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RESEARCH ARTICLE

Exploring the reasons for labour market gender inequality a year into the COVID-19 pandemic: evidence from the UK cohort studies

Bożena Wielgoszewska, b.wielgoszewska@ucl.ac.uk
Alex Bryson, a.bryson@ucl.ac.uk
University College London, UK

Monica Costa Dias, monica.costa-dias@bristol.ac.uk
University of Bristol and Institute for Fiscal Studies, UK

Francesca Foliano, f.foliano@ucl.ac.uk
Heather Joshi, h.joshi@ucl.ac.uk
David Wilkinson, d.wilkinson@ucl.ac.uk
University College London, UK

The COVID-19 pandemic has caused unexpected disruptions to Western countries which affected women more adversely than men. Previous studies suggest that gender differences are attributable to: women being over-represented in the most affected sectors of the economy, women's labour market disadvantage as compared to their partners, and mothers taking a bigger share childcare responsibilities following school closures. Using the data from four British nationally representative cohort studies, we test these propositions. Our findings confirm that the adverse labour market effects were still experienced by women a year into the COVID-19 pandemic and that these effects were the most severe for women who lived with a partner and children, even if they worked in critical occupations. We show that adjusting for pre-pandemic job characteristics attenuates the gaps, suggesting that women were over-represented in jobs disproportionately affected by COVID-19 pandemic. However, the remaining gaps are not further attenuated by adjusting for the partner's job and children characteristics, suggesting that the adversities experienced by women were not driven by their relative labour market position, as compared to their partners or childcare responsibilities. The residual gender differences observed in the rates of active, paid work and furlough for those who live with partner and children point to the importance of unobserved factors such as social norms, preferences, or discrimination. These effects may be long-lasting and jeopardise women's longer-term position through the loss of experience, leading to reinforcement of gender inequalities or even reversal of the progress towards gender equality.

Key words COVID-19 • pandemic • gender • employment • furlough

Key messages

- Adverse labour market effects of COVID-19 were still experienced by women a year into the pandemic.
- These effects were the most severe for partnered women with children, even if they worked in critical occupations.
- Job characteristics attenuate the gaps implying women were over-represented in affected jobs.
- Partner's job and children's characteristics do not attenuate the remaining gaps suggesting adversities were not driven by women's jobs as relative to partners.

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Introduction

The COVID-19 pandemic has caused unexpected disruptions to Western countries. The rapid spread of the virus led governments to introduce social distancing and mitigation measures that limited economic activity. In the UK, a series of national lockdowns that started in March 2020 forced closures of some sectors and substantially reduced the economic activity in others. GDP fell by 19.5% in the second quarter of 2020 – the largest fall since the ONS statistics were first recorded in 1955. Although the UK's economy partially recovered by the first quarter of 2021, GDP levels were as low as in 2014 (ONS, 2021).

The UK government responded to the economic downturn with radical labour market interventions, which was unprecedented in the UK and uncharacteristic of a liberal welfare state. In March 2020 it launched the Coronavirus Job Retention Scheme (CJRS) – a furlough scheme, which entitled employees to 80% of pay up to a cap of £2,500 per month. This scheme supported workers whose ability to work was severely impaired (either because they worked in sectors that were forced to cut operations, or those with caring responsibilities that could no longer be outsourced). Office workers were more likely to shift to working from home and key workers in health, education and public services to continue working at their workplaces.

In previous economic downturns employers were forced to issue redundancies, but the furlough scheme allowed them to retain workers in post, even though they were unable to work. The steep drop in employment levels reached almost ten million by early May 2020, but the employment gap was almost fully composed of furloughed workers. The scheme did not allow furloughed employees to work at all initially, but from July 2020 businesses had the flexibility to bring employees back on a part-time basis. By May 2021, the employment drop compared to the start of the pandemic was around three million, the gap composed of fully and partially furloughed workers as well as a fall in payroll employees (Brewer, 2021).

Research suggests that in the early phases of lockdown women's employment was disproportionately adversely affected (Madgavkar et al, 2020). This contrasts to earlier recessions where men's employment rates were more strongly impacted (Hoynes et al, 2012).

As a result, some have labelled the downturn induced by COVID-19 as a 'shecession' (Alon et al, 2021). In this paper we address three questions:

1. Were women still experiencing adverse labour market effects one year into the COVID-19 pandemic?
2. What mechanisms were responsible for gender differences in employment and furlough rates?
3. To what extend do these differ by the types of households?

Gender differences between COVID-19 and previous recessions have been attributed to two main causes. First, whereas previous recessions impacted sectors such as manufacturing, the pandemic severely affected some service sectors where women are disproportionately employed, such as hospitality and tourism (Alon et al, 2021). However, other female-dominated sectors, such as health and social care, faced increased demand.

Second, school closures and restrictions on social contact meant families faced increased childcare needs and competing pressures on their time to replace services that were formerly outsourced. Evidence from early stages of the pandemic shows that men and women with no dependent children at home were equally likely to have stopped work, but mothers with children of primary school age or younger were significantly more likely to stop working, as compared to fathers with children of the same age (Wielgoszewska et al, 2020). Mothers were spending substantially longer in childcare and housework than their partners and were more likely to be juggling paid work and childcare (Sevilla and Smith, 2020; Andrew et al, 2021).

In this study we provide evidence on how the pandemic crisis affected gender inequalities in employment and furlough rates in different types of households. We investigate the reasons for these differences by exploring three hypotheses:

1. an occupational segregation hypothesis, which posits that gender differences in job characteristics are responsible for varying employment and furlough rates;
2. an efficient household hypothesis, which posits that, among couples, women's comparative labour market disadvantage is responsible for varying employment and furlough rates;
3. a childcare responsibilities hypothesis, which posits that the scale of domestic responsibilities is responsible among couples with children.

We contribute to the existing literature in several ways. First, while most existing research focuses on the period of the first national lockdown, we examine data collected between February and March 2021. By looking at effects one year after the first restrictions were imposed, we provide a view on whether the initial gender gaps still existed a year later. Second, while previous studies mainly focused on couples with children, we show how gender effects vary across different types of households. Our findings confirm that women's employment was more likely to suffer the effects of COVID-19 pandemic than men's. The effects were the most severe for women who lived with a partner and children. We also find some support for the importance of occupational segregation, but little support for the efficient household or childcare responsibility hypotheses. The remaining residual differences between men and

women point to alternative explanations that are less straightforward to test directly, such as social norms, gender differences in preferences, or employer discrimination.

The remainder of the paper is structured as follows. The hypotheses are developed and linked to the existing literature in the next section. In the subsequent section we provide details of the data and methods used in this study. We present the results in the penultimate section. The final section discusses these results in the context of our hypotheses, provides alternative explanations for the residual gaps, and concludes.

Previous literature and hypotheses

Occupational segregation

Women are concentrated in different occupations from men and, historically, this segregation has worked to women's disadvantage (Preston, 1999). Although female-dominated occupations have been less vulnerable to previous recessions, this recession had greater effects on sectors where women are heavily concentrated, such as travel, accommodation and services (Cotofan et al, 2021). At the same time, women are also more likely to work in jobs that remained essential during the pandemic. Globally women form 70% of workers in the health and social sector (Boniol et al, 2019) and in the UK approximately 60% of key workers are women, which is driven substantially by women working in health and social care, education and childcare (Zhou et al, 2020).

Previous studies suggest that occupational segregation may partly, but not fully, explain the gender gaps in how the working status of individuals changed with the lockdown (see, for example, Albanesi and Kim, 2021). For example, Alon et al (2021), in their international comparison found that, even after controlling for work type, there has been a large and significant gender gap in terms of hours among parents of school-age children in Spain. While similar patterns were observed using UK data, the estimates were not statistically significant. Andrew et al (2021) compared mothers and fathers of school-age children living in opposite-gender couples in England, and who were active in work before the pandemic, in February 2020. They found that mothers were more likely than fathers to stop working during the first lockdown, but this was not driven by mothers working in jobs that were structurally more vulnerable to the demand-side shocks.

Another aspect that typically differentiates the jobs of men and women is the prevalence of part-time work, which usually has greater flexibility. As shown by Joshi et al (2021), by the age of 55 women employees born in 1958 on average accumulated ten years of part-time experience compared with just seven months for men. Between April and June 2020, part-time workers were over twice as likely to lose their jobs and 70% more likely to be furloughed than full-time workers (Şandor, 2021). They were also more likely to experience another labour market shock in the second half of 2020 (Wenham and Şandor, 2021). At the same time, other studies suggest that women are more likely to work in jobs that can be done from home, thus providing opportunities for ongoing employment even during lockdown (Hatayama et al, 2020; Hupkau and Petrongolo, 2020).

If gender differences in pre-pandemic job characteristics (occupations, key workers and part-time status) lie behind the differential impact of the pandemic, we expect that accounting for job characteristics would reduce the gender differences in employment and furlough rates.

H1: Gender difference in employment and furlough rates are related to women being over-represented in jobs disproportionately affected by COVID-19 pandemic.

Efficient household allocation

The idea of efficient household allocation can be traced back to Becker (1965) who proposed that, among couples, the allocation of labour in the household reflects the comparative advantage of partners in domestic and labour market. At the time Becker was writing, men often had more education and work experience than women, and it was rare to challenge the proposition that women were more productive at organising the household and caring for dependent children. While the idea of efficient household allocation is strongly linked to the childcare responsibility hypothesis developed later in this article, it is also applicable to partnered households without any children. The focus of this proposition is women's jobs compared to the jobs of their male partners where, given their earnings potential, it makes sense for women to stay at home while men spend their time in paid employment.

The furlough scheme, although designed to protect the jobs of those who were the most vulnerable, might have reinforced gender asymmetries in the allocation of paid and unpaid work. In line with the efficient household allocation hypothesis, the economic incentive to request leave for caring purposes may be stronger for women than for men if they are the main carer and/or the second earner in couples, minimising the potential loss of household income. Indeed, Andrew et al (2021) found the biggest gender gaps in furloughing status, for the specific case where the worker could choose whether or not to furlough (as opposed to furloughing because their jobs were temporarily shut down). This suggests that decisions taken within the family about how to organise domestic and paid work could have played a key role in driving gender gaps in participation during the lockdowns. Since individuals who work longer hours are disproportionately highly rewarded (Goldin, 2014), this incentive could be especially desirable if women were only employed on a part-time basis.

There is still scant evidence on how couples organised paid and unpaid work during the pandemic, and whether they prioritised the financial well-being. Two studies using British data consider how families allocated responsibilities for paid and domestic work between partners, during the pandemic. Qian and Hu (2021) find an increase in sole-worker families with the better-educated partner remaining in work, irrespective of gender, as might be expected under efficient household allocation hypothesis. Andrew et al (2021), on the other hand, find that mothers reduced their paid hours by more than fathers did, even if they continued to work, and even if they were better paid than their partners or used to work more hours than their partners pre-pandemic. To compensate, they always did more housework and childcare.

If women's job disadvantage comparative to their partners' lies behind the differential impact of the pandemic, we expect that accounting for partner's job characteristics would reduce the remaining gender differences in employment and furlough rates.

H2: In partnered households, gender difference in employment and furlough rates are related to women's comparative labour market disadvantage as compared to their partners.

Childcare responsibilities

A substantial part of domestic responsibilities is typically related to childcare, and this is likely to reinforce gender asymmetries within the household. Recent studies provide evidence of continuing labour market disadvantage of women, especially following the birth of their first child. Typically, when the first child arrives, women either take a break from employment or switch from full- to part-time work, which is often less-well paid per hour. The arrival of subsequent births tends to prolong the period of low or no earning. Although shared parental leave has been available since 2015, very few fathers take advantage of it. In their investigation of the pay gaps in the cohort born in Britain in 1958, Joshi et al (2021) find that the initial gap between men and women widened substantially during childrearing years, which is attributable to divergent work experience, especially in midlife. Similarly, Costa Dias et al (2018) find that, in the UK, the gender wage gap opens up gradually after the first child arrives and among employees continues to widen for many years after that point with women taking more flexible working arrangements.

COVID-19 caused further impediments to labour supply with the pressures from domestic responsibilities, due to enforced schools' closures for prolonged periods and the expectation that parents would home-school their children. Recent evidence shows that this disproportionately negatively affected the working status and employment of mothers of young children, while fathers of similar aged children were actually less likely to experience job loss than other men (Furman et al, 2021). Benzeval et al (2020) show that, during the initial stages of the pandemic, parents spent considerably longer actively helping primary school–age students than those in secondary education. Similarly in the US, Collins et al (2020) found that, during the COVID-19 pandemic, mothers with young children reduced their work hours four to five times more than fathers resulting in a growth in the projected gender hours gap by 20–50%. Similarly, the effects on productivity and engagement in employment were particularly detrimental for single parents (Hertz et al, 2020), mostly mothers with particularly low pre-COVID employment rates (Blundell et al, 2020). Single parents spent more time on housework but not on childcare and home-schooling than multiple adult households (Benzeval et al, 2020).

If gender differences in household distribution of childcare responsibilities lies behind the differential impact of the pandemic, we expect that accounting for number and age of children in the household would reduce the remaining gender differences in employment and furlough rates.

> H3: In partnered households with children, gender difference in employment and furlough rates are related to the scale of childcare responsibilities and the scale of domestic responsibilities.

Data and methodology

Sample

Our data are extracted from four nationally representative cohort studies for Britain: National Child Development Study (NCDS) of people who were born in 1958, into

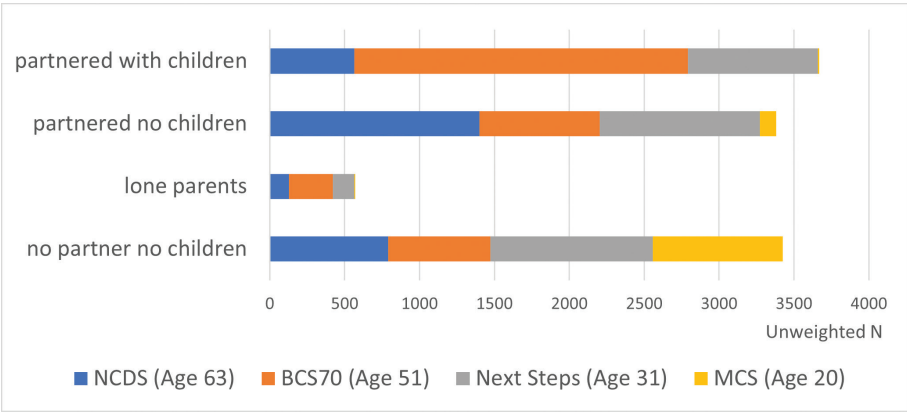
the later part of the 'baby boomers' generation, who were age 63 at the time of the data collection; 1970 British Cohort Study (BCS70) who were born in 1970, part of 'Generation X', and around 51; Next Steps, who were born in 1989–90, part of the generation known as 'Millennials', age 31; and Millennium Cohort Study (MCS), born in 2000–02, part of 'Generation Z', age around 20.

Members of all these cohorts have taken part in a COVID-19 survey (Brown et al, 2021) conducted in three waves. A first online survey (Wave 1) took place in May 2020, a second survey (Wave 2) in September–October 2020. Participants completed a third survey (Wave 3) in February–March 2021 via a combination of phone and web interviews. We utilise the data from the third wave of this survey (Centre for Longitudinal Studies, 2021).

Our primary analytical sample (N = 10,892) is confined to survey participants who were employed in March 2020, and who at the time of the third wave of the data collection have been living in England, Scotland or Wales. In classifying household type, we use information regarding people living in the cohort member's household that is, whether husband, wife or cohabiting partner are present and whether there are any co-resident children to whom the survey participant considers themselves a parent. This is not always equivalent to their family status since not all cohort members live with their partner and/or children. Given that our sample only includes those who responded to the questions regarding their living situation, and that we further exclude lone fathers from the analyses by household types due to small sample, we exclude 148 observations. We restore sample representativeness by using combined weights which account for both survey design and non-response (for details on weights derivation, see Brown et al, 2021).

Figure 1 shows the distribution of cohort members in our analytical sample by their household type, and highlights that the living situation is age-graded. Almost 50% of those in the oldest cohort (age 63) live with their partner and no children. The majority of those in the second cohort (age 51) live with a partner as well as children. The cohort members of the third cohort (age 31) are relatively evenly distributed across household types. The youngest cohort members tend not to live with either partner or children. Since it is possible to test H2 (that is, account for partner's job

Figure 1: Distribution of cohort across household types



characteristics) only on the subset of participants who live with a partner, we test H2 on a subsample (N = 7,011). Similarly, since it is possible to test H3 (that is, account for number and age of children) on a subsample of those who live with both their partner and children, we test H3 on a further subsample (N = 3,644).

Outcomes

We investigate four binary outcomes: three relate to progressively narrower definitions of employment, and the fourth to furlough. Our first outcome indicates whether the respondent remained in employment and includes employees (furloughed or not), apprenticeships, those in voluntary work and the self-employed. Our second outcome is active paid work, which excludes those on paid or unpaid leave or furlough and those in unpaid work from the initial definition. Our third outcome is an indicator for whether the respondent remains in the same job in February–March 2021 as the one they held prior to the pandemic, in March 2020. Finally, our last outcome is furlough status, an indicator for whether the respondent is on paid leave. Although this is largely paid leave under the Retention Scheme, it could also have included a small number on other sorts of paid leave, such as parental leave.

Table 1 shows the weighted proportion of the outcomes across all three analyses samples. Men are a little more likely than women to be in employment, especially among those with partners and children. The gender gap is wider when we focus on those who are in active work and those in the same job. Again, the gap is most pronounced among those with partners and children. By contrast, women are more likely than men to be on furlough.

The distribution of outcomes across cohorts, shown in Appendix A,[1] reveals that the members of the two middle cohorts, those age 51 and 31, are more likely to remain in employment (~96%), active work (~91%) and remaining in the same job (~82%). These rates are the lowest and gender differences are the largest for the youngest cohort, pointing to the relatively disadvantaged position of the younger cohorts. The largest gender differences are observed in the proportion of people who continued to actively work in the youngest cohort. This proportion is 57% for men, while the comparable proportion of women is only 44%. However, the sample size for this cohort is also the smallest.

Estimation

Our analyses are designed to examine whether COVID-19 had a disproportionately negative impact on women compared to men and, if so, whether this was because

Table 1: Weighted proportions of outcomes across three analyses samples

	All (H1)		**Partnered (H2)**		**Partnered with children (H3)**	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Proportion remaining in employment	0.89	0.87	0.93	0.90	0.95	0.90
Proportion in active work	0.85	0.80	0.89	0.83	0.92	0.82
Proportion in the same job	0.76	0.72	0.82	0.75	0.85	0.76
Proportion furloughed	0.03	0.06	0.04	0.06	0.03	0.07
Unweighted N	4,630	6,262	3,130	3,881	1,630	2,014

Notes: Proportions are based on weighted survey responses; Ns are unweighted.

women were over-represented in affected jobs (H1) or whether their jobs were less economically valuable, as compared to their partners' jobs (H2), and whether the scale of childcare responsibilities (H3) lies behind the adjustment in household's labour supply.

In our primary models, we first identify the presence and magnitude of gender gaps across all households. To do this we include a female dummy in our regression models to estimate raw gender differences. The complete results from these regressions are shown in Appendix C. We then test our hypotheses in different types of households by investigating changes in the interaction between gender and household type. Here we initially include variables indicating household and gender interaction. Partnered men with children are considered as the reference category, given they tend to have privileged position in the labour market as they would have likely accumulated the labour market experience and they tend to experience lower or no child penalty to their wage (Joshi et al, 2021). We then add the variables from the different levels of adjustment described in the next subsection. The complete results of these regressions are shown in Appendix D.

The subsequent set of analyses is designed to investigate the impact of the partner's job. If these characteristics of partner's job account for the gender differences, this can be considered as evidence for H2. As stated earlier, these analyses are conducted on the subset who live with a partner. A final set of analyses is designed to test H3 and is conducted on a further subset living with a partner and children. The complete results from these regressions are shown in Appendices E and F.

Adjustment

We consecutively add sets of covariates to the regression models and compare the coefficients of the female dummy, or the gender–household interaction variable, to examine how these adjustments affect gender differences. These adjustments are:

- *Basic:* this set of indicators relates to the likelihood of being employed and includes: age (equivalent to cohort) the country of residence (England, Scotland, Wales), whether they live in London, their education level as captured by their highest qualification before the start of the pandemic (none, NVQ level 1 to 5), childhood social class (manual, non-manual) and the mode of the survey (web, telephone).
- *Job:* here we also control for the cohort member's job characteristics by including their Standard Occupational Classification (SOC) in March 2020 at one digit level (for categorisation see Appendix B), a part-time dummy based on the hours worked in March 2020, identifying those who worked less than 30 hours per week, as well as an indicator of whether the person is working in an occupation likely to contain key workers as defined by their four-digit SOC in March 2020 (see Appendix I for details[2]).
- *Partner:* this adjustment differs for different models. In the primary models conducted on the full sample, where we investigate the coefficients on a female dummy, this adjustment only includes an indicator of whether partner lives in the household. However, in the models conducted on the subset of those who live in partnered households, where we investigate the gender–household interaction, adjustment for partner's job includes: their SOC at one-digit level, part-time and key worker indicators.

- *Children:* similarly, this adjustment on the full sample includes an indicator of whether any children live in the household. However, in the models conducted on the subsample of those with partner and children we include the number of children in the household as well as the age of the youngest child (5 or less, 6–11, 12–18, 19 or more).

To retain the same sample across the adjustment levels, we include missing dummies where the covariate categories are missing. These are mainly variables that have been collected in pre-pandemic sweeps, such as education and parental social class, as well as the occupation variables. Detailed missingness rates, together with the descriptive statistics, for all controls across men and women in the three samples are shown in Appendix B.

We estimate linear probability models for all outcomes. In addition, given the furlough outcome is a lower probability event, we also estimate logit models for this outcome. These are shown in Appendices C–F (final columns).

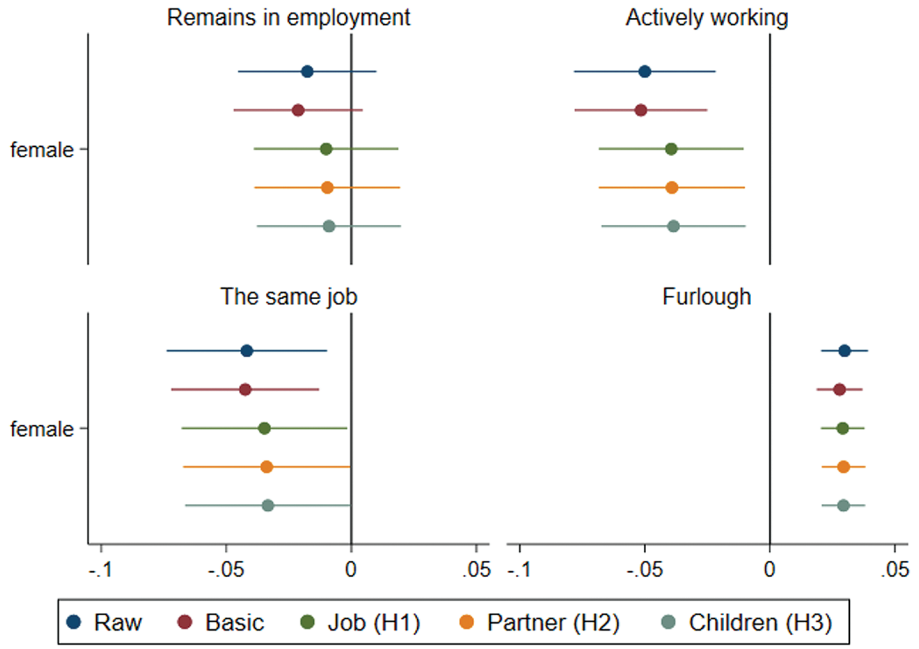
Results

Figure 2 shows raw and adjusted gender gaps in primary models (that is, regression coefficients on the female dummy) for our four outcomes. Male, the reference category, is reflected by the black vertical line, while the dots represent female coefficients and the whiskers the associated 95% confidence intervals. The raw gaps are shown by the dark blue estimates, the red estimates include the set of basic controls listed above, green estimates are adjusted for the job characteristics of the cohort member, yellow are include an indicator of whether partner lives in the households and teal whether there are any dependent children in the household.

In terms of raw gaps we find no significant gender differences in terms of remaining in employment – our broadest definition of employment participation. However, women are ~5 percentage points less likely than men to remain in active paid work and 4 percentage points less likely to remain in the same job, as well as 3 percentage points more likely to be furloughed. The adjustment for basic controls makes little difference to these estimates. However, once we account for pre-pandemic job characteristics the gaps in employment participation outcomes are reduced, but not fully attenuated. We interpret this as evidence in support of H1; this adjustment does not fully account for the gender difference in furlough rates, with women 3 percentage points more likely to be furloughed. In our sample, as shown in Appendix G, women account for majority of workers in administrative and secretarial occupation (74%), caring, leisure and other service occupations (78%) and sales and customer service occupations (65%). However, men predominantly work in skilled trades occupations (89%) and process, plant and machine operatives (91%).

Figure 3 shows the gender by household gaps in the probability of remaining in employment. Here the reference category is partnered men with children. The raw gaps show that people in all other household types are less likely to remain in employment than partnered men with children. In the case of partnered women with children the raw differences are relatively small (5 percentage points) but persist even after the basic adjustment and disappear once job characteristics are accounted for, providing further evidence in support of H1. These findings are partially in line

Figure 2: Gender gaps in the employment participation and furlough

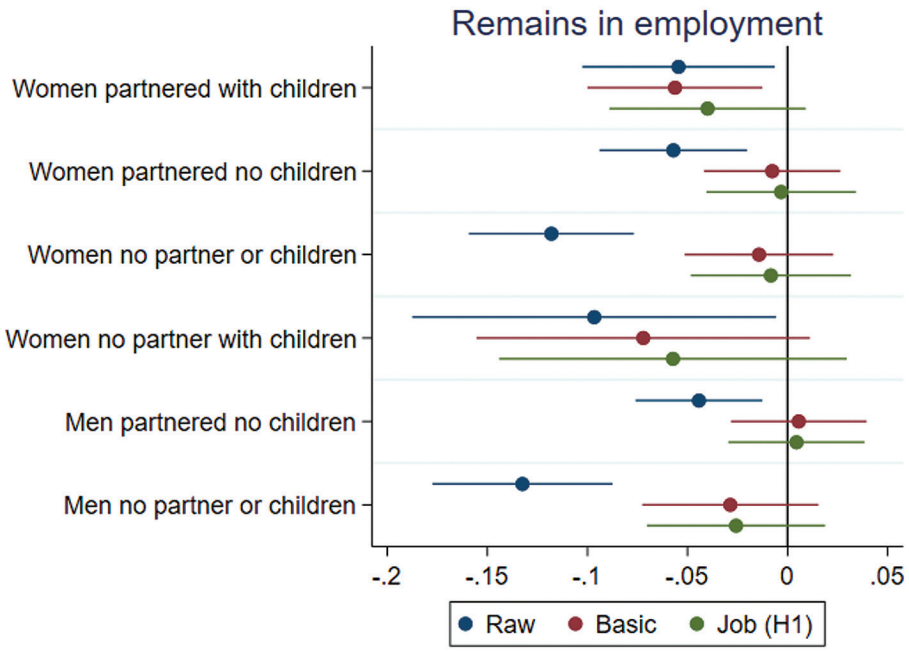


Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Male; full regression results are available in Appendix C.

with Andrew et al (2021) who also find significant differences in the rates of job loss and furlough between mothers and fathers, with mothers being 10 percentage points more likely to have stopped working for pay than fathers. However, they also find that controlling for job characteristics increases the gender gap in how likely individuals were to be in paid work during lockdown by between 2 and 7 percentage points. While their findings suggest that mothers' jobs may have been less structurally vulnerable to COVID-related demand shocks than those of fathers, our evidence does not support this proposition. These differences could be related to the timing of data collection (they study the first lockdown, a couple of months into the pandemic crisis, while we focus on what happened one year after that), or the composition of the sample (they use a sample of parents of school-age children while we use four distinct one-year cohorts), or the different level of detail on job characteristics that exists in the two data sources (their data was collected online through a bespoke survey and contains less detail on the industry and occupation of pre-pandemic jobs than ours).

The coefficients for those who do not live with either partner or children are similar for men and women and are not significantly different from each other. The raw gaps for these groups and the largest in magnitude (12 percentage points for women and 13 for men), showing that those who do not live with children are much less likely to remain in employment than men with partners and children. The differences diminish and are no longer statistically significant when accounting for basic controls. As shown in Appendix D, consistently with previous studies, younger people of both sexes were more likely to be adversely affected (see for example Cotofan et al, 2021). Job adjustment makes little difference once basic controls are

Figure 3: Gender by household gaps in probability of remaining in employment



Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Men partnered with children; full regression results are available in Appendix D.

accounted for. Conversely to what H1 would suggest, these results indicate that for those who do not live with partner or children, basic controls and in particular age are main drivers behind the differences.

Both men and women who live with a partner but no children are significantly less likely than men with partners and children to remain in employment, with gaps estimated at 5.7 percentage points for women and 4.4 for men. Similarly in this case, once basic controls are accounted for, the differences are no longer statistically significant. The job adjustment makes little additional difference in terms of further attenuating the differences.

Furthermore, we do not observe any significant gender difference in the probability of remaining in employment once pre-pandemic job characteristics are accounted for, irrespective of household type. This is important in distinguishing between the evidence for H1 and H2. If conditioning on job characteristics has led to a diminution of gender differences in couple households but not for those who do not live with a partner, this could have been consistent with H2 implying that women's jobs are probably less-well paid or are more likely to be part-time and therefore provided less contribution towards the household income. Instead, we find the effects of including job characteristics are common across all household types, irrespective of the presence of partner or children lived in the same household. This is more consistent with what might be expected under H1.

Lone mothers have a lower probability of remaining employed than men with partners and children. This raw differential shifts marginally with the inclusion of

basic controls, but the small sample size means the confidence intervals around the point estimates are large.

Figure 4 shows the differences between the same family types as described earlier, but for two alternative outcomes, namely whether the respondent remained in active paid work and whether they continued working in the same job they held prior to the pandemic. The estimates for these two outcomes follow similar patterns. In the case of partnered women with children the raw differences are statistically significant and broadly similar across the two outcomes, estimated at ~10 percentage points. The basic adjustment does not attenuate these differences by much. However, once the job characteristics are accounted for the differences are attenuated, as expected under H1. Despite this, women are still less likely to be in active paid work or in the same job than otherwise comparable men.

For couples with no children and those people who do not live with either partner or children, the raw differences are substantially attenuated by basic adjustment, making the adjusted estimates either not different or borderline different from partnered men with children. All gender differences become statistically borderline non-significant when accounting for job characteristics, irrespective of household type.

Figure 5 shows the probability of being furloughed across the household types. What is the most striking is that women appear to be more likely to be furloughed than men, irrespective of household type, and the differences compared to the men with children and partners remain statistically significant even controlling for basic controls and job characteristics.

Women with children and partners are the most likely to be furloughed, and they remain statistically more likely to be furloughed even when accounting for their pre-pandemic job characteristics, with the estimated difference of 3.8 percentage points. This implies that, for those who live with partner and children, women are more likely to be furloughed than otherwise comparable men, regardless of the job they held prior to the pandemic. Although job adjustment reduces gender differences, they are not fully attenuated implying H1 does not provide a full explanation. When we control for the job characteristics, women in all household types still are more likely to be furloughed than partnered men with children.

Men who do not live with partner or children appear to be the only group that is less likely to be furloughed than men with children. Although the raw differences are not statistically significant, they increase with subsequent adjustment, indicating that this group is less likely to be furloughed than otherwise comparable men who live with partner and children. We do not find any significant differences among men who live with a partner but have no children.

We expect that there may be significant differences among those whose jobs were and were not critical, we conduct supplementary analyses stratified by our estimate of key worker status. These are shown in Appendix H. These show that the gaps were smaller among those working in occupations likely to contain key workers and that these were substantially reduced with basic adjustment. However, even among those who worked in key occupations significant gender gaps remain after adjusting for job characteristics for those partnered with children, with women being more likely to be furloughed and less likely to remain in the same job. This implies that even among those whose occupations were likely to be critical during the pandemic, women were more likely to be furloughed.

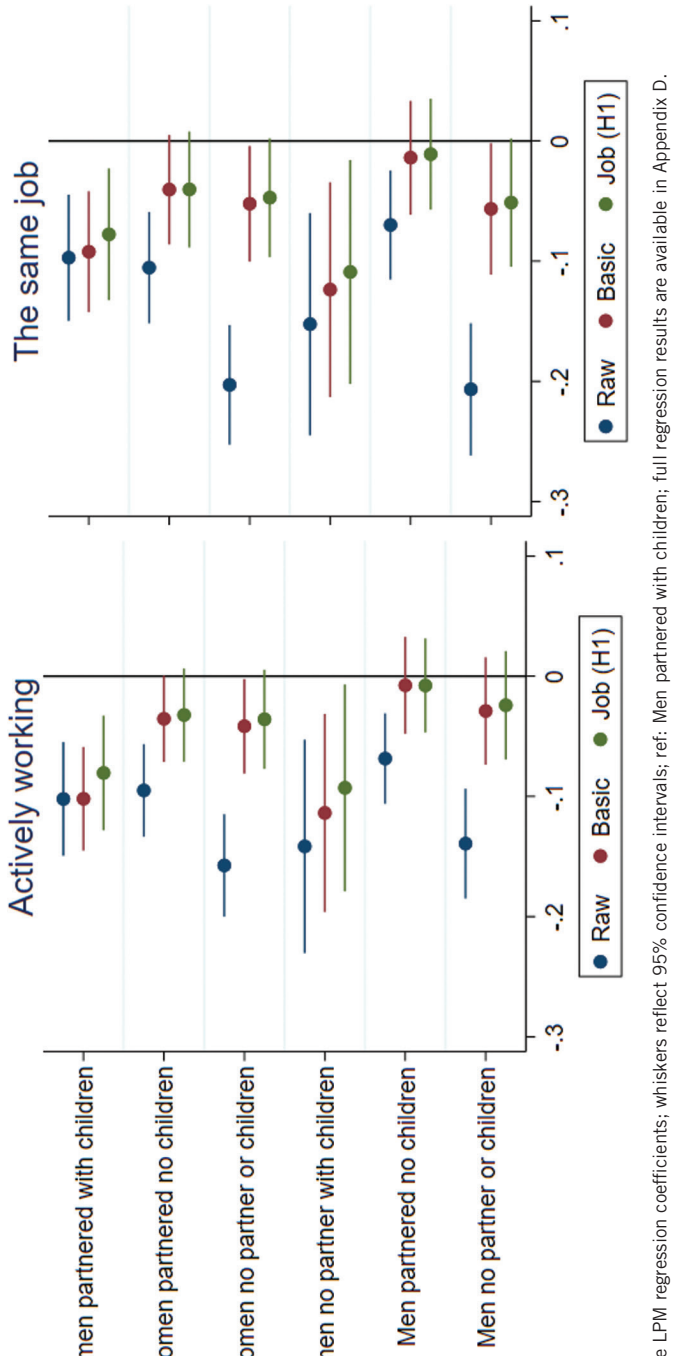
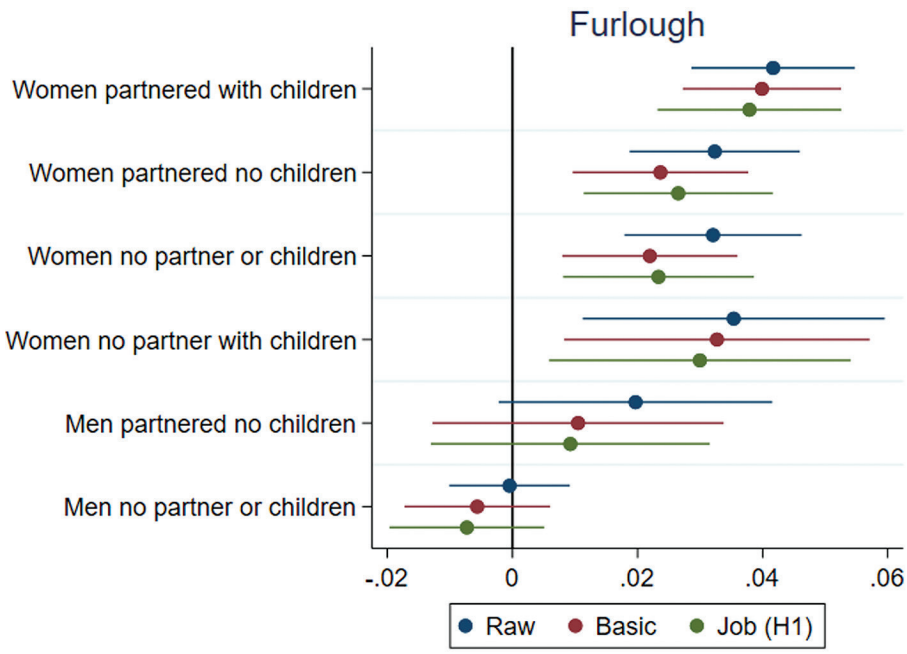


Figure 4: Gender by household gaps in probability of being active in paid work and remaining in the same job

Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Men partnered with children; full regression results are available in Appendix D.

Figure 5: Gender by household gaps in probability active paid work and remaining in the same job



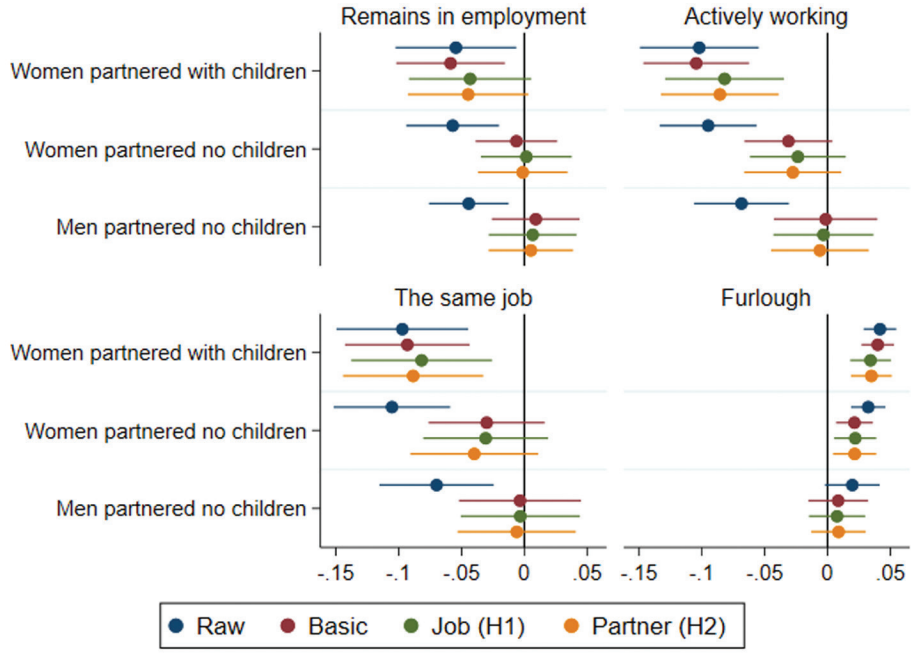
Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Men partnered with children; full regression results are available in Appendix D.

Given that we find significant differences for women in all household types regardless of their job characteristics, we conduct further analyses to test H2 and H3 for two subgroups: those who have a partner and those who have a partner and children. These are designed to test whether taking into consideration the job characteristics of their partner and the scale of childcare responsibilities further attenuate gender differences.

The results for respondents with partners are shown in Figure 6. With this subsample we see similar patterns to those observed in the previous figures: job adjustment narrows gender differences between women and men who are partnered with children, but significant gaps in the rates of active, paid work and the furlough remain. Furthermore, basic adjustment appears more relevant for those with no children. We find that adjusting for partner's job characteristics makes little difference to previous estimates: partnered women with children are still significantly less likely to be actively working, remain in the same job and more likely to be furloughed. While for women with partner and no children gaps are not significant once we account for their job characteristics, significant gaps in their probability of being furloughed remain even after adjustment for partner's job. This provides little support for H2.

To test whether these differences are driven by the presence of children and whether age of children matters, we turn to the subset of respondents who have children as well as a partner. These are shown in Figure 7 and reveal that even after accounting for partner's job, the number of children in the household and the age of youngest child, we still find statistically significant differences between partnered men and

Figure 6: Gender by household gaps in all outcomes accounting for partner's job characteristic



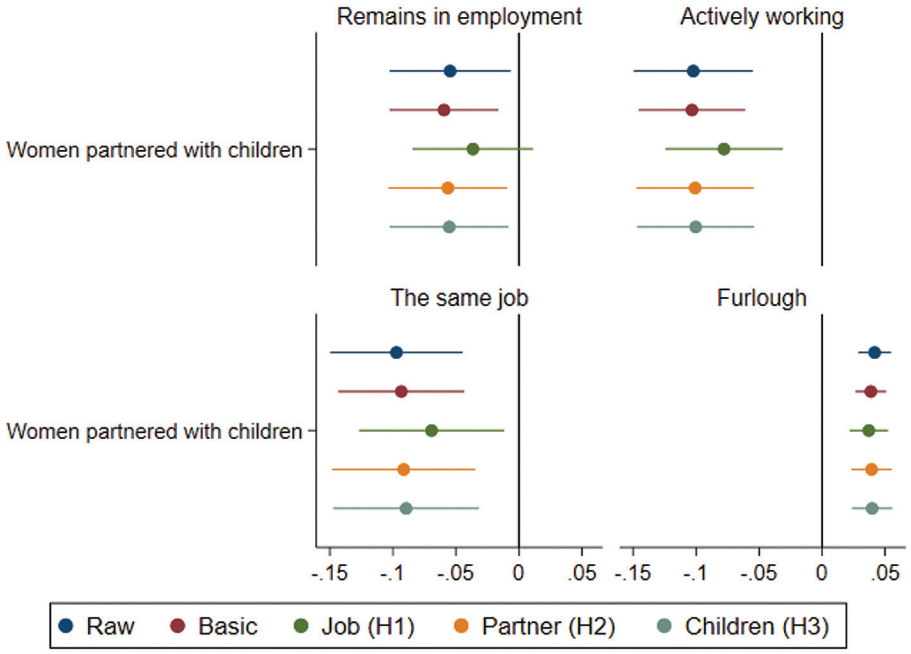
Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Men partnered with children; full regression results are available in Appendix E.

women in terms of their propensity to remain in employment, actively work, remain in the same job and be furloughed. Furthermore, while job adjustment closes the gender gaps in probability of remaining in employment, these became significant once partner's job and the children's characteristics are taken into consideration. This provides little support for H3. The residual gap that remains after all our adjustment could be related to social norms, preferences, and discrimination, which is discussed in more detail in the following section.

Limitations

While our analyses further our understanding of the mechanisms underlying gender differences in labour market participation when confronted by the COVID-19 pandemic in the UK, there are limitations to our study. First, while seeking to account for differences across birth cohorts, we recognise that household composition is strongly related to the age of cohort member (that is, as cohort members get older they tend to move in with partner and have children, who eventually tend to move out of the cohort members' households). In an analysis of a particular time period a cohort is inevitably confounded with life stage and therefore sample sizes in the given cohort are too small to analyse the cohorts by household types separately. Second, there are issues related to the availability of the data. While the remaining gaps could be due to social norms, discrimination, or preferences, as discussed in the final section, these aspects are less straightforward to test empirically since the

Figure 7: Gender and household gaps in all outcomes accounting for children characteristics



Note: Estimates are LPM regression coefficients; whiskers reflect 95% confidence intervals; ref: Men partnered with children; full regression results are available in Appendix F.

information on these has not been collected. Similarly, our data does not include information of team work and while previous waves of the COVID-19 survey collect information on the time spent doing domestic work, this is not the case for the third wave used in this study. Finally, given our data are observational, they have little value in testing causal hypotheses and only associations are discussed throughout in the text. Nevertheless, both cohort members' and their partners' job characteristics have been measured prior to the start of the pandemic and therefore the risk that these have been affected by the pandemic can be eliminated.

Discussion and concluding remarks

In this paper we examine whether the COVID-19 pandemic disproportionately affected women's employment relative to men's in Britain one year after the start of the pandemic. We consider four different employment outcomes and consider both overall gender differences and differences by gender and household type. Unlike much of the previous research we look at outcomes one year on from the beginning of the pandemic, once the economy has partially recovered. In line with previous findings (Collins et al, 2020; Alon et al, 2021; Andrew et al, 2021), the results reveal that women were more likely to be adversely affected then men, especially if they live with partners and children. However, the gaps are much more modest than in previous studies.

We find some support for the hypothesis that women have been affected to a greater extent because they are over-represented in jobs disproportionately affected by

COVID-19 pandemic (H1). The initial indication of this can be seen in Figure 2, as the gender differences in the probability of employment are partially attenuated when we account for the job characteristics. This is further confirmed in Figures 3 and 4, where we consider gender and household type differences. Once we adjust for job characteristics partnered women with children are equally likely to remain employed as their male counterparts. We observe these effects irrespective of household type, which implies that reasons behind the differences are more likely to be related to the characteristics of the jobs typically performed by women and men, rather than the relative labour market position of partners or their childcare responsibilities.

We find little support for the hypothesis that women have been affected to a greater extent because of their labour market disadvantage as compared to their partners (H2) and the scale of childcare responsibilities (H3). Our initial analyses of gender differences, Figure 2, show that adjusting for the presence of a partner in the household makes little differences to gender gaps. Furthermore, even accounting for the partners' job characteristics explicitly, as shown in Figures 6 and 7, and for the age of the youngest child, as shown in Figure 7, makes little difference to previous estimates. This is in line with previous studies that suggest that the choices families made were not entirely driven by the aim of prioritising the work of the partner who earned more (Andrew et al, 2021).

Having accounted for the participant's and their partner's job, as well as the presence and age of children we still find significant differences between men and women, especially in terms of their propensity to be furloughed. These are greater for women with children. Women are less likely to remain in active paid work and more likely to be furloughed regardless of their pre-pandemic job, the job of their partner, the number of children and age of youngest child. This residual gap is probably related to unobserved characteristics, such as social norms, preferences, or discrimination.

Social norms reflect the expectation that looking after children and housework are women's responsibilities to which they are better suited than men. Women may face pressure to look after the children, despite their earnings potential, and to navigate their careers in a way that allows them to combine both work and family roles. Similar pressure may be faced by men in terms of their breadwinner status. In recent years women overtook men in educational attainment (Bryson et al, 2020) and increased their participation in the labour market. While these societal changes are challenging Becker's original idea about efficient household allocation, social norms continue to play an important part. Evidence suggests that women's contribution to household income increases with their relative education (Van Bavel and Klesment, 2017) and that high-earning women, even though they often still did more housework than their male partners, reported a significantly less traditional division of domestic labour than did other women (Lyonette and Crompton, 2015). Social expectations with respect to the role of women are likely to be higher for couples with children; balancing the demands of paid work with childcare is likely to be more challenging for mothers in more demanding jobs. Social normal are also interrelated to welfare state regime implying they can vary by country as well as over time.

Alternatively, the residual gap may reflect preference theory (Hakim, 2000), which posits that women's preferences are a central determinant of life choices, in particular the choice between family life and employment. For example, women

may have chosen to be furloughed because, facing the choice between juggling home-schooling and paid work or the conditions offered under the furlough scheme (that is, not working while still receiving 80% of their pay) they may simply prefer the latter. Although, as already mentioned in the limitations section, we have no indication of preferences in our data, there is a debate in the literature related to whether lower labour market participation by women as compared to men, even in highly educated groups, reflects the preferences of women to undertake the greater share of housework, or whether women are conforming to socially constructed gender roles. For example, Bertrand (2020) shows that in countries where majority of people agree with the statement that 'when jobs are scarce, men have more of a right to a job than women', female labour market participation rates are lower. She argues that this could be because the gender identity norms have been fully internalised and directly shape one's preferences, or because of concerns about the reputational consequences of deviating from the prescribed behaviour. Countering such expectations may be costly and may even inhibit women when deciding how much to invest in education and careers (Adda et al, 2017).

Employer discrimination is another possible explanation of the residual gap. For example, we may consider the possibility that women, rather than volunteering to be furloughed, were forced into it by their employers in greater numbers. These decisions could have been grounded in economic and profit-making reasons, but they could also have been based on inferred statistical characteristics of mothers, stereotypes, or simply favouritism of men. Charles et al (2018), in their study of the effects of sexism on American women, show that sexism lowers women's wages, labour force participation and ages of marriage and childbearing. Although discrimination based on gender is illegal in the UK, the COVID-19 pandemic presented an unprecedented setting. Given that there were few established procedures to challenge unfair workplace culture, the novel context may have reinforced existing prejudices and fixed ideas about gender roles that some hold.

Following the COVID-19 pandemic, the UK observed a strong contraction in labour demand with entire sectors of the economy closed by decree and workers sent home. These changes affected women to a greater extent. Even though this state intervention mitigated the labour market impact of the pandemic disadvantaging women in the short run, women's labour supply is generally more elastic than that of men and their lowered earnings prospects after an unemployment spell are more likely to result in a persistent reduction in labour supply in the long run (Alon et al, 2021). These effects may be long-lasting and jeopardise women's position in the labour market, leading to reinforcement of gender inequalities or even reversal of the progress towards gender equality. While these sectors are expected to reopen fully, eventually, their level of activity may take a long time to return to pre-pandemic levels. Those who interrupted their careers or took a step back may find it challenging to return. While this mainly affects women, it could help if the working arrangements of fathers became more flexible. Workers may have lost skills, experience and promotion opportunities and may be at especially elevated risk of job loss, after the end of the furlough scheme (the CJRS closed on 30 September 2021), and earnings stagnation or contraction upon return. It seems likely that the pandemic was a setback to the secular improvement in women's economic status (Bryson et al, 2020).

Avila and Mattozzi (2020) highlight that inclusive and gender-responsive labour market policies should be prioritised to ensure that the disadvantaged groups do not fall further behind. However, as at the time of writing, the UK government has largely failed to consider gender in its COVID-19 response, despite the many and varied differential impacts of policy interventions on women and men (Wenham and Herten-Crabb, 2021). A briefing by UK Women's Budget Group et al (2021) shows that, a year into the pandemic, many women do not believe their needs have been met by the UK government's responses. This feeling is even more widespread among women who already were experiencing disadvantage and discrimination, potentially exacerbating social inequalities. Future policy initiatives should ensure that those who were unable to work during the pandemic are reinstated into employment as soon as circumstances allow them to do so safely. With increased prevalence of remote working, decreasing stigma associated with working from home, and more and more business moving their operations online, policy initiatives ought to consider changing realities of the world of work.

In particular, the policies should focus on the most vulnerable groups. Our research, in line with other recent studies, shows that lockdown had more adverse effects on women and younger adults. Many younger people have lost potential opportunities for employment and skills development, while many women have experienced the double burden of navigating paid work and childcare. Future policy initiatives should be inclusive and mindful of the life course scarring effects that economic downturns have on these groups and aim at ensuring that the divide does not increase further. These long-term, forward-planning policies should also focus on the groups that are at higher risks of 'falling through the cracks'.

Notes

[1] All appendices can be found at https://figshare.com/articles/journal_contribution/Appendices_to_Exploring_the_Reasons_for_Labour_Market_Gender_Inequality_a_Year_into_the_Covid-19_Pandemic_Evidence_from_the_UK_Cohort_Studies/22137779.

[2] Based on the list available at: https://www.gov.uk/government/publications/coronavirus-COVID-19-maintaining-educational-provision/guidance-for-schools-colleges-and-local-authorities-on-maintaining-educational-provision.

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Data availability statement

The first author takes the responsibility for the integrity of the data and the accuracy of the analysis. Data has been collected by the Centre for Longitudinal Studies (CLS) and can be accessed at https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=8658. Data should be cited as: University College London, UCL Institute of Education, Centre for Longitudinal Studies (2021) COVID-19 Survey in Five National Longitudinal Cohort Studies: Millennium Cohort Study, Next Steps, 1970 British Cohort Study and 1958 National Child Development Study, 2020–2021 [data collection], 3rd edition. UK Data Service. SN: 8658, http://doi.org/10.5255/UKDA-SN-8658-3

Experimentation on humans and animals statement

This study is based solely on secondary data and no experiments were conducted.

Conflict of interest

Joshi is the Executive Director of the Longitudinal and Life Course Studies, but currently on temporary leave from the role.

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