



Research

Evaluating Increased Federal Spending on K-12

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Executive Summary

- Both leading Democratic presidential candidates, former Vice President Joe Biden and Senator Bernie Sanders, have proposed tripling federal Title 1 spending on low-income students, arguing that increasing spending will boost student performance.
- Prior research has found that increasing instructional spending alone—i.e. teacher pay and money for classroom supplies—boosts student performance, but only marginally: Raising instructional expenditures per student by \$1,000 raises test scores by a meager 0.84 points.
- This study finds that if the federal government were to triple Title 1 spending, raising it to \$45 billion per year, instructional expenditures per pupil would increase by only \$619.
- This study indicates that increasing Title 1 spending apart from accompanying structural reforms will do little to boost student performance.

Introduction

Title I of the Every Student Succeeds Act—the most recent reauthorization of the Elementary and Secondary Education Act of 1965—is the largest federal K-12 education program in the United States. Through Title I, the federal government provides extra funding to states for local education agencies in low-income and high-poverty districts. The federal government spent \$15.3 billion on Title I funding in 2018. Former Vice President Joe Biden and Senator Bernie Sanders (D-VT) have each indicated that as president they would propose tripling Title I funding to \$45 billion per year.

The underlying logic of these proposals is that the federal government should invest more in public K-12 school systems, which are traditionally funded and administered at the local and state level. The specific goal of tripling or quadrupling Title I funding is to increase teacher pay and classroom expenditures (commonly defined as instruction expenditures) and thereby to improve student performance.^[1] ^[2] ^[3] This proposal raises the question, however: What portion of the proposed increases in Title I funding would translate to increases in instruction expenditures?

This study measures that portion. It first briefly reviews prior research on the relationship between school spending and student performance. It then examines the relationship between federal funding and school district instruction expenditures. The next part combines the two relationships above to estimate what the presidential proposals would accomplish. Ultimately this analysis finds that tripling Title I funding, without reforming how those funds are allocated and used, would have little effect on student performance.

Instruction Expenditures Matter

The impact of school funding on student outcomes has been contested since the Equality of Educational

Opportunity Report (1966), also known as the Coleman Report. The Coleman Report found that families, mainly the ability of parents, are the main factor in determining student performance, and that differences in school inputs are largely marginal in determining student performance.[4]

Since the Coleman Report, many meta-analyses support the notion that spending plays a negligible role in increasing student performance.[5] The issue with many of these studies is that in their methodology they lump different types of school spending into one category. This aggregated measure of spending can miss the dynamics of different types of spending.[6]

Charles Jacques and B. Wade Brorsen found in their 2002 study, “Relationships Between Types of School District Expenditures and Student Performance,” published in *Applied Economics Letters*, that for every additional \$1,000 spent per student on instructional expenditures, student test scores on average increased by 0.82 point (test scores were averaged from the Criterion Referenced Test and Iowa Norm Referenced Test, which score from 0 to 100.)[7] Like many before them who also differentiated between types of school spending, the authors could not find a causal relationship between test scores and other expenditures such as after-school programs, counseling, and social work.[8] Nevertheless, Title I funds are commonly spent on the above expenditures along with professional development. These other types of spending have not been found to improve student performance.[9]

This analysis adds to the discussion about school spending and student achievement by estimating a direct causal relationship between federal funding and instruction expenditures. If the presidential candidates want to increase Title I funding so that school districts can pay their teachers more and thereby improve student performance, how much of the increase in Title I funding would actually make its way toward those goals?

Findings

To determine the relationship between school district instruction expenditures and federal funding, this study collected data from the National Center for Education Statistics (NCES) for academic years 2000-01 through 2015-16 for 445 large public-school districts across the country. The NCES Digest of Education Statistics provides the most robust and complete dataset to answer this question, but it unfortunately did not have data on the many small school districts around the country.

A fixed effect regression model was fitted to the data, where the dependent variable is the log instruction expenditures per pupil of a school district. The main independent variable of interest is the log revenue received from the federal government per pupil for a school district. The model finds that a 1 percent increase in revenue received per pupil from the federal government results in a 0.057 percent increase in instruction expenditures per pupil.

Across large school districts, the average per pupil revenue from the federal government for a school district is \$956.09. The average per pupil expenditures on instruction for a school district is \$5,277.48. Using the regression model, a 1 percent increase in revenue per pupil (\$9.56) is associated with a 0.057 percent increase in instruction expenditures per pupil (\$3.00.) Dividing the \$3.00 figure by the \$9.56 figure returns 31 cents. In other words, on average for every dollar a school district receives from the federal government, 31 cents go toward instruction expenditures. (For a more detailed explanation of the data, model, and analysis, please see the appendix below.)

Policy Implications

Tripling Title I funds would bring total Title I funding to about \$45 billion per year. Since only 31 cents on the dollar goes toward instruction expenditures, this overall increase would translate to about a \$14 billion increase per year in instruction expenditures. \$14 billion spread across all students in large school districts translates to an average \$619 increase per pupil in instruction expenditures.

While the data here only consider large school districts, the dataset includes 23 of the 25 million students who benefit from Title I spending. Therefore, while the overall impact is likely similar to the figures above, they are an overestimation.

Considering that prior research finds that a \$1,000 increase on instruction expenditures per student raised test scores by about 0.82 point, spending another \$45 billion per year on public schools would not discernibly improve student outcomes. Going backward in the analysis, to achieve a \$1,000 increase in instruction expenditures per pupil, Title I funding would have to increase by about \$72 billion per year.

Caveats and Conclusions

As noted above, the NCES dataset has limitations, particularly in that it does not include small school districts. This analysis also does not consider that Title I funds are not equally distributed among schools; rather, they are heavily weighted toward those in high-poverty and low-income districts. Every district in the dataset did receive Title I funds, however. The odds are that some districts would receive more funding than others, and thus the per-pupil bump in instructional spending would also be higher. Also of note, this analysis does not suggest that other types of expenditures besides instruction should be eliminated altogether.

Nevertheless, the basic message to policymakers is clear: Systemic reforms are likely to have more of an impact than merely spending more money. Thus, before proposing large increases in federal K-12 spending, the federal government should find how to shift current funding levels toward maximizing instruction expenditures.

Appendix

Data was collected from the NCES Digest.[\[10\]](#)

Table 1: Summary Statistics of Variables by School District Per Student

Variable	Mean	Std. Dev.	Min.	Max.
Instruction Expenditures	\$5,277	\$1,654	\$2,330	\$18,603
Revenue from Federal Gov	\$956	\$576	\$84	\$6,732
Revenue from State Gov	\$4,993	\$2,502	\$243	\$25,771
Revenue from Local Gov	\$4,203	\$2,200	\$163	\$19,709
Number Enrolled	44,611	68,748	15,013	1,077,381
Percent Non-White	44%	26%	0%	96%
Percent Hispanic	28%	26%	0%	100%

Number of Schools in District	66	96	9	1636
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A fixed effect regression model was fitted to the data where the panel variable is the school district. A fixed effect model accounts for unobservable characteristics that differ among school districts. The Akaike Information Criterion test indicated that the best model used the first lags of the revenue received per pupil from the various levels of government. Robust standard errors were used to account for heteroscedasticity. Indicator variables for the corresponding academic year were included to control for time variant factors.

The fixed effect regression model to predict instruction expenditures per pupil is:

$$\ln(\text{Instruction Expenditures Per Pupil}) = \beta_0 + \beta_1 \ln(\text{Revenue Received Per Pupil from the Federal Gov}) + \beta_2 \ln(1^{\text{st}} \text{Lag of Revenue Received Per Pupil from the Federal Gov}) + \beta_3 \ln(\text{Revenue Received Per Pupil from the State Gov}) + \beta_4 \ln(1^{\text{st}} \text{Lag of Revenue Received Per Pupil from the State Government}) + \beta_5 \ln(\text{Revenue Received Per Pupil from the Local Gov}) + \beta_6 \ln(1^{\text{st}} \text{Lag of Revenue Received Per Pupil from the Local Gov}) + \beta_7 \ln(\text{Percent of Students Below Federal Poverty Line}) + \beta_8 \ln(\text{Number of Students Enrolled}) + \beta_9 \ln(\text{Percent of Students That Are Not White}) + \beta_{10} \ln(\text{Percent of Students That Are Hispanic}) + \beta_{11} \ln(\text{Number of Schools in School District}) + \beta_{12} (2001-2002 \text{ Year Indicator}) + \dots + \beta_{26} (2015-2016 \text{ Year Indicator}) + \epsilon$$

Variable	Coefficient (Standard Error)
LN of Revenue Received from the Federal Government Per Student	0.057*** (.007)
1 st Lag of LN of Revenue Received from the Federal Government Per Student	-0.005 (0.006)
LN of Revenue Received from the State Government Per Student	0.139*** (.014)
1 st Lag of LN of Revenue Received from the State Government Per Student	0.031*** (0.009)
LN of Revenue Received from the Local Government Per Student	0.123*** (.009)
1 st Lag of LN of Revenue Received from the Local Government Per Student	0.037*** (0.009)
LN of Percentage of Students Living Below Federal Poverty Line	-0.051*** (0.011)
LN of Number of Students Enrolled	-0.172*** (0.031)

LN of Percent of Students That Are Not White	0.083*** (0.018)
LN of Percent of Students That Are Hispanic	0.018* (0.009)
LN of Number of Schools in the District	0.143*** (0.026)
Within R ²	0.8530

The dependent variable is the log instruction expenditures per pupil of a school district. The main independent variable of interest is the log revenue received from the federal government per pupil for a school district. The log state and local equivalents serve as controls for state government and local government funding, as they make up the bulk of public education funding. The model also controls for race, ethnicity, poverty rate, and number of schools in the district.

The model finds that for a 1 percent increase in revenue received per pupil from the federal government results in a 0.057 percent increase in instruction expenditures per pupil. Multiplying the percent changes with real figures and dividing then provides a dollar-for-dollar amount (i.e., for a one dollar increase in federal funding, how much of it goes toward instruction expenditures?).

Across large school districts, the average per pupil revenue from the federal government for a school district is \$956.09. The average per pupil expenditures on instruction for a school district is \$5,277.48. Using the regression model, a 1 percent increase in revenue per pupil (\$9.56) is associated with a 0.057 percent increase in instruction expenditures per pupil (\$3.00). Dividing the instruction expenditures per pupil figure (\$3.00) by the per pupil revenue from the federal government (\$9.56) figure returns 31 cents. This can be interpreted as for every dollar a school district receives from the federal government, 31 cents go toward instruction expenditures.

Then taking the proposed increase in federal spending on K-12 education and multiplying that figure by 0.31 provides an estimate of how much of an increase in federal funding goes toward instruction expenditures. Dividing this figure by total enrollment provides an increase per pupil in instruction expenditures. Going backward, one can set the increase per pupil in instruction expenditures to figure out how much total increase in federal funding is needed to attain the set per pupil increase in instruction expenditures.

[1] <http://blogs.edweek.org/edweek/campaign-k-12/2019/05/Biden-Education-Plan-Title-!.html>

[2] <https://berniesanders.com/issues/reinvest-in-public-education/>

[3] <https://elizabethwarren.com/plans/public-education>

[4] <https://files.eric.ed.gov/fulltext/ED012275.pdf>

[5] <https://edpolicy.education.jhu.edu/wp-content/uploads/2017/05/Does-Money-Matter-Commentary.pdf>

[6] <https://files.eric.ed.gov/fulltext/ED412271.pdf>

- [7] Charles Jacques & B. Wade Brorsen (2002) Relationship between types of school expenditures and student performance, *Applied Economics Letters*, 9:15, 997-1002, DOI: 10.1080/13504850210148161
<https://doi.org/10.1080/13504850210148161>
- [8] <https://www.ets.org/Media/Research/pdf/PICWMM.pdf>
- [9] <https://www.brookings.edu/research/why-federal-spending-on-disadvantaged-students-title-i-doesnt-work/>
- [10] <https://nces.ed.gov/programs/digest/index.asp>