

Does greater teaching experience in kindergarten teachers improve (eventual) student outcomes?

Arnav Agarwal

November 21, 2022

1 Introduction

At present, in the United States, "Most public school districts adopt a step program that establishes a pay scale based on the number of years a teacher works within the district." (Indeed)¹. This is curious, because it essentially issues a value to years of teaching experience: greater years of teaching experience warrants greater pay. But does teaching experience really play a role in teaching efficiency? Most of the current literature on the topic seems to think so. Kini and Podolsky, infact, recently conducted a study on exactly this matter, and determined that "Teaching experience is positively associated with student achievement gains throughout a teacher's career." (Kini and Podolsky).² However, this research is done over K-12 generally, and herein lies opportunity for this paper: Does such a correlation hold for kindergarten teachers? Kindergarten is curious to study because it is often considered fundamentally important in a student's formative education, and appears to be generally indicative of an individual's eventual success, "A new study found students with better teachers learned more in kindergarten — and earned more as young adults." (NYTimes)³. As such, this report will investigate whether the years of teaching experience of kindergarten teachers impact a student's eventual academic performance.

2 Methodology

This study will predominantly rely on the STAR database (star.dta) to conduct this research. The outcome variable (Y-Variable) in this case is eventual academic performance, which will be measured through aggregate SAT scores of students (a contentious measure of academic performance, but it should suffice within this context). The treated variable (X-Variable) is the number of years of teaching experience the kindergarten teacher's of these students had. Considering that both data are continuous, a scatter-plot can be created to visualize the correlation between the two, alongside running a regression through Stata.

3 Results

The correlation coefficient between the total sat score and the yeas of experience of a kindergarten teacher is $R = 0.1220$. This suggests a weak positive correlation between the two variables, implying that the greater the number of years of teaching experience, the greater the student scored on the SAT, which coincides with the literature discussed previously. However,

¹<https://www.indeed.com/career-advice/pay-salary/how-do-teachers-get-paid>

²<http://www.ecs.org/wp-content/uploads/TeachingExperienceBrief.pdf>

³<https://www.nytimes.com/2010/07/28/business/economy/28leonhardt.html>

we can't necessarily comment on the causation of one on the other based solely through this, and it is worth noting the very low R (i.e. this correlation isn't necessarily very apparent).

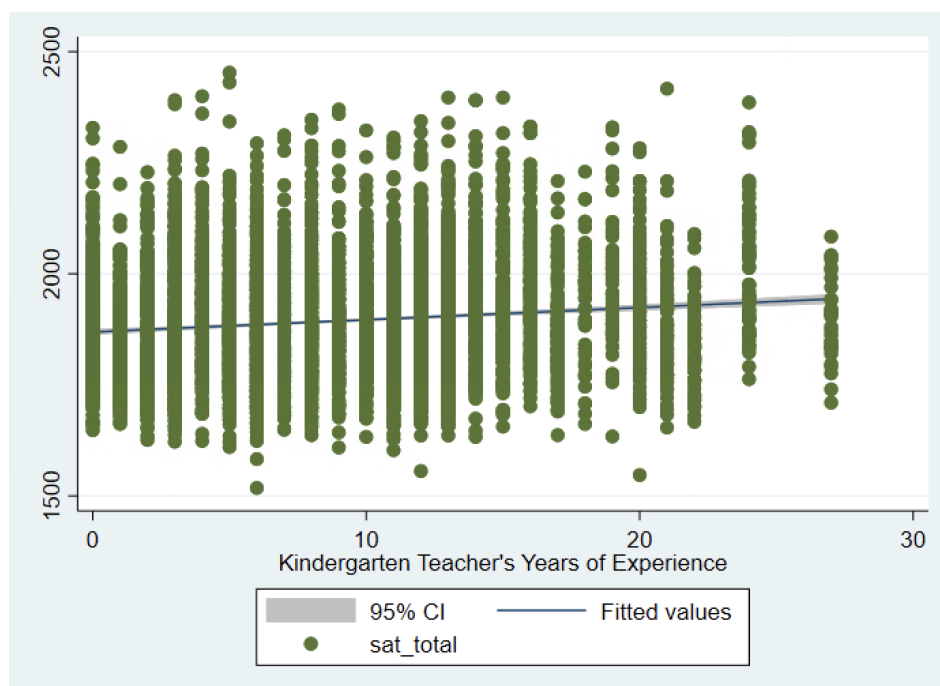
The results from the regression are as follows:

Source	SS	df	MS	Number of obs	=	5,710
Model	1434805.92	1	1434805.92	F(1, 5708)	=	86.31
Residual	94888178.9	5,708	16623.7174	Prob > F	=	0.0000
				R-squared	=	0.0149
				Adj R-squared	=	0.0147
Total	96322984.8	5,709	16872.1291	Root MSE	=	128.93

sat_total	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
teacher_experience	2.751549	.2961725	9.29	0.000	2.170939	3.33216
_cons	1869.093	3.246646	575.70	0.000	1862.728	1875.458

The coefficient of the linear regression between the two is 2.752. This implies that for every additional year of teaching, one can expect an increase in the aggregate SAT score by approximately 3 points. This result is statistically significant as it has a p-value of 0 with a 95% confidence interval [2.17, 3.33]. The p-value < 0.05 so we can reject the null-hypothesis. The R^2 value is extremely low, at 0.0149, implying that only 1.49% of the variability in SAT scores is explained by this regression model.

Finally, we can visualize this data:



Here, we can see the weak positive correlation between the two variables, and an extremely great variance in the SAT data generally, from which it is difficult to deduce the causal relationship between them.

4 Conclusion

From these results, it's hard to affirm that more teaching experience in kindergarten teachers contributes to greater future academic success for students. While there exists a weak positive correlation between the two, the issue is that it is just that; not very substantive. This is particularly evident from the extremely great variance in the data and low correlation coefficient between the two variables, implying there are probably confounders in this investigation that aren't being accounted for. For instance, the compounding effect of all teachers that come after the kindergarten teacher could play a substantive role in future success.

Nevertheless, this study is not without its merit. It has significant relevance in terms of state teacher employment policies, particularly those related to teacher salaries (discussed earlier), and could probably yield more relevant conclusions given more data. For instance, instead of measuring solely SAT scores (which is usually taken between grade 11-12), it would benefit the study to benchmark academic success over the years. In this case, SAT score might not be apt to measure academic success, but rather report cart aggregates. This would be particularly interesting in deducing the immediate impact of kindergarten teacher's (SR vs LR), and probably better identify relevant time-varying covariance.

I learned that any study is valuable, even those that seem to have results that don't necessarily appear promising. In a world where there's an increasing presence of academic fabrication (or generally the use of fake data to show conclusive results), it's important to note that any study contributes to the field of knowledge associated with the relevant subject being investigated. Afterall, observational studies like this one are reliant on data from one geography, and the external validity of study of this nature can always be tested by extrapolating the research method in other contexts. Regardless, this has been a valuable learning experience.