The Effect of the No Child Left Behind Act on Per-Student
Public Education Expenditures at the State Level

Mark P. Gius
Quinnipiac University

Abstract: The purpose of the present study is to determine if the passage of the No Child Left
Behind Act (NCLB) in 2002 resulted in a statistically-significant increase in per-student public
educational expenditures at the state level. In addition, it will be determined if federal funding
was sufficient to support compliance with NCLB. Although numerous studies have estimated
the effects of various government programs and initiatives on education, only a few have
examined the impact of No Child Left Behind on per capita educational spending, and all of
these prior studies used data from a very limited number of states, thus possibly restricting the
applicability of their results. Using data from all fifty states over a period of 21 years, the
present study found that the enactment of the No Child Left Behind Act has had a significant
effect on per-student educational expenditures; on average, state education expenditures
increased by about eight percent due to the passage of this act. In examining federal spending on
NCLB initiatives, it was found that federal spending was inadequate to support this increased
spending by the states. In order to insure compliance with NCLB, state-level spending increased
by $10 billion; however, increases in federal spending were far below that level during the period
2002-2007. The results of the present study suggest that the NCLB is an under-funded federal
mandate in education.

Keywords: NCLB, educational expenditures

JEL Classification: I22

1. Introduction

In January of 2002, President Bush signed into law the No Child Left Behind Act (NCLB).
Although many believed that it was the first great intrusion by the federal government into the
education field, this act was really only a reauthorization of the Elementary and Secondary
Education Act (ESEA) that was first signed into law by President Johnson in 1965. The primary
purpose of NCLB was to link federal funding on education to state-level educational standards.
In order for states to obtain ESEA Title I funding, the primary source of NCLB funding, school
districts and state education departments must annually test students in order to identify schools
that do not meet state academic standards. If schools continually failed to meet these standards,
then the state may lose some or all of their federal education funds.

Although the passage of this act caused some observers to note that the requirements to obtain
federal funding were too high and that teachers may end up “teaching to the test,” others believe
that the federal government is providing too little money to the states to allow them to properly
implement and administer NCLB; recent research has supported this contention (Imazeki and
Reschovsky, 2004; Duncombe, Lukemeyer, and Yinger, 2008). In response to that criticism, the
US Department of Education noted that Title I spending increased by over 30 percent from 2000 to 2002 and that total NCLB spending increased by 40.8 percent from 2001 to 2008 (US Department of Education, 2010). Nonetheless, many state-level officials and school administrators fear that the requirements of NCLB may be so onerous so as to make compliance result in a net loss for state education programs; in other words, compliance would cost as much or more than the total of federal funds received for NCLB. Connecticut, for example, estimated that it spent almost $17 million to comply with NCLB in 2007 (Lips and Feinberg, 2007). However, Connecticut did not suffer a net loss; in ESEA Title I funding alone, Connecticut obtained over $111 million from the federal government in 2007 (US Department of Education, 2010). Finally, it is important to remember that NCLB is voluntary and that states that do not have participate in this program; of course, if they do not, then they will lose most federal funds for education.

An important issue then regarding NCLB is the impact of this act on state and local education budgets. The reason this issue is important is because, as noted above, many states believe that compliance with NCLB is resulting in a net loss for state governments. However, states may be overestimating the true cost of compliance with NCLB, and some state education officials may be more concerned about other issues, such as federal versus state control, and may be using the “unfunded or under-funded mandate” argument to win over opponents of NCLB. In order to determine if the NCLB is financially onerous for state and local education budgets, the present study will estimate the impact of the No Child Left Behind Act on per-student educational expenditures at the state level; in doing so, it will then be possible to determine if federal funds were sufficient to cover the additional expenditures at the state level that were undertaken in order to achieve compliance with the NCLB.

2. Literature Review

Very few prior studies have examined the financial impact of the NCLB act on state and local education budgets. One of the first was Reschovsky and Imazeki (2003). The authors, using district-level data from Texas, attempted to determine the minimum amount a school district needed in order to achieve a specific level of student academic performance. Estimating a log-linear cost function and using data from 1995-1996, the authors found that, on average, a district had to spend $5,610 in 1995-1996 in order to achieve the desired minimum level of academic achievement. Although this study used district-level data and a unique empirical technique to estimate the cost needed to achieve a given level of performance, there are several issues with attempting to generalize their results. One of the most serious problems is that the data used in the study is for one state and for only one academic year. In addition, the one year examined was seven years before the actual implementation of NCLB. Given that different states use different standardized tests in order to measure student performance and given that, since 1995, there may have been substantial changes in the effects that various factors have on educational expenditures, the applicability of the results of this study may be limited.

In a follow-up piece to their 2003 work, Imazeki and Reschovsky (2004) once again used district-level data from Texas in order to estimate the additional costs required to meet new higher academic standards. Using data from the 2001 school year and using a model that is very similar to the one used in their 2003 article, the authors found that, in Texas, NCLB is forcing
state lawmakers to pursue very expensive policies, namely improving the academic performance of low-performing students. In addition, they theorized that Texas, in the absence of NCLB, would not have increased student performance standards primarily due to the cost involved. According to the authors, the minimum additional amount needed per student to achieve an academically acceptable pass rate on the Texas statewide standardized test would be, at a minimum, $423; higher pass rates could push this estimate to as high as $2,000. Finally, the Federal government does not provide sufficient funds to cover this additional cost. Imazeki and Reschovsky (2004) estimated that the annual additional cost imposed by NCLB could range from $1.7 billion to $5.5 billion. However, the Federal government, over a two-year period, increased Title I funds by only $329 million, clearly far below what was needed even to achieve the minimally acceptable pass rates. Although this study has limitations similar to those of the 2003 study, given that the data used was only one year prior to the implementation of NCLB, there is less of a concern regarding the applicability of these results.

The only prior study that examined the effects of NCLB on per student educational expenditures and actually used data from the NCLB period was Duncombe, Lukemeyer, and Yinger (2008). Using multi-year data from Kansas and Missouri, the authors attempted to determine if Federal funding is adequate to support high academic standards set by states. The authors selected these two states because of their similarities in many areas except in academic performance standards; Kansas has lower academic standards than Missouri. Estimating cost functions similar to those found in Imazeki and Reschovsky (2003, 2004), the authors found that, to meet the 2007 NCLB standards, district-level spending will not have to increase at all in Kansas (the state with the lower standards) but will have to increase by 18.5 percent in Missouri (the state with the higher standards). By 2011, however, in order to comply with NCLB, spending in Kansas will have to go up by 10 percent, while spending in Missouri will have to go up by 50 percent. Regarding whether or not NCLB is an unfunded or under-funded mandate, the authors found that, in 2011, Federal aid will only cover 20.9 percent of the required increase in per student educational expenditures in Kansas and only 8 percent in Missouri. Clearly, this study found that NCLB is a very under-funded mandate of the Federal government.

Finally, two recent studies (Reitz, 2011; Branca, 2009) also found that NCLB had statistically-significant effects on per student expenditures. However, both studies examined small, limited samples of schools, and both found that the effects, although statistically significant, were minimal at best; Reitz (2011) found that the cost per student of an ADA intervention was approximately $1,800, and Branca (2009) found that the cost was less than $1,000.

The present study is similar to the above studies in that it attempts to determine if NCLB is an under-funded federal educational mandate. It does, however, differ in several respects from this prior research. First, state-level, rather than district-level, data is used. Although district-level data is typically preferred for this type of analysis, the use of state-level data allows for the construction of a large national, panel data set. The use of this type of data allows one to determine if there are unobservable state-level effects with regards to educational expenditures; using cross-sectional data does not permit the estimation of these types of effects. The second difference is that, of the three prior studies examined, only one used post-NCLB data, and none of them used data from more than two states. The third difference is that none of them included the passage of NCLB as an explanatory variable in their regressions. The present study improves
upon these earlier works by estimating a more general cost function in order to determine if NCLB had any statistically-significant effect on state-level per student educational expenditures. Using these results, the average increase in state-level instructional expenditures will be estimated. With those estimates, it will then be possible to determine if NCLB is an under-funded federal mandate.

3. Empirical Technique

In order to estimate the effect of NCLB on state-level educational spending, guidance was obtained from not only the above three articles but also from other articles that estimated educational spending in general. Although the empirical techniques and variables used in these prior general studies are somewhat varied, all attempted to estimate some measure of per-student educational expenditures. The most common explanatory variables used in these studies included state-level measures of race, level of education, elderly population, taxes, urban population, and school-age population. For example, Bergstrom, et al., (1982) found that, on average, a person who is black, Jewish, a renter, a college graduate, a school employee, somebody who has children in public schools, and somebody who is 65 or older was more likely to desire higher expenditures on public education. Rubinfeld and Shapiro (1989) found that the demand for education was not affected by race, but black voters did desire much greater spending on average than whites. Reid (1990) found that households sorted themselves across communities on the basis of their demand for public services. Silva and Sonstelie (1995) estimated an average tax price of education which was the increase in a family’s taxes resulting from a one-dollar increase in spending per pupil. In the final regressions, however, the tax price variable was insignificant. Poterba (1997) found that per capita income, percentage of population of school age, percentage of population that owns homes, and percentage of population in urban areas are all significant determinants of educational expenditures. Gius (2006, 2007) estimated the effect of the Americans with Disabilities Act (ADA) on educational expenditures at the state level; he found that the ADA had a statistically significant and positive effect on educational spending.

Using Gius (2006, 2007), Imazeki and Reschovsky (2003, 2004), Duncombe, Lukemeyer, and Yinger (2008), and Anderson (2011) as guides, the present study uses the following demographic variables in order to control for variations in per-student, state-level, educational expenditures (Prior research that utilized similar explanatory variables are noted in parentheses after the relevant variable):

1. income (Bergstrom, et al, 1982; Rubinfeld and Shapiro, 1989; Reid, 1990; Silva and Sonstelie, 1995; Poterba, 1997; Gius, 2007, 2006; Duncombe, Lukemeyer, and Yinger, 2008)
2. college-educated populace (Bergstrom, et al, 1982; Rubinfeld and Shapiro, 1989; Reid, 1990; Gius, 2007, 2006; Duncombe, Lukemeyer, and Yinger, 2008)
3. elderly population (Bergstrom, et al, 1982; Rubinfeld and Shapiro, 1989; Reid, 1990; Poterba, 1997; Gius, 2007, 2006; Duncombe, Lukemeyer, and Yinger, 2008)
4. school-age population (Poterba, 1997; Gius, 2006; Imazeki and Reschovsky, 2003, 2004)
5. rates of home-ownership (Poterba, 1997; Gius, 2006; Duncombe, Lukemeyer, and
Given the above, the following equation is estimated in the present study:

\[
\ln(PSE) = a_1 NCLB + a_2 \ln(HOME) + a_3 \ln(INC) + a_4 \ln(POP) \\
+ a_5 \ln(STUD) + a_6 \ln(COLLEGE) + a_7 \ln(AGE65) + a_8 \ln(LUNCH) \\
+ a_9 \ln(GRAD) + a_{10} \ln(SALARY)
\]  

(1)

where the variables are as defined as follows:

(1) PSE is per-student public school instructional expenditures at the state-level; only state spending on instruction is examined in the present study.

(2) NCLB is a dummy variable that takes a value of 1 for the years 2002-2007, indicating the years when the No Child Left Behind was in effect, and 0 otherwise.

(3) HOME is the percentage of state’s residents who are homeowners.

(4) INC is per capita income.

(5) POP is population density.

(6) STUD is the total public school student population.

(7) COLLEGE is the percentage of the state’s adult (25 or older) population who are college educated.

(8) AGE65 is the percentage of the state’s population who are 65 or older.

(9) LUNCH is the percentage of students eligible for free lunches.

(10) GRAD is the state-level average freshman graduation rate which is defined as the percentage of an entering freshman class graduating in four years.

(11) SALARY is the state-level average teacher salary.

As noted above, the dependent variable is state spending on instruction for public schools (K-12). Only instructional spending is examined in the present study. The reason for this is because it is expected that NCLB would have the greatest impact on that category of state-level public school expenditures. In addition, because NCLB uses state-level performance standards in order to assess the quality of education in public schools, only state-level spending is examined.

Theory suggests that, for the state-level data used in the present study, the following results are expected: NCLB will have a positive effect on PSE; INC will have a positive effect on PSE, suggesting that states with higher per capita incomes will spend more on education; COLLEGE will have a positive effect, suggesting that states with higher percentages of college-educated persons will support increased levels of spending on education; AGE65 will have a negative effect on educational spending, indicating that elderly persons have no direct interest in public
schools and will not support increased levels of educational spending; STUD will have a negative effect on PSE, suggesting that those states with larger populations of students will have lower per-student education costs; HOME, which proxies for the post-tax price of education, will have a positive effect on per-student educational spending; POP will have a positive effect, indicating that states with high population densities, which is used as a measure of urban population, will have higher costs in providing education; LUNCH will have a negative effect, suggesting that states that have higher percentages of students who are eligible for free lunches will have fewer resources to spend on education; GRAD will have a positive effect, indicating that states with higher performance measures will have to spend more in order to achieve those standards; and SALARY will have a positive effect of per student costs.

Regarding the variable HOME, according to Poterba (1997), the percentage of the state’s residents who are homeowners is a reasonable proxy for the percentage of residents who itemize deductions, such as state and local taxes, on their federal tax returns. If an individual itemizes their deductions, this implies that they pay more in state and local taxes than can be accounted for in the standard deduction. Thus, if more of a state’s residents itemize, this implies that their state and local taxes are high relative to those state residents who more commonly use the standard deduction. In addition, this variable may capture differences in the preferences for education between homeowners and renters.

The state-level average freshman graduation rate is used as a proxy for measuring student academic performance. As noted above, the average freshman graduation rate is defined as the percentage of an entering freshman class graduating in four years. No state uses this measure for purposes of assessing compliance with NCLB.

A fixed effects model is used to estimate Equation (1). This type of model controls for potentially important but unobservable state-level effects that may be correlated with other determinants. A log-log functional form is used, which is the standard in this type of research (Poterba, 1997; Gius, 2006).

4. Data and Results

The data used in the present study is state-level and covers all 50 states for the period 1987-2007. The education variables, PSE and STUD, were estimated from data obtained from two sources published by the US Department of Education: the State Non-fiscal Public Elementary/Secondary Education Survey and the National Public Education Financial Survey Data. From the Non-fiscal Survey, the variable used was Total Students. From the Fiscal Survey, the variable used was Current Expenditures. PSE was calculated by dividing Current Expenditures by Total Students. All other variables were obtained from various reports compiled by the Census Bureau, including “Annual State Population Estimates,” “Age and Sex for States and Puerto Rico,” American Community Surveys, and “Housing Vacancies and Home Ownership”. All dollar values are expressed in terms of real dollars, base year 1982-84. All education data is for public schools only.

Given a log-log model is used in the present study, the coefficients for the continuous explanatory variables, except for NCLB and other binary variables, are interpreted as elasticities.
Hence, if the coefficient on a variable is one, then for a ten percent increase in that X variable, the Y variable also increases by ten percent. For the NCLB variable, however, the interpretation is somewhat different. Since NCLB is a dummy variable, the coefficient must be transformed in order for it to be interpreted as a percentage change. By taking the antilog of the dummy coefficient and then subtracting one from that value, the percentage change in PSE that occurs when NCLB equals one can be obtained.

Since a fixed-effects panel data model is used in the present study, the standard errors will be underestimated. In order to correct the standard errors and obtain appropriate measures of statistical significance, a clustered standard error approach is used to correct the standard errors. Descriptive statistics for the variables used are presented on Table 1. Regression results are presented on Table 2.

Results of the present study suggest that the No Child Left Behind had a significant impact on per-student educational expenditures at the state level; after transforming the NCLB variable as discussed above, the results indicate that, after the passage of No Child Left Behind, per-student educational expenditures increased by 7.88 percent, holding all other factors constant. This result supports anecdotal evidence and suggests that this major legislative initiative has had a rather significant impact on per-student educational costs.

In order to quantify this impact on state budgets, it is necessary to compare the predicted increase in expenditures due to NCLB with the actual increase in federal funding for the act. To compute the predicted increase in instructional spending due solely to NCLB, it is first necessary to identify the per-student increase in educational expenditures that resulted due to the passage of this act. Using the post-2001 average annual, inflation-adjusted, per student increase of $219, which is 7.88 percent of the average annual per-student expenditure for the period 2002-2007, one obtains an average annual state-level increase of over $213 million due to the passage of the NCLB. Nationally, this translates into an annual increase in educational spending of over $10 billion; this value is the predicted annual increase in expenditures that were undertaken by the states due to the passage of NCLB. One may interpret this increase as a parallel shift up in educational expenditures post-NCLB.

In comparing this value to actual annual federal spending on NCLB, it is important to note that most, but not all, funding for NCLB occurs under the auspices of the Elementary and Secondary Education Act (ESEA). Funding for the various programs that comprise NCLB were approximately $9.8 billion (inflation-adjusted) in 2001, which is the year prior to the passage of NCLB. In 2002, this value increased to $12.2 billion (inflation-adjusted), an increase of only $2.4 billion, which is far below the estimated annual increase of $10 billion incurred by the states. Since 2002, the average annual increase in NCLB spending has been $390 million, which is far below the $10 billion needed to insure that the NCLB is a fully-funded federal mandate.

If one examines all discretionary federal spending on education, for the period 1990-2001, the average annual, inflation-adjusted amount was $10.5 billion. For the period, 2002-2007, average annual discretionary spending was $18.9 billion. Hence, even if one ignores spending on all other federal education initiatives, this increased level of spending was still inadequate to meet the higher level of spending that the states were undertaking in order to attempt to comply with
NCLB. Hence, this analysis suggests that NCLB is an under-funded federal educational mandate. This result is consistent with the results found by other studies examining the impact of NCLB on state and local spending on education.

All of the other variables were significant with the expected signs. The income variable was positive, suggesting that those states with higher per capita incomes spent more on education; states with higher population densities and higher home ownership rates spent more on education; states that had higher average teacher salaries had higher per student costs; states with higher graduation rates had higher per student costs; and finally, those states with larger student populations had lower per-student educational expenditures. These results are corroborated by prior research and anecdotal evidence. In addition to the significance of all of the explanatory variables, the adjusted $R^2$ is 0.955, and the F test statistic is 376.82, both of which suggest that the model is statistically significant and is explaining most of the variation in per student expenditures.

One potential issue with the above analysis, however, is that another major federal intervention in public education, the Americans with Disabilities Act (ADA), was also being implemented at approximately the same time as NCLB. The ADA of 1990 was designed to protect the civil rights of individuals with disabilities. The intent of this federal statute was to prevent any form of discrimination against persons with disabilities who are otherwise qualified. This law has had a major impact on public schools, their offerings of services, and their budgets. One reason for this is because the ADA defines disability much more broadly than earlier laws. Because of this change, more and more parents began requesting services under the ADA, thus putting additional pressure on already strained educational budgets and assets.

Therefore, some may interpret the above result as indicative of an increase in instructional expenses due not only to NCLB but also to ADA. In order to determine if NCLB by itself contributed to the increase in state-level instructional expenditures, equation (1) was estimated again, but this time, a dummy variable for the ADA was included. This variable (ADA) is a dummy variable with a value of 1 for the years 1991-2000 and 0 otherwise indicating the years in which the ADA was in effect. The results are presented on Table 3. These results suggest that, even with the inclusion of the ADA variable, NCLB still increased per student educational expenditures. It is estimated from this regression that NCLB increased per student educational expenses by 8.4 percent, a value very similar to that found in the regression without the ADA variable. Hence, even after taking into account the effect of ADA on state-level instructional expenditures, the NCLB still had a significant impact on instructional expenditures at the state level.

5. Concluding Remarks

The purpose of the present study was to determine if the No Child Left Behind Act of 2002 had a statistically significant impact on public school spending at the state-level. Using state level data for the years 1987-2007, it was found that the increase in instructional expenses due to NCLB is approximately $10 billion, which is substantially more than the actual increase in federal discretionary educational spending for the years 2002-2007.
It is important to note that many state-level factors that could affect educational spending, such as state-imposed educational requirements, state-specific school funding issues, or local versus regional school district structure, were, by design of the model, omitted from the analysis. Instead, all of the relevant state-level factors were coalesced into the state-level dummy variable used in the fixed effects model. Nonetheless, the present study is important since it has allowed for the determination of the effect of No Child Left Behind on educational expenditures within the framework of the available data.

References


Smith, Tom. 2001. “Section 504, the No Child Left Behind, and Public Schools,” Remedial and Special Education, 22, 335-343.

Table 1. Descriptive Statistics (n=1050)

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<tr>
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<td>HOME</td>
<td>68%</td>
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<tr>
<td>INC (in real dollars)</td>
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<td>POP</td>
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<td>STUD</td>
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<td>COLLEGE</td>
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<td>AGE65</td>
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<td>GRAD</td>
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<td>SALARY (in real dollars)</td>
<td>$22,922</td>
<td>$3,648</td>
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Table 2. Fixed Effects Model Regression Results with NCLB

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<th>Corrected Test Statistic</th>
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<td>0.0112</td>
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<td>0.0417</td>
<td>2.152**</td>
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<td>0.0048</td>
<td>0.82</td>
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<tr>
<td>LN( attraverso)</td>
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<td>0.0404</td>
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<td>LN(SALARY)</td>
<td>0.645</td>
<td>0.0438</td>
<td>14.72***</td>
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$R^2 = 0.955$

F Test = 376.82

Significant at 10% level = *
Significant at 5% level = **
Significant at 1% level = ***
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<td>0.039</td>
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<td>0.04249</td>
<td>0.006429</td>
<td>6.609***</td>
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$R^2 = 0.957$
F Test = 388.24
Significant at 10% level = *
Significant at 5% level = **
Significant at 1% level = ***