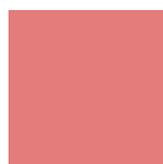
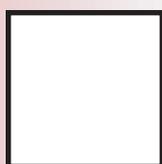


Federal Reserve Bank of St. Louis

REGIONAL ECONOMIC DEVELOPMENT

VOLUME 2, NUMBER 1 2006



Challenges to Public Education Financing Facing Missouri and the Nation

*Proceedings of a symposium co-hosted by the
Federal Reserve Bank of St. Louis and the Murray Weidenbaum
Center on the Economy, Government, and Public Policy,
Washington University in St. Louis, November 4, 2005*

Alternative Education Finance Strategies

Thomas J. Nechyba

K-12 Public School Finance in Missouri: An Overview

Michael Podgursky and Matthew G. Springer

School Accountability and Student Performance

Eric A. Hanushek and Margaret E. Raymond

Discussions and Commentaries by

Ross Rubenstein

Steven G. Rivkin

Gerri Ogle

The Honorable Brian L. Baker

The Honorable Yvonne Wilson

Terry Adams

Craig Larson

REGIONAL ECONOMIC DEVELOPMENT

Director of Research
Robert H. Rasche

Deputy Director of Research
Cletus C. Coughlin

Editor
Thomas A. Garrett

Center for Regional Economics—8th District (CRE8)

Director
Howard J. Wall

Cletus C. Coughlin
Thomas A. Garrett
Rubén Hernández-Murillo
Anthony N.M. Pennington-Cross
Christopher H. Wheeler

Managing Editor
George E. Fortier

Assistant Editor
Lydia H. Johnson

Graphic Designer
Donna M. Stiller

The views expressed are those of the individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis, the Federal Reserve System, or the Board of Governors.



Challenges to Public Education Financing Facing Missouri and the Nation

- 1** **Chairman's Remarks**
Walter L. Metcalfe Jr.
- 4** **Editor's Introduction**
Thomas A. Garrett
- 7** **Alternative Education Finance
Strategies**
Thomas J. Nechyba
- 28** **Discussion**
Ross Rubenstein
- 31** **K-12 Public School Finance
in Missouri: An Overview**
Michael Podgursky and Matthew G. Springer
- 51** **School Accountability and
Student Performance**
Eric A. Hanushek and Margaret E. Raymond
- 62** **Discussion**
Steven G. Rivkin
- Commentaries**
- 64** **Gerri Ogle**
- 66** **The Honorable Brian L. Baker**
- 68** **The Honorable Yvonne Wilson**
- 70** **Terry Adams**
- 75** **Craig Larson**

Regional Economic Development is published occasionally by the Research Division of the Federal Reserve Bank of St. Louis and may be accessed through our web site: research.stlouisfed.org/regecon/publications/. All nonproprietary and nonconfidential data and programs for the articles written by Federal Reserve Bank of St. Louis staff and published in *Regional Economic Development* also are available to our readers on this web site.

General data can be obtained through FRED (Federal Reserve Economic Data), a database providing U.S. economic and financial data and regional data for the Eighth Federal Reserve District. You may access FRED through our web site: research.stlouisfed.org/fred.

Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Please send a copy of any reprinted, published, or displayed materials to George Fortier, Research Division, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, MO 63166-0442; george.e.fortier@stls.frb.org. Please note: Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis. Please contact the Research Division at the above address to request permission.

© 2006, Federal Reserve Bank of St. Louis.

ISSN 1930-1979

Contributing Authors

Terry Adams

Rolla, Missouri, School District
TAdams@rolla.k12.mo.us

The Honorable Brian L. Baker

Missouri House of Representatives
brianbaker@brianbaker123.com

Thomas A. Garrett

Federal Reserve Bank of St. Louis
tom.a.garrett@stls.frb.org

Eric A. Hanushek

Stanford University
hanushek@stanford.edu

Craig Larson

Rockwood, Missouri, School District
larsoncraig@rockwood.k12.mo.us

Walter L. Metcalfe Jr.

Board of Directors of the
Federal Reserve Bank of St. Louis
wlmetcalfe@BryanCave.com

Thomas J. Nechyba

Duke University
nechyba@econ.duke.edu

Gerri Ogle

Missouri Department of Elementary and
Secondary Education
Gerri.Ogle@dese.mo.gov

Michael Podgursky

University of Missouri–Columbia
PodgurskyM@missouri.edu

Margaret E. Raymond

Stanford University
raymond@hoover.stanford.edu

Steven G. Rivkin

Amherst College
sgrivkin@amherst.edu

Ross Rubenstein

Syracuse University
rrubenst@maxwell.syr.edu

Matthew G. Springer

Vanderbilt University
matthew.g.springer@vanderbilt.edu

The Honorable Yvonne Wilson

Missouri Senate
Yvonne.wilson@senate.mo.gov



Chairman's Remarks

Walter L. Metcalfe Jr.

The Research Division of the Federal Reserve Bank of St. Louis and the Weidenbaum Center at Washington University in St. Louis provided a valuable public service by co-hosting the symposium on K-12 public education finance. Unlike many academic or local conferences, participants included both nationally recognized scholars in school finance and Missouri legislators and school superintendents active in the design and implementation of public policy. This is a useful model to move the dialogue forward for the benefit of K-12 students.

For every state, the cost of educating students enrolled in public K-12 schools is divided among local, state, and federal resources. The debate is lively and contentious at each level. States allocate education funding in various ways and the state legislative debate usually involves only two subjects: (i) “more” money for K-12 education and (ii) “fair” distribution of money across the public school districts. Thus, state legislators with specific constituencies—representing areas with small or large districts, rural or urban districts, wealthy or poor districts, special need or traditional districts—typically argue for outcomes based on the characteristics of their school districts rather than on standards-based student achievement. The debate usually emphasizes dividing the dollars to be spent by the state rather than accountability for the dollars.

The courts are a second forum for debate. Legal challenges to finance distribution formulas traditionally forward three arguments: education

as a fundamental right, equal protection under the law, and the education articles of the constitution of the individual state. Historically, this litigation has focused its efforts on issues of equality and opportunity. Recently, more cases have addressed the adequacy of finance distribution formulas in terms of meeting state constitutional and statutory guidelines. Because there are significant achievement gaps between pupils in low-income areas and high-income areas in most states, a formula change then becomes highly contentious because it again involves a redistribution of resources, the level of local control, and the effectiveness of increased spending.

Now statewide debates and litigation have widened to include school choice options that generate immense controversy, whether they allow students to attend a public school outside their neighborhood or a charter school or provide vouchers for a private school or tax credits for scholarships allowing some choice.

Symposia such as this provide an opportunity for the exchange of information outside adversarial litigation, the heat of the legislative process, and the myopia of personal interests, thus freeing legislators, administrators, teachers, economists, and informed observers to integrate experience and learning over years of education outcome disparity in broader terms. Leaving aside the individual's absolute or relative right to education or opportunity, student achievement today is unacceptable on an aggregate level. From the beginning, Thomas Jefferson and many others took the position that

Walter L. Metcalfe Jr. is the chairman of the Board of Directors of the Federal Reserve Bank of St. Louis and chairman of the law firm Bryan Cave LLP.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 1-3.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

Metcalfe

an enlightened citizenry is indispensable for the proper functioning of the republic. "Self-government is not possible unless the citizens are educated sufficiently to enable them to exercise oversight. It is therefore imperative that the nation see to it that a suitable education be provided for all its citizens." Leadership today continues to accept this ideal.

The state constitution of Missouri, Article IX, Section 1(a), provides such a commitment:

A general diffusion of knowledge and intelligence being essential to the preservation of the rights and liberties of the people, the general assembly shall establish and maintain free public schools for the gratuitous instruction of all persons in this state within ages not in excess of 21 years as prescribed by law.

Going beyond a responsible citizenry, Eric Hanushek and Margaret Raymond underscore the powerful economic effects of quality schooling by observing that the entire national cost of K-12 public education could be paid for by a one-standard-deviation increase in student achievement; such an improvement would translate into higher annual earnings and productivity gains and thereby increase gross domestic product. That is, the growth dividend would make schooling free. Clearly, improving scholastic achievement is in our national interest for civic and economic reasons.

So, then, how much does money matter? The litigation and the debate over linkages between monetary input and educational outcome has been addressed often in research studies and academic conferences, and the level of linkage is consistently brought before the legislatures and the courts. Virtually everyone concedes that there is some level of spending required; however, additional spending does not generally yield large marginal gains in student achievement. Researchers conclude that the evidence shows student performance does not necessarily correlate with expenditures per student, so state strategies aimed principally at equalizing financial inputs are limited in the degree to which they can address disparity and inequity.

What next? In the 1960s it was concluded that student achievement is more dependent on nonfinancial inputs than financial inputs. The nonfinancial inputs often cited publicly include a lack of

parental involvement, problems in a student's home life and upbringing, and a student's lack of interest and motivation as the most important reasons for the disparity between the achievement levels of students in relatively wealthy areas and those in poor areas. This argument holds that schools have little influence over these nonfinancial inputs. Others, such as those involved in the Teach For America corps, disagree, saying the key to closing that gap is to train and employ better teachers and improve the quality of the administrators. They argue that by rebuilding schools and school systems at the leadership level, changing the means of promoting teachers, and ensuring that high expectations and standards are set for all students, the achievement gap will be closed. This argument holds that schools should control these nonfinancial inputs.

Others suggest different means of intervention. Vouchers and tax credits have been promoted. House Bill 1783, currently being debated in the Missouri legislature, would allow individuals and corporations to contribute money to organizations that provide educational scholarships to eligible students in the St. Louis, Kansas City, and Wellston school districts to attend the public or non-public school of their parent's choice. The proposed legislation is being opposed vigorously by such organizations as the Missouri School Boards' Association and the Missouri Federation of Teachers, who, in part, take the position that there is no "unbiased" empirical evidence that tuition scholarship tax credit programs improve student achievement. On the other hand, two studies by Harvard researchers, one by Caroline Hoxby and another by Rajashri Chakrabarti, show that as a voucher program expanded in Milwaukee, there was a marked improvement in test scores at public schools most threatened by the program, that is, the ones with large numbers of low-income students eligible for the vouchers. Is there a good setting to understand these differences?

The current Missouri debate on House Bill 1783, the relative value of other interventions to reduce outcomes disparity, and other issues relating to a K-12 funding should be aired more often in this type of symposium where economists speak in nontechnical terms and educators and legislators

meet outside the adversarial context of legislative debate or the courtroom. The discipline and structure of sound economic thought helps set the table for useful legislative and legal debate in Missouri. And in all debate and dialogue on these issues, it must be stipulated that the student is the client—not the teacher, not the parent, not the administrator, not the school system. Learning from such dialogue can be shared in the larger context of the quantity and quality of schooling without being limited by the bias of the location or relative size or relative wealth or population or demographics of a particular district.



Editor's Introduction

Thomas A. Garrett

On June 29, 2005, the governor of Missouri signed into law Senate Bill 287 (SB287), which dramatically changed the way elementary and secondary public education is funded in the state of Missouri. Prior to the new law, the education finance formula in Missouri was a tax rate–driven formula: School districts that levied identical property tax rates would receive the same level of state funding. Disparities in school district wealth (and thus property tax revenue) would be offset with additional state funding. Over time, however, soaring property values in higher-income districts relative to lower-income districts and weakening state fiscal conditions placed pressure on this tax rate–driven formula. In addition, several lawsuits were filed that claimed the tax rate–driven formula was unconstitutional because it did not provide an adequate level of funding for low-income, arguably higher-need, school districts. SB287 moved school finance in Missouri from a system based on fairness (in terms of equal tax rates) to a system based on adequacy. Specifically, the new law provides a minimum level of spending to all districts (\$6,117 per student) and establishes that the state has the responsibility to ensure that all districts meet this minimum level of per-student expenditure, regardless of district tax effort.

Despite the new law, there is still much public and political debate over education finance in Missouri. Because SB287 will require, according to some estimates, roughly \$900 million in additional state spending over the next several years, the question of affordability arises. Other issues

such as teacher salaries, expenditures for students with special needs, and meeting requirements set forth by the No Child Left Behind Act are still at the forefront of the debate. Missouri is not alone in dealing with these issues, however—each state across the country shares in these challenges.

On November 4, 2005, the Federal Reserve Bank of St. Louis cohosted, with the Weidenbaum Center on the Economy, Government, and Public Policy at Washington University in St. Louis, a one-day symposium on public education finance: “Challenges to Public Education Financing Facing Missouri and the Nation.” The purpose of the symposium was to provide attendees with a non-technical description of the major issues surrounding school finance in Missouri and the nation.¹ To provide diversity of views and experiences, the symposium brought together nationally recognized academic scholars, state lawmakers, and public school officials. The symposium format consisted of presentations by academic scholars as well as several panel sessions involving school officials and state lawmakers. This issue of *Regional Economic Development* contains the proceedings from the symposium.

ALTERNATIVE EDUCATION FINANCE STRATEGIES

In the first paper of the symposium, Thomas Nechyba discusses two broad education finance

¹ More information on the symposium can be found at <http://research.stlouisfed.org/conferences/challengesconf/index.html>.

Thomas A. Garrett is a research officer at the Federal Reserve Bank of St. Louis.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 4-6.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

strategies: (i) traditional strategies that provide state funds to local districts and (ii) strategies that provide funds directly to parents. Nechyba argues that because traditional school expenditures are tied to local property values, this “pricing” of public schools often segregates students based on income and nonfinancial characteristics, such as student quality and home life. Thus, Nechyba argues that this latter strategy, while often ignored in the policy debate, is crucial because traditional strategies alone cannot correct for the unequal distribution of nonfinancial inputs across school districts.

Nechyba provides evidence that suggests that even if state financing completely equalized per-student expenditures across districts, unequal educational opportunities would still exist as a result of nonrandom sorting of nonfinancial inputs. The main point stressed by Nechyba is that the introduction of choice can eliminate some or all of the unequal distribution of nonfinancial inputs across schools. The predominant means of introducing choice is through private school voucher programs or grants that give parents and students a choice in where students attend school. Nechyba argues that a careful design of public school vouchers could also increase public school quality through greater competition. However, Nechyba is correct in pointing out that vouchers or grants are not without potential problems, each of which must be carefully considered before formulating new policy.

In his discussion, Ross Rubenstein points out several critical issues raised by Nechyba. First, school finance has focused predominately on ensuring adequate or equal resources across all districts. However, evidence suggests that there exist large interdistrict differences in resources and student and teacher quality. Thus, school finance policies and formulas should also focus on addressing these interdistrict differences. Second, although there exist numerous state and federal grant programs and tax credits that provide more choice to students in higher education, such programs for K-12 education are often vilified. Rubenstein argues that K-12 policy officials could learn important lessons from the design of higher education financing programs. Finally, Rubenstein discusses several problems that may arise from vouchers or grant programs.

Equal grants to all parents may dissuade school districts from enrolling the students who are most costly to educate, thus leaving special needs students more isolated. Unequal grants raise the question of which families should receive more funding and which should receive less. In addition, determining the appropriate level of grant funding for each family poses a difficult challenge.

K-12 PUBLIC SCHOOL FINANCE IN MISSOURI

Michael Podgursky and Matthew Springer provide a historical perspective of public school finance in Missouri. They first discuss previous education finance formulas and laws in Missouri. In particular, they discuss the details of the school finance formula that existed prior to SB287. They then present statistics on student quality and district expenditures per student, for school districts both in Missouri and across the United States. From this data analysis, Podgursky and Springer conclude that expenditures per student in Missouri are very close to the national average.

Podgursky and Springer also compare funding under SB287 with funding under past formulas. SB287 states that there is a minimal, or “adequate,” level of funding required to educate a student and it is the state’s responsibility to ensure that each district spends this minimal level for each student. Podgursky and Springer also discuss several other changes that occurred with SB287, such as cost-of-living adjustments and modifications based on student poverty thresholds. Their paper concludes with a general concern for the new adequacy-based system. Specifically, the new formula under SB287 implies that student funding and performance are linked. That is, because there is a direct link between expenditures and performance, school officials can thus chose a level of student achievement and measure the level of spending needed to reach that level of achievement. As Podgursky and Springer point out, however, research has not established a definitive relationship between spending and student performance, and their analysis of data from Missouri school districts reveals no relationship between spending and student performance.

SCHOOL ACCOUNTABILITY AND STUDENT PERFORMANCE

Eric Hanushek and Margaret Raymond present a nontechnical overview of research on state accountability of public education performance. One objective of their paper is to predict the likely effects of the No Child Left Behind Act. They use statistics to highlight the importance of accountability and show a positive relationship between the human capital (e.g., education and skills) of an individual and his or her earnings. After establishing that schooling does matter, they cite previous research and present statistics, both national and international, that reveal there is little relationship between expenditures per student and student quality. Given this lack of evidence between levels of funding and quality, Hanushek and Raymond argue that student quality can improve only as a result of increased accountability.

Hanushek and Raymond provide a general description of accountability systems, including two important components of such systems: (i) consistent performance measures and (ii) consequences (e.g., reduced funding) for unacceptable performance that are similar across districts. Hanushek and Raymond argue that both components must exist. To support their argument, they present data that suggest that states with stronger consequences for poor student performance had much greater improvements in student quality. Hanushek and Raymond conclude with an overview of how accountability systems should be designed.

In his discussion, Steven Rivkin raises several important issues concerning the interpretation of the relationship between earnings and school quality, such as measurement error and accounting for inherent student characteristics, including work effort and talent. Rivkin argues that any accountability system must measure quality or quality gained rather than simply the skills students bring into the classroom. He also suggests that the strong relationship between accountability systems and achievement might not be reflective of the average student because state achievement tests focus on less-advanced skills, thus making it more likely that the tests predominately capture quality changes in students from lower-income districts.

COMMENTARY

In addition to the three academic papers, two panel sessions were also held during the symposium. Four superintendents from Missouri public schools, two from rural districts and two from urban districts, participated in the first panel session. Several of the superintendents discussed how SB287 will affect their district; others offered their opinions on how public education should be financed in Missouri. Comments from two of the superintendents are printed in this volume.

The last session of the day consisted of a panel of Missouri state legislators and a representative from the governor's office. Two Democratic legislators, two Republican legislators, and an official from the Missouri Department of Elementary and Secondary Education (DESE) offered their views on education finance in Missouri. The panel session provided the audience an opportunity to understand the highly political nature of education finance in Missouri. Statements from two of the legislators as well as the DESE official are provided in this volume.

ACKNOWLEDGMENTS

I thank the authors, discussants, and panelists who helped put this conference volume together, as well as the managing editor, George Fortier, and his staff, Lydia Johnson and Donna Stiller, for their fine work on this issue of the journal. I also thank the Weidenbaum Center at Washington University in St. Louis for their professional partnership in organizing this event. A special thanks to Melinda Warren at the Weidenbaum Center for her hard work and careful attention to detail.



Alternative Education Finance Strategies

Thomas J. Nechyba

Differences in the formulas states use to fund education account for some of the equity issues in education finance. But the implicit pricing of public school access through housing markets plays a much larger role by rationing valuable nonfinancial inputs into schools that are disproportionately attended by children from higher-income households. This paper then considers two broad categories of state finance policies: those that channel funds to traditional local public schools and those that instead channel such funds to parents or school entrepreneurs. Both types of policies can be targeted in various ways to address equity concerns related to financial school inputs, but the latter allows for a greater severing of the link between school access and housing markets and thus opens a way for addressing inequities in nonfinancial input allocations. The paper concludes that state policies should aim at a greater balance between the two types of state aid.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 7-27.

Education finance policies affect the incentives of a variety of different individuals, which implies that a thorough analysis of trade-offs faced by policymakers must be rooted in an understanding of how individual responses to incentives shape policy outcomes. In this paper, I will consider two broad categories of state finance strategies: traditional strategies based on providing state aid to local public school districts and more recent strategies based on providing aid directly to parents. Understanding the potential impacts of these different strategies must first and foremost be based on a realistic assessment of the economic forces that shape our current mix of public and private school systems. Although the large inequities within the public system in the United States are widely recognized, the underlying root causes are often caricatured as deriving primarily from unequal levels of financing of public schools due to excessive reliance on local sources of funding. I will

argue that, while unequal funding is part of the story, a deeper underlying root cause for the current inequities arises from the fact that public schools—just like private schools—are “priced.” For public schools, such pricing emerges through housing markets that fundamentally limit choice disproportionately for disadvantaged families who, as a result, end up in the worst public schools. The “quasi-public” nature of public schools that emerges from this pricing then implies unequal distributions of *nonfinancial inputs* into public schools—implying that equalization of *financial* resources cannot be expected to result in equalization of educational opportunities.

State finance strategies that are aimed mainly at equalizing financial inputs into public schools are thus limited in the degree to which they can address the root causes of inequities in public school systems. Using a model developed over the past decade and calibrated to real-world data, I will argue that such strategies do not fundamentally

Thomas J. Nechyba is the Fuchsberg-Levine Family Professor of Economics at Duke University and a research associate at the National Bureau of Economic Research.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

alter the distribution of nonfinancial inputs, which are rationed by housing markets that produce systematically different levels of nonfinancial inputs in different public school districts and neighborhoods by “bundling” school and housing choices. State finance strategies that aim aid directly at parents have the potential to “unbundle” housing and schooling decisions—thus addressing the root cause of inequities more directly through the introduction of choice for disadvantaged families. Although such strategies unambiguously result in a reduction in residential segregation, the degree to which they produce greater educational opportunities depends on assumptions one makes regarding the nature of private school competition—and the way in which such strategies are targeted and designed. The potential of such strategies to address root causes of current inequities more directly, however, implies that future reforms of state financing of education will likely have to involve a greater balance between strategies that target aid to schools and strategies that target aid to parents. Such reform has the potential to not only help increase educational opportunities but also address some of the fiscal challenges of urban areas in some parts of the United States.

Section 1 begins with an overview of some of the central challenges faced by education finance policymakers, suggesting that close attention to how policy affects the distribution of households across schools is central to sound education policy. Section 2 then provides a conceptual overview of the economic root causes of inequities in public education, drawing in part on previous simulation work to determine the magnitudes of competing effects. In Section 3, I discuss the potential for traditional school finance strategies to narrow inequities within the public system while maintaining incentives for efficient decisionmaking. Section 4 proposes a conceptually different way of thinking about state education finance policy, focusing state aid more directly on parents rather than school districts. Finally, Section 5 concludes with some thoughts on how education finance policy might benefit both schools and cities if the alternative strategies discussed in the previous two sections were applied in a more balanced way.

THE COMPLEXITIES OF EDUCATION FINANCE POLICY

Education policy unfolds within a complex economic environment in which multiple actors make choices that shape the observable outcomes of policy. Some of these actors are *directly* or *intentionally* affected by the incentives contained in the policy and others are only *indirectly* and often *unintentionally* affected. Predicting the outcome of policy changes must therefore involve an analysis of how changing incentives aggregate, moving the economic environment from its pre-intervention equilibrium to a new equilibrium in which all actors do the best they can given their changed circumstances. Much of what makes education policy challenging, then, derives from the multiple channels through which changes in behavior may influence the ultimate outcomes we observe.

Whose Behavior Might Change?

It is natural to think first of those individuals in the economy who are directly affected by changes in education finance policies.

Local governments and school officials (including teachers), for instance, pay close attention to the ways in which higher-level governments structure aid, with increasing empirical evidence suggesting responses to even small changes in policy.¹ Their motivation derives in part from local voter preferences and in part from incentives within local bureaucracies that favor “gaming” the system to maximize revenue.

Local voters may also internalize policy changes, extending greater or less support to local schools depending on incentives contained within school finance formulas. Some voters—in particular, those with children—might pay close attention to how their voting choices affect local public schools, while others might be more concerned about the impact of such changes on local property values. Among the latter, renters face different incentives than homeowners, with homeowners concerned

¹ Various recent empirical papers suggest that school officials respond directly to changing incentives in both financing and accountability rules. See, for instance, Cullen (2003), Cullen and Reback (2002), Figlio and Winicki (forthcoming), Figlio and Getzler (2002), Jacob (2005), and Jacob and Levitt (2003).

about protecting their wealth, which is typically concentrated disproportionately in their housing investments.²

In addition, parents face choices within a local economy—ranging from whether to send children to public or private schools, whether to live in “better” or “worse” school or neighborhood districts within the local economy, and how much effort to put into monitoring local schools and investing in their children’s education at home.³ And children themselves may change their behavior depending on how school policy affects their peer environment and their parents’ level of involvement.⁴

School entrepreneurs, both inside and outside the public system, determine how much effort to invest in employing innovative new strategies and whether or not to set up new private, charter, or magnet schools.⁵ School policy might even impact how land developers and landlords determine where to build new housing and whether to invest in renovating older housing within a local economy—all depending on how school policy affects demand for different types of housing in different areas.

The Need for Non-Price Rationing in School Markets

In equilibrium, all of these actors seek to do the best they can, given what others are doing and how others’ behavior affects their own economic circumstances. In the end, *something* determines which students end up in which school, which teachers teach in which classrooms, what resources teachers and school officials have available to them,

and how this translates to the delivery of school services to different households. This point is far from trivial. In a typical economic market—say, for instance, the car market—the equilibrium rationing mechanism is straightforwardly governed by market prices. Individuals who like expensive cars and have the resources to buy them end up with expensive cars, whereas those who place less value on car services and those whose resources are more limited end up with lower-end car models. As conditions affecting the car market change—for instance, as gasoline prices increase or as governments introduce different forms of environmental regulations—prices adjust as both demand and supply for different car models change. A new equilibrium then emerges with potentially different allocations of cars to individuals—all rationed by the price mechanism.

School policy is challenging in large part because the rationing mechanisms are more subtle than they are in car markets. Public schools are nominally “free” in the sense that no tuition prices govern who has access to such schools. If this were the end of the story, public school quality would have to equalize across all public schools as no parent—regardless of how much or how little she values school quality—would ever choose an inferior school. Public school quality in the real world is not, of course, equal across all schools, which must mean that there exist other non-tuition rationing mechanisms that cause some parents to end up sending their children to bad public schools while others send their children to good public schools. Similarly, teacher salaries are often controlled by rigid salary scales—implying that there must exist non-wage rationing mechanisms that determine where good teachers and bad teachers end up within the public system. In private school markets, more explicit price rationing is possible as private schools set private school tuitions. But such schools might supplement price rationing with other mechanisms, using, for instance, admissions policies to screen applicants.

Similar non-market factors play a role in determining what level of financial resources different schools have available to them. In car markets, the level of investment undertaken by car manufacturers is determined by profit considerations, with

² Recent work on voting in California suggests the importance of property value considerations for homeowners (Brunner, Thayer, and Sonstelie, 2001; Brunner and Sonstelie, 2003). Fischel (2001) provides a broad overview of the connection between home values and local government behavior.

³ The evidence on parental choices about schools is most rooted in a long empirical literature (starting with Oates, 1969) documenting the capitalization of school quality into property values.

⁴ Harris (1998) documents a substantial psychology literature suggesting such peer influences, and Cooley (2005) models such peer-related behavioral changes in an empirical framework.

⁵ Private school markets have demonstrated an ability to respond relatively quickly to changes in economic circumstances, as evidenced (for instance) by the quick emergence of new private schools in California in the late 1970s (Downes and Greenstein, 1996).

manufacturers considering whether additional investments in improving cars will result in more or less profit given what they know about consumer demand. Funding for public schools, on the other hand, is driven by political markets, with voters and interest groups ultimately determining how much is invested where—and with the set of voters determined by decisions made in housing markets. Private schools must operate more like car manufacturers in that they can afford additional investments in schools only to the extent to which parents (or charitable contributors) are willing to pay for such investments.

The Role of Equilibrium Non-Price Rationing

Ultimately, whether governed by market prices or non-price mechanisms, an equilibrium is characterized by supply equaling demand in school markets and housing markets—and by voter preferences being aggregated through some voting mechanism. But the process by which supply becomes equal to demand is crucial for understanding how policy can affect equilibrium outcomes.

I will argue that, in most U.S. contexts, the most important rationing mechanism within the public system is generated by the close link of housing and school markets. Typically, the right to access a particular public school is given to those who reside within politically drawn geographic boundaries that define attendance zones associated with each public school. If I want my child to access public school A, the best way to ensure such access is by purchasing or renting a residence within the attendance zone of that school. Over three decades of empirical work has now conclusively established that housing markets then “price” such access.⁶ Put differently, the “price” of attending a particular public school is incorporated into the cost of housing. Good schools are associated with considerably “inflated” housing prices, while bad schools are associated with “depressed” housing prices. In any given distribution of housing quality across school attendance zones, the housing market substitutes

for a public school tuition market by pricing or “rationing” access to most public schools.

In addition, it is important to recognize that housing quality is not randomly distributed across school attendance zones. Even if that were the case, housing price differences would ration access to schools. But, in addition, the distribution of housing within local economies arises not only from market forces but also from a combination of political factors that govern both the drawing of attendance zone boundaries and zoning regulations that set minimum housing quality in different neighborhoods. As a result, good public schools tend to reside within attendance zones in which there exist disproportionately high levels of high-quality housing; moreover, all housing prices in that zone are higher than prices for equivalent-quality housing in attendance zones with bad public schools. The combination of housing price differentials for equal quality housing *and* differences in housing quality distributions then rations who will attend which school within the public system.

This rationing mechanism is sometimes supplemented by other forms of rationing. Charter and magnet schools, for instance, are often not as explicitly linked to geographic attendance zones—with some form of lottery system or merit-based admissions resolving instances of excess demand. In some “open enrollment” districts, attendance zones grant immediate rights of access to particular schools but parents may apply to attend schools outside their attendance zone conditional on available space within the school of interest. In such instances, commuting costs to schools as well as lottery systems that ration limited space in desirable schools might ration who transfers out of their local attendance zone. And private schools, as already noted, may combine explicit price rationing through tuition policies with other forms of screening mechanisms of applicants.

The labor markets for teachers and other school officials are subject to similar rationing considerations. To the extent to which wage differences across schools are constrained by government or union policies, again *something* else determines where teachers are assigned. Within a large public school district, for instance, good teachers may be compensated not by disproportionately high wages

⁶ This work began with Oates (1969) and is summarized in Epple and Nechyba (2004).

but rather by “better” assignments to schools and classes with fewer challenges.⁷ Even within schools, quality differences between teachers or tracks require some rationing mechanism that allocates students to classrooms.

Implications of Rationing for “Peer Quality” Inputs to School Quality

The reason why the “rationing” mechanism of students into schools and teachers into classrooms is so important is that it has direct implications for the nonfinancial set of inputs into school production that I will broadly call “peer inputs.” By peer inputs, I mean any nonfinancial input that has some correlation to characteristics of households. Peers themselves may affect each other’s educational experience—implying that nonrandom assignment of peers into schools will result in different school qualities even if all financial inputs are identical. Similarly, the nonrandom selection of parents into schools is likely to have an impact on school quality, with some parents providing greater human capital at home and paying systematically more attention to monitoring what happens in schools and disciplining how school resources are used. And teacher assignments are likely to favor children whose parents monitor schools more closely and whose children are viewed as “easier” to educate. The characteristics of households that attend a particular school may therefore shape school quality through multiple channels, and the rationing mechanism used to allocate households to schools determines the quality of nonfinancial inputs.

QUASI-PUBLIC AND PRIVATE SCHOOLS WITHIN A LOCAL ECONOMY

Public schools are often held up as an ideal that delivers equal opportunity to quality education for all children while internalizing important societal goals that would be absent in a private school system. Since access to private schools is priced, it is natural to assume that purely private

school markets would exhibit segregation by economic class (and potentially by race to the extent to which class correlates with race and the extent to which parents have preferences biased against particular racial or ethnic groups). The public school ideal holds out the hope that this can be avoided through publicly funded “free” schools that admit all. Furthermore, schools may perform important functions, such as building respect for diversity that forms the foundation for a more harmoniously functioning political climate when children become voters. However, even parents who care about living in a well-functioning society may discount this role of schools for their particular children in favor of emphasizing the building of marketable human capital that can more directly benefit their children. Private schools, it is argued, therefore do not have sufficient incentive to internalize these larger societal goals, whereas the public school ideal holds out hope that it can, through the political process, accomplish such goals more effectively.

Although it is difficult to quarrel with the public school ideal of equal opportunity for all and an appropriate internalization of societal aims, it is crucial to recognize that the structure of the public system in the United States is in many ways set up much more like a private system; thus, the public system is far from being optimally positioned to implement the public school ideal. It is therefore worthwhile to consider briefly how the public system in the United States might more aptly be characterized as a *quasi-public* system that contains the element of taxpayer financing shared with a public system but also the pricing or rationing mechanism of a private system that does not explicitly aim for the public school ideal.

Quasi-Pricing of Public Schools and Inequities in Public Education

It is no secret that public school quality varies greatly within local economies, with public school quality directly related to the income of parents—and with most states having experienced legal challenges to public school financing systems as a result. Because legal challenges have been based largely on observed per-pupil spending differences, the policy discussion emerging from these court

⁷ See, for instance, Loeb and Page (2000).

cases has focused primarily on the role of local financing of public schools.

It is certainly true that, to the extent to which marginal funding for schools comes from local tax bases, spending inequities across public schools can be linked directly to local funding. It does not follow, however, that local funding of schools is the only—or even the primary—reason for differences in school quality. In fact, a long literature on the role of financial resources in public education has cast doubt on the extent to which such funding differences play a large role in undermining the public school ideal of equal opportunity for all.⁸

A fuller appreciation of the root causes of inequities in public education emerges from a fuller appreciation of the role of quasi-public pricing of schools. Suppose, for instance, schools were in fact equally funded but inputs such as teacher and peer (and parental input) quality play a large role in shaping schools. Teacher-rationing mechanisms are likely to place good teachers in schools with students who have higher socioeconomic status (SES) (i.e., those viewed as “easier” to teach), and parents who have the resources to invest in their children outside school and thus create positive peer characteristics are likely to live in higher-income neighborhoods. Thus, multiple channels exist through which public school quality differences can emerge, even in the absence of funding differences; and these quality differences will be priced in housing markets as discussed in the previous section. Differences in household income will then lead to higher-income households enrolling their children in better public schools through the quasi-pricing in housing markets.

Inequities in public education may therefore arise in part from a history of local financing of public schools, but increasing evidence suggests that it is primarily due to larger economic forces within urban and suburban economies that are tightly linked to differential access to schools and the resulting nonrandom assignments of parents, students, and teachers, which in turn results in unequal levels of nonfinancial inputs. The quasi-pricing of public schools through housing markets implies that the very type of school segregation

feared under a private system is, at least to some degree, present in the quasi-public system.

Private Schools in a Quasi-Public System

We can then think about the role played by private schools in local economies characterized by quasi-public school systems. Recall that such systems lead to substantial distortions of prices in housing markets—with a premium added to housing prices in good school districts beyond housing (and neighborhood) characteristics, and an analogous reduction in housing prices in poor school districts. For private schools, this opens a potential competitive advantage over quasi-public schools since private schools do not ration access by drawing geographical attendance zones. In essence, the distortions of housing prices arising from the quasi-public nature of public schools create incentives for private school entrepreneurs to open schools in areas with depressed housing prices (i.e., in poorer areas) because this will then permit parents to “unbundle” their housing choice from their school quality choice and take advantage of “bargains” in the housing market.

Of course this unbundling is not the only competitive advantage enjoyed by private schools. Private schools may be more “efficient” in the sense of producing more quality per dollar; they may be able to *horizontally differentiate* themselves by offering different pedagogical approaches aimed at particular types of students; and they may be able to “cream skim” good peers from public schools and thus create “high peer quality” schools by rationing entry into the school by means other than tuition policies (Nechyba, 2005). Regardless of which other competitive advantages such schools exploit, however, the quasi-public nature of public schools linked to housing markets creates an incentive for private schools to emerge in lower-income areas—or at least areas where average income is below the average income of private school attendees.

Quasi-Public Schools, Private Schools, and Residential Segregation

While the quasi-pricing of public schools through housing markets therefore introduces a *segregating* force into local economies, the ability

⁸ See, for instance, Hanushek (1999).

Table 1
The Role of Quasi-Public School Pricing in Local Economies

Private schools allowed	Public school financing	Average district income			Average district property value		
		Low-income district	Middle-income district	High-income district	Low-income district	Middle-income district	High-income district
Yes	None	\$25,700	\$50,175	\$67,325	\$158,327	\$227,189	\$266,474
No	Local property tax	\$17,628	\$39,647	\$85,925	\$101,683	\$204,075	\$392,402
	State income tax	\$19,875	\$42,250	\$81,075	\$102,086	\$220,725	\$387,549
Yes	Local property tax	\$29,725	\$50,262	\$63,212	\$123,224	\$211,729	\$294,825
	State income tax	\$29,891	\$51,309	\$62,000	\$118,486	\$226,345	\$316,308

NOTE: Dollar values are expressed in 1990 dollars.

SOURCE: Nechyba (2003b,d and 2004).

of private schools to de-couple housing from schooling choices introduces a *desegregating* force. This is not to say that such schools will necessarily be, in themselves, more integrated than public schools; rather, even if private schools appeal to a homogeneous clientele and thus segregate certain types of students coming from the quasi-public school system, this nevertheless reduces *residential* segregation and with it the housing price dispersion created by the link of housing to quasi-public schools.

To give some indication of how important the bundling of public schools and housing markets is—and what role private schools might be playing in such an economic environment—I have formulated a general equilibrium model with multiple school districts; a competitive private school market that has the ability to “cream skim” good peers from public schools; and a housing market with (i) different mixes of housing qualities in different districts and (ii) residents/voters that face different economic circumstances.⁹ In Nechyba (2003b), this model is calibrated to New Jersey data on households, housing markets, and public school spending records. With the appropriate New Jersey system of school finance modeled as a baseline, this model successfully replicates important features of the data—such as distributions of income and housing prices

across school districts, observed spending patterns in public schools, and appropriate levels of private school activity.¹⁰ I will repeatedly refer to simulation results from this model (which is also applied in Nechyba, 2003c) and begin in Table 1 by reporting some hypothetical experiments to illustrate the importance of the interaction of private and quasi-public schools.

The first row of Table 1 reports simulation results from the model *in the absence of public schools* and thus with no school-induced housing price distortions. The values in this row are therefore a benchmark for what housing prices and levels of income segregation one would expect simply given the housing (and neighborhood) quality distributions in the New Jersey data. The next two rows of the table then simulate the functioning of a quasi-public school market *in the absence of private schools* under either strictly local or strictly state (equalized) funding. Regardless of how public schools are funded, whether entirely through local tax bases or equally through state funding, the model predicts stark increases in residential income segregation and a substantial increase in the inter-district variance of housing prices. Finally, the last

⁹ This model was first presented in Nechyba (1999), further developed in Nechyba (2000), and presented in a less technical form in Nechyba (2003a).

¹⁰ The base model assumes that private schools, in addition to locational advantages discussed above, seek to select attractive peer groups and thus engage in “cream skimming” of good peers from public schools. Alternative versions of the model include other types of private school advantages with little change in the prediction of how policy affects local economic environments.

two rows of the table introduce private school markets into the quasi-public school environment. Although housing prices across districts still capitalize local public school quality, housing values in poor districts rise as private schools allow residents there to de-couple their housing and schooling choices. More remarkable, however, is the substantial narrowing of residential income segregation resulting from the introduction of a private school market, with less segregation than would exist were there no school-induced price distortions at all (as in row 1). This effect is due to the fact that, given the negative capitalization of poor public schools into housing values, households with children enrolled in private schools (whose income tends to be larger than the average income of the poor districts) have an added incentive to reside in higher-quality housing within the poor district.

After providing this background of how quasi-public and private school markets interact, I am now ready to discuss two conceptually different types of school finance policies. The first, labeled “Strategy 1” in the next section, is aimed at achieving greater funding equity within the quasi-public system through differential aid based on local characteristics. The second, labeled “Strategy 2” in Section 4, instead aims aid directly at parents to increase “choice,” particularly for those households whose choices are limited given the quasi-public school rationing mechanism that is in place.

STRATEGY I: EQUALIZING PUBLIC SCHOOL RESOURCES

The first broad category of school finance strategies is focused on finding ways of achieving greater equity in terms of per-pupil resources within the quasi-public school sector. Most state policy debates over the past few decades essentially are debates about the effectiveness of different ways of accomplishing such equalization, with attempts to balance local discretion with state equity goals. The distinguishing characteristic of this class of strategies is that it tacitly assumes funding differences lie at the base of observed inequities—and consequently focuses on providing additional financial resources to financially disadvantaged schools.

Within this class of school finance strategies, one can distinguish between a variety of different conceptual approaches. First, state aid may come in the form of *block grants* based on the underlying characteristics of a school district, or it may come in the form of *matching grants* that depend on local tax effort, with the match rate determined by the underlying characteristics of a school district. Second, state finance policies may or may not place limits on the degree to which local districts can supplement state aid through local revenues beyond some predetermined amount. Put differently, a key feature of any combination of state financing strategies is the extent to which *marginal* school funding comes from state versus local sources. Finally, state aid to districts can vary in the degree to which it is targeted to particular characteristics of districts (such as low income).¹¹

I begin with two extreme cases: pure local and pure state funding. Under local financing, each dollar (including the marginal dollar) of spending is derived from local tax bases, whereas under state financing each dollar (including the marginal dollar) comes from a statewide tax. Given that higher-income districts pay more in state taxes, state funding implicitly transfers money from rich to poor districts.

The Limits of Equalization: Pure Local versus Pure State Funding

If per-pupil spending were the only input that mattered in education production, equalization of spending through state funding would eliminate inequities. In the presence of other “peer” inputs into education production, however, equalization of per-pupil spending eliminates inequities only to the extent to which current inequities arise from local and unequal financing. The challenge for predicting the impact of state equalization is then to merge theory and data in a way that permits us to quantify the different channels through which inequities are currently maintained within the public or quasi-public system.

The model first developed in Nechyba (1999) and extended in Nechyba (2000) and Ferreyra

¹¹ See, for instance, Hoxby (2001) for empirical evidence on the importance of these distinctions.

(2005) takes up this challenge by modeling school quality as a function of per-pupil financial resources *and* other factors broadly labeled as “peer effects.” As already noted earlier, by “peer effects” I mean not only the exogenous and endogenous effects peers have on one another in a school or a classroom,¹² but also other nonpriced inputs that are correlated with characteristics of peers. For instance, a student may be considered of “higher peer quality” if she has parents that invest in the public school by monitoring school performance or if she is the type of student who attracts good teachers in a system in which high-quality teachers are assigned to “better” classroom environments.

Within such a model, the structure of the model then has implications for how well private schools can compete with quasi-public schools and how housing prices within a local economy evolve. For now, let us assume that the primary competitive advantage of private schools (aside from permitting an unbundling of school and housing choices) derives from their ability to “select” peer groups. If the school production technology assumed in the model places “too much” weight on per-pupil financial resources, private schools then do not have a sufficient advantage to compete with quasi-public schools and housing markets do not incorporate empirically plausible levels of school capitalization. If, on the other hand, the model places “too much” weight on peer effects, quasi-public schools cannot compete with private schools—leading to an equilibrium dominated by empirically implausible levels of private school attendance.¹³ Thus, the structure of a general theoretical model of quasi-public and private school markets—when matched to important characteristics of the data—can place appropriate weights on the role of per-pupil financial resources and “peer effects.” Such weights may then be interpreted as actual weights in the school production function or as the weights valued by parents as they evaluate school quality.

¹² See Manski (1993) for the distinction between different types of peer effects and an exposition of the econometric difficulties of identifying them independently.

¹³ This result is due to the fact that the model assumes either that private schools can select peers or that such schools have other competitive advantages discussed in more detail in Nechyba (2005).

The empirically relevant versions of a theoretical model of quasi-public and private schools then place substantial weight on both per-pupil resources and peer effects; and, because of the weight on peer effects, equalization of per-pupil resources is limited to the extent that it can produce a substantial narrowing of public school inequities. Table 2 below reports results from such a model that compares the baseline result from the hybrid state/local system in New Jersey to results from the radically different choices of pure local public school financing and equalized state financing, again within a version of the model calibrated to be consistent with data from New Jersey.

The first row of the table illustrates the impact of the school financing formula used in the three sets of simulations: It shows that the per-pupil funding under a purely local system is over twice as high in the wealthy district as in the poor district, with per-pupil funding under the state-financed system fully equalized and the New Jersey hybrid system falling in between the extremes. The second row of the table, however, illustrates much less dramatic effects of school financing on nonfinancial inputs (i.e., peer composition) within quasi-public schools, resulting in a smaller narrowing of overall public school quality achieved through centralization of financing than one would expect from simply per-pupil spending effects. In addition, average per-pupil spending in the system falls under centralized financing for political economy reasons described in the literature predating this work.¹⁴ This implies that, although centralization is predicted to result in a narrowing of inequities within the public system, *average* school quality will suffer under full equalization as fewer financial resources flow into the system.

Private school attendance changes in somewhat subtle ways across the three systems, with the model predicting an overall decline in private school attendance under centralized financing.¹⁵

¹⁴ Sontelle and Silva (1995) illustrate that average spending levels (under majority rule voting) depend approximately on mean state income under local financing and on median state income under state financing. Given the skewed nature of state income distributions (also reflected in the calibrated model on which Table 2 is based), this implies greater average spending under local financing.

¹⁵ This is discussed in detail in Nechyba (2003c).

Table 2**The Limits of Equalization**

	Decentralized system plus N.J. state formula			Decentralized local property tax			Centralized state income tax		
	Low- income district	Middle- income district	High- income district	Low- income district	Middle- income district	High- income district	Low- income district	Middle- income district	High- income district
Per-pupil spending	\$6,652	\$7,910	\$8,621	\$5,000	\$7,326	\$10,215	\$7,195	\$7,195	\$7,195
Peer inputs	0.2684	0.4701	0.6521	0.2613	0.5142	0.6404	0.2826	0.5469	0.6470
School quality	0.4322	0.6178	0.7803	0.3674	0.6192	0.8183	0.4616	0.6316	0.6841
Average spending		\$7,753			\$7,731			\$7,195	
Average quality		0.6152			0.6204			0.5960	
District income	\$31,120	\$46,216	\$65,863	\$29,725	\$50,262	\$63,212	\$29,891	\$51,309	\$62,000
Property values	\$117,412	\$205,629	\$292,484	\$123,224	\$211,729	\$294,825	\$118,486	\$226,345	\$316,308
% Private	20%	22.5%	12.5%	30%	20%	10%	22.5%	17.5%	15%

NOTE: Dollar values are expressed in 1990 dollars.

SOURCE: Nechyba (2004).

Although the subtleties of how private school attendance changes across districts are not central to the purpose of this paper, it is important to note that the prediction that centralization results in a decline in private school attendance is somewhat at odds with the experience in California (which has come closest to fully equalizing per-pupil spending), where private school attendance increased after centralization of public school financing. This suggests that, in the real world (but not in the model), centralization results in additional declines in public school quality that are not captured by the structure of the model used here.

The main point of Table 2, however, is simply that, because school quality is determined only in part by per-pupil *financial* resources, there are limits to what school finance equalization can achieve and trade-offs emerge between average quality and the degree of inequity within the public system. The underlying economic forces that cause persistence of inequities even under full equalization can then be found in the combination of (i) the importance of nonfinancial inputs into education and (ii) the sorting of peers, parents, and teachers that is implied by the quasi-public nature of public school markets linked to local housing markets.

Block Grants with and without Local Funding

Most state finance systems contain elements of local financing supplemented by elements of state financing provided through some form of grant system in which block or “lump sum” grants may play a role. Equalized state financing is an extreme version of a block grant system in which local districts are not permitted to supplement state funds from local revenue sources. Less extreme versions might be differentially targeted to poorer districts and might permit local jurisdictions to supplement state funding through local tax sources.

The theory of block grants suggests that such grants—so long as they permit but do not require additional local financing—have little effect on per-pupil spending unless the block grants are sufficiently large to cause local districts to choose no additional spending. This is because districts can “undo” block grants by reducing their local funding levels. A sufficiently large universal block grant system that provides the same amount per pupil to all districts will then have a differentially large impact in poor districts, whose spending levels would be below the block grant level in the absence

of state financing.¹⁶ The empirical literature on block grants, however, suggests that local political institutions tend to function in such a way that they do not fully “undo” block grants by reducing local tax effort, implying that, although block grants have the greatest marginal impact in districts that would spend below the block grant level in the absence of intervention, such grants will have a significant positive impact on local spending even in districts where this is not the case.¹⁷

So long as block grants can be supplemented through local funds, it is unlikely that block grant systems can result in a greater narrowing of public school quality than could be achieved by full state equalization (which is equivalent to an equalized block grant system without allowing localities to supplement state funding). Consider, for instance, the equalized state system in Table 2, a system in which the state provides a \$7,195 per-pupil block grant to all quasi-public schools but prohibits additional marginal funding from local sources. Then suppose that that state maintains the block grant program but permits additional local funding. *If* the state can indeed maintain the same per-pupil block grant level, residents in the wealthiest district would choose to raise per-pupil funding by over \$2,000 but no district would lower its funding. Given relatively little change in peer quality under the two systems, this implies that school quality rises in the wealthier districts but does not fall in poorer districts when local funding is permitted to supplement state funding. Therefore, overall public school quality rises without quality falling in any districts. To the extent to which the state’s goal is to guarantee “adequacy” rather than “equity” of funding, this would suggest that permitting local jurisdictions to supplement state financing may be attractive.

However, the conclusion that it is desirable to allow local jurisdictions to supplement state funding may fail to hold if political forces can influence the level of the per-pupil block grant. If local tax sources cannot be used to finance local schools, then parents in high-income districts have an incen-

tive to vote for large block grants even though only a portion of their own tax payments will remain in their district. However, parents in wealthier districts would prefer to supplement the state block grants their district receives with local taxes, which would remain entirely within their local schools; the less attractive option for them would be to vote for high block grants funded by statewide taxes that are paid disproportionately by the wealthy. Thus, the political equilibrium changes when local jurisdictions are permitted to supplement state funds—with less support for block grants from those who have the high demand for public school spending. Consequently, public school spending in poor schools may erode when a policy of permitting local districts to supplement state funding is introduced into the state-equalized model shown in Table 2.

I am unaware of any serious modeling of this trade-off and can therefore offer only a conjecture about the degree to which political forces might undermine a block grant system when local jurisdictions are able to supplement state funding. In states with sufficiently strong judicial mandates for adequacy, such mandates impose a constraint on the degree to which higher-income households can vote to reduce block grants to rely more on local sources of revenues. When such mandates are sufficiently strong, one would expect that block grant systems would be maintained even as local supplements to state funding are permitted. To the extent that such mandates are not sufficiently strong, however, one might be concerned about allowing local jurisdictions to supplement state aid.

Matching Grants and District Power Equalization

Many state finance formulas have features that can be modeled as matching grants—grants that match local tax efforts in some relation to local economic conditions. Unlike block grants, matching grants affect per-pupil spending by reducing the *tax price* faced by local voters, giving rise to what economists refer to as powerful substitution effects that induce voters to make fundamentally different trade-offs—substituting away from other (private and public) spending and toward school spending. *District power equalization* represents a system of

¹⁶ Detailed simulation results are reported in Nechyba (2003c, 2004).

¹⁷ For an introduction to the literature on the “flypaper” effect, see Hines and Thaler (1995).

matching grants that sets matching rates in inverse proportion to local tax bases, giving larger tax price subsidies to poorer districts.

If matching grants are unrestricted, in the sense that there is no ceiling at which the match disappears, local jurisdictions will raise spending until the marginal value of an additional dollar of spending is equal to the amount that needs to be raised locally in order to generate a dollar of spending. Put differently, the marginal value of spending on schools will necessarily fall below the marginal cost. This raises clear efficiency concerns in light of the fact that efficient spending requires that the marginal cost and benefit of spending are equal to one another. As a result, unrestricted matching grants result in inefficiently high levels of spending unless there are externalities from spending on schools that are not taken into account by local voters and governments.¹⁸ In the absence of such externalities, this suggests that matching rates ought to be zero *on the margin*.

This is not, however, an argument against matching grants—only against *unrestricted* matching grants. Programs like district power equalization are motivated primarily by equity concerns that arise from the fact that local tax bases in quasi-public school systems differ dramatically and that equity or adequacy considerations can be addressed by essentially supplementing local tax efforts in poorer districts with state matches. Put differently, *equity* concerns may trump *efficiency* concerns in the design of matching aid.

A second consideration arises from the impact the grants themselves have on property values. An extreme version of district power equalization, for instance, might impose positive match rates in poorer districts and negative match rates in richer districts. In essence, such a system taxes local tax effort in districts with high tax bases and subsidizes local tax effort in districts with low tax bases. This will, however, necessarily imply that property values (and thus tax bases) in poor districts rise while property values (and thus tax bases) in richer districts fall. As a result, the potential exists for such extreme forms of district power equalization

to result in a convergence of property values that will in part unravel the intent of subsidizing spending in poor districts and taxing it in rich districts. The local public finance literature has not settled on a consistent view on how important this “unraveling” effect is; models such as the one used to generate simulations in our previous tables suggest modest effects, and some empirical evidence from actual district power equalization programs suggest much larger effects.¹⁹

The price effects from matching grants (combined with effects on property values) also have underappreciated implications for how much district power equalization is necessary to equalize spending across districts. It might seem initially intuitive, for instance, that a district power equalization program aimed at equalizing per-pupil spending should set matching rates in such a way as to allow every district to achieve the same level of spending with the same local tax rate. Such a program could in principle involve positive matching rates for poor districts and negative matching rates for rich districts, or it could involve positive matching rates for all districts, with disproportionately higher matches for poorer districts. In the former case, the district power equalization program can be revenue neutral by simply transferring from rich to poor districts, whereas in the latter case the program would have to be supplemented from general state revenue sources.

The intuition that such a system might lead to equality of per-pupil spending is, however, fundamentally flawed. Although the same local tax rate would result in the same level of spending, voters with similar tastes will implement very different tax rates in different districts because of the tax price incentives of the system. Empirically based simulations suggest that full district power equalization would in fact result in an inverse relationship of spending and community income, with the potential of large defections to private schools in rich districts.²⁰ Thus, state finance policies using

¹⁸ Such “externalities” would have to be of the type that creates spillover benefits across jurisdictions. These are treated in more detail in Epple and Nechyba (2004).

¹⁹ This was suggested in simulations by Inman and Rubinfeld (1979), and Hoxby and Kuziemko (2004) provide evidence related to Texas district power equalization. Nechyba (1996, 2004) suggests that, when housing markets are sufficiently settled, the effect might be small in magnitude.

²⁰ See, for instance, Feldstein (1975) and Nechyba (1996).

matching grants to try to achieve equality of spending across districts require substantially less dramatic district power equalization than our initial intuition might suggest.

Desirable Features of State Finance Policies Aimed at Greater Interdistrict Adequacy or Equity

Our discussion of state finance approaches began by distinguishing three key features of such approaches: (i) the mix of block versus matching grant features of the approach, (ii) the degree to which marginal spending derives from local sources, and (iii) the degree to which block or matching features of the system are targeted to underlying characteristics of local districts (such as local tax bases). Pure (equalized) state financing can be viewed as an extreme form of an equalized block grant that sets the local tax price for additional spending at infinity. Foundation aid systems based on block grants are less extreme in that they provide differential per-pupil block grants while (usually) permitting local jurisdictions to supplement funding from local tax sources, thus setting the marginal tax price to 1. District power equalization systems, on the other hand, rely on matching grants that, if unrestricted, set marginal local tax prices above or below 1 depending on whether matching rates for particular districts are positive or negative.

Efficiency considerations imply that marginal local tax prices (in the absence of certain types of externalities) should be set to 1. Put differently, in the absence of externalities, funding for schools should come from local sources *at the margin* to provide the right incentives for local voters and governments to ensure that the marginal value from additional spending is equal to its marginal cost. This implies that equalized state financing as well as unrestricted matching aid formulas are inherently inefficient in the absence of externalities that cross district boundaries.

Equity or adequacy considerations, however, imply that some form of state aid is necessary to ensure less variance in per-pupil spending. Block grant programs can achieve this by setting a minimum (“adequate”) level of per-pupil spending that is funded from state sources while permitting local jurisdictions to spend more from local sources at a

local tax price of 1. Matching grant programs can also accomplish this so long as match rates are zero at the margin. The price incentives of matching grants furthermore imply that, for any level of state expenditures, matching grant programs will induce greater levels of spending than block grant programs. Although the extent to which state aid programs affect local property values in ways that undermine the goals of adequacy or equity is still in question, it is important that capitalization of such policies into local property values become part of the general discussion of state aid programs in education. Finally, as suggested by our discussion of Table 2, it appears unlikely that state aid in any form will have substantial impacts on nonfinancial inputs into schools—causing little change in the “peer quality” input that is associated with non-random sorting of households into districts.

STRATEGY 2: “UNBUNDLING” THROUGH CHOICE

As discussed in the previous section, the typical state strategy for addressing adequacy or equity concerns in education is one that focuses on different ways of providing state aid to quasi-public school districts. Such strategies can be effective, as I have argued, at managing per-pupil spending in local districts in ways that can help substantially reduce the variance of per-pupil spending across districts. Table 2, however, suggests that such policies, even when fully equalizing per-pupil spending, encounter insurmountable difficulties in equalizing educational opportunities because of nonrandom sorting of nonfinancial inputs. And, as argued in Section 2, these difficulties are rooted in the quasi-public nature of schools combined with the importance of nonfinancial inputs into education (which I have broadly labeled “peer effects”). Put differently, the underlying economic forces within local economies and housing markets combined with the nature of education production necessarily result in unequal quasi-public schools that limit opportunities for children from poorer households.

One possible response to this is to move state finance systems beyond the goal of equalization of per-pupil spending and to explicitly recognize in

state aid programs that equality of opportunity in the public school system necessitates per-pupil spending levels that are *inversely* related to local income.²¹ Although such an approach might indeed result in a narrowing of school *quality* beyond what is predicted from equalization, it is doubtful that such a system would ever be politically feasible and stable or that higher-income parents would not defect in large numbers to private schools under such a system.

A second response to the limits of equalization is to fundamentally re-conceptualize the nature of state aid from a model that targets aid to districts to one that targets aid to parents. The logic behind such a re-conceptualization arises directly from the quasi-public nature of public schools and the economic forces that inherently limit access to educational opportunities along income lines. As argued in Section 2, access to public schools is not “free” but is priced through housing markets and shaped by historically and politically driven attendance zones across housing markets. Higher-income parents have their “choice” of public schools due to their ability to afford housing in all attendance zones, whereas lower-income parents have a substantially narrower choice set. Similarly, higher-income parents have access to private school markets that is much more limited for lower-income parents, especially those judged as “low peer quality” by private schools. At a fundamental level, state aid to districts does not address the restriction of choice imposed on poorer parents—and thus does not address the root economic cause of inequities in quasi-public systems.

This section will therefore explore the impact of introducing choice, particularly for lower-income parents, into a system that has fundamentally restricted such choice. In principle, aid can be channeled to parents in ways analogous to how it can be channeled to districts—in “block grants” through vouchers or tax credits, in “matching aid” through vouchers that require parental contributions (in terms of time or money), or through tax deductibility of private school tuition—in ways

that permit parents to supplement spending on the margin or ways that prohibit such supplemental spending and restrict schools to accept the voucher as payment for tuition. The fundamental difference in this section is that I consider state aid to parents rather than to school districts.

The “Unbundling” Effect of Aid to Parents: Targeting to Households versus Targeting to Communities under Private School Cream Skimming

Our discussion of Table 1 has already suggested the potentially powerful (residentially) desegregating forces introduced by the existence of private school markets in quasi-public school economies. The quasi-pricing of public schools, which depresses housing values in poor districts while inflating them in rich districts, provides dramatic incentives for households at the margin that enroll their children in private schools to locate in relatively poorer school districts. The introduction of aid to parents in the form of private school vouchers (or other types of choice programs that unbundle residential and school decisions) then simply enlarges the already desegregating impact of private schools.

Employing the same computational model (calibrated to New Jersey) as in the previous tables, Table 3 then illustrates the predicted impact of three different types of vouchers. In each case, let us assume that parents are permitted to add to the voucher amount as they pay private school tuition, and the voucher is given as a “block grant” to parents who use it to send their children to private schools. The first third of the table assumes that everyone is eligible for the voucher; the second assumes that the voucher is restricted to those residing in the poor district; and the third part of the table assumes the voucher is restricted to poor households (earning less than \$25,000 per year).²²

First, note that in the top portion of the table, vouchers are used primarily in the poor district for modest voucher amounts. Approximately one-third of the predicted effect arises from parents who resided in the poor district prior to the intro-

²¹ The fact that equalization addresses primarily issues of fiscal capacity but not those of fiscal need (which arises from the lower level of nonfinancial inputs in disadvantaged communities) has been understood for some time; see, for instance, Ladd (1976).

²² For greater detail on the assumptions behind results in Table 3, see Nechyba (2003c, 2004).

Table 3**Vouchers (under N.J. system) with Private School “Cream Skimming”**

Voucher amount	Percent in private schools			Average state spending	Ratio of District 3 to District 1 spending	Average public school quality	Ratio of District 3 to District 1 quality	Net cost of voucher
	Low-income district	Middle-income district	High-income district					
Universal voucher eligibility								
\$0	20%	22.5%	12.5%	\$7,753	1.296	0.6153	1.805	\$0
\$1,000	32.5%	22.5%	15%	\$7,725	1.207	0.6035	1.767	-\$175
\$2,500	40%	27.5%	22.5%	\$7,502	1.150	0.5645	1.716	-\$330
\$4,000	67.5%	40%	30%	\$6,914	1.556	0.4773	2.339	-\$753
\$5,000	100%	82.5%	32.5%	\$7,385	—	0.4220	—	-\$656
Eligibility restricted to District 1 residents								
\$0	20%	22.5%	12.5%	\$7,753	1.296	0.6153	1.805	\$0
\$1,000	35%	22.5%	12.5%	\$7,869	1.226	0.5971	1.698	-\$182
\$2,500	47.5%	30%	15%	\$7,695	1.197	0.5534	1.616	-\$614
\$4,000	82.5%	42.5%	15%	\$7,408	1.623	0.5019	2.460	-\$1,280
\$5,000	100%	47.5%	17.5%	\$7,430	—	0.5093	—	-\$1,321
Eligibility restricted to low-income households								
\$0	20%	22.5%	12.5%	\$7,753	1.296	0.6153	1.805	\$0
\$1,000	20%	22.5%	12.5%	\$7,753	1.296	0.6153	1.805	\$0
\$2,500	20%	22.5%	12.5%	\$7,753	1.296	0.6153	1.805	\$0
\$4,000	40%	22.5%	12.5%	\$7,899	1.264	0.6089	2.046	-\$140
\$5,000	67.5%	20%	10%	\$7,698	1.710	0.6121	2.783	-\$427

NOTE: Dollar values are expressed in 1990 dollars.

SOURCE: Nechyba (2003c, 2004).

duction of the voucher, whereas two-thirds of the effect is due to marginal households from the middle- and high-income district relocating to the better houses in the poor district to qualify for the voucher. Average spending in public schools declines somewhat but, for modest levels of the voucher, the ratio of spending in the rich district to the poor district also declines (as resources in the poor district’s public school are spread across fewer students while local tax bases increase). As the voucher amount increases and the local political equilibrium “tips,” however, this ratio increases because political support for public schools in the poor district declines. When the voucher rises to \$5,000 per pupil (in 1990 dollars), public schools in the poor district cease to exist.

Because the assumption in this table is that private schools engage in an extreme form of “cream skimming” the best students and parents from the public system, public school quality necessarily declines, although for modest voucher levels it declines more in wealthier districts than in the poor district (because the voucher is disproportionately used by parents from wealthier districts). The final column then calculates the per-family tax cost of publicly funded education, the sum of what is spent in public schools and the cost of the voucher system. Because parents are permitted to “top off” the voucher, their actual cost is higher even as the publicly incurred cost declines.

Next, consider the middle portion of the table in which voucher eligibility is restricted to only

those households that reside in the poorest district. Migration into the poor district by middle-income households now increases, causing “take-up” rates in the poor district to rise faster than in the top portion of the table. Because private schools attract clients mainly from this pool of new residents in the poor district, public schools in the other districts are affected primarily by the exit of high-quality peers, with overall spending in public schools changing less. Still, it is striking how similar the predicted effects from a universally available voucher (in the top portion of the table) are to those from a voucher targeted solely at the poor district (in the middle portion of the table). The reason for this is that, even when vouchers are universally available, those who take up the voucher have a strong incentive to move to housing in the poor district.

Finally, the lowest portion of the table considers targeting to low-income families as opposed to targeting to low-income districts. The predicted impact of such targeting differs dramatically because it does not give rise to the residential mobility effects that arise in the first two portions of the table. Targeting to low-income parents thus requires considerably higher voucher amounts for the voucher to affect the system in a significant way.

The Importance of Assumptions about Private Schools

So far, we have assumed that the primary competitive advantage of private schools derives from their ability to select students and thus isolate peer groups. This necessarily implies that public school quality *must* decline as private school markets are fostered through voucher policies, thus giving us the bleakest picture regarding the potential impact of such policies on public schools. The evidence on the extent to which private schools rely on this “cream skimming” advantage as their sole tool for attracting parents is, however, relatively weak. I therefore consider two alternative assumptions about private schools to highlight the potential for more positive impacts of competition on public schools.

Table 4 reports the impact of different levels of private school vouchers on public school quality in each of our three districts, with quality indexed by 100 for the middle-income district in the absence of vouchers. The top portion of the table continues

with the assumption of “cream skimming” as the primary tool used by private schools to compete against public schools (as in Table 3), illustrating once again the drop in public school quality in all districts as universally available vouchers are introduced. Note again that public school quality declines in all districts even as private schools appear primarily in the poor district—because private schools are “skimming the cream” from all public schools, not just those in the poor district.

The second and third parts of Table 4 then introduce two alternative assumptions about private schools. In the middle portion of the table, I assume that children with different “abilities” can be served better if pedagogical approaches can be tailored to their needs to the extent to which they are in classrooms with similar peers. Although private schools are still assumed to engage in *some* cream skimming, they also aim to fill market niches by offering different types of pedagogical approaches most suited to the needs of particular types of children.²³ Children that remain in the public schools then exhibit less variance in their characteristics, permitting public schools to also target their approaches more directly to student needs. The main conclusion from this exercise is that, as less deleterious motives for private schools are introduced together with an ability by public schools to become more effective under competition, the introduction of vouchers *can* lead to increases in public school quality in all districts.

The final portion of the table illustrates a similar conclusion from introducing yet a third private school advantage supported by some empirical evidence. Again, let us continue to assume that *some* of the private school advantage derives from cream skimming; however, private schools are also assumed to be more efficient at translating financial resources into school quality, whereas public schools become more efficient only when exposed to competition.²⁴ And, as in the middle portion of

²³ The simulations assume that approximately half of the private school advantage still derives from “cream skimming” and half derives from pedagogical targeting.

²⁴ The pedagogical targeting in the middle portion of the table can in fact be viewed as a special case of resource efficiency—with private schools being able to produce more quality with a given set of financial resources because they can target their curriculum to a narrower range of student types.

Table 4
Impact of (Universal Vouchers) Under Alternative Private School Assumptions

	Voucher amount				
	\$0	\$1,000	\$2,500	\$4,000	\$5,000
Public school quality*					
Cream skimming only					
Poor district	69.97	68.05	65.82	39.83	†
Middle district	100.00	98.80	89.43	78.93	44.59
Wealthy district	126.31	120.22	112.96	93.19	80.27
Cream skimming + pedagogical targeting					
Poor district	70.36	76.46	80.55	81.61	76.85
Middle district	100.00	101.52	104.96	105.99	101.55
Wealthy district	131.05	130.11	129.67	131.74	127.02
Cream skimming + competitive resource efficiency					
Poor district	65.72	67.42	69.81	71.08	71.74
Middle district	100.00	101.83	104.90	107.68	109.75
Wealthy district	124.64	126.96	128.23	131.24	132.59

NOTE: Dollar values are expressed in 1990 dollars. *Indexed to be equal to 100 in middle-income districts in the absence of vouchers.

†Public school ceased to exist.

SOURCE: Nechyba (2005).

the table, the simulations suggest that it is *possible* for public schools to improve in all districts under assumptions about private schools that are more favorable for such effects emerging.²⁵

The Robustness of Unbundling to Different Assumptions about Private Schools

Although the predicted impact of private school competition on public school quality therefore depends on the nature of private school competition (as illustrated in Table 4), the residential desegregation predicted by the model under greater private school activity is independent of what form private school competition takes. Put differently, under each of the scenarios considered in Table 4, the interdistrict variance of community income and housing prices narrows as private school-attending parents disproportionately choose to reside in

poorer districts as they take up vouchers and unbundle their school choice from their residential location choice.

Implications for Voucher Design

As suggested at the beginning of this section, state aid targeted to parents can, in principle, take different forms analogous to the forms state aid can take when targeted to districts. Thus, vouchers can in principle have “block grant” features (as in the tables reported above) or “matching grant” features (which would attract greater private resources into education due to the additional “price effect” discussed in Section 3). Vouchers, like aid to districts, can be designed to limit additional parent contribution by requiring that private schools accept vouchers as full payment for tuition, or they can (as in the tables above) permit households to “top off” vouchers. And vouchers can be targeted to households based on where they live (analogous to targeting state aid differentially to districts) and to household characteristics (analogous to making

²⁵ See Nechyba (2005) for more discussion of the assumptions that lead to better or worse public school performance.

state aid to districts dependent on the mix of household types in each district).

The main difference between state aid to districts and state aid to parents, however, is the inter-district and interschool mobility of aid under the latter system but not the former. When state aid to districts is dependent on the characteristics of households in each district (as when students with low SES or learning disabilities imply greater aid to the district), a household has an incentive to take into account the impact its residential location choice has on local schools because the money that accompanies the household is spread across all students in the public schools of the district. When such aid is provided directly to parents, however, the household is in control of the aid and can use it at whatever school it chooses, thus introducing the unbundling effect emphasized here.

Although this unbundling addresses the central limitations imposed on poorer households in quasi-public school economies, it also gives rise to a number of possible concerns. For instance, if diversity of student populations has important long-run social effects, for instance, will policies that foster greater segregation of student types into different schools create future social problems (even if such policies simultaneously foster greater residential desegregation)? Or, given that some parents are less likely to be engaged in their children's educational progress, will fostering greater choice lead some public schools to be composed almost entirely of students from relatively dysfunctional families? Would segregation of student types into more specialized schools improve quality through educational innovations targeted at the particular needs of different types of children, or will the segregation result in low-peer-quality students having even less educational opportunity than they do under the current quasi-public system?

Our discussion of the potential for unbundling of school and residential choices as a means to offer choice to those most disenfranchised in a quasi-public school system is not meant to minimize these concerns. Instead, our discussion of the quasi-public nature of public schools that bundle residential and school choices suggests that such concerns about the potential adverse effects of increasing choice should raise similar concerns

about public schools as they are presently designed—because their quasi-public character already implies a lack of diversity and a disproportionate concentration of children from more dysfunctional family backgrounds. The potential of private school choice to lessen *residential* segregation offers the possibility of greater integration within communities even as it suggests the possibility of greater segregation in schools. As illustrated in Table 4, greater segregation of student types can have positive or negative effects depending on the nature of private school competition and public school responses. Vouchers can, however, in principle be designed to address concerns about diversity by requiring such diversity in private schools that accept vouchers and by varying voucher amounts based on household and child characteristics.²⁶ And the introduction of greater private school choice for poorer parents must certainly be accompanied by a concerted effort to improve public schooling for those—particularly those in poor districts—whose parents do not exercise choice.

CONCLUSION: THINKING ABOUT CITIES AND SCHOOLS TOGETHER

It is well recognized that educational opportunities for children are currently quite dependent on the economic circumstances of parents. This paper argues that the economic root cause for this fact lies in the quasi-public nature of public education in most of the United States. Public schools are “public” in the sense that they are funded through taxpayer contributions; they are “quasi-public” in the sense that, while nominally “free,” access is implicitly priced through housing markets, thus limiting educational opportunities for poorer households whose choice of public school is typically limited to the worst schools in the public system. As a result, the public system whose ideal is equal opportunity for all children is one that disproportionately concentrates poorer households in worse schools. Furthermore, goals such as exposing children to diversity within public schools are, to the extent that they are realized, far

²⁶ Nechyba (2005) discusses implications for voucher design in more detail.

from the ideal often envisioned by public school proponents.

The inequities inherent in public education in the United States have been well recognized for decades, with increasing state efforts (often motivated by court challenges) to use state aid programs to reduce these inequities. The discussion in this paper suggests that, although state equalization programs can indeed ameliorate inequities to some extent, the quasi-public nature of schools combined with the importance of nonfinancial inputs into school production implies severe limits to how far such policies can go in achieving their aim of providing equal or even adequate educational opportunities for all. Although it is possible to distinguish between different types of traditional state aid programs in terms of their effectiveness at achieving greater equity, some important economic causes of existing inequities—rooted in residential segregation by income—remain intact.

Over the past decade, an alternative set of fiscal approaches has therefore emerged.²⁷ These can be broadly characterized as “choice-based” approaches that include both the introduction of greater choice within the public system and the introduction of greater incentives for private school formation through voucher policies. These approaches are aimed more directly at the economic root cause of inequities in public education, recognizing more explicitly the relative lack of school choice for disadvantaged families. The rise of charter schools, which permit parents to form publicly funded schools aside from traditional residence-based schools, is one such approach, whereas the emergence of publicly funded (private school) voucher programs is another. There is much we do not currently know about the potential systemic effects of such programs, as illustrated by our discussion of the very different predictions regarding the impact of such programs on traditional public school quality, depending on assumptions about the nature of school competition (Table 4). At the same time, economic models suggest that the unbundling of school and housing choices permitted under these approaches is likely to have pro-

found impacts on residential segregation.

Our discussion of the differences between district-based and parent-based education finance strategies highlights the importance of more explicitly recognizing the connection between how cities evolve and the educational opportunities they offer. In a public system in which access to public schools is residence-based, it is not possible to divorce the analysis of school finance policies from an understanding of how city and suburban neighborhoods are shaped. As was demonstrated in Section 3, achieving equality in school spending is far from achieving equality in educational opportunities when households are not randomly assigned to residential neighborhoods. Although state aid to traditional public schools, particularly those serving disadvantaged families, is surely an important aspect for any state effort to ensure greater educational opportunity for all, the fundamental economic forces that maintain inequities within traditional public schools require state fiscal policies to pay increasing attention to those economic forces. Thus, combining traditional state aid programs with parent-focused aid that increases choice for the disadvantaged can become an increasingly important component of state aid strategies, with the aim of increasing educational opportunities while addressing at the same time some of the economic challenges faced by cities (and suburbs) whose populations are too segregated along income lines.

REFERENCES

- Brunner, Eric and Sonstelie, Jon. “Homeowners, Property Values, and the Political Economy of School Vouchers.” *Journal of Urban Economics*, September 2003, 54(2), pp. 239-57.
- Brunner, Eric; Thayer, Mark and Sonstelie, Jon. “Capitalization and the Voucher: An Analysis of Precinct Returns from California’s Proposition 174.” *Journal of Urban Economics*, November 2001, 50(3), pp. 517-36.
- Cooly, Jane. “Desegregation and the Achievement Gap: Do Diverse Peers Help?” Working paper, Duke University, 2005.

²⁷ In addition to “fiscal” approaches, there has also been an increased emphasis on accountability systems that lie beyond the scope of this paper.

Nechyba

- Cullen, Julie. "The Impact of Fiscal Incentives on Student Disability Rates." *Journal of Public Economics*, August 2003, 87(7-8), pp. 1557-89.
- Cullen, Julie and Reback, Randall. "Tinkering Toward Accolades: School Gaming under a Performance Accountability System." Working paper, University of Michigan, 2002.
- Downes, Thomas and Greenstein, Shane. "Understanding the Supply Decision of Non-Profits: Modeling the Location of Private Schools." *Rand Journal of Economics*, Summer 1996, 27(2), pp. 365-90.
- Epple, Dennis and Nechyba, Thomas. "Fiscal Decentralization," in V. Henderson and Jacques Thisse, eds., *Handbook of Regional Economics*, Volume 4. Amsterdam: North Holland, 2004.
- Feldstein, Martin. "Wealth Neutrality and Local Choice in Public Education." *American Economic Review*, March 1975, 65(1), pp. 75-89.
- Ferreya, Marya. "Estimating Effects of Private School Vouchers in Multi-District Economies." Working paper, Carnegie Mellon University, 2005.
- Figlio, David and Getzler, Larry. "Accountability, Ability and Disability: Gaming the System." NBER Working Paper No. 9307, National Bureau of Economic Research, 2002.
- Figlio, David and Winicki, Joshua. "Food for Thought: The Effects of School Accountability Plans on School Nutrition." *Journal of Public Economics*, February 2005, 89(2-3), pp. 381-94.
- Fischel, William. *The Homevoter Hypothesis: How Home Values Influence Local Government Taxation, School Finance, and Land-Use Policies*. Cambridge, MA: Harvard University Press, 2001.
- Hanushek, Eric. "Some Findings from an Independent Investigation of the Tennessee STAR Experiment and from Other Investigations of Class Size Effects," Susan Mayer and Paul Peterson, eds., *Earnings and Learning: How Schools Matter*. Washington, DC: Brookings Institution, 1999.
- Harris, Judith. *The Nurture Assumption*. New York: The Free Press, 1998.
- Hines, James and Thaler, Richard. "The Flypaper Effect." *Journal of Economic Perspectives*, Autumn 1995, 9(4), pp. 217-26.
- Hoxby, Caroline. "All School Finance Equalizations are not Created Equal." *Quarterly Journal of Economics*, November 2001, 116(4), pp. 1189-231.
- Hoxby, Caroline and Kuziemko, Ilyanna. "Robin Hood and His Not-So-Merry Plan." NBER Working Paper No. 10722, National Bureau of Economic Research, 2004.
- Inman, Robert and Rubinfeld, Daniel. "The Judicial Pursuit of Local Fiscal Equity." *Harvard Law Review*, June 1979, 92(8), pp. 1662-750.
- Jacob, Brian. "Accountability, Incentives and Behavior: Evidence from School Reform in Chicago." *Journal of Public Economics*, June 2005, 89(5-6), pp. 761-96.
- Jacob, Brian and Levitt, Steven. "Rotten Apples: An Investigation of the Prevalence and Predictors of Teacher Cheating." *Quarterly Journal of Economics*, August 2003, 118(3), pp. 843-77.
- Ladd, Helen. "State-Wide Taxation of Commercial and Industrial Property for Education." *National Tax Journal*, March 1976, 29(2) pp. 143-53.
- Loeb, Susanna and Page, Marianne. "Examining the Link between Teacher Wages and Student Outcomes: The Importance of Alternative Labor Market Opportunities and Non-Pecuniary Variation." *Review of Economics and Statistics*, August 2000, 82(3), pp. 393-408.
- Manski, Charles. "Identification of Endogenous Social Effects: The Reflection Problem." *Review of Economic Studies*, July 1993, 60(3), pp. 531-42.
- Nechyba, Thomas. "A Computable General Equilibrium Model of Intergovernmental Aid." *Journal of Public Economics*, November 1996, 62(3), pp. 363-97.
- Nechyba, Thomas. "School Finance Induced Migration Patterns: The Impact of Private School Vouchers." *Journal of Public Economic Theory*, January 1999, 1(1), pp. 5-50.

- Nechyba, Thomas. "Mobility, Targeting and Private School Vouchers." *American Economic Review*, March 2000, 90(1), pp. 130-46.
- Nechyba, Thomas. "Introducing School Choice into Multi-District Public School Systems," in Caroline Hoxby, ed., *The Economics of School Choice*. Chicago: University of Chicago Press, 2003a.
- Nechyba, Thomas. "School Finance, Spatial Income Segregation and the Nature of Communities." *Journal of Urban Economics*, July 2003b, 54(1), pp. 61-88.
- Nechyba, Thomas. "Centralization, Fiscal Federalism and Private School Attendance." *International Economic Review*, February 2003c, 44(1), pp. 179-204.
- Nechyba, Thomas. "Public School Finance and Urban School Policy: General vs. Partial Equilibrium Analysis." *Brookings-Wharton Papers on Urban Affairs* 2003, 2003d, pp. 139-70.
- Nechyba, Thomas. "Prospects for Achieving Equity and Adequacy in Education: The Limits of State Aid in General Equilibrium," in John Yinger, ed., *Helping Children Left Behind*. Cambridge, MA: MIT Press, 2004.
- Nechyba, Thomas. "Mobilizing the Private Sector: A Theoretical Overview." Working paper, Duke University, 2005.
- Oates, Wallace. "The Effects of Property Taxation and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis." *Journal of Political Economy*, November-December 1969, 77(6), pp. 957-71.
- Sonstelie, Jon and Silva, Fabio. "Did Serrano Cause a Decline in School Spending?" *National Tax Journal*, June 1995, 48(2), pp. 199-215.



Discussion

Ross Rubenstein

The paper “Alternative Education Finance Strategies” by Thomas Nechyba (2006) examines issues often ignored in shaping and analyzing school finance policy—namely, the effects of behavioral responses to inter-governmental grants. To the extent that attention is paid to these behavioral responses, it is often limited to *school district* responses—that is, the ways in which school districts might alter taxing and spending policies in response to changes in income or prices brought about by changes in state funding formulas. The analyses in this paper, though, do not assume that policies operate in a vacuum or that district characteristics are static. Instead, the paper incorporates simulations of the resulting behavioral responses by families and the potential effects of these responses on school quality, segregation, and spending.

This paper makes a strong theoretical case for adopting a family-based funding system, and I believe that recent policy initiatives may inevitably move us in that direction in the future. For example, around the country we have seen bitter disputes over the amount of funding charter schools should receive for each student enrolled (see Vanourek, 2005, and Loh, 2005) because the systems currently in place are simply not designed to fund individual students. With direct aid to parents, of course, these funding mechanisms would be quite simple. The simulations in the paper also raise a number of important policy issues and questions that would need to be addressed to develop an effective family-based funding system.

WITHIN-DISTRICT DISPARITIES

Much of the attention in policy and litigation surrounding school finance has focused on school districts—specifically, to ensure adequate educational resources in all districts or equitable resources across districts. The implicit assumption in district-based averages is that all schools within the district receive the district’s average level of resources. Evidence accumulated in recent years, though, has shown that wide disparities in student characteristics, teacher characteristics, and resources exist at the school level, and these disparities may be as large as or even larger than those across districts. (See, for example, Stiefel, Rubenstein, and Schwartz, 2004, and Roza and Hill, 2004.) Moving from the current “quasi-public” system to one in which parents have more complete choice of schools could, in fact, reduce these disparities, but the effects are not entirely clear (and the simulations are not designed to model them). As the simulations show, a market-based system in which parents receive vouchers reduces disparities across wealthier and poorer districts as higher-income families move into poorer areas. An important supplement to this analysis would be to examine disparities in school quality within, as well as across, districts.

Although the sorting across districts may be largely related to the sorting of families and tax bases, sorting within districts may be more complex. An important assumption in such an analysis is how to model teacher sorting. Under a purely private system it may be safe to assume that teachers are subject to the same market forces as other profes-

Ross Rubenstein is an associate professor of public administration at the Maxwell School, Syracuse University.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 28-30.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

sions, with schools bidding for the services of teachers who would best match the school, within the school's budget constraint. If we assume more equalized spending across schools, this would require schools to make trade-offs between teacher quality and other school inputs, such as class size (assuming that higher-quality teachers receive higher salaries, on average). As Nechyba points out in the paper, public school teacher assignment is very different from the scenario just described. Instead, we typically find the most experienced and educated teachers sorting not only into the districts with the most advantaged students, but also into the schools with the most advantaged students within those districts. Seniority transfer rights and single salary schedules provide no incentives for teachers to teach in schools with greater needs. It is not clear whether school finance reform that doesn't address these intradistrict resource allocation mechanisms can truly equalize educational opportunities within school districts. This may not be a concern in small districts, but in large urban areas with many schools, for example St. Louis and its almost 100 schools, some level of equalization could occur between St. Louis and its suburbs but have relatively little effect on the poorest schools within St. Louis.

LESSONS FROM HIGHER EDUCATION

It is not uncommon for ideas that might be considered radical and politically untenable in K-12 education to be standard operating procedure in higher education. The idea of vouchers for elementary and secondary school students, with much more fluid competition among public and private providers, is an example of such an idea. Though not referred to as "vouchers," the federal and state governments provide an array of grants, scholarships, tax credits, and subsidized loans that follow students to any institution of higher learning, public or private, at which he or she chooses to enroll. While there are critical differences between higher education and elementary/secondary education, there may also be lessons to learn in the design of a K-12 state aid system targeted to parents.

First, depending on the structure of the system, we may not see the demise of public schools or even a dramatic reduction in their share of the market. Under our current system, approximately 10 percent of elementary and secondary school students are enrolled in private schools, whereas in higher education approximately 23 percent are enrolled in private institutions (National Center for Education Statistics, 2005). The effects of family-based aid, though, would likely depend on whether public schools continue to receive direct state or local subsidies that allow them to charge prices below the actual cost of providing educational services. Second, higher education is extremely stratified: An average of only 3 percent of students at the nation's most selective institutions come from the bottom income quartile; 74 percent of students at the most selective institutions come from the highest quartile (Carnevale and Rose, 2004). This stratification is evident even at many elite public institutions, despite their relatively low net prices. The causes of this inequality are complex, of course, but an important contributing factor is admission policies at elite schools that heavily weight standardized test scores (such as the SAT) along with other nonacademic factors, such as legacies and athletic ability (Bowen, Kurzweil, and Tobin, 2005). This suggests that if we hope to reduce segregation and stratification in elementary and secondary schools, a purely free market system that allows schools to choose the students they enroll, "cream skimming," as the paper describes, may do little to achieve this goal. At the same time, if a family-based funding system were successful at reducing inequalities in elementary and secondary education, it could also be a powerful force for reducing stratification in higher education as well.

THE DEVIL IS IN THE DETAILS

Although this statement is true to some extent for any public policy, the devil may be in the details when attempting to design a family-based aid system that maximizes benefits without creating unintended negative consequences. As the paper recognizes, determining which students or families should be targeted and how much funding such

Rubenstein

students should receive presents some of the most critical challenges in the design of such a system.

A simple “lump sum” grant of equal amount to all families is likely to exacerbate stratification because schools would face a strong disincentive to enroll the most costly-to-educate students. Grants of sufficient size for students with special needs could, though, lead to greater opportunities for such students as school entrepreneurs compete to offer high-quality specialized programs for such students. This raises two potential problems. First, such a system might inevitably lead to more isolation of students with special needs, a situation many advocates would consider unacceptable regardless of the quality of the programs. Second, how do we determine the appropriate grant level? Though a number of methods have been proposed, no broadly accepted methodology exists to determine the cost of educating various types of students (see Duncombe and Yinger, 2005, for a discussion of these methods). Moreover, we typically focus on the average costs of such students, but have little understanding of the marginal costs of educating the first student with a learning disability, for example, as compared with the twentieth. To unleash a robust and competitive market, the grants would need to be sufficiently high to bring entrepreneurs into the market willing to serve all students. At the same time, we can ill-afford to offer excessively high grants simply to guarantee that supply of schools.

In closing, I want to stress that these comments are not meant to suggest flaws in the logic or careful analysis presented in the paper, but simply to point out some of the other critical issues that these analyses raise. Ultimately, I am afraid I end with the stereotypical academic’s plea: the call for more research to help us better understand the important ramifications that these policy decisions have on children’s opportunities.

REFERENCES

- Carnevale, Anthony P. and Rose, Stephen J. “Socioeconomic Status, Race/Ethnicity, and Selective College Admissions,” in Richard D. Kahlenberg, ed., *America’s Untapped Resource: Low-Income Students in Higher Education*. New York: Century Foundation Press, 2004.
- Bowen, William G.; Kurzweil, Martin and Tobin, Eugene. *Equity and Excellence in American Higher Education*. Charlottesville: University of Virginia Press, 2005.
- Duncombe, William and Yinger, John. “How Much More Does a Disadvantaged Student Cost?” *Economics of Education Review*, October 2005, 24(5), pp. 513-32.
- Loh, Laura. “City Schools To Challenge State Decision on Charters; Equal Spending for All Students Places System Finances at Risk, Officials Say; Relief To Be Sought from Courts, Federal Agency.” *Baltimore Sun*, May 11, 2005, p. 1B.
- National Center for Education Statistics. *Digest of Education Statistics, 2004*. Washington, DC: Institute for Education Sciences, U.S. Department of Education, 2005; Tables 36, 52, 178.
- Nechyba, Thomas J. “Alternative Education Finance Strategies.” Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 7-27.
- Roza, Marguerite and Hill, Paul T. “How Within-District Spending Inequities Help Some Schools Fail,” in Diane Ravitch, ed., *Brookings Papers on Education Policy, 2004* Washington, DC: Brookings Institution, 2004, pp. 201-27.
- Stiefel, Leanna; Rubenstein, Ross and Schwartz, Amy Ellen. “From Districts to Schools: The Distribution of Resources Across Schools in Big City School Districts,” in David H. Monk and James Wyckoff, eds., *Proceedings from the Symposium on Education Finance and Organizational Structure in NYS Schools*. Albany, NY: Education Finance Research Consortium, 2004.
- Vanourek, Greg. *State of the Charter Movement 2005*. Washington, DC: Charter School Leadership Council, 2005.



K-12 Public School Finance in Missouri: An Overview

Michael Podgursky and Matthew G. Springer

The level and distribution of spending for public K-12 education remains a contentious matter of policy in many states because of increasing expectations for school performance and widespread school finance litigation. In this paper, the authors examine the policies that have generated school funding in Missouri and the outcomes of these policies in terms of the overall level of school spending and interdistrict spending gaps. Interdistrict inequality in average spending is higher in Missouri than in surrounding states, but the spending gaps are equalizing in the sense that poor children tend to be concentrated in districts with above-average spending. A new school funding formula is grounded on a purported link between spending and student achievement. Since that association is tenuous statistically, challenges are likely to arise as this new scheme is fully implemented.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 31-50.

The level and structure of public elementary and secondary education funding is a contentious public policy matter in Missouri and many other states.

Although state revenues and spending grew briskly during the latter 1990s, the 2001 recession produced large deficits and sharp declines in tax revenues in most states. Fiscal recovery has been slow, and growing spending demands in the areas of public safety, social services, and education coupled with rapid growth in Medicaid expenses have resulted in considerable fiscal stress for states (Kane, Orszag, and Gunter, 2003). Voters also have been reluctant to raise tax rates. In Missouri, voter discontent led to the passage of a constitutional amendment in 1980 known as the Hancock Amendment, which limits the growth of state revenues to the growth rate of state per capita personal income (Hembree, 2004).

Two generations of school finance litigation have further complicated fiscal matters. Beginning

with the 1971 *Serrano v. Priest* decision in California, school finance systems based primarily on local property taxes have been found to violate state constitutions. Interdistrict per-student spending disparities in many states were substantial. In Texas, for example, given identical property tax rates, high-wealth districts were capable of spending over 20 times more per student than low-wealth districts (*Edgewood Independent School District v. Kirby*, 1989). These legal challenges, termed “equity” cases, have been successfully argued in 12 states. Research suggests that they have had the effect of narrowing spending inequality (Murray, Evans, and Schwab, 1998).

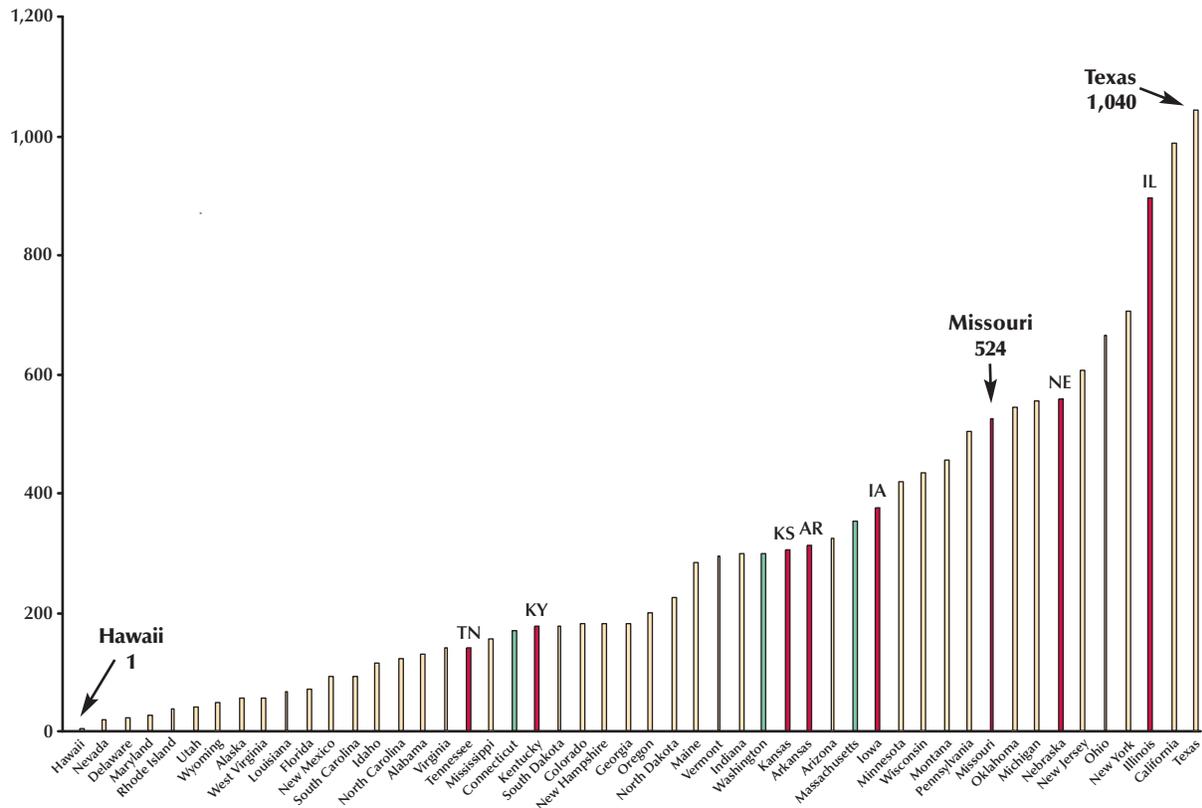
Missouri’s school finance system was challenged on equity grounds and found unconstitutional in 1993. The legislature responded by writing into law the School Improvement Act of 1993, which called for an extensive overhaul of the school funding mechanism by means of an increase in elementary and secondary education spending and decoupling of local tax collections from local

Michael Podgursky is a professor of economics at the University of Missouri–Columbia, and Matthew G. Springer is assistant director for policy research at the Peabody Center for Education Policy, Vanderbilt University. The authors thank Mark Ehler and Gerri Ogle for assistance with the state finance and assessment data, Art Peng for research assistance, and Michael Wolkoff for helpful comments.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

Figure 1

Number of Public School Districts by State, 2001-02



SOURCE: U.S. Department of Education, *Digest of Education Statistics, 2003, Table 87.*

wealth. In theory, districts with identical property tax rates would raise identical revenues. However, the sharp decline in state revenues as a result of the 2001 recession combined with high rates of housing price inflation in some parts of the state made the system unviable.

A second generation of school finance lawsuits, known as “adequacy” or “equity II” (Ladd and Hansen, 1999), emerged following Kentucky’s *Rose v. Council for Better Education* (1989). In these cases, courts have shifted their focus to include examination of what dollars buy, including high-quality teachers, class sizes, textbooks, curriculum materials, facilities, technology, and whether these inputs are adequate to meet constitutional standards for education. An adequacy lawsuit was filed in

2004 in Missouri and once again set the state legislature on course to throw out the old finance system in favor of a very different alternative. A new “adequacy based” finance system, approved in 2005, aims to make available to all students a level of resources sufficient to reach a level of proficiency defined by state standards.

This paper provides a descriptive overview of the Missouri school finance system. The first section provides an overview of the system of school districts in Missouri and some contextual background. The following section gives a rudimentary explanation of the “old” finance regime in Missouri from 1993 to the present, but which is now being phased out. We then examine data on the fiscal outcomes of that system and how Missouri’s per-student

spending compares with neighboring states. We then discuss the new regime, which attempts to determine “adequate” spending levels based on student achievement. Our conclusion briefly summarizes our findings and suggests potential bumps in the school finance road ahead.

INSTITUTIONAL BACKGROUND

Before considering the distributional effects of this regime, it is important to consider some institutional features of the school finance landscape. First, relatively speaking, Missouri has many school districts. Missouri has 522 regular school districts (75 K-8 and 447 K-12).¹ Figure 1 shows that, among the states, there is a wide distribution in the number of school districts in operation, ranging from 1 statewide district in Hawaii to 1,040 in Texas. Missouri is at the high end of the range, and most of the eight states exceeding Missouri have significantly larger populations. In many of our comparisons, we will focus on surrounding Midwestern states. Most of these states, like Missouri, have a large number of school districts, many of which are rural.

Second, Missouri has a highly skewed distribution of students among these districts: Some have very few students and some have many. Table 1 reports the distribution of students by decile of district size, from lowest to highest. The smallest 10 percent of Missouri districts enroll just 0.5 percent of all students. The smallest 20 percent of districts (i.e., 104 of 524) enroll just 1.5 percent of public school students. By contrast, the largest 10 percent enroll over half (57 percent) of the students. In fact, the largest ten school districts enroll just over 25 percent of the students, and the five largest enroll 16 percent. Imagine a parade of school districts marching down the street with each district’s height proportional to its size: one-quarter inch of height per student in the district. The first hundred marchers would average only two and a half feet tall. The next hundred would be about four and a half feet tall and so on, until we reach the last five

¹ Officially, Missouri has 524 school districts. However, for this study we drop two: the St. Louis and Pemiscot County Special School Districts.

Table 1

Enrollment by District Size: 2004-05

Decile by district size	Percentage of students	Cumulative percentage of students
10	0.5	0.5
20	1.0	1.5
30	1.5	3.0
40	2.3	5.3
50	3.1	8.4
60	4.2	12.6
70	5.7	18.3
80	8.9	27.2
90	15.8	43.0
100	57.0	100.0
Largest 5 districts	16.0	—
Largest 10 districts	25.8	—

SOURCE: Missouri Department of Elementary and Secondary Education.

marchers in the parade, who would tower nearly 600 feet into the sky.

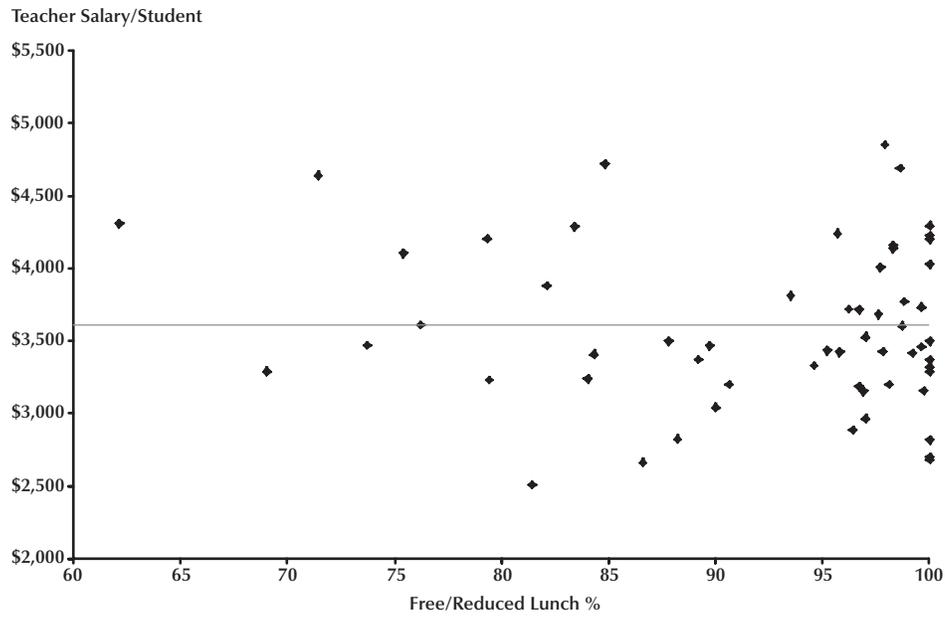
Finally, the analysis in this paper will focus on the distribution of resources among these school districts. However, we should keep in mind that our ultimate concern is the distribution of school resources among children, not school districts. Unfortunately discussions of school finance and equity tend to conflate the two. However, it should be noted that there are likely significant intradistrict inequalities in many school districts—particularly in the larger urban districts.² One source of inequality arises from the use of salary schedules for teachers that set base pay entirely on the basis of years of seniority and graduate credits or degrees. Teacher seniority often varies considerably between schools. For example, because schools with students with higher socioeconomic status are generally considered more desirable places to work by teachers, more senior teachers (who are paid more) tend to transfer to more advantaged schools. On

² Recent research conducted by Roza and Hill (2004) illustrates substantial disparities between school spending in several urban districts.

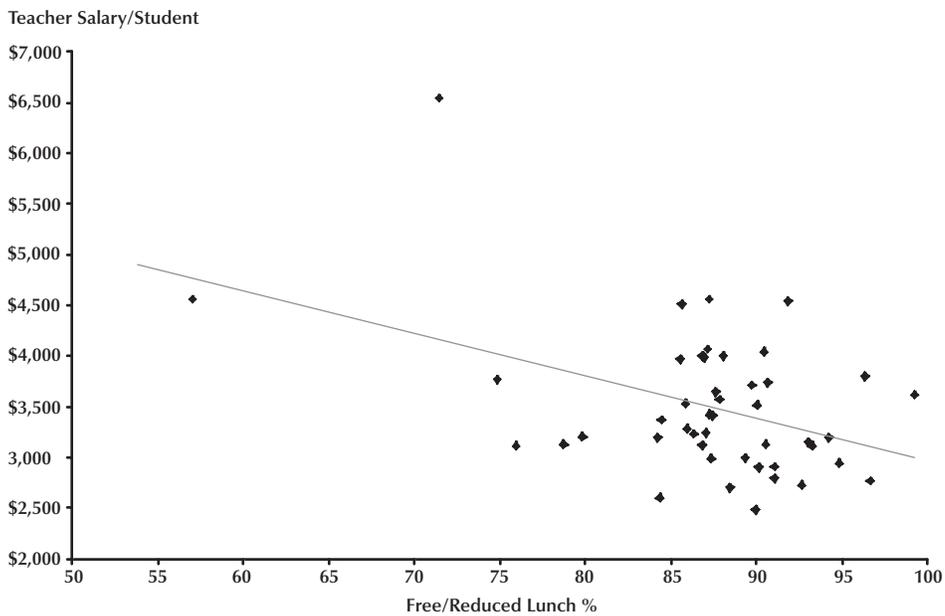
Figure 2

Average Teacher Salary Per Student and Student Poverty Rate in Elementary Schools, 2004-05, in Three Missouri School Districts

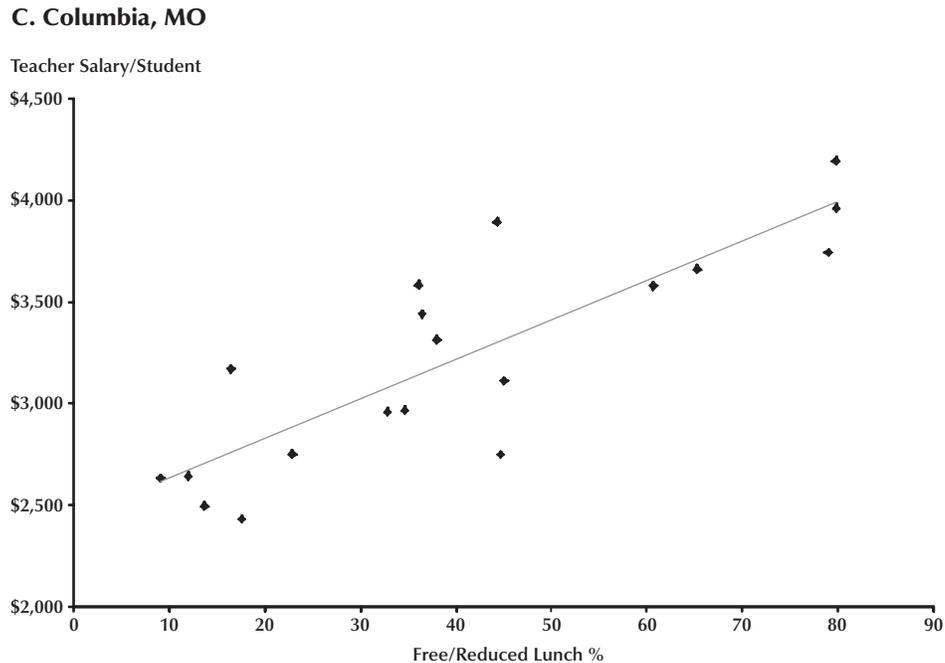
A. St. Louis, MO



B. Kansas City, MO



SOURCE: Missouri Department of Elementary and Secondary Education.

Figure 2, cont'd**Average Teacher Salary Per Student and Student Poverty Rate in Elementary Schools, 2004-05, in Three Missouri School Districts**

SOURCE: Missouri Department of Elementary and Secondary Education.

the other hand, schools with high levels of poverty may receive additional compensatory resources from the district.

Figure 2 presents some illustrative data on this point for three urban districts in the state (St. Louis, Kansas City, and Columbia). We cannot compute total spending per student in the state; however, we can examine the allocation of teacher payroll by school. In Figure 2 we present average teacher payroll per student in regular elementary schools within the three school districts. Variation across schools in this measure would arise from two sources—variation in average pay per teacher and variation in students per teacher. First we note that there is considerable variation between schools in all three districts with nearly all schools roughly falling in a \$2000 band. The three school districts differ significantly in the relationship between spending and school poverty. In the Columbia

public schools the relationship is strongly compensatory. In the Kansas City elementary schools the dispersion is somewhat disequalizing, and in St. Louis it is neutral.³

Unfortunately, aside from teacher and some staff pay, data are lacking on intradistrict patterns of school spending. Thus we will focus on per-student spending at the district level, although it is important to keep these intradistrict issues in mind.

THE OLD REGIME: 1995-2005

From 1995 until the 2005 legislative session, Missouri operated under a formula based on the principle that identical tax effort should yield roughly similar tax revenues. These types of for-

³ The St. Louis and Kansas City data exclude charter elementary schools.

Table 2**Missouri Aid for School Districts, Fiscal Year 2005**

	\$Millions	%
Basic formula	1,808	68.2
At-risk	374	14.1
Transportation	162	6.1
Special education/remedial reading	161	6.1
Vocational education	53	2.0
Career ladder	39	1.5
Early childhood	30	1.1
Gifted	25	0.9
Total	2,652	100.0

SOURCE: Missouri Department of Elementary and Secondary Education.

mulas are sometimes referred to as “power equalization” (Hoxby, 2004). This operational structure emerged after Missouri courts in *Committee for Educational Equality v. State of Missouri* (1993) found the prior system unconstitutional and provided districts with a guaranteed tax base. In principle, districts exerting identical taxing effort in their respective property tax rates would be guaranteed equal resources, with state revenues acting to offset disparities in district wealth. School districts were provided foundation aid roughly as follows:

$$\text{Foundation aid} = (EP \times T \times GTB) - \text{local tax revenues},$$

where EP is the number of eligible students, T is the local school tax rate levy, and GTB is the guaranteed tax base. Senate Bill 180, passed in 1995 in response to school finance litigation, set the guaranteed tax base by the district-assessed valuation of the school district at the 95th percentile of school district wealth. In other words, the formula intended to decouple tax effort from district wealth. A poor school district would be guaranteed as much tax revenue as a rich school district with the same tax rate.⁴

⁴ There was also a supplemental payment to school districts (“at risk”) that provided revenues to school districts based on the number of students eligible for free or reduced price lunches; this program assigns a weight of 1.2 or 1.3 for these students.

Such a formula maintained local control of the setting of property tax rates; however, it also encouraged school districts with below-average levels of district wealth to raise their local tax rates.⁵ A district with half the local wealth per student of the 95th percentile would get one dollar in state aid for every dollar raised locally. A poor district with one-fifth the property wealth would get four dollars for every local dollar. Districts above the 95th percentile of wealth per student would receive no state foundation aid, but none of their local tax revenues would be confiscated either. Unlike some other states, Missouri has no “Robin Hood” provisions for redistribution of local tax revenues (Hoxby and Kuzienko, 2004).

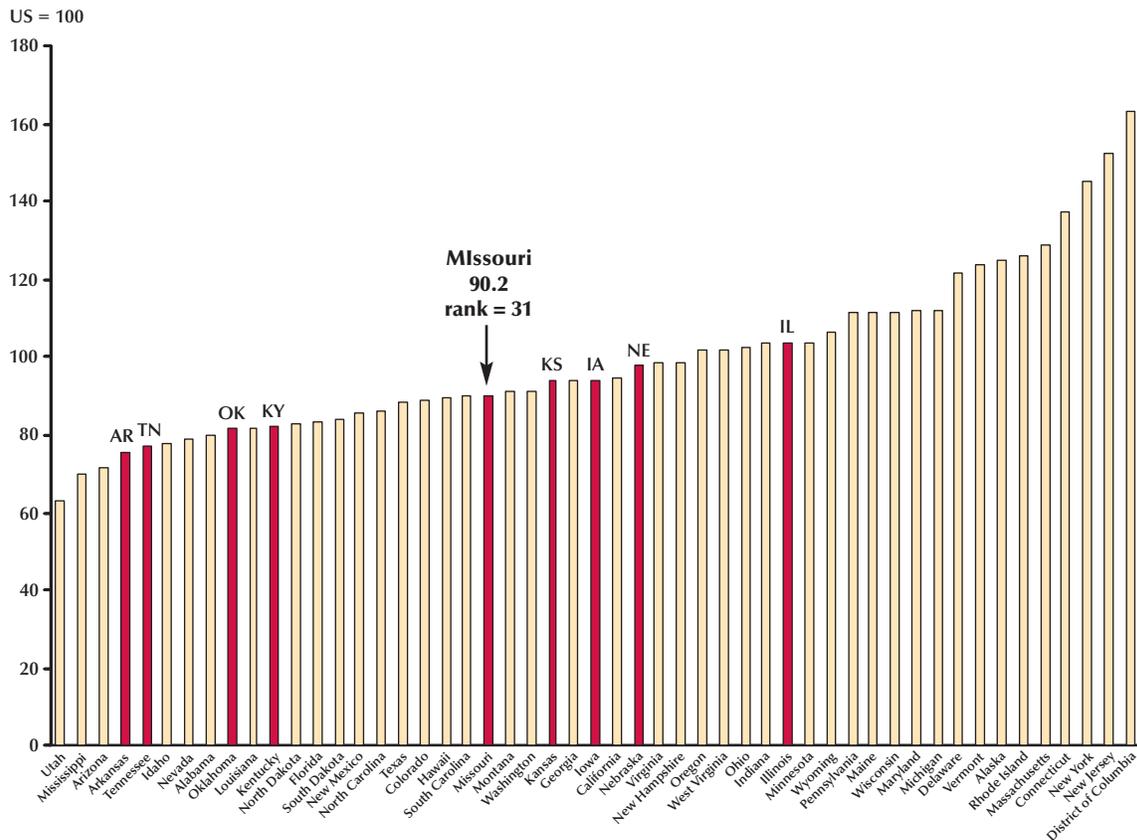
No school finance system ever proves this simple, however. We have omitted a variety of details. The most important omission for our purposes was Senate Bill 180’s “hold harmless” provision. To secure sufficient political support for passage of Senate Bill 180, school districts that were going to lose state aid had their aid frozen at 1992-93 levels. These districts, termed “hold harmless,” were primarily wealthier school districts. Thus, the bill’s equalizing effect was somewhat muted because of the existence, in any year, of 55 or so “hold harmless” districts.

The foundation formula was not the only way in which state aid was allocated to school districts. The state of Missouri also provided “categorical aid”—aid that can be used only for specified purposes—to school districts. The largest categorical aid programs in Missouri included the following:

- transportation
- special education and remedial reading
- career ladder program (i.e., bonus pay for teachers)
- vocational education

Table 2 shows a breakdown of state aid for fiscal

⁵ This formula applied to school districts that set their tax rates at \$2.75 per \$100 of assessed valuation. This was intended to be a floor on the local rates. The small number of districts that set their rates below this rate were not cut off from state aid but were given aid through a less-generous formula. Foundation matching aid was capped at a tax rate of \$3.85. Finally, by statute, residential property is assessed at 19 percent, commercial at 32 percent, and farmland at 12 percent of market value.

Figure 3**Current Expenditure Per Student in Missouri and Other States, 2000-01**

SOURCE: U.S. Department of Education, *Digest of Education Statistics*, 2003.

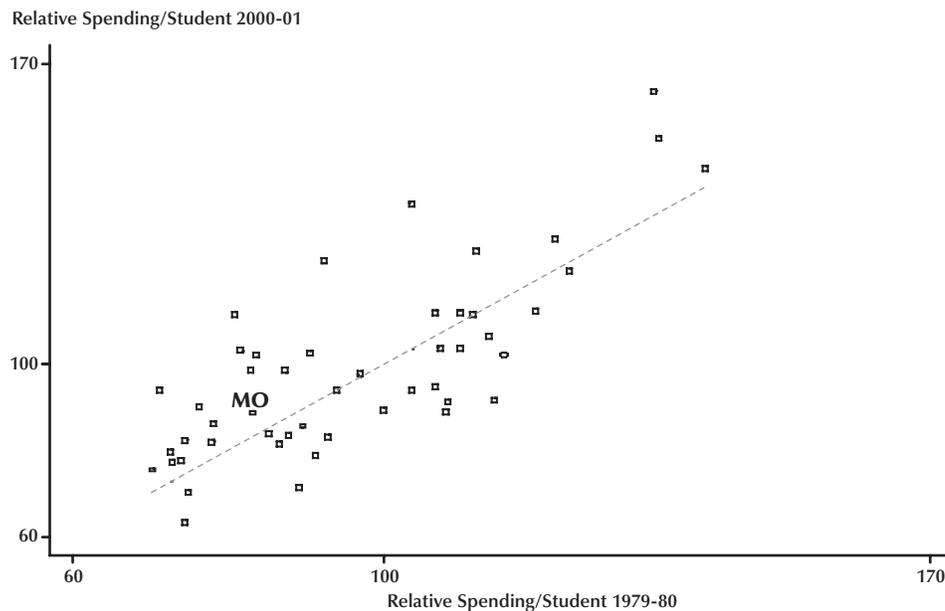
year 2005. The first two lines are the basic foundation formula. They show that roughly 82 percent of state aid to K-12 education was driven by the local tax formula and that 18 percent was distributed through categorical grants.

Finally, a substantial share of statewide aid is hidden in “local spending.” In 1982, voters passed a statewide sales tax of 1 percent (Proposition C), the proceeds of which were earmarked for elementary and secondary education. However, these revenues were provided directly to school districts on a per-student basis and counted as local rather than state revenue. In theory, half of Proposition C revenues were to be used to reduce property tax payments. However, districts could waive some

or all of this “rollback” by a majority vote and 471 school districts chose to do that. In fiscal year 2005, the revenues from Proposition C allocated to schools amounted to approximately \$700 million, or roughly 25 percent of formal state revenues provided to schools.

PER-STUDENT EXPENDITURES IN MISSOURI AND OTHER STATES

We begin by examining overall funding for K-12 public education in Missouri. How does Missouri spending compare to the national average? Unfortunately, there is a rather long lag in reporting of state education spending by the National Center

Figure 4**State Relative Spending Per Student, 1979-80 and 2000-01 (U.S. = 100.0)**

SOURCE: U.S. Department of Education, *Digest of Education Statistics*, 2003. Alaska is not plotted.

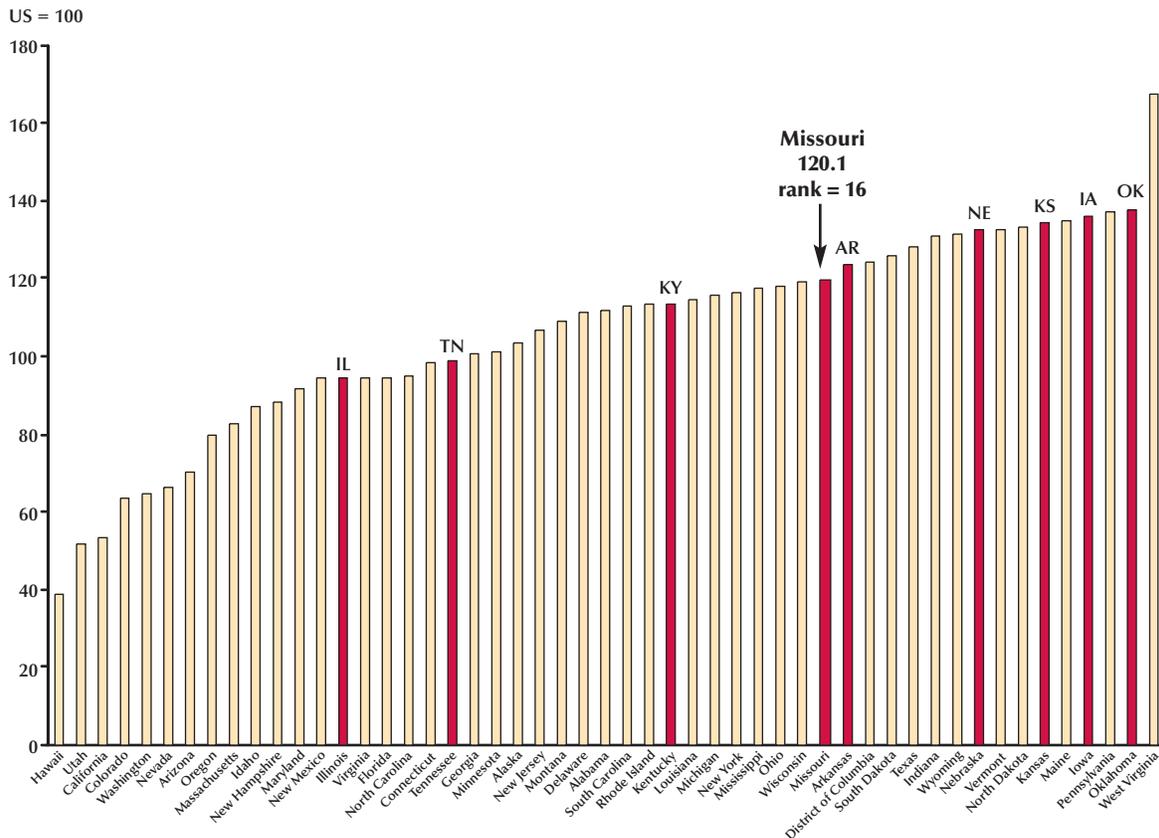
for Education Statistics, the data-gathering arm of the U.S. Department of Education. The most recent data available are for the 2000-01 school year (National Center for Education Statistics, 2002). In that year, Missouri ranked 30th of 50 states plus the District of Columbia. Missouri spending per student was 90.2 percent of the U.S. average (Figure 3). That percentage has been fairly stable over time. Figure 4 reports state spending as a percentage of the U.S. average by state for two school years: 1979-80 and 2000-01. We have included a 45-degree line in the chart. States above the line have moved up relative to the U.S. average over that period, and states below the line have moved down. Missouri is slightly above the line; however, Missouri's spending in both years was close to 90 percent of the national average.

At first glance, these figures suggest that Missouri underfunds elementary and secondary education, at least compared with the national average. However, it is well-known that living costs vary from state to state. Although it is true that

spending per student is lower in Missouri than, say, California, so too are many other costs, such as housing and gasoline. Unfortunately, federal statistical agencies do not compute a cross-section cost of living index because the practical and conceptual problems with constructing such an index are daunting. The national cost of living index (consumer price index, CPI) is designed to measure changes in prices over time (i.e., inflation). Each month, the Bureau of Labor Statistics prices out the change in the cost of purchasing a fixed bundle of goods and services on a typical urban wage by a clerical worker's family. If the CPI rises by 0.2 percent, we conclude that it would take 0.2 percent more money to buy the same bundle of goods. Thus, to compensate a typical family for inflation would require 0.2 percent more income. As long as a family's consumption spending patterns do not differ too radically from this average bundle, then this index would provide a rough approximation of a pay increase necessary to offset this price increase.

Figure 5

Current Expenditure Per Student Relative to Average Housing Prices in Missouri and Other States, 2000-01



SOURCE: U.S. Department of Education, *Digest of Education Statistics*, 2003.

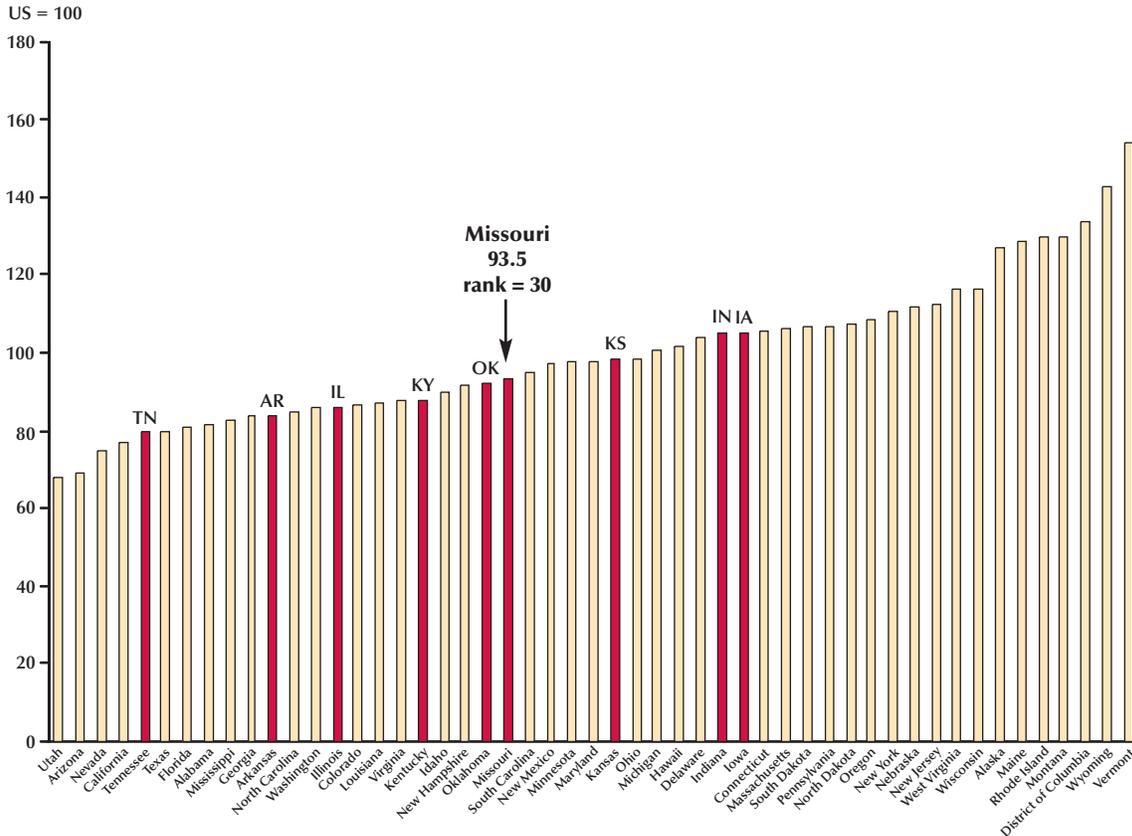
A cross-section index is another matter altogether. It is meant to measure, for example, the differences in costs for a family in Worcester, Massachusetts, to maintain the same standard of living in St. Louis, Missouri. Simply stating the intent illustrates the conceptual problems of measurement. First of all, the bundles of good consumed by an average family may be very different in different locales. Where housing is very expensive, people may live in smaller houses and spend their money on a boat. Winter is much colder on average in Worcester than in St. Louis; hence, a typical Worcester household likely spends more on heating oil. Of course, people who like the ocean and

snow are much more likely to live in Worcester. There is no easy way to account for these individual preferences in a cross-section index.

Figures 5 and 6 provide two illustrative ways to deflate school spending. Figure 5 deflates school spending by a measure of housing values from Census 2000. With this deflator, Missouri's relative spending and rank rise sharply. Compared with the average price of a house, Missouri school spending is 20 percent above the national average, and the state ranks 16th in the nation. However, such an index almost certainly overadjusts Missouri's spending for two reasons. First, the index accounts for less than half of consumer spending, and there

Figure 6

Current Expenditure Per Student Relative to Young College Graduates' Earnings in Missouri and Other States, 2000-01

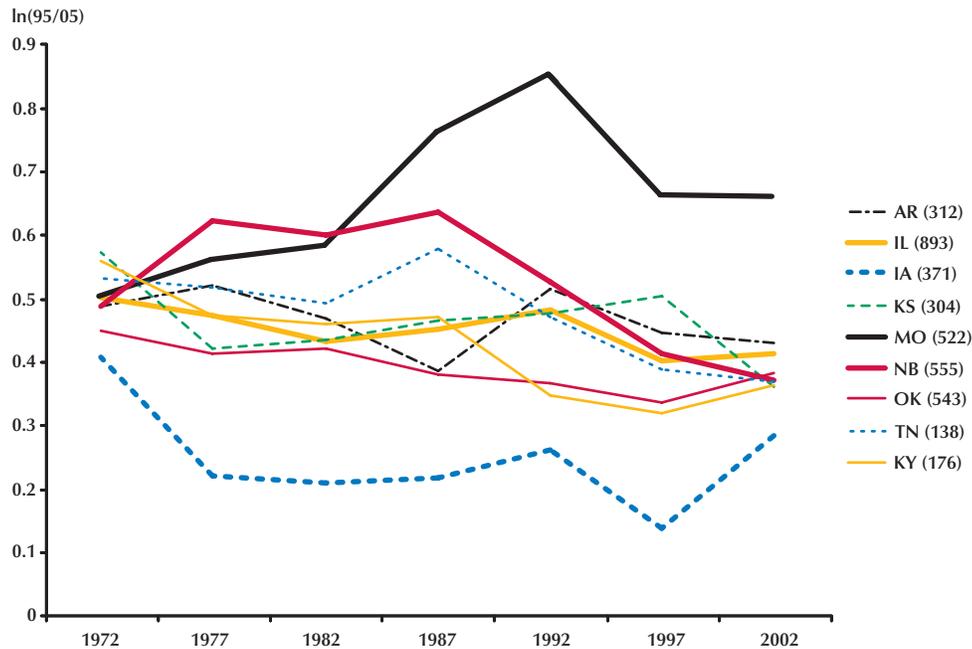


SOURCE: Spending per student: U.S. Department of Education, *Digest of Education Statistics, 2003*; doctor and dentist annual incomes, 2000 Census of Households, 5 percent public use microdata sample (PUMS) computed by author.

is no reason to believe that the prices of other consumer goods and services follow those of housing. Second, housing prices reflect the value of amenities such as sunshine, scenic views, etc. Houses cost more in California than in Iowa because most people prefer California weather and amenities (e.g., beaches and mountains). If a scientific study showed that living next to cornfields doubled life expectancy, then you could be sure that housing prices would skyrocket in Iowa and much of Missouri.

Figure 6 takes a different approach. Here we deflate school spending by an index of the earnings of young people (aged 25 to 35) who have a college

degree or higher. Young people are very mobile geographically. Thus, if real earnings, taking into account living costs and amenities, are higher in California than Idaho, we would expect young people to migrate from the latter to the former. This migration would tend to raise the earnings in Idaho and reduce them in California. The relative pay adjustment would continue until net migration halted, at which point any remaining pay gap would reflect the “value” of living in California relative to Idaho. It is interesting to note that there is only a modest effect on Missouri’s position when we deflate Missouri education spending by college graduate earnings. Indeed, instructional spending

Figure 7**Measured Inequality in Current Spending Per Student in Missouri and Surrounding States, 1972-2002**

NOTE: Inequality measure: $\ln(95\text{th}/5\text{th percentiles})$. Number of regular school districts (2002) are in parentheses in the legend.
SOURCE: U.S. Census Bureau, Elementary and Secondary School System Finance Data Files (F-33).

is 93 percent of the U.S. average, and Missouri's rank rises just one position, from 31st to 30th.

We conclude from this exercise that Missouri's "real" spending for K-12 education may be somewhat closer to the national average than Figure 2 suggests, but it is probably not above the national rate.

VARIATION IN SCHOOL SPENDING BETWEEN DISTRICTS

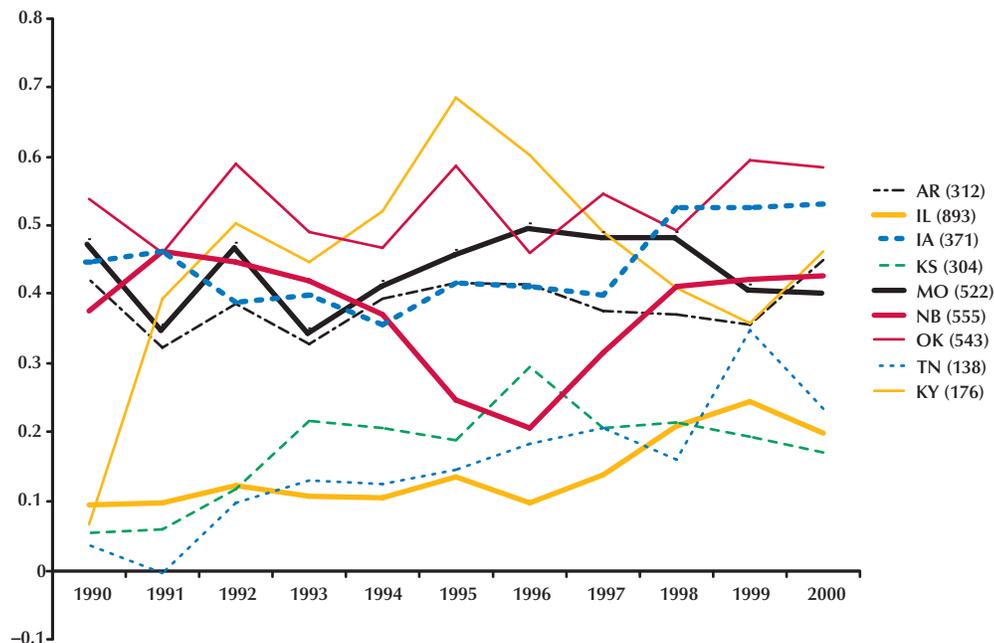
One concern in school finance is equity or "fairness." However, there are different notions of what constitutes fairness in school spending. Many researchers in the field distinguish "horizontal" and "vertical" equity (e.g., Berne and Stiefel, 1983). If real spending per student were identical for all students in the state, regardless of family back-

ground, location, or need, that would constitute perfect horizontal equity. Vertical equity, on the other hand, takes account of need and seeks to equalize educational opportunity or outcomes given gaps in family incomes. If more spending per student is required to equalize educational opportunity for children from poor families, then the ideal distribution of spending from this point of view would not be equal but compensating.

Horizontal equity is the easiest to measure. The measure we will use is the ratio of the natural logarithm of spending per student at the 95th and 5th percentiles, a measure commonly used in studies of horizontal equity (e.g., Murray, Evans, and Schwab, 1998; Hussar and Sonnenberg, 2000). This measure has two desirable properties. First, with so many small districts in Missouri, the impact of extreme outliers is attenuated. Second, the approach allows us to decompose trends in

Figure 8

Correlation Between Current Spending Per Student and Student Poverty in Missouri and Surrounding States, 1990-2000



NOTE: Inequality measure: $(\ln(95\text{th}/5\text{th percentiles}))$. Number of regular school districts (2002) are in parentheses in the legend.
SOURCE: National Center for Education Statistics, Longitudinal School District Fiscal-Nonfiscal Data File.

inequality above and below the median of the distribution of spending.⁶

Figure 7 shows inequality trends in resource distribution from 1972-2002 for Missouri and surrounding states. During the 1972-92 period, Missouri clearly diverged from the trend in these states. While there was a general upward drift in inequality in the surrounding states, the increase was much more pronounced in Missouri. The leveling effect of the 1995 School Improvement Act is also visible. Nonetheless, by the end of the period, spending inequality was still significantly higher in Missouri.

Figure 8 presents data on “vertical equity” in school spending in Missouri and its neighbors. Here we plot the correlation between average spending per student and student poverty (i.e., the percent of students eligible for free or reduced-price

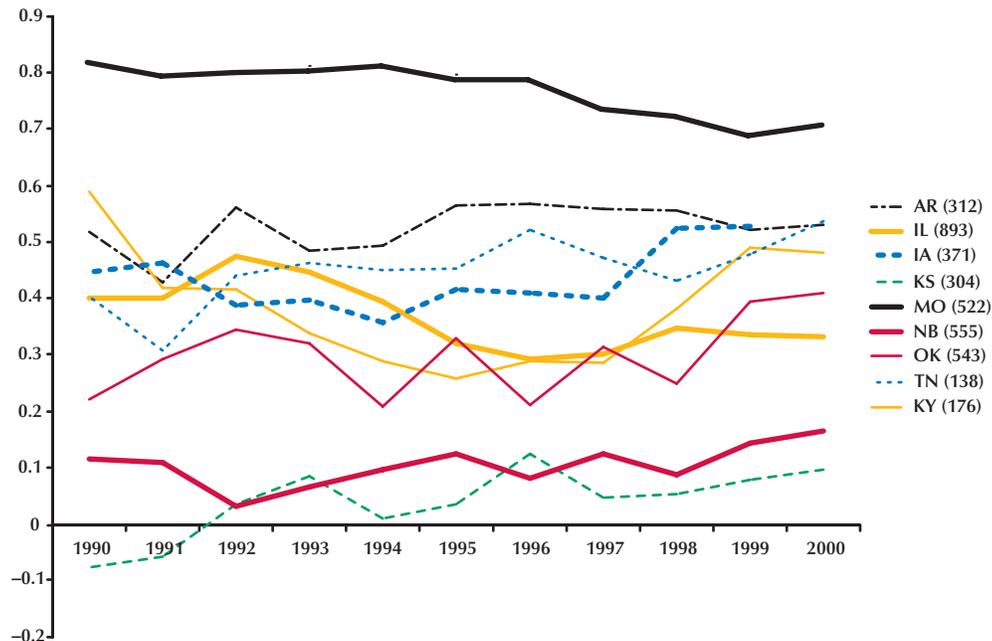
lunches) between 1990 and 2000. (2000 is the most recent year for which free or reduced lunch data are available by district for all these states.) Here the story changes considerably. In all of these states there is a positive correlation between spending and student poverty. In Missouri the average correlation between student poverty and school spending hovers around 0.4. In other words, when districts are weighted by enrollments, on average districts with more students in poverty have higher spending per student. While there was some convergence at the end of the period, over the period as a whole, spending was more equal in Missouri than most of its neighbors as measured by this vertical equity measure.

Figure 9 examines another dimension of vertical equity: racial spending disparities. The large gap between black and white test scores is well-documented. For example, the gap in the Missouri state assessment scores between black and white

⁶ All of our measures of inequality are weighted by student enrollment in the district.

Figure 9

Correlation Between Current Spending, Per-Student Spending and Percent Minority in Missouri and Surrounding States, 1990-2000



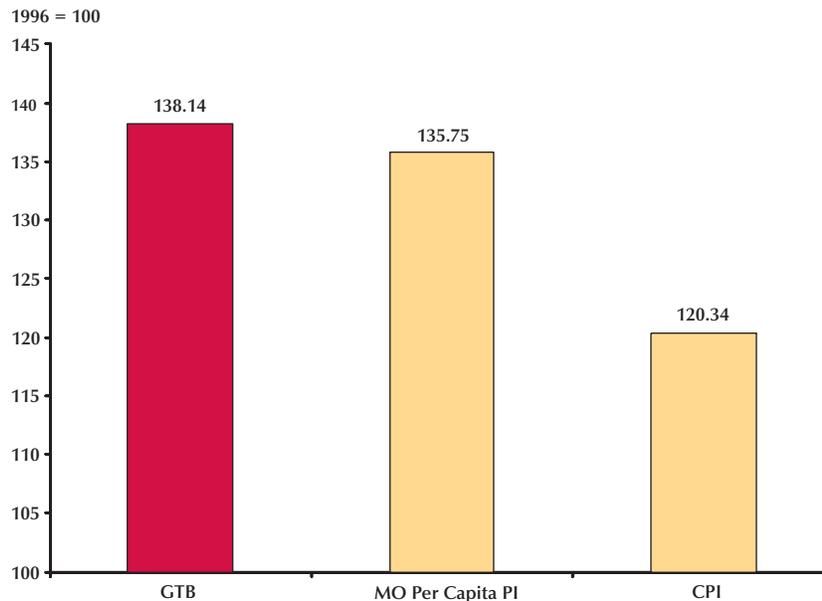
students is nearly 1 standard deviation—a very large gap. Thus, one might view as favorable spending inequality that arises from high compensatory spending in districts with more minority students. Figure 9 shows the correlation between the percentage of minority students and school spending in Missouri and adjacent states. There is a strong positive correlation in Missouri—much larger than any of the surrounding states.

Thus, by horizontal equity measures, Missouri interdistrict inequality seems relatively high, at least compared with neighboring states. However, from a vertical equity perspective, Missouri compares favorably, with much of the spending inequality having a compensatory character.

“ADEQUACY” AND THE NEW SYSTEM

The school finance system put in place after the 1993 lawsuit proved difficult to sustain. Fully

funding the formula would tie school spending not to tax revenues or personal income, but to housing price inflation, in particular, housing price inflation in the wealthiest school districts in the state. It turns out that the guaranteed tax base rose somewhat faster than personal income per capita, and considerably faster than the CPI between 1996 and 2004 (Figure 10). Faced with a second-generation adequacy-based legal challenge, the Missouri legislature revamped the school finance system during the 2005 legislative session. The first wave of school finance cases focused on the fact that, because of different levels of property wealth per student, local school districts with identical tax rates could end up with very different levels of educational revenues. However, plaintiffs in the new round of school finance lawsuits claim a different constitutional standard, namely that the overall level of spending in high-poverty school districts is simply not adequate to meet state educational goals. Under the No Child Left Behind Act (NCLB), in theory

Figure 10**Inflation in Guaranteed Tax Base (GTB), Missouri Per Capita Personal Income (PI), and Consumer Price Index (CPI), 1996-2004**

NOTE: GTB values from 1996-97 to 2004-05, PI for calendar years, CPI September values.

SOURCE: Missouri Department of Elementary and Secondary Education, U.S. Commerce Department, Bureau of Labor Statistics.

school districts are expected to have all students proficient or better on state assessments by 2014. States, in general, set somewhat less ambitious educational goals, but nonetheless expect school districts with low levels of performance on state assessments to raise proficiency overall and close achievement gaps.

In principle, one might estimate a level of spending that would be the minimum necessary to achieve these educational goals. In Missouri, a study commissioned by the Missouri School Boards' Association by two educational consultants, Augenblick and Myers (2003), attempted to do just that. These authors took two approaches. The first, a "professional judgment" approach, convened a panel of Missouri public school teachers and administrators. These panels were charged with the task of determining a bundle of resources that would enable schools to meet state targets for student achievement. They were also charged with pricing this bundle of inputs. Specifically, the

spending target, based on 2001-02 costs, was the amount of money required for all students to attain a "nearing proficient or higher" score on the MAP tests in communications and math. Like all state assessments, the MAP is criterion-referenced with five performance levels: level 1 (unnamed), advancing, nearing proficient, proficient, and advanced. NCLB requires that all children be "proficient" or "advanced" on their state assessment by 2014 and make adequate yearly progress toward that goal in the interim. Augenblick and Myers (2003) set a lower target of "nearing proficient or higher" for their expert panels. These panels arrived at an estimate of \$7,832 per student to achieve this target.⁷

Augenblick and Myers then took a second, "successful schools" approach to determining

⁷ "Professional judgment" estimates have become very popular. According to *Education Week*, by the end of 2004 professional judgment studies had been undertaken for 15 states (*Education Week*, 2005, pp. 38-39). For a critical assessment of these methods, see Hanushek (2005).

adequacy. Each year the Missouri Department of Elementary and Secondary Education scores every school district in the state on the basis of MAP performance and related academic variables such as the percentage of students taking the ACT. Augenblick and Myers computed the average spending of 102 school districts that had perfect or nearly perfect scores on this report card (\$5,664). This was their second measure of adequacy.⁸ Obviously, these are very different numbers. Augenblick and Myers tried to reconcile the disparity by arguing that, because only 61 percent of students in the successful schools met the “nearing proficient and above” standard and the expert panel target was based on 100 percent proficiency, 61 percent of \$7,832 is close to \$5,664.⁹

Although the state legislature did not adopt Augenblick and Myers’s estimates wholesale, they did adopt the principle of an “adequacy” target based on a “successful schools” perspective. Recall that under the old finance regime what became equalized was revenue for identical tax effort. This formula embodied a concept of fairness that said, in effect, if district X set the same property tax rate as district Y, then both should collect the same tax revenues. By tying state aid to local fiscal effort, poorer school districts leveraged local tax dollars with matching state aid. The “adequacy” concept employs a very different approach, claiming there is a minimum adequate level of spending and that it is the responsibility of the state government to make certain the level of spending per student meets that target regardless of local tax effort. Low-income districts that tax themselves at a high rate will retain those dollars and will not lose equivalent

amounts of state aid. However, those local dollars will no longer be leveraged.

In 2005, the legislature determined that the minimum adequate level of spending was \$6,117 dollars per student. The legislature arrived at this figure by calculating the average operating spending per student for the 113 districts with perfect or nearly perfect scores on the annual performance report (APR) conducted by the Department of Elementary and Secondary Education; these scores are heavily weighted toward performance on the MAP assessment. This figure will be recomputed every two years. In theory, the figure could go down; however Senate Bill 287 specifies that the old level will stay in effect should that occur.

Simplified greatly, the new formula works roughly as follows:

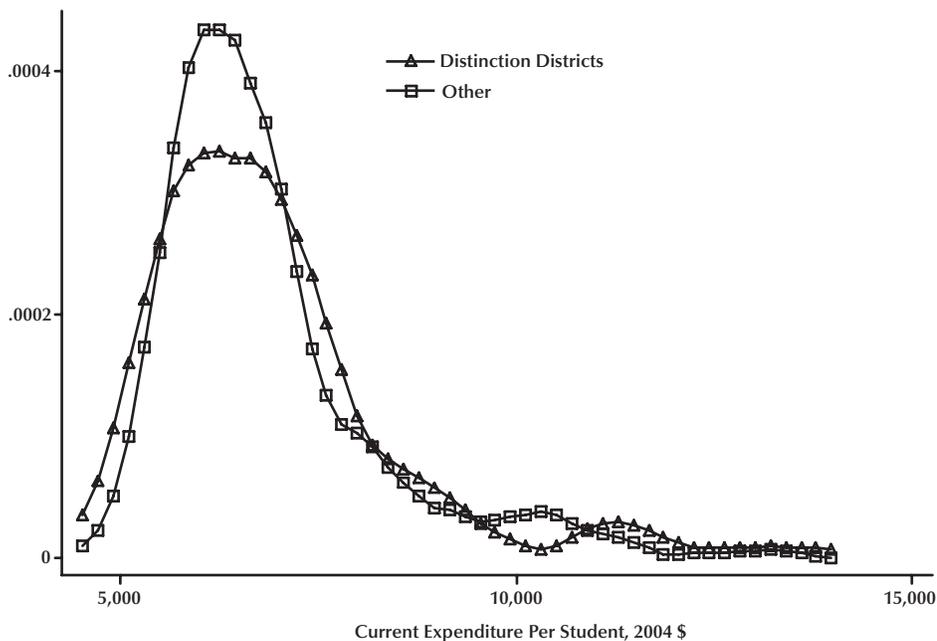
$$\text{Foundation aid} = (\text{weighted ADA} \times \$6,117) - (\$3.43 \times \text{Local Tax Base}).$$

There are no penalties in this formula for local tax effort. Districts keep every dollar of tax revenue raised locally. However, there will no longer be a leverage effect for low-wealth districts. Each district will get a dollar of educational spending for every dollar raised locally. In other words, the “tax price” of additional local spending will be 100 percent (Hoxby, 2001).

Several other changes were made as well. Because the new system was predicated on the concept of an adequate level of resources, a question of cost-of-living arose. As of 2004, nine states used intrastate cost-of-living adjustments in their state aid formula (*Education Week*, 2005). Until now, Missouri had not. Clearly, cost-of-living adjustments will tend to reduce payments to rural districts, while raising payments to urban and suburban districts. The new system phases in a cost-of-living adjustment based on average earnings in the county or the metropolitan area. The new system also adjusts student counts for poverty and limited English proficiency populations if they exceed certain thresholds. Some categorical aid is also now folded into the basic aid. Finally, the new funding mechanism will be phased in over seven years. In the first year, only 15 percent of district aid is determined by the new formula. This figure rises in a stepwise fashion to 100 percent by the 2012-13 school year.

⁸ By construction, many of the “successful schools” will have spending that is less than adequate. In fact, 69 of 102 successful school districts spent less than \$5,664 per student. Note that Augenblick and Myers estimate costs to educate a regular student (i.e., one who is not poor and does not have limited proficiency in English). Poor students and English-language learners are assumed to cost more.

⁹ This argument assumes that there is a proportionate relationship between spending and student achievement, i.e. that if district A spends twice as much as district B, then twice as many students will be nearing proficient or above. They present no evidence in support of this assumption. In fact, actual test data in spring 2002, the test data used by the consultants, cast some doubt on the “professional judgment” estimate. In spring 2002 only 12 K-12 school districts had 100 percent of their students “nearing proficient” or above on the math and communications arts assessments at all grade levels and all 12 of these districts spent less than \$7,832 per student.

Figure 11**Distribution of Current Spending Per Student in “Distinction” and Other Missouri Public School Districts, 2004**

SOURCE: Missouri Department of Elementary and Secondary Education.

Whether or not the new formula passes muster with the courts, the entire concept of determining “adequate” levels of finance with reference to student achievement levels is problematic. We have already seen that the determination of adequacy in the Augenblick and Myers study was at variance with the MAP data used in the same year. More generally, it is very difficult to establish a reliable relationship between any level of spending and student achievement. A basic thesis put forth by “adequacy” proponents is that research can establish a reliable causal relationship between spending and student achievement. On the basis of that relationship, we can then choose a level of student achievement (e.g., all students “nearing proficient or better”) and measure the minimum level of spending necessary to reach that achievement target. The new school finance formula is built on a similar concept. The adequacy target is the average level of spending for school districts that earn perfect

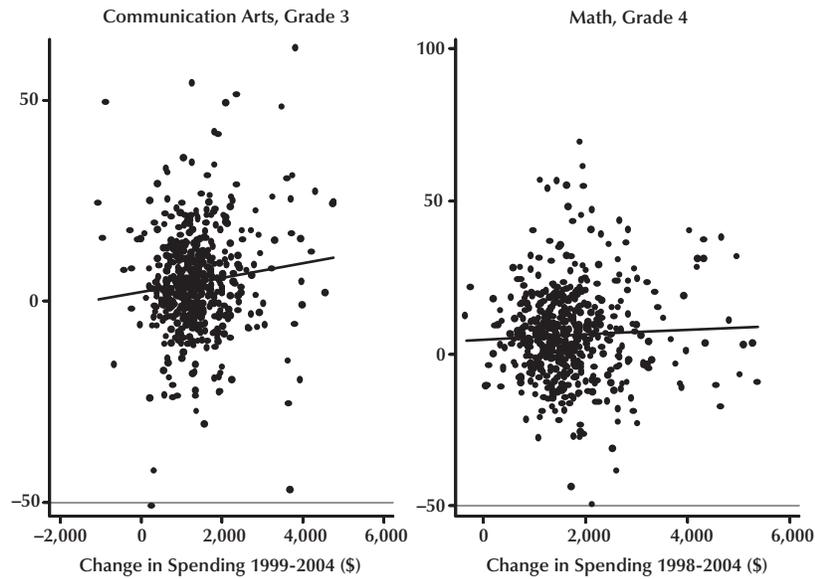
scores on their annual performance report. This target is to be updated every two years. However, average test scores exhibit considerable variation from year to year. Thus, the list of districts with perfect scores is likely to vary from year to year and is surely going to get smaller as the performance bar rises under NCLB.¹⁰

In fact, the research literature cannot reliably identify a causal relationship between spending on any type of resource and student achievement. Surveys of this literature routinely note the difficulties of identifying causal links between school resources and student achievement gains (e.g., Hanushek, 2003). Figures 11 through 14 illustrate the problem with Missouri data. In Figure 11 we plot 2004-05 spending in the 113 “distinction” districts (as designated by the Missouri Department

¹⁰ The Missouri School Improvement Program system for scoring school districts’ annual performance report is due for major revision in 2006.

Figure 12

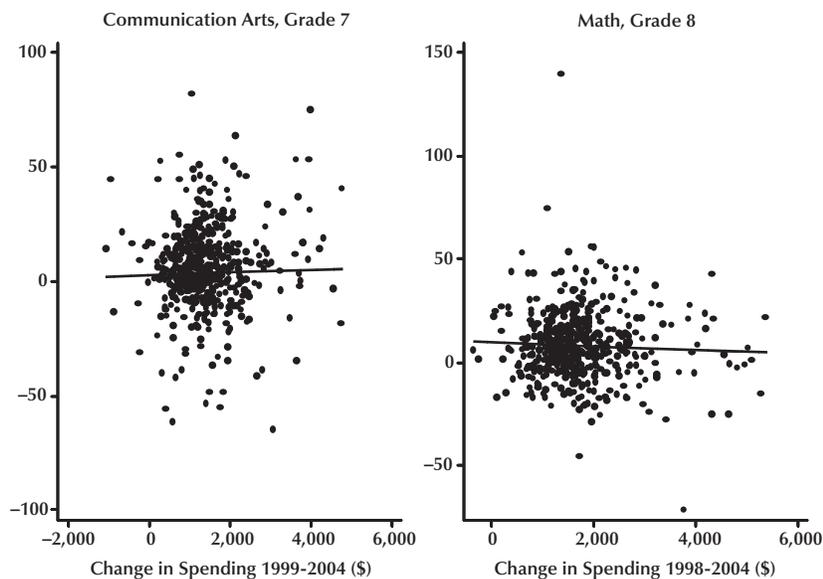
Changes in Elementary School MAP Scores and Spending Per Student: First Mandatory MAP Year to 2004



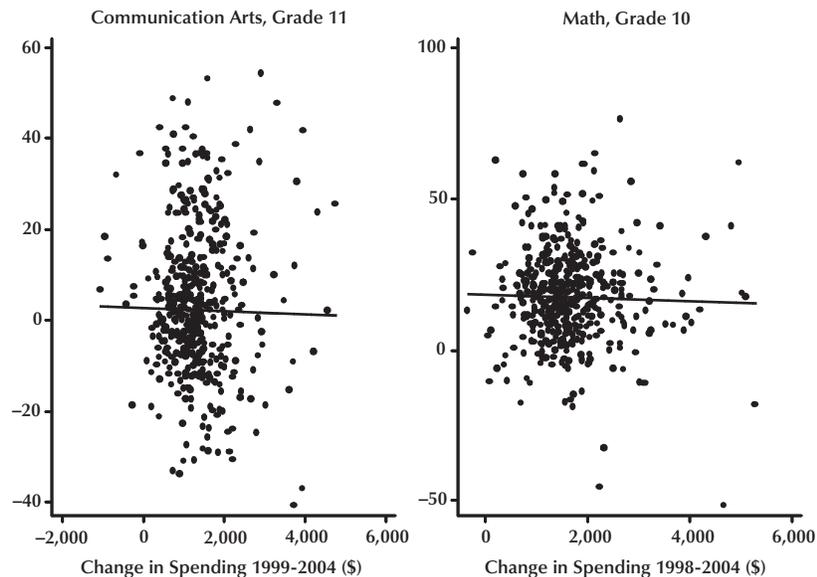
NOTE: All reported District MAP scores with at least 25 valid test scores in beginning and ending year.
 SOURCE: Missouri Department of Elementary and Secondary Education.

Figure 13

Changes in Middle School MAP Scores and Spending Per Student: First Mandatory MAP Year to 2004



NOTE: All reported District MAP scores with at least 25 valid test scores in beginning and ending year.
 SOURCE: Missouri Department of Elementary and Secondary Education.

Figure 14**Changes in High School MAP Scores and Spending Per Student: First Mandatory MAP Year to 2004**

NOTE: All reported District MAP scores with at least 25 valid test scores in beginning and ending year.

SOURCE: Missouri Department of Elementary and Secondary Education.

of Elementary and Secondary Education). Average spending in these districts forms the basis of the “adequate” spending estimate in the new law. We also plot spending per student in the 409 remaining “non-distinction” districts.

If spending per student were an important determinant of school performance, we would expect to see two things. First, the level of spending for distinction districts would be noticeably higher. Second, we would expect a tight distribution of spending around the higher distinguished mean. After all, districts that are more homogeneous in their performance ought to be more homogeneous in their spending, if spending is an important determinant of performance. In fact, we observe neither. Although the mean of the distinction districts is slightly higher, the two distributions overlap almost entirely. In addition, spending among the distinction districts is noticeably more dispersed than among the non-distinction districts.

Figures 12 through 14 give us some indication of how reliably we can predict achievement gains

given changes in expenditure per student. In these charts we plot changes in student achievement on MAP from the first mandatory testing year, 1998 for math and 1999 for communication arts, to spring 2004. We plot these student achievement changes against changes in spending per student. To reduce the statistical “noise” in the changes in test scores, we include only districts with at least 25 students taking the test in both the beginning and ending years. For the most part, the relation between changes in spending and changes in test scores is very erratic and nearly random. Only in third grade communication arts do we find a statistically significant positive relationship. These charts further undermine the proposition that levels or changes in spending can reliably predict school performance.

CONCLUSION

The level and distribution of spending for public K-12 education remains a contentious matter

of policy in many states because of increasing expectations for school performance and widespread litigation. Missouri is no exception. In this paper, we have examined the level and trend of school funding in Missouri over the past decade and a half. The old system was put in place in response to litigation challenging inequality in spending. It aimed to provide a guaranteed tax base for nearly all school districts and thereby equalize revenues for districts exerting the same tax effort. Rapid increases in housing values in high-wealth districts in the state as well as sharp declines in state revenues made that system unworkable. A new system is now being phased in as a response to claims about educational “adequacy” and purported links between spending and student achievement. While the notion of a minimum adequate level of spending for all students may be attractive philosophically, attempts to establish adequacy based on levels of student performance are problematic. There is little basis in education research generally or in Missouri’s experience with the MAP for establishing a level of district spending that can reliably produce a given level of student achievement.

REFERENCES

- Augenblick, John and Myers, John. “Calculation of the Cost of an Adequate Education in Missouri Using the Professional Judgment and the Successful School District Approaches.” Missouri Coalition for Adequacy, 2003; www.msbanet.org/pdf/adequacy.pdf.
- Berne, Robert and Stiefel, Leanna. *The Measurement of Equity in School Finance: Conceptual, Methodological, and Empirical Dimensions*. Baltimore, MD: Johns Hopkins University Press, 1983.
- Committee for Educational Equality v. State of Missouri* (MO), No. CV190-1371CC, slip op. (1993).
- Edgewood School District v. Kirby* (TX), 777 S.W.2d 391 (1989).
- Education Week*. “Quality Counts.” 2005, 24(7), pp. 38-39.
- Hanushek, Eric A. “The Failure of Input-Based Schooling Policies.” *The Economic Journal*, February 2003, 113(485), pp. F64-98.
- Hanushek, Eric A. “Pseudo-Science and Sound Basic Education: Voodoo Statistics in New York.” *Education Next*, Fall 2005, 5(4), pp. 67-73.
- Hembree, Russ. “The Hancock Amendment: Missouri’s Tax Limitation Measure.” Report 49-2004, University of Missouri, Truman School of Public Affairs, Missouri Legislative Academy, 2004; <http://truman.missouri.edu/uploads/Publications/MLA%2049-2004.pdf>.
- Hoxby, Caroline M. “All School Finance Equalizations are Not Created Equal.” *Quarterly Journal of Economics*, 2001, 116(4), pp. 1189-231.
- Hoxby, Caroline M. and Kuzienko, Ilyana. “Robin Hood and His Not So Merry Plan: Capitalization and the Self-Destruction of Texas’ School Finance Equalization Plan.” NBER Working Paper 10722, National Bureau of Economic Research, August, 2004.
- Hussar, William and Sonnenberg, William. *Trends in Disparities in School District Level Expenditures Per-Pupil*. Washington, DC: National Center for Education Statistics, 2000.
- Kane, Thomas J.; Orszag, Peter R. and Gunter, David L. *State Fiscal Constraints and Higher Education Spending: The Role of Medicaid and the Business Cycle*. Washington, DC: Brookings Institution, 2003.
- Ladd, Helen F. and Hansen, Janet S. *Making Money Matter: Financing America’s Schools*. Washington, DC: National Academy Press, 1999.
- Murray, Sheila E.; Evans, William N. and Schwab, Robert M. “Education-Finance Reform and the Distribution of Education Resources.” *American Economic Review*, September 1998, 88(4), pp. 789-812.
- National Center for Education Statistics. *Digest of Education Statistics, 2002*. Washington, DC: United States Department of Education, 2002.
- Roza, Marguerite and Hill, Paul T. “How Within-District Spending Inequities Help Some Schools Fail,” in Diane Ravitch, ed., *Brookings Papers on Education*

Podgursky and Springer

Policy, 2004. Washington, DC: Brookings Institution, 2004, pp. 201-28.

Rose v. Council for Better Education (KY), 790 S.W.2d 186, 60 Ed. Law Rep. 1289 (1989).

Serrano v. Priest (CA), 5 Cal. 3d. 584, 96 Cal Rptr. 601, 487 P. 2d. 1241 (1971).



School Accountability and Student Performance

Eric A. Hanushek and Margaret E. Raymond

The introduction of student accountability systems across the United States has been controversial both because of its focus on standardized achievement tests and because of questions about its effectiveness. Past evidence, however, shows that performance on standardized tests of the type central to state accountability systems has powerful economic effects. Additionally, analysis of performance across states indicates that accountability policies in general lead to higher levels of achievement, though the magnitudes of the effects are influenced by the design of the policy. Finally, however, despite positive effects overall, recent work shows that these policy instruments are not effective at closing the black-white achievement gap.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 51-61.

Since the passage of the No Child Left Behind Act (NCLB), a common question has been: Is it working? Of course, analyzing the overall impacts of NCLB is difficult if not impossible. The policies are very recent. But, more than that, there is no obvious comparison group because all states fall under the purview of NCLB. Nonetheless, because many states had previously introduced their own accountability systems—systems that became the heart of most states' responses to NCLB—it is possible to examine these states' experiences and infer many of the overall effects of the federal legislation.

This paper presents a nontechnical overview of the findings of analyses of state accountability. It summarizes three central results:

- Performance on typical “state accountability” standardized tests is tied directly to economic effects;
- accountability policies in general lead to higher levels of achievement, though the magnitudes of the effects are influenced by the design of the policy; and,

- despite positive effects overall, recent work shows that these policy instruments are not effective in repairing existing disparities in performance by race.

THE IMPORTANCE OF SCHOOL QUALITY

Much research on how schooling affects individual earnings has focused merely on attainment, or the *quantity* of schooling, but more-recent research has turned to issues of *quality*. This alternative focus is consistent with the current attention policymakers are paying to student testing and accountability in the United States, United Kingdom, and elsewhere.¹

Recent research in the United States shows that the quality of schooling relates to real differences in earnings and attainment. Three recent studies provide direct and quite consistent estimates of the

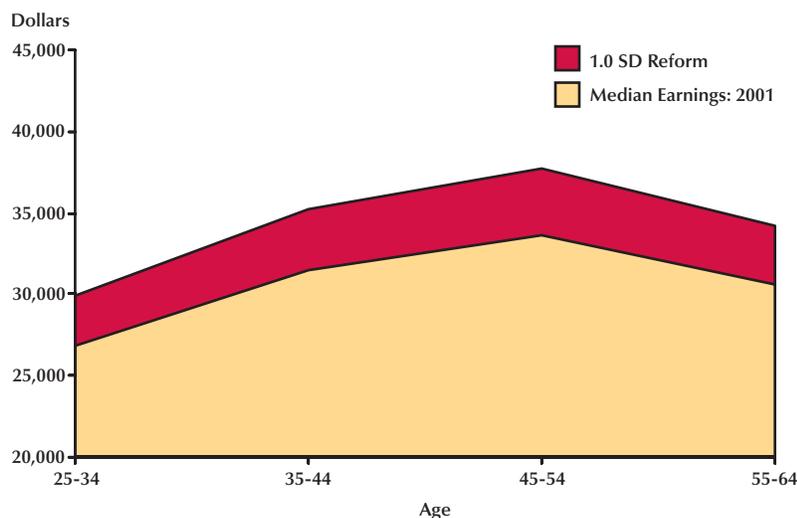
¹ A more complete discussion of the issues in this section can be found in Hanushek (2004): www.hanushek.net.

Eric A. Hanushek is the Paul and Jean Hanna Senior Fellow, and Margaret E. Raymond is the director of CREDO (Center for Research on Education Outcomes) at the Hoover Institution, Stanford University.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

Figure 1

Median U.S. Individual Earnings with 1.0 SD Reform



NOTE: SD is standard deviation.

impact of test performance on earnings (Mulligan, 1999; Murnane et al., 2000; and Lazear, 2003). These studies use different nationally representative data sets that follow students after they leave school and enter the labor force. When scores are standardized, they suggest that a 1-standard-deviation increase in mathematics performance at the end of high school translates into 12 percent higher annual earnings.²

Figure 1 graphically portrays the impact of higher quality of schooling: Comparing the median earnings in 2001 of a typical individual in the United States with the amount they would earn if the quality of their schooling had been 1 standard deviation higher (i.e., if their measured achievement

changed from the 50th percentile to the 84th) shows that expected earnings shifts upward by some 12 percent each year throughout their working career. Although the research is less extensive, similar or larger magnitudes of earnings improvement have been found in other countries.

Moreover, although not shown in this figure, there are additional gains that would accrue because individuals with greater skills tend to continue farther in schooling—that is, to have higher school attainment. Murnane et al. (2000) separate the direct returns to measured skill from the indirect returns to more schooling and suggest that perhaps one-third to one-half of the full return to higher achievement comes from further schooling. (Figure 1 shows just the direct effects of skills, not including the indirect effects from added schooling.) Note also that the other side of increases in school attainment from quality improvements is a decrease in school drop-out rates. Specifically, higher student achievement keeps students in school longer, which will lead to, among other things, higher graduation rates at all levels of schooling.

Another place to look for the economic impact of school quality is the effect on the growth in

² Murnane et al. (2000) provide evidence from the “High School and Beyond” survey and the national longitudinal survey of the high school class of 1972. Their estimates suggest some variation: male students obtain a 15 percent increase and female students a 10 percent increase in earnings per standard deviation of test performance. Lazear (2003), relying on a somewhat younger sample from the national education longitudinal study of 1988, provides a single estimate of 12 percent. These estimates are also very close to those in Mulligan (1999), who finds 11 percent for the normalized Armed Forces Qualification Test in the national longitudinal survey of youth data. By way of comparison, estimates of the value of an additional year of school attainment are typically 7 to 10 percent.

Figure 2
Effect of Economic Growth on U.S. Income

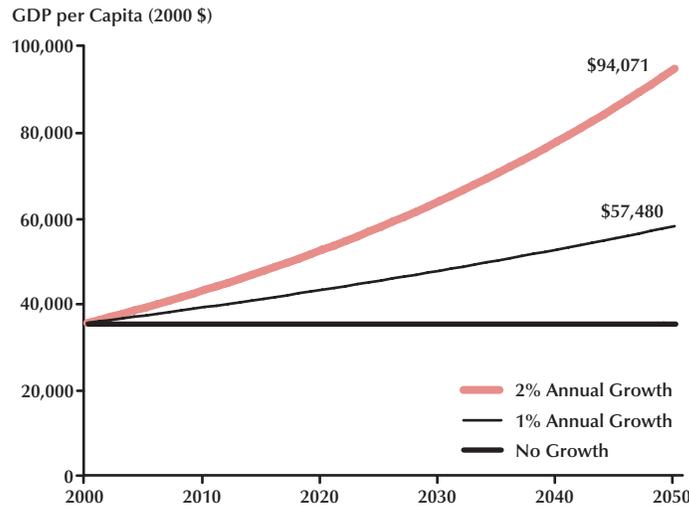
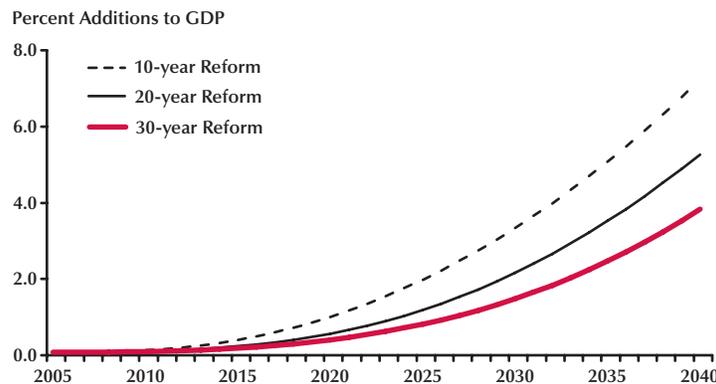


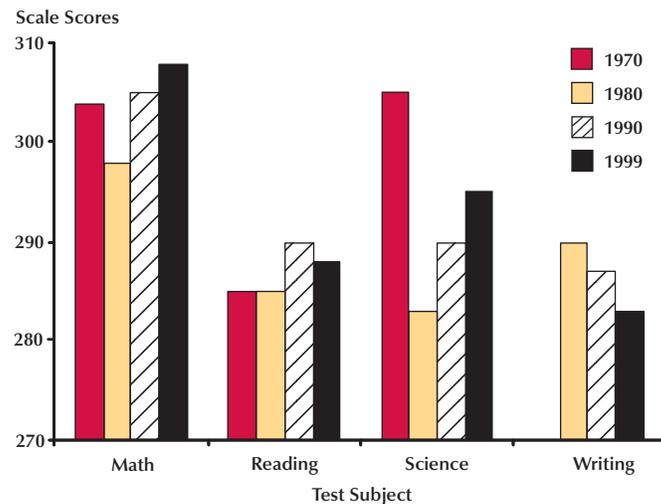
Figure 3
Improved GDP with Moderately Strong Knowledge Improvement



national income. Economists have demonstrated that productivity gains that are directly related to human capital fuel increases in the gross domestic product (GDP) of a nation. GDP growth, in turn, is what improves the standard of living for its citizens. Furthermore, the benefits of productivity growth compound over time, to dramatic effect. With U.S. economic levels as shown in Figure 2, if the econ-

omy grew by 1 percent per year starting in 2000, GDP per capita would increase by 65 percent by 2050. Were the economy of the United States to grow at 2 percent per year, the GDP per capita would go from roughly \$35,000 to over \$94,000.

Research on how school quality affects growth shows that a 1-standard-deviation increase in student achievement (moving from the 50th to the 84th

Figure 4**National Assessment of Educational Progress (NAEP), Age 17**

percentile) translates into 1 percent faster growth (Hanushek and Kimko, 2000). That is, after allowing for any other factors that might affect growth, improvements in student outcomes have a very powerful impact on growth, leading to the kind of gains found in Figure 2.

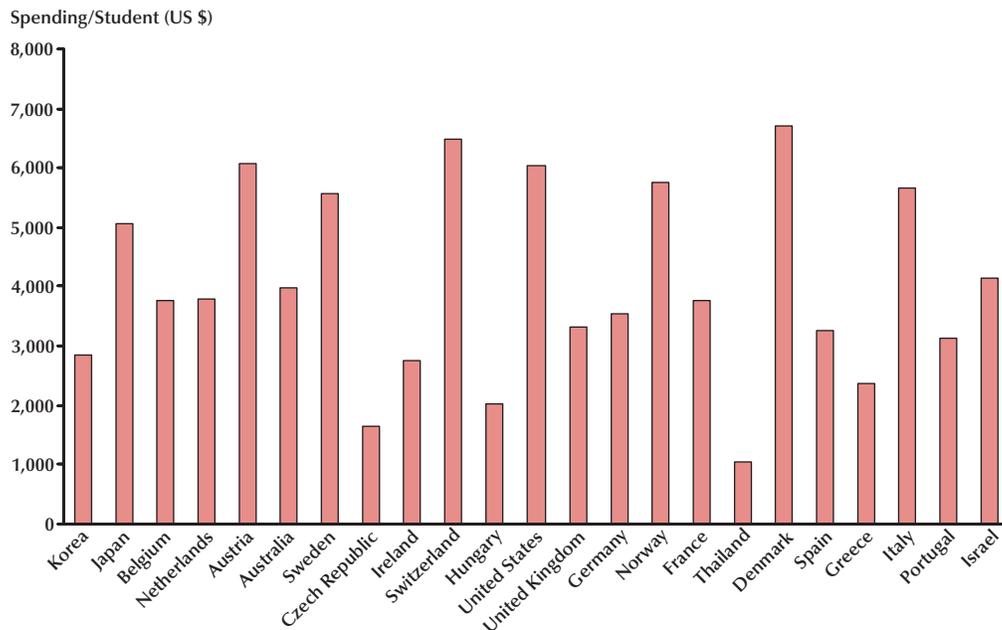
The pattern of economic effects depends on two factors: the size of achievement gains and the speed with which they are obtained. The faster the United States introduces quality-oriented education reforms, the faster it will be able to realize the benefits offered by such an approach. Consider the effects of achieving a moderately strong gain in knowledge, as measured by moving from the median to the 69th percentile (i.e., 0.5 standard deviations) over differing time horizons. Figure 3 illustrates the impact on the level of GDP arising from moderately strong gains in knowledge over 10-, 20- and 30-year time frames. If it takes 30 years to achieve that level of improvement, the GDP in 2040 will be approximately 4 percent higher than it otherwise would be. This gain in GDP would essentially pay for all primary and secondary expenditures. In other words, the growth dividend *from true reforms that led to real student achievement gains* would make schooling free. If those quality

gains can be realized in 20 years, then the compounding is more pronounced and 2040 GDP will be greater by 5 percent. With a 10-year horizon for improvement, the GDP gain in 2040 will be nearly 7 percent. Reaching higher achievement levels in a shorter period of time is clearly more difficult, but it yields compensating gains.

RESOURCE RICH, RESULTS POOR

Despite decades of effort, no resource-oriented policies have achieved results that are as significant as those described here. The evidence is consistent across many countries—in the United States and foreign nations, in developed countries and developing ones—that “throwing money at schools” does not result in improvements (see Hanushek, 2003).

We have learned this lesson with difficulty in the United States. We have witnessed large growth in teacher investments, as measured by the share of teachers with Master’s degrees and decreased pupil-teacher ratios. We have more experienced—and thus more highly paid—teachers than in past decades. And perhaps most dramatically, we have tripled our average real per-pupil spending since 1960.

Figure 5**TIMSS Performance and Spending (Countries Ranked by TIMSS Aggregates)**

But the rewards are slim to none. As shown in Figure 4, U.S. performance on the National Assessment of Educational Progress (NAEP) has gained only slightly in reading and math and has actually declined in science and writing. This is hardly a sterling endorsement for increasing spending further.

The international picture is similarly unhelpful. If resources were significantly and positively related to performance, one would expect to see that countries who scored the highest in the Trends in International Math and Science Study (TIMSS) would spend the most and that lower-performing countries would spend less. However, as laid out in Figure 5, which ranks countries by TIMSS performance, no such pattern exists. Of note, the United States is among the countries with the highest expenditures but ranks near the middle in terms of performance.

FOCUS ON ACCOUNTABILITY

Over the past decade, a sea change has occurred in the design of education policies in many coun-

tries around the globe.³ Policies have shifted from attending to inputs and processes to a focus on the outcomes realized by students. The change has emerged through the widening practice of testing students against a common set of expectations about learning objectives for each grade. Thus, standards, testing, and accountability go hand in hand.

Where countries have a single education administration, as in Taiwan or the United Kingdom, students often face national exams. Countries with federal systems of government in which education is a federal responsibility operate in similar ways. In the United States, the responsibility for education resides in the 50 individual states. Over the past 10 years, states have adopted their own policies at different times, which created a diversity of accountability policies and testing programs as well as different adoption dates. States differed also in the use of rewards and sanctions. Figure 6

³ The explicit modeling of accountability is fully developed in Hanushek and Raymond (2005). This section relies on the results in that study.

shows the pattern of the adoption of accountability systems by states. It also shows the division between “report card” states (those simply reporting results to the population) and “consequential” states (those attaching varying rewards and sanctions to school performance).

Not surprisingly, the adoption of accountability policies has produced a range of education outcomes as well.

The closest thing to a national examination in the United States is the NAEP. The program is designed to test a representative sample of students in 4th, 8th, and 12th grades in reading, mathematics, science, and other subjects regularly. Starting in 1992, the methods used to select student samples were intended to provide representative results at the state level. Participation, until recently, was voluntary for individual states, so states could test in only one subject or restrict the grades that were tested. Still, it is the only available common measure of performance across states.

In recognition of the heterogeneity of student results, the U.S. Congress in 2001 passed sweeping education reform legislation, the No Child Left Behind Act. Although not completely standardized, NCLB pushes toward a common practice on accountability throughout the United States. Although the law respects the states’ rights to design both education policies and standards/testing policies, it requires each system to test students annually, requires all states to report on a limited set of performance metrics, and introduces a common set of consequences for schools that fail to show acceptable results. The policy also requires states to establish their own standards of proficiency using their state standardized test, though the actual thresholds of “below proficient” and “proficient” may differ across states.

We are able to capitalize on the staggered adoption and diversity of accountability programs to study in a general way the effect of this important change on student performance. (Clearly, the NCLB has equalized the program characteristics and, thus, has ended the national accountability experiment of state-level differences.) Combined with the periodic scores reported on NAEP tests, which were given every four years throughout our evaluation period, three research questions can be addressed:

- Does accountability work?
- Are the impacts common for all subgroups?
- Are there policy attributes that affect results?

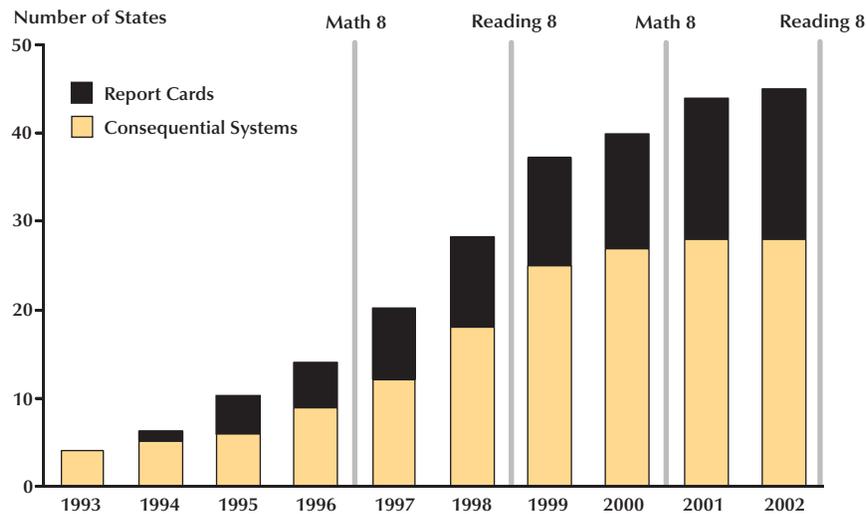
It is important to note that the analysis is limited in several respects. Some states did not adopt an accountability system at all until required by NCLB, thus limiting the observations of accountability effects. Second, state participation in NAEP is voluntary; so, even among those states with accountability policies, data were lacking for some grades in some years. States also differed in their decisions to exclude students on the basis of disability, language proficiency, or time since entry into a school from taking the test; accordingly, there is some mixing of students across states and over time within states. Finally, accountability was not the only reform initiative that states implemented over the study period, but the impacts of these other initiatives are difficult to isolate.

How Well Do Accountability Systems Work?

Accountability policies have two general characteristics: They provide performance information about a school in a consistent way, and they require all schools to face similar treatment based on their results. States create an aggregate score for each school based on individual student test scores. Because states differ in the way they measure school performance, they may send different signals to schools and, ultimately, promote different policy results. Our basic assessment of existing accountability systems does not distinguish among design features of different states, although later we suggest that the designs are very different and are likely to affect performance more or less strongly. The school score is then used to determine the performance of schools against some pre-set criteria. These evaluative ratings are intended to provide feedback and offer objective motivation to spur improvement. Second, what happens to schools once they obtain their scores differs by state. As noted previously, some states merely make the information public (known as report card states), whereas others introduce consequences in the form of rewards and/or sanctions. The current analysis looks at the impact of having consequences to test whether the design

Figure 6

State Accountability Over Time



NOTE: Gray bars indicate NAEP testing dates.

characteristics of state accountability systems matter. We return later to issues of overall design.

Conditional Consequences. Accountability programs differ in how they use accountability scores, and such differences may influence the effectiveness of the program. Earlier research identified two general approaches. The first uses public disclosure to motivate interested parents, school boards, the media, and civic leaders to demand better performance from low-scoring schools. This approach relies on release of scores over the Internet and publication and comment in local papers. The second and more direct approach incorporates into the accountability program’s design a set of consequences—typically monetary awards, Blue Ribbon designations, or punitive actions such as probationary status or threat of reconstitution—to prompt schools to improve.

As shown in Figure 6, between 1993 and 2002, 43 states adopted accountability programs. Of these, 29 programs included consequences and 14 used a report card approach. The markedly different mechanisms of influence provide the chance to study whether this design feature is influential in the educational improvement of states. Considera-

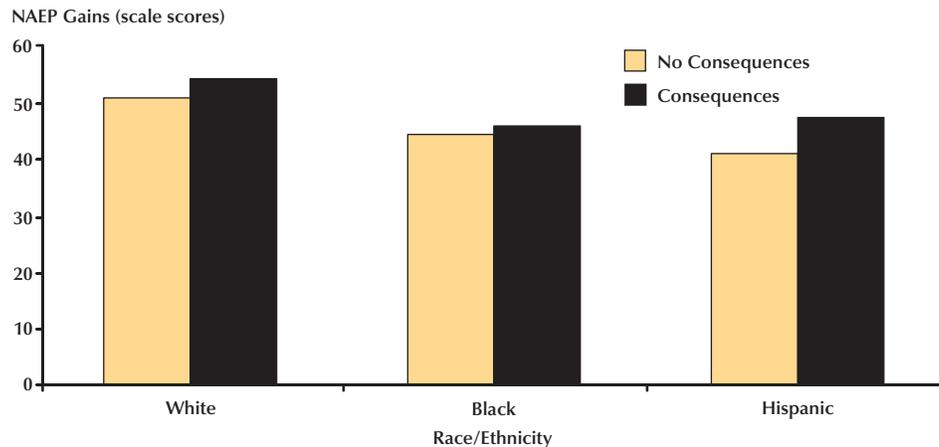
tion of the type of accountability system was incorporated into the overall test of the effectiveness of accountability to which our discussion now turns.

Modeling the Effectiveness of Accountability. The availability of NAEP test results on repeated administrations of the test provides a unique opportunity to examine the staggered adoption of accountability policies across the states and to test their impact on the rate of improvement in student academic achievement. Conveniently, NAEP tests students in the 4th and 8th grades in reading and math every four years; so, for states that test students in both grades, over time the same cohort is captured as it moves through school.

For both reading and math, we can test the progress of two cohorts of students in states participating in the NAEP. As noted in Figure 6, we can use 8th grade math scores in 1996 and 2000 and reading scores in 1998 and 2002 (combined with 4th grade scores four years prior). As long as we can control for cohort differences in family background (e.g., parental education, race/ethnicity, poverty), average state education spending, and testing exclusions over the period, the growth in achievement across cohorts can be compared for

Figure 7

Effect of Consequential Accountability on Achievement by Race/Ethnicity



states that had adopted accountability over the period of study against states that did not. We further exploit the disaggregation of NAEP results by race and ethnicity (white, black, and Hispanic). We pool the disaggregated state test data for both reading and math.

We also consider the difference in the system design (consequence vs. report card) and a fixed-state effect to reflect any other policy changes that the state might have adopted to improve student performance. Multivariate econometric modeling was used to discern the impacts of the factors we examined. (The full models estimated are reported in Table A1 of the appendix.)

The overall difference in performance between 4th and 8th grades that comes from accountability is displayed in Figure 7. For each group of students, the expected growth in achievement is higher in states that implement accountability systems than in states that do not.

The improvement was realized by states that attached consequences to schools’ performance. However, states with “report card” accountability programs had no significantly different achievement levels from those of states without any accountability program.

Other results are also noteworthy. Testing exclusion rules were negatively significant—the more

students excluded, the better the results; nonetheless, exclusion rates vary across states in a way that does not affect the estimated importance of accountability. Differences in per-pupil spending were not significant in explaining the differences in learning gains. This latter finding is consistent with a large body of earlier work; in this case, the finding provides especially important insight because many states face pressure to dramatically increase spending to promote better learning.

At the same time, by comparing the gains for each group, it is clear that accountability has different impacts on the groups. The overall differences are shown in Figure 8, which identifies the black-white and Hispanic-white achievement gaps both with and without accountability. The comparisons (measured in standard deviation units) show that accountability closes the gap for Hispanics but widens it for blacks.

DESIGN ISSUES

Although each adopted its accountability system independently, states copied student testing and school scoring design from each other.⁴ Although

⁴ A more complete discussion of these design issues is found in Hanushek, Raymond, and Rivkin (2004).

Figure 8

Racial/Ethnic Gaps by Consequential Accountability Status: NAEP Gains Relative to White Students

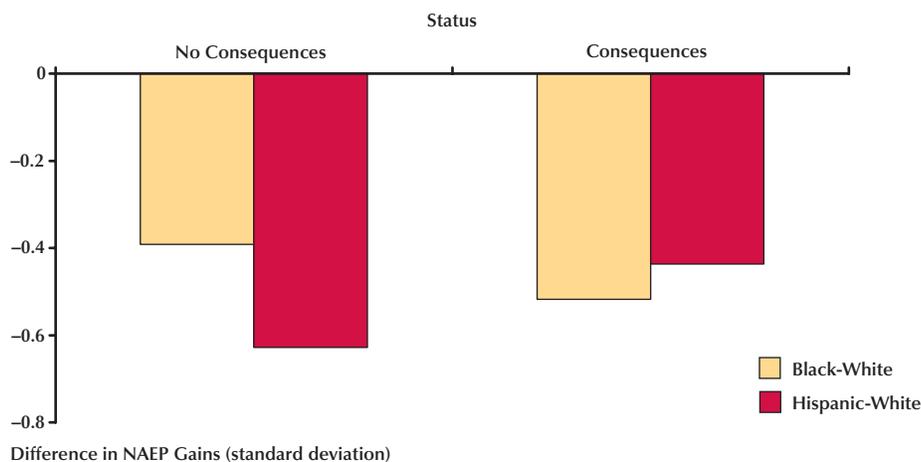


Table 1

Simple Correlation of Alternative School Accountability Measures: TAAS Math for Grades 5 and 6

	Average score	Average gain	Relative gain
Average score	1.00		
Average gain	0.27	1.00	
Relative gain	0.67	0.86	1.00

NOTE: Correlations are weighted by the number of students in each school. These data exclude all students moving into school during the year plus those eligible for special education or bilingual programs. Each measure is calculated for individual grades and then aggregated to the school level.

small distinctions arose, the systems fall into a few groups; the differences provided the chance to examine the design features of these systems and learn whether they influence the effectiveness of accountability as a policy. We found that design does matter: The results that states obtain can be markedly different based only on the approach they use.

School Scores

We begin by looking at the individual student test score. We know that the score a student receives on an achievement test is influenced by multiple factors: earlier learning, family background, test

measurement error, and the actual contribution of his schooling in the year tested. But a test score at one point in time captures the effect of all these, not simply that of the school.

Depending on the method of aggregating a school score from student-level scores, the school score also captures these other factors to varying extents. *Simple averages* of annual test scores produce results that can differ over time simply because of changes in the student population, a real problem in schools with high student mobility rates. Purer results are obtained when school scores aggregate the *gain scores* for individual students over time (that is, the improvements in their scores); the influences of family background and prior learning tend

to disappear when these scores are used. Still, the magnitude of gains may depend on the starting point—low-performing students may achieve higher gains than high-performing ones—so comparison across schools may be problematic. For this reason, a third method (not currently in use but valuable for comparison purposes) examines gains relative to other like-situated schools. We refer to this approach as the *relative gain score*.

To gauge the effects that program design has on school scores, we compute then compare the rankings of schools over the same set of student scores. The student scores from the Texas Assessment of Academic Skills (TAAS) test for 5th and 6th graders for over 1000 schools were used. If no difference in the computational methods existed, the correlations of school ranks should be unitary. The correlation results are shown in Table 1. The low correlation of the simple average and gain scores, at 0.27, is particularly troublesome since these are the two methods most widely used in the United States today. Even more troubling is the finding that the different rankings result in many schools moving from the top quartile to the bottom and vice versa, completely reversing the signal about the effectiveness of the school. Better alignment is seen between the other comparisons, which may suggest new options for calculating scores. It is difficult to judge the success of national reform programs if the outcome metrics used in those inquiries are so unrelated.

CONCLUSIONS

Improving educational quality has a dramatic effect on the economic well-being of individuals and nations. The original research described here reinforces the idea that public policies can positively affect the course of education quality. The findings demonstrate that, overall, the adoption of accountability policies produces higher academic gains than having no policy, but that the impacts are not equally distributed across all student groups. We also find that the designs of the systems themselves must receive careful attention so that consistent and accurate information about school performance can be obtained.

REFERENCES

- Hanushek, Eric A. "The Failure of Input-Based Schooling Policies." *Economic Journal*, February 2003, 113(485), pp. F64-98.
- Hanushek, Eric A. "Some Simple Analytics of School Quality." NBER Working Paper 10229, National Bureau of Economic Research, January 2004.
- Hanushek, Eric A. and Kimko, Dennis D. "Schooling, Labor-Force Quality, and the Growth of Nations." *American Economic Review*, December 2000, 90(5), pp. 1184-208.
- Hanushek, Eric A. and Raymond, Margaret E. "Does School Accountability Lead to Improved Student Performance?" *Journal of Policy Analysis and Management*, Spring 2005, 24(2), pp. 297-327.
- Hanushek, Eric A.; Raymond, Margaret E. and Rivkin, Steven G. "Does It Matter How We Judge School Quality?" Paper presented at the American Education Finance Association annual meetings, Salt Lake City, Utah, March 11-13, 2004.
- Lazear, Edward P. "Teacher Incentives." *Swedish Economic Policy Review*, 2003, 10(2), pp. 179-214.
- Mulligan, Casey B. "Galton Versus the Human Capital Approach to Inheritance." *Journal of Political Economy*, December 1999, 107(6, Part 2), pp. S184-224.
- Murnane, Richard J.; Willett, John B.; Duhaldeborde, Yves and Tyler, John H. "How Important Are the Cognitive Skills of Teenagers in Predicting Subsequent Earnings?" *Journal of Policy Analysis and Management*, Fall 2000, 19(4), pp. 547-68.

APPENDIX

Table A1

Differential Racial and Ethnic Impact of Accountability on State Growth in NAEP Reading and Mathematics Performance (4th to 8th Grade), 1992-2002

	Accountability by ethnicity	Disaggregation of state accountability
Consequential accountability	3.40 (2.8)**	3.54 (3.0)**
Consequential accountability x black	-2.04 (2.0)*	
Consequential accountability x Hispanic	3.10 (2.4)*	
Disaggregated x Hispanic		-2.35 (2.0)*
Disaggregated x black		3.02 (2.0)*
Report card system	0.72 (0.6)	0.72 (0.6)
(%Population age 25+) \geq high school	0.05 (0.7)	0.06 (0.9)
School spending, \$/ADM (\$1000)	-1.14 (0.6)	-1.07 (0.6)
Change in exclusion rates	0.50 (3.5)**	0.51 (3.5)**
Black	-6.34 (2.5)*	-6.76 (2.6)**
Hispanic	-10.17 (4.4)**	-9.80 (4.2)**
Minority exposure x black	-8.59 (2.7)**	-8.16 (2.4)*
Minority exposure x Hispanic	-4.90 (1.4)	-4.98 (1.4)
Observations	348	348
Number of states	42	42
R ²	0.956	0.956

NOTE: **/ ** Indicates significance at the 5/1 percent levels. All models are estimated with state fixed effects. Models include NAEP 4th grade scores for reading and math (lagged four years) and indicator variables for test and period. Absolute value of robust *t* statistics (with clustering by state) in parentheses.



Discussion

Steven G. Rivkin

The passage of the No Child Left Behind Act (NCLB) represents a major shift in the federal role in elementary and secondary education. Whether it succeeds in raising academic achievement and improving subsequent economic and social outcomes remains to be seen. As Hanushek and Raymond point out, the recent, nationwide implementation of NCLB makes it very difficult to identify the impacts of the reform. This difficulty led them to use existing evidence to predict the likely effects of the law. A sensible approach. Of course, the predictive power of the existing evidence depends on both the strength of that evidence and its relevance to the accountability reforms mandated by NCLB.

The paper begins by documenting the growing body of evidence showing that mathematics achievement raises earnings and economic growth, both directly and indirectly, by increasing educational attainment. The evidence indicates that school quality improvements could have substantial economic benefits and affect both average earnings and the degree of inequality. Therefore education reforms could have a large economic payoff.

Questions do remain about the overall magnitude of the effects and the impact of school quality improvements on the earnings distribution. If those who have a higher expected return to learning mathematics tend to receive better instruction or put forth higher effort, returns based on earnings differences may understate the value of mathematics knowledge for some (engineers, for example) and overstate the value for others (writers or laborers, for example). Higher mathematics achievement may

also be related to other determinants of earnings, including family income and wealth, in which case the observed return to mathematics knowledge could conflate the actual return and related advantages of growing up in a higher-income family. Alternatively, evidence on the returns to mathematics skills, such as the returns depicted in Figure 1, may understate the true return by assuming that the increase in one's earnings is constant in percentage terms throughout one's career. Most studies use samples of younger workers early in their careers, and those with higher mathematics skills may be "investing" more in the sense of foregoing current earnings to obtain additional skills that will increase future earnings. Yet despite these and other concerns, the weight of the evidence points to a strong economic payoff to raising mathematics knowledge, meaning that the benefits of accountability reforms depend on their effects on school quality.

Accountability systems adopted prior to NCLB facilitate the study of accountability effects. The authors point out the substantial variation in program structure and emphasize the importance of design details, including the type and severity of sanctions, generosity of rewards, and method for estimating school and teacher effects. Long-run success of accountability systems depends on a consensus of belief that teacher and school evaluations and rankings are based on actual quality and not on the skills that students bring to the classroom. Proper assessment requires the development of comprehensive data systems that can also be used in the study of state education systems more broadly. Not only would flawed assessment fail to

Steven G. Rivkin is an associate professor of economics at Amherst College.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 62-63.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

reward or sanction based on true quality, it would discourage high-quality teachers and administrators from remaining in and entering public education.

Hanushek and Raymond argue that variation in the timing and structure of state accountability systems adopted prior to the passage of NCLB can be used to estimate the effects of reforms that are similar in many respects to NCLB. Complications arise because differences in the timing and extent of reforms may be related to other factors that affect achievement, making it difficult to isolate the accountability effects. For example, states may implement a number of reforms in response to low performance or changes in the political climate. These include alignment of the curriculum more closely to the type of material covered on the National Assessment of Educational Progress (NAEP) examination, the test used in this and other papers. Consequently, observed changes in test scores could result from a number of factors, necessitating the identification of a comparison group that would provide a benchmark of achievement changes not resulting directly from the newly adopted accountability system. States yet to adopt accountability systems are good candidates, but they may fail to capture other systematic changes experienced by the accountability adopters.

The results suggest that high-stakes accountability systems raise achievement, but there is reason to interpret the findings with some caution due to the variation in program characteristics—the possibility that other factors are contaminating the results—and to the pattern of the results. Specifically, given that state tests tended to focus on less-

advanced skills, improvements in schools serving poor and minority students with lower initial scores would be more likely to be captured on the tests. Moreover, one might expect the introduction of high-stakes examinations to have a larger impact on schools serving predominantly minority and lower-income students whose families likely placed less pressure on school administrators to raise quality than did families of middle and upper class students who can more easily opt out of underperforming schools by switching to the private sector or moving to a different community.

Additional concerns revolve around the question of the size of the effects on longer-run outcomes, including academic attainment, earnings, and economic growth. The fact that the NAEP data is not the assessment used in the accountability programs certainly mitigates the likelihood that test score increases do not carry over to longer-run outcomes or even other tests in the same subjects. Nonetheless, reports of extensive time devoted to test-taking instruction and additional emphasis on the test material vis à vis other subjects highlights the importance of structuring the incentives correctly.

Finally, although frustration with resource-based policies has been a catalyst for the growing demand for accountability and other incentive programs, expanded resources and more-rigorous incentives are not mutually exclusive tools for improving the schools. In fact, one measure of the success of accountability efforts is the extent to which these reforms increase the return to financial investments in the public schools.



Commentary

Gerri Ogle

Associate Commissioner, Missouri Department of Elementary and Secondary Education

In 2005, the Missouri legislature adopted a new school foundation formula, which will be phased in over seven years, beginning in 2006-07. It is based on the current expenditure of local and state dollars in those districts meeting all performance standards established by the State Board of Education. It is designed to ensure that all districts have at least the “state adequacy target” of money behind each child if the district chooses to have a tax levy equal to or greater than the performance tax levy. For the 2006-07 school year, the target funding level is \$6,117 per student; this amount will be recalculated every two years.

Also, an additional allocation will be available for school districts that have a higher-than-average number of students with unique special education needs, with limited English proficiency, or who qualify for free or reduced lunch.

Because the state adequacy target includes expenditures for the previously identified categories of students, the following items will no longer be categorically funded:

- exceptional pupil aid
- gifted education
- remedial reading education
- fair share fund
- text book fund
- line 14 of current formula (“at-risk” programs).

The net effect is that districts must think differently now because they have a total number of dollars with which to address the educational needs of all students rather than specified amounts that must be spent on certain categories of students.

The performance tax levy is established at \$3.43. This means that a one-time calculation will be made ($\$3.43 \times$ the 2004 assessed valuation in the school district) when determining the amount of state aid needed to achieve the state adequacy target in that district. A dollar value modifier is created to recognize districts’ increased costs as measured by higher wages, primarily in metropolitan areas. This formula will be phased in over seven years beginning in 2006-07.

Other funding will be distributed as follows:

- A \$15 million Small School Fund will be distributed to all districts having 350 or fewer students in average daily attendance (ADA). Two-thirds of that money will be distributed on an ADA basis; the other third will be distributed on a prorated basis to those districts with levies greater than the \$3.43 performance levy. The net effect of the proration is that districts with the highest levies that are eligible for the Small School Fund will benefit the most. (A change from the current formula removes the extra weighting for summer school average daily attendance.)
- A Classroom Trust Fund will be created to provide a separate accounting for money generated by riverboat gaming. Local districts will have great flexibility in the expenditure of this money.
- A fund will be created to reimburse districts for the educational costs of students with disabilities when the costs for a child’s services exceed three times the district’s current expenditure per ADA.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 64-65.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

The formula also calls for the minimum salary for a teacher to be \$22,000 in 2006 and moved to \$25,000 in 2010. A teacher with a master's degree and 10 years of experience must earn at least \$30,000 in 2006-07 and \$33,000 by 2009-10.



Commentary

The Honorable Brian L. Baker
Missouri State Representative

For 10 years Missouri has worked under the idea that the best way to fund education is to look at the taxing ability and tax demographics of a local district and then decide how much state aid should be provided to schools.

However, the ideology of that formula and its components caused the funding system to grow out of control. The formula was flawed in that it did not look at student need or student success. One must also remember that the past funding model was simply that—a model—with no basis for accounting for student need or assessment.

Missouri has undertaken a 180-degree change in its method of funding education. Instead of looking at numbers and tax abilities of districts, it now looks at student need and student success.

Today, Missouri—like many states—is facing a lawsuit by school districts claiming that the state is not equitably or adequately funding education. This group of 250 school districts claims this lawsuit has driven the state to make changes.

This is not the truth. The process to review and rewrite the formula began before the lawsuit was filed. In fact, an interim committee headed by State Senator Charlie Shields traveled the state to start collecting input before the school districts united in their lawsuit.

Further, in the development of the new formula, not one major education group testified against the “Successful Schools Funding Model.” These groups offered small changes and ideas, but overall supported the direction of the new formula.

Beginning in 1993, this foundation formula took four years to be fully phased in. This new for-

mula, because of its sweeping change in direction, will take seven years to fully phase in, but will add an additional \$900 million to education in that time period.

Still, school districts claim it is not enough.

Today, the 250 school districts suing the state are asking for \$2 billion in new tax revenue. Many of the school districts hope the lawsuit will create a Robin Hood approach where growing districts with large local effort will send their local tax dollars to small and poor districts. This method of funding schools was ruled unconstitutional in Texas.

It is apparent that the 250 school districts suing the state are dealing with several conflicts within their own group. It would even seem that the lawyer representing these school districts is facing a conflict of interest with these school districts.

Other schools want the state to invest \$1 billion in new taxes to help build schools. However, Missouri has always allowed local school districts to fund buildings with local dollars. Very few states can or will invest dollars in buildings.

Missouri is unlike every other state that has faced a lawsuit regarding funding. Voters approved a state constitutional measure that requires the state to spend 25 percent of its funds on education. Missouri is exceeding that mandate.

Missouri has seen its student population flatline in the past five years while education funding has increased 10 percent in that same time period.

Every state that has faced a lawsuit has seen the judicial branch favor the school districts’ claims. However, in Arkansas, when school districts won their lawsuit, the legislature developed the political

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 66-67.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

willpower to consolidate districts. School districts truly risk a worse scenario as they seek a judicial action.

In the end, one very important question needs to be addressed. Which branch of government is responsible for funding and defining what education needs? Even if the judicial branch were to favor the school districts involved in the lawsuit, how will the courts enforce any of their rulings? The day is coming where the authority of the judicial branch on the legislature will be challenged.

Missouri's new funding formula moves away from the practice of basing funding on the taxing capacity or tax demographics of a school district. Instead, it looks at the annual performance report of school districts and finds the average spending of the districts that score a perfect 100 percent. Then, it weights the needs of special education, poor students, and English proficiency students. It takes into account the cost of living and the local funding effort of a school district.

The Successful Schools Funding Model looks at student success and student need to account for the state input into education. It allows for growth and works to continue providing an adequate and equitable education for students.

Missouri faces many challenges. Yet, amidst the arguments facing education, Missouri has developed a legitimate and sound funding model that truly address equity and adequacy.



Commentary

The Honorable Yvonne Wilson
Missouri State Senator

I am Senator Yvonne Wilson, representing the Ninth District in the Missouri State Senate, which encompasses part of Jackson County. Thank you for the opportunity to discuss the challenges facing education funding in Missouri and in the Kansas City area in particular.

The Kansas City School District remains in a state of transition—from its status under court oversight stemming from the desegregation lawsuit to a unitary status (i.e., free of court oversight). The Kansas City School District has petitioned the Department of Elementary and Secondary Education to approve a re-review of the district for full accreditation.

Outgoing Kansas City school superintendent Bernard Taylor was recently asked about the most difficult part of his job. His response: “school finances.” Dr. Taylor says the difficulty is *balancing what you have to do to remain fiscally solvent with what you have to do to meet the needs of students*. Adding to the district’s financial woes are reductions in state support and the attempted diversion of limited resources to charter schools.

An effort to provide millions of dollars to fund a state school voucher program was defeated in the Missouri legislature this year, but supporters are sure to attempt this diversion of public school dollars to private and religious schools in the next session. The proposed “tuition tax credits” would do nothing to improve the education of the majority of children in the Kansas City School District who attend public schools.

Nevertheless, the Board of Fund Commissioners is forcing the Kansas City School District to pay up to \$6 million per year to charter schools. The money

is used by the district to pay bonds, which cover expenses for the improvement of facilities mandated by the desegregation case.

The District’s enrollment for the current year has declined, resulting in a projected net loss in revenue of more than \$4 million compared with fiscal year (FY) 2005. Each year balancing the budget becomes a little more difficult.

The District is pleased that a new state foundation formula was adopted in the previous legislative session. The new formula, Senate Bill 287, is a “student needs” driven formula, whereas the current formula relies heavily on property taxes generated at the local level.

The new formula creates a per-pupil allocation based on what it takes to adequately fund education needs of a “regular education” student. Senate Bill 287 also provides funding for “special needs” students.

Although the funding for a special needs student is a step in the right direction, there are some parts of the new formula that require some tweaking. For example, the new formula does not take into consideration districts with high percentages of special needs students. Just as consideration was given in the new formula for small districts, the formula also needs to be modified to add additional revenue to districts with high concentrations of students eligible for free and reduced lunch.

Overall, the formula provides about \$24 million in additional revenue for the Kansas City School District to be phased in over seven years beginning July 1, 2006.

Looking ahead to the 2006 Missouri legislative session, the Kansas City School Board will pursue

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 68-69.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

a number of items related to school funding, including

- supporting the elimination of the summer school penalty;
- supporting a 1.25 percent allowance for summer school attendance;
- supporting the new formula's current consolidation of Proposition C into the basic formula;
- opposing the elimination of the dollar value modifier;
- supporting the creation of a regional or county dollar value modifier;
- opposing tax credit scholarships or vouchers;
- supporting funding for after-school programs;
- opposing the "adopt-a-school" business tax credit; and
- opposing an increase in the number of charter schools in the district.

Although the new school funding formula will provide an estimated annual increase in school funding of \$838 million, phased in over seven years, a number of lawmakers, including myself, have questioned how the state will come up with this additional revenue.

Republicans constantly reject any talk of tax increases to help *fully* fund the educational needs of our children, yet they continue to propose tax breaks for large corporations and special interest groups.

Governor Blunt and his allies in the legislature claim their top priority is education, but their deeds thus far have shown their rhetoric to be empty. The children of Missouri deserve better. After all, our future is in their hands.



Commentary

Terry Adams

Superintendent of the Rolla School District

DISTRICT OVERVIEW

Rolla, Missouri, is a city of 16,367 located in mid-Missouri. The Chamber of Commerce coined the phrase that Rolla is in the middle of everywhere, but it has been argued that it is in the middle of nowhere.

Rolla is the home of the University of Missouri–Rolla, one of the best schools of engineering in the world. The primary and secondary public school district covers 234 square miles and currently serves 4,056 students. Of the 4,056 students, 1,540 or nearly 38 percent qualify for free or reduced lunches. This year, once again, Rolla’s public schools achieved the status of “accredited with distinction in performance.” Last year 28 graduating students qualified for Bright Flight scholarships, and three students were National Merit Scholarship recipients. The Rolla School District (No. 31) has 330 certificated and 246 support staff employees.

DISTRICT FINANCES

Balances in school district fund 1 (general operating fund) and fund 2 (special revenue fund, better known as the teacher’s fund) total 30.91 percent of anticipated expenditures. Although these balances might seem excessive, it will be beneficial to have them as the new formula developed and approved last year in Missouri is implemented. The formula represents the greatest change in school finance since 1993, but it is inherently flawed with respect to both equity and adequacy.

The simulations reported to this district by the state Senate appropriations staff indicate that the

increases projected for the Rolla School District will begin at \$110,373 in fiscal year (FY) 2007 and increase to \$473,831 in FY 2013. This represents an increase of 1 percent in FY 2007. Consider that it takes more than \$500,000 annually to service the existing salary schedule—that is, to accommodate increases in the salaries of teachers and staff as they earn advanced degrees and accumulate experience. These increases are built into the salary schedules for the district in much the same way as they are in nearly all school districts in Missouri. Yet, under this formula, the school district is not projected to receive enough new money from the State of Missouri to service the salary schedule, without any consideration of raises in base pay, in any one of the seven years that the new formula will be implemented. Furthermore, this does not take into account any other inflationary increases the district will inevitably incur.

To get an accurate view of how the new formula will affect the Rolla School District in future years, simulations were developed based on the following revenue assumptions:

1. Estimated an annual increase of \$5,000,000 for new construction in the district.
2. Used Missouri revenue assumptions provided by the State Senate appropriations staff.
3. Considered federal revenues to be neutral to the budget in total.

The following assumptions were made with respect to expenditures:

1. Allowed movement on the salary schedule representing a 1.6 percent annual increase.

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 70-74.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

2. Raised the base salary for FY 2007 by 3 percent, FY 2008 by 2 percent, and FY 2009 by 1 percent. No increases in pay were assumed for the last four years of the comparison.
3. Included a projected annual retirement benefit increase of 1/2 percent for certificated staff and 1/4 percent for classified staff.
4. Estimated that health insurance would increase by 5 percent annually.
5. Added a 3 percent increase for all other items as an estimate of inflation.

With these revenue and expenditure assumptions, the balances will drop from a positive 31.2 percent in FY 2006 to a negative 17.1 percent in FY 2012. Obviously, many changes will have to be made in the budget prior to FY 2012.

EQUITY

For a variety of reasons, the formula does not represent equity. The first reason is parochial in nature, but Rolla doesn't benefit as much as other districts with the new formula. Second, although it is possible that the gap between the "have" districts and the "have not" districts may narrow somewhat, the gap will still be wide enough to constitute inequity. Over the seven-year period, the district currently at the bottom, spending \$4,771, will increase per-pupil expenditure to \$6,117—plus any adjustments built into the formula. It is assumed that the district currently spending \$13,339 per pupil, based almost entirely on current taxes, will increase spending based on increases in assessed value during the same period of time. Even if this does not happen as predicted, the variance between \$6,117 and \$13,339 would fund a reduction in the pupil/teacher ratio for the districts funded at the \$6,117 level, provide better support services, and/or purchase a great deal of technology with which to teach children. Districts that spend more per pupil can provide more opportunity to learn through more time spent with individual students and more teaching resources.

Finally, the dollar value modifier (DVM) is of dubious worth from the outset if the goal is to attain equity; but as implemented, it is ludicrous. In ten

minutes of reviewing the simulations, anyone could find numerous examples of injustices that would be humorous if they didn't ultimately affect some children in a negative way. The DVM ranges from a low of 1.0 to a high of 1.103. A DVM of 1 generates no additional revenue, but any number higher than 1 does generate additional revenue. The concept is undoubtedly founded on the premise that it costs more to operate a school in an area with a higher cost of living. Although not all subscribe to that concept, it is easy to understand why the City of St. Louis and St. Louis County would be grouped together and have the highest possible DVM. It is significantly less clear why the school district in Potosi, Missouri, would also qualify for the highest possible DVM and the district in Owensville, Missouri, would have the lowest possible DVM. It also makes very little sense that the Potosi, Missouri, and the Caledonia, Missouri, school districts would receive the highest DVM, whereas the school district in Maries County, Missouri, receives nothing in the formula with respect to DVM. The St. Louis City and the St. Louis County school districts are generally large urban and suburban school districts. By contrast the school districts in Potosi, Caledonia, and Maries County, Missouri, are all small rural school districts.

ADEQUACY

Adequacy is the larger issue and the one with which everyone should be concerned. The national average expenditure per student in 2005 was \$8,618, and the Missouri average expenditure per student in 2005 was \$7,451 (National Education Association [NEA] Rankings and Estimates Table 5). The expenditure per student in the Rolla School District for the same period of time was \$6,740.25 (Department of Elementary and Secondary Education website). Missouri is well behind the national average, and the Rolla School District is well behind the state average.

Education Vital Signs (2006) includes Missouri in the north central group of states, and the expenditure per child for FY 2004 found Missouri last in those eight states, which are Illinois (\$10,439), Indiana (\$8,734), Iowa (\$7,477), Kentucky (\$7,719), Michigan (\$8,909), Minnesota (\$9,239), Missouri

Adams

(\$7,452), Nebraska (\$7,617), Ohio (\$9,573), and Wisconsin (\$9,881).

In 2005, Missouri ranked 38th in expenditures per student (NEA Rankings and Estimates Table 5). In 2003, Missouri ranked 30th in personal income per capita (U.S. Census Bureau, data on personal income per capita); but, in 2004, Missouri ranked 45th in the state’s taxes per capita (U.S. Census Bureau, data on states ranked by total taxes). The discrepancy between per capita income and per capita taxation is a primary cause for the relatively low expenditure per pupil in Missouri. The expenditure per pupil in Missouri does not compare favorably with national averages or with the group of north central states even though the per capita income of Missourians indicates the ability to spend more for education.

TIME AS IT RELATES TO ADEQUACY

Although there are many variables that affect performance, it is important to consider the variable of time and understand that time will equate to money. The average number of days attended by students nationally is 180 (Barrett, 1990). Missouri is tied with North Dakota for last place nationally, with a required 174-day school year. Schreens and Bosker ranked time as the number-one school-level factor as it relates to student achievement (Marzano, 2003, p. 17). Marzano found that time was the second most important school-level factor as it relates to student achievement (p. 18). In a speech at the International Leadership Conference in June 2005, Lezotte stated that educators should stop viewing time as a constant with learning optional and start considering time as the variable with learning as the constant. The research in the field is clear that time spent educating children affects levels of performance.

Authors Cooper and Ryan (2004) indicate that the United States is not doing well in international comparisons of academic performance as measured by the Third International Math and Science Study (TIMSS). The performance of U.S. fourth grade students is quite good, but that performance diminishes as the children progress through school. It may be that the cumulative effect of going to school fewer days than our international counterparts

has a negative impact that impedes educational growth over time. The following are some selected quotations (pp. 123-24) on the topic:

1. U.S. students don’t start out behind, they fall behind.
2. By the time U.S. students finish high school, they are not equipped to meet the international expectations demanded by a global labor market.
3. Of the 21 nations that participated in the twelfth grade, the United States outperformed only two, Cyprus and South Africa.
4. Even the most advanced students, those taking advanced mathematics and physics, scored at the bottom when compared with their counterparts in other countries.

The TIMSS study tested students in math and science at multiple grade levels. For comparative purposes, the results of the eighth grade math examination are included here—the countries that scored in the top five on the examination, along with the number of days their children attend school.

1. Singapore	255
2. South Korea	220
3. Chinese Taipei	Not available
4. Hong Kong, SAR	195
5. Japan	243

The number of days attended by students in Chinese Taipei was not available, but the remaining four countries average 228.25 days of student attendance annually. Again, the average in the United States is 180 school days and the requirement in Missouri is 174 school days. If time does in fact make a difference in student performance, the cumulative effect of attending school fewer days than our international counterparts would obviously have a negative impact on our ability to compete academically. Given that students in the United States perform well in the fourth grade and not nearly as well in the twelfth grade, it seems likely that the effect of attending school more days gives students in other nations an advantage academically.

The National Education Commission on Time and Learning states that “No matter how the assumptions underlying the figure are modified,

the result is always the same—students abroad are required to work on demanding subject matter at least twice as long as U.S. students” (Marzano, 2003). This raises the following questions:

1. Does time make a difference?
2. Should Missouri make an effort to reach the national average?
3. Do international educational achievement comparisons mean anything in an increasingly globalized economy that is increasingly knowledge based?
4. Should Missouri consider moving to international standards with respect to the issue of time?
5. What will time cost?
6. Is Missouri adequately funding education?
7. Where will our children work?

FUNDING SCHOOLS AND TAXATION

Compared with other states, Missouri is 42nd in state and local taxes as a percentage of personal income (Kessler, Stallmann, and Winter, 2006). If the plan in Missouri is to enhance the economy through low taxes, there is at least a chance for short-term success if Kansas and Illinois are considered to be competitors. If Missouri is really in competition with countries such as China and India, it will take a paradigm adjustment to regain a competitive advantage.

Maybe it is time to reconsider giving students a three-month break every year so that they can tend and harvest the crops. The three-month break in the summer traces back to a need for children to work on farms, but is now more closely aligned to the desire to have cheap labor for the tourism market. Tourism is an important element in the Missouri economy; but if tourism is enhanced by keeping Missouri at the bottom in national comparisons of the length of the school year, the cost may be far greater than the benefits.

Globalization, outsourcing, business closures, the national debt, an increase in personal debt, and the trade deficit are all warning signs. Setting the stage for education at the highest international stan-

dards is obviously part of the solution. Increasing the length of the school year could also be part of the solution, but it will not happen without additional funding.

It was too expensive to fix the levies in New Orleans, so we now get to replace the city. If it is too expensive to fix public education in the United States, there will be even larger consequences. This is the richest and the best country in the world. The children, the future of our nation, deserve to have these issues addressed. It is imperative to decide what is important and pay for it.

CONCLUSION

The premise of this paper is to emphasize the need to improve the school system dramatically. The economy cannot be sustained if our children do not compare well academically with those of other countries. The author proposes the following:

1. Look to research for answers.
2. Lengthen the school year significantly.
3. Demand reform designed to meet international standards.
4. Demand that all children, even those who learn quickly, are challenged every day they go to school. Closing the gaps for various subgroups is a worthy goal, but those who learn quickly are ignored at society's peril.
5. Establish a much more focused curriculum with emphasis on skill sets that children will need to successfully participate in the new economy.

None of the suggestions listed above will be inexpensive or painless. This is a prosperous nation, with good schools and many fine traditions. If, as is often quoted, the enemy of great is good, there needs to be motivation to improve education. Other nations that are not constrained with the inability to make needed adjustments are making great strides academically, and it is already apparent when comparing economic growth. Dramatically lengthening the school year in Missouri and the United States is one of the more obvious reforms needed. This would require additional funding and is the foundation of the author's belief that Missouri schools are inadequately funded.

REFERENCES

- Barrett, Michael J. "The Case for More School Days." *The Atlantic Monthly*. November 1990, pp. 78-106; <http://programs.weber.edu/eslend/educ4740/Readings/MoreSchool.html>.
- Cooper, James M. and Ryan, Kevin. *Those Who Can, Teach*. Boston, MA: Houghton Mifflin, 2004.
- Education Vital Signs. *American School Board Journal*, 2006 (supplement), p. 25.
- Kessler, Seth A.; Stallmann, Judith I. and Winter, Steven B. "Missouri State and Local Taxes and Revenues: A Fifty-State Comparison for 2002." University of Missouri Extension, January 25, 2006; <http://muextension.missouri.edu/explore/miscpubs/mp0743.htm>.
- Marzano, Robert J. *What Works in Schools—Translating Research Into Action*. Alexandria, VA: Association for Supervision and Curriculum Development, 2003.
- National Education Association. *Rankings and Estimates: A Report of School Statistics Update*. NEA, Fall 2005; Table 5.
- U.S. Bureau of the Census. "Personal Income per Capita in Constant (2000) Dollars, 2003." January 25, 2006, entry (last revised: February 11, 2005); <http://www.census.gov/statab/ranks/rank29.html>.
- U.S. Bureau of the Census. "States Ranked by Total Taxes and Per Capita Amount: 2004." January 25, 2006, entry; <http://www.census.gov/govs/statetax/04staxrank.html>.



Commentary

Craig Larson

Superintendent of the Rockwood School District

My background as an educator is in curriculum and instruction. I have spent my career working to improve the quality of instruction in classrooms in suburban schools. Over the years, however, I have learned the importance money plays in providing a quality educational environment. In my current role as superintendent of the Rockwood School District, the fourth largest school district in Missouri, I am continually involved in studying school finance. Let me provide some background information about the Rockwood School District.

Rockwood enrolls 22,000 students in thirty schools and covers 150 square miles. Rockwood is funded from several sources, with local property tax being the largest single source of funding and representing 62 percent of our revenue. Additional major sources of revenue include state sales tax at 10 percent, desegregation funding at 8 percent, and the state funding formula at 6 percent. The remaining 14 percent of our revenue comes from over thirty sources. Rockwood's tax rate of \$4.50 is approximately the average rate among the twenty-three districts in St. Louis County. Rockwood's revenue is approximately \$7,300 per student, not including the funds available for special education through the Special School District. This is among the lowest per-pupil expenditure among the twenty-three St. Louis County districts.

In spite of having the fourth-lowest funding per student in St. Louis County and spending near the state's average cost per student, Rockwood has exceptional student achievement. Many of our schools score at the top of the state proficiency test, and our average standardized test scores are well

above state and national averages. Further, our graduation rate is over 90 percent, with 90 percent of the graduates going on to higher education. For good reason, we market ourselves as an excellent value in education. Members of our Board and many members of the state legislature cite Rockwood as an example of quality education being provided at an affordable price.

During the past eighteen months the state has completely rewritten the school funding formula. Rockwood was involved in testifying and discussing the goals of a new formula throughout the legislative process. The new formula is designed to gradually infuse additional dollars into the school funding formula—an additional \$800 million over a seven-year period. Some would say the new formula was adopted as a way for the state to avoid being forced to revise the formula by losing a current court case. In fact, Rockwood has been active in the “Coalition to Fund Excellent Schools,” an organization of over sixty school districts that are “interveners” in the current school funding court case that is designed to force a revision of the state's school funding procedures. The court action is being advanced by over 200 school districts that are members of the “Coalition for Educational Equity” and are suing to force the state to equalize funding for districts around the state. The court case is continuing in spite of the recent newly adopted funding formula.

A recent quote in the May 2005 issue of *American School and University* stated what seems to be the pattern for state funding of schools in Missouri: “Ideally, states would define what is a suitable or adequate education, determine what the costs are, and provide the funding. But legislators

Federal Reserve Bank of St. Louis *Regional Economic Development*, 2006, 2(1), pp. 75-76.

© 2006, The Federal Reserve Bank of St. Louis. Articles may be reprinted, reproduced, published, distributed, displayed, and transmitted in their entirety if copyright notice, author name(s), and full citation are included. Abstracts, synopses, and other derivative works may be made only with prior written permission of the Federal Reserve Bank of St. Louis.

Larson

tend to approach the question in a more politically expedient way. They look at how much funding is politically feasible, and allocate that amount to school districts.” Missouri’s new formula is an attempt to provide “adequate” funding to all students by guaranteeing a floor per-pupil expenditure to each student. But the amount of the floor, \$6,100, was developed as a way for the state to avoid the need to raise new taxes to fund the formula in the early years. The plan assumes that future economic growth will allow the state to increase school funding over a seven-year period.

Rockwood has advocated throughout the development of the new formula for a “need driven” formula rather than a “revenue equalization formula.” The new formula does provide a weighting for students’ needs if the local district is serving more than the average number of “at risk” students, special education students, or limited English proficiency students. Included within the \$6,117 identified as the state adequacy target are certain categorical programs that previously were funded separately, including exceptional pupil aid, remedial reading, gifted funding, free text revenues, and fair share revenues. In addition, the formula, for the first time, includes a dollar value modifier to recognize differences in the regional cost of education. After the above calculations, the district’s “local effort” is deducted and is based on the district’s assessed values as of January 1, 2004, multiplied by a “performance levy” of 3.43. In addition, certain other items are included in local effort such as payments in lieu of taxes, fines, state assessed railroad and utility taxes, and one-half of the district’s 2004-05 “Proposition C” funds (a state sales tax to support schools).

When fully phased in after seven years, the new formula is anticipated to provide Rockwood School District approximately \$20 million in additional state revenues annually. Though this is

good news, our revenue grows only about \$2.5 to \$3 million annually as the new formula is phased in. Although helpful, this small additional state funding will not solve all of our financial issues or enable the district to address all student needs. It certainly is a significant improvement from the prior twelve years when we have seen no increases in our per-pupil state funding. This new funding will likely increase the portion of Rockwood’s operating expenditures funded by state revenues from the current 9 percent to an estimated 14 percent.

The following are Rockwood’s and my major concerns related to the new formula:

- that it is fully funded during the planned seven-year phase-in period, or more rapidly than that if possible;
- that the importance of serving gifted students be included in the student weightings similar to the current consideration for at-risk, special education, and limited English proficiency students;
- that a dollar value modifier that more accurately reflects the true incremental cost of providing education in the metropolitan St. Louis area be implemented;
- that the change in the distribution of sales tax (Proposition C) revenues be phased in over a seven-year period of time similar to the foundation formula; and
- that the penalty related to reduced summer school participation be removed.

We are pleased that the legislature attempted to adopt a student need-driven formula and they included some recognition of regional variances in the cost of education, but we believe the inclusion of the above-recommended changes could enhance the new formula to be truly excellent.