

The relationship between the teachers' working time and the students' test score

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Introduction

Recently, teachers and principals have had a lot of stress in the United States. About twice as many teachers and principals reported experiencing frequent job-related stress as the general population of working adults in January 2022, and more teachers and principals than other working adults reported symptoms of depression and not coping well with their job-related stress (Steiner et al., 2022).

In this paper, we analyze the relationship between the labor time of teachers and the test scores of students on a county-by-county basis in the U.S. As mentioned above, the labor force of teachers is expected to decrease because of stress, and there is a possibility that hours worked per capita will increase in the U.S. From this above, we assumed that too many and too few hours worked negatively affected the educational outcomes. In

this research, we use the test score as an educational outcome.

Methodology

Our first attempt to control for such confounding factors is to exploit within-state and within-year variation by estimating the following equation:

$$Y_{csy} = \beta_0 + \beta_1 \text{time}_{csy} + \beta_2 \text{time}_{csy}^2 + \beta_3 \text{Overtime}_{csy} + \delta_s + \gamma_y + \varepsilon$$

Where c , s , and t indicate county, states, and years, respectively. Y represents the test score. time measures the average teacher's labor time in county c and in state s in year t , δ_s is the state dummy, and γ_y is the year dummy. The study also includes Overtime_{csy} dummy to analyze whether teacher's overtime work affects the student's test score. ε is the error term, reflecting variation not accounted for in the model. We analyze at a 5% significance level.

Table1.Basic Statistics

	mean	sd	min	max
Teacher's working time -X	34.98	17.199	3	80
Math mean score(cohort scale)	0.0348	0.252846	-0.59624	0.690202
over-time_dummy				
year-dummy			2003	2021
county-dummy			101	55479

To analyze the assumption more correctly, we use dummy variables which are over time, year, and county.

Results

Table 2 is the results of the linear regression analysis. The p-value of the explanatory variable is not below the 5% significance level, indicating that this explanatory variable does not have a significant effect. Therefore, we could not reject the null hypothesis. However, the p-value of the overtime dummy was less than 0.01, so we found that overtime work affects the test score negatively.

According to this result, it can be assumed that just the data describing a teacher's working time is not relevant to a student's test score. Nevertheless, the negative coefficient for over-time

worksuggests that the stress from the overtime work might affect their students' test score.

Table2. The results of the linear regression analysis

Variables	Coefficients	Pr (> t)
Working time	-0.2280323	0.531175
Overtime-dummy "Yes"	-0.0003398	0.009348
Observations	2934	
R^2	0.5042	

Conclusion

In this study, the relationship between teacher labor hours and test scores was analyzed, and a significant relationship was not found between the two variables even. Though, there is a significant coefficient for the overtime work. Based on this, one reflection for future research is that if the labor force of teachers decreases, the remaining teacher might be owed the work of teacher quitting, and it might be connected to the decline of the test score.

References

Steiner, Elizabeth D., and Ashley Woo. (2021). Job-Related Stress Threatens the Teacher Supply. https://www.rand.org/pubs/research_reports/RR A1108-1.html