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Searching for the Cause of the Gender Gap in Employment Losses during the COVID-19 Crisis†

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The recession caused by the COVID-19 crisis has features that could disproportionately harm female employment. Risk of infection and social distancing measures may have disrupted jobs in face-to-face industries, which have traditionally hired more women than men. School closures and a consequent increase in childcare and homeschooling demands may have discouraged labor market participation by working mothers. Using the Economically Active Population Survey, I examine how female employment was affected by each factor. I find that the gender gap in the Employment to Non-participation (E to N) transition rates is twice as large as the gap in the Employment to Unemployment (E to U) transition rates. Women's overrepresentation in the face-to-face industries accounts for most of the gap in the E to U transition but only a third of the gap in the E to N transition. The rise in non-participation is especially pronounced among married women aged 39-44, the group most likely to have elementary-school-age children.

Key Word: COVID-19, Employment Losses, Gender Gap
JEL Code: E24, J2, J16, J21, J23

I. Introduction

The recession in 2020 caused by COVID-19 is unprecedented in many ways. In this paper, I explore one of the unique features of the pandemic recession: its disproportionate impact on female employment. It has been well documented that women, especially married women, have a lower cyclicality of employment than men (Albanesi, 2019). This is explained to some extent by a high share of female employees in jobs that are less sensitive to business cycles, such as service occupations (Albanesi and Sahin, 2018). Married women's tendency to stay employed in economic downturns in response to the increased risk of spousal job

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loss also plays a role (Ellieroth, 2019). Consequently, we usually observe a larger drop in male employment during recessions.

During the COVID-19 recession, however, a different pattern emerged. Figure 1 describes employment losses for men and women throughout the year 2020 in comparison with the 1998 recession. With year fixed effects and seasonality controlled for, the employment-to-population ratio for married women dropped much more than that for married men in March, when the number of confirmed cases of COVID-19 spiked for the first time. The difference becomes more striking considering the lower reference employment rate for married women.[1] The gap narrowed as female employment recovered more rapidly in the lull periods but

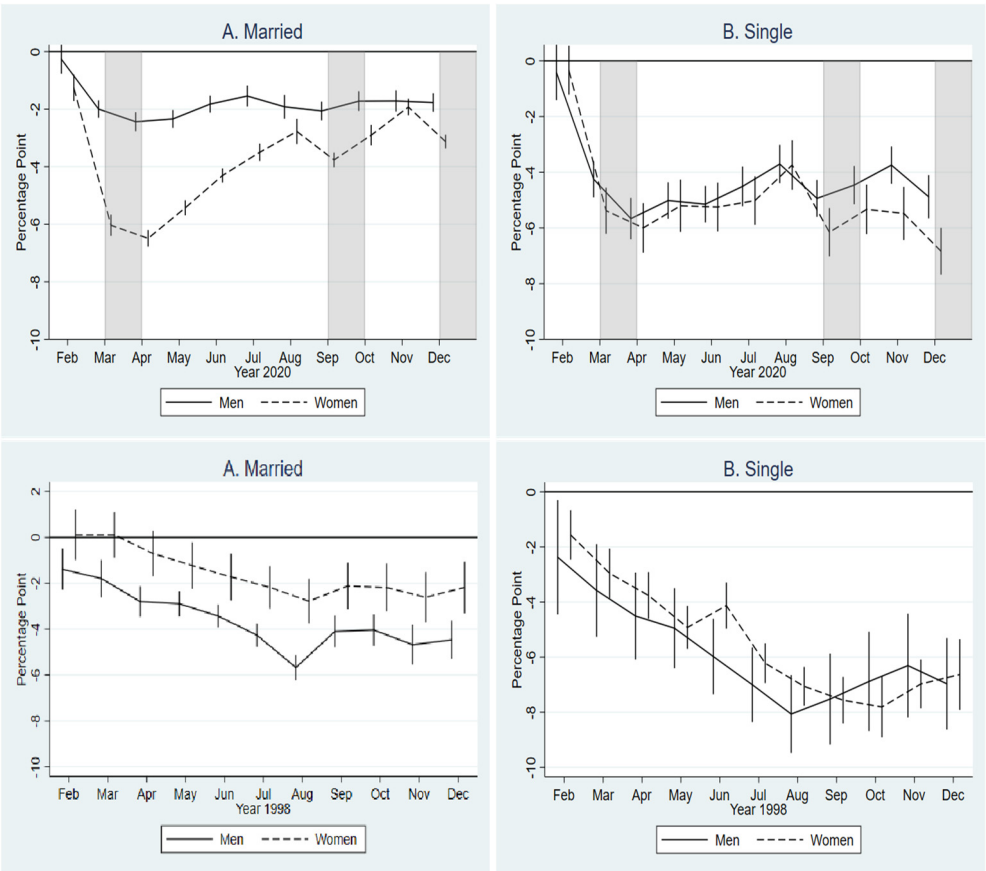

FIGURE 1. EMPLOYMENT RATES: 2020 VS 1998

Note: 1) The figure compares the 2020 and 1998 recessions in terms of their impact on employment by gender and marital status, 2) The upper (lower) figures plot changes in the share of employed individuals aged 25-54 throughout the year 2020 (1998) compared to January 2020, 3) Seasonality and year fixed effects are controlled for, 4) Error bars denote 95% confidence intervals, 5) The shaded areas indicate the periods when the first, second, and third waves of infections hit.

Source: Economically Active Population Survey, 2013-2020.

[1]The employment rate for married women in January of 2020 was 58 percent, whereas the rate for men was 94 percent. Married women lost 11 percent of employment between January of 2020 and March of 2020, while married men lost about three percent during the same period.

started to widen again with the start of the third wave of infections in December of 2020. No significant gender differences were observed between single men and women at least in the first half of the year, but the gap began to broaden starting with the second wave in September of that year. This pattern is in sharp contrast to the 1998 recession, in which men experienced a greater drop in the employment-to-population ratio than women.

The reason COVID-19 took a greater toll on female employment, unlike in previous recessions, appears to be twofold. One factor is related to the types of jobs the pandemic hit. The risk of infection and social distancing measures imposed to curb the transmission of the virus mainly disrupted jobs in the services industries. Women were more affected by this disruption because they are overrepresented in such jobs. Another important factor is the increased need for childcare at home caused by school closures. Given that it is commonly the mother who is in charge of childcare in the household, when children spend more time at home, it becomes difficult for working mothers to stay in the labor market.

In this paper, I examine both possibilities. I first document the heterogeneous impact of COVID-19 across different jobs along with the share of men and women employed. I find that jobs with a high share of female employees are most affected by the pandemic. To ascertain if this is the main reason women fared much worse than men, I explore gender differences in the outflows from employment using the individual-level data. I find that the transition from employment to non-employment (E to NE) for married women rose by an additional two percentage points from its pre-pandemic level of 1.9 percentage points compared to married men in the first wave of the pandemic. Controlling for job characteristics such as occupations, industries, and worker arrangements mitigates the gender differences, but a statistically significant gap of 0.9 percentage points remains. Decomposing the E to NE transition into the employment to unemployment (E to U) and the employment to non-participation (E to N) transition, I find that the gender gap in the E to N transition is more than twice as large as the gap in the E to U transition. Moreover, job characteristics explain most of the gap in the E to U transition but only half of the gap in the E to N transition.

The aforementioned results imply that a sizable gender difference unexplained by women's concentration in service jobs exists in labor supply behavior in response to the pandemic. As likely as it seems to be associated with added childcare responsibilities at home, it is not possible to obtain direct evidence of this due to data restrictions. Instead, I use workers' marital status and age as a proxy for having children. The largest gender gap in the E to N transition is observed among married women aged 39-44, the group most likely to have elementary school age children. Women in this group were 1.4 percentage points more likely to leave the labor force than men during the first wave of infections taking all job characteristics into account. In the other age groups, gender disparities do not exist or are mostly explained by gender differences in the job characteristics. The heterogeneity observed among parents may reflect a disproportionate increase in the childcare burden according to children's ages during the pandemic. Older children do not need as much supervision from parents. Families of preschool children who most likely need parental care the most were provided intensive governmental support such as emergency childcare services and extra child benefits. The fact that mothers of

children between these age groups were most likely to drop out of the labor force during the COVID-19 crisis suggests that increased childcare needs played a sizable role in the excess drop in female employment. Since the start of the pandemic, a large body of work has examined its economic consequences from various angles. A number of papers[2] are concerned with gender differences in the labor market impact of the pandemic. Most of them focus on occupational distributions, emphasizing that female-dominated jobs tend to require employees to work in a close physical proximity to other people and are difficult to be conducted remotely, which makes them especially vulnerable to the COVID-19 shock. A few studies state that female-dominated jobs' excessive exposure to COVID-19 does not explain all of the gender disparities. Cajner *et al.* (2020) finds that even within detailed industries, women experience larger job declines than men. Adams-Prassl *et al.* (2020) point out that the gender gap persists even with job characteristics controlled for. Alon *et al.* (2020b) stress that men and women's different labor supply responses to school closures make an additional contribution to women's incremental employment losses. Albanesi and Kim (2021) show that the gender gap in employment losses is larger among parents than non-parents and that differential occupation declines do not fully account for the sharp increase in non-participation among mothers. Despite growing interest in the topic, evidence from non-US countries is still scarce.

This paper aims to fill this gap by providing evidence from the Korean labor market.

The paper is structured as follows. Section 2 documents the distributional impacts of COVID-19 across job characteristics and the share of female employees. Section 3 describes the data and methodology used in the paper. Section 4 examines the individual-level data and investigates the gender-related impact of the COVID-19 recession on outflows from employment. Section 5 discusses COVID-19's long-run implications for female employment.

II. Heterogeneous Impacts of COVID-19

Recessions in general do not affect everyone equally. This unequal impact of recessions is even more pronounced during the COVID-19 crisis. The COVID-19 recession was caused by a health crisis. The risk of infection and the ensuing social distancing measures disrupted activities that involve physical contact with other people, resulting in large employment losses in the service industries. On the other hand, jobs that can be performed at workers' home were affected less. This section documents the heterogeneous impacts of the COVID-19 recession across industries, occupations, and work arrangements.

Table 1 reports the changes in employment rates by industry during the pandemic. The Pre-COVID column reports the industry-specific employment rates in January of 2020. The industry-specific employment rates are defined as the number of individuals employed in each industry divided by the total population aged 25-54. The next four columns report the drop in the employment rate for each industry in

[2]Among others, Albanesi and Kim (2021); Mongey *et al.* (2020); Cortes and Forsythe (2020); Alon *et al.* (2020b); Cajner *et al.* (2020); Adams-Prassl *et al.* (2020).

TABLE 1—EMPLOYMENT IMPACTS OF COVID-19 BY INDUSTRY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Industry	Pre-COVID (%)	Mar (%p)	Apr (%p)	Sep (%p)	Dec (%p)	Emp. women (%)	Emp. men (%)	F. share (%)
Education	5.5	-1.703	-1.480	-1.009	-1.071	12	4	68
Accommodation and food service activities	5.4	-0.650	-0.766	-0.871	-0.830	10	6	54
Human health and social work activities	6.2	-0.438	-0.503	-0.419	-0.404	16	3	81
Arts, sports and recreation related services	1.4	-0.284	-0.276	-0.170	-0.356	2	2	45
Membership organizations, repair and other personal services	3.3	-0.210	-0.329	-0.225	-0.359	5	4	47
Wholesale and retail trade	10.4	-0.208	-0.125	-0.343	-0.342	15	13	44
Business facilities management and business support services	3.2	-0.204	-0.284	-0.058	-0.065	4	4	41
Professional, scientific and technical activities	4.1	-0.195	-0.154	-0.124	-0.004	5	6	35
Manufacturing	14.2	-0.162	-0.453	-0.286	-0.343	13	23	27
Transportation and storage	3.7	-0.110	-0.210	-0.184	0.023	2	7	15
Real estate activities	1.3	-0.097	-0.159	-0.243	-0.269	2	2	44
Construction	5.5	-0.082	-0.258	-0.120	-0.128	2	11	12
Financial and insurance activities	2.7	-0.081	-0.056	-0.032	-0.074	5	3	54
Information and communication	3.2	-0.078	-0.052	-0.089	-0.060	3	5	28
Agriculture, forestry and fishing	1.1	-0.048	-0.123	-0.106	0.028	1	2	30
Electricity, gas, steam and air conditioning supply	0.2	-0.017	-0.044	0.001	-0.008	0	0	15
Activities of extraterritorial organizations and bodies	0.0	-0.003	-0.014	-0.005	0.001	0	0	32
Mining and quarrying	0.0	-0.002	-0.005	-0.012	-0.003	0	0	23
Water supply; sewage, waste management, materials recovery	0.4	0.006	-0.001	-0.022	0.023	0	1	12
Public administration and defense	2.8	0.047	0.067	0.188	0.328	3	4	35
Total	74.6	-4.5	-5.2	-4.1	-3.9	100	100	41

Note: 1) This table presents the changes in the employment rate by industries throughout the year 2020, 2) The industry-specific employment rate is computed as the ratio of workers employed in a given industry to the total 25-54 population, 3) The *Pre-pandemic* column reports the industry-specific employment rates in January of 2020, 4) *Emp. women (men)* is the percent of women employed in the given industry as a share of all employed women (men), 5) *F. share* denotes the share of female employees, 6) Industries are ranked from the most affected by COVID-19 to the least affected based on the declines in the corresponding employment rates in March of 2020, 7) Year and month fixed effects are excluded.

Source: Economically Active Population Survey, 2013-2020.

March, April, September, and December, the months associated with high numbers of confirmed cases. The year fixed effects and seasonality are controlled for. The remaining columns describe the distribution of workers by gender across industries. The Emp. women (men) column reports the percentage of women (men) employed in each industry as a share of all employed women (men). The F. share column presents the share of female employees for each industry.

The impacts of COVID-19 vary considerably by industry. The education industry shows the largest decline. In March of 2020, the employment rate of the education industry dropped by nearly two percentage points from its pre-pandemic level of 5.5 percent. At the end of the year, it remained nearly one percentage point lower than its pre-pandemic level. Accommodation and food service activities are the second worst affected, hitting a low in April of that year with a decline of 0.8 percentage points from 5.4 percent in January. Human health and social work activities are the third worst-hit industry, exhibiting a 0.5 percentage point drop in April from the corresponding January level of 6.2 percent. Table 1 also reports the pre-pandemic distribution of men and women across industries. More than a third of employed women were working in one of the three most affected industries. Twelve percent of women as opposed to four percent for men were employed in the education industry. The female share in the education industry is around 68 percent. Accommodation and food service activities (54 percent) and human health and social work activities (81 percent) also exhibit a high share of female employees

A similar pattern is observed in the analysis of occupations. The employment rate dropped the most among professional occupations, in which 30 percent of women and 23 percent of men are employed. Service occupations and clerical occupations, the second and third worst hit, are female-dominated as well, accounting for about 40 percent of female employment. More than two-thirds of those in the female workforce belong to one of the three most affected occupation groups. Among the least affected occupations are managers, skilled agricultural workers, forestry and fishery workers, and equipment, machine operating and assembly workers. These occupations account for 20 percent of male employment but only five percent of female employment.

With regard to work arrangements, the majority of the workforce, 61 percent of women and 66 percent of men, were employed full-time before the pandemic struck. The employment rate for full-time workers dropped by around two percentage points in April of 2020 from the pre-pandemic level of 47.8 percent and has remained low since. Women are disproportionately employed as part-time workers. Nineteen percent of women worked part-time pre-pandemic while only nine percent of men were classified as part-time workers. The employment rate for part-time workers declined by 1.6 percentage points in April from the corresponding pre-pandemic level of 9.8 percent. Part-time workers account for approximately 30 percent of the average employment losses in the year, much larger than their share in the workforce, at 13 percent.

The results thus far suggest that there are indeed considerable differences in employment losses caused by COVID-19 across different types of jobs and that women are more likely to be employed in jobs that experienced larger declines. The rest of the paper is devoted to understanding to what extent these differences in job characteristics account for the gender gap in the economic fallout of COVID-19.

TABLE 2—EMPLOYMENT IMPACTS OF COVID-19 BY OCCUPATION

(1) Occupation	(2) Pre-COVID (%)	(3) Mar (%p)	(4) Apr (%p)	(5) Sep (%p)	(6) Dec (%p)	(7) Emp. Women (%)	(8) Emp. Men (%)	(9) F. share (%)
Professionals and Related Workers	19.3	-2.108	-2.101	-1.639	-1.566	30	23	48
Service Workers	7.5	-0.926	-1.117	-1.122	-1.236	14	7	58
Clerks	16.5	-0.439	-0.461	-0.606	-0.392	27	19	50
Sales Workers	8.2	-0.355	-0.238	-0.246	-0.355	13	10	47
Craft and Related Trades Workers	6.7	-0.254	-0.511	-0.384	-0.359	2	14	10
Elementary Workers	6.1	-0.188	-0.348	0.253	0.199	9	8	44
Equipment, Machine Operating and Assembling Workers	8.3	-0.185	-0.307	-0.269	-0.237	4	16	13
Skilled Agricultural, Forestry and Fishery Workers	1.1	-0.07	-0.169	-0.151	0.006	1	2	26
Managers	1.0	0.003	0.027	0.07	0.054	0	2	15
Total	74.6	-4.5	-5.2	-4.1	-3.9	100	100	41

Note: 1) This table presents the changes in the employment rate by occupations throughout the year 2020, 2) The occupation-specific employment rate is computed as the ratio of workers employed in a given occupation to the total 25-54 population, 3) The *Pre-pandemic* column reports the occupation-specific employment rates in January of 2020, 4) *Emp. women (men)* is the percent of women employed in the given occupation as a share of all employed women (men), 5) *F. share* denotes the share of female employees, 6) Occupations are ranked from the most affected by COVID-19 to the least affected based on the declines in the corresponding employment rates in March of 2020, 7) Year and month fixed effects are excluded.

Source: Economically Active Population Survey, 2013-2020.

TABLE 3—EMPLOYMENT IMPACTS OF COVID-19 BY WORK ARRANGEMENT

(1) Worker type	(2) Pre-COVID (%)	(3) Mar (%p)	(4) Apr (%p)	(5) Sep (%p)	(6) Dec (%p)	(7) Emp. Women (%)	(8) Emp. Men (%)	(9) F. share (%)
Full-time employee	47.8	-1.59	-2.239	-2.18	-2.097	61	66	39
Part-time employee	9.8	-1.509	-1.574	-1.1	-0.898	19	9	60
Self-employed w/o employees	8.4	-0.756	-0.579	-0.181	-0.103	9	13	33
Self-employed w/ employees	4.1	-0.432	-0.414	-0.419	-0.363	4	7	27
Unpaid family worker	2.0	-0.133	-0.156	-0.168	-0.145	5	1	82
Day-to-day worker	2.6	-0.104	-0.264	-0.045	-0.281	2	4	28
Total	74.6	-4.5	-5.2	-4.1	-3.9	100	100	41

Note: 1) This table presents the changes in the employment rate by worker classes throughout the year 2020, 2) The class-specific employment rate is computed as the ratio of workers employed as a given status to the total population aged 25-54, 3) The *Pre-pandemic* column reports the class-specific employment rates in January of 2020, 4) *Emp. women (men)* is the percent of women who belong to the given class as a share of all employed women (men), 5) *F. share* denotes the share of female employees for each work arrangement, 6) Worker types are ranked from the most affected by COVID-19 to the least affected based on the decline of employment rates in March of 2020, 7) Year and month fixed effects are excluded.

Source: Economically Active Population Survey, 2013-2020.

III. Data and Methodology

I use monthly data from the Economically Active Population Survey between January of 2013 and December of 2020. The EAPS provides a rich set of information ranging from basic demographics to various labor market characteristics at the individual level. For the employed, the survey provides current job characteristics, such as occupations, industries, and work arrangements (full-time, part-time, or self-employed). For those who are not employed, the characteristics of the most recent job are available. The analysis focuses on the prime-age group (aged 25-54). Each respondent belongs to one of the three labor market statuses: employment, unemployment, and non-participation. Those who have a job but are temporarily laid off are classified as unemployed.

The availability of longitudinal data at the individual level is crucial when investigating transitions of labor market statuses. Although the EAPS surveys the same respondent for 36 consecutive months, it is not possible to utilize its panel structure due to the unavailability of individual identifiers. Instead, the survey provides the year and month of job separation (whether they quit or were laid off) for individuals who are currently not employed. Based on this information, I compare the time of job separation to the survey time. If a respondent's job separation time is within a month from the survey time t, I conclude that she made an employment to non-employment transition in time t.

Figure 2 displays the aggregate outflows of different demographic groups from employment throughout the year 2020. The flows are expressed as a share of the labor force in each demographic group. Women, especially married women, experienced a sharper increase in the outflow rates during the first and the second waves of infections compared to their male counterparts. In the periods between, the outflow rates for married women were lower than for married men. This could be a reverse rebound effect after the considerable outflows in March and September. The survey also provides the job start time for the employed, which can be used to analyze the inflow rates into employment. The changes in the employment inflow rates can measure the speed at which the economy recovers in periods of low infection rates. However, the job start time is not available for the self-employed, who account for 18 percent of the total employment. Especially considering the nontrivial share of self-employed workers in the service industries (30 percent), where the COVID shock is concentrated, significant bias could be generated in the analysis. For this reason, I only focus on the outflow from employment in this study.[3]

[3]Although the individual job start time is not available for all workers, it is possible to obtain the aggregate inflows into employment using the following equation:

$$NEE_t = \Delta E_t - ENE_t$$

where NEE_t is the number of newly employed workers in time t, ΔE_t denotes the changes in employment between t and $t-1$, ENE_t is the number of newly separated workers obtained from the job separation time information. Figure A1 in the Appendix plots the aggregate pattern of the inflows in the year 2020 for different demographic groups. The inflows dropped more for married women than for married men in all three waves of infections. In the periods between the waves, there are no significant gender differences. For those who are single, men and women experienced nearly identical declines in the inflows in all three waves. However, in the periods of low infections, the inflows for women recovered more rapidly than those for men.

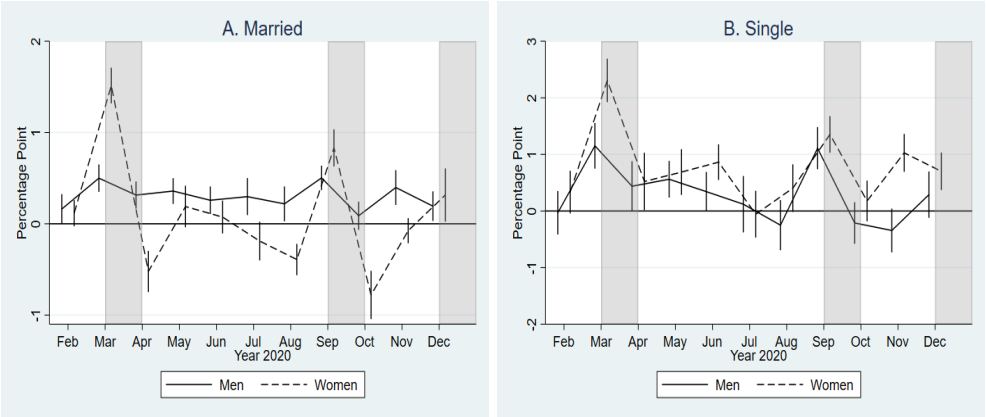

FIGURE 2. OUTFLOW RATES FROM EMPLOYMENT

Note: 1) The figure plots changes in the percent of individuals aged 25-54 who exit employment to non-employment as a share of the labor force throughout the year 2020, compared to January 2020, 2) Seasonality and year fixed effects are controlled for. 3) Error bars denote 95% confidence intervals, 4) The shaded areas denote the periods when the first, second, and third waves of infections hit.

Source: Economically Active Population Survey, 2013-2020.

The main specification is as follows:

$$Y_{it} = \alpha + \beta Female_i + \gamma Covid_t + \delta Covid_t \times Female_i + \rho X_{it} + \eta Covid_t \times X_{it} + \omega Year_t + \psi Month_t + \varepsilon_{it} \quad (1)$$

The dependent variable Y_{it} is equal to one for individuals who make a transition from employment to non-employment between time $t-1$ and t, and zero otherwise. I regress this on the female indicator (denoted as $Female_i$), the COVID-19 indicator (denoted as $Covid_i$), which is a vector of the time dummies from February of 2020 through December of 2020, and the interaction between the female indicator and the COVID-19 indicator. The vector γ captures the impact of the pandemic recession on men's employment in each month of the pandemic year. δ, the gender difference, is a vector capturing the extra impact of the pandemic on women's employment during each pandemic month. The vector X_{it} includes a set of additional control variables regarding various job characteristics. To control for the disproportionate impact across different job types, a well-documented feature of the COVID-19 recession, I include occupation, industry, and work arrangement fixed effects as well as their interactions with the COVID-19 indicator. If most gender differences in the pandemic's impact stem from high shares of women in hard-hit jobs, an estimate of δ will not be different from zero. Year and month dummies are included as well to control for year specific effects and seasonality.

IV. Results

Table 4 reports $\hat{\delta}$ for those who are married, estimated using the linear probability

model. Each column represents a different specification. Column (1) contains no additional controls other than year and month dummies. Columns (2), (3), and (4) include occupation, industry, and work arrangement fixed effects as well as their interactions with the COVID-19 indicator. Column (5) reports the most restrictive specification with all sets of controls included.

All specifications include year and month fixed effects. In March of 2020, when the country experienced the first spike of confirmed cases of COVID-19, women were two percentage points more likely to leave employment than men. As more control variables are considered, the size of the coefficients is reduced. When all controls are included, the coefficient is reduced to 0.9 percentage points, suggesting that occupation, industry, and work arrangement distribution together account for about half of the gender differences in the impact of COVID. Occupation and work arrangement alone do not explain the gender gap very much, whereas controlling for industry alone narrows the gap by a third. This implies that the difference in the industry distribution between men and women is the key to understanding the pandemic's uneven impact across gender. I do not observe gender differences in the second (September) and third (December) wave. The results for those who are single are in marked contrast to those who are married. Unlike married individuals, no gender differences are observed among single individuals, even in the version with no controls. The regression results for singles are relegated to the Appendix.

There are two working hypotheses on why the COVID-19 pandemic extracted a greater toll on female employment. One is the labor demand story. Service jobs traditionally have employed more women than men. Given that the pandemic hit those jobs harder, it is no surprise that more women lost their jobs. The other hypothesis concerns labor supply factors. As schools and nurseries closed, mothers with an increased childcare burden may have chosen to exit the labor force to take

TABLE 4—GENDER DIFFERENCES IN THE EMPLOYMENT TO NON-EMPLOYMENT TRANSITION RATES

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.020***	0.019***	0.013***	0.020***	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
2nd Wave * Female	-0.000	0.001	-0.001	0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
3rd Wave * Female	0.002	0.003	0.005	-0.002	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	1,421,439	1,421,439	1,421,439	1,421,439	1,421,439
R-squared	0.007	0.013	0.011	0.068	0.070
P.C.P	0.982	0.982	0.982	0.982	0.982

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent left employment within the past month, 3) The sample is restricted to those who are married, 4) The corresponding results for single individuals can be found in Table A1 in the Appendix, 5) OLS regressions. Robust standard errors in parentheses. P.C.P: percent correctly predicted. *** p<0.01, ** p<0.05, * p<0.1. Full regression results are available on request.

care of their children. In an attempt to isolate the role of labor demand and supply factors, I estimate the same specification for the employment to unemployment (E to U) and the employment to non-participation (E to N) transition. The E to U flow measures the rate at which employed individuals lose their jobs. The E to N flow captures voluntary job separations as well as discouraged workers. The former shows very good agreement with the labor demand factors, while the latter reflects workers' labor supply decisions.

Table 5 reports the gender gap in the E to U flows throughout the year 2020. There exists a significant gender gap of 0.6 percentage points in March, which becomes insignificant once industries are controlled for. Table 6 presents the results for the E to N flows. Around the first wave in March, the gap is more than twice as large as the gap observed from the E to U flows. Married women are 1.5 percentage points more likely to leave the labor force than married men. Controlling for industries narrows the gap by a third. However, unlike the case for the E to U flows, a significant gap of one percentage point remains. This marks a large increase given that the pre-pandemic E to N flow rates for married women is around three percent. In the most restrictive specification where not only industry but also occupation and work arrangement controls are included, the gap in March is reduced to one half but remains significant at the 10% significance level.

To summarize, the empirical evidence suggests that (1) the changes in the E to N flows contributed more to the larger drop in female employment in the first wave of infections, (2) the concentration of women in service industries explains most of the gender gap in the E to U flows but not entirely the E to N flows.

The increase in the E to N flows for married women is a unique feature that has not been seen in previous recessions. Female employment usually shows lower cyclicality than that for males (Albanesi, 2019). Analyzing pre-pandemic periods,

TABLE 5—GENDER DIFFERENCES IN THE EMPLOYMENT TO UNEMPLOYMENT TRANSITION RATES

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.006***	0.006***	0.003	0.007***	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
2nd Wave 2020 * Female	-0.000	-0.001	0.000	-0.000	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
3rd Wave 2020 * Female	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	1,402,185	1,402,185	1,402,185	1,402,185	1,402,185
R-squared	0.000	0.002	0.002	0.025	0.026
P.C.P	0.995	0.995	0.995	0.995	0.995

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent made an employment-unemployment transition within the past month, 3) The sample is restricted to those who are married. The corresponding results for single individuals can be found in Table A2 in the Appendix, 5) OLS regressions. Robust standard errors in parentheses. P.C.P: percent correctly predicted. *** p<0.01, ** p<0.05, * p<0.1. Full regression results are available on request.

TABLE 6—GENDER DIFFERENCES IN THE EMPLOYMENT TO NON-PARTICIPATION TRANSITION RATES

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.015***	0.013***	0.010***	0.013***	0.007*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
2nd Wave * Female	0.000	0.001	-0.002	0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
3rd Wave * Female	0.001	0.002	0.003	-0.002	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	1,414,972	1,414,972	1,414,972	1,414,972	1,414,972
R-squared	0.008	0.013	0.012	0.054	0.056
P.C.P	0.986	0.986	0.986	0.986	0.986

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent made an employment to non-participation transition within the past month, 3) The sample is restricted to those who are married, 4) The corresponding results for single individuals can be found in Table A3 in the Appendix, 5) OLS regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Ellieroth (2019) shows that married women's lower cyclicality is accounted for by their precautionary labor supply behavior, by which married women tend to be more attached to employment in economic downturns to compensate for their husbands' increased unemployment risks. For this reason, the E to N flows for married women decrease in recessions.

Which aspect of the COVID-19 recession causes married women to behave differently from other recessions? One possibility is the increased burden of childcare. In the spring of 2020, as the number of confirmed cases of the coronavirus continued to increase, schools throughout the country, ranging from day care centers to high-schools, were mandated to postpone the start of the spring semester. Schools were not allowed to open for in-person learning until the end of May. Most schools re-opened in June, but many students started going to school only part of the week as schools attempted to limit the number of students per classroom. This nationwide school closure heightened the need for parents to supervise and take care of their children at home. Because mothers commonly take more childcare responsibilities than fathers even in two-earner households,[4] school closures caused by the pandemic may have driven more mothers out of the labor market than fathers.

The ideal way to examine this hypothesis is to determine whether mothers experienced larger employment losses compared to women who do not have children. Unfortunately, the EAPS does not provide information about whether the respondents have children, let alone the children's ages. As an alternative, I use individuals' marital status and ages as a proxy for having children. The average age of mothers at their child's birth in the 2010s is around 32 years old.[5] Based on this

[4]According to 2019 time use survey, the wife spends three times as much time on housework as the husband in dual-earner households.

[5]Vital Statistics, 2010-2019.

TABLE 7—GENDER DIFFERENCES IN THE EMPLOYMENT TO NON-PARTICIPATION TRANSITION RATES BY AGE

	Aged 25-31		Aged 32-38		Aged 39-44		Aged 45-54	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st Wave * Female	-0.012	-0.009	0.020**	0.011	0.028***	0.014*	0.010**	0.002
	(0.016)	(0.019)	(0.009)	(0.008)	(0.008)	(0.008)	(0.004)	(0.004)
2nd Wave * Female	-0.039**	-0.048***	0.009	0.010	-0.001	-0.000	0.003	-0.001
	(0.016)	(0.018)	(0.008)	(0.009)	(0.005)	(0.005)	(0.004)	(0.004)
3rd Wave * Female	-0.015	-0.008	-0.003	0.001	-0.004	-0.010**	0.007*	0.004
	(0.016)	(0.018)	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.005)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes		Yes		Yes		Yes
Industry Fixed Effects		Yes		Yes		Yes		Yes
Worker Type Fixed Effects		Yes		Yes		Yes		Yes
Observations	71,341	71,341	285,624	285,624	368,095	368,095	689,912	689,912
R-squared	0.013	0.053	0.012	0.048	0.009	0.054	0.006	0.069
P.C.P	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978

Note: 1) The table reports δ from equation (1), 2) The regressions are done separately for each age group, 3) The dependent variable is a binary variable for whether a respondent made an employment to non-participation transition within the past month, 4) The sample is restricted to those who are married, 5) OLS regressions. Robust standard errors in parentheses. P.C.P: percent correctly predicted. *** p<0.01, ** p<0.05, * p<0.1.

information, I divide married individuals into four age groups. The youngest group (32 and younger) is assumed to have no children. Those who are assumed to have children are further divided into parents of younger children (under 6 years old), elementary school age children (7-12 years old), and adolescents (above 12 years old). Table 7 reports the estimates of the E to N transition for each age group. Those aged 39-44, who are most likely to be parents of children in elementary school, show the largest gender gap in the E to N flows around the first wave. With all work characteristics controlled for, married women in this age group have a 1.4 percentage point higher E to N transition rate than their male counterparts. In contrast, the results for those who do not have children show a negative and non-significant gender gap. Among the parents of children under 7 and above 12, there exists a gender gap of 1-2 percentage points, but those gaps are gone once controls for work characteristics are included. The higher rate of voluntary job separation for married women aged 39-44 is not observed among single women about the same age. Table A4 in the Appendix shows that regardless of age, there are no prominent differences in the E to N transition around the first wave between single men and women. The results in Table 7 and the fact that this pattern cannot be found among single individuals are indirect evidence supporting that added difficulties related to child supervision led to a high E to N transition among married women during the COVID-19 recession.

Why is there heterogeneity even among parents? Although school closures affected most households with young children, there is heterogeneity according to children's ages in the extent to which households were affected by this situation. First, older children who go to junior high or high schools need much less supervision from parents than younger children. In addition, the details of the government programs introduced to support working parents during the crisis varied depending on the children's ages. There is some evidence that these programs mainly

benefited families of children under 7. From March through May of 2020, the government provided emergency childcare services to lessen the burden of working parents. Any child 12 years old or younger was eligible for the program, but due to capacity limits, the program prioritized younger children, leaving the parents of older children with no choice but to take care of their kids at home.[6] Families with children under 7 were also given extra child benefits, including a 400,000 won voucher they could use to offset their increased childcare costs.[7]

Despite the data limitation, the results from Table 7 are consistent with other studies using data on which detailed family information is available. Using the U.S. Current Population Survey, Albanesi and Kim (2021) show that the E to N flow rates increased more for mothers than for fathers during the pandemic and that the differences were especially sizable for single parents. Similarly, Collins *et al.* (2021) report that the largest reductions in work hours were observed among mothers with children aged 6 through 12, attributable to homeschooling demands.

The results from Table 7 highlight how the childcare burden continues to be of critical importance with regard to mothers' decisions to participate in the labor market. The fact that mothers of elementary-school-aged children are disproportionately pushed out of the labor market during the pandemic implies that they may have been excluded from the current public child care system, which focuses on providing care for younger children. An expanded system that includes older children will help parents continue their careers in situations such as the COVID-19 pandemic, which will burden them with increased family responsibilities. The high incidence of labor market exits during the pandemic also reveals the hidden costs of the school shutdowns. These actions not only deprive children of learning opportunities but also prevent parents from working, suggesting that they should be carefully implemented based on a thorough comparison between the benefits and costs. In a situation where a school shutdown is unavoidable, complementary policies such as emergency child care should be considered.

Table 8 presents the estimation results by education group. Regardless of the education level, the gender differences in the E to U flows disappear with industry controls included, except for the third wave of infections in December of 2020. At the time, less-educated women were 0.7 percentage points more likely to be unemployed than less-educated men, significant at the 1% significance level, even with industry controls. The gender differences in the E to N flows are mainly driven by those who have at least some college education. Women in this category are 1.5 percentage points more likely to exit the labor force than their male counterparts. In contrast, the E to N gap for the less-educated group is influenced by gender differences in the industry distribution, implying that the extra increase in non-participation for less-educated women is driven by discouraged workers rather than voluntary quitters. These differences based on education levels may reflect different self-insuring abilities. More-educated women likely have more household savings and their spouses' income compared to less-educated women, helping them to get by in periods of joblessness. For this reason, more-educated women may have been

[6]According to a government report published late March, 20 percent of preschool children in the Seoul area were participating in the emergency childcare program. The participation rate for elementary school students, however, was much lower, at 2.2 percent.

[7]Households with older children received a smaller voucher later in the year as school closures were prolonged.

TABLE 8—GENDER DIFFERENCES IN THE EMPLOYMENT TRANSITION RATES BY EDUCATION LEVEL

	High school or less				At least some college			
	E to U		E to N		E to U		E to N	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st Wave * Female	0.007**	0.005	0.009*	0.006	0.006**	0.003	0.020***	0.015***
	(0.003)	(0.003)	(0.005)	(0.006)	(0.003)	(0.003)	(0.005)	(0.005)
2nd Wave * Female	0.001	0.000	0.002	-0.004	-0.001	0.000	0.000	-0.001
	(0.002)	(0.003)	(0.005)	(0.006)	(0.002)	(0.002)	(0.003)	(0.004)
3rd Wave * Female	0.006**	0.007***	0.008	0.008	-0.001	-0.001	-0.002	0.002
	(0.002)	(0.002)	(0.005)	(0.005)	(0.002)	(0.002)	(0.003)	(0.004)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects		Yes		Yes		Yes		Yes
Observations	609,040	609,040	617,285	617,285	793,145	793,145	797,687	797,687
R-squared	0.000	0.000	0.007	0.007	0.000	0.000	0.009	0.009
P.C.P	0.994	0.994	0.981	0.981	0.997	0.997	0.991	0.991

Note: 1) The table reports δ from equation (1), 2) The regressions are done separately for each education group, 3) In columns (1)-(2) and (5)-(6), the dependent variable is a binary variable for whether a respondent made an E to U transition within the past month, 4) In columns (3)-(4) and (7)-(8), the dependent variable is a binary variable for whether a respondent made a E to N transition within the past month, 5) The sample is restricted to those who are married, 6) OLS regressions. Robust standard errors in parentheses. P.C.P: percent correctly predicted. *** p<0.01, ** p<0.05, * p<0.1.

able to choose to exit the labor market in the face of increased childcare and homeschooling demands. Furthermore, relatively more-educated parents are usually more engaged with their children's education than less-educated parents (Guryan *et al.,* 2008). Faced with the unexpected halt in children's schoolwork, more-educated mothers may have responded to this situation rather actively by leaving their jobs and supervising their kids' education themselves.

V. Concluding Remarks

In this paper, I show that the COVID-19 recession disproportionately hit women. Both labor demand factors such as a high concentration of women in industries vulnerable to COVID-19 and labor supply factors such as the added childcare and homeschooling burdens due to school closures have made this recession particularly challenging for women, more so for working mothers. That said, the question arises of what the consequences of the COVID-19 recession, distinctive from previous recessions, will be. First, its unequal impacts on married women can make the recession more severe because this can disable the insurance mechanism of households against income shocks. Households insure themselves against idiosyncratic risks not only by accumulating assets but also adjusting their labor supply behavior. In two-earner households, when one spouse faces income risks, the other spouse will compensate for that risk by increasing the labor supply of the household. A recent study by Wu and Krueger (2021) finds that the presence of and labor supply adjustment by the second earner, i.e., the female in most two-earner households, both decrease considerably to the extent that the wage shocks translate

into consumption. The less cyclical nature of female-dominated jobs and married women's tendency to be loosely attached to the labor market make them crucial providers of household consumption insurance. During the COVID-19 recession, however, many households lost this insurance channel, allowing more income shocks to pass through household consumption.

Second, the COVID-19 crisis produced a generation of women whose careers were halted prematurely. Human capital depreciation during spells of prolonged non-employment will hurt their future career prospects, aggravating gender disparities in the labor market. As their return to the labor market is delayed, the recovery of employment will slow down as well. Some of the jobs lost in the pandemic may not return because occupations that have suffered from large employment losses during the pandemic are highly susceptible to automation (Albanesi and Kim, 2021). One of the changes expected to continue after the COVID-19 crisis is the spread of remote working. How this trend will affect the female workforce is a controversial topic. Alon *et al.* (2020b) raises the possibility that the rise of remote work as accelerated by the pandemic could largely benefit women, as it encourages fathers to take a more active role in childcare. This can lead to a permanent shift in the traditional view of gender roles, freeing women from their conventional household duties. In addition, more flexible work arrangements of remote work could make it easier for working mothers to balance work and childcare. Unfortunately, a series of survey results appears pessimistic about this possibility; amongst the population working from home, women spend significantly more time homeschooling and caring for children than men (Adams-Prassl *et al.,* 2020), and female employees with children are less satisfied with remote working than their male colleagues and females without children (Slack survey). These survey results imply that remote work could result in an extra childcare burden laid on women, thereby diminishing their work productivity. Moreover, remote work has grown considerably more for women than men during the pandemic (Mertens *et al.,* 2021). If it is mostly working mothers seeking flexible work arrangements who choose to work remotely, these mothers may feel stigmatized and discriminated against (Albanesi and Kim, 2021) in the long run. Further investigations of these long-term consequences of COVID-19 are left for future work.

APPENDIX

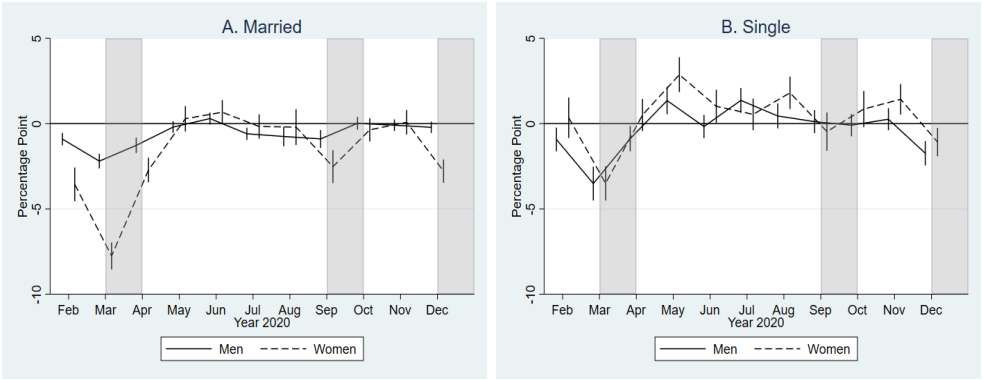

FIGURE A1. INFLOW RATES INTO EMPLOYMENT

Note: 1) The figure plots changes in the percent of individuals aged 25-54 who become employed from non-employment as a share of the labor force throughout the year 2020, compared to January of 2020, 2) Seasonality and year fixed effects are controlled for, 3) Error bars denote 95% confidence intervals, 4) The shaded areas denote the periods when the first, second, and third waves of the infections hit.

Source: Economically Active Population Survey, 2013-2020.

TABLE A1—E TO NE, SINGLE

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.010	0.010	0.007	0.010	0.003
2nd Wave * Female	-0.003	0.000	-0.002	-0.001	0.003
3rd Wave * Female	0.001	0.006	0.003	0.003	0.005
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	465,056	465,056	465,056	465,056	465,056
R-squared	0.002	0.010	0.008	0.070	0.073
P.C.P	0.972	0.972	0.972	0.972	0.972

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent left employment within the past month, 3) The sample is restricted to those who are single, 4) OLS regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A2—E TO U, SINGLE

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.003	0.006	0.004	0.002	0.004
2nd Wave * Female	-0.002	-0.000	-0.002	-0.001	0.001
3rd Wave * Female	0.003	0.004	0.003	0.002	0.004
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	457,221	457,221	457,221	457,221	457,221
R-squared	0.001	0.005	0.004	0.035	0.037
P.C.P	0.988	0.988	0.988	0.988	0.988

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent made an employment-unemployment transition within the past month, 3) The sample is restricted to those who are single, 4) OLS regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A3—E TO N, SINGLE

	(1)	(2)	(3)	(4)	(5)
1st Wave * Female	0.007	0.004	0.003	0.007	-0.001
2nd Wave * Female	-0.002	0.000	-0.000	-0.000	0.002
3rd Wave * Female	-0.002	0.002	0.000	-0.000	0.001
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Worker Type Fixed Effects				Yes	Yes
Observations	459,594	459,594	459,594	459,594	459,594
R-squared	0.001	0.007	0.006	0.052	0.054
P.C.P	0.983	0.983	0.983	0.983	0.983

Note: 1) The table reports δ from equation (1), 2) The dependent variable is a binary variable for whether a respondent made an employment to non-participation transition within the past month, 3) The sample is restricted to those who are single, 4) OLS regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A4—GENDER DIFFERENCES IN THE EMPLOYMENT TO NON-PARTICIPATION TRANSITION RATES BY AGE, SINGLE

	Aged 25-31		Aged 32-38		Aged 39-44		Aged 45-54	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st Wave * Female	0.004	-0.008	0.009	0.010	0.002	-0.002	0.018	0.008
	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)	(0.012)	(0.021)	(0.024)
2nd Wave * Female	0.005	0.016*	-0.016*	-0.020**	-0.002	-0.012	-0.008	-0.014
	(0.008)	(0.009)	(0.008)	(0.010)	(0.013)	(0.013)	(0.013)	(0.020)
3rd Wave * Female	0.003	0.008	-0.009	-0.013	-0.001	0.001	-0.011	-0.003
	(0.007)	(0.008)	(0.008)	(0.010)	(0.010)	(0.011)	(0.014)	(0.009)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes		Yes		Yes		Yes
Industry Fixed Effects		Yes		Yes		Yes		Yes
Worker Type Fixed Effects		Yes		Yes		Yes		Yes
Observations	230,549	230,549	126,825	126,825	58,530	58,530	43,690	43,690
R-squared	0.001	0.040	0.002	0.050	0.003	0.105	0.003	0.127
P.C.P	0.978	0.978	0.978	0.978	0.978	0.978	0.978	0.978

Note: 1) The table reports δ from equation (1), 2) The regressions are done separately for each age group, 3) The dependent variable is a binary variable for whether a respondent made an employment to non-participation transition within the past month, 4) The sample is restricted to those who are singles, 5) OLS regressions. Robust standard errors in parentheses. P.C.P: percent correctly predicted. *** p<0.01, ** p<0.05, * p<0.1.

TABLE A5—GENDER DIFFERENCES IN THE E TO NE TRANSITION RATES, FULL REGRESSION RESULTS, MARRIED

	(1)	(2)	(3)	(4)	(5)
Female	0.019***	0.018***	0.021***	0.012***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
February 2020	0.004*	0.015	-0.013	-0.001	-0.015
	(0.002)	(0.009)	(0.011)	(0.002)	(0.035)
March 2020	0.006**	-0.002	-0.033***	-0.000	-0.073*
	(0.002)	(0.004)	(0.007)	(0.002)	(0.041)
April 2020	0.006**	0.005	-0.019**	0.001	0.017
	(0.002)	(0.005)	(0.009)	(0.002)	(0.052)
May 2020	0.008***	0.013*	-0.011	0.005**	0.033
	(0.002)	(0.007)	(0.010)	(0.002)	(0.044)
June 2020	0.005**	0.009	-0.021***	0.003	-0.006
	(0.002)	(0.006)	(0.008)	(0.002)	(0.045)
July 2020	0.005**	-0.000	-0.004	0.003	0.067
	(0.002)	(0.002)	(0.013)	(0.002)	(0.050)
August 2020	0.005*	0.006	-0.003	-0.000	0.032
	(0.002)	(0.008)	(0.012)	(0.002)	(0.037)
September 2020	0.010***	0.001	-0.022***	0.007***	-0.053***
	(0.002)	(0.002)	(0.007)	(0.002)	(0.009)
October 2020	0.006***	0.002	-0.024***	0.005**	-0.077*
	(0.002)	(0.002)	(0.006)	(0.002)	(0.041)
November 2020	0.008***	0.010*	-0.012	0.006**	-0.002
	(0.002)	(0.006)	(0.008)	(0.002)	(0.041)
December 2020	0.005**	0.002	0.047***	0.001	0.055
	(0.002)	(0.005)	(0.018)	(0.002)	(0.060)
February 2020 * Female	-0.000	0.002	-0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
March 2020 * Female	0.020***	0.019***	0.013***	0.020***	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
April 2020 * Female	0.005	0.006*	0.003	0.006*	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
May 2020 * Female	-0.004	-0.003	-0.003	-0.000	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
June 2020 * Female	-0.001	0.001	-0.001	0.002	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
July 2020 * Female	-0.002	0.001	-0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
August 2020 * Female	-0.006**	-0.006**	-0.008**	-0.007**	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
September 2020 * Female	-0.000	0.001	-0.001	0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
October 2020 * Female	-0.007***	-0.006**	-0.009***	-0.004	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
November 2020 * Female	-0.007***	-0.007**	-0.007***	-0.003	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
December 2020 * Female	0.002	0.003	0.005	-0.002	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	1,421,439	1,421,439	1,421,439	1,421,439	1,421,439
R-squared	0.007	0.013	0.011	0.068	0.070
P.C.P	0.982	0.982	0.982	0.982	0.982

TABLE A6—GENDER DIFFERENCES IN THE E TO U TRANSITION RATES, FULL REGRESSION RESULTS, MARRIED

	(1)	(2)	(3)	(4)	(5)
Female	0.000*	-0.000	0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
February 2020	0.002	0.009	-0.003***	-0.001	-0.001
	(0.001)	(0.008)	(0.001)	(0.001)	(0.009)
March 2020	0.001	-0.002**	-0.005***	-0.001	-0.024***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.009)
April 2020	0.002	-0.002*	-0.003*	-0.000	-0.023***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.009)
May 2020	0.003*	0.003	-0.000	0.001	0.011
	(0.001)	(0.004)	(0.004)	(0.001)	(0.025)
June 2020	0.001	0.003	-0.001	0.001	0.005
	(0.001)	(0.004)	(0.002)	(0.001)	(0.016)
July 2020	0.001	-0.002	0.004	-0.000	0.051
	(0.001)	(0.001)	(0.008)	(0.001)	(0.052)
August 2020	-0.001	0.007	-0.003***	-0.002*	-0.002
	(0.001)	(0.008)	(0.001)	(0.001)	(0.008)
September 2020	0.002	-0.000	-0.003**	0.001	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
October 2020	0.002	-0.000	-0.002	0.001	-0.006**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
November 2020	0.002*	0.005	-0.001	0.001	-0.002
	(0.001)	(0.005)	(0.001)	(0.001)	(0.005)
December 2020	0.001	0.004	-0.003***	-0.001	0.000
	(0.001)	(0.005)	(0.001)	(0.001)	(0.006)
February 2020 * Female	0.001	0.002	0.000	0.000	0.000
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
March 2020 * Female	0.006***	0.006***	0.003	0.007***	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
April 2020 * Female	0.003	0.003*	0.001	0.003	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
May 2020 * Female	0.001	0.002	0.003	0.002	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
June 2020 * Female	-0.000	0.002	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
July 2020 * Female	0.003*	0.004**	0.004**	0.003*	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
August 2020 * Female	0.001	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
September 2020 * Female	-0.000	-0.001	0.000	-0.000	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
October 2020 * Female	-0.002	-0.001	-0.002	-0.001	0.000
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
November 2020 * Female	-0.001	-0.001	-0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
December 2020 * Female	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	1,402,185	1,402,185	1,402,185	1,402,185	1,402,185
R-squared	0.000	0.002	0.002	0.025	0.026
P.C.P	0.995	0.995	0.995	0.995	0.995

TABLE A7—GENDER DIFFERENCES IN THE E TO N TRANSITION RATES, FULL REGRESSION RESULTS, MARRIED

	(1)	(2)	(3)	(4)	(5)
Female	0.019***	0.018***	0.020***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
February 2020	0.002	0.006	-0.010	-0.000	-0.018
	(0.002)	(0.004)	(0.010)	(0.002)	(0.034)
March 2020	0.005**	-0.000	-0.028***	0.001	-0.058
	(0.002)	(0.003)	(0.006)	(0.002)	(0.040)
April 2020	0.004**	0.007	-0.017*	0.001	0.034
	(0.002)	(0.005)	(0.009)	(0.002)	(0.051)
May 2020	0.005***	0.010*	-0.010	0.004**	0.031
	(0.002)	(0.005)	(0.009)	(0.002)	(0.044)
June 2020	0.004*	0.006	-0.020**	0.002	-0.013
	(0.002)	(0.005)	(0.008)	(0.002)	(0.046)
July 2020	0.005**	0.001	-0.009	0.003*	0.044
	(0.002)	(0.002)	(0.010)	(0.002)	(0.045)
August 2020	0.006***	-0.001	0.000	0.001	0.032
	(0.002)	(0.002)	(0.012)	(0.002)	(0.038)
September 2020	0.007***	0.002	-0.019***	0.005**	-0.047***
	(0.002)	(0.002)	(0.007)	(0.002)	(0.009)
October 2020	0.004**	0.002	-0.022***	0.004**	-0.073*
	(0.002)	(0.002)	(0.006)	(0.002)	(0.042)
November 2020	0.005***	0.006**	-0.011	0.004**	-0.000
	(0.002)	(0.003)	(0.008)	(0.002)	(0.043)
December 2020	0.005**	-0.001	0.050***	0.001	0.053
	(0.002)	(0.002)	(0.018)	(0.002)	(0.060)
February 2020 * Female	-0.001	0.000	-0.001	0.001	0.001
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
March 2020 * Female	0.015***	0.013***	0.010***	0.013***	0.007*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
April 2020 * Female	0.002	0.002	0.002	0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
May 2020 * Female	-0.005**	-0.005*	-0.006**	-0.002	-0.002
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
June 2020 * Female	-0.001	-0.001	-0.002	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
July 2020 * Female	-0.005*	-0.003	-0.005*	-0.002	-0.003
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
August 2020 * Female	-0.008***	-0.007***	-0.008***	-0.009***	-0.012***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
September 2020 * Female	0.000	0.001	-0.002	0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
October 2020 * Female	-0.006***	-0.006**	-0.008***	-0.003	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
November 2020 * Female	-0.006***	-0.005**	-0.006**	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
December 2020 * Female	0.001	0.002	0.003	-0.002	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	1,414,972	1,414,972	1,414,972	1,414,972	1,414,972
R-squared	0.008	0.013	0.012	0.054	0.056
P.C.P	0.986	0.986	0.986	0.986	0.986

TABLE A8—GENDER DIFFERENCES IN THE E TO NE TRANSITION RATES, FULL REGRESSION RESULTS, SINGLE

	(1)	(2)	(3)	(4)	(5)
Female	-0.005***	0.001**	-0.002***	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
February 2020	0.005	-0.008*	-0.055***	0.004	-0.075***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.016)
March 2020	0.014**	-0.017***	-0.054***	0.004	-0.185
	(0.006)	(0.005)	(0.008)	(0.005)	(0.137)
April 2020	0.013**	0.046	-0.007	0.007	-0.120
	(0.006)	(0.058)	(0.022)	(0.005)	(0.191)
May 2020	0.009*	-0.008	-0.028	0.004	0.020
	(0.005)	(0.005)	(0.022)	(0.005)	(0.079)
June 2020	0.007	-0.007	0.012	0.001	0.108
	(0.005)	(0.004)	(0.030)	(0.005)	(0.083)
July 2020	0.006	-0.007	-0.009	0.003	0.134
	(0.005)	(0.004)	(0.021)	(0.005)	(0.114)
August 2020	0.004	0.005	-0.014	-0.001	0.056
	(0.005)	(0.015)	(0.019)	(0.005)	(0.069)
September 2020	0.017***	-0.004	-0.015	0.009*	0.030
	(0.005)	(0.005)	(0.019)	(0.005)	(0.086)
October 2020	0.003	-0.006	-0.042***	-0.001	-0.065
	(0.005)	(0.004)	(0.009)	(0.004)	(0.083)
November 2020	-0.001	-0.004	-0.013	0.003	0.044
	(0.005)	(0.004)	(0.018)	(0.004)	(0.081)
December 2020	0.007	-0.009**	0.036	-0.001	0.102
	(0.005)	(0.005)	(0.027)	(0.005)	(0.077)
February 2020 * Female	-0.006	-0.010	-0.004	-0.007	-0.012*
	(0.006)	(0.006)	(0.006)	(0.005)	(0.007)
March 2020 * Female	0.010	0.010	0.007	0.010	0.003
	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)
April 2020 * Female	-0.004	0.003	-0.005	-0.003	-0.001
	(0.006)	(0.007)	(0.007)	(0.006)	(0.008)
May 2020 * Female	0.002	0.008	0.004	0.002	0.006
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
June 2020 * Female	-0.002	0.001	0.003	-0.000	0.005
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
July 2020 * Female	-0.002	-0.001	0.000	0.001	0.002
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
August 2020 * Female	-0.002	-0.004	0.001	-0.002	-0.001
	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
September 2020 * Female	-0.003	0.000	-0.002	-0.001	0.003
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
October 2020 * Female	0.001	0.003	0.003	-0.000	0.004
	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)
November 2020 * Female	0.008	0.006	0.007	0.005	0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
December 2020 * Female	0.001	0.006	0.003	0.003	0.005
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	465,056	465,056	465,056	465,056	465,056
R-squared	0.002	0.010	0.008	0.070	0.073
P.C.P	0.972	0.972	0.972	0.972	0.972

TABLE A9—GENDER DIFFERENCES IN THE E TO U TRANSITION RATES, FULL REGRESSION RESULTS, SINGLE

	(1)	(2)	(3)	(4)	(5)
Female	-0.004***	-0.002***	-0.003***	-0.003***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
February 2020	-0.003	-0.007**	-0.015***	-0.002	-0.033***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.010)
March 2020	0.006	-0.009***	-0.015***	0.001	-0.173
	(0.004)	(0.003)	(0.003)	(0.004)	(0.131)
April 2020	0.006	-0.005	0.011	0.004	-0.250
	(0.004)	(0.003)	(0.018)	(0.004)	(0.171)
May 2020	0.004	-0.004	0.011	0.001	0.078
	(0.004)	(0.003)	(0.022)	(0.004)	(0.098)
June 2020	0.000	-0.005*	0.002	-0.002	0.065
	(0.004)	(0.003)	(0.015)	(0.003)	(0.095)
July 2020	-0.000	-0.005	0.012	-0.003	0.109
	(0.003)	(0.003)	(0.017)	(0.003)	(0.119)
August 2020	-0.010***	-0.006*	-0.013***	-0.007**	-0.020***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.008)
September 2020	0.003	-0.003	-0.005	0.002	0.040
	(0.004)	(0.003)	(0.006)	(0.003)	(0.086)
October 2020	-0.001	-0.004	-0.011***	-0.004	-0.059
	(0.003)	(0.003)	(0.003)	(0.003)	(0.047)
November 2020	-0.003	-0.005	-0.003	-0.002	0.061
	(0.003)	(0.003)	(0.009)	(0.003)	(0.082)
December 2020	-0.002	-0.005*	-0.007	-0.005*	-0.005
	(0.003)	(0.003)	(0.006)	(0.003)	(0.039)
February 2020 * Female	0.002	0.001	0.004	0.001	0.001
	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
March 2020 * Female	0.003	0.006	0.004	0.002	0.004
	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
April 2020 * Female	-0.009**	-0.006	-0.009**	-0.008*	-0.008
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
May 2020 * Female	-0.003	0.002	0.000	-0.002	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
June 2020 * Female	-0.001	0.000	0.002	-0.001	0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
July 2020 * Female	0.000	0.001	0.001	0.003	0.003
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
August 2020 * Female	0.005*	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
September 2020 * Female	-0.002	-0.000	-0.002	-0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
October 2020 * Female	0.001	0.003	0.002	0.001	0.004
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)
November 2020 * Female	0.003	0.006*	0.002	0.002	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
December 2020 * Female	0.003	0.004	0.003	0.002	0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	457,272	457,272	457,272	457,272	457,272
R-squared	0.001	0.005	0.004	0.035	0.037
P.C.P	0.988	0.988	0.988	0.988	0.988

TABLE A10—GENDER DIFFERENCES IN THE E TO N TRANSITION RATES, FULL REGRESSION RESULTS, SINGLE

	(1)	(2)	(3)	(4)	(5)
Female	-0.001*	0.003***	0.001**	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
February 2020	0.007*	-0.001	-0.041***	0.006*	-0.051***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.014)
March 2020	0.009**	-0.008**	-0.040***	0.003	-0.015
	(0.004)	(0.004)	(0.007)	(0.004)	(0.050)
April 2020	0.007*	0.051	-0.017	0.003	0.118
	(0.004)	(0.058)	(0.014)	(0.004)	(0.113)
May 2020	0.005	-0.004	-0.040***	0.003	-0.045***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.015)
June 2020	0.007*	-0.002	0.010	0.002	0.112
	(0.004)	(0.003)	(0.027)	(0.003)	(0.092)
July 2020	0.006*	-0.002	-0.020	0.006	0.076
	(0.004)	(0.003)	(0.013)	(0.004)	(0.090)
August 2020	0.013***	0.010	-0.003	0.006	0.072
	(0.004)	(0.015)	(0.019)	(0.004)	(0.071)
September 2020	0.015***	-0.002	-0.011	0.007*	0.012
	(0.004)	(0.004)	(0.018)	(0.004)	(0.072)
October 2020	0.004	-0.002	-0.031***	0.002	-0.016
	(0.004)	(0.003)	(0.008)	(0.003)	(0.080)
November 2020	0.002	0.001	-0.010	0.005	-0.022
	(0.003)	(0.003)	(0.016)	(0.003)	(0.016)
December 2020	0.009**	-0.004	0.043	0.004	0.139*
	(0.004)	(0.003)	(0.027)	(0.004)	(0.084)
February 2020 * Female	-0.008**	-0.011**	-0.008*	-0.009**	-0.014***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
March 2020 * Female	0.007	0.004	0.003	0.007	-0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
April 2020 * Female	0.005	0.009	0.003	0.004	0.006
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
May 2020 * Female	0.005	0.006	0.004	0.004	0.005
	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
June 2020 * Female	-0.001	0.001	0.001	0.000	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
July 2020 * Female	-0.002	-0.003	-0.001	-0.002	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
August 2020 * Female	-0.006	-0.007	-0.002	-0.005	-0.003
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
September 2020 * Female	-0.002	0.000	-0.000	-0.000	0.002
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
October 2020 * Female	0.000	-0.000	0.001	-0.001	0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
November 2020 * Female	0.005	0.001	0.005	0.003	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
December 2020 * Female	-0.002	0.002	0.000	-0.000	0.001
	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Occupation Fixed Effects		Yes			Yes
Industry Fixed Effects			Yes		Yes
Class Fixed Effects				Yes	Yes
Observations	459,594	459,594	459,594	459,594	459,594
R-squared	0.001	0.007	0.006	0.052	0.054
P.C.P	0.983	0.983	0.983	0.983	0.983

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