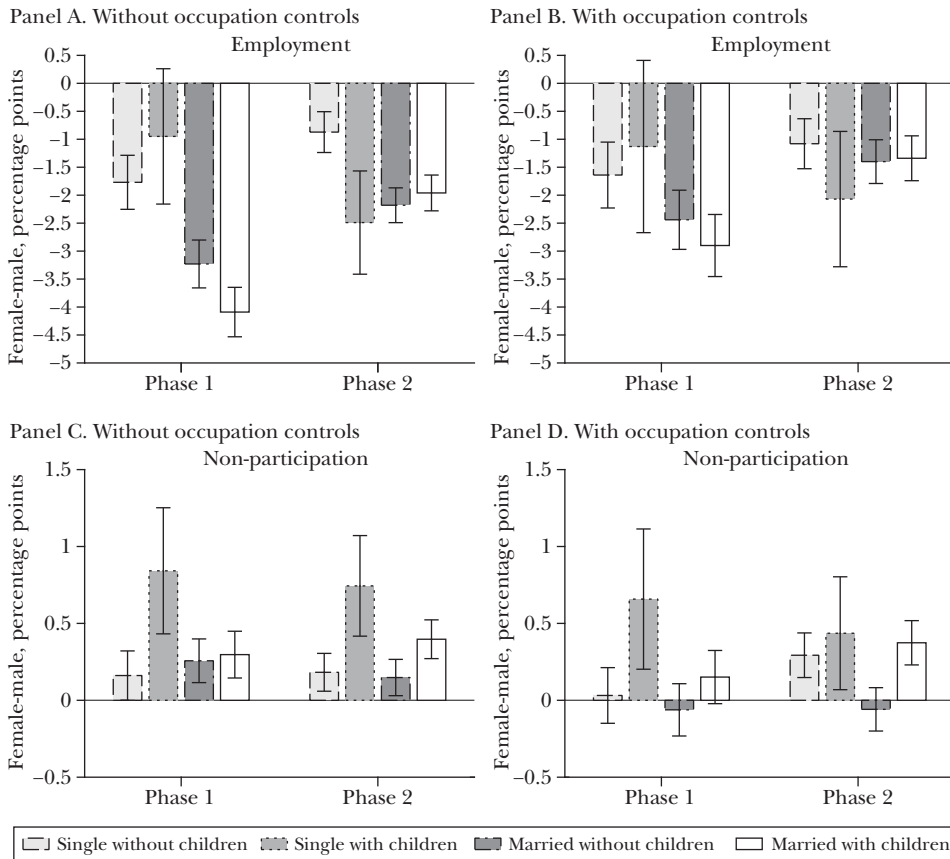
Without occupation controls, employment declined on average by 5.3 percent in Phase 1 and 3.8 percent in Phase 2; controlling for occupations, the declines were smaller at 3.6 percent and 3.1 percent. This suggests that the occupational distribution can account for over one-third of the decline in employment in Phase 1 and approximately one-fifth in Phase 2. The share of this change accounted for by women is similar with and without occupational controls, ranging from 62 to 66 percent, much larger than women's share in the population in February 2020, which was 52 percent.

The two panels in Figure 4 display the gender differences in the changes in employment in the two phases of the pandemic by demographic group, with and without occupation controls. (The values of the bars in the unadjusted figure will not match those from Figure 2 in the earlier discussion, because those values are not adjusted for age or education.) The figure shows that women in all demographic groups suffer larger losses in employment compared to men at every stage of the pandemic, with the biggest gender differences estimated for married women with children, whose employment falls by an additional 4 percentage points compared to men in that category in Phase 1. For married women without children, employment falls by 3 percentage points more than for men in that category over the same time period. Among single parents, women's employment falls by 1 percentage point more than men's in Phase 1 and by 2.5 percentage points more in Phase 2, and among single individuals without children, women's employment losses are 2 percentage points larger than men's in Phase 1 and 1 percentage point larger in Phase 2.

Controlling for occupations attenuates the gender differences in employment losses by about one-quarter to one-third in both phases of the pandemic. These estimates suggest that the occupation distribution plays a limited role in accounting for the gender gaps in the drop in employment.

We calculated similar regressions looking at patterns of unemployment and labor force nonparticipation. We find a very similar pattern for unemployment, both in terms of the average response, the contribution of occupation controls and for the gender wage gaps by demographic group. For non-participation, without controlling for occupation, gender differences are sizable for parents, particularly single parents, and more pronounced in Phase 2. Controlling for occupation, the gender gap in the rise in participation is 0.5 percentage points for parents, which is attenuated by about one-third for single parents relative to no occupation controls,

Figure 4
Female–Male Difference in Changes in Employment since February 2020, Estimated with and without Occupation Controls



Source: Author’s calculations from Current Population Survey data, using equation in text.
 Note: See note to Table 3. Error bars denote 90 percent confidence intervals.

but not for married parents in Phase 2. These results suggest that the occupation distribution plays little role in accounting for the rise in nonparticipation for mothers with children, particularly married mothers, relative to men.⁷

⁷Figure 8 in the online Appendix, available with this paper at the *JEP* website, displays the gender differences in the change in unemployment by demographic group with and without occupation controls. We also report a set of parallel regressions for employment, unemployment, and non-participation using data from the Great Recession. The results suggest that the occupational distribution is a significant factor in women’s smaller losses in employment compared to men in this period.

Evidence from Gross Labor Flows

To explore the potential role of labor demand and supply factors during the pandemic, we also examine gross labor market flows between employment, unemployment, and labor force participation. To capture the impact of demand factors, we consider the employment-to-unemployment flow and the unemployment-to-employment flow. The employment-to-unemployment flow is commonly interpreted as a measure of job destruction and usually rises dramatically at the start of recessions. The reverse measures the rate at which the unemployed find jobs, and it tends to fall dramatically in recessions and rise during recoveries. Because the unemployed are willing to but can't find work, the flows in and out of unemployment are more associated with the number of jobs available in the labor market rather than individual workers' decisions to supply labor. In contrast, the flows into nonparticipation reflect workers' voluntary choices to leave labor market.

To capture the impact of labor supply factors, we consider the employment-to-nonparticipation flow and the unemployment-to-nonparticipation flow. The first captures voluntarily quits, while the second is often interpreted as a key measure of labor market attachment during recessions. Krusell et al. (2017) provide detailed documentation of the cyclical properties of gross job flows in the United States.⁸

The estimates of the effect of the pandemic on these flows by demographic group are reported in Table 4. Overall, we find that employment-to-unemployment flows rise by 2.9 percentage points in Phase 1 and 1.2 percentage points in Phase 2. Controlling for occupations lowers these values by one-third in Phase 1. These are large changes, as on average monthly employment-to-unemployment flows range between 1.5 and 2 percentage points for men and 1 and 1.5 percentage points for women in 1976–2007 (Albanesi and Şahin 2018).

Women contribute to 65 percent of this rise in Phase 1 and 67 percent in Phase 2, and the female share declines only modestly in Phase 2 with occupation controls, suggesting that the occupation distribution plays a small role in accounting for gender gaps in the change in employment-to-unemployment flows. This can be seen in Figure 5 which reports the gender gaps by family status for this variable. These gaps are substantial for all demographic groups, ranging from 1 percentage point for single without children to 2.2 percentage points for married with children in Phase 1, and from 0.5 percentage points for single without children to 1.1 percentage points for single with children in Phase 2. Controlling for occupation attenuates these gaps by at least one-third for all categories, except for single women with children, in both phases of the pandemic. These results suggest that

⁸The possibility of classification error is an important concern when analyzing gross job flows. Earlier research has found these errors to be sizable for transitions between unemployment and nonparticipation. A standard approach to correct this issue is to adjust the gross flows data using Abowd and Zellner (1985) estimates of misclassification probabilities based on resolved labor force status in reinterviews in the Current Population Survey, as in Elsby, Hobijn, and Şahin (2015). However, given the short time span of our data and the exceptional nature of the labor markets transitions during the pandemic, it is questionable that those corrections accurately capture the extent of misclassification for our sample. For that reason, we do not apply any adjustment.

Table 4
Change in Gross Labor Flows by Demographic Groups

<i>Change since February 2020</i>	<i>EU</i>		<i>UE</i>		<i>EN</i>		<i>UN</i>	
	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 1</i>	<i>Phase 2</i>	<i>Phase 1</i>	<i>Phase 2</i>
Average without occupation controls	2.9	1.2	-0.4	-0.6	0.2	0.1	0.1	0.1
Share women	65.1	66.6	57.6	62.1	68.7	68.0	71.0	61.0
Average with occupation controls	1.8	1.1	-0.4	-0.4	0.2	0.1	0.01	0.04
Share women	66.8	58.5	72.4	86.2	55.4	85.0	120.2	76.2

Source: Authors' calculations based on CPS.

Note: The table reports selected estimates from equation in text for employment-to-unemployment, unemployment-to-employment, employment-to-non-participation and unemployment-to-non-participation. The full set of estimates are reported in the online Appendix. Phases of the pandemic correspond to March to May for Phase 1, June to November for Phase 2. The average effect is obtained by summing the contribution of each demographic group, obtained by multiplying the corresponding estimated effect for each phase of the pandemic with the group's population share in February 2020. The average effect is reported for the specification without and with occupational controls. In each case, "Share women" is the sum of all female contributions divided by the average effect for the specification with occupation controls. Population shares In February 2020 are reported in the online Appendix. All values in percentage.

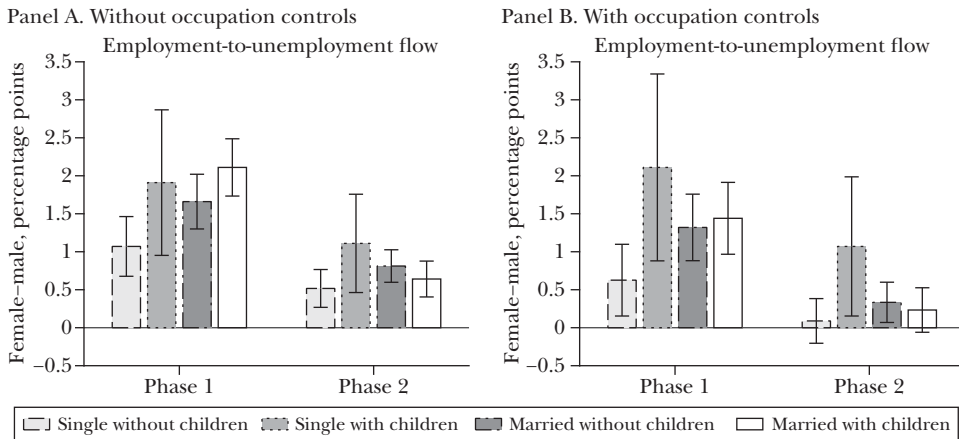
single women with children were disproportionately affected by job losses during the pandemic, beyond the effects associated with their occupation distribution.

Turning to unemployment-to-employment flows, these results show a substantial decline of 0.4 percentage points in Phase 1 and 0.6 percentage points in Phase 2, suggesting that the labor market had not yet reached a recovery phase. Occupational controls reduce the magnitude of the effect of the pandemic, though most of the effects by demographic group and corresponding gender gaps are not statistically significant.

For the flows from employment into nonparticipation, which we interpret as evidence of a supply-side shift in the labor market, we find a substantive rise during the pandemic with sizable gender differences. Employment-to-nonparticipation flows rose 0.2 percentage points in Phase 1, and by 0.1 percentage points in Phase 2, and 68 percent of this change is accounted for by women. This is a very large increase, as the average for these flows have been 0.023 for men and 0.035 for women in recent years (Albanesi and Şahin 2018). Controlling for occupation attenuates this rise only in Phase 1, and in Phase 2 increases the share of the rise accounted for by women. As shown in Figure 6, controlling for occupations, the gender differences in the change in the employment-to-nonparticipation flows are mostly driven by single women with children, for whom the rise is percentage points higher than comparable men in Phase 1 and 0.6 percentage points higher in Phase 2. Married women with children also experience a larger increase in this flow compared to men in the same demographic group in Phase 2. Turning to unemployment-to-nonparticipation flows, we find that there is an average increase of 0.1 percentage points during the pandemic. This rise is disproportionately accounted for by women, controlling for occupation,

Figure 5

Female–Male Difference in Changes in EU Flows since February 2020, Estimated with and without Occupation Controls



Source: Author's calculations from Current Population Survey data, using equation in text.

Notes: See note to Table 4. Error bars denote 90 percent confidence intervals.

with a large and significant gender gap among married workers with children in Phase 2.

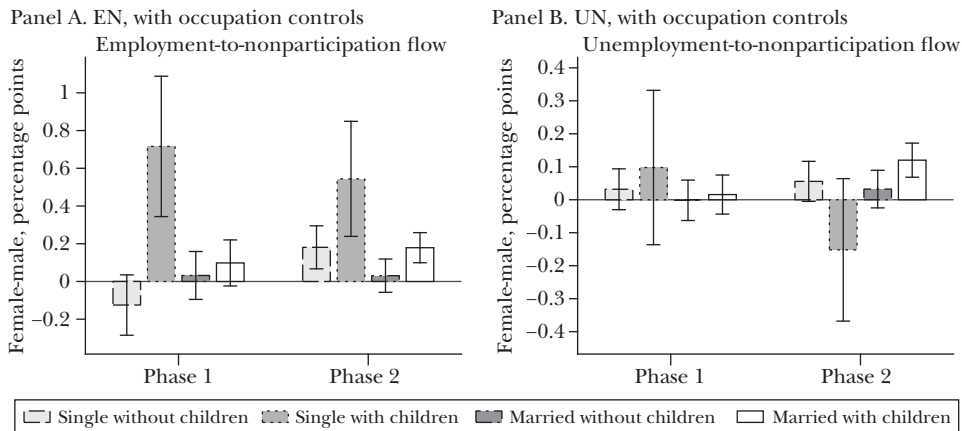
The disproportionate rise in flows into nonparticipation for women during the pandemic is striking, as it follows several decades of continued convergence in these flows across genders (Albanesi and Şahin 2018). Historically, women have exhibited higher employment-to-non-participation flows than men, with most of the difference accounted for by men's higher rate of job-to-job transition, with the gap mostly accounted for by women's tendency to exit the labor force temporarily after the birth of a child (Royalty 1998). However, as women's participation has grown, there has been a decline in their employment-to-nonparticipation transition rates. Additionally, as shown in Ellieroth (2019), these flows tend to fall for married women in recessions. Controlling for occupation, we find that unemployment-to-nonparticipation flows increase more for women, though the only significant gender gap is for married workers with children. It bears noting that historically these flows have been higher for women than for men. However, women's increased labor force attachment (Albanesi and Şahin 2018) has considerably contributed to increasing the average duration of unemployment in the United States since the early 1990s (Abraham and Shimer 2001).

Continuing Impacts

As we look forward to the end of the pandemic, one critical question is whether employment will return to pre-pandemic levels and jobs that were lost during the

Figure 6

Female–Male Difference in Changes in Employment-to-Nonparticipation and Unemployment-to-Nonparticipation Flows since February 2020, Estimated with Occupation Controls



Source: Author's calculations from Current Population Survey data, using equation in the text.

Note: See note to Table 4. Error bars denote 90 percent confidence intervals.

pandemic will be reinstated. Since the 1990–1991 recession, the US economy has experienced “jobless recoveries”—that is, even as GDP and aggregate demand rebound from the trough of the cycle, labor market indicators continue to stagnate and employment struggles to attain pre-recession levels. After the 1990–1991 recession ended in March 1991, for example, it took until February 1993 for employment to reach its pre-recession peak. After the 2001 recession ended in November, employment only reached its pre-recession peak in October 2003. And after the Great Recession in June 2009, it took until May 2014 for total employment to reach its pre-recession peak.

Two main factors appear to be behind this phenomenon. First, Albanesi (2019) argues that the subdued behavior of employment during recoveries since the 1990s is driven by the flattening of female labor force participation. Recoveries before the 1990s have commonly been jobless for men, but as long as female labor force participation was rising briskly, female employment tended to grow very rapidly in recoveries. But as the rise in female participation slowed in the 1990s, the rate of growth of women's employment during recoveries has been similar to men's in the recessions since 1990–1991. If the recovery from the pandemic is associated with a rebound of female participation to pre-pandemic levels, the rebound in aggregate employment may be faster compared to recent cycles.

However, a second explanation for jobless recoveries points in the opposite direction. The hypothesis is that the slow and incomplete rebound of aggregate

employment is due to structural change leading to a long-run decline in certain areas like manufacturing employment (Groschen and Potter 2003) and routine jobs (Jaimovich and Siu 2020). The job losses associated with these slow-moving trends are concentrated in recessions, but then as the economy recovers, those jobs are not reinstated. This phenomenon affects primarily middle-skill jobs, which are particularly cyclical (Foote and Ryan 2015), and is a key mechanism through which the trend toward job polarization (Acemoglu and Autor 2011) has affected business cycles.

As we have argued, the pandemic has affected service occupations that in the past have seemed less amenable to automation. However, the pandemic has also given employers an additional incentive to embrace automation, an ongoing risk of infection that is expected to persist, as long as a substantial fraction of the world population remain susceptible to the coronavirus. Machines and software will not fall ill. Are jobs that were lost during the pandemic recession more or less susceptible to automation?

One way to measure the susceptibility to automation by occupation is Routine Task-Intensity (RTI), an index developed in Autor and Dorn (2013) that calculates the routine, manual, and abstract task inputs in each occupation based on job task requirements from the Dictionary of Occupational Titles (DOT). Higher values of RTI correspond to higher susceptibility to automation. Earlier in this paper we focused on four main categories of occupations. We looked at the share of occupations in each group with above median RTI and the share of pre-pandemic employment accounted for by these occupations, and show some results in Table 5.⁹

For inflexible/low-contact occupations, the most exposed to standard recessions, 22 percent of workers are employed in high-RTI jobs. For the inflexible/high-contact occupations, the category most affected by the pandemic, 34 percent of workers are employed in high-RTI positions. The most automatable occupational category with 49 percent of employed in high-RTI jobs is the flexible/low-contact, as it includes Office and Administrative and Sales and Related occupations, which are cognitive and routine. The least automatable group of occupations is flexible/high-contact, comprised of Education, Training and Library occupations. Only 0.2 percent of workers are in highly automatable jobs in this category. These findings suggest that even healthcare and personal service occupations are susceptible to automation, leaving open the possibility that employment losses in those occupations may not be fully reversed as the broader economy recovers from the pandemic.

Finally, women's employment losses from the pandemic may have longer-term effects. In the past, mothers who leave the labor force temporarily to take care of children have experienced substantial losses to wages and lifetime earnings. Adda,

⁹For details of the calculations presented here, see the online Appendix. RTI is defined as $\log(\text{routine task input}) - \log(\text{abstract task input}) - \log(\text{manual task input})$. Some occupations do not have an RTI score. For the categories used in Table 5 in the text, the fraction of workers without an RTI score is 2 percent for flexible/low-contact, 8 percent for inflexible/high-contact occupations, and 6 percent for inflexible/low-contact occupations

Table 5
Susceptibility to Automation by Occupation

<i>Occupation</i>	<i>Percent employed in High-RTI</i>
Flexible, High-contact	0.2
Flexible, Low-contact	49.0
Inflexible, High-contact	34.3
Inflexible, Low-contact	22.0

Source: Authors' calculations based on Autor and Dorn (2013).

Note: All values in percentage.

Dustmann, and Stevens (2017) estimate that the component of the child penalty associated with “atrophy” during spells of nonparticipation, due to human capital depreciation or skill obsolescence, accounts for 13 percent of the overall gender wage gap. Additionally, employer investments in human capital and the career paths offered to women are affected by the expectation of career interruptions (Albanesi and Olivetti 2009). After many decades of increasing labor market attachment for women (Goldin 2006)—although that rise leveled out in the 1990s and has seen a small decline since then—the reduction in mothers’ labor supply associated with the pandemic may reverse the slow progress made in this area.

Such effects will also interact with the extent to which remote work continues after the pandemic. Lack of flexibility has long been seen as a barrier to women’s career advancement (Goldin 2014; Cortes and Pan 2019), and increased ability to work remotely, which is expected to continue after the pandemic when child care needs are normalized, may benefit women. Alon et al. (2020) conjecture that the rise in remote work may help women, as it may increase sharing of child care responsibilities with fathers now working remotely. However, the rise in mothers’ nonparticipation during the pandemic suggests that, in the aggregate, this is unlikely to play a large role. In addition, even as remote work has grown for most classes of workers during the pandemic, it has increased considerably more for women (Bick, Blandin, and Mertens 2020). If it is mostly women who continue to take advantage of remote work arrangements, they may be stigmatized and miss out on career advancement opportunities, particularly in highly competitive professional and managerial occupations.

■ *We are grateful to Nicholas Fleming for excellent research assistance.*

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