The following paper was researched and written as part of LSE GROUPS 2022.

LSE GROUPS takes place during the final fortnight of the LSE summer term. Undergraduate students are placed in small groups; these are cross-year, interdisciplinary, and group members do not know one another in advance. Each group must then devise its own research question, and carry out every stage of a small-scale research project in less than two weeks.

LSE GROUPS is part of the LSE commitment to students learning through enquiry, and developing the skills for knowledge creation.

The overall theme of LSE GROUPS 2022 was *Resilience and the 'New Normal'*.

This paper was submitted on the final Thursday afternoon of the project. Students then presented their work at a conference, on the closing Friday.

More information on LSE GROUPS, and other papers.

Papers are presented as submitted by the students, without corrections.

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She-Cession or *She*-Covery?
The impact of COVID-19 on the gender wage gap in industries using different work modes (hybrid or in-person) in the UK

LSE Groups 2022, Group 7

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Word Count: 3114

Abstract

Our research examines the effect of the COVID-19 pandemic on the Gender Wage Gap (GWG) in the UK. Using data from GOV UK database and regression analysis, we model the role of pandemic-induced effects on wage gaps among industries using different work modes (hybrid/in-person). We show that through the pandemic the gender wage gap has actually decreased, albeit at a slower rate for in-person sectors. The number of women in the top income quartile is one of the main reasons in explaining this outcome. No statistically significant relationship was found between gender wage gap and different work modes, hence an increase in GWG is most likely a short-term fluctuation. Nonetheless, our findings support that labour market employment penalties (especially among disadvantaged women employed in sectors most affected by COVID-19) may last longer than the pandemic. This could have implications for gender inequality in the long-run. Policy conclusions drawn about the pandemic provide a new opportunity to re-envision current labour market practices and to rectify structural gender inequalities.

Keywords: ***COVID-19, UK, wage gap, employment, gender, inequalities, she-cession***

1. Introduction

The COVID-19 pandemic has raised new barriers to building inclusive and prosperous economies/societies - with implications of economic recession for gender equality attracting substantial research attention. Disruption of economic activity and work-from-home may create disproportionate effects on employment opportunities and the wage gap among women and men. This could be reflective of pre-existing gender inequalities. Further, the pandemic has accelerated automation and digitalization - creating new parameters for the wage gap to exist in. These trends have led to concerns that COVID-19 can generate further gender inequality across labour markets, economies and societies.

While emerging literature focuses on the adverse effects of the COVID-19 crisis on employment and pandemic-induced "she-cession" (Alon et al, 2020), literature still neglects to investigate the potential influence of different working modes on the GWG. Given the importance of investigating this area to gender equality and welfare within the workplace, we hope to provoke further research through our report allowing for the design of policy responses that target individuals most affected by the adverse impacts of the pandemic. Therefore, our research seeks to answer the question: ***How did the gender wage gap change using different work modes as a result of COVID-19 in the UK?***. Choosing this specific research question is driven by our interest in contributing towards policies that would alleviate the negative impacts of GWG drivers.

To do this, we provide a comprehensive empirical assessment of the change in gender wage gap during the COVID-19 pandemic among different work modes (hybrid/in-person) using two measurements: the difference in average earnings of men and women across a workforce and the change in percentage of women in top payment quartile over the last three years (2019-2021). We complement this with existing literature on major drivers of gender disparities to identify how characteristics of different working modes could potentially exacerbate existing GWGs.

The rest of the paper is structured as follows. Section 2 situates the literature on the GWG and COVID-19 within the local context. Section 3 discusses the methodology adopted. Section 4 presents the results of our empirical assessment. Section 5 provides a discussion of results. Finally, Section 6 will conclude the paper.

2. Literature Review

2.1. COVID-19 and Employment: Stylized Facts

Prior to the pandemic, long-standing gender differences in sectors, occupations and wages existed. This was evident across a variety of measures:

- 79% of occupations within the UK had a gender wage gap (Smith, 2019).
- Female employees were more likely than male employees to be working in jobs paying the National Minimum Wage - with low-paid women more likely to remain stuck in low-paid jobs compared to men. (Francis-Devine et al., 2022).

The pandemic caused severe disruptions to the labour market. According to the IFS, women were more likely to be employed in sectors that were "shut-down" due to lockdown, such as hospitality, restaurants, retail and arts/leisure services. According to Figure 1, workers who were impacted by this were predominantly female, young and low-paid.

Figure 1 - Share of workers in shut-down sectors (Blundell et al., 2020)

2.2 Reasons behind GWG

Most literature focuses on three systemic reasons for the existence of the gender wage gap.

i) Child-Caring Responsibilities

It has long been acknowledged that women undertake more household/childcare tasks than men, often irrespective of their employment status. 2014 ONS figures reveal that women undertake between "26 to 30 hours of unpaid home labour per week", against men's 16 hours. This labour is valued at 1.01 trillion GBP or 56% of the 2014 GDP. (ONS, 2016) During initial COVID-19 lockdowns, Sevilla & Smith (2020) found that women in remote work, regardless of their paid employment hours, consistently contributed to an even larger proportion to childcare and homemaking throughout the pandemic period. Cross-country differences are also in line with this trend - with similar data being recorded in Italy and USA (Del Boca et al., 2020; Zamarro & Prados, 2020).

ii) COVID-19's Effect on Employment Structure

A second potential driver of inequalities is the asymmetric effect of COVID-19 on employment. Specifically, professions affected by lockdowns which were perceived as unessential saw pandemic-specific alterations in wages (Zinovyeva & Tverdostup, 2021) A gendered occupational segregation

was also present, as women's high representation in sectors which were hit hardest by the pandemic translated into larger declines in employment among women than men. Specifically, 24% of women were part of higher-earning, higher-valued professional occupations, while 44% of women were employed as the lower earning and less highly regarded roles like nurses, teachers, or other educational professionals (Francis-Devine et al., 2022). Furthermore, the UK parliament found a 5% disparity between the distribution of senior leadership roles among genders (ibid), which indicates a large overall gender wage difference within sectors/specialisations. All these factors contributed to the she-cession, with women's income falling disproportionately compared to men.

iii) The role of remote-work

With lockdown and strict social-distancing measures, work from home became a crucial characteristic amongst jobs. However, adaptability to remote work is largely determined by specific features of a job. Avdiu & Gaurav (2020) state that occupations which cannot easily be adapted for remote work tend to concentrate in the lower earning percentiles, which also coincides with the concentration of women in lower earning sectors. According to Smithson et al (2004), women who took on work-from-home opportunities to combine flexible working with other caring commitments damaged their career prospects and had clear impacts on current and future salaries, reinforcing the GWG by generating motherhood penalties (Weeden, 2016).

Conversely, empirical evidence on the effects of remote work remains inconclusive - with some studies reporting drops in productivity while others finding evidence to support the increase in productivity, most apparent for women (Angelici & Profeta, 2020). These may translate to higher bonuses/promotions to better paid positions, potentially reducing the GWG.

As COVID-19 has potentially both exacerbated and reduced the GWG, it becomes important to look at a case-by-case basis to identify which effect was stronger, especially in areas like the UK where case studies have not been systematically undertaken.

3. Methodology

3.1 The Approach

To investigate our research question - how did the GWG change among different working modes - a quantitative approach is utilised as it produces a comparable analysis with an accessible interpretation for a wider audience. Moreover, the GWG can be coded as a quantifiable variable, facilitating quantitative analysis. Moreover, numerical values lend themselves to a straightforward comparison which helps pinpointing which industries experienced an increase, decrease or no change in GWG. Conclusions can then be drawn on whether industries that switched to remote or hybrid work as a whole experienced any changes.

3.2 The Data Set

Our data is the 2022 version of the GOV UK Gender Pay Gap Service, which provides published figures comparing men's and women's average pay across the organisation - categorised into sectors. Our approach includes several components. Firstly, we selected 10 industries for investigation - 5

industries that stayed mostly in-person (Manufacturing, Retail, Construction, Arts & Entertainment, and Transportation) and 5 industries that implemented elements of remote/hybrid-work (Financial services, Education, IT & Communication, Professional Scientific & Technical Activities and Administration). The classification of work mode for industries was based on assumptions. Within each sector, 100 companies were chosen using random sampling. This sampling method was used for its simplicity and ability to remove selection bias. Further, data which could be obtained in two weeks without the need for special licensing from the Department of Statistics was not granular enough for systematic sampling.

Then, a spreadsheet was compiled - consisting of companies sorted by ascending order of percentage of women in highest-paying quartile. Our data-set consisted of data for years of 2019/20, 2020/21 and 2021/22. In our analysis, we excluded several companies from our data-set i.e companies that used furlough extensively during the pandemic period which exempted them from reporting, or trusts/estates which were often set for the purpose of tax-reporting and tend to have limited number of employees. Therefore, our data was derived only from companies which had reports of all three time periods to avoid missing values and to also demonstrate pre-pandemic and pandemic-induced effects on GWG.

3.3 The Model

To analyse the data, Excel was used to produce Bar Charts, Box Plots and Line Graphs. Analysis was done as a longitudinal study of changes in GWG over 3 year periods in the same companies. To complement the analysis, the following multiple variable regression model was run using STATA:

$$\Delta GWG = \alpha + \beta work\ mode + \gamma \Delta women\ in\ top\ pay\ quartile + \delta \Delta bonus\ pay\ + \varepsilon$$

where:

Variable	Type	Definition
ΔGWG	Dependent Variable	dependent variable, i.e. change in mean Gender Wage Gap (between 2019/20-2020/21, 2020/21-2021/22 and 2019/20-2021/22)
α	Intercept	when $work\ mode$, $\Delta women\ in\ top\ pay\ quartile$ and $\Delta bonus\ pay$ are 0
$work\ mode$	Independent Binary Variable	hybrid or in-person work mode, work mode =1 if hybrid, work mode =0 otherwise

$\Delta women\ in\ top\ pay\ quartile$	Independent Continuous Variable	change in percentage of women compared to men in top pay quartiles (between 2019/20-2020/21, 2020/21-2021/22 and 2019/20-2021/22)
$\Delta bonus\ pay$	Independent Continuous Variable	change in bonus pay (between 2019/20-2020/21, 2020/21-2021/22 and 2019/20-2021/22)
β	Coefficient	ceteris paribus relationship between $\Delta Gender\ Wage\ Gap$ and $work\ mode$
γ	Coefficient	ceteris paribus relationship between $\Delta Gender\ Wage\ Gap$ and $\Delta women\ in\ top\ pay\ quartiles$
δ	Coefficient	coefficient, i.e. ceteris paribus relationship between $\Delta Gender\ Wage\ Gap$ and $\Delta bonus\ pay$
ε	Coefficient	error term

*Note: In the model, we add $\Delta women\ in\ top\ pay\ quartile$ and $\Delta bonus\ pay$ as our control variables.

This method has several benefits. Firstly, data is derived from GOV UK, which means that the database is reviewed by the government and is reliable. Secondly, we utilise a large sample size of 1000 companies which is representative of the current labour market situation. Lastly, our method enabled the usage of multiple data analysis softwares - Excel, STATA and Python.

However, there are several limitations to consider in our methodology. First, there are validity issues with the data collected as it was self-reported by employers for the GOV UK database. Second, the use of mean values for analysis could be problematic, especially if the data contains extreme values which can skew the results. This limitation is also applicable to the linear regression model, which computes a skewed coefficient due to this issue. Lastly, the omission of certain industries from the analysis due to time-constraints could mean that the results we obtain might not be generalisable or representative of the actual GWG within all industries.

4. Results

4.1 Figures

In this section and in light of our research question, we firstly look at the general trends in the GWG using graphs, then we perform regression analysis to identify whether there has been a significant change in GWG among different working modes.

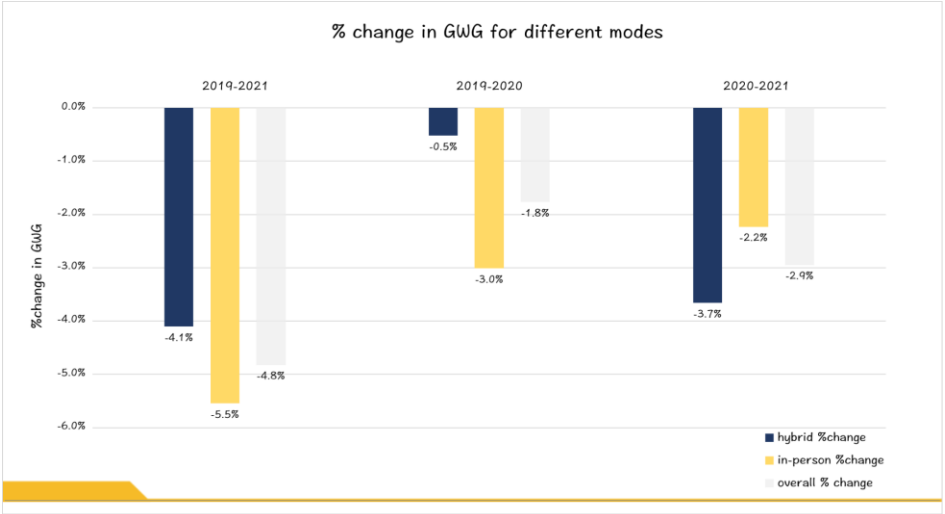

Figure 2 - % change in GWG for different modes

The bar chart above illustrates a decrease in GWG in both between 2019-2020 and 2020-2021, with the latter time-period experiencing a greater decline of 2.9%. There is also an overall decline of 4.8% from 2019 to 2021. Both working modes show a decreasing GWG. Sectors using an in-person working mode experienced a greater decline in the wage gap, compared to hybrid mode between 2019/2021 and between 2019/20. Although, in 2020-2021 an opposite trend was evident.

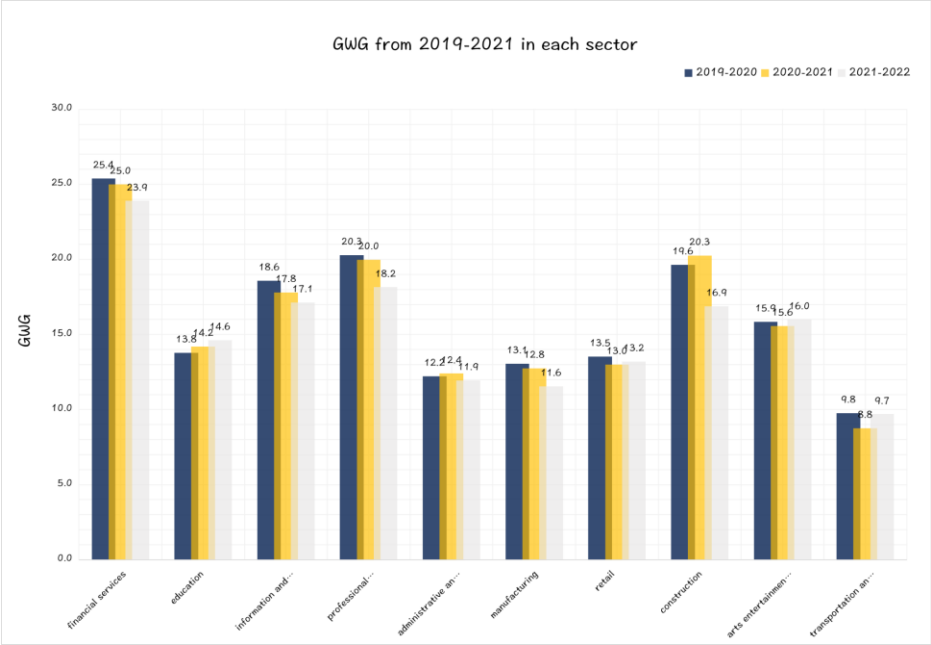

Figure 3 - GWG from 2019/2021 within different sectors

This figure breaks down our findings into different sectors, representing the GWG in each sector. It is evident that four sectors using hybrid mode showed a decrease in GWG from 2019-2021, while the Education sector experienced an increase from 13.8% to 14.6%. For in-person sectors, three showcase a decrease in GWG, and two stay almost the same.

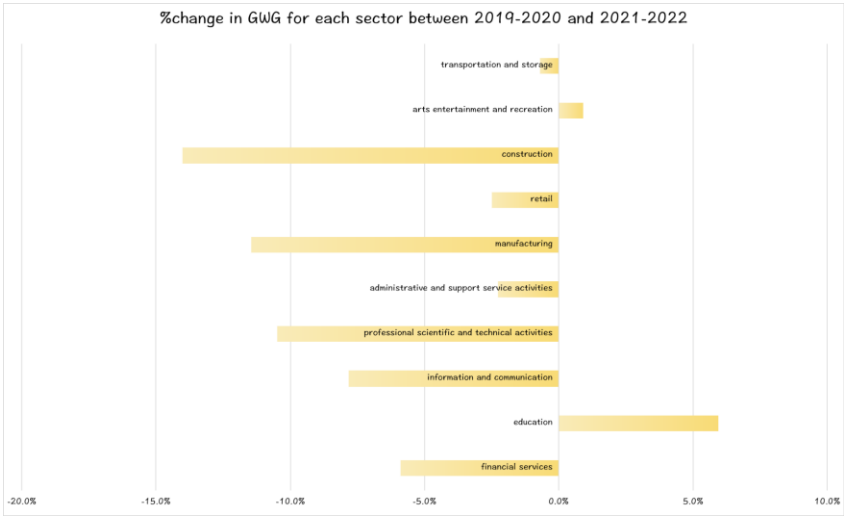

Figure 4 - % change in GWG for each sector between 2019-2020 and 2021-2022

Looking at the percentage change in GWG for each sector during the period 2019-2021 (with top 5 sectors using in-person mode), it is evident that all sectors had a decline in percentage change in GWG except arts entertainment & recreation (in-person) and education (hybrid). Conversely, construction (in-person) and manufacturing (in-person) sectors experienced the greatest drop of around 14% and 12%, respectively. The breakdown of change year-by-year is shown in the appendix.

4.2 Regression Analysis

To identify the causal factors for the change in GWG and to identify whether our results are statistically significant, we run a regression model using STATA. Work mode was treated as a binary variable with a value = 1 if the company was in hybrid/remote work mode and with a value = 0 if the company stayed in-person. Coefficient of work mode being positive when the work mode = 1, means that the GWG increases with the hybrid mode which proves our assumptions. The regression model equations are shown below:

1. $\Delta GWG = -0.342 + 0.248\, work\ mode - 0.342\, \Delta women\ in\ top\ pay\ quartile + 0.101 \Delta bonus\ pay$
2. $\Delta GWG = -0.605 + 0.171\, work\ mode - 0.225\, \Delta women\ in\ top\ pay\ quartile - 0.002 \Delta bonus\ pay$
3. $\Delta GWG = -0.926 + 0.319\, work\ mode - 0.352\, \Delta women\ in\ top\ pay\ quartile - 0.002 \Delta bonus\ pay$

From the regression model, during the period of 2019-2021 - we find that for sectors using hybrid mode, the change in GWG increased by 0.248 units (percentages of GWG) - compared to those using in-person mode (as the coefficient of work mode is 0.248). Similarly, for periods of 2020-2021 and 2019–2021, sectors using hybrid mode experienced a change in wage gap of 0.171 units and 0.319 units respectively - compared to those using in-person mode. As demonstrated by the STATA outputs (Figures 4-6 in the appendix), the p-values show that coefficients are insignificant using any reasonable significance level. This motivated exploring one of the control variables as the leading cause for the change in GWG.

In our STATA output, we find that the control variable "*change in percentage of women in top pay quartiles"* is statistically significant. To demonstrate the relationship between change in GWG and this variable, we produced the plot below using Python.

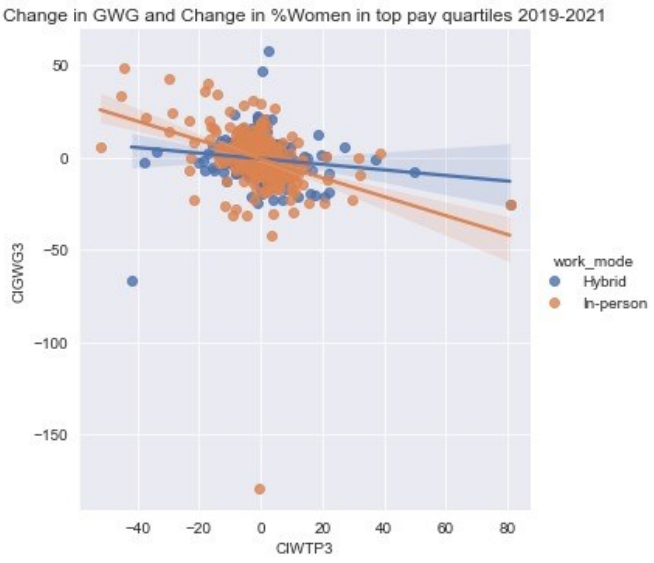

Figure 5 - Change in GWG & Change in % of Women in top pay quartiles from 2019-2021

The scatter plot shows how the % change in number of women in the top paying quartile affects the change in GWG. The line of best fit drawn comparing hybrid with in-person sectors showcases that the % change in number of women in the top earnings quartile has a more drastic impact on change in GWG within in-person sectors. Same % increase in women in the top earnings quarter is associated

with a bigger decrease in GWG in in-person sectors compared to hybrid work, which is showing only a small decrease in GWG with the opposite also being true.

5. Discussion

Our findings suggest that the relationship between GWG and different working modes is not statistically significant. However, the regression analysis shows a statistically significant relationship for the variable of proportion of women in the highest earning jobs in each sector. Specifically, the more women in this quartile, the higher the decrease in GWG. In figure 5, we can see that for the same amount of increase in women in top pay quartiles, remote industries featured a smaller decrease in GWG, suggesting that this was the factor slowing down the closing of the GWG there.

Remote work can contribute to the positions women are placed in through several mechanisms: Firstly, there is evidence that women are disproportionately placed in low-earning, low status positions due to systemic factors (e.g stereotypes, additional household duties or limited opportunities for education and professional ascension) (Breyer et al., 2020). This effect may indicate that the mode of work perpetuates existing drivers for the glass ceiling, or a disadvantage in the proportion of women in high earning positions (Purcell et al., 2010). This inability to rise within the ranks and increase earnings, in turn, influences the GWG.

Secondly, in the second part of the pandemic - 2021 onwards , companies that worked fully hybrid allowed employees to return to the office to a limited extent as part of hybrid work schemes. At this point, women began opting for less days in the office, creating a new mechanism to perpetuate the wage gap. Their choice to work remotely is often associated with less commitment and productivity. This perception enhances status-based discrimination from employers. Status-based discrimination manifests itself in the assumption that women are inherently less capable in taking on leadership roles as a result of social stereotypes (Gunther et al., 2010). These stereotypes are further enhanced by perceptions of “less-committed women” due to hybrid-working.

Thirdly, Statistical Discrimination also increases (Arrow, 1973). This type of discrimination occurs when information about group averages is used to make conclusions about individuals' productivity according to gender. Due to this type of discrimination being based on 'rational fact' and the high costs associated with remedying imperfect information, it is difficult to discern and combat. As women engaging in remote work are more likely to shoulder a higher share of housework, they are likely to experience more stress and to trade off some of their work responsibilities. This validates the statistic that they are less productive, exacerbating the wage gap.

Remote work also limits the interaction opportunities for women, both with colleagues and with superiors. Remote work tends to focus on carrying out the practicalities of a task rather than forming interpersonal connections. This disconnection leads to the acquisition of less references from co-workers or limited connections with management staff that would otherwise allow a female employee to be considered as a suitable candidate for promotions. The procurement of a higher status role would in turn increase the wages female employees would be eligible for, subsequently narrowing the wage gap.

However, there are several limitations within our findings to consider. Firstly, the aforementioned results are based on average statistics. While average inequalities may remain narrow or unaffected, certain labour-markets may experience a more long-run expansion of gender inequalities - which comes at the cost of female unemployment and low wages. Therefore, drawing conclusions on long-term implications of the pandemic on the GWG requires more data samples of post-pandemic effects and higher data granularity. Secondly, other variables such as sociological or cultural factors could have stronger impacts on the GWG. Lastly, these findings are largely more applicable to a local context (UK labour market) and are more-country specific - in line with most empirical literature studying the relationship between GWG and COVID-19.

6. Conclusion

While empirical research in the field of COVID-19 and exacerbating gender inequalities in the workplace is relatively new, most literature showcases an ambiguous relationship between the changes in GWG as a result of the pandemic. Using a GOV UK Gender Pay Gap database and a regression model, our research has produced two significant findings.

- The relationship between change in GWG and different working modes is statistically insignificant
- The relationship between change in GWG among women in top pay quartiles (control variable) is statistically significant.

So, *She*-Cession or *She*-Covery? We conclude that there is a potential for a slow she-covery. However, the relationship between GWG and different working modes is far from straightforward. Hence, more research needs to be done to investigate these variables. There are several implications from these findings. Considering the effects of long-term persistence of work from home(WFH) attitudes in occupations, this could potentially exacerbate the GWG. However, in the case of a documented decline in GWG, this could also indicate the potential thinning of the glass-ceiling due to hybrid working. These trends are also expected to create cross-country differences. Therefore, while WFH becomes the new normal - it is imperative to consider the potential role of such "collateral effects" on wage inequality and gender inequality as a whole. Our project opens up promising areas for further research to investigate such notions.

On a policy level, our findings suggest a need for additional focus on de-stigmatizing remote work, as this working mode possesses the potential to engage intersectional groups (single mothers, individuals with mobility issues) in paid employment to a greater extent. Coherent to the wider objective of de-stigmatizing remote work, emphasis should be placed on the concern of combining childcare or housework with career commitments e.g making childcare less costly or widely available via the public sector. Furthermore, HR departments within firms should be trained to recognize personal prejudices. Additionally, including more tasks meant to foster interpersonal connections as part of the remote work can lead to the social networks facilitating meritocratic promotion. These suggestions would allow female employees to be viewed as more suited for higher-earning positions, speeding up the decline of the GWG.

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8. Appendix

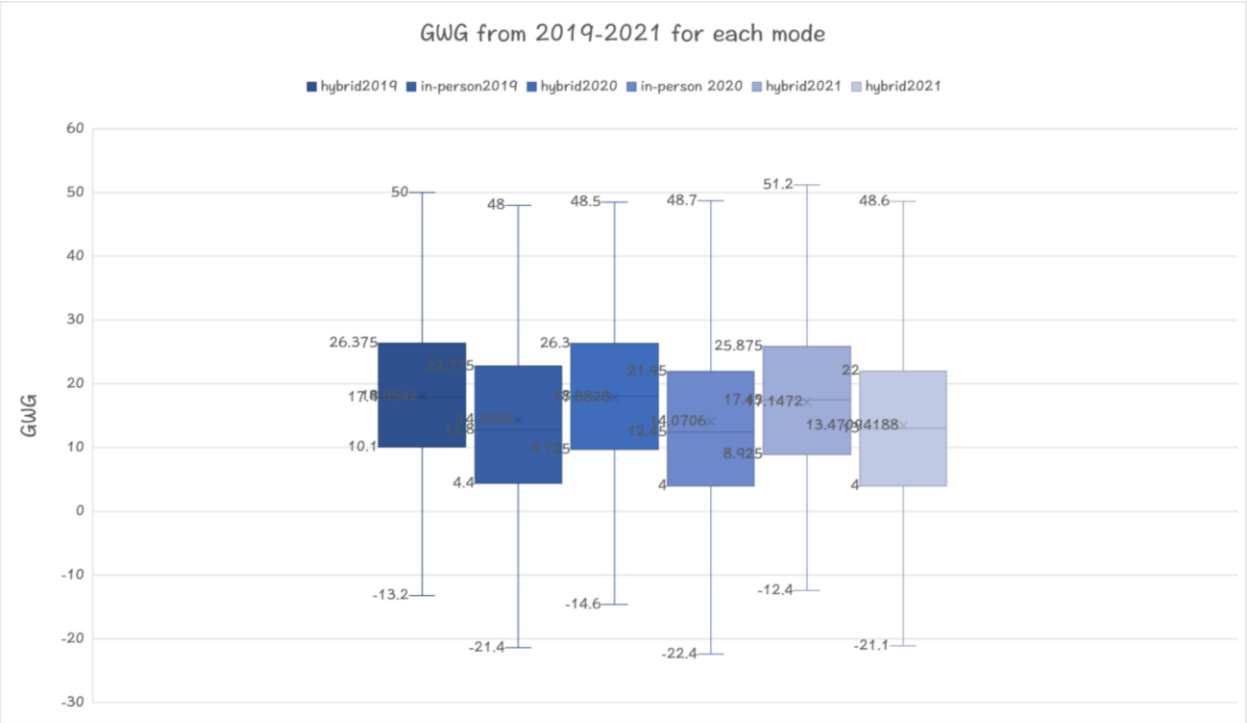

Figure 1: Distribution of GWG within 2 work modes across 3 time periods

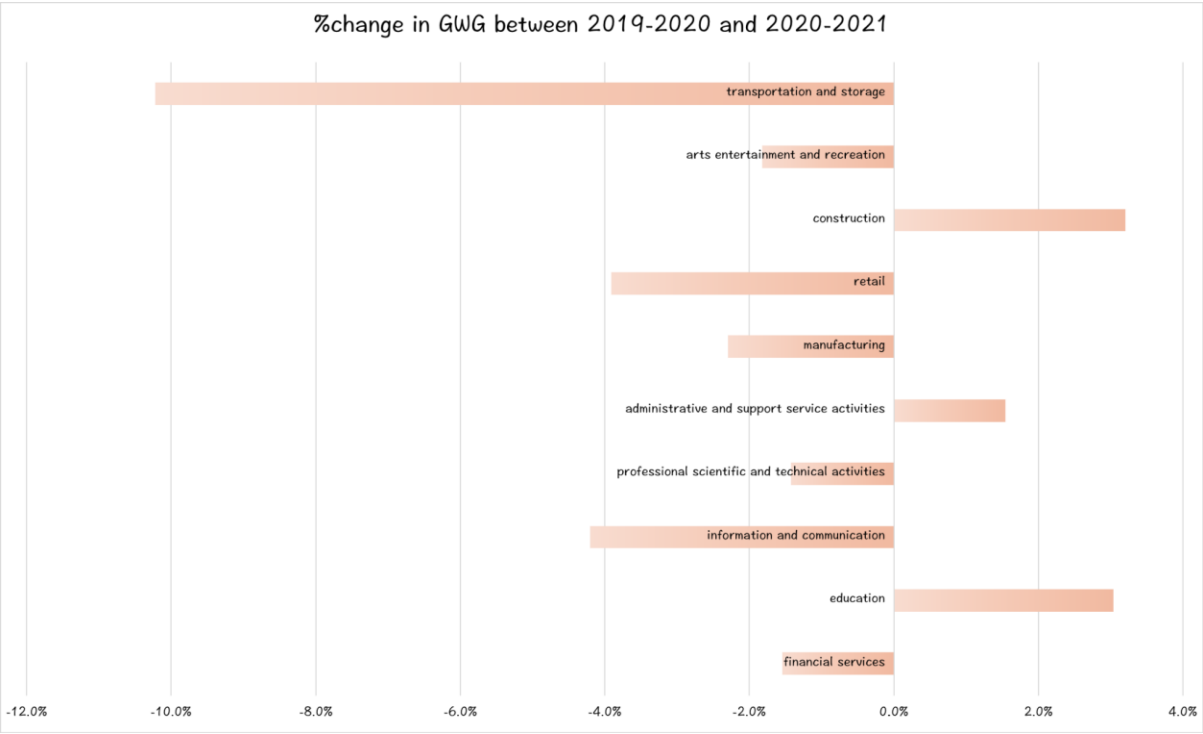

Figure 2: %change between in GWG between 2019-2020 and 2020-2021 across 10 sectors

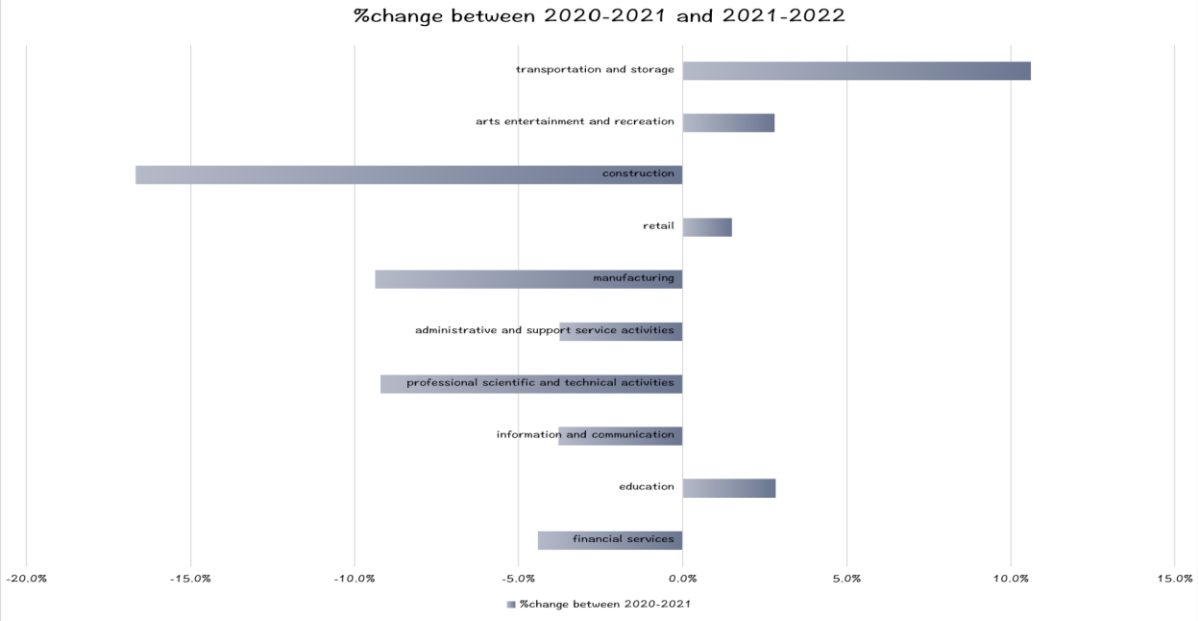

Figure 3: %change between in GWG between 2020-2021 and 2021-2022 across 10 sectors

STATA Outputs:

```
CIGWG1 WM CIWTP1 CIBP1
```

Source	SS	df	MS		
				Number of obs	= 1,00
				F(3, 996)	= 23.7
Model	4310.14547	3	1436.71516	Prob > F	= 0.000
esidual	60377.0912	996	60.6195694	R-squared	= 0.066
				Adj R-squared	= 0.063
Total	64687.2366	999	64.7519886	Root MSE	= 7.785

CIGWG1	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval
WM	.2477168	.4928094	0.50	0.615	-.719347	1.21478
CIWTP1	-.3419621	.0417199	-8.20	0.000	-.4238311	-.260093
CIBP1	.01013	.0075656	1.34	0.181	-.0047164	.024976
_cons	-.3419559	.3482339	-0.98	0.326	-1.025312	.341400

Figure 4: GWG measure during the period 2019-2020

```
CIGWG2 WM CIWTP2 CIBP2
```

Source	SS	df	MS		
				Number of obs	= 1,00
				F(3, 996)	= 9.11
Model	2516.51638	3	838.838795	Prob > F	= 0.000
sidual	91726.1211	996	92.0944991	R-squared	= 0.026
				Adj R-squared	= 0.023
Total	94242.6375	999	94.3369745	Root MSE	= 9.596

Figure 5: GWG measure during the period 2020-2021

```
. reg CIGWG3 WM CIWTP3 CIBP3
```

Source	SS	df	MS	Number of obs	=	1,000
				F(3, 996)	=	27.97
Model	8623.55175	3	2874.51725	Prob > F	=	0.0000
Residual	102362.29	996	102.773384	R-squared	=	0.0777
				Adj R-squared	=	0.0749
Total	110985.842	999	111.096939	Root MSE	=	10.138

CIGWG3	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
WM	.3187796	.6424036	0.50	0.620	-.9418402	1.5794
CIWTP3	-.3523491	.0384792	-9.16	0.000	-.4278586	-.2768395
CIBP3	-.0017962	.0037883	-0.47	0.635	-.0092302	.0056377
_cons	-.9263941	.453723	-2.04	0.041	-1.816757	-.0360314

Figure 6: GWG measure during the period 2019-2021