INEQUITABLE EQUILIBRIUM: SCHOOL FINANCE IN THE UNITED STATES

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INTRODUCTION

Fifteen years after *Brown v. Board of Education*,[1] as the effort to desegregate America's schools continued, reformers began to turn to other areas of educational inequality. One of the most important of these areas was school finance, where wide disparities in per pupil spending existed between wealthy districts and poor districts. In 1970, authors John Coons, William Clune, and Stephen Sugarman published a book entitled *Private Wealth and Public*

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1. 347 U.S. 483 (1954).

Education, in which they argued that the Equal Protection Clause of the United States Constitution could be read to prohibit states from tying school spending to local property wealth.[2] The authors argued that the Constitution required that a state's school finance system should mandate that a district's per pupil spending could not be directly correlated with the district's local wealth.[3] This concept came to be known as "wealth neutrality."[4]

In 1971, the California Supreme Court agreed with Coons and his co-authors, and held that the California state education finance system violated the Equal Protection Clause of the United States Constitution and comparable provisions of the state constitution.[5] The court held that California, like many other states, relied too heavily on local property taxes to fund education. This reliance led to a correlation between district wealth and school spending primarily because districts with high property values could generate substantial revenue through local taxes. Districts with relatively low property values had to either tax themselves at a much higher rate to generate the same education revenue or simply spend less per pupil. Many poor districts were forced to do both. The California Supreme Court found this arrangement unconstitutional and ordered the state legislature to equalize per-pupil funding across the state.[6]

Two years later, the United States Supreme Court rejected this reading of the Federal Constitution.[7] In an Equal Protection challenge to the Texas education finance system, the Court held that education was primarily a state responsibility, and was not a fundamental interest protected by the Federal Constitution. The Court ruled that Texas' rationale for funding education through local property taxes satisfied the rational basis test applied to state infringement of non-fundamental rights.[8]

This decision forced education finance reformers to turn to state courts and legislatures. As of 1999, forty-three out of fifty states have faced legal challenges in state court alleging that the school finance system violated the state constitution's education or equal protection clause;[9] twenty of these states have lost these challenges and been ordered to reform the education finance system.[10] Furthermore, state legislatures have acted whether plaintiffs won or lost in court: since 1973 every state in the nation has passed some type of education finance

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2. JOHN E. COONS ET AL., PRIVATE WEALTH AND PUBLIC EDUCATION 153, 295-311 (1970).

3. *Id.*

4. Robert Berne & Leanna Stiefel, *Concepts of School Finance Equity: 1970 to the Present*, *in* EQUITY AND ADEQUACY IN EDUCATION FINANCE 7, 16-18 (Helen Ladd et al. eds., 1999) [hereinafter EQUITY AND ADEQUACY].

5. Serrano v. Priest, 487 P.2d 1241 (Cal. 1971).

6. *Id.*

7. San Antonio Indep. Sch. Dist. v. Rodriguez, 411 U.S. 1 (1973).

8. *Id.* at 37-41.

9. Paul A. Minorini & Stephen D. Sugarman, *School Finance Litigation in the Name of Educational Equity: Its Evolution, Impact, and Future*, *in* EQUITY AND ADEQUACY, *supra* note 4, at 34, 35.

10. William Evans et al., *The Impact of Court-Mandated Sch. Finan. Reform*, *in* EQUITY AND ADEQUACY, *supra* note 4, at 72.

reform.[11] Many state reforms were designed to accomplish greater spending equity, greater wealth neutrality, or both.

While most studies agree that in almost every state, wealthy districts continue to spend more per pupil on education than poor districts, researchers disagree over whether school finance reforms have made things better than they used to be. A 1999 study by William Evans, Sheila Murray, and Robert Schwab argued that court-mandated reform "has achieved its primary goal of fundamentally restructuring school finance and generating a more equitable distribution of resources."[12] This study, however, was recently challenged in an article by Caroline Hoxby, who argued that equalization efforts have often left poor districts worse off than before.[13] Hoxby argues that while state courts and legislatures may not be confused about their goals in attempting to equalize spending across districts, "[s]tates are confused about how to *implement* their goals."[14]

The approaches that states currently use to "implement their goals" are typically grouped into six categories: flat grants, foundation programs, percentage equalizing, guaranteed tax base, guaranteed tax yield, and full state funding.[15] While all six can be shown to have some equalizing effects, it is often assumed that the order in which they are listed above correlates roughly to the degree to which they equalize the allocation of education resources. In other words, flat grants equalize the least, foundation programs slightly more so, etc. In fact, Coons and his co-authors designed what became known as the "guaranteed tax base" and "guaranteed tax yield" approaches with the explicit purpose of achieving what became known as "wealth neutrality."[16]

This paper provides an in-depth analysis of these six approaches, and details the connections between a state's basic approach to education funding and equity outcome measures. I began my research assuming—as I think most legislators do—that the different funding approaches produce different equity outcomes. After conducting an empirical analysis, however, I learned that no connection can be made between a state's basic approach to education finance and the equality of educational opportunity provided to students.

In the following sections, I will demonstrate both theoretically and empirically why there is very little difference in the equitable distribution of

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11. Caroline Hoxby, *All School Finance Equalizations Are Not Created Equal*, 116 Q. J. ECON. 1189, 1190 (2001).

12. Evans et al., *supra* note 10, at 93.

13. Hoxby, *supra* note 11, at 1190.

14. *Id.* at 1189.

15. For a general discussion of the different approaches to allocating funds to local schools, see AMERICAN EDUCATION FINANCE ASSOCIATION, PUBLIC SCHOOL FUNDING IN THE UNITED STATES AND CANADA, 1993-94, at 27-31 (1995) [hereinafter AEFA]; MARK G. YUDOF ET AL., EDUCATION POLICY & THE LAW 776-77 (1992); *see also* KERN ALEXANDER & RICHARD SALMON, PUBLIC SCHOOL FINANCE (1995); JAMES GUTHRIE ET AL., SCHOOL FINANCE AND EDUCATION POLICY (1988); DAVID M. MONK, EDUCATION FINANCE (1990); ALLEN ODDEN & LAWRENCE PICUS, SCHOOL FINANCE (1992).

16. *See* COONS ET AL., *supra* note 2, at 295-31; YUDOF ET AL., *supra* note 15.

education resources under the six basic funding approaches used by states. My theoretical demonstration focuses on how the formulas used to calculate state aid under each approach can be, and often are, manipulated so as to make them mathematically equivalent. My empirical demonstration focuses on a statistical analysis of the correlation between a state's basic approach to education finance and the degree of equity in that state's allocation of education resources. The analysis, which includes all fifty states, shows that the distribution of education resources in a state does not significantly depend upon the funding approach a state adopts for allocating education resources.

Finally, I propose a hypothesis for explaining these results, which I call the inequitable equilibrium of school finance. In many states, the distribution of education resources is primarily a function of the distribution of political power in the state. This distribution is the "equilibrium point," and in many states it is an inequitable equilibrium insofar as it permits wealthy districts, even at lower tax rates, to spend more per student than poor districts.

My hypothesis is that while an outside event, such as an adverse court ruling, may temporarily upset this equilibrium, in many cases the system will gradually return to its equilibrium point, or something close to it. Thus, while a state may change its basic approach to education funding in response to outside pressure, the legislature often manipulates that approach in order to restore the previous equilibrium. The experiences of three states—Washington, New Jersey, and Vermont—further support the inequitable equilibrium theory.[17]

This is not to say that the situation is entirely hopeless or that political equilibria cannot be changed. There are, and I hope that there will continue to be, states in which school finance reform has resulted in lasting improvements in the equitable distribution of education resources.[18] Rather, my argument is that common assumptions notwithstanding, a state's adoption of a nominally more progressive school finance formula will not necessarily result in a more equitable allocation of education resources. To achieve this latter goal, courts and reformers must dig deeper, and they must focus on changing the political dynamics that perpetuate the inequitable equilibrium of school finance.

I. DEFINING EQUAL EDUCATIONAL OPPORTUNITY

State education finance systems are designed to serve several goals. Since at least the beginning of the Twentieth Century, one of these goals has been to provide all students with equal opportunities to succeed.[19] The concepts of "equal opportunity" and "equity," however, have many different definitions. These differences often lead to the pursuit of conflicting policies among legislators, courts, and the public, with the different parties seeking to achieve competing conceptions of equal opportunity. This section briefly outlines some

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17. *See infra* Part VI.

18. *Cf, e.g.*, Molly A. Hunter, *All Eyes Forward: Public Engagement and Educational Reform in Kentucky*, 28 J.L. & EDUC. 485 (1999) (describing movement toward more equitable distribution of education resources in Kentucky since 1989).

19. Berne & Stiefel, *supra* note 4, at 7.

of these competing conceptions in an effort to familiarize the reader with the philosophical debate that often underlies school finance discussions. I do not attempt to make a normative argument about what equal opportunity should mean, either philosophically or politically. Rather, the overall goal is to make a positive argument about the extent to which education finance systems meet some of the outcome measures commonly used to evaluate different conceptions of equal opportunity.

Generally, many agree that the idea of equal opportunity is that

> all students should have an equal chance to succeed, with actual observed success dependent on certain personal characteristics, such as motivation, desire, effort, and to some extent ability. [Put] [i]n negative terms, the idea of equal opportunity is that success should not depend on circumstances outside the control of the child, such as the financial position of the family, geographic location, ethnic, or racial identity, gender, and disability.[20]

Equal opportunity can be measured in terms of either inputs, such as dollars per pupil, or outputs, such as reading achievement. Equal opportunity measured in terms of inputs asks whether there is a relationship between the resources allocated per pupil in a district and some educationally irrelevant factor, such as a district's property wealth or racial composition. Equal opportunity measured in terms of outputs looks to the relationship between district wealth and student achievement measures (e.g., test scores, graduation rates, etc.). The greater the relationship between district wealth, on the one hand, and input or output measures, on the other, the lesser the equality of opportunity in that state.

Choosing among these and other similar standards is no easy task, and is a major source of disagreement over what constitutes equal opportunity. Measuring the equity of inputs may be simple, but the inputs may not bear any significant relationship to *educational* opportunity. For example, if a state were to pass a law requiring that every school age student be provided with exactly the same pair of shoes, and that no other shoes could be worn to school, the input of footwear would be equalized. Few would argue, however, that equalizing this input would in any way equalize educational opportunity, because we recognize that the shoes that a child wears to school have little to no impact on her learning. And while most of us can agree that the type of shoe a child wears to school does not impact the quality of her education, there is surprisingly little consensus over what, if any inputs *can* meaningfully affect the quality of a student's education.[21]

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20. *Id.* at 13.

21. *Compare, e.g.*, Eric A. Hanushek, *The Economics of Schooling: Production and Efficiency in Public Schools*, 24 J. OF ECON. LIT. 1141, 1148 (1986) (finding no relationship between spending and outcomes); Eric A. Hanushek, *Throwing Money at Schools*, 1 J. AM. PUB. POL, & MGT. 19 (1981) (same), *with* Ronald Ferguson & Helen Ladd, *How and Why Money Matters: An Analysis of Alabama Schools*, *in* HOLDING SCHOOLS ACCOUNTABLE 265, 265-66 (Ladd, ed. 1996) (arguing that inadequate measures of resources may have influenced earlier findings and illustrating how more meticulous measures of inputs can lead to positive findings of positive effects of resources on outputs); Frederick Mosteller et al., *Sustained Inequity in Education: Lessons from*

Furthermore, even if meaningful inputs could be identified and equalized, many would argue that this would fall short of providing equal opportunity to all students. Since the Coleman report first demonstrated in 1966 the strong correlation between a student's socioeconomic status and educational performance,[22] many have argued that merely equalizing school-related inputs would not provide children from disadvantaged backgrounds with an equal educational opportunity, but, rather, would perpetuate or even exacerbate societal inequities.[23]

Outcome standards, on the other hand, present their own set of difficulties.[24] Attempting to eliminate any correlation between standardized test scores and "educationally irrelevant" factors, for example, simply begs the question of which factors to consider "educationally irrelevant" and which to deem "educationally relevant."

In the school finance context, equal opportunity has historically been defined primarily in resource (or input) terms.[25] In particular, school finance literature has stressed one particular conception of equal opportunity, known as wealth—or fiscal—neutrality.[26] The concept of wealth neutrality was developed in a 1970 book entitled *Private Wealth and Public Education*, as a basis for legal challenges to a state's education finance system.[27]

Coons and his co-authors argued that Supreme Court precedent could be read

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Skill Grouping and Class Size, 66 HARV. EDUC. REV. 797 (1996); ANITA A. Summers & Barbara L. Wolfe, *Do Schools Make a Difference?* 67 AM. ECON. REV. 639, 643-46 (1977) (indicating that some school inputs such as small class size and teacher experience can significantly affect student achievement). *See generally* YUDOF ET AL., *supra* note 15, at 774.

22. JAMES COLEMAN ET AL., EQUALITY OF EDUCATIONAL OPPORTUNITY SURVEY (1966).

23. This argument is commonly referred to in terms of vertical equity. Vertical equity is the idea that unequal persons should be treated unequally. Notions of vertical equity underlie "weighting" policies that provide additional funds to schools with high numbers of learning disabled students, for example, since these students are generally understood to require greater attention to succeed. In its most extreme form, vertical equity prescribes equal educational outcomes for all students. Horizontal equity, by contrast, is the notion that "like persons" should be treated alike.

24. *See generally* Mark G. Yudof, *Equal Educational Opportunity and the Courts*, 51 TEX. L. REV. 411 (1973).

25. *See* James Coleman, *The Concept of Equality of Educational Opportunity*, 38 HARV. EDUC. REV. 7 (1968).

26. For a competing conception, see Frank Michelman, *Foreword: On Protecting the Poor Through the Fourteenth Amendment*, 83 HARV. L. REV. 7 (1969). Michelman argues that wealth neutrality merely substitutes place-wealth-determined inequalities with simple place/wealth determined inequalities. From the perspective of the child, there is little or no moral distinction between the two forms of inequalities. Michelman's competing conception of equal opportunity is that all students should be guaranteed a basic minimum level of education. Insofar as we are part of a market-oriented society, and students will be forced to compete after graduation, Michelman believes that "the minimum is significantly a function of the maximum and to that extent calls for equalization." *Id.* at 58.

27. COONS ET AL., *supra* note 2, at 317-37.

to support the proposition that the quality of public education may not be a function of wealth other than the total wealth of the state.[28] The idea of wealth neutrality is to sever the correlation between local district property wealth per pupil and the amount of money spent per pupil, while at the same time preserving local decision making. This has two implications: first, if fully implemented, a wealth-neutral system would distribute tax income to create equal tax "yields" for equal tax rates; second, it would not require that districts choose the same tax rates, thereby preserving local control over how much money is raised locally. Inequalities in expenditures could persist under this standard, but they would not be caused by inequalities in property wealth per pupil.

Coons and his co-authors also proposed a school finance system—known as "power equalizing"—designed to achieve the objective of wealth neutrality.[29] Under power equalizing formulas, local expenditure levels are based on the local tax rate chosen by the district, regardless of the value of property in the locality. Thus, if local property values are too low to produce the revenues called for under the state's guaranteed expenditure level for the specific tax rate selected, state aid makes up the difference. On the other hand, if local property, taxed at the specified tax rate, yields *more* than the state guarantee in revenue, the state would "recapture" the surplus.[30]

Many reformers adopted the Coons argument for fiscal neutrality and used it to press reform in courts and state legislatures. Since 1973, every state in the nation has passed some form of school finance reform legislation,[31] and six states have at one point used some form of DPE system.[32] In this context, it is not surprising that many people assume that adopting a DPE system will necessarily lead to greater equality of educational opportunity. After all, they were designed for that explicit purpose. As we shall see, however, DPE has not been the radical break from inequitable methods of school financing that its authors had hoped.

Another concept commonly used in evaluating the equality of educational opportunity is horizontal equity. Horizontal equity is based on the notion that similarly situated students ought to receive similar resources.[33] Horizontal equity differs from wealth neutrality in that it makes no effort to control for differences in local preferences for education spending. One of the debates surrounding horizontal equity is what constitutes "similar students" for purposes of determining equal funding. For purposes of calculating the number of students in a district, many states currently "weight" students with certain characteristics differently than other students. For example, some states count special education students as 1.25 students, implying that they are 25% more expensive to educate than students weighted at 1.00. Which characteristics should be weighted, and

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28. *Id.* at 304.

29. *Id.* at 200-42. Power equalizing later came to be known as district power equalizing (DPE), guaranteed tax base (GTB) or guaranteed tax-year (GTY) formulas. *See* YUDOF ET AL., *supra* note 15, at 776-77.

30. YUDOF ET AL., *supra* note 15, at 771-72.

31. Hoxby, *supra* note 11, at 1090.

32. Berne & Stiefel, *supra* note 4, at 18 (citing AEFA, *supra* note 15, at 24).

33. *Id.*

what the weighting should be, are extremely controversial elements of the debate over what constitutes "horizontal equity."

I will use four outcome variables to measure equal opportunity and horizontal equity: wealth neutrality score, targeting score, coefficient of variation, and McLoone Index. The first of these, the wealth neutrality score, is an ex post measure of Coons' ideal of wealth or fiscal neutrality. The score measures the observed correlation in the state between a district's actual spending per pupil from all sources, including federal, state, and district money and the value of that district's taxable property.[34] The larger the wealth neutrality score, the greater the connection between district spending and district wealth, and, therefore, the lower the equality of opportunity (as defined by Coons in the school-finance context) in the state.

A targeting score is similar to a wealth neutrality score, except that it measures the correlation between district wealth and state aid per pupil to that district, rather than total spending per pupil.[35] Thus, the targeting score focuses exclusively on the redistributive nature of money allocated by the state, irrespective of the local district's contribution. A negative targeting score indicates that state aid is targeted to poor districts.

The third and fourth measures—coefficient of variation and McLoone Index—are measures of horizontal equity. These measures use different techniques to measure the amount of interdistrict variation in per-pupil spending in a given state. The coefficient of variation is calculated by dividing the standard deviation of adjusted spending per pupil across all districts in a state (adjusted to reflect cost differences and student needs) by the state's average spending per pupil. [36] The fourth measure, the McLoone Index, reflects the amount of money that would be required to bring districts in the bottom half of spending up to the median spending level. It is calculated by dividing the amount spent by districts in the bottom half by the actual dollar amount needed to raise those districts up to the midpoint.[37] These two measures, however, are less reflective of equal opportunity, as they do not account for variation in district wealth. Even in a state where there was no correlation between district wealth and per pupil spending, there could still be variation since the Coons definition of equal opportunity does not require total equality of spending across all districts. Thus, education spending in a state could theoretically be perfectly wealth neutral, but still have a significant coefficient of variation, or low McLoone Index score.

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34. EDUCATION WEEK, QUALITY COUNTS 2001, *at* http://www.edweek.org/sreports/qc01 (last visited Mar. 26, 2003).

35. *Id.*

36. *Id. See also* ROBERT BERNE & LEANNA STIEFEL, THE MEASUREMENT OF EQUITY IN SCHOOL FINANCE 19 (1984).

37. EDUCATION WEEK, *supra* note 34; *see also* BERNE & STIEFEL, *supra* note 36.

II. Different Approaches to Allocating State Aid

In order to meet various goals, including those of equal educational opportunity and horizontal equity, states have developed a number of different approaches to allocating state education aid. These different approaches are typically grouped into six different categories.[38] These six categories are flat grant programs, foundation programs, percentage equalizing programs, guaranteed tax base, guaranteed tax yield, and full state funding. The standard description found in the literature and replicated in this section assumes that there are significant differences in the equality of opportunity afforded under each approach. These differences are generally believed to be the result of different philosophies and values underlying each approach. In the remainder of the paper, however, I will demonstrate that while there may be different philosophies behind the approaches, there are not, in practice, significant differences in the equitable allocation of resources under each approach.

A. Flat Grants

Flat grants are the simplest of any state aid formula: each district receives a set amount of money for every student unit, regardless of that district's capacity to pay. The philosophy behind flat grants is one of minimum or adequate provision. Since there is no obligation on the part of local districts to supplement this flat grant amount, it should ideally represent the state's judgment as to the minimum amount of money necessary to provide a student with an adequate education. Often, however, flat grants are not connected in any way to educational judgments, and states rely on local districts to provide substantial additional funding.

> Example: If State X adopted a flat grant program of $4000 per pupil, every district in the state would receive that amount from the state. Any education revenue raised through local taxes supplements the $4000 in state aid.[39]

B. Foundation Programs

The philosophy behind foundation programs is similar to that of flat grants: minimum or adequate provision. Under a foundation program, however, each school district is only given a level of funding necessary to guarantee each of the district's pupils *access* to a minimum level of per-pupil expenditures. This is done by taking into account each local district's ability to raise revenue. Districts with greater ability to raise revenue locally receive less state aid under a foundation program than districts with relatively less local wealth. This design is intended to make foundation programs more progressive than flat grants.

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38. *See generally supra* note 15.

39. Flat grant programs can be represented mathematically as $A_i = FN_i$, where A_i = the dollar value of the state's grant to the ith district, F = the flat grant level, and N_i = the number of pupils in the ith district (suitably weighted).

The first step in calculating state aid under a foundation program is the same as under a flat grant program. The number of student units in a district is simply multiplied by the state-determined minimally adequate per-pupil expenditure. In a foundation program, however, a local district's ability to pay, as determined by the state, is then subtracted from the flat grant level. In some states, local districts are then required to provide these additional resources. This is called a mandatory local effort provision. Other states, however, do not require local effort but nevertheless use local districts' ability to pay as a computational device in determining the amount of basic support aid. Districts are then free to determine their own tax rates, which could result in per pupil expenditures of either more or less than the minimally adequate level set by the state.

As with flat grants, the foundation level is rarely tied to any measure of the cost of providing an adequate education. Consequently, most local school districts impose taxes that enable them to spend more than the foundation level, usually considerably more. "Because this spending generally is not equalized, foundation programs place school districts with relatively small per-pupil tax bases at a disadvantage relative to school districts with larger per-pupil tax bases."[40]

> Example: A state with a foundation level of $5000 per pupil and a local effort requirement of 1% would give $4000 per pupil in state aid to a district with a tax base of $100,000 per pupil ($5000 less 1% of $100,000), but only $3000 per pupil to a district with a tax base of $200,000 per pupil ($5000 less 1% of $200,000).[41]

C. Percentage Equalizing Programs

Percentage equalizing programs are thought to provide aid based on a philosophy of equal access to educational funding, with each district deciding the level of spending. In a percentage equalization program, the state matches local contributions with state aid at a ratio inversely related to a district's ability to pay. In other words, wealthy districts receive less state aid than poor districts for every dollar of local contribution. The theory is that while decisions about tax rates and school revenue are made locally, state aid is used to ensure that equal local effort results in equal available educational revenue. To do this, districts with lower capacity to raise revenue through local taxes receive greater levels of state aid.

State aid is calculated under percentage equalization programs according to a state aid ratio based on a district's relative ability to pay. Poor districts will tend to have higher state-aid ratios than wealthy districts. State aid is then determined by multiplying this state-aid ratio by the local district's total

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40. AEFA, *supra* note 15, at 28.

41. Foundation programs can be represented mathematically as $A_i = FN_i—rW_i$ where A_i = the dollar value of the state's grant to the ith district, F = the foundation grant level, N_i = the number of pupils in the ith district (suitably weighted), r = the common tax rate selected by the state, and W_i = the total value of the ith district's tax base.

expenditure.

> Example: If the state aid ratio in district [A] were 0.60, the state would contribute 60% of district A's budget, while the remaining 40% would come from locally generated revenues. If district [A] wants to spend $10,000 per pupil, it would have to raise $4000 per pupil through local taxes, while the state would give the district $6000 per pupil.[42]

Theoretically, the state could continue to match local contributions regardless of how much the district wants to spend. In practice, however, most states establish limits on state aid, known as spending ceilings. The ceilings establish a maximum per-pupil contribution that the state will make to any district, even if that district chooses to tax itself at a higher rate. In these cases, where the ceiling is set below the per-pupil expenditure in the district, the percentage equalizing program functions the same way as a foundation program.[43]

D. Guaranteed Tax Base

The guaranteed tax base and the guaranteed tax yield approaches were designed by Coons, Clune, and Sugarman to achieve the objective of wealth neutrality.[44] Like that of percentage equalizing programs, the philosophy of the guaranteed tax base approach is to provide each district with equal access to education funding, while allowing decisions about the appropriate level of funding to be made locally. Under the guaranteed tax base approach, state aid is used to ensure that for purposes of generating education revenue, every district has the same tax base. When local districts choose a tax rate, the education revenue generated is based on the guaranteed tax base, rather than the district's actual tax base. Districts with tax bases higher than the guaranteed tax base forfeit additional revenue generated to the state.

> Example: If the state guaranteed a tax base of $1,000,000 per pupil, an effective local tax rate of 1% would yield $10,000 per pupil, regardless of a district's actual tax base. If the tax base in Poor District were $400,000 per pupil, that district would receive $6000 per pupil in state aid if it taxed itself at a 1% rate. If the tax base in Middle District were $1,000,000 per pupil, the district would receive no additional state aid. Rich District, with a $1,500,000 per pupil tax base, would have the same

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42. Percentage equalization programs can be represented mathematically as:

$$A_i = \left[1 - \left(\frac{W_i}{W_s}\right)\right] * E_i N_i$$

, where A_i = the dollar value of the state's grant to the ith district, W_i = the total value of the ith district's tax base, W_s = an arbitrary measure of fiscal capacity set by the state for use in this formula, E_i = the per-pupil expenditure for the ith district, and N_i = the number of pupils in the ith district (suitably weighted).

43. In this case, where the spending ceiling level (S) is less than the per-pupil expenditure in the district (i.e., $S < E_i$), the percentage equalizing formula becomes a foundation grant in which $F = S$ and $r = 1/W_s$.

44. COONS ET AL., *supra* note 2, at 33-35.

$10,000 per pupil to spend on education, and would have to give the remaining $5000 in generated revenue to the state.

This is known as a recapture provision.[45]

E. Guaranteed Tax Yield

The guaranteed tax yield approach is simply a modification of the guaranteed tax base program. Under the guaranteed tax yield, the state provides matching funds based on the level of local tax effort and the amount of revenues generated by that effort. Local school districts are guaranteed by the state a given amount of revenue per pupil for a given tax effort, regardless of the tax base in the local district.

Example: A state could guarantee revenue of $10,000 for a district with an effective local tax rate of 1%. For Middle District, where the local tax base was equal to $1,000,000 per pupil, the state would not contribute any additional aid, and local revenue would be $10,000 (1% of the tax base). In Poor District, with a local tax base of only $400,000 per pupil, the state would contribute $6000 per pupil ($10,000—1% of $400,000). If the state had a recapture provision, Rich District, with a local tax base of $1,5000,000 per pupil, would have to give the state $5000 per pupil ($10,000—1% of $1,500,000).[46]

The guaranteed tax yield approach and the guaranteed tax base approach are perfectly equivalent as long as the guaranteed yield is linear (i.e., for any tax rate, doubling the rate yields twice the revenue).

F. Full State Funding

Finally, under a full state funding program, the state assumes full responsibility for providing educational funding. These programs are based on the philosophy of equal inputs, or horizontal equity, and do not allow for local control of spending. All educational funds are raised by statewide taxes and all schools receive the same per-pupil funds. This is essentially the same approach as the flat grant except that local districts are not permitted to supplement state aid from local revenues. The effect is full funding parity across the state, regardless of the district in which a particular student lives. Hawaii is currently

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45. The guaranteed tax base can be represented mathematically as $A_i = r_i (V_s - V_i)$ where A_i = the dollar value of the state's grant to the ith district, r_i = the tax rate of the ith district, V_s = the guaranteed per pupil tax base, and V_i = the per-pupil tax base for the ith district.

46. This approach is best represented as a simple chart:

Tax rate	*Education Revenue*
1%	$4000
1.5%	$6000
2%	$8000
2.5%	$10,000

the only state whose education finance system can technically be classified as full state funding. While Washington state's program may be also best classified as full state funding, the state does allow local districts to raise some revenue for limited programs that the state does not provide.[47]

> Example: If State X adopted full state funding at the level of $10,000 per pupil, every district in the state would receive that amount from the state. This amount could not be supplemented with local revenue.[48]

III. ARE THE DIFFERENT APPROACHES REALLY DIFFERENT?

Each of the six approaches can be represented mathematically as shown in Table 1.

Table 1—Mathematical Representation of Basic Approaches to Education Funding

Flat Grant	$A_i = GN_i$
Foundation Program	$A_i = FN_i—r_fV_iN_i$
Percentage Equalizing	$A_i = [1—(V_i/V_s)]*E_iN_i$
Guaranteed Tax Base	$A_i = r_i(V_s—V_i)N_i$
Guaranteed Tax Yield	$A_i = (E_r—rV_i)N_i$
Full State Funding	$A_i = TN_i$
where:	
A_i = State aid to ith district	V_s = Per pupil tax base of hypothetical district chosen by state
G = Flat grant amount	E_i = Expenditures per pupil
N_i = Number of students in ith district	E_r= Guaranteed per pupil expenditures for chosen rate
F = Foundation level	T = Full state funding level.
r_f = Foundation rate	
V_i = Per pupil tax base in ith district	

While each formula is written so as to reflect the logic or "philosophy" underlying each approach, the foundation, percentage equalizing, guaranteed tax base, and guaranteed tax yield approaches can be manipulated so as to deliver the same amount of aid to different districts.

Take, for example, the three hypothetical districts discussed above: Poor District, with a local tax base of $400,000 per student, Middle District, with a local tax base of $1,000,000 per student, and Rich District, with a local tax base of $1,500,000 per student. Under a foundation approach, the state gets to choose the foundation level (F), and the foundation rate (r_f). If the state chooses a foundation level of $15,000 per student, and a foundation rate of 1%, Poor

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47. See Appendix B for the American Education Finance Association's classification of every state's approach.

48. Full state funding can be represented mathematically as $A_i = TN_i$ where A_i = the dollar value of the state's grant to the ith district, T = the full state funding level, and N_i = the number of pupils in the ith district (suitably weighted).

District would receive $11,000 per student in state aid, Middle District would receive $5000, and Rich District would receive $0.

Under a percentage equalizing approach, the state chooses the hypothetical tax base (V_s). If the state sets V_s at $1,500,000, and each district wishes to spend $15,000 per student, Poor District would again receive $11,000 from the state, Middle District would receive $5000, and Rich District would receive $0.

Under a guaranteed tax base approach, the state again chooses the hypothetical tax base (V_s). If the state sets V_s at $1,500,000 again, and each district taxes itself at a 1% rate, Poor District would again receive $11,000 from the state, Middle District would receive $5000, and Rich District would receive $0.

Finally, under a guaranteed tax yield approach, the state chooses the guaranteed expenditure for a given rate (E_r). If E_r is set at $15,000 for a 1% rate, and each district taxes itself at 1%, each district will again receive the exact same amount of state aid.

These results are summarized in Table 2.

Table 2—State Aid to Hypothetical Districts

	Poor District	Middle District	Rich District
Taxable base per student (V_i)	$400,000	$1,000,000	$1,500,000
Foundation Program	=15,000 – (0.1)(400,000) State Aid = **$11000**	= 15,000 – (0.1)(1,000,000) State Aid = **$5000**	=15,000 – (0.1) (1,500,000) State Aid = **$0**
Percentage Equalizing	= [1 – (400,000)/(1,500,000)] * 15,000 State Aid = **$11,000**	= [1 – (1,000,000)/(1,500,000)] * 15,000 State Aid =**$5000**	= [1 – (1,500,000)/ (1,500,000)] * 15,000 State Aid =**$0**
Guaranteed Tax Base	= (0.01)(1,500,000 – 400,000) State Aid = **$11,000**	= (0.01)(1,500,000 – 1,000,000) State Aid = **$5000**	= (0.01)(1,500,000 – 1,500,000) State Aid = **$0**
Guaranteed Tax Yield	= (15,000 – (0.01)(400,000) State Aid = **$11,000**	= (15,000 – (0.01)(1,000,000) State Aid = **$5000**	= (15,000 – (.01)(1,500,000) State Aid = **$0**

While these results reflect a very high level of state commitment, the formulas work the same if the state chooses to reduce the amount of aid being distributed.

For example, under a foundation approach, if the state chooses a foundation level of only $10,000 per student, and a foundation rate of 1%, Poor District would receive $6000 per student in state aid, Middle District would receive $0, and under the formulas, Rich District would owe $5000.

Under a percentage equalizing approach, if the state sets V_s at $1,000,000, and each district wishes to spend $10,000 per student, Poor District would again receive $6000 from the state, Middle District would receive $0, and Rich District

would owe $5000.

Under a guaranteed tax base approach, if the state sets V_s at $1,000,000 again, and each district taxes itself at a 1% rate, state aid would be the same for all three districts.

Finally, under a guaranteed tax yield approach, if E_r is set at $10,000 for a 1% rate, and each district taxes itself at 1%, Poor District would again receive $6000 from the state, Middle District would receive $0, and Rich District would owe $5000.

These results are summarized in Table 3.

Table 3—State Aid to Hypothetical Districts

	Poor District	Middle District	Rich District
Foundation Program	=10,000 – (0.1)(400,000) State Aid = **$6000**	= 10000 – (0.1)(1,000,000) State Aid = **$0**	= 10,000 – (0.1)(1,500,000) State Aid = **-$5000**
Percentage Equalizing	= [1– (400,000)/(1,000,000)] * 10,000 State Aid =**$6000**	= [1 – (1,000,000)/(1,000,000)] * 10,000 State Aid = **$0**	= [1 – (1,500,000)/(1,000,000)] * 10000 State Aid = **-$5000**
Guaranteed Tax Base	= (0.01)(1,000,000 – 400,000) State Aid = **$6000**	= (0.01)(1,000,000 – 1,000,000) State Aid =**$0**	= (0.01)(1,000,000 – 1,500,000) State Aid = **-$5000**
Guaranteed Tax Yield	= (10,000 – (0.01)(400,000) State Aid = **$6000**	= (10,000 – (.01)(1,000,000) State Aid = **$0**	= (10,000 – (0.01)(1,500,000) State Aid = **-$5000**

While there are a number of assumptions built into the results of Tables 2 and 3 so as to simplify the example (such as each district wishing to spend the same amount per pupil, and tax itself at the same rates), each of the approaches is mathematically equivalent under the following conditions:

The Guaranteed Tax Yield and Guaranteed Tax Base programs are equal as long as the yield is linear (i.e., twice the rate yields twice the per-pupil expenditure). When the yield (E_r) is equal to the guaranteed tax base (V_s) multiplied by the rate, the two formulas are equivalent.

These approaches are equal to the percentage equalizing approach when the state chooses as its hypothetical tax base (V_s) the same level as for the guaranteed tax base (V_s), and expenditures per pupil (E_i) are equal to the tax rate multiplied by this guaranteed tax base.

Finally, the percentage equalizing approach is equivalent to a foundation program if the state establishes a spending ceiling (S) that is less than the per-pupil expenditure in the district (i.e., $S < E_i$). State aid is then calculated as $[1-(V_i/V_s)]*SN_i$. This is equivalent to a foundation program in which $F=S$ and $r=S/V_s$.

Ironically, the two opposite ends of the spectrum—the flat grant approach and full state funding—are remarkably similar in the way they function. In fact, the formulas for delivering state aid are almost identical (GN_i and TN_i

respectively, where G and T are numbers selected by the state). The only difference is whether local districts are permitted to supplement the state aid amount with local revenue. Under the flat grant approach, they are permitted to supplement state aid. Under full state funding, local districts are forbidden by law from supplementing state aid (in Hawaii, local districts do not even exist) to local schools using local revenue.

Thus, even in theory there are really only two different approaches: some form of percent equalizing approach (including foundation programs, percent equalizing programs, guaranteed tax base, and guaranteed tax yield approaches)[49] and a fixed grant per student (to be either supplemented or not). The possibility of manipulating the formulas to make them equivalent, however, does not exist only in theory. In the next section, I will demonstrate that the nominally different approaches produce, on average, similar equity results, and I will provide evidence of legislative manipulation of the formulas.

IV. DO THE DIFFERENT APPROACHES PRODUCE DIFFERENT RESULTS?

Unpacking the mathematical similarities of the different approaches to education finance leads one to wonder whether the school finance reform efforts of the last thirty years have had any effect on the equitable distribution of resources. The existing literature dealing with this question generally concludes that the results are mixed. Though some states have made substantial progress in eliminating the inequitable distribution of education resources, other states have made no progress or have seen increasing disparities in spending between wealthy and poor districts. This finding raises a second question: when do (or which) reforms successfully reduce spending disparities? Some of the most recent school finance literature, as well as the empirical results reported in this paper, attempt to address this second question.

A. Previous Empirical Studies

A 2000 study released by the National Center for Education Statistics (NCES) concluded that "disparity appears to have fallen from 1980 to 1994, for most states and for most educational finance disparity measures."[50] However, the NCES also found that disparity increased in a substantial number of states (eleven) over the same time period.[51] Furthermore, the NCES noted that "the decline in disparity does not mean that the state may not still have a substantial amount of disparity."[52] This echoed the conclusions of earlier studies, which found substantial disparity between districts both within states and across the nation.[53] Like earlier studies, however, the NCES report used only horizontal

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49. Caroline Hoxby in a recent article refers to these approaches as School Finance Equalization (SFE) approaches. *See* Hoxby, *supra* note 11, at 1194-97.

50. U.S. DEP'T OF EDUC., NAT'L CENTER FOR EDUC. STATS., TRENDS IN DISPARITIES IN SCHOOL DISTRICT LEVEL EXPENDITURES PER PUPIL 2 (2000).

51. *Id.* at 23.

52. *Id.* at 2.

53. *See, e.g.*, Linda Hertert et al., *School Financing Inequalities Among the States: The*

equity measures, such as coefficient of variation and McLoone Index. It did not look at wealth-neutrality outcome measures.

No longitudinal study of wealth neutrality has been done in the United States over the last thirty years. Two recent studies, however, report current levels of fiscal neutrality in the country. A 1997 study by the United States General Accounting Office concluded that fiscal neutrality has not been achieved in most states:

> Although most states pursued strategies to supplement the local funding of poor school districts, wealthier districts in thirty-seven states had more total (state and local combined) funding than poor districts in the 1991-92 school year. This disparity existed even after adjusting for differences in geographic and student need-related education costs.[54]

These results were more recently supported by a 2001 *Education Week* survey of wealth neutrality in all fifty states.[55] Like the NCES study of horizontal equity, the *Education Week* survey of wealth-neutrality showed wide discrepancies in the wealth-neutrality score from state to state. While a handful have managed to effectively eliminate any correlation between school spending and local wealth, half of the states still have a positive correlation of .087 or higher.

One group of researchers that has attempted to answer the second-order question of when reforms are successful at reducing disparities in spending is Evans, Murray, and Schwab.[56] These authors examine the impact of school finance litigation by analyzing the change in equity measures following a school finance plaintiff's victory and a court order for education finance reform. By examining the coefficient of variation in states before and after court reform, the researchers concluded that "court-mandated education finance reform can decrease within-state inequality significantly."[57]

The study also examined the impact of school finance reform on a state's overall average expenditures per pupil. This is of interest to many school finance researchers, because most legislators seek to achieve greater equality by increasing the amount of money spent in poor districts (known as "leveling up"), rather than decreasing the amount spent in wealthy districts (known as "leveling down"). Evans and his co-authors conclude from their study that "court-ordered reform reduces inequality by raising spending at the bottom of the distribution while leaving spending at the top unchanged . . . [and] finance reform leads states to increase spending for education and leave spending in other areas

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Problem from a National Perspective, 19 J. ECON. FIN. 231, 252 (1994) (finding that "substantial variations remain in the distribution of public education revenues within states, even after years of litigation and legislative action to change these systems.").

54. U.S. GENERAL ACCOUNTING OFFICE, SCHOOL FINANCE: STATE EFFORTS TO REDUCE FUNDING GAPS BETWEEN POOR & WEALTHY DISTRICTS 2 (1997), *cited in* Berne & Stiefel, *supra* note 4, at 18.

55. EDUCATION WEEK, *supra* note 34.

56. Evans et al., *supra* note 10, at 72.

57. *Id.* at 77.

unchanged."[58]

These results were challenged in a recent paper by Caroline Hoxby, who argues that the researchers err by not differentiating between types of school finance reform. While the researchers were asking the question of *when* reforms result in greater finance equity and leveling up (answer: when they are enacted in response to a court decision), Hoxby asks the question of *which types* of reform have these results. Hoxby's argument is that when reforms are differentiated into redistributive efforts that use a district's local property value in calculating equalization aid ("school finance equalization" (SFE) programs such as foundation programs and guaranteed tax yield programs) and redistributive efforts that use other criteria such as mean income to calculate equalization aid (such as categorical grant programs), SFE programs are far more prone to leveling down than categorical grants. Since many of the reforms enacted over the last thirty years have been moves away from categorical grants and toward SFE programs, Hoxby argues that in many cases these reforms have left *all* districts, rich and poor, worse off than they would have been.[59]

B. Exploring the Relationship Between the Equity and Basic Funding Approaches

My empirical study asks a similar question to Hoxby: *which* reforms tend to be successful in reducing funding inequities? Using data from the U.S. Department of Education and *Education Week*, I examined the relationship between characteristics of a state's school finance system, such as the basic funding approach, spending limits, pupil weighting, etc., and the four outcome measures of equal opportunity discussed above—wealth neutrality, targeting score, coefficient of variation, and McLoone Index.[60]

Surprisingly, almost no characteristic of a state's school finance program—not even the basic funding approach—was significantly correlated with outcome measures.[61] In other words, the allocation of resources in states

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58. *Id.*

59. *See* Hoxby, *supra* note 11, at 1190-92.

60. See Appendix A for methodology and data sources.

61. See Appendix F for regression results. The few exceptions were (1) states that used average enrollment or attendance-based pupil counts had greater coefficients of variation and lower McLoone Indexes than states using enrollment; (2) states that measured district wealth using assessed property value (APV) in tandem with other measures had greater coefficients of variation than states using only APV; (3) states with property tax rate limits and general expenditure limits tended to have lower wealth neutrality scores (greater equality of opportunity) while states with assessment increase limits had higher wealth neutrality scores; and (4) states using a combination of APV and income spent approximately $1000 less per pupil and contributed approximately 9% more than states using other methods of evaluating a district's tax base. There is some logic behind exception #3 insofar as revenue and expenditure limits would restrict the ability of districts to translate rapid increases in local property value into higher spending on education, while assessment increase limits allow wealthy districts to receive more state aid than they deserve through artificially deflated valuations of the district's ability to pay. Exception #4 is discussed in

with flat grant or foundation programs were not, on average, any more equitable or wealth neutral than the allocation of resources in states with percent equalizing, guaranteed tax base, or full state funding. Table 4 summarizes the average outcome measures for states categorized by basic funding approach.

Perhaps the most surprising result was that even the targeting score was not significantly correlated with a state's basic approach to education. This was particularly interesting because the targeting score measures the correlation between state aid and district wealth without factoring in local contribution. In other words, the targeting score measures how redistributive state aid is in practice, without any distortion based on the behavior of local districts. Thus, the targeting score reflects the feature that we assume makes the "different" approaches to school finance different: the progressivity, or redistributive nature, of state aid. And yet, in practice, the targeting score shows no significant correlation with school finance approach at all.

Table 4: Mean state outcome, by basic funding approach

Outcome Variable	Flat Grant	Foundation Program (Local Effort Required)	Foundation Program (No Local Effort Required)	Percent Equalizing Program	Guaranteed Tax Base	Full State Funding
State aid as percentage of total education spending*	67.95%	57.58%	48.33%	40.5%	53.95%	84.35%
Targeting Score†	-0.069	-0.194	-0.2089	-0.3537	-0.143	-0.031
Wealth Neutrality†	0.0955	0.0372	0.0917	0.145	0.079	0.0225
Coefficient of variation†	0.071	0.1299	0.1311	0.1425	0.0945	0.0485
McLoone Index‡	0.9449	0.9360	0.9219	0.9158	0.925	0.9706
Spending per pupil*	$5089	$4749	$4994	$7074	$5484	$5112

† Higher scores denote greater inequity.

‡ Lower scores denote greater inequity.

* Indicates that differences in averages were statistically significant at the 0.05 level. See Appendix C for results of ANOVA test.

A second interesting result was that states using a percentage equalizing approach have the highest average correlation between district wealth and spending, and the greatest variation in spending as measured by both the

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the text, *infra*.

coefficient of variation and the McLoone Index. This is interesting because percentage equalizing programs are supposed to be more progressive than flat grants and foundation programs, yet in practice percentage equalizing programs appear to be *less* equitable. In the next section, I will address the question of how states using a state aid formula that appears to be more beneficial to poor districts can in practice have equal or greater levels of inequality than states using flat grants or foundation programs.

Third, it is interesting to note that while a state's school finance approach is unrelated to equity outcome measures, it *is* significantly related to both the total spending per pupil and the percentage of that spending that comes from the state (rather than local districts). This is surprising because, as discussed above, the different approaches were designed to impact the equitable allocation of resources; they were not designed to impact a state's total spending or percentage contribution. Changes in overall spending or percentage contribution that results from a modification of the state's approach to school finance are generally treated as unintended consequences. The results of my empirical study suggest that these "unintended consequences" of school finance reform may be more significantly impacted by reforms than the "intended consequences."

Fourth, there is also a negative correlation between a state's average expenditure per pupil and the percentage of education funding that comes from the state. Lower state contributions as a percentage of total spending correlate with higher average spending at a statistically significant level. This was true both when controlling for program type and when not. This result is interesting in the context of the debate over whether school finance reform results in "leveling down" because the percentage of education funding that comes from the state is also correlated with outcome measures of equity. Increases in the state's percentage contribution to education spending is significantly correlated with increased equity in the state, and it is significantly correlated with lower spending overall. This finding lends some support to those who claim that while transferring greater responsibility for education spending from local districts to the state may result in greater spending equity, it will also lead to lower levels of spending overall, or "leveling down."[62]

A final result not illustrated in Table 4 but worth noting is the significant impact of the method a state uses to assess a local district's ability to pay. States using a combination of assessed property value (APV) and income as a measure of local tax base tend to have significantly greater horizontal equity (as measured by both the coefficient of variation and McLoone Index), significantly greater state percentage, and spend significantly more per pupil than states using only APV. This held true both when controlling for other program variables and when not.[63] This result may lend support to arguments that the use of average property value in state aid formulas as a measure of local ability to pay can distort property values, which in turn may undermine the progressive goals of the state

62. *See* Appendix E.

63. *See* Appendix F & G (note, however, that coefficient of variation result is only significant at 0.10 level).

aid formula.[64] My results show that states that rely on APV and income to measure local ability to pay tend to have greater success in achieving equity goals than states that use only APV.

C. Interpretation of Results

There are at least three possible interpretations of my empirical results, all of which may be partially correct. The first is that the different approaches do produce different results, but that small sample sizes prevented differences in programs from being *statistically* significant. This explanation is particularly applicable to generalizations about the basic types of state aid programs, since the vast majority of states (forty) follow the same basic foundation approach. Only two states each are characterized as following flat grant, guaranteed tax base, and full state funding approaches, while the remaining four states are characterized as following a percentage equalizing approach.[65] Even taking only the most robust statistical results, however, requires one to think more critically about why most program characteristics, including basic funding approaches, fail to correlate with wealth neutrality, targeting score, or horizontal equity.

A second explanation stems from the strong negative correlation found between a state's targeting score and the state percentage.[66] This suggests that in states with aid formulas that tend to be very redistributive, state aid only accounts for a very small percentage of overall education spending. New Hampshire, for example, distributes aid more progressively than any other state (targeting score = -.73), yet accounts for the smallest percentage of overall education spending (state percentage = 7%). New Mexico, on the other hand, does not target additional state aid to poor districts at all (targeting score = 0.00), but only relies on local districts to contribute a small portion of overall education spending (state percentage = 83%).

To illustrate how this could account for the failure of nominally progressive state aid formulas to correlate with greater equality of opportunity or horizontal equity, consider the following hypothetical: State X has only two districts, one with a per pupil tax base of $100,000, another with a per pupil tax base of $800,000. If each district assesses a tax of .1%, District 1 would raise $1000 per student, while District 2 would raise $8000. If the state only contributes 10% of overall spending, even if that aid is allocated in the most progressive way possible—with $1000 going to District 1, and $0 going to District 2—District 1 would end up with $2000 per pupil, while District 2 would have $8000 per pupil. Thus, the state's overall education spending pattern would reflect a high correlation between district spending and district wealth, and large horizontal inequities, despite a highly progressive state aid formula. Indeed, despite its dramatically higher targeting score, New Hampshire's wealth neutrality (0.23) is substantially less equitable than New Mexico's (0.07).

While the strong relationship between targeting score and state percentage

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64. *See, e.g.*, Hoxby, *supra* note 11, at 1200-05, 1223, 1228-29.

65. See Appendix B for a categorization of each state.

66. *See* Appendix D.

probably goes a long way toward explaining why there is no correlation between a state's finance system and the equality of opportunity and horizontal equity in that state, it does not explain how the targeting score itself can be unrelated to the different ideals about the equitable allocation of resources supposedly embodied in the different types of state aid programs. In other words, it fails to explain how guaranteed tax base programs, which were designed to be more redistributive, can have statistically equivalent targeting scores (a measure of redistribution) to those of flat grant and foundation programs.

This question is at least partially answered by the third explanation, which is that states in practice manipulate the formulas in the manner suggested in Part IV to make them mathematically and functionally equivalent. Percentage equalizing programs, for example, are mathematically equivalent to foundation programs when states impose a ceiling on equalizing aid; three of the four states that have adopted a percent equalizing approach have spending ceilings. Thus, it might be more accurate to classify these three states as following a foundation approach. Full state funding is mathematically equivalent to a flat grant approach if local districts are permitted to raise additional revenue; one of the two states described as having full state funding permits local districts to raise additional revenue. Perhaps it should be re-classified as following a flat grant approach.

Furthermore, all of the formulas contain variables that are arbitrarily chosen by the state. Manipulating these variables often results in substantial manipulation of how resources are allocated. As demonstrated in Part IV, if these variables are chosen in a particular way, four of the six program approaches yield identical state aid to poor, middle, and rich districts. Finally, many states also allocate state aid to districts through programs other than basic support aid, such as separate funds for construction, transportation, or high-need-student programs. States can manipulate these other programs to offset the redistributive effects of the basic support aid formula.

New York state is an excellent example of formula manipulation. In New York, the state has adopted what is nominally a percent equalizing approach. The state has also added a ceiling provision, however, which makes the percent equalizing formula functionally equivalent to a foundation program. Nevertheless, this represents only the beginning of formula manipulation in New York. Additionally, the state has created a multitude of state aid formulas that have been described by a former New York State Education Commissioner as "an ocean of confusion piled on a pillar of disorder."[67] In a New York school finance case decided at the trial level last January, the judge held that

> [t]he evidence demonstrates that the State aid distribution system is unnecessarily complex and opaque . . . . However, more important than the formulas' and grants' needless complexity is their malleability in practice . . . . [T]he formulas do not operate neutrally to allocate school funds . . . . Rather the formulas are manipulated to conform to budget agreements reached by the Governor, the Speaker of the State Assembly,

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67. Plaintiff's Brief at ¶1816, Campaign for Fiscal Equity v. State, 719 N.Y.S.2d 475 (2001).

and the State Senate Majority Leader.[68]

This "three men in a room" approach to allocating state aid is obviously unrelated to the nominal philosophy or goals of the state's approach to school finance; it is an exercise in raw political power. Once these political leaders reach an agreement on the allocation of resources, officials in the state education department run the formulas backwards, manipulating them to produce the desired outputs. In discovery for the trial, plaintiffs uncovered a blank Confidential State Aid Data Form that included "% increase for NYC" in the section entitled "goals." Plaintiffs then calculated that in each of the last thirteen years New York City received exactly or almost exactly 38.86% of any increases in state aid for that year.[69] Considering the complexity of the formulas and the annual changes in student population and property values across the state, it defies common sense to believe that the state was using the state aid formula impartially to determine the allocation of resources.

The end result is that while New York state follows a purportedly redistributive approach of percent equalizing, it has one of the most inequitable allocations of resources in the country, with a wealth neutrality score of .17 (5th highest in country), and a coefficient of variation of .20 (2nd highest in the country).

The final outcome of my empirical study is that the results suggest a theory for reconciling the results of Evans' and Hoxby's studies. Hoxby's decision to group foundation programs, percentage equalizing programs, guaranteed tax base, and guaranteed tax yield programs into one category of SFE programs reflects an implicit assumption that these four approaches are sufficiently similar to treat them as a single approach. My empirical results are consistent with Hoxby's paper insofar as they provide evidence to support this assumption. Hoxby's conclusion that implementing SFE programs do not necessarily improve equity in school funding is consistent with my finding that there is no relationship between a state's basic approach to education funding, and the equitable allocation of education resources.

However, while there is no significant connection between a state's basic approach to school funding and the equitable allocation of resources, this is not to say that there is not wide variation in the extent to which states provide equal educational opportunity. Indeed, some states have much lower wealth neutrality, targeting scores, and spending variation than others. The data illustrate that a state *can* achieve high levels of equity under an SFE program. When *do* they? Evans' and Hoxby's results suggest that states will achieve greater equity in funding when they have reformed the state system under court order.

Combining the results of Evans' and Hoxby's study, and my own empirical results yields the following hypothesis: Under the watchful eye of a court, a state can and does produce significantly more equitable funding results (even if it does not change its basic approach to education funding). This is logical when one

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68. *Campaign for Fiscal Equity*, 719 N.Y.S.2d at 529-30.

69. In half the years, the percentage for NYC was exactly 38.86%, while in other years the percentage for NYC never deviated by more than .3%. Plaintiffs Brief at ¶¶1840-1855.

considers that plaintiffs and courts will be focusing on the outcomes produced by the reform, not the legislature's description of the new approach. Without judicial oversight, on the other hand, approaches that are generally thought to be more redistributive are in fact no different than the other basic approaches to education finance. The explanation for this is that the legislature is responsible only to the voting public, who may indeed be influenced by the legislature's description of the new, highly progressive approach, even if (and perhaps all the more so because) no actual change occurs in the actual distribution of resources.

V. WHY DO STATES ADOPT DIFFERENT APPROACHES THAT AREN'T REALLY DIFFERENT?

As Carr and Fuhrman have noted, "[a] state's existing school finance system is a product of the legislative process and therefore reflects the state's balance of political power. Changing that system requires a shift of power relationships."[70] While something like an adverse court ruling may shift these power relationships, in some cases it simply acts as an outside disturbance to a system at equilibrium. The outside force may shift the balance in the short term, but the system will ultimately return to its previous equilibrium state. In the school finance context, this means that while a court decision declaring the education finance system unconstitutional may force the legislature to make immediate changes in the system, subsequent amendments and formula modifications are likely to shift the allocation of resources back to the balance that existed before the court decision.

We have already seen how the allocation of state aid in New York is simply a reflection of a district's political influence over the "three men in the room." Other states, such as Washington, New Jersey, and Vermont, also provide illustrations of political equilibrium at work. In Washington, following substantial reforms in response to a decision in favor of the plaintiffs in a school finance lawsuit, the state drifted slowly back toward its pre-court political equilibrium. In New Jersey, the political equilibrium was so strong that it took several court rulings in favor of plaintiffs and significant judicial activism before the legislature moved toward enacting a more equitable school finance system. And in Vermont, legislation that dramatically equalized the distribution of education resources has been under constant political pressure and is still in danger of being substantially undermined.

A. Washington State

Washington state nominally follows a full state funding approach. In 1974, the Washington Supreme Court rejected a challenge to the state education system that rested on the notion of wealth neutrality.[71] The court held that the state constitution did not guarantee all students the right to an equal education. Four years later, however, in *Seattle School District No. 1 v. State*,[72] the court did

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70. Melissa C. Carr & Susan H. Fuhrman, *The Politics of School Finance in the 1990s*, *in* EQUITY AND ADEQUACY, *supra* note 4, at 136.

71. Northshore Sch. Dist. v. Kinnear, 530 P.2d 178, 182 (Wash. 1974).

72. Seattle Sch. Dist. No. 1 v. State, 585 P.2d 71 (Wash. 1978).

declare the state's education system unconstitutional on the grounds that it did not satisfy the constitutional requirement that the state assume responsibility for funding "basic education" for a "general and uniform system of K-12 public schools."[73] The court declared that financial support for basic education must be provided through state, not local, sources.[74]

In response to the *Seattle* decision, the legislature adopted the Basic Education Act of 1977 which provided that the state would provide full funding for basic educational services, without relying on local property tax revenue.[75] While local districts were permitted under the law to supplement state funding through special levies, the state placed two restrictions on these special levies through the Levy Lid Act. The first restriction was that funds raised through special levies could not be used for any basic educational services. The funds could only be used for enrichment programs that went beyond the basic services provided by the state. The second restriction was that local district levies could not exceed 10% of a district's basic education allocation from the state.[76] The Levy Lid Act is all that distinguishes Washington's "full state funding" approach from a flat grant.[77]

However, when the Levy Lid Act was passed, some school districts already collected local revenues that exceeded the 10% lid. These districts were given special authorization ("grandfathered") to continue their higher levies. Levy amounts for grandfathered districts were to be reduced gradually so as to eliminate higher levies by 1982. However, the districts that were to be negatively affected by the Levy Lid Act "were among the largest in the state and [they] banded together to get relief."[78] Over the next fifteen years, the Levy Lid Act was amended eight times (in 1979, 1981, 1985, 1987, 1988, 1989, 1992, and 1993), and the original 10% limit has never been implemented. From a high of 24% in 1977-78, local revenue as a percentage of total education spending (excluding federal aid) declined to only 8% in 1980-81.[79] Since 1981, however, this percentage has steadily increased to 18.0% in 1997-98.[80] By 1999, districts were allowed to return to the pre-*Seattle* equilibrium of 24% of their state and

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73. *Id.* at 92-96.

74. *Id.* at 95.

75. 1977 ex.s c 759 (codified as amended at WASH. REV. CODE ANN. §§ 28A.150-200-260 (West 2003)). *See also* Margaret Plecki, *School Finance in Washington State 1997-98: Emerging Equity Concerns* (1998) (a paper prepared for the annual meeting of the American Educational Research Ass'n).

76. 1977 ex.s c 325 (codified as amended at WASH. REV. CODE ANN. §§ 84.52.052-054 (West 2003)). *See also* Plecki, *supra* note 75.

77. *See* discussion at *supra* note 47 and accompanying text (distinguishing between full state funding approaches and flat grants).

78. Neil Theobald & Faith Hanna, *Ample Provision for Whom? The Evolution of State Control over School Finance in Washington*, 17 J. OF EDUC. FIN. 7, 17 (1991) (internal quotations omitted).

79. Plecki, *supra* note 75.

80. Margaret Plecki, *Washington*, *in* AMERICAN EDUCATION FINANCE ASS'N, SCHOOL FINANCE PROGRAMS IN THE UNITED STATES AND CANADA, 1997-98, at 2 (1999).

federal allocations.[81]

Furthermore, there is no evidence that the restriction on the use of local levy revenue to non-basic education items has been enforced in any way. "Given existing state databases, it is not possible to examine the exact nature of local levy expenditures, as the state does not collect this information . . . . [But] anecdotal information from local district sources indicate that the possibility exists that, in some cases, levy dollars might be used to support basic education."[82]

The result in Washington is that while the state was nominally following a full state funding approach, state funds actually accounted for only 82% of total education spending, and there was greater variation in spending between districts than there was in sixteen other states.[83]

B. New Jersey

Like Washington, New Jersey faced an early challenge to its education finance system. In 1973, the New Jersey Supreme Court, in *Robinson v. Cahill*,[84] held that the state's foundation program violated the New Jersey constitutional requirement of providing all students a "thorough and efficient" education.[85] After hearing further arguments on the question of remedy, the court chose not to "disturb the statutory scheme unless the Legislature fails to enact, by December 31, 1974, legislation compatible with our decision in this case and effective no later than July 1, 1975."[86] The court also withheld "ruling upon the question whether, if such legislation is not so adopted, the court may order the distribution of appropriated moneys toward a constitutional objective notwithstanding the legislative directions."[87]

Unlike in Washington, however, the New Jersey legislature failed to enact more equitable legislation, despite the court's decision in *Robinson*. After initially extending the deadline before which the legislature was to act,[88] the court reheard arguments two years after its initial decision. The tone of the opinion on this occasion was notably different, beginning as follows:

> The Court has now come face to face with a constitutional exigency involving, on a level of plain, stark and unmistakable reality, the constitutional obligation of the Court to act. Having previously identified a profound violation of constitutional right, based upon default in a legislative obligation imposed by the organic law in the plainest of terms, we have more than once stayed our hand, with appropriate respect

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81. WASH. REV. CODE ANN. § 84.52.0531(4) (West 2003). *See also* Plecki, *supra* note 75.

82. Plecki, *supra* note 75.

83. As measured by the McLoone Index. The coefficient of variation in Washington is greater than that of twelve other states.

84. Robinson v. Cahill, 303 A.2d 273 (N.J. 1973).

85. *Id.* at 289-98 (citing N.J. CONST., art. 8, § 4, para. 1 (1947)).

86. Robinson v. Cahill (Robinson II), 306 A.2d 65, 66 (N.J. 1973).

87. *Id.* at 66.

88. Robinson v. Cahill (Robinson III), 335 A.2d 6,7 (N.J. 1975).

> for the province of other Branches of government. In final alternative, we must now proceed to enforce the constitutional right involved.[89]

The court ordered that if the legislature failed to enact a constitutionally acceptable alternative, then state aid would be allocated according to a percentage equalizing approach for the school year 1976-77.[90]

The Legislature responded to this court order by enacting the Public School Education Act of 1975.[91] While the Act withstood an initial, facial challenge, the court noted "[p]arenthetically, . . . that [the question] whether [the 1975 Act] may or may not pass constitutional muster as applied in the future to any individual school district at any particular time, must quite obviously await the event."[92]

"The event" came only five years after passage of the Public School Education Act of 1975. As "the disparities in per-pupil spending in the cities versus the suburbs were increasing again,"[93] school finance advocates filed *Abbott v. Burke*, challenging the inequitable outcomes of the new state education finance system, as applied to property-poor districts.[94]

The New Jersey Supreme Court first required the plaintiffs to exhaust their administrative remedies in hearings with the state Department of Education.[95] After six years of administrative proceedings, in which the Commissioner of Education eventually overturned an administrative judge's determination that the funding system was unconstitutional, the state supreme court considered the case on its merits.[96] The court overturned the Commissioner and held that New Jersey's system of education finance violated the state constitution.[97] Once again, however, the court left it to the legislature to amend the education act or pass new legislation that would "assure that poorer urban districts' educational funding is substantially equal to that of property-rich districts. 'Assure' means that such funding cannot depend on the budgeting and taxing decisions of local school boards. Funding must be certain, every year."[98]

This time, the legislature responded by passing the Quality Education Act (QEA), which significantly increased the foundation level of spending for all districts, provided supplemental programs for students in the poorest districts, and slowly phased out state aid to the wealthiest districts.[99] The legislature also passed a $2,800,000,000 tax increase to pay for increases in education spending

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89. Robinson v. Cahill (Robinson IV), 351 A.2d 713, 716 (N.J. 1975).

90. *Id.* at 724.

91. c.212, L.1975, NJSA 18A: 7A-1 to -52, *repealed by* L.1996, c. 138, § 85, *cited in* Robinson v. Cahill (Robinson V), 355 A.2d 129, 131 (N.J. 1976) (per curiam)).

92. *Robinson V*, 355 A.2d at 131-32.

93. Carr & Fuhrman, *supra* note 70, at 163.

94. Abbott v. Burke (Abbott I), 495 A.2d 376 (N.J. 1985).

95. *Id.* at 393-94.

96. Abbott v. Burke (Abbott II), 575 A.2d 359 (N.J. 1990).

97. *Id.* at 363.

98. *Id.* at 408.

99. 1990 N.J. Laws 587 (codified as amended at N.J. STAT. ANN. 18A:7D-1 to -37 (West Supp. 1994), *repealed by* L.1996, c.138, § 85).

provided in the QEA. With the support of Democratic Governor Jim Florio, the QEA and tax increase were passed and signed into law within a month.

Before the legislation was enacted, however, the legislature amended the law, passing a revised package called QEA II.[100] This new bill substantially decreased the tax burden and reduced the level of education aid by $360,000,000. Some observers attributed the "derailing of reforms" to

> [w]idespread public opposition to the QEA proposals, the tax increases, and the prospect of increased spending in urban districts . . . . After the first QEA and the $2,800,000,000 tax increase were passed, an anti-tax uprising, led by a grass-roots organization called Hands Across New Jersey, caused the governor's approval ratings to drop 19 points.[101]

In the 1991 election, many of the Democratic legislators who had supported the QEA were defeated, and the Republicans gained a majority in the state legislature.[102] Two years later, Governor Florio was defeated by a Republican challenger who made a major campaign issue of Florio's efforts to increase taxes to equalize education spending.[103]

At that point, the new governor, Christine Todd Whitman, faced the challenge of reforming the education finance system to comply with the court's latest decision—a 1994 holding that the QEA II failed to meet the constitutional requirements established in *Abbott II*.[104] After initially calling for increased spending to special-needs districts and cuts in state aid to wealthier districts, Governor Whitman was forced to change course lest she suffer the same fate as her predecessor. Wealthy suburban districts mounted strong opposition to any plan that would result in reduced state aid to their schools, and Republican legislative allies of the governor began to call for hearings to re-examine the Commissioner of Education's proposals. Facing such eroding support from her own Republican base, Governor Whitman backed away from her equity proposal and endorsed an adequacy measure that guaranteed a basic level of funding for all districts, but ignored the court's order to equalize spending.[105]

In 1997, the New Jersey Supreme Court declared this latest approach unconstitutional and ordered the legislature to increase funding to the state's poorest districts.[106] Following proceedings on remand, in 1998, the court approved a state education finance reform plan in what many expected to be the last chapter in the *Abbott* saga.[107] Only two years later, however, the plaintiffs

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100. 1991 N.J. Laws 200, 231 (codified as amended at N.J. STAT. ANN. 18A:7D-1 to -37 (West Supp. 1994), *repealed by* L.1995, c.138, § 85) (amending the QEA to create the QEA II).

101. Carr & Fuhrman, *supra* note 70, at 165.

102. *Id.*

103. *Id.*

104. Abbott v. Burke (Abbott III), 643 A.2d 575, 576-80 (N.J. 1994).

105. *See* Abbott v. Burke (Abbot IV), 693 A.2d 417, 421 (1997); Mark Walls, *Wealthy N.J. Districts Assail Spending Categories*, EDUC. WK. (Feb. 22, 1995).

106. *Abbott IV*, 693 A.2d at 421.

107. *See* Abbott v. Burke (Abbott V), 710 A.2d 450, 490 (N.J. 1998) ("[T]his decision should be the last major judicial involvement in the long and tortuous history of the State's extraordinary

were back in court, alleging that the Commissioner of Education had failed to fully implement the proposal that had been approved by the court. While the court refused to find bad faith on the part of the Commissioner, it did agree with the plaintiffs that certain promises had not been kept, and issued yet another judicial order designed to ensure that the students in New Jersey's poorest districts received an equitable education.[108]

Thus, the story of school finance reform in New Jersey is that of legislatures and governors who often respond to an inequitable political equilibrium by making changes that maintain an inequitable equilibrium in the allocation of state education aid despite court orders mandating reform. Only through the continued vigilance of school finance plaintiffs representing the state's poor districts, and the state supreme court, have inter-district spending disparities been reduced in New Jersey.

C. Vermont

Although equity reforms enacted in Vermont in 1997 have remained intact to date, substantial pressure exists to repeal them. The state, therefore, remains an interesting one to watch in coming years to see if this pressure will result in the type of backsliding toward an inequitable equilibrium that occurred in Washington and New Jersey.

In 1997, following a decision by the Vermont Supreme Court that the state's education finance system was unconstitutional,[109] the legislature passed a reform law known as Act 60.[110] The new law replaced most local property taxes with a uniform, statewide property tax, and established a per-pupil block grant for every district.[111] Act 60 also established a guaranteed yield component for districts that chose to spend amounts above the base block grant. This latter provision included a recapture provision that required affluent districts to contribute revenue generated above the guaranteed yield to a "sharing pool." Like Washington's Basic Education Act, Act 60 provided for a gradual transition for districts that had been spending well above the basic block grant level.

The sharing pool provision immediately generated strong opposition from residents of the state's wealthier districts. Opponents dubbed the "sharing pool" the "shark pool" and have engaged in a variety of tactics to avoid the law's impact, including filing lawsuits, engaging in civil disobedience, and establishing private foundations.[112] Republicans opposed to Act 60 have also used the legislation as a major campaign issue in an effort to unseat members of the

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effort to bring a thorough and efficient education to the children in its poorest school districts."); Minorini & Sugarman, *supra* note 9, at 51 (stating that, "[a]t long last, after more than two decades of litigation, the New Jersey battle over school finance equity appears to be over").

108. Abbott v. Burke (Abbott VI), 748 A.2d 82 (N.J. 2000).

109. *See* Brigham v. State, 692 A.2d 384, 386 (Vt. 1997).

110. 1997 Vt. Acts and Resolves 60.

111. *Id.*

112. *See* Michael A. Rebell & Jeffrey P. Metzler, *Rapid Response and Radical Reform: The Story of School Finance Litigation in Vermont*, 31 J.L. & EDUC. 167, 167 (2001).

Democratic majority that support Act 60's passage.

While no reforms of Act 60 have been enacted in the five years since its passage, Republican opponents have gotten closer every year. In 1998, Republicans successfully poured huge sums of money into the campaigns to unseat the two principal authors of Act 60.[113] According to the New York Times Magazine, Democratic Governor Howard Dean saw his approval ratings fall from 62% to 47% in the year following the passage of Act 60.[114] In the 2000 gubernatorial campaign, Dean's Republican challenger made Act 60 a central campaign theme, resulting in a proposal by Dean to eliminate the sharing pool.[115] And while the Governor retained his office, Republicans gained a majority in the House for the first time in more than a decade and promptly introduced measures to eliminate the sharing pool provisions.[116] Even the Democratically-controlled Senate passed measures in 2001 that would have given wealthy districts more time to phase in the sharing pool portion of Act 60. And while no compromise was reached in conference committee, a majority of political observers believe that the issue will not go away.[117]

The New York story provides strong evidence of the general proposition that state aid reflects the political equilibrium in the state. New Jersey illustrates how difficult it is to shift this equilibrium, even after multiple court victories. Washington demonstrates that even in states where a court ruling shifts the political equilibrium sufficiently to allow legislative school finance reform, there is a tendency for the balance of political power to return to the equilibrium point. And while Vermont has thus far resisted this tendency, it remains to be seen whether a new, more equitable equilibrium point has been reached, or whether it is only a matter of time before the 1997 school finance reforms are substantially undone.

CONCLUSION

A state's basic approach to funding education may have some impact on the nature of funding debates. For example, in states with "full state funding" programs, it may be more difficult politically for legislators to provide only minimal state funds than in states with "flat grant" programs, even though the two approaches are, in fact, almost identical mathematically.[118] However, the

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113. *Id.* at 183.

114. Elinor Burkett, *Don't Tread on My Tax Rate*, N.Y. TIMES MAG., Apr. 26, 1998, at 44.

115. Christopher Graff, *Governor to Propose Changes to Act 60*, RUTLAND HERALD (July 14, 2000).

116. Bess Keller, *Pressure Mounts for Overhauling Finance Systems*, EDUC. WK. (Feb. 7, 2001).

117. Joetta L. Sack, *Well-to-do Vt. Towns Seeking Relief from Sch. Finan. Law*, EDUC. WK. (June 6, 2001).

118. *See supra* note 48 and accompanying text. Similarly, the language of guaranteed tax base programs suggests that state should choose a hypothetical district (V_s) that has realistic property values, whereas V_s in percentage equalizing programs does not seem to be conceptually tied to anything.

empirical findings presented in this paper, and the examples of New York and Washington, suggest that the type of basic allocation approach that a state adopts is not significantly related to the equitable allocation of education resources in that state.

More research needs to be done in this area. If the state's basic approach to school finance is not related to the equitable allocation of resources, what factors can account for the differences in interdistrict equity found between states? When does a court decision shift political power to create a new equilibrium, and when is it simply a temporary disturbance to a system that will ultimately return to its original equilibrium state? What is the impact of state categorical aid such as money for construction, transportation or districts with high-needs students? A state's measure of local tax base and the incentives associated with using only assessed property value, compared with using a combination of property value and income, also deserves additional research in light of Hoxby's arguments and the significant impact I found this variable to have on horizontal equity, state percentage, and overall spending. Finally, the relationship between the targeting score and state percentage must be better understood to determine whether it is the result of deliberate calculations by legislators, or unintended consequences of poorly understood incentive structures.

The principal lesson to draw from these finding is that legislators, courts, and citizens interested in achieving greater equality of educational opportunity must stay focused on outcome measures rather than on legislative inputs. The results presented in this paper illustrate that it is all too easy for the redistributive goals of a legislative plan to be undermined by modifications, the impact of which may be unclear ex ante to even the most sophisticated observer, let alone the average voter. Furthermore, evidence suggests that there is often strong pressure impeding state legislatures from enacting or sustaining school finance reforms that represent meaningful deviation from inequitable equilibriums. Thus, those interested in a permanent shift to a more equitable distribution of education resources must either change the political equilibrium in most states, or rely on courts to impose solutions on resistant legislatures.

APPENDICES

A. Methodology & Data Sources

To evaluate the correlation between a state finance system and the equality of opportunity, horizontal equity, and overall spending, I first collected data on the different features of each state finance system. Much of this data is conveniently collected periodically by the American Education Finance Association in the series "School Finance Programs in the United States and Canada."[119] Second, I collected data on the various outcome measures discussed above for each state. Four of these measures—wealth neutrality score, targeting score, coefficient of variation, and McLoone Index—were taken from *Education Week*'s annual survey of the states, "Quality Counts," as was a fifth variable, the percentage of overall education spending contributed by the state ("state percentage").[120] All four outcome measures control for regional cost differences.[121] Finally, the average expenditure per pupil for each state was taken from the U.S. Department of Education's Digest of Education Statistics.[122]

Once the data were cleaned and appropriate dummy variables created, I used several statistics techniques—including regressions, correlations, difference of means t-tests, Chi-squares, and ANOVA models—to explore the connection between the program variables and the outcome variables. The analysis was done on the statewide level, rather than the district level, though all of the techniques could be done at the district level as well, provided a state variable were included. One limit to using statewide data, however, is that my sample size was limited to fifty. As a result, I have reported only the most robust results; i.e., those that were significant at the 95% level under a variety of control conditions, e.g., whether the state used pupil weighting or not.

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119. *See* AEFA, *supra* note 15; U.S. DEP'T OF EDUC., NAT'L CENTER FOR EDUC. STATS., PUBLIC SCHOOL FINANCE PROGRAMS OF THE UNITED STATES AND CANADA, 1997-98 (1999), *at* http://nces.ed.gov/edfin/state_finance/StateFinancing.asp (last visited Jan. 26, 2003).

120. *See* EDUCATION WEEK, *supra* note 34.

121. *See id.*

122. *See* U.S. DEP'T OF EDUC., NAT'L CENTER FOR EDUC. STATS., DIGEST OF EDUCATION STATISTICS, *at* http://www.nces.ed.gov/pubs2002/digest2001/ (last visited Jan. 26, 2003).

B. Classification of 1998-99 Basic Support Programs

Flat Grants	Foundation Programs		Percentage Equalizing	Guaranteed Tax Base / Yield	Full State Funding
Delaware (with separate equalization component)	*Required Local Effort*	*Local Effort Not Required*	Rhode Island	Indiana	Hawaii
	Alabama	Arizona		Wisconsin	Washington
	Alaska	Arkansas	**Foundation Type**		
North Carolina	Colorado	California	*Required Local Effort*		
	Florida	Idaho	Connecticut		
	Georgia[1]	Illinois			
	Iowa	Kansas	*No Local Effort Required*		
	Kentucky	Louisiana	New York		
	Maine	Maryland	Pennsylvania		
	Massachusetts	Montana[1]			
	Michigan	Nebraska			
	Minnesota	New Hampshire			
	Mississippi	New Jersey			
	Missouri[2]	North Dakota			
	Nevada	Oklahoma[1]			
	New Mexico	Oregon			
	Ohio	South Dakota			
	South Carolina	Vermont			
	Tennessee	West Virginia			
	Texas[1]				
	Utah				
	Virginia				
	Wyoming				
Total = 2	Total = 22	Total = 18	Total = 4	Total = 2	Total = 2

The following states provided descriptions for years other than 1993-94: Colorado—1994-95; Michigan—1994-95; Wyoming—1992-93.

[1] These states have a second tier of GTB / GTY funding in addition to the foundation program.

[2] Missouri incorporates a GTB add on into the basic support formula.

Adapted from AMERICAN EDUCATION FINANCE ASSOCIATION, PUBLIC SCHOOL FINANCE PROGRAMS OF THE UNITED STATES AND CANADA, 1993-94 (1995) using updates from AMERICAN EDUCATION FINANCE ASSOCIATION, PUBLIC SCHOOL FINANCE PROGRAMS OF THE UNITED STATES AND CANADA, 1998-99 (1999), *at* http://www.nces.ed.gov/edfin/state_finance/StateFinancing.asp (last visited Mar. 7, 2002).

C. Outcome Variables to Program Classification

```
*** Analysis of Variance Model ***

Short Output:
Call:
  aov(formula = State.percentage ~ Program.Classification, data = EdData4,
    na.action = na.exclude)

Terms:
                Program.Classification Residuals
 Sum of Squares                3816.970  7618.471
Deg. of Freedom                       5        44

Residual standard error: 13.15854
Estimated effects may be unbalanced

                      Df Sum of Sq  Mean Sq  F Value       Pr(F)
Program.Classification  5  3816.970 763.3941 4.408935 0.002431118
             Residuals 44  7618.471 173.1471

*** Analysis of Variance Model ***

Short Output:
Call:
  aov(formula = Targeting.Score ~ Program.Classification, data = EdData4,
    na.action = na.exclude)

Terms:
                Program.Classification Residuals
 Sum of Squares                0.194605  1.116842
Deg. of Freedom                       5        44

Residual standard error: 0.1593197
Estimated effects may be unbalanced

                      Df Sum of Sq    Mean Sq  F Value   Pr(F)
Program.Classification  5  0.194605 0.03892099 1.533362 0.19912
             Residuals 44  1.116842 0.02538278

*** Analysis of Variance Model ***

Short Output:
Call:
     aov(formula = Wealth.neutrality ~ Program.Classification, data =
EdData4,
    na.action = na.exclude)
```

```
Terms:
                Program.Classification Residuals
 Sum of Squares              0.0605348 0.6571625
Deg. of Freedom                      5        44

Residual standard error: 0.1222109
Estimated effects may be unbalanced

                       Df Sum of Sq    Mean Sq   F Value     Pr(F)
Program.Classification  5 0.0605348 0.01210696 0.8106158 0.5484605
             Residuals 44 0.6571625 0.01493551

*** Analysis of Variance Model ***

Short Output:
Call:
   aov(formula = Coefficient.of.variation ~ Program.Classification, data
=
    EdData4, na.action = na.exclude)

Terms:
                Program.Classification  Residuals
 Sum of Squares             0.02170629 0.08477723
Deg. of Freedom                      5         44

Residual standard error: 0.04389482
Estimated effects may be unbalanced

                       Df  Sum of Sq     Mean Sq  F Value      Pr(F)
Program.Classification  5 0.02170629 0.004341258 2.253144 0.06561803
             Residuals 44 0.08477723 0.001926755

*** Analysis of Variance Model ***

Short Output:
Call:
   aov(formula = McLoone.Index ~ Program.Classification, data = EdData4,
    na.action = na.exclude)

Terms:
                Program.Classification  Residuals
 Sum of Squares             0.00652386 0.03493732
Deg. of Freedom                      5         44

Residual standard error: 0.02817854
Estimated effects may be unbalanced

                       Df  Sum of Sq     Mean Sq  F Value     Pr(F)
```

```
Program.Classification  5 0.00652386 0.001304772 1.643227 0.1686231
                Residuals 44 0.03493732 0.000794030


*** Analysis of Variance Model ***

Short Output:
Call:
   aov(formula = Spending.enrollment.1993 ~ Program.Classification, data
=
    EdData4, na.action = na.exclude)

Terms:
                Program.Classification Residuals
 Sum of Squares                18786497  53401061
Deg. of Freedom                      5        44

Residual standard error: 1101.663
Estimated effects may be unbalanced

                      Df Sum of Sq Mean Sq  F Value      Pr(F)
Program.Classification  5  18786497 3757299 3.095841 0.01764418
            Residuals 44  53401061 1213660
```

D. Targeting Score to State Percentage

```
    *** Linear Model ***

Call: lm(formula = Targeting.Score ~ Flat.grant + Foundation.NLER +
    Percent.Equalizing + GTB.GTY + Full.State + State.percentage, data =
    EdData4, na.action = na.exclude)
Residuals:
     Min       1Q    Median      3Q   Max
 -0.2635 -0.07063 0.0002475 0.07806 0.249

Coefficients:
                    Value Std. Error t value Pr(>|t|)
       (Intercept) -0.5667  0.0768    -7.3830  0.0000
        Flat.grant -0.0052  0.0993    -0.0525  0.9584
   Foundation.NLER -0.0536  0.0427    -1.2547  0.2164
Percent.Equalizing -0.0868  0.0714    -1.2150  0.2310
           GTB.GTY  0.0244  0.0954     0.2558  0.7993
        Full.State -0.0886  0.1087    -0.8155  0.4193
  State.percentage  0.0074  0.0015     5.0656  0.0000

Residual standard error: 0.1275 on 43 degrees of freedom
Multiple R-Squared: 0.4667
F-statistic: 6.271 on 6 and 43 degrees of freedom, the p-value is
0.00008604
```

E. Spending to State Percentage

```
    *** Linear Model ***

Call: lm(formula = Targeting.Score ~ State.percentage, data = EdData4,
na.action =
    na.exclude)
Residuals:
     Min       1Q Median     3Q    Max
 -0.2844 -0.07216 0.0149 0.0802 0.2748

Coefficients:
                   Value Std. Error t value Pr(>|t|)
     (Intercept) -0.5778  0.0659    -8.7670  0.0000
State.percentage  0.0070  0.0012     5.9724  0.0000

Residual standard error: 0.1252 on 48 degrees of freedom
Multiple R-Squared: 0.4263
F-statistic: 35.67 on 1 and 48 degrees of freedom, the p-value is 2.762e-
007
    E.  Spending to State Percentage


    *** Linear Model ***

Call: lm(formula = Spending.enrollment.1993 ~ Flat.grant + Foundation.NLER
+
    Percent.Equalizing + GTB.GTY + Full.State + State.percentage, data =
    EdData4, na.action = na.exclude)
Residuals:
   Min     1Q Median    3Q  Max
 -1548 -674.3 -102.6 568.7 3535

Coefficients:
                       Value Std. Error    t value   Pr(>|t|)
       (Intercept)  6206.2025   639.9355     9.6982     0.0000
        Flat.grant   587.4596   827.7010     0.7097     0.4817
   Foundation.NLER   -13.1419   356.1774    -0.0369     0.9707
Percent.Equalizing  1884.0380   595.4241     3.1642     0.0029
           GTB.GTY   631.1520   795.4205     0.7935     0.4319
        Full.State  1021.1693   905.7831     1.1274     0.2658
  State.percentage   -25.0802    12.1812    -2.0589     0.0456

Residual standard error: 1063 on 43 degrees of freedom
Multiple R-Squared: 0.3266
F-statistic: 3.476 on 6 and 43 degrees of freedom, the p-value is 0.006866
```

F. Regression Results

```
    *** Linear Model ***

Call: lm(formula = Spending.enrollment.1993 ~ State.percentage, data =
EdData4,
    na.action = na.exclude)
Residuals:
   Min     1Q Median    3Q  Max
 -1766 -813.8 -238.1 518.9 3263

Coefficients:
                     Value Std. Error    t value   Pr(>|t|)
     (Intercept)  6569.4127   605.8470    10.8434     0.0000
State.percentage   -27.4531    10.7616    -2.5510     0.0140

Residual standard error: 1151 on 48 degrees of freedom
Multiple R-Squared: 0.1194
F-statistic: 6.508 on 1 and 48 degrees of freedom, the p-value is 0.01398


    *** Linear Model ***

Call: lm(formula = Wealth.neutrality ~ State.percentage, data = EdData4,
na.action
     = na.exclude)
Residuals:
     Min       1Q  Median      3Q    Max
 -0.5041 -0.02329 0.02653 0.06532 0.1716

Coefficients:
                   Value Std. Error t value Pr(>|t|)
     (Intercept)  0.2174   0.0604     3.5985  0.0008
State.percentage -0.0027   0.0011    -2.5520  0.0139

Residual standard error: 0.1147 on 48 degrees of freedom
Multiple R-Squared: 0.1195
F-statistic: 6.513 on 1 and 48 degrees of freedom, the p-value is 0.01395


    *** Linear Model ***

Call: lm(formula = Coefficient.of.variation ~ State.percentage, data =
EdData4,
    na.action = na.exclude)
Residuals:
      Min       1Q    Median      3Q    Max
 -0.07571 -0.02872 -0.006402 0.02157 0.2106
```

```
Coefficients:
                  Value Std. Error t value Pr(>|t|)
     (Intercept)  0.1855  0.0230     8.0487  0.0000
State.percentage -0.0011  0.0004    -2.7531  0.0083

Residual standard error: 0.04377 on 48 degrees of freedom
Multiple R-Squared: 0.1364
F-statistic: 7.58 on 1 and 48 degrees of freedom, the p-value is 0.00831
```

F. Regression Results

*** Linear Model ***

```
Call: lm(formula = Coefficient.of.variation ~ Flat.grant + Foundation.NLER
+
    Percent.Equalizing + GTB.GTY + Full.State + Avg.enrollment +
    Attendance + Teacher + Weighting + APV.other + APV.income + APV.all +
    Hold.harmless + Property.tax.rate.limit + Revenue.limit +
    General.expenditure.limit + Assessment.increase.limit +
    Full.disclosure + State.percentage, data = EdData4, na.action =
    na.exclude)
Residuals:
      Min       1Q     Median      3Q     Max
 -0.05643 -0.01976 -0.0006848 0.01441 0.1496

Coefficients:
                           Value Std. Error t value Pr(>|t|)
                     (Intercept)  0.1087  0.0574     1.8929  0.0696
                    Flat.grant -0.0262  0.0423    -0.6197  0.5408
                Foundation.NLER  0.0175  0.0187     0.9336  0.3591
            Percent.Equalizing -0.0122  0.0351    -0.3467  0.7316
                       GTB.GTY -0.0168  0.0433    -0.3867  0.7021
                    Full.State  0.0199  0.0570     0.3485  0.7303
                Avg.enrollment  0.0459  0.0214     2.1410  0.0418
                    Attendance  0.0619  0.0265     2.3404  0.0272
                       Teacher  0.0213  0.0282     0.7547  0.4572
                     Weighting -0.0045  0.0173    -0.2596  0.7972
                     APV.other  0.0566  0.0267     2.1194  0.0438
                    APV.income  0.0470  0.0361     1.3019  0.2044
                       APV.all -0.0069  0.0243    -0.2824  0.7798
                  Hold.harmless -0.0092  0.0167    -0.5516  0.5859
      Property.tax.rate.limit  0.0193  0.0208     0.9270  0.3624
                 Revenue.limit -0.0100  0.0169    -0.5928  0.5584
    General.expenditure.limit  0.0272  0.0238     1.1431  0.2634
    Assessment.increase.limit -0.0285  0.0214    -1.3307  0.1948
              Full.disclosure -0.0155  0.0180    -0.8641  0.3954
            State.percentage -0.0006  0.0008    -0.7302  0.4718
```

```
Residual standard error: 0.04462 on 26 degrees of freedom
Multiple R-Squared: 0.4146
F-statistic: 0.9692 on 19 and 26 degrees of freedom, the p-value is 0.52
4 observations deleted due to missing values


    *** Linear Model ***

Call: lm(formula = McLoone.Index ~ Flat.grant + Foundation.NLER +
Percent.Equalizing +
    GTB.GTY + Full.State + Avg.enrollment + Attendance + Teacher +
    Weighting + APV.other + APV.income + APV.all + Hold.harmless +
    Property.tax.rate.limit + Revenue.limit + General.expenditure.limit +
    Assessment.increase.limit + Full.disclosure + State.percentage, data
     = EdData4, na.action = na.exclude)
Residuals:
      Min        1Q    Median      3Q     Max
 -0.05292 -0.005611 0.0006508 0.01096 0.03241

Coefficients:
                            Value Std. Error  t value Pr(>|t|)
                (Intercept)  0.9141   0.0308  29.7006   0.0000
               Flat.grant    0.0074   0.0226   0.3270   0.7463
          Foundation.NLER    0.0069   0.0100   0.6917   0.4953
       Percent.Equalizing    0.0327   0.0188   1.7400   0.0937
                  GTB.GTY    0.0017   0.0232   0.0744   0.9412
               Full.State    0.0038   0.0305   0.1240   0.9023
            Avg.enrollment  -0.0193   0.0115  -1.6802   0.1049
                Attendance  -0.0419   0.0142  -2.9519   0.0066
                   Teacher  -0.0325   0.0151  -2.1502   0.0410
                 Weighting  -0.0070   0.0093  -0.7572   0.4557
                 APV.other  -0.0193   0.0143  -1.3451   0.1902
                APV.income  -0.0320   0.0193  -1.6553   0.1099
                   APV.all  -0.0053   0.0130  -0.4076   0.6869
              Hold.harmless  -0.0140   0.0090  -1.5597   0.1309
  Property.tax.rate.limit    0.0067   0.0111   0.6040   0.5511
             Revenue.limit  -0.0058   0.0090  -0.6371   0.5296
General.expenditure.limit  -0.0024   0.0128  -0.1891   0.8515
Assessment.increase.limit    0.0015   0.0115   0.1341   0.8943
           Full.disclosure   0.0028   0.0096   0.2869   0.7765
          State.percentage   0.0008   0.0004   1.9138   0.0667

Residual standard error: 0.02391 on 26 degrees of freedom
Multiple R-Squared: 0.5653
F-statistic: 1.78 on 19 and 26 degrees of freedom, the p-value is 0.08555
4 observations deleted due to missing values
```

```
    *** Linear Model ***

Call: lm(formula = Targeting.Score ~ Flat.grant + Foundation.NLER +
    Percent.Equalizing + GTB.GTY + Full.State + Avg.enrollment +
    Attendance + Teacher + Weighting + APV.other + APV.income + APV.all +
    Hold.harmless + Property.tax.rate.limit + Revenue.limit +
    General.expenditure.limit + Assessment.increase.limit +
    Full.disclosure + State.percentage, data = EdData4, na.action =
    na.exclude)
Residuals:
     Min       1Q    Median      3Q    Max
 -0.2347 -0.06511 -0.001199 0.05481 0.2092

Coefficients:
                            Value Std. Error t value Pr(>|t|)
                (Intercept) -0.4342  0.1688    -2.5729  0.0161
                Flat.grant  0.0649  0.1242     0.5229  0.6055
           Foundation.NLER -0.0279  0.0551    -0.5063  0.6169
       Percent.Equalizing -0.1237  0.1031    -1.2006  0.2407
                  GTB.GTY  0.0320  0.1274     0.2515  0.8034
                Full.State  0.1014  0.1674     0.6055  0.5501
            Avg.enrollment  0.0128  0.0630     0.2032  0.8406
                Attendance  0.0513  0.0778     0.6590  0.5157
                   Teacher -0.0191  0.0828    -0.2302  0.8197
                 Weighting -0.0194  0.0510    -0.3813  0.7061
                 APV.other  0.0665  0.0785     0.8466  0.4050
                APV.income  0.0308  0.1060     0.2908  0.7735
                   APV.all  0.0422  0.0715     0.5897  0.5605
             Hold.harmless -0.0316  0.0491    -0.6430  0.5258
  Property.tax.rate.limit  0.0756  0.0611     1.2368  0.2272
            Revenue.limit -0.0113  0.0496    -0.2269  0.8223
General.expenditure.limit -0.0156  0.0700    -0.2230  0.8252
Assessment.increase.limit -0.0543  0.0629    -0.8619  0.3966
          Full.disclosure -0.0938  0.0528    -1.7751  0.0876
         State.percentage  0.0048  0.0024     2.0005  0.0560

Residual standard error: 0.1311 on 26 degrees of freedom
Multiple R-Squared: 0.5433
F-statistic: 1.628 on 19 and 26 degrees of freedom, the p-value is 0.123
4 observations deleted due to missing values


    *** Linear Model ***

Call: lm(formula = Wealth.neutrality ~ Flat.grant + Foundation.NLER +
    Percent.Equalizing + GTB.GTY + Full.State + Avg.enrollment +
    Attendance + Teacher + Weighting + APV.other + APV.income + APV.all +
```

```
    Hold.harmless + Property.tax.rate.limit + Revenue.limit +
    General.expenditure.limit + Assessment.increase.limit +
    Full.disclosure + State.percentage, data = EdData4, na.action =
    na.exclude)
Residuals:
     Min       1Q    Median      3Q    Max
 -0.3213 -0.04477 -0.002726 0.04296 0.1998

Coefficients:
                            Value Std. Error t value Pr(>|t|)
              (Intercept)  0.2981  0.1375     2.1682  0.0395
             Flat.grant -0.0443  0.1012    -0.4383  0.6648
          Foundation.NLER -0.0824  0.0448    -1.8367  0.0777
       Percent.Equalizing -0.0274  0.0840    -0.3265  0.7466
                  GTB.GTY -0.1168  0.1038    -1.1259  0.2705
             Full.State -0.0292  0.1364    -0.2140  0.8322
           Avg.enrollment -0.0189  0.0513    -0.3683  0.7156
              Attendance -0.0274  0.0634    -0.4321  0.6692
                 Teacher -0.0750  0.0675    -1.1114  0.2766
               Weighting -0.0389  0.0415    -0.9370  0.3574
              APV.other -0.1295  0.0640    -2.0244  0.0533
             APV.income -0.0491  0.0863    -0.5688  0.5744
                APV.all  0.0505  0.0583     0.8673  0.3937
           Hold.harmless -0.0120  0.0400    -0.3004  0.7662
  Property.tax.rate.limit -0.1101  0.0498    -2.2114  0.0360
           Revenue.limit  0.0549  0.0404     1.3577  0.1862
General.expenditure.limit -0.1527  0.0570    -2.6789  0.0126
Assessment.increase.limit  0.1347  0.0513     2.6273  0.0142
          Full.disclosure  0.0212  0.0430     0.4932  0.6260
        State.percentage -0.0011  0.0019    -0.5507  0.5865

Residual standard error: 0.1068 on 26 degrees of freedom
Multiple R-Squared: 0.5658
F-statistic: 1.783 on 19 and 26 degrees of freedom, the p-value is 0.08486
4 observations deleted due to missing values


    *** Linear Model ***

Call: lm(formula = Spending.enrollment.1993 ~ Flat.grant + Foundation.NLER
+
    Percent.Equalizing + GTB.GTY + Full.State + Avg.enrollment +
    Attendance + Teacher + Weighting + APV.other + APV.income + APV.all +
    Hold.harmless + Property.tax.rate.limit + Revenue.limit +
    General.expenditure.limit + Assessment.increase.limit +
    Full.disclosure + State.percentage, data = EdData4, na.action =
    na.exclude)
Residuals:
```

```
   Min     1Q Median  3Q  Max
 -2146 -393.8 -23.57 336 2752

Coefficients:
                              Value Std. Error    t value   Pr(>|t|)
                  (Intercept)  5194.4725  1318.8615     3.9386     0.0005
                  Flat.grant   816.0438   970.5496     0.8408     0.4081
             Foundation.NLER   291.7132   430.1792     0.6781     0.5037
          Percent.Equalizing   399.7447   805.4616     0.4963     0.6239
                     GTB.GTY  1253.1723   995.3907     1.2590     0.2192
                  Full.State   224.3503  1308.3097     0.1715     0.8652
              Avg.enrollment    36.6761   492.2866     0.0745     0.9412
                  Attendance   159.2119   607.8509     0.2619     0.7954
                     Teacher   851.7083   647.3225     1.3157     0.1997
                   Weighting  -220.1397   398.2334    -0.5528     0.5851
                   APV.other   137.7341   613.5390     0.2245     0.8241
                  APV.income  2182.5871   828.2985     2.6350     0.0140
                     APV.all  -624.6253   559.0418    -1.1173     0.2741
               Hold.harmless   127.5920   383.8395     0.3324     0.7422
    Property.tax.rate.limit   171.8510   477.7229     0.3597     0.7220
               Revenue.limit   -95.1226   387.6556    -0.2454     0.8081
  General.expenditure.limit   857.9966   546.8434     1.5690     0.1287
  Assessment.increase.limit  -374.3081   491.8410    -0.7610     0.4535
             Full.disclosure   -33.4020   412.7920    -0.0809     0.9361
           State.percentage   -16.8522    18.5596    -0.9080     0.3722

Residual standard error: 1025 on 26 degrees of freedom
Multiple R-Squared: 0.6146
F-statistic: 2.182 on 19 and 26 degrees of freedom, the p-value is 0.03258
4 observations deleted due to missing values

    *** Linear Model ***

Call: lm(formula = State.percentage ~ Flat.grant + Foundation.NLER +
    Percent.Equalizing + GTB.GTY + Full.State + Avg.enrollment +
    Attendance + Teacher + Weighting + APV.other + APV.income + APV.all +
    Hold.harmless + Property.tax.rate.limit + Revenue.limit +
    General.expenditure.limit + Assessment.increase.limit +
    Full.disclosure, data = EdData4, na.action = na.exclude)
Residuals:
    Min      1Q  Median    3Q  Max
 -22.16 -5.236 -0.2282 4.979 16.8

Coefficients:
                            Value Std. Error  t value Pr(>|t|)
                (Intercept)  56.3452   8.3331   6.7616   0.0000
                Flat.grant   8.7103   9.9233   0.8778   0.3878
           Foundation.NLER   3.1555   4.4191   0.7140   0.4813
```

Percent.Equalizing	6.5040	8.2578	0.7876	0.4378
GTB.GTY	-1.8610	10.3153	-0.1804	0.8582
Full.State	6.3109	13.5118	0.4671	0.6442
Avg.enrollment	-4.4488	5.0324	-0.8840	0.3845
Attendance	-4.1738	6.2516	-0.6676	0.5100
Teacher	2.7555	6.6913	0.4118	0.6837
Weighting	3.7412	4.0662	0.9201	0.3657
APV.other	-0.4588	6.3614	-0.0721	0.9430
APV.income	-20.6997	7.6092	-2.7204	0.0113
APV.all	-6.1196	5.6760	-1.0781	0.2905
Hold.harmless	-2.7821	3.9440	-0.7054	0.4866
Property.tax.rate.limit	1.2437	4.9479	0.2514	0.8034
Revenue.limit	1.4401	4.0102	0.3591	0.7223
General.expenditure.limit	-6.1426	5.5458	-1.1076	0.2778
Assessment.increase.limit	2.5063	5.0772	0.4936	0.6255
Full.disclosure	-0.5365	4.2791	-0.1254	0.9012

Residual standard error: 10.63 on 27 degrees of freedom
Multiple R-Squared: 0.5742
F-statistic: 2.022 on 18 and 27 degrees of freedom, the p-value is 0.04756
4 observations deleted due to missing values

G. Measure of Ability to Pay to Outcome Measures

```
    *** Linear Model ***

Call: lm(formula = Coefficient.of.variation ~ APV.other + APV.income +
APV.all,
    data = EdData4, na.action = na.exclude)
Residuals:
     Min       1Q   Median       3Q    Max
 -0.1123 -0.02842 -0.01033 0.02242 0.1804

Coefficients:
              Value Std. Error t value Pr(>|t|)
(Intercept)  0.1123   0.0089    12.6755  0.0000
  APV.other  0.0242   0.0177     1.3666  0.1784
 APV.income  0.0313   0.0177     1.7678  0.0837
    APV.all  0.0203   0.0224     0.9040  0.3707

Residual standard error: 0.04605 on 46 degrees of freedom
Multiple R-Squared: 0.08394
F-statistic: 1.405 on 3 and 46 degrees of freedom, the p-value is 0.2534


    *** Linear Model ***

Call: lm(formula = McLoone.Index ~ APV.other + APV.income + APV.all, data
= EdData4,
    na.action = na.exclude)
Residuals:
      Min       1Q    Median       3Q     Max
 -0.06585 -0.01334 0.0004481 0.01178 0.06005

Coefficients:
               Value Std. Error   t value  Pr(>|t|)
(Intercept)   0.9400    0.0051   184.5998    0.0000
  APV.other  -0.0062    0.0102    -0.6106    0.5444
 APV.income  -0.0363    0.0102    -3.5685    0.0009
    APV.all  -0.0165    0.0129    -1.2803    0.2069

Residual standard error: 0.02646 on 46 degrees of freedom
Multiple R-Squared: 0.2233
F-statistic: 4.409 on 3 and 46 degrees of freedom, the p-value is 0.008293


    *** Linear Model ***

Call: lm(formula = Wealth.neutrality ~ APV.other + APV.income + APV.all,
data =
```

```
    EdData4, na.action = na.exclude)
Residuals:
     Min       1Q  Median      3Q     Max
 -0.4486 -0.04093 0.01517 0.05957 0.2284

Coefficients:
              Value Std. Error t value Pr(>|t|)
(Intercept)  0.0719  0.0215     3.3514  0.0016
  APV.other -0.1024  0.0429    -2.3850  0.0213
 APV.income  0.0744  0.0429     1.7335  0.0897
    APV.all  0.0199  0.0543     0.3661  0.7160

Residual standard error: 0.1115 on 46 degrees of freedom
Multiple R-Squared: 0.2029
F-statistic: 3.904 on 3 and 46 degrees of freedom, the p-value is 0.01446


    *** Linear Model ***

Call: lm(formula = State.percentage ~ APV.other + APV.income + APV.all,
data =
    EdData4, na.action = na.exclude)
Residuals:
    Min     1Q Median    3Q   Max
 -27.91 -7.763  1.834 7.428 38.14

Coefficients:
              Value Std. Error  t value Pr(>|t|)
(Intercept)  59.2593   2.4070    24.6198   0.0000
  APV.other   0.7519   4.8139     0.1562   0.8766
 APV.income -23.8481   4.8139    -4.9540   0.0000
    APV.all  -8.7393   6.0892    -1.4352   0.1580

Residual standard error: 12.51 on 46 degrees of freedom
Multiple R-Squared: 0.3708
F-statistic: 9.035 on 3 and 46 degrees of freedom, the p-value is
0.00008168


    *** Linear Model ***

Call: lm(formula = Spending.enrollment.1993 ~ APV.other + APV.income +
APV.all,
    data = EdData4, na.action = na.exclude)
Residuals:
   Min     1Q Median    3Q  Max
 -1761 -634.5 -69.41 591.8 3035
```

```
Coefficients:
                Value Std. Error    t value   Pr(>|t|)
(Intercept)  4728.2348   179.7006    26.3117     0.0000
  APV.other   137.9032   359.4012     0.3837     0.7030
 APV.income  2037.3257   359.4012     5.6687     0.0000
    APV.all  -390.9240   454.6105    -0.8599     0.3943

Residual standard error: 933.8 on 46 degrees of freedom
Multiple R-Squared: 0.4444
F-statistic: 12.26 on 3 and 46 degrees of freedom, the p-value is 5.065e-
006
```