

Remote Work in the United States: Sectoral Analysis of Salary Trends

Roshan Shivnani¹, Serene Ho²

¹Plano West Senior High School, Plano, Texas

²Lumiere Education, Cambridge, Massachusetts

SUMMARY

Since its beginning, the COVID-19 pandemic brought a landslide of changes to the United States. Perhaps one of the most enduring has been a shift in how we work. Specifically, the concept of remote work saw significant growth within the United States between 2020 and 2023. Both remote work and hybrid work arrangements have become ubiquitous in recent years. Discussion has started to arise surrounding the long-lasting implications of remote work. Given the anticipated reduction in costs for employers, we hypothesized that remote work would be associated with higher salaries. Sectors were compared using the percentage of employees working remotely in a sector and the average salary of said sector. A positive correlation was observed between the two. However, this correlation was not observed when adjusting for potential confounding variables, such as education and job tenure.

INTRODUCTION

In 2020, the COVID-19 pandemic caused a global recession and numerous disruptions around the world. As a result, policies like social-distance and stay at home mandates were put into place. Well before the pandemic in 2000, only 3.2% of US workers worked from home, based on data from the 2000 census (1). This rate rose modestly in the two decades prior to COVID-19, reaching 7.3% of the US labor force working primarily at home by 2020. However, in 2021, near the height of pandemic-related policies, an estimated 17.9% of people worked primarily from home. More recent data shows an estimated 12.7% of US workers were fully remote in 2023 and an additional 28.2% operated in a hybrid model, commonly regarded as an arrangement where employees complete at least 20% (1 day/week) of their work remotely (2).

Following the World Health Organization declaring the end of the COVID-19 virus as a public health emergency, some researchers predicted a drop off in remote work (3). Labor experts, however, including economist Nicholas Bloom, have countered this prediction, stating that remote work will maintain its prevalence even after the waning of COVID-19 (4). This notion was reaffirmed by the US Bureau of Labor Statistics with a reported 35 percent of employed people still doing some or all of their work at home on days they worked in 2023 (5). As remote work becomes more pervasive in the US economy, it becomes imperative to understand the potential implications of this transition.

The impact of remote work on productivity was examined in a randomized experiment conducted in China (6). Call-center employees at a travel agency volunteered to be randomized between remote work or office work for nine months. The authors found that in the remote worker group productivity rose by 13% (measured by both minutes worked per shift and number of calls handled per minute); this was attributed to fewer breaks/sick days and improved focus with fewer distractions in a quieter and more convenient work environment (7).

While remote work may be associated with lower corporate costs, salary may be confounded by other variables (8). Barrero, *et al.*, showed that employment sector, population density, education, and gender can affect the rate of remote workers in the United States with sector and education level being the two most important variables (9). The same authors have also suggested that companies may use remote work arrangements to restrain wage growth (10). Therefore, to properly evaluate the impact of remote work, these underlying variables must be taken into consideration.

Despite the potential influence of other variables, we hypothesized that remote work would be associated with higher salaries, due primarily to both cost reductions for companies along with the improved productivity from remote work. Our study aimed to clarify the correlation between remote work and workers' salaries while considering variables like tenure, job sector, and education. To establish this relationship, we focused our analysis on companies and employees within the United States. Key variables such as education and job tenure were identified and adjusted through a regression analysis. After correcting for these variables, sectors with a higher percentage of remote workers were correlated with higher salaries, but this did not reach statistical significance. Nonetheless, our results support the original hypothesis that remote work is associated with increased salary. We believe this can have a significant impact for both companies and government policy as remote work has the potential to be beneficial to both employees and businesses, through lower costs for supporting fewer on-site workers.

RESULTS

In order to examine the relationship between remote work and salary, we first obtained data from ten employment sectors as defined by the National Bureau of Economic Research, ranging from retail trade to information technology. We obtained data from the Work From Home database and defined the "remoteness" of each job sector as the percentage of jobs that were remote or hybrid for September 2022. Data was obtained from over 10,000 surveys obtained over the internet using a third-party commercial survey provider.

Remoteness varied from a low of 18% in the transportation sector to 77% in the information technology sector.

We generated a simple linear regression to test if remoteness significantly predicted average annual salary (Figure 1). The remoteness of a sector significantly correlated with the salary of the sector ($p = 0.03$). Additionally, salary changes were annualized (multiplying weekly data by 52 weeks/year). On average, a 1% increase in the percentage of remote jobs within a given sector was associated with an increase in salary of \$852.27 per year.

Next, we analyzed this data further by including two potential confounding variables: tenure (the number of years someone has worked at a job) and education level (defined as percentage of workers in a given sector with a post-secondary degree). For this analysis, we had to limit our scope to 8 of the 10 original sectors examined as the sectors of durable goods/manufacturing and leisure/hospitality did not have sufficient education data.

A multiple regression analysis was then performed to test if remoteness, job tenure, and education level significantly predicted salary. The multivariate regression did not reach statistical significance ($p = 0.15$). Additionally, correlations between job tenure and salary ($p = 0.14$), education level and salary ($p = 0.90$), and remoteness and salary ($p = 0.79$), were also not statistically significant (Table 1).

DISCUSSION

As noted above, workers' salaries, on average, increase \$852.27 per year for every 1% increase in the percentage of remote jobs within a given sector. Several potential explanations for this correlation exist. One explanation could be that companies see financial benefit from employees working remotely and therefore are incentivized to share the saved costs/increased revenue with employees to prevent employees from leaving (11). This may also incentivize more companies/workers to transition to remote work in the future. Another explanation could be that remote work leads to increased competition for employee services by reducing geographic barriers to hiring by companies in other cities or states (12). Therefore, employers may need to raise salaries to compete for the best talent. Yet another explanation may be that pandemic-related policies encouraged some workers

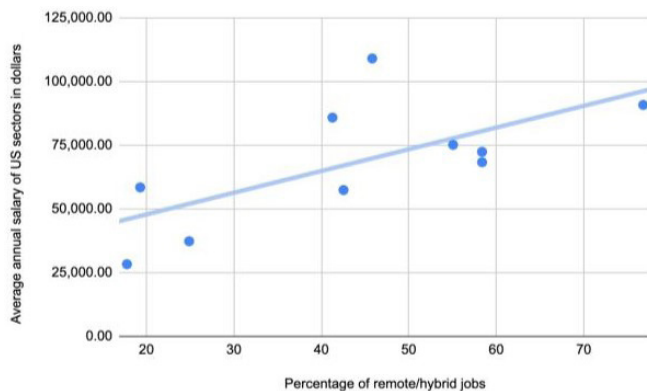


Figure 1: The relation between remoteness and salary. Average US annual salary (US Dollars) correlated with percentage of remote/hybrid jobs across sectors. The blue line represents the linear regression model: $\text{Salary} = \$852.27 \times (\% \text{ remoteness}) + \$30,821.80$; $p = 0.03$ and $R^2 = 0.45$.

Job Sector	Tenure (years)	Education (% college degree)	Remoteness (% of jobs that are remote)	Annual salary (US dollars)
Utilities	6	12.30	45.82	\$109,092.88
Information	4.2	77.00	76.81	\$90,868.96
Financial activities	4.5	74.40	41.28	\$85,882.16
Wholesale trade	4.9	50.80	55.06	\$75,196.16
Durable goods manufacturing	5.3	Not available	58.38	\$72,435.48
Manufacturing	5.2	50.80	58.38	\$68,373.76
Transportation and warehousing	3.4	26.00	19.29	\$58,473.48
Healthcare/hospital	3.9	62.00	42.54	\$57,437.12
Retail trade	2.8	36.7	24.89	\$37,329.76
Leisure and hospitality	2	Not available	17.78	\$28,314.52

Table 1: Sector-specific data. The average tenure (in years), education (% of workers with post-secondary education), remoteness (% of remote/hybrid workers), and salary (yearly) for each sector used in the analysis.

to leave the workforce entirely, thereby reducing the supply of workers available and leading to increased salaries for the remaining limited supply workers (13).

Despite these results and potential explanations, there are limitations to this study. As presented in our second analysis, when accounting for the confounding variables of tenure and education, this correlation between remoteness and salary lost statistical significance. This suggests that the association between remote work and salaries is more nuanced, with varying impacts on different sectors and different groups of employees.

One could also posit that job sectors more suited to remote work tend to pay higher salaries (Information technology, financial activities). However, the highest paying sector in our study, Utilities, appeared to have less than half of employees working remotely during the relevant time period. This suggests that the explanation of sectors more suited to remote work having inherently higher salaries may not explain the larger correlation observed. Additionally, future research could quell these concerns by having salary comparisons between remote and onsite workers done within a certain company or sector to see how remote work affects the pay gaps between otherwise similar workers in similar sectors. This distinction would help clarify the extent to which remote work affects salaries as opposed to the other confounding variables mentioned.

We conclude the average remote worker has a higher salary compared with the average in-office worker. Additionally, companies may realize increased profits through remote work, assuming increased worker productivity. Remote work correlates with a ~13% increase in productivity; 9% of the increase is due to more working minutes (because of less commute time, fewer breaks, less sick days), and 4%

is attributed to higher quality work (6). This suggests that companies should favor remote job growth where possible.

Conversely, a surplus of remote workers may hinder wage growth. Companies may not continue to see continued productivity increases from remote work. Beyond a certain level of remoteness, or after a certain amount of time passes, the increase in salaries may eventually flatten. Nonetheless, at least in the present, more remote work could benefit both employers and employees. These benefits could translate into a higher GDP and an overall improved national economy (14).

The above conclusions could be further expanded upon in future studies. Perhaps with the use of a larger data set, it may be possible to identify a statistically significant correlation between remote work and salary on multivariate analysis. If a correlation is observed in a larger data set, even after adjusting for education and tenure, this may help establish a causal relationship.

Additionally, future research may also explore temporal trends. The data presented here were from September 2022, and we were only able to investigate the relationship between remoteness and salary during that period. Perhaps by comparing trends across time, we would be able to better understand future implications of remote work.

MATERIALS & METHODS

Data used was acquired from the Work From Home (WFH) research online database and the Bureau of Labor Statistics salary report (15, 16). For the initial linear regression, we used just salary and remoteness, for which 10 sectors were considered: utilities, manufacturing, retail trade, financial activities, transportation and warehousing, information technology, wholesale trade, healthcare, durable goods/manufacturing, and leisure/hospitality. Remoteness was calculated by taking the percent of onsite workers and subtracting it from 100%, as both remote and hybrid workers are included in the remoteness of a sector. The linear regression analysis was performed in Google Sheets and was modeled ($Y_1 \sim AX_1 + B$), where the salary variable was set to Y and the remoteness variable was set to X.

For the multiple regression analysis, data regarding tenure, salary, and education were collected (measurements specified in Table 1) from various Bureau of Labor Statistics reports (16-18). For consistency we obtained these data points from September 2022. Tenure across sectors ranged from 2 years (leisure and hospitality) to 6 years (utilities). Education level (quantified as the percentage of survey respondents with a college degree) ranges from 12.3% (utilities) to 77% (information). The sectors of durable goods/manufacturing and leisure and hospitality were excluded from the multiple regression analysis, due to lack of the education data for these specific sectors.

In our analysis, the salary variable was set to Y, tenure variable was set to X, remoteness variable was set to Z, and education variable was set to W. A regression equation was modeled ($Y_1 \sim AX_1 + BZ_1 + CW_1$) in Google Sheets. The equation for the fitted regression model was salary = $-\$10,138.84 + \$16,706.66 \times (\text{job tenure in years}) + \$52.84 \times (\% \text{ of workers with a post-secondary degree}) + \$165.07 \times (\% \text{ remoteness})$, with a standard error of \$16,253.74. The software program extension XLMiner Analysis ToolPak was

utilized for both linear regression and multiple regression (19).

Received: January 13, 2024

Accepted: April 2, 2024

Published: September 26, 2024

REFERENCES

1. Silver, Hilary. "Working from Home: Before and After the Pandemic." *Contexts*, vol. 22, no. 1, 2 Mar. 2023, pp. 66-70. <https://doi.org/10.1177/15365042221142839>
2. Haan, Katherine. "Remote Work Statistics and Trends in 2024." *Forbes*, 12 Jun. 2023. www.forbes.com/advisor/business/remote-work-statistics/
3. "WHO Chief Declares End to COVID-19 as a Global Health Emergency | UN News." *UN News*, 5 May 2023. news.un.org/en/story/2023/05/1136367
4. Bloom, Nicholas. "Nicholas Bloom Predicts a Working-from-Home Nike Swoosh." *The Economist*, 29 Aug. 2023, www.economist.com/by-invitation/2023/08/29/nicholas-bloom-predicts-a-working-from-home-nike-swoosh
5. "American Time Use Survey - 2023 Results." Bureau of Labor Statistics, 27 Jun. 2024. www.bls.gov/news.release/atus.nr0.htm
6. Bloom, Nicholas, et al. "Does Working from Home Work? Evidence from a Chinese Experiment." *The Quarterly Journal of Economics*, vol. 130, no. 1, February 2015, pp. 165-218. <https://doi.org/10.1093/qje/qju032>
7. Pokojski, Zenon, et al. "Remote Work Efficiency from the Employers' Perspective— What's Next?" *Sustainability*, vol. 14, no. 7, April 2022. <https://doi.org/10.3390/su14074220>
8. Silvermann, Baruch. "Does Working From Home Save Companies Money?" *business.com*. 10 Apr. 2024. www.business.com/articles/working-from-home-save-money/
9. Barrero, Jose Maria, et al. "The Evolution of Work from Home." University of Chicago, Becker Friedman Institute for Economics Working Paper, no. 2023-116, 6 Sep. 2023. <http://dx.doi.org/10.2139/ssrn.4564075>
10. Barrero, Jose Maria, et al. "The Shift to Remote Work Lessens Wage-Growth Pressures." National Bureau of Economic Research Working Paper no. 30197. July 2022. <https://www.nber.org/papers/w30197>
11. Lister, Kate. "Latest Work-at-Home/Telecommuting/Remote Work Statistics." Global Workplace Analytics. June 2021. globalworkplaceanalytics.com/telecommuting-statistics
12. Teodorovicz, Thomaz, et al. "Location-Specificity and Geographic Competition for Remote Workers." Harvard Business School Working Paper, no. 23-071. 27 May 2023. www.hbs.edu/ris/Publication%20Files/23-071_89dd668d-c58d-48e8-84f1-1fad1c968388.pdf
13. Ferguson, Stephanie. "Understanding America's Labor Shortage" *US Chamber of Commerce*. 24 Jun 2024. www.uschamber.com/workforce/understanding-americas-labor-shortage
14. Gaskell, Adi. "Research Explores The Economic Benefits Of Remote Work During Covid-19" 15 Feb 2022. www.forbes.com/sites/adigaskell/2022/02/15/research-explores-the-economic-benefits-of-remote-work-during-covid/
15. "Survey of Working Arrangements and Attitudes." *WFH Research*. www.wfhresearch.com.

16. United States, Bureau of Labor Statistics. "Employee Tenure in 2022." *Economic News Release*, 22 Sept. 2022, www.bls.gov/news.release/tenure.toc.htm
17. United States, Bureau of Labor Statistics. "The Employment Situation – March 2024." *Economic News Release*, 8 December 2023. www.bls.gov/news.release/empsit.t19.htm
18. United States, Bureau of Labor Statistics. "Educational Attainment for Workers 25 Years and Older by Detailed Occupation." *Employment Projections*, 6 September 2023, www.bls.gov/emp/tables/educational-attainment.htm
19. Solver. (n.d.). XLMiner Analysis ToolPak. Retrieved July 6, 2024 www.solver.com/xlminer-analysis-toolpak-0

Copyright: © 2024 Shivnani and Ho. All JEI articles are distributed under the attribution non-commercial, no derivative license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). This means that anyone is free to share, copy and distribute an unaltered article for non-commercial purposes provided the original author and source is credited.