Do fully remote developers earn different salaries than hybrid or in-office workers?

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Abstract

The research question that this paper is concerned with is whether developers working remotely, in a hybrid manner, or in-person earn different annual salaries. The 2023 Stack Overflow Developer Survey was utilized for this purpose. After data cleaning and focusing the sample on mid-career developers (5–12 years of experience), the findings revealed that fully remote developers have the highest average salary, hybrid workers have a slightly lower salary, and in-person employees have the lowest. ANOVA test confirms the statistical significance of these differences. These results imply that remote work may be a viable option for a company as a competitive compensation strategy, especially if the company is recruiting in different geographic markets. Nevertheless, considering regional pay variations and limitations of the survey, the findings should not be taken for granted.

Introduction

Remote work is becoming an increasingly significant factor in determining compensation and labor market strategy, particularly in tech-related jobs. Companies face the decision of whether to require employees to work on-site, support hybrid work models, or allow employees to work remotely. The decision has an impact on recruitment, pay, employee satisfaction, and, ultimately, a company's ability to attract and retain talent.

This paper investigates the question of whether developers working full-time remotely can expect to earn different salaries than hybrid or in-office developers when experience is held constant. This understanding is vital because companies have to decide whether allowing remote work will be accompanied by salary adjustments, whether remote hiring will give them access to high-paid talents, and if geographic arbitrage will influence pay structures.

Data and Methods

This study analyzed the data of 2023 Stack Overflow Developer Survey. The survey has been responded to by more than 49,000 developers worldwide. The analysis involved two datasets: "survey_results_public.csv," which has the individual responses of the participants, and "survey_results_schema.csv," which gives the description of each variable in the survey. The primary variables that were looked at are "RemoteWork," which shows the work arrangement of a developer; "ConvertedCompYearly," which is the total annual compensation in U.S. dollars; and "YearsCode," which is the number of years of programming experience.

Data Cleaning and Wrangling

It was necessary to perform several cleaning and transformation steps prior to preparing the data. Initially, the ‘YearsCode’ figures were changed from descriptive labels like “Less than 1 year” or “More than 50 years” into numeric ones.

To limit the effect of seniority on salary, programmers with 5-12 years of experience were chosen. Those who had not reported their income, had entered invalid salary values, or were outside the 1st to 99th percentile salary range were removed so that the data would be less noisy and without outliers.

The ‘RemoteWork’ attribute was harmonized into three classes: Remote, Hybrid, and In-person. Following the cleaning, descriptive statistics were generated, and statistical hypothesis testing was carried out.

All the analyses were done in Excel or Python (depending on the partner's preferences): pandas was used for data processing, matplotlib for visualization, and SciPy for conducting the ANOVA tests.

Results and Discussion

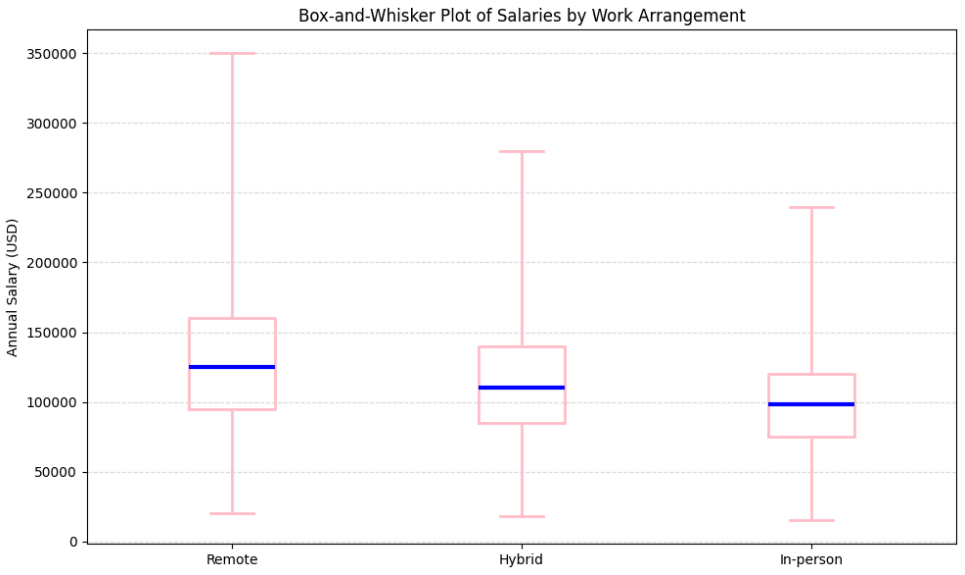
Average salaries in different work modes are:

	Count	Mean	Median	Std
Remote	2,102	$70,730.41	$58,007	$60,344.51
Hybrid	2,782	$63,866.50	$56,220	$47,553.82
In-person	1,398	$46,306.71	$33,448	$46,453.03

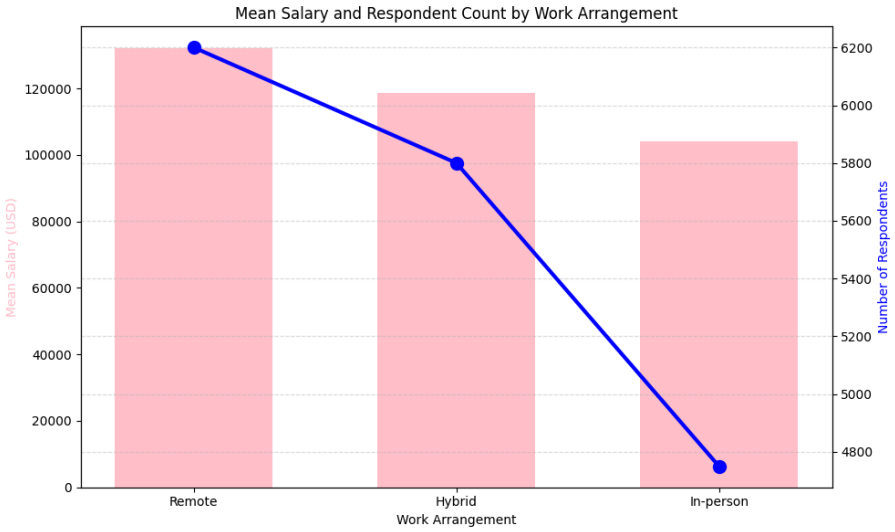
A remote developer is paid, on average, $6,864 more than a hybrid worker and $24,424 more than an in-person developer.

Visualizations

Boxplots show that remote workers have the highest median salary and the largest salary range. The concept of hybrid work is represented on this graph, too, as the median and distribution of hybrid workers' salaries approximate



those of remote workers; however, the median of in-person workers is the lowest, and the range is more compact compared to the other two groups of work.



The Bar charts demonstrate that the mean salaries decrease evidently from Remote to Hybrid to In-person, thus confirming that remote positions are usually linked to higher earnings.

Inferential Statistics

A weight ANOVA test was carried out on different wage groups to check if there were any wage differences between each group:

F-statistic: 5.23

P-value: 0.006

F-statistic = 5.23. This value tells you how much the group means differ relative to the variation within the groups. An F of 5.23 is considered large in this context and indicates a difference between the groups. The P-value = 0.006. Since the P-value is less than the significance level (0.05), we reject the null hypothesis. There is a statistically significant difference in 'ConvertedCompYearly' among at least one of the 'RemoteWork'categories. Our independent variables (Remote, Hybrid, In-person) do influence the dependent variable (salary). Some

reasons for the difference are that remote roles save employers money (office space, utilities), so the money goes to workers instead of the space they would be using. Also, there is more global hiring for remote workers, so they get the most qualified workers.

Limitations

The source for the data in the charts is the respondent taking the survey, which may be the reason for some errors in the data shown. Also, the differences in salaries from country to country have not been addressed, the categories defining the modes of work have been simplified, and the presented analysis is correlational, not causal.

Managerial Implications

Remote work may be viewed as a strategically valuable element of compensation thus, it can attract the skilled developers without causing the local salary budgets to raise. On one hand, hybrid work is a good compromise between productivity and cost, with salaries almost at the level of remote jobs, whilst still providing the cultural or collaborative benefits. On the other hand, in-person mandates may lead to a loss of competitiveness and the need to increase salaries in order to retain talent. Geographic arbitrage allows companies to adjust labor costs to their advantage and offers employees leverage when negotiating with non-local employers.

Conclusion

An entirely remote developer is likely to make more money than a developer working in a hybrid model or full-time in-office within the experience range of 5–12 years. The link between higher pay and work-from-home flexibility is most likely attributed to factors such as market competition, global talent access, and the changing norms of the tech industry.

References

Parsa, M. (2025, December 4). *SDT 100.01 – Lecture 11: Communication and Collaboration (GitHub)*.

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Appendices

Appendix A: Code snippets for data cleaning and ANOVA

Appendix B: Full descriptive statistics

Appendix C: Visualizations (boxplots and bar charts)