Final Project - MI Education Funding

Katie Denzin, Shrishti Jalan, Joon Chung

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1. Introduction

Investment in education is not only a tool for professional development, but it essentially reduces social inequalities and fosters equal opportunities. Therefore, understanding the impact of such investment on education on other variables such as attendance or proficiency in English and Math could shed light into whether this investment is generating a significant impact, or whether it should be more targeted; maybe less in infrastructure and more in quality of lessons or opportunities provided to students. Our analysis of the results may inform policymakers into making investments in education a driver to upward mobility. It may also show the scope of any problems related to chronic absenteeism and where in Michigan schools may be struggling more than others. Our research centers on Michigan, a state profoundly influencing our lives, offering a relevant case study.

The data we are using in this report comes from Michigan School Data (https://www.mischooldata.org/). We are specifically looking to analyze data from the 2021-2022 school year as it is the most recent available data set on the site. To investigate the relationship between funding and attendance, we merged information about Per Pupil Expenditures (PPE) with attendance rates for all schools. Attendance rate is defined as the percentage of students at school more than 90% of the academic year. In addition, we briefly analyzed the combined proficiency rate of schools, representing the combined state testing scores of Math and English. Although it would be interesting to look at the breakdown of how districts are spending the money specifically, the data was only available by specific schools and the aggregation of that much data is beyond the scope of this report.

Therefore, this research not only seeks to understand the impact of educational funding on attendance and proficiency but also it aims to contribute valuable insights for informed decision-making by policymakers. Education's role as a driver of upward mobility emphasizes the importance of strategic investments, and our findings may pave the way for more effective resource allocation, hence fostering a more equitable and impactful educational system in Michigan.

2. Theory

We are interested in studying the relationship between attendance rate and Per Pupil Expenditure (PPE) in Michigan districts, we are guided by the human capital theory. This theory says that investments in education, such as increased spending per student lead to improved human capital development, resulting in higher productivity and socio-economic well-being. Theoretically, higher PPE could enhance the quality of education by providing better resources, facilities, and support systems that positively influence student attendance. We expect a positive functional relationship, where increased PPE correlates with higher attendance rates, reflecting the notion that well-funded educational systems attract and retain students, contributing to overall academic success.

Similarly, our exploration of the relationship between average proficiency rates and PPE aligns with human capital theory. Here, we predict that a higher level of per pupil expenditure is associated with better educational outcomes, including increased proficiency rates. The underlying theory suggests that increased

funding allows for the implementation of effective teaching methods, specialized programs, and additional resources that contribute to enhanced student proficiency. Thus, we anticipate a positive functional relationship between PPE and proficiency rates, indicating that greater investment in education correlates with improved academic performance.

To understand these relationships, we will use statistical analyses, such as regression modeling. By interpreting the coefficients, we can assess the strength and direction of the relationships. Additionally, we may conduct hypothesis testing to determine whether the observed associations are statistically significant. This theoretical framework allows us to explore not only the quantitative relationships but also the underlying mechanisms by which PPE influences attendance and proficiency rates in the Michigan education system.

3. Hypotheses

Our study revolves around three main hypotheses centered on the relationship between Per Pupil Expenditure (PPE) and crucial educational indicators in Michigan districts. In the first hypothesis, we predict a positive association between PPE and attendance rates, anticipating that higher investment in education will correspond to increased student attendance. This aligns with the overarching theory that well-funded educational systems create an environment conducive to heightened student engagement and participation.

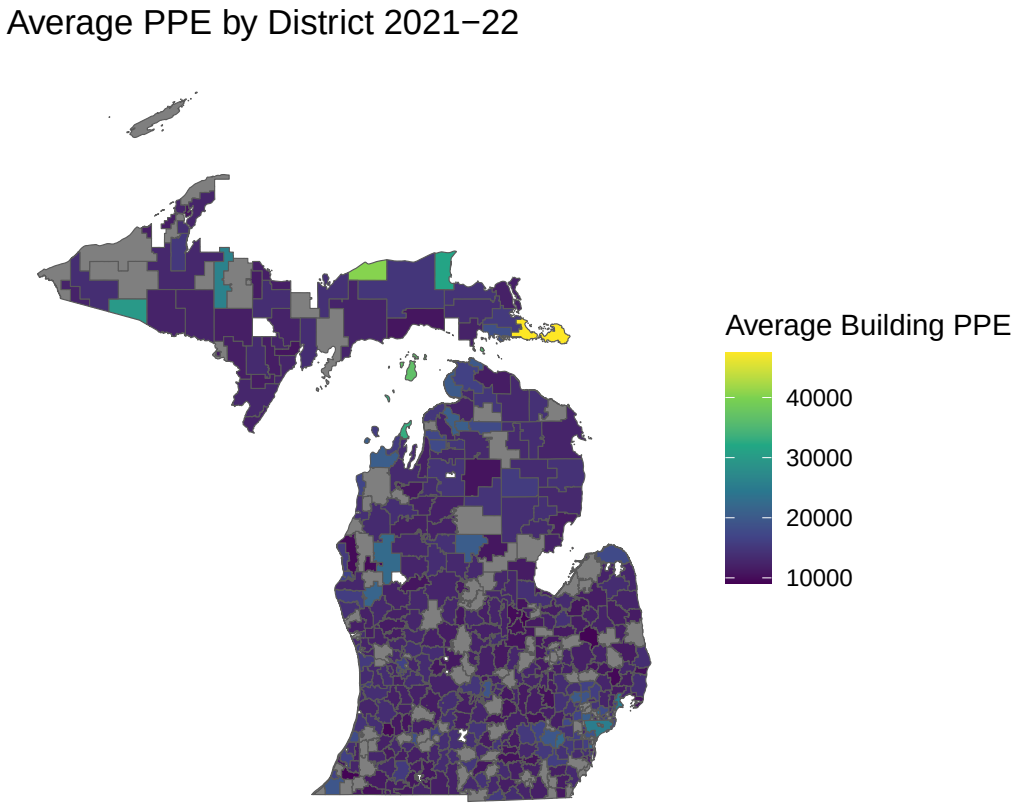
The second hypothesis focuses on proficiency rates, predicting a positive relationship between profieciency rates and PPE. We expect that districts with higher PPE levels will exhibit elevated average proficiency rates, reflecting the impact of increased financial resources on teaching quality and student performance.

These hypotheses guide our investigation, emphasizing the fundamental role of PPE in shaping key aspects of the educational landscape. Each hypothesis, rooted in human capital theory, seeks to elaborate on the relationships between funding levels and educational outcomes. As we delve into the data and use statistical analyses tools, our aim is to rigorously test and either accept or reject these hypotheses, providing valuable insights into the effectiveness of educational investments in Michigan counties.

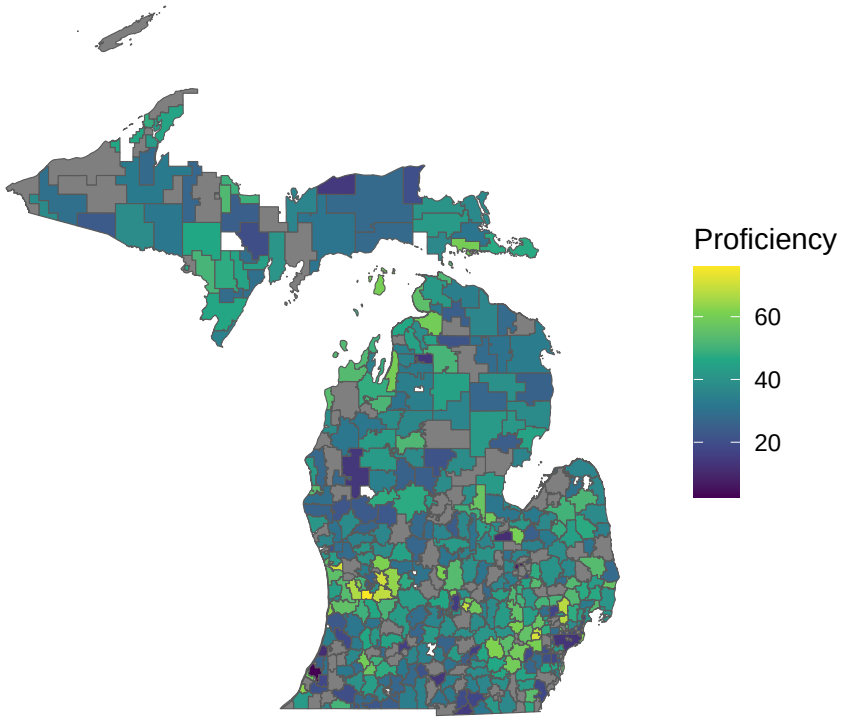
4. Data

Not every single school in Michigan is included in the analysis. We are limited by which schools are included in both of the datasets we chose. Of the schools that were in both sets, the attendance rate and total school PPE was 99% and 100% complete, constituting a relatively encompassing project. Although there were many other variables to choose from, the total school PPE combined all funding from local, state, federal, and district level funding. The attendance rate was one of the most complete variables and is an important part of a school's success. Additionally, we used the Tigris library to collect geographical information of each district. One significant issue we ran into was the slight differences in the names of districts that did leave out a few districts from our maps.

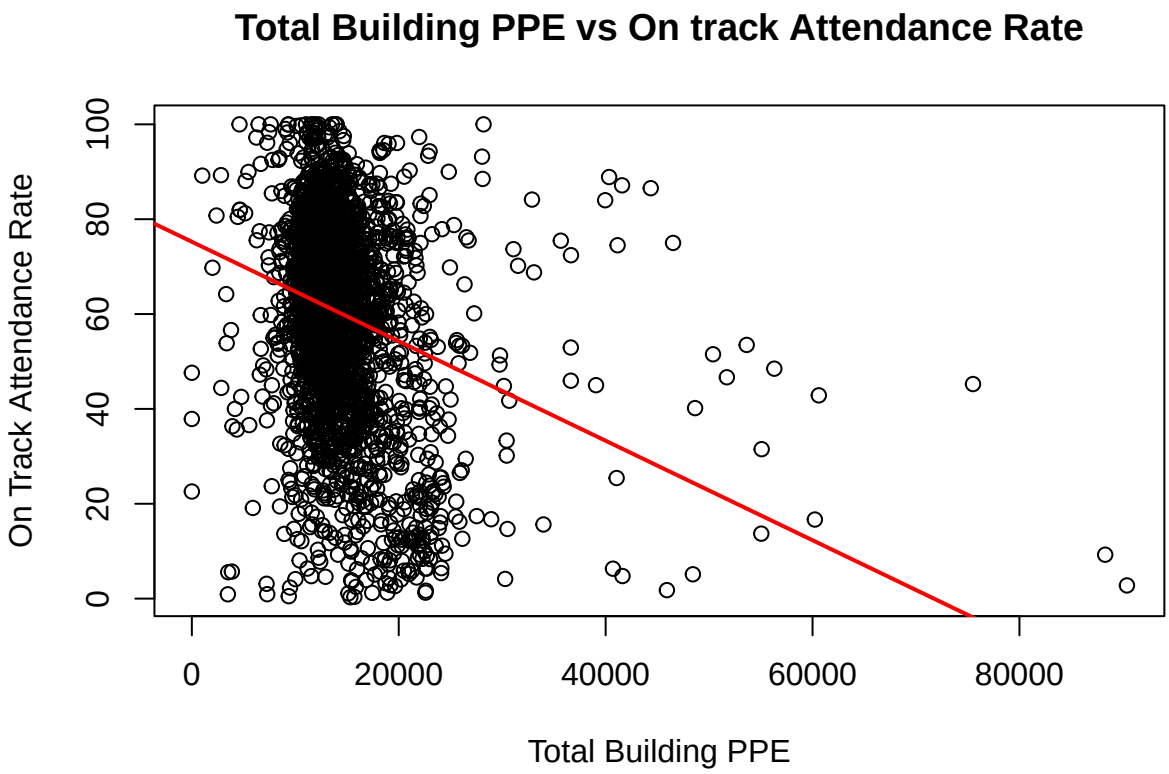
5. Analyses



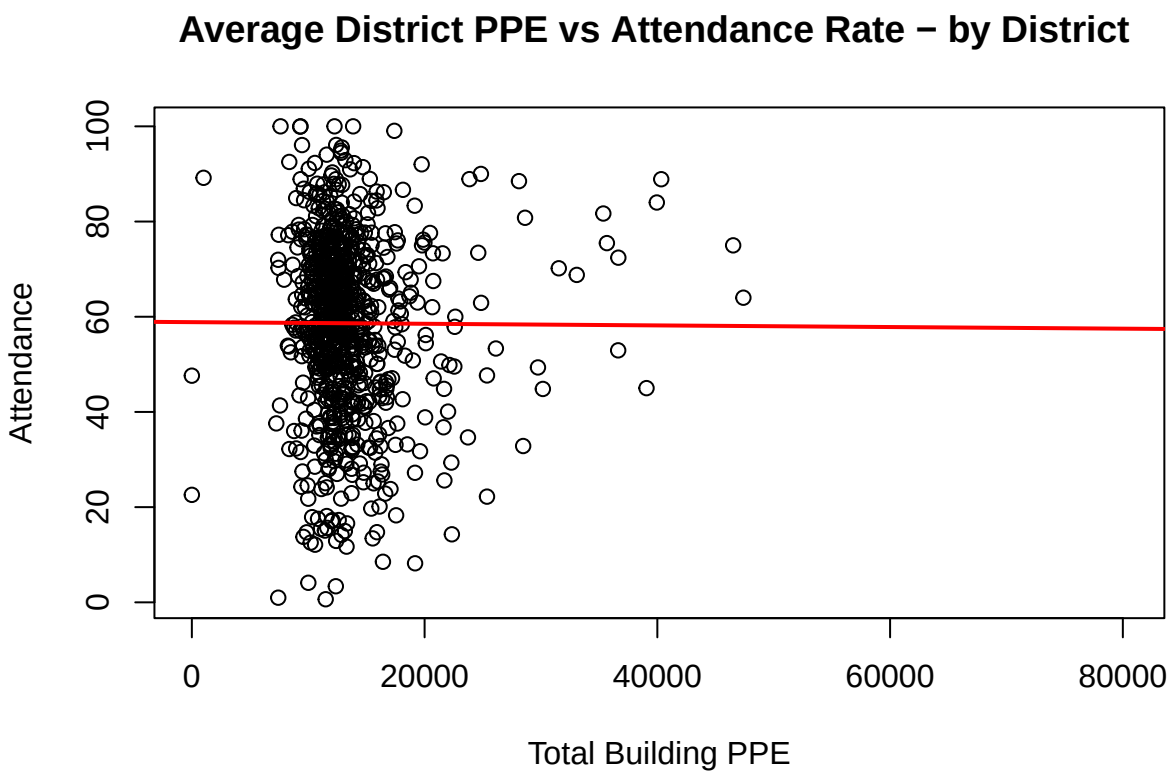
We notice that more or less all the counties invest around 10,000 dollars per pupil. There were counties with significant expenditure in the upper peninsula. However, A really big outlier of 108,739 dollars that we decided to remove from our analysis was Warren Woods Public Schools in Macomb County, Metro Detroit. One potential reason we were able to find for Warren Woods Public Schools being an outlier is the fact that they had a large bond purchase in the recent past, which funded their overall infrastructural investments and expenditures. We also see increased investments in areas near Detroit and the metropolitan area.



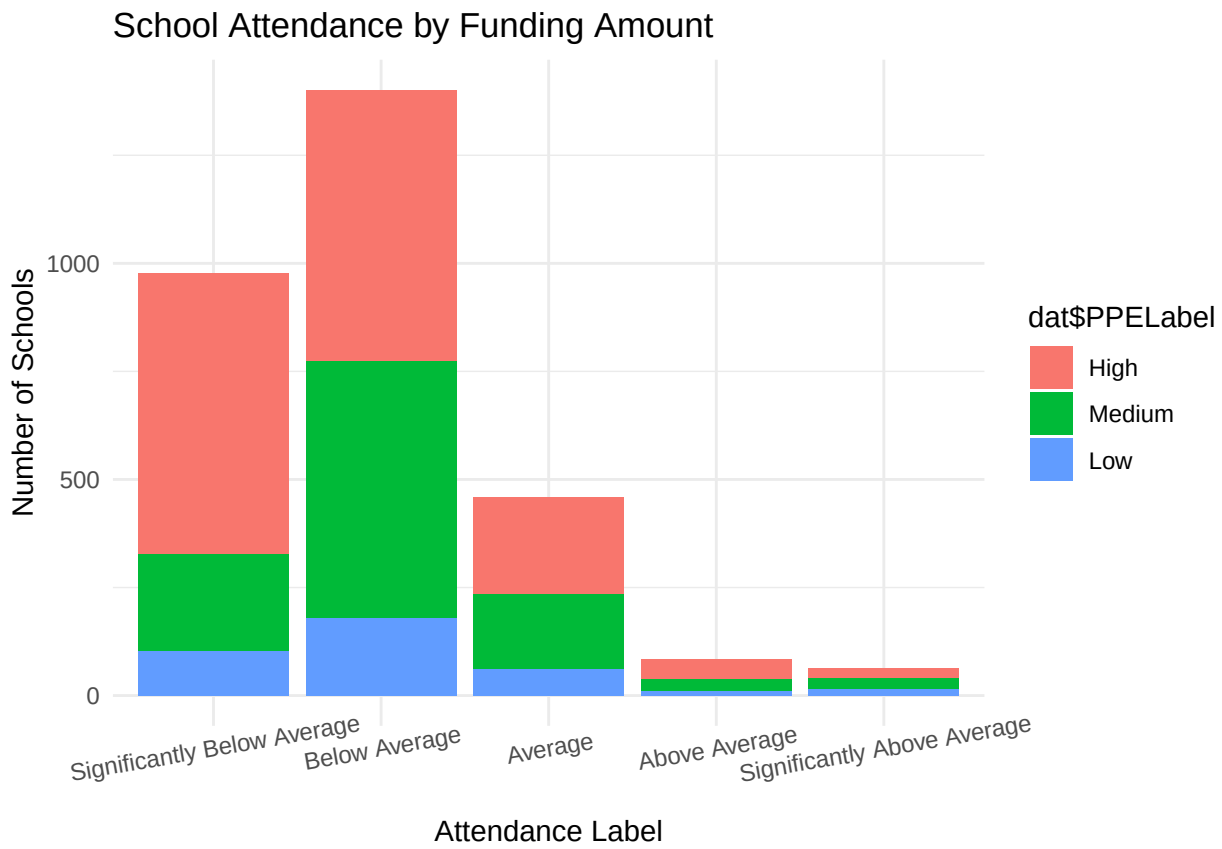
The proficiency rate follows a general trend along North and South. The southern part of the lower peninsula has lighter (higher) proficiency rates as compared to the northern parts of the state.



The negative correlation between total building PPE and on track attendance rate shows that as the investment per pupil per school increases, the on track attendance rate decreases. This result contradicts our main hypothesis of positive correlation between investment on education and attendance.



When the schools are aggregated by districts, with the Warren Woods outlier removed, the correlation is more akin to a straight line, zero correlation. There is a slight negative correlation between investment per pupil and attendance and is statistically insignificant. Both of these regressions indicate that there is no relationship between total school funding by pupil or average district PPE on attendance. Rather, it signifies that there is still much to explore to find solutions to boost school attendance.



We defined low PPE as below 11,000 dollars, medium as below 13,000 dollars, and high as above 13,000 dollars. Our attendance analysis graph shows that a large portion of high PPE schools have a "Below Average" or "Significantly Below Average" attendance rating. This reveals an interesting pattern as one would expect schools with high per-pupil expenditure to have infrastructural or educational resources that incentivize students to attend more frequently, and hence have a better attendance rating. Using this graph and the regression graphs above, we can conclude that Per-Pupil Expenditure does not have a significant impact on Attendance Rate. The combination of these graphs unveils a big problem- educational investments are not reaching all students and not encouraging attendance. Schools with high per-pupil expenditure have low attendance

6. Conclusion

We found that total building funding nor average district funding PPE was statistically significant with the attendance rate. As discussed in the introduction, the breakdown of how this money is spent (instructional staff, transportation, support staff, etc) may provide more information about what impacts attendance. The analysis could also be extended to proficiency rates, state testing, and college readiness as well as over time. However, from the data visualizations, attendance is clearly a problem in Michigan schools with the vast majority of schools included in our analysis falling in the Significantly Below Average and Below Average categories.

7. References

https://www.sciencedirect.com/topics/social-sciences/human-capital-theory /newline

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https://www.mischooldata.org/