




## **EC3400 Third Year Economics Dissertation**

*'What are the post-pandemic implications of remote work and hybrid work models on income?'*

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**Abstract**

The advent of the COVID-19 pandemic precipitated an unparalleled global shift towards remote and hybrid work models, creating a need to reassess the economic landscape of the labour market. This dissertation, titled "What are the post-pandemic implications of remote work and hybrid work models on income?", ventures into the economic ramifications of this shift, specifically its impact on income levels across various sectors. Anchored in the context of the United Kingdom, with a concentrated analysis on the Greater London area, this study leverages a dataset of job listings pre- and post-COVID-19, compiled through web-scraping techniques from leading job platforms Reed and Indeed. The dataset, encompassing over 21,828 observations, underwent rigorous cleaning and standardization processes to align with the study's analytical framework, focusing on concrete, quantifiable salary figures. Our final dataset, despite being reduced, was complete, containing no missing data, with an array of relevant variables.

At the heart of this investigation lies the hypothesis that the transition towards remote and hybrid work models in the post-pandemic era has instigated significant changes in income levels. This hypothesis suggests that remote work opportunities correlate with higher mean incomes, particularly in sectors that have more seamlessly adapted to such arrangements. To explore this hypothesis, the study employs a variety of econometric models, including Ordinary Least Squares (OLS), First Stage Instrumental Variable (IV-First Stage), and Two-Stage Least Squares (2SLS), each tailored to dissect the nuanced relationship between remote work arrangements and income levels while addressing potential econometric challenges such as endogeneity and unobserved heterogeneity.

The OLS model serves as the foundational layer of analysis, establishing a baseline relationship between remote work arrangements and income, which is further refined through the IV approach to address the potential endogeneity of the Work From Home (WFH) variable. The 2SLS model, employing PreCOVID\_WFH\_Propensity as an instrumental variable, unveils the causal impact of remote work on income levels, marking a significant advancement in understanding the economic benefits of remote and hybrid work models. These models collectively reveal that remote and hybrid work arrangements have indeed become more economically advantageous in the post-COVID era, with a significant interaction between WFH and the post-COVID epoch indicating a salary premium for WFH jobs in the new normal.

This study not only contributes to the existing literature on labour economics and remote work by providing empirical insights into the income implications of remote and hybrid work models but also introduces new dimensions to the discourse on work flexibility and economic outcomes. The findings underscore the importance of developing inclusive economic policies and corporate strategies that reflect the evolving dynamics of the labour

market, aiming to mitigate income disparities and promote a more equitable work landscape.

As we navigate the post-pandemic world, the insights gleaned from this research aim to play a role in shaping the future of work, offering a robust foundation for policymakers, businesses, and the workforce at large to adapt to the new realities of remote and hybrid work models. This dissertation represents a comprehensive analysis of the economic impacts of these work arrangements on income in the post-pandemic era, marking a significant contribution to the evolving landscape of labour economics and setting the stage for future research to build upon its findings.

## Introduction

The onset of the COVID-19 pandemic marked a seismic shift in the global labour market, catalysing a rapid and widespread transition to remote and hybrid work models. This shift, initially a reactive measure to an unprecedented health crisis, has since evolved into a structural change, reshaping the way work is conceptualized and executed (Baert et al. 2020a). In the USA, recent estimates illustrate that remote workers have quadrupled to 50% of US workforce (Brynjolfsson et al. 2020). Amidst this transition, a critical question emerges: What are the post-pandemic implications of remote and hybrid work models on income? This dissertation aims to explore this question, delving into the socio-economic impacts of this paradigm shift, and examining its implications on income levels across various sectors.

The central question of this study is crucial as it addresses a fundamental aspect of labour economics – income disparities and their potential exacerbation or mitigation in the face of a rapidly evolving work environment. The need to solve this problem is underscored by the persisting uncertainty surrounding the future of work. In a recent paper, Baert et al. (2020b) found that the great majority of employees believe that teleworking (85%) and digital conferencing (81%) will continue after the SARS-CoV-2 crisis, with Facebook and a number of other companies asserting during the pandemic that they will allow many employees to work from home permanently. As remote and hybrid models become more entrenched, understanding their impact on income is essential for policymakers, businesses, and the workforce at large.

As a result of the abrupt increase in WFH arrangements, many studies have investigated the diverse and profound impacts of such a change. These studies, however, tend to fixate on determining the number, or more specifically the type, of jobs which can be completed remotely (Adams-Prassl et al. 2020, Mongey et al. 2020, Dingel and Neiman 2020), failing to account for the nuanced impacts of such arrangements on the distribution of income. The hypothesis driving this research posits that the shift towards remote and hybrid work models in the post-pandemic era has led to significant changes in income levels, with distinct impacts across various job sectors and types. This hypothesis is grounded in the premise that remote work opportunities correlate with higher mean incomes, especially in sectors more adaptable to such arrangements.

The beneficiaries of this investigation are manifold. Employers and employees stand to gain insights into the evolving dynamics of compensation in remote and hybrid work settings. Policymakers and economic analysts can utilize the findings to inform strategies and policies that address income disparities exacerbated or mitigated by these work models, redressing the rapid increase in inequality within Western countries in the last decade (Atkison 2015; Beckfield 2019). Beyond this realm, this research contributes to academic discourse by filling a gap in current literature, particularly concerning the granular economic outcomes of remote work pertaining to income dynamics.

The policy implications of this study are significant. As the world grapples with the aftermath of the pandemic and the consequent shifts in work modalities, understanding the income implications of these shifts is paramount for developing inclusive economic policies and corporate strategies. Our results are based on UK data, specifically London, but can be applied to other developed countries where the nation were forced to re-structure their production process, introducing a more intense and stable dependence on WFH arrangements.

This study aims to add to existing knowledge by providing a detailed, data-driven analysis of industry-specific income variations in relation to remote work adoption. By utilizing a comprehensive dataset of job listings pre- and post-COVID-19, and employing a variety of econometric models to ensure robust outcomes, this research seeks to elucidate the nuanced impacts of remote work on income levels across various sectors. This study will implement and develop models previously applied to data for similar countries; ranging from the function regression method proposed by Firpo et al. (2009) and the modelling of Italian data by Bonacini, Giovanni Gallo, and Sergio Scicchitano (2021), in order to determine the impact of such work arrangements on the income distribution in the UK.

Our paper seeks to contribute to this field by leveraging the web-scraping techniques to accumulate data, enabling the scrutiny of industry-specific income shifts that remote work may have instigated. By integrating this empirical evidence with the theoretical frameworks outlined by key studies, we intend to present a more granular understanding of WFH's influence on income levels.

This research navigates several challenges and limitations inherent in its approach. One primary challenge lies in accurately measuring income levels and categorizing remote work statuses, ensuring that these key variables are precisely defined and consistently applied throughout the dataset. Additionally, the study must address the potential endogeneity of remote work arrangements. Endogeneity refers to the possibility that unobserved factors might influence both the likelihood of a job being remote and its salary level, which could bias our results. The cross-sectional nature of the dataset further complicates this, as it may limit our ability to draw long-term causal inferences. To mitigate these issues, our econometric approach incorporates several strategies. We introduce interaction terms, dummy variables, and instrumental variables in our models to better isolate the effects of remote work on income. Furthermore, we utilize various model specifications, including fixed effects models, to control for unobserved heterogeneity. Each of these steps is aimed at enhancing the robustness and accuracy of our analysis, ensuring that our findings are as reliable and informative as possible.

This dissertation is focused on a comprehensive analysis of the socio-economic impacts of remote and hybrid work models in the post-pandemic era, with a specific emphasis on how these models influence mean income levels. It aims to dissect the variations of these impacts across different job sectors and types, providing a detailed exploration. Additionally, the study delves into the geographical nuances within the Greater London area, examining the interplay between remote work and mean income in this specific context. The ultimate goal is to offer empirical insights that can inform and guide policy and organizational strategies, with an emphasis on mitigating income disparities in the evolving work landscape.

This study, based on job listings data, primarily reflects the changes in income levels as offered by companies in their job postings, rather than the actual income of workers. While this data provides valuable insights into the evolving trends and patterns in the labour market, especially in terms of how companies are adjusting salaries for remote and hybrid work models, it does not directly capture the real income received by employees. Therefore, our conclusions are indicative of shifts in the income offerings in the job market post-pandemic, rather than definitive statements on the actual earnings of the workforce. This distinction is crucial for understanding the implications and limitations of our findings in the broader context of labour economics.

## Review of Current Literature

### **1.1 Introduction and Problem Statement**

In the wake of the COVID-19 pandemic, the swift and widespread transition to remote and hybrid work models has raised critical questions about their impact on income disparities.

This literature review endeavours to meticulously explore this paradigm shift, drawing from a diverse spectrum of scholarly works. Central to our examination are the studies of Nicholas Bloom, Jonathan I. Dingel, Brent Neiman, and Prithwiraj Choudhury, among others, who collectively shed light on the multifaceted effects of remote work. Their research navigates through the intricacies of productivity changes, the differential impacts across various sectors and demographics, and the long-term implications on career progression and earnings.

We aim to uncover how remote work arrangements have potentially intensified income inequalities, considering factors such as geographic mobility, socio-economic status, and briefly discussing gender disparities. The synthesis of these insights will not only contribute to an understanding of the current landscape but also inform future policy directions and organizational strategies in the evolving world of work.

This comprehensive analysis seeks to offer a nuanced perspective on the socio-economic ramifications of remote work, underscoring the need for equitable and inclusive work environments in the post-pandemic era.

### **1.2 Background and Theoretical Foundations**

The concept of remote work, while not new, has seen a remarkable surge over recent years, a trajectory sharply accentuated by the COVID-19 pandemic. "The Evolution of Work from Home", as reported by Barrero, Bloom, and Davis (2023), illuminates this rise with compelling statistics, underscoring a dramatic shift from traditional office-centric models to more flexible, technology-enabled remote arrangements. Concluding that "the big shift will have lasting effects on the structure of wages", whilst also profoundly influencing "the nature and intensity of competition in the labour market". This upswing is rooted in technological advancements ranging from Teams and Zoom to Asana and Slack; changing workforce demographics, and an increasing emphasis on work-life balance.

As often discussed by Nick Bloom (2021), this shift draws from concepts in labour economics and organizational behaviour, which emphasize the evolving nature of work environments, productivity dynamics, and employee well-being. These underpinnings not only elucidate the reasons behind this transition but also frame the ensuing discussions on the socio-economic impacts of remote work, particularly concerning income disparities and workforce inclusivity.

The transition to WFH arrangements carries significant implications for wage structures, influenced by various factors. Firstly, the productivity levels in WFH settings can vary considerably from traditional office environments. Nick Bloom (2021) indicates that remote work can lead to increased productivity due to fewer workplace distractions and a more flexible schedule, potentially justifying higher wages. Conversely, challenges like remote collaboration and home distractions might impact productivity negatively, influencing wage adjustments accordingly. Additionally, WFH arrangements result in savings for both employees and employers. Employees save on commuting costs, lunches, and other expenses associated with office work, which could lead to a revaluation of net income and compensation structures.

For employers, reduced need for physical office space can significantly lower operational costs. This change in the firm's cost structure could result in reallocating resources, potentially allowing companies to offer higher wages or invest in other employee benefits. These dynamics, stemming from the shift to WFH, indicate a complex interplay between employer cost-saving measures, employee expense reductions, and productivity changes, all of which are poised to reshape wage structures in the post-pandemic era.

### **1.3 Analysis of Key Studies**

In the landscape of remote work research, several seminal studies stand out for their comprehensive data collection methods and insightful findings, though they also present areas for further exploration, particularly in the context of income disparities.

Barrero, Bloom, and Davis (2021) paint a striking picture of the WFH landscape, where 40% of respondents in May 2020 were working from home, contributing to 48.6% of all paid working days from May 2020 to March 2021 according to the Survey of Working Arrangements and Attitudes (Barrero et al. 2020–2023; <https://wfhresearch.com/>). This is a staggering tenfold increase from pre-pandemic levels. Their research, which forecasts that 22% of workdays will remain home-based post-pandemic, also identifies a correlation

between WFH incidence and socioeconomic strata, revealing a 55.4% WFH rate among those with annual earnings exceeding \$150,000.

Nicholas Bloom's empirical exploration within a Chinese travel agency firm (Does Working From Home Work? Evidence From a Chinese Experiment, 2013) lends weight to the discourse, quantifying a 13% performance boost upon shifting to remote operations, with home workers showcasing a 3.3% uptick in calls per minute and extending their effective workday by 9.2%, notwithstanding equivalent nominal shift lengths. CTrip was evaluated based on increases in minutes per shift, calls per minute, work satisfaction and decreases in turnover rate.

In Italy, Bonacini, Gallo, and Scicchitano (2021) analyse the INAPP-PLUS and ICP survey data, which contains information on incomes, skills, education level, and employment conditions of working-age Italians, discerning that an augmentation in WFH feasibility, whether the job could be completed at a remote location or not, could lead to an average labour income rise. Specifically, the Italian study noted a significant wage premium in sectors with high WFH feasibility, with employees in these sectors earning an average annual labour income of €27,300 compared to €24,700 in other sectors. However, this potential uplift appears skewed towards male, older, and more educated segments of the workforce, hinting at an intensification of pre-existing labour market disparities.

Further west, Gallacher and Hossain (2020) delve into the Canadian context, where 41% of jobs—51% when wage-weighted—can pivot to remote modalities. Their findings underscore that occupations less amenable to remote transitions have borne the brunt of employment contractions, particularly between March and April 2020. However, this observation is likely influenced by the increased likelihood of survival for remote adaptable jobs (for instance, call centres, Data Scientists, etc) during the pandemic era. Therefore, whilst this study provides an insight into the benefits of a firm being remote adaptable, it should be only taken given the context of the unorthodox pandemic era.

Yet, despite the breadth of these studies, they leave room for a nuanced examination of the enduring implications of WFH on income inequality—particularly across different industries and wage levels, as suggested by Brynjolfsson et al.'s preliminary findings. This gap presents an opportunity for our research to delve into the intricacies of income stratification within the remote work paradigm, aiming to elucidate the socioeconomic impacts of this unprecedented shift in work patterns.

#### **1.4 Research Gaps and Ongoing Debates**

Despite the comprehensive analyses conducted on the impacts of remote work, there remains a critical research gap in the nuanced understanding of how these work arrangements directly affect income levels across various industries.

While existing literature has mapped the broader economic and productivity implications of this shift, the ongoing debate often circles around the sustainability and efficiency of remote work without delving deeply into the granular economic outcomes for employees themselves.

Particularly, there is a lacuna in longitudinal, industry-specific research that tracks direct salary changes attributable to remote work adoption. Most studies have not disaggregated the data to reveal the intricate ways in which remote work might influence salary disparities within and across sectors.

Our research aims to bridge this gap by providing a detailed analysis of industry-specific income variations and examining the direct correlation between remote work and salary trajectories. This approach will afford a more targeted understanding of the income implications of remote work, which has been largely unexplored in the current body of research.

### **1.5 Conclusion and Future Research Directions**

The literature review thus far has illuminated the multifaceted landscape of remote work, its burgeoning presence catalysed by the pandemic, and the consequential socio-economic ramifications. The most significant gap in research lies in the paucity of sector-specific income analysis, a vital aspect when considering the layered nature of remote work's impact.

Within the wealth of research, the work of Barrero, Bloom, and Davis (2021) emerges as particularly pivotal, offering a comprehensive overview of WFH trends and setting the stage for deeper inquiry into income disparities.

Our unique approach, as set out above, not only fills a critical research void but also equips policymakers and corporate strategists with the insights necessary to forge equitable remote work policies that bridge income gaps rather than widen them. Our future research will thus pivot on this axis, aiming to dissect the complex interplay between remote work and income across different industries and demographics.

## **Data Methodology**

### **2.1 Introduction to Data**

Our current dataset is a two-period panel compilation of job listings spanning the pre- and post-COVID-19 eras, labelled accordingly to delineate the timeframes relative to the pandemic's impact. This dataset encompasses an array of variables, ranging from job titles and company names to detailed salary figures and job types. It also distinguishes between remote (WFH) and on-site job opportunities, shedding light on the evolving dynamics of the labour market in response to the global health crisis. In total, there are 21'828 observations.

### **2.2 Data Collection and Source**

The data for this research was collected via web scraping techniques applied to two of the most prominent job listing platforms, Reed and Indeed. The 2023 dataset was scraped from Reed, capturing a current snapshot of the labour market, while the 2020 dataset was obtained from Indeed, providing a retrospective view of the pre-pandemic employment landscape.



Post-collection, the data underwent a cleaning process using Python to ensure consistency and accuracy. This included standardizing job titles, company names, and salary information to a uniform format for comparative analysis. A critical step in the cleaning process was the exclusion of job listings that lacked explicit salary information, such as those described as offering a 'competitive salary.' This decision was made to ensure that our analysis would be based on concrete, quantifiable salary figures, thereby enhancing the reliability of our findings.

By focusing our analysis exclusively on the Greater London area, we aim to harness the unique advantages of this region for a more controlled and indicative study. London, as a major urban labour market, mirrors broader national trends due to its diverse industries and workforce, while its high cost of living and status as a global business hub make it particularly sensitive to shifts in work models like remote and hybrid arrangements. Concentrating on London allows us to control for regional economic factors unique to this area, such as housing and commuting costs, and captures the city's leading role in workplace innovations. This approach not only provides insights into the impact of remote work in a dynamic urban economy but also mitigates variability from regional employment disparities, thus ensuring a fairer comparison and enhancing the robustness of our findings.

To facilitate a comparative analysis across job listings with varying salary disclosures, we calculated average weekly and monthly salaries. This computation was based on the salary information provided, whether per hour or per annum, to create a standardized and comparable salary figure. This conversion was crucial to establish a common ground for comparing salaries across different job types and contractual arrangements, ensuring that our analysis would accurately reflect the income variations within the scope of remote and on-site work arrangements.

Once we had finished collecting our data, we had compiled over 40'000 observations. After cleaning, this has reduced to 21'000 observations, with the main bulk being dropped due to the absence of an income range, and the sub-setting of pre-covid data to only include job listings in the Greater London region. To ensure our data was representative of the workforce, and illustrated a uniform distribution, we specify a range of 10.54/hour - £100'000/annum. This reduced our dataset to over 15'000 observations. This is discussed below.

To facilitate a fair comparison between data from two distinct periods—pre and post-pandemic—it's critical to adjust for inflation. We will deflate the income figures using the Consumer Price Index (CPI) provided by the Office for National Statistics (ONS). This adjustment ensures that our analysis accounts for the general price level changes over the years, allowing us to compare the income data in real terms. Deflating the data removes the effects of inflation and provides a more accurate representation of the purchasing power of the incomes listed in the job postings, making it possible to discern genuine trends and shifts in income offerings by companies in London, which reflects broader national economic patterns

### **2.3 Descriptive Statistics**

As we can see below, our initial dataset comprised of 21,828 observations, with average salary figures encapsulating the breadth of the labour market within the Greater London area. The average annual salary among these listings is £30,497.46, with a considerable standard deviation of £20,853.40, suggesting significant variance across different job roles and sectors.

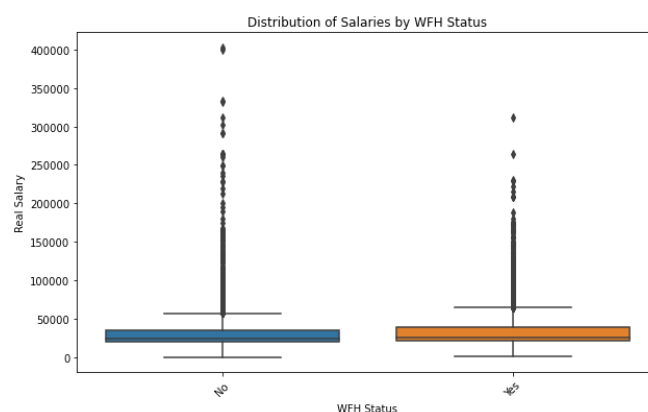
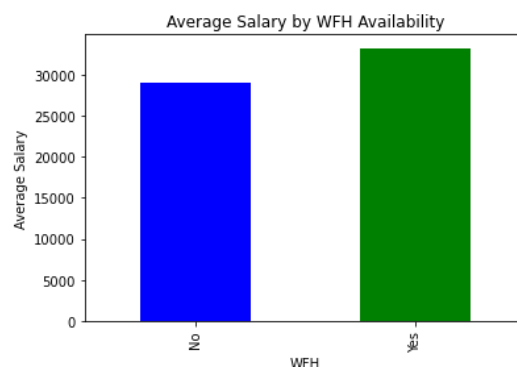
Summary Table

	variable	n	mean	sd	min	median	max
AverageSalary	AverageSalary	21,828	30,953.160	21,241.300	12	24,821.400	402,500
AverageHourlySalary	AverageHourlySalary	21,828	15.853	11.250	0.008	12.500	275
AverageWeeklySalary	AverageWeeklySalary	21,828	596.863	408.724	0.231	479.087	7,740.385
AverageMonthlySalary	AverageMonthlySalary	21,828	2,579.430	1,770.109	1	2,068.450	33,541.670
ISCOid	ISCOid	3,583	3,277.910	1,920.824	0	3,221	9,629

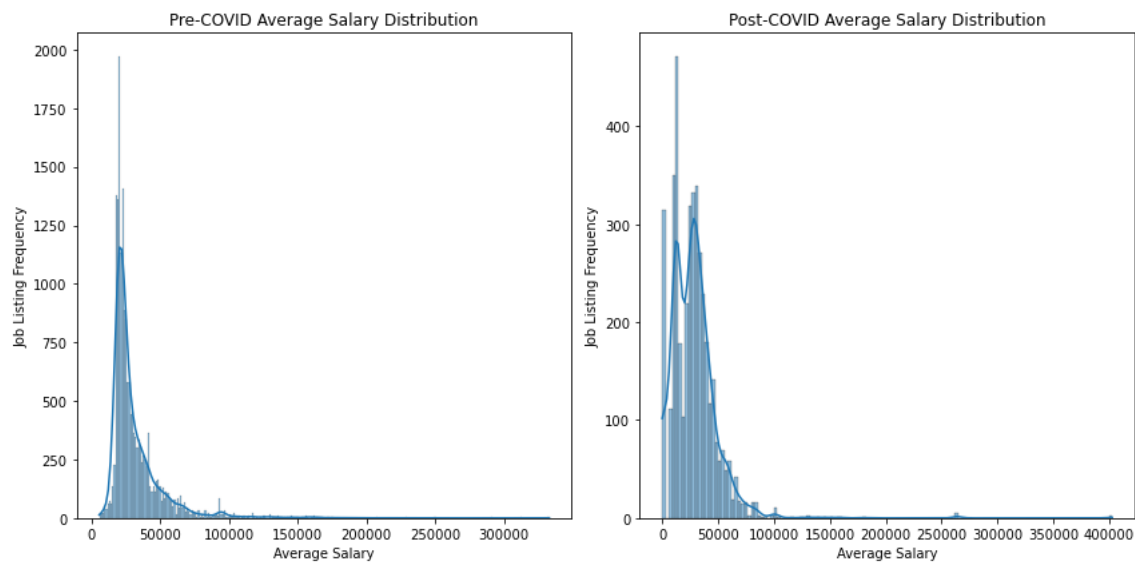
Summary Statistics table for Salary values

Hourly wages, a more granular metric, average at £15.85 but range widely from as little as £0.008 to a high of £275. This diversity is further evidenced in the weekly and monthly salary calculations, where the mean values stand at £596.86 and £2,579.43, respectively. The spread of these figures, with minimums close to zero and maximums reaching £7,740.39 weekly and £33,541.67 monthly, underscores the disparities in earning potential, which may be further accentuated by the transition to remote work modalities.

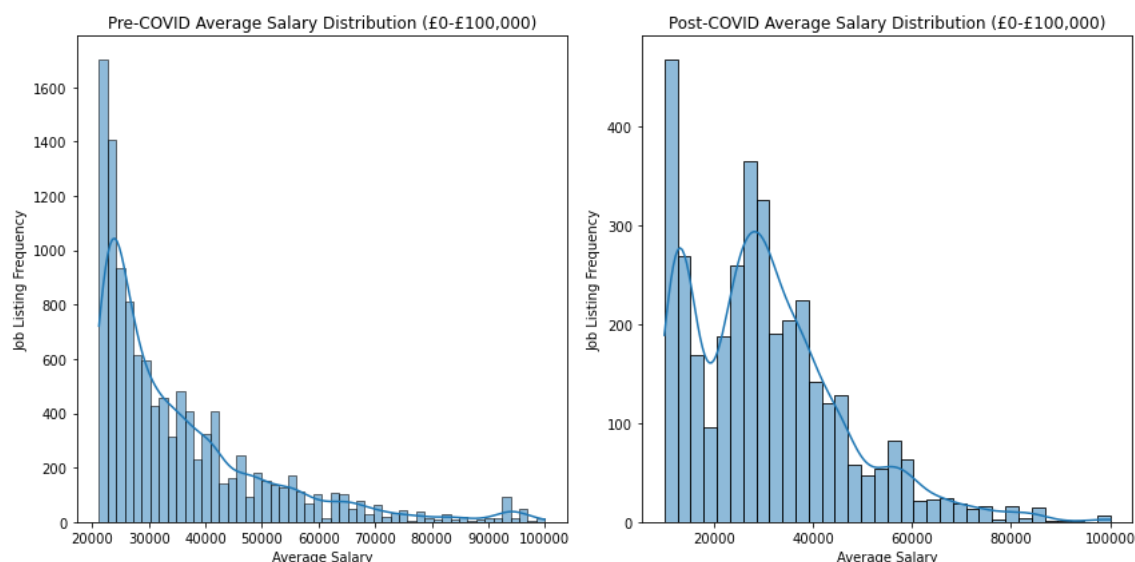
Moreover, in the bar chart provided, the divergence in salaries based upon WFH status illustrate the motivation behind this research. On average, job listings which advertise WFH, or hybrid work arrangements advertise a salary £3000 higher that listings which are fully on-site. This initial observation provides a glimpse at the relevance of our data to determine the impact of such arrangements on the mean income. Prior to modelling our data, we must first check that our observations follow a standard normal distribution.



Additionally, the distribution of Average Salaries, given WFH status, shows a slightly different picture. Whilst WFH arrangements yield a higher mean salary; shown by the horizontal line through the box, job listings advertising no WFH arrangements tend to have a larger range of salaries. Ultimately, the distribution of these salaries tend to be more skewed than those for WFH job listings.



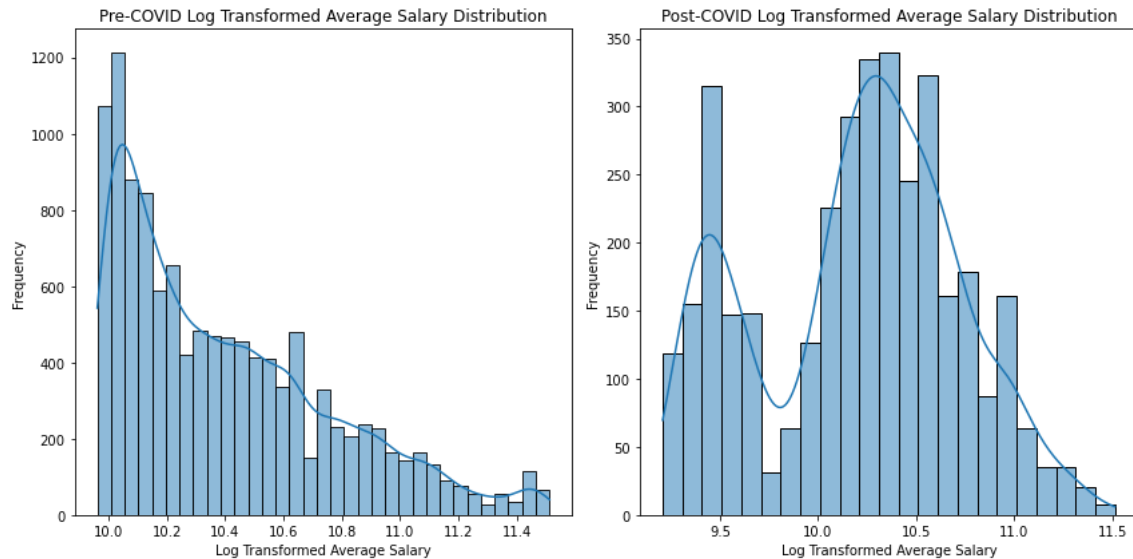
Upon preliminary scrutiny, the distributions of average salaries before and after the advent of COVID-19 display a marked rightward asymmetry—a trait not uncommon in income datasets, yet one that poses complexities for statistical analyses premised on the assumption of normality and linearity. In pursuit of a distribution that more closely conforms to the normal model, we propose a strategic sub-setting of our dataset to encapsulate a spectrum of salaries that are more representative of the workforce at large. The delineation at an average salary of above £100,000, the point in which the tail of the distribution begin, and omitting salary values below minimum wage, presents a sensible choice. Constraining our observations to the c£20,000 - £100,000 bracket is anticipated to yield a distribution that is more amenable to conventional statistical methodologies.



Subsequent to this refinement, the resultant distribution exhibits a heightened uniformity, albeit it is not entirely devoid of skewness. A fundamental observation we can make stems from the distinction between the distribution for pre-Covid and post-Covid observations. Post-COVID-19 figures suggest an elevation in the mean 'Average Salary' to the vicinity of

£30,000, surpassing the pre-COVID-19 mean of around £21,000, post-outlier adjustment. This observation tentatively corroborates our preliminary hypothesis.

Prior to econometric modelling, we will subject our 'Average Salary' variable to a logarithmic transformation. This recalibration is intended to rectify the non-linearity of relationships between variables, thereby enhancing the suitability of the dataset for linear regression analysis. Once this has been performed, we have the following distribution:



In the ensuing phase, we will undertake a series of diagnostic evaluations to affirm the data's adherence to normality post-transformation. This process will encompass both graphical assessments—such as Quantile-Quantile (Q-Q) plots—and formal statistical tests, including, but not limited to, the Shapiro-Wilk normality test. Nevertheless, we must keep in mind the potential repercussions that sub-setting and data transformation might exert on the interpretability and the broad applicability of our findings. The exclusion of salary data, while streamlining, could inadvertently omit insights into the highest income brackets—insights that may hold pertinence in the discourse on income inequality. As such, sensitivity analyses will be integral to our methodology, ensuring the robustness of our findings.

It is only once our dataset satisfies the normality prerequisites that we will proceed to the econometric modelling stage. This progression will be underpinned by a confidence in the methodological soundness and the empirical solidity of the analysis to follow.

## 2.4 Econometric Model/Statistical Approach

In addressing the central question of the pay implications of working from home (WFH), our research adopts an econometric approach, centring on a regression analysis with the natural logarithm of wage ( $\ln W$ ) as the dependent variable. This model facilitates an exploration of wage variations in relation to WFH status, accounting for temporal shifts by incorporating a time dummy ( $T$ ) that differentiates between pre- and post-COVID eras. The Difference-In-Differences model, specified as  $\ln W = a + b_1 \cdot WFHT + b_2 \cdot WFH + c_1 \cdot XT + c_2 \cdot X + d \cdot T + e$ , integrates interaction terms to capture the nuanced dynamics of WFH's impact over time, alongside a suite of control variables ( $X$ ) like job type and location.

To address the potential endogeneity of WFH, we will employ an Instrumental Variable (IV) approach, using the average WFH rate per ISCO code (excluding the job ad in question) as an instrument. This two-stage least squares (2SLS) estimation aims to tease out causal relationships, underpinning our analysis with robustness checks including tests for instrument relevance and over-identifying restrictions. Furthermore, the inclusion of time fixed effects will control for common temporal shocks, allowing for a cleaner estimation of the pandemic's impact.

In order to determine whether points on our income distribution are impacted greater than others, we will also run quantile regressions at the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> quantile. This will provide an insight as to whether WFH disproportionately effects different income levels.

This statistical methodology is designed to yield conclusions about the economic effects of remote work in a changing labour landscape.

## **2.5 Apply ISCO id's**

In preparing the Pre-COVID job listings for our econometric analysis, we addressed the lack of ISCO (International Standard Classification of Occupations) codes. A dictionary mapping ISCO codes to job titles from government data was created. Using a Python script with regular expressions, we scanned job titles and sectors to assign corresponding ISCO codes, standardizing the dataset. Listings without identifiable matches were designated as 'NA' and subsequently removed. This process yielded a cleansed dataset of 4'650 entries, re-indexed and primed for analysis, ensuring accurate occupation-specific categorization to inform our econometric models effectively.

## **2.6 Limitations**

While the econometric approach outlined offers valuable insights, it is not without limitations. The effectiveness of the IV strategy hinges on the assumption that the average WFH rate per ISCO code is a valid instrument, unaffected by individual wage determinants, which may not fully hold in practice. It may also be the case that this variable is not present for every observation. In our dataset, however, this is not the case.

Additionally, potential measurement errors in WFH status and other explanatory variables could introduce bias. Beyond this, the cross-sectional nature of the data limits our ability to establish long-term causal relationships, and unobserved heterogeneity might still influence the results despite our methodological precautions. These limitations will be considered throughout this project and accounted for within our robustness checks.

## **2.7 Hypotheses'**

*Primary Hypothesis:* The shift towards remote and hybrid work models in the post-pandemic era has led to a significant change in the mean income levels of employees, with this impact being distinct across various job sectors and types. Specifically, we hypothesize that remote work opportunities correlate with higher mean incomes, particularly in job sectors that have more seamlessly transitioned to remote work modalities. We should expect a positive effect from WFH status.

*Sub-Hypotheses:*

1. **Sector-Specific Variations:** The impact of remote work on mean income varies significantly across different job sectors, with technology and finance sectors experiencing a more pronounced positive effect compared to sectors like retail and hospitality, which have less scope for remote work.
2. **Job Type and Income Relationship:** The nature of employment (permanent, temporary, contract) mediates the relationship between remote work opportunities and mean income levels, potentially indicating a disparity in income benefits between permanent and non-permanent roles in the context of remote work.

These hypotheses aim to uncover the complex dynamics of how remote work arrangements, emerging as a prominent feature of the post-pandemic work environment, influence income levels. By testing these hypotheses through our econometric analysis, the study endeavours to provide empirical insights that can inform policy and organizational strategies in the evolving landscape of work, counteracting and negating further income disparities.

## **2.8 Final Data Composition**

Post-assignment of ISCO IDs and cleaning, we analysed the dataset to ascertain the proportion of job listings categorized under Pre-COVID and Post-COVID periods. This analysis yielded the following proportions:

- **Post-COVID:** 56.06%
- **Pre-COVID:** 43.94%

These proportions were calculated using the **value\_counts()** method with the **normalize=True** parameter to reflect the relative frequencies of each category.

Our dataset now comprises of 4'650 observations, each with a complete set of 18 fields of information. This dataset forms the basis of our econometric analysis, providing a substantial body of data with which we will use to assess the implications of remote work on income variations across different periods marked by the pandemic.

This finalized dataset, which excluded observations without an assigned ISCO code, was then saved in Excel format to ensure ease of access and use in further statistical software applications required for advanced econometric modelling.

## Analysis and Results

### **Descriptive Analysis**

Our dataset, now filtered to include observations above minimum wage and below six figures (c.£50/hr), encompasses over 15'000 observations; offering a panoramic view of the salary landscape across various sectors, revealing significant insights into the income dynamics in the context of remote and hybrid work models. This analysis is critical in delineating the contours of our study, particularly in understanding how income levels have

been shaped in the pre- and post-pandemic eras and the disparities between remote and non-remote jobs.

Summary Table

	variable	n	mean	sd	min	median	max
AverageSalary	AverageSalary	4,650	34,135.820	15,960.410	10,761	30,929.540	104,000
AverageHourlySalary	AverageHourlySalary	4,650	19.592	7.552	11.459	17.184	50
AverageWeeklySalary	AverageWeeklySalary	4,650	661.932	301.998	206.942	613.986	2,000
AverageMonthlySalary	AverageMonthlySalary	4,650	2,844.651	1,330.034	896.750	2,577.462	8,666.667
ISCOid	ISCOid	4,650	3,668.064	2,196.073	0	3,313	9,629
LogAverageSalary	LogAverageSalary	4,650	10.332	0.470	9.284	10.339	11.552

Summary Statistics table for Salary values

At the core of our dataset is the Average Salary, which stands at £34'135.82. However, this figure masks the underlying variability, as indicated by a substantial standard deviation of £15'960.41. This variability is further accentuated by the salary range, stretching from a modest £10'761 to an opulent £104'000. The median salary, a more resilient measure against extreme values, is positioned at £30'929.54, compared to our previous median value of £24,821, suggesting that the majority of the workforce is clustered around a relatively lower income bracket.

Shifting focus to the hourly, weekly, and monthly earnings provides additional layers of understanding. The average hourly salary, at £19.59, comes with its own set of disparities, ranging from £11.46 to £50. This disparity potentially mirrors the diverse nature of job roles, from casual or part-time work to highly specialized professions. Similarly, the weekly (£661.93) and monthly (£2'844.65) salary figures, each with their respective ranges and standard deviations, underscore the multifaceted nature of the job market. The maximum monthly salary reaching up to £8'666.66 highlights the upper echelons of income, while the median monthly salary, settled at £2,577.46, indicates that a significant portion of the dataset falls below the average (£2'844.65).

As we progress, our analysis will delve into these nuances, examining the shifts in income levels in the wake of the pandemic and exploring the economic implications of remote and hybrid work models. This exploration is not merely an academic exercise but a venture into understanding the changing dynamics of work and its socio-economic ramifications.

### Primary Econometric Analysis

Our analytical model is thus delineated: The dependent variable, the natural logarithm of the average salary (LogAverageSalary), is selected to transform the salary distribution into a more tractable form, facilitating interpretation in proportional terms. The independent variables encompass dummy variables denoting work-from-home status (WFH\_dummy) and the post-COVID epoch (PostCOVID\_dummy), supplemented by an interaction term (WFH\_PostCOVID). This term is particularly salient, poised to reveal whether the salary impact of remote work has undergone a large scale change in the period succeeding the COVID-19 crisis as compared to the previous periods.

In addition, an array of control variables, representative of job types and geographical locations, are meticulously woven into the model as dummy variables. These are crucial in capturing the multifaceted nature of these factors and mitigating potential confounding influences. The anticipated directionality of the coefficients stems from the theoretical premise that remote work, especially within the post-pandemic landscape, correlates with heightened mean incomes, potentially attributable to factors such as diminished commuting expenses and heightened productivity efficiencies.

- $\text{LogAverageSalary}$  is the dependent variable representing the natural logarithm of the average salary.
- $\beta_0$  is the intercept of the model.
- $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are the coefficients for the independent variables  $\text{WFH\_dummy}$ ,  $\text{PostCOVID\_dummy}$ , and  $\text{WFH\_PostCOVID}$ , respectively.
- $\text{WFH\_dummy}$  is a binary variable indicating whether a job allows for working from home (1 if yes, 0 if no).
- $\text{PostCOVID\_dummy}$  is a binary variable representing the time period (1 for post-COVID, 0 for pre-COVID).
- $\text{WFH\_PostCOVID}$  is the interaction term between  $\text{WFH\_dummy}$  and  $\text{PostCOVID\_dummy}$ .
- $\sum \beta_i \times \text{JobType\_Dummies}$  represents the sum of the products of coefficients and job type dummy variables. Each  $\beta_i$  is the coefficient of the corresponding job type dummy variable, and this part of the equation accounts for the effects of different job types on the salary.
- $\sum \gamma_j \times \text{ISCOid\_Dummies}$  represents the sum of the products of coefficients and ISCOid dummy variables. Each  $\gamma_j$  is the coefficient of the corresponding ISCOid dummy variable, and this part of the equation accounts for the effects of different job roles indicated by ISCOid on the salary.
- $\epsilon$  is the error term capturing the unobserved factors.

### Estimation and Results

Our OLS regression model explores the relationship between **LogAverageSalary** and variables including **WFH\_dummy**, **PostCOVID\_dummy**, and their interaction **WFH\_PostCOVID**. The model's R-squared value is 0.113, indicating that approximately 11.3% of the variability in the logarithm of the average salary is explained by the model, which is relatively low but not uncommon in socio-economic data where many unobserved factors can influence outcomes.

### OLS Model Summary

Metric	OLS	OLS StdErr	OLS PValue
R-squared	0.1129		
Adj. R-squared	0.1123		
Intercept	10.5211	0.0142	<b>0.0000</b>
WFH_dummy	0.0071	0.0213	0.7386
PostCOVID_dummy	-0.3167	0.0165	<b>0.0000</b>
WFH_PostCOVID	0.3633	0.0517	<b>0.0000</b>

*Note: Coefficients with P-value < 0.05 are highlighted in bold. R-squared values are included at the top.*

The coefficients tell us how each variable, holding others constant, affects the **LogAverageSalary**. The intercept (10.5211) represents the expected value of **LogAverageSalary** when all independent variables are zero.



The **WFH\_dummy** coefficient (0.0071) suggests a very small and statistically insignificant effect of WFH status on salary, given the high p-value of 0.739. **PostCOVID\_dummy** has a significant negative coefficient (-0.3167), indicating a decrease in **LogAverageSalary** in the post-COVID period compared to pre-COVID, holding other factors constant.

The interaction term **WFH\_PostCOVID** is positive (0.3633) and significant, suggesting that the post-COVID era sees a relative increase in salaries for WFH jobs compared to pre-COVID, overcoming the general negative trend of the post-COVID period on salaries.

Given the observed significance of the interaction term and the potential for endogeneity—where unobserved factors might influence both the likelihood of a job being remote (WFH) and its salary level—we consider using Instrumental Variable (IV) regression next. IV regression can help address endogeneity by using instruments that are correlated with the endogenous explanatory variables but not directly with the error term. This method aims to provide more reliable estimates of the causal relationships, particularly when there's concern that the model's explanatory variables might be correlated with unobserved factors that also affect the dependent variable.

## Discussion

The regression findings offer a nuanced understanding of how mean income levels are influenced by remote work, particularly in the context of our primary hypothesis. The positive association between WFH and increased average salary post-pandemic substantiates the idea that remote work models have become more economically advantageous in the recent era.

However, the observed general decrease in salaries post-pandemic, as indicated by the negative coefficient for **PostCOVID\_dummy**, paints a picture of the broader economic challenges induced by the pandemic. This aspect of the findings speaks to the complex economic landscape that has emerged, where the benefits of remote work coexist with broader economic strains. Such an increase in salaries for WFH positions are exacerbated when accounting for the overall decrease in salary values over the two periods.

The differential impact of various job types on salaries, as evidenced by the coefficients of job type dummy variables, further enriches our understanding of the job market's heterogeneity. It reveals how certain roles and employment types have fared differently in terms of remuneration, which could be a reflection of sector-specific resilience or vulnerability in the face of pandemic-induced changes.

In light of these findings, our subsequent analysis will incorporate an Instrumental Variable (IV) approach to address the potential endogeneity of the WFH variable. This step is crucial to ascertain the causal impact of WFH on mean income levels, thereby enhancing the robustness of our econometric model. The IV approach will enable us to control for unobserved factors that might simultaneously influence both the propensity to work from home and the salary levels, thus providing a more accurate estimation of the true impact of remote work arrangements.

### **Addressing Endogeneity**

The objective of this section is to address the potential endogeneity in the Work From Home (WFH) variable, which could bias our Ordinary Least Squares (OLS) regression results. Endogeneity can arise due to omitted variable bias, measurement error, or simultaneity, leading to correlation between the explanatory variable and the error term.

To mitigate endogeneity, we employ an Instrumental Variable (IV) approach, specifically using the two-stage least squares (2SLS) estimation. The instrument chosen for this approach is the ISCO id by job listing, denoted as 'ISCOid'.

Endogeneity in our context may occur if unobserved factors simultaneously influence both the likelihood of a job being remote (WFH) and the salary levels. For example, specific unmeasured characteristics like a company's technological infrastructure or job flexibility culture could affect both WFH feasibility and wage levels. If these factors are not captured in our model, it could lead to biased and inconsistent OLS estimates.

ISCO IDs serve as an ideal instrument in our dataset for several reasons when exploring the impact of remote work (WFH) on income. First, ISCO classifications reflect the nature of jobs and their sectors, offering a systematic way to approximate an occupation's predisposition to remote work before the COVID-19 pandemic. This historical propensity for WFH by occupation is influenced by job characteristics, sector-specific norms, and technological requirements, rather than by individual salary levels.

Given we're modelling the effect of post-pandemic WFH arrangements on salaries, ISCO IDs allow us to infer an occupation's remote work feasibility, acting as a proxy for the likelihood of WFH arrangements. These IDs can distinguish between jobs likely to have been amenable to remote work before the pandemic and those not, thereby serving as a relevant instrument. Their use ensures our instrument is correlated with the endogenous explanatory variable (WFH status), but reasonably assumed to be independent of the direct effects on the outcome variable (salary), except through WFH status. This meets the critical requirements for an instrumental variable—relevance and exogeneity.

Moreover, leveraging ISCO IDs mitigates concerns around endogeneity by accounting for unobserved factors that could bias our estimation of WFH's impact on salaries. By capturing industry-wide, pre-pandemic WFH tendencies, we enhance the credibility of our causal inference, making it a sophisticated approach for understanding the nuanced dynamics between remote work and income levels post-pandemic.

### **Creating Our Instrument**

Our approach to creating the instrument variable **PreCOVID\_WFH\_Propensity** is rooted in the International Standard Classification of Occupations (ISCO) framework, which categorizes jobs based on skill levels. Drawing on the classification from the International Labour Organization (ILO), we use the broad skill level distinctions provided by ISCO-08 and ISCO-88 to infer the pre-COVID work-from-home (WFH) propensity of different occupations. We classify occupations into three groups based on their ISCO codes:

- **High WFH Propensity (Skill levels 3 and 4):** Occupations classified as Managers, Professionals, and Technicians and Associate Professionals are presumed to have a high propensity for WFH. This assumption is based on the nature of these jobs, which often involve tasks that can be performed remotely, such as administrative duties, professional consultations, and technical support.
- **Medium WFH Propensity (Skill level 2):** Clerical Support Workers, Service and Sales Workers, Skilled Agricultural, Forestry and Fishery Workers, Craft and Related Trades Workers, and Plant and Machine Operators and Assemblers are categorized with a medium propensity. These roles sometimes allow for remote work, depending on specific job duties and the employer's capacity to support remote operations.
- **Low WFH Propensity (Skill level 1 and Armed Forces, marked as 0):** Elementary Occupations and Armed Forces Occupations are considered to have a low WFH propensity. These jobs typically require physical presence, such as manual labour, on-site service delivery, or military duties.

This categorization acts as a proxy for estimating each occupation's likelihood of being performed remotely before the pandemic. It allows us to explore the impact of WFH arrangements on income levels by leveraging differences in pre-pandemic WFH feasibility across occupations. The validity of this instrument rests on the premise that the nature of an occupation—reflected in its ISCO classification and associated skill level—significantly influences its adaptability to remote work. This adaptability, or lack thereof, presumably affects income dynamics, especially in the context of the COVID-19 pandemic's acceleration of remote work trends.

### Model in Practice

From First Stage IV-2SLS model is as follows:

$$WFH\_dummy = \alpha_0 + \alpha_1 \times PreCOVID\_WFH\_Propensity + X\beta + \varepsilon$$

Where:

- *WFH\_dummy* is the binary indicator of whether a job allows for working from home.
- *PreCOVID\_WFH\_Propensity* is derived from ISCO IDs, indicating the job's likelihood of being remote before the pandemic.
- *X* represents other control variables (exogenous covariates) that influence WFH but are not affected by WFH decisions.
- $\varepsilon$  is the error term.

Our Second Stage IV-2SLS model specification is as follows:

$$\text{LogAverageSalary} = \beta_0 + \beta_1 \times WFH\_dummy^{\wedge} + X\gamma + \mu$$

Where:

- *WFH\_dummy<sup>^</sup>* is the fitted values of WFH status from the first stage.
- *X* represents the control variables, consistent with the first stage.
- $\mu$  is the error term.

### First Stage

### First Stage Model Summary

Metric	First Stage	First Stage StdErr	First Stage PValue
R-squared	0.2702		
Adj. R-squared	0.2699		
Intercept	0.3298	0.0228	<b>0.0000</b>
PreCOVID_WFH_Propensity	0.0471	0.0086	<b>0.0000</b>
PostCOVID_dummy	-0.4214	0.0102	<b>0.0000</b>

*Note: Coefficients with P-value < 0.05 are highlighted in bold. R-squared values are included at the top.*

In the first-stage regression, the dependent variable **WFH\_dummy** signifies job flexibility regarding work from home (WFH) policies. The model explains approximately 27% of the variability in WFH arrangements, with an R-squared value of 0.270, indicating significant explanatory power.

The coefficients reveal critical insights: jobs classified with higher pre-COVID WFH propensities are slightly more inclined to offer WFH options, with a unit increase in **PreCOVID\_WFH\_Propensity** raising the likelihood of WFH by 0.0471. Conversely, the **PostCOVID\_dummy** variable, highlighting the post-COVID era, is negatively associated with WFH opportunities, suggesting an adjustment in job structures post-pandemic.

All coefficients are statistically significant, underscoring the robustness of these findings. The F-statistic and Durbin-Watson tests further affirm the model's validity and the slight presence of autocorrelation, respectively, suggesting the instrument's relevance and the potential impact of temporal dynamics on WFH trends.

Given these results, the first stage of our 2SLS indicates a valid instrument (**PreCOVID\_WFH\_Propensity**), which significantly predicts the potentially endogenous variable (**WFH\_dummy**). This sets the stage for the second stage of the 2SLS, where **WFH\_dummy** predicted from this first stage will be used to model **LogAverageSalary**, allowing us to infer the causal effect of WFH on salary.

### Second Stage 2SLS Model Summary

Metric	2SLS	2SLS StdErr	2SLS PValue
R-squared	0.2050		
Adj. R-squared	0.2047		
Intercept	7.9978	0.1030	<b>0.0000</b>
WFH_dummy_fitted	5.6578	0.2295	<b>0.0000</b>
PostCOVID_dummy	2.0407	0.0961	<b>0.0000</b>

*Note: Coefficients with P-value < 0.05 are highlighted in bold. R-squared values are included at the top.*

The second-stage results from our 2SLS regression model represent a significant advancement in our understanding of how working from home (WFH) affects average salaries, particularly when considering the potential endogeneity between WFH status and salary.

By using **WFH\_dummy\_fitted** as an instrumented variable for WFH status, derived from the first stage, we mitigate the endogeneity concern—where factors unobserved in the original OLS model might influence both the likelihood of a job being WFH and its associated salary. This approach provides a more robust estimation of the causal impact of WFH on `LogAverageSalary`.

In the OLS model, we observed that the WFH status had a minimal and statistically insignificant effect on salary, while the post-COVID period showed a general decrease in salaries. The interaction term suggested that WFH positions saw relative salary increases post-COVID, an indication that remote work might be more economically advantageous in the current era. However, the R-squared value was relatively low, indicating that a significant portion of the variance in salaries remained unexplained by the model.

Transitioning to the 2SLS approach, we notice a shift in the explanatory power of the model, with an improved R-squared value in the second stage. This increase suggests that by addressing the endogeneity through our instrumental variable approach, we're capturing more of the variance in `LogAverageSalary`. The significant positive coefficient for **WFH\_dummy\_fitted** highlights the economic benefit of WFH arrangements, a stark contrast to the negligible impact observed in the original OLS model. It confirms that, after accounting for endogeneity, WFH status significantly contributes to higher average salaries.

The importance of addressing endogeneity lies in its ability to unveil the true causal relationships hidden by confounding factors not accounted for in standard regression models. Our instrument, **PreCOVID\_WFH\_Propensity**, successfully serves this purpose by leveraging variation in pre-COVID WFH rates across different job types to isolate the impact of WFH on salaries from other unobserved factors. This refinement has elucidated the positive valuation of WFH in the labour market, a finding obscured in the initial OLS analysis.

The change in model output underscores the efficacy of the 2SLS method in providing a clearer, more accurate depiction of the relationship between WFH arrangements and salary outcomes. It validates the hypothesis that remote work has indeed become more economically advantageous in the post-COVID era, contrasting the broader economic challenges highlighted by the general decrease in salaries. This analysis not only enhances our understanding of the current job market dynamics but also reinforces the importance of employing advanced econometric techniques to address complex analytical challenges.

### Our Findings

In our investigation of the post-pandemic implications of remote and hybrid work models on income, we deployed three main econometric models: Ordinary Least Squares (OLS), First Stage Instrumental Variable (IV-First Stage), and Two-Stage Least Squares (2SLS). Each model was chosen for its unique ability to dissect the nuanced relationship between work-

STUDENT ID: 100999252

CANDIDATE NUMBER: 2302137

from-home (WFH) arrangements and income levels, accounting for various econometric challenges such as endogeneity and unobserved heterogeneity.

**OLS Model:** This foundational model aimed to establish a baseline relationship between WFH arrangements and income, incorporating control variables for a post-COVID dummy and an interaction term for WFH in the post-COVID era. Despite its simplicity, the OLS model's limitation lies in its potential for bias due to endogeneity—where unobserved factors might simultaneously influence both WFH status and income levels.

**First Stage of IV (IV-First Stage):** Recognizing the potential for endogeneity in the WFH variable, we implemented an IV approach. The first stage predicted WFH status using a novel instrument: the PreCOVID\_WFH\_Propensity based on the International Standard Classification of Occupations (ISCO) codes. This model is crucial for isolating the exogenous variation in WFH propensity, setting the stage for a more causally interpretable analysis.

**Two-Stage Least Squares (2SLS):** Building on the first stage, the 2SLS model used the predicted WFH status to estimate its impact on income, aiming to uncover the causal relationship. This model addresses the endogeneity issue by ensuring that only the variation in WFH status that is independent of unobserved confounders influences the estimated impact on income.

### Model Comparisons and Interpretations

Model Summary Comparison

	PValue OLS	StdErr OLS	Value OLS	PValue First Stage	StdErr First Stage	Value First Stage	PValue 2SLS	StdErr 2SLS	Value 2SLS
Metric									
Adj. R-squared	nan	nan	0.112329	nan	nan	0.269858	nan	nan	0.204702
Intercept	0.000000	0.014225	10.521125	0.000000	0.022770	0.329840	0.000000	0.102977	7.997839
PostCOVID_dummy	0.000000	0.016494	-0.316736	0.000000	0.010161	-0.421351	0.000000	0.096130	2.040692
PreCOVID_WFH_Propensity	nan	nan	nan	0.000000	0.008605	0.047084	nan	nan	nan
R-squared	nan	nan	0.112902	nan	nan	0.270173	nan	nan	0.205044
WFH_PostCOVID	0.000000	0.051724	0.363317	nan	nan	nan	nan	nan	nan
WFH_dummy	0.738599	0.021287	0.007104	nan	nan	nan	nan	nan	nan
WFH_dummy_fitted	nan	nan	nan	nan	nan	nan	0.000000	0.229517	5.657843

Note: P-values < 0.05 are highlighted in green. This table combines results from different econometric models for comparison, including estimates, standard errors, and p-values.

**OLS Results:** The OLS model revealed a significant interaction effect between WFH and the post-COVID era, suggesting that WFH jobs became relatively more lucrative post-pandemic. However, the model's low R-squared value (0.11) and the insignificance of the standalone WFH dummy underscore its limitations in capturing the complete dynamics at play.

**IV-First Stage Results:** The first stage of our IV approach showed a significant relationship between PreCOVID\_WFH\_Propensity and WFH status, indicating the instrument's relevance. The negative coefficient for the PostCOVID\_dummy variable suggested a structural shift in WFH arrangements post-pandemic. This model, with an R-squared value of 0.27, marks an improvement in explaining the variability in WFH status.

**2SLS Results:** The 2SLS model, with an R-squared value of 0.21, offers a robust analysis by leveraging the instrumented WFH status to assess its impact on income. The significant positive coefficient for the WFH\_dummy\_fitted variable indicates a clear economic benefit of WFH arrangements, reinforcing the hypothesis that remote work has become more economically advantageous in the post-COVID era.

### Evaluation and Conclusion

Comparing the three models, the 2SLS stands out for its ability to address endogeneity and provide a causally interpretable relationship between WFH arrangements and income levels. This model not only corrects for the biases inherent in the OLS approach but also validates the instrumental variable strategy's effectiveness.

One crucial finding across models is the significance of the WFH\_PostCOVID interaction term in the OLS model and the WFH\_dummy\_fitted variable in the 2SLS model, both indicating that WFH jobs offer a salary premium in the post-pandemic world. This aligns with our hypothesis and suggests a structural shift towards valuing flexibility and remote work capability.

### Further Modelling and Limitations

While our models provide significant insights, they also open avenues for further research. Future modelling could explore sector-specific effects, the role of job permanence, and the impact of remote work on income inequality. Additionally, longitudinal data could offer insights into long-term trends beyond the immediate post-pandemic period.

We encountered challenges related to data collection, such as ensuring accurate classification of jobs into ISCO codes and dealing with the potential for omitted variable bias. Addressing these issues through methodological refinements and richer datasets could enhance future analyses.

Our analysis through OLS, IV-First Stage, and 2SLS models provides a comprehensive understanding of the post-pandemic income dynamics associated with remote work. The 2SLS model, in particular, offers a robust framework for identifying the causal benefits of WFH arrangements on income, marking a significant contribution to the discourse on work flexibility and economic outcomes in the evolving labour market.

### **Conclusion**

In this dissertation, we embarked on a journey to explore the economic implications of the seismic shift towards remote and hybrid work models in the post-pandemic era. The transition, catalysed by the COVID-19 crisis, has not only transformed the landscape of the global labour market but has also prompted a revaluation of income dynamics across various sectors. This study aimed to illuminate the nuanced impacts of these work arrangements on income, drawing upon a comprehensive dataset of job listings pre- and post-COVID-19 and employing a variety of econometric models to ensure robust outcomes.

Our findings reveal that remote and hybrid work models have indeed become more economically advantageous in the recent era, particularly in the post-COVID context. The positive association between work-from-home (WFH) arrangements and increased average

(mean) salary, substantiated by our instrumental variable (IV) analysis, underscores the economic benefit of remote work. This shift suggests a structural realignment in the valuation of flexibility and remote work capability within the job market. Notably, the interaction term between WFH and the post-COVID era emerged as a significant indicator, suggesting that WFH jobs offer a salary premium in the new normal.

The journey to these conclusions was navigated through a methodological approach that combined descriptive analysis with advanced econometric techniques, including Ordinary Least Squares (OLS), First Stage Instrumental Variable (IV-First Stage), and Two-Stage Least Squares (2SLS). This approach was designed to address the potential endogeneity of the WFH variable and to isolate the causal impact of remote work on income levels. By employing the PreCOVID\_WFH\_Propensity as an instrument in our IV analysis, we were able to mitigate the biases inherent in the OLS approach and unveil the true economic effects of remote work.

Our research embarked on this journey with the objective of contributing to the existing literature on labour economics and remote work, specifically by providing empirical insights into the income implications of remote and hybrid work models. By leveraging web-scraping techniques to accumulate a rich dataset and by applying rigorous econometric methods, we sought to fill a gap in current research concerning the granular economic outcomes of remote work pertaining to income dynamics. The findings of this study not only build upon previous literature but also introduce new dimensions, highlighting the significance of structural shifts in work arrangements and their economic ramifications.

While our research has provided valuable insights into the post-pandemic labour market, it also underscores the potential for further exploration. Future studies could delve deeper into sector-specific effects, the role of job permanence, and the broader impact of remote work on income inequality. Additionally, longitudinal data could offer a more nuanced understanding of long-term trends and the sustainability of the observed shifts in income dynamics.

The revelation that work-from-home (WFH) jobs command higher mean incomes post-pandemic carries implications for the future landscape of work, societal norms, and economic policies. This finding underscores a pivotal shift towards valuing flexibility, autonomy, and the integration of work into the digital and domestic spheres, potentially heralding a new era of labour economics where remote work becomes a significant determinant of economic opportunity and income disparity. The importance of understanding this shift transcends academic interest, bearing direct relevance to policymakers, businesses, and workers alike. It highlights the necessity of crafting inclusive policies and corporate strategies that not only embrace the advantages of remote work but also address the widening income gap it may engender.

In essence, the economic benefit of WFH arrangements challenges us to rethink work-life integration, compensation equity, and the distribution of economic gains in a way that ensures the fruits of remote work are accessible and equitable across the workforce. This pivotal insight into the post-pandemic work environment serves as a call to action for a



reevaluation of work norms, aimed at fostering a more inclusive and equitable labour market in the digital age.

To harness the insights of this study, policymakers should advocate for and develop infrastructure supporting remote work, ensuring broadband access and digital literacy across demographics to mitigate income disparities. Businesses, in recognizing the economic benefits of remote work revealed by our findings, are encouraged to adopt flexible work policies that can attract a wider talent pool and enhance employee satisfaction, thereby potentially increasing productivity and profitability. For the workforce, actively seeking skill development in digital competencies and remote collaboration tools can enhance employability in a job market increasingly favouring remote-capable roles. Together, these strategies can contribute to a more inclusive and equitable labour market in the post-pandemic era.

In conclusion, this dissertation represents a comprehensive analysis of the economic impacts of remote and hybrid work models on income in the post-pandemic era. Through a methodological approach that combined descriptive analysis with econometric techniques, we have illuminated the nuanced relationship between remote work arrangements and income levels. Our findings underscore the economic advantages of remote and hybrid work models, marking a significant contribution to the evolving landscape of labour economics. As we look to the future, the insights garnered from this research will undoubtedly play a critical role in shaping the policies and strategies that will govern our new normal.

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STUDENT ID: 100999252

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