

**TALES FROM THE OTHER SIDE OF
EDUCATION FINANCE: OTHER
DISTRICTS' SCHOOLS, OTHER
PATHWAYS INTO TEACHING, AND
OTHER PEOPLE'S PREFERENCES**

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INTRODUCTION

In economics, general equilibrium effects refer to the changes that result once the quantity supplied equals the quantity demanded in each market. A change in education policy can not only influence the targeted market but can also substantially affect supply or demand in other markets. In order to fully understand the impact of education policies, one must carefully consider whether there will be important general equilibrium effects.

This policy brief discusses research concerning general equilibrium effects in three areas of education policy and discusses the policy implications of this research. Each section includes a brief summary of one chapter from my doctoral dissertation (Reback 2003), a review of the general literature on the chapter's topic, and a discussion of policy implications and unresolved questions meriting further research. The three topics covered are the general equilibrium effects of school choice programs on housing markets, college course offerings on teacher labor markets, and the composition of the electorate on voters' behavior in local public school referenda.

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GENERAL EQUILIBRIUM EFFECTS OF THE ADOPTION OF SCHOOL CHOICE PROGRAMS

School choice programs can erode differences in house prices across school districts by weakening the link between house prices and local school quality. Reback 2005 examines how the adoption of an inter-district public school choice program affected house prices in Minnesota. Inter-district open enrollment allows students to cross school district borders to attend a public school located outside of their residential district. While forty states have policies allowing inter-district transferring (Education Commission of the States 2005), Minnesota has the oldest statewide open enrollment policy and has one of the highest participation rates.

After the full statewide adoption of Minnesota's open enrollment program in the 1990–91 school year, a strong relationship is observed between popular transferring opportunities and trends in house prices. This relationship holds when controlling for prior trends in property values, detailed school district characteristics, and trends in the construction of new properties. Greater initial outflows of transfer students caused house prices to rise, because households could live in that district but enjoy schooling opportunities beyond its boundaries. Conversely, greater inflows of transfer students caused house prices to decline, because households did not necessarily have to pay a premium to use a regionally popular district's schools. The capitalization effects gradually increase each year, until they level off after the eighth year of the program. A one standard deviation change in the initial outgoing/incoming transfer rate caused a 3 percent increase/decrease in residential property values by the end of the eight-year period.

These effects are robust to a variety of specification checks. The use of initial transfer rates rather than later transfer rates allows the estimates to pick up transfer opportunities rather than longitudinal changes in school quality, and the estimates are robust to the addition of control variables that proxy for changes in school quality over the sample period. There is a good amount of heterogeneity among districts with similar transfer rates, so it is unlikely that the results are driven by an omitted variable. Capitalization effects should be strongest when students transfer due to commonly held preferences rather than idiosyncratic tastes, and there are in fact stronger effects of exit transfer opportunities when districts have lower average test scores than their neighbors or have negative net flows of transfer students.¹ As expected, transfer opportunities do not significantly affect nonresidential property values.

1. This is consistent with the school quality capitalization literature, which finds that house prices are related to students' test scores (e.g., Black 1999; Barrow 2002; Downes and Zabel 2002; Kane, Riegg, and Staiger 2006).

Table 1. How “Open” is Open Enrollment? Inter-District Open Enrollment Policies and Estimates of School District Participation during 1993–94

State	District Participation Rate*	Was District Participation Voluntary?	Could Districts Prevent Students from Transferring Out?	Could Districts Selectively Admit Transfer applicants?
Minnesota	89%	No	No	No
Nebraska	82%	No	No	No
Iowa	79%	No	No	No
Washington	76%	No	Yes	No
Utah	73%	Yes	No	No
Idaho	65%	No	No	No
Colorado	63%	Yes	No	Yes
Ohio**	47%	Yes	No	No
Arkansas	41%	Yes	No	No
Tennessee	40%	Yes	No	Yes
Oklahoma	34%	Yes	Yes	Yes
California	32%	Yes	Yes	Yes
Massachusetts	19%	Yes	No	No

*District participation rate is the estimated percent of districts that admitted any inter-district transfer students, based on the sample of schools found in the Schools and Staffing Survey for the 1993–94 school year.

**Students may not transfer to non-adjacent districts (Fowler 1996).

Sources: Analysis of NCES Schools and Staffing Survey Results; Bierlein, Sheane, and Mulholland 1993; Center for Education Reform 1996.

In other states adopting inter-district choice, the capitalization effects per transfer opportunity may be similar to those found in Minnesota, but the amount of transfer opportunities will largely depend on the details of the state’s choice policy. While forty states have some sort of inter-district transfer policy, about half of these states have statewide inter-district open enrollment, and these programs are often “less open” than Minnesota’s program. Table 1 displays participation rates and transfer policies among the thirteen states that had adopted statewide inter-district open enrollment by the 1993–94 school year. Participation rates are greater in states with fewer restrictions on students’ ability to transfer—that is, states requiring all districts to accept transfer applicants unless the districts are at capacity, states in which districts could not prevent students from transferring out, and states that do not allow districts to selectively admit students. The supply of transfer spaces should also be related to districts’ financial incentives to accept transfer students.²

2. Both the size of the transfer and the payment mechanism could affect participation. In Iowa, Utah, and Massachusetts, districts with exiting transfers pay a share of local revenues to the districts receiving their students, whereas other states redistribute money through centralized state aid distributions.

Popular districts may be hesitant to admit transfer students, due to concerns over negative capitalization effects or negative peer effects. Even in states such as Minnesota, where rejections are only supposed to be based on capacity constraints, the ability of superintendents to define these constraints means that many factors could influence the rejection decision.³

Given the substantial capital loss associated with accommodating transfer requests, why would districts admit any transfer students? In states with voluntary participation, accepting transfer students may be a competitive response to neighboring districts' participation, whereby districts seek to avoid the stigma of net outflows of students.⁴ Alternately, in states with mandatory participation subject to a self-determined capacity assessment, districts may participate because superintendents feel they must comply with state policy and are able to convince their constituents that the state policy is to blame for any loss of local capital.⁵

Similar general equilibrium effects on housing markets should occur due to the adoption of other types of school choice programs. For example, the adoption of a private school voucher program could partially erode house price premiums related to public school quality. Computable general equilibrium models find evidence that house prices increase in relatively poor school districts, because households are able to move to that district and send their children to private schools at reduced cost (Nechyba 1996, 1999; Ferreyra 2007).⁶ Studies of California citizens' voting behavior in statewide private school voucher referenda support the hypothesis that homeowners anticipate capitalization effects from the adoption of vouchers (Brunner and Imazeki 2006; Brunner and Sonstelie 2003; Brunner, Sonstelie, and Thayer 2001).

Capitalization effects from choice programs not only influence homeowners' welfare, but they also may have important effects on public school districts' tax bases and incentives. To the extent that a public school district's revenues are dependent on its local property tax base, capitalization effects can mitigate the financial impact of the adoption of choice, as unpopular districts enjoy an increase in their property tax base. It is important to remember, however, that these capitalization effects are a one-time change linked to the adoption of a choice program. Once choice has been adopted, unpopular public schools

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3. Reback (2007) finds evidence that both supply and demand for transfer spaces in Minnesota are related to differences in socioeconomic characteristics and student test scores between neighboring districts.
 4. Rincke (2006), using data from Michigan, finds evidence that districts' decisions to participate in a voluntary open enrollment program are positively related to the lagged participation decisions of their neighbors.
 5. In Minnesota, a decline in house prices due to open enrollment was not correlated with turnover rates of school district superintendents (Reback 2005).
 6. See Nechyba (2003) for an insightful review of computable general equilibrium studies.

may still have incentives to improve to try to reduce the outflow of students. A choice program diminishes house price premiums related to in-district public school quality, but it does not eliminate these premiums.

Other types of education reforms also influence housing markets. Examining house prices in Florida, Figlio and Lucas (2004) show that school accountability ratings can have short-run effects on house prices. Dee (2000) finds evidence of the capitalization of education finance reforms, whereby rents and house prices increase in school districts receiving greater state subsidies.

Future research might examine the impact of charter schools on local house prices, though this question is empirically challenging due to the endogenous location of charter schools.⁷ There could be substantial differences across states in the impact of charter schools on house prices, because there is a large amount of cross-state variation in the types of charter schools permitted and in the impact of charter schools on the resources of local public schools.⁸ Another interesting question is whether school choice programs lead to changes in household sorting across communities, another potentially important general equilibrium effect. School choice programs could potentially decrease residential segregation by income and/or race, as predicted by some computable general equilibrium models (e.g., Nechyba 1996, 2000). Empirical studies have examined the impact of choice on segregation across schools, but there is less evidence concerning segregation across residences.⁹ Also, the weakened link between parents' residences and their children's schools could possibly influence levels of support (financial or otherwise) for local schools and could alter parents' social networks (Fischel 2006).

TEACHER ENTRY REQUIREMENTS AND THE GENERAL EQUILIBRIUM EFFECTS OF COLLEGE COURSE OFFERINGS

The No Child Left Behind Act required that teachers in each state must be "highly qualified" by the 2004–5 school year, meaning that teachers must possess bachelor's degrees, possess certification from their state, and "have demonstrated competency in each of the core subjects that they teach" (U.S.

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7. In his study of the impact of charter schools on the performance of public schools, Bettinger (2005) discusses the endogenous location of charter schools and uses an instrumental variable strategy to disentangle the possibility that public school performance influences charter school locations.
 8. Dee and Fu (2004) analyze the impact of charter schools on traditional public school resources in Arizona and discuss why these effects might differ in other states.
 9. One study by Kane, Riegg, and Staiger (2006) examines how a court-ordered desegregation plan in Mecklenburg County, North Carolina, affected house prices and racial segregation across neighborhoods. Other studies examine the impact of charter schools on the distribution of students across schools (see, for example, Bifulco and Ladd 2006; Wells et al. 1998). Clotfelter (1999) finds that a large fraction of the racial segregation of students across public schools in metropolitan areas is due to racial disparities across school districts.

Department of Education 2006). Rigorous training might improve teachers' effectiveness, but there may be trade-offs between training requirements and the equilibrium supply of teachers. Obtaining state teacher certification can be a costly proposition. It requires either a series of undergraduate courses, completion of a post-baccalaureate program, or completion of an alternative certification program. The primary cost to undergraduates pursuing certification is the forgone college coursework that they otherwise would have completed. The most costly of these routes is arguably the post-baccalaureate programs, which typically require a full year to complete and are thus costly in terms of both tuition and the opportunity cost of forgone income. Alternative certification can also be quite costly; it typically involves many hours of in-service training and restricts the range of schools in which a person can teach. Participants in the most widely used national alternative certification route, Teach for America, must complete a summer training program and must satisfy their states' emergency certification requirements, which typically involve taking the full series of teacher certification courses during evenings, weekends, and/or summers. The optimal teacher training and certification policies must consider both the value of the training and the effects of these requirements on the composition of the teaching workforce.

Reback 2004a investigates how time-intensive entry costs affect the supply of teachers. In particular, the empirical analyses examine whether undergraduate teacher certification programs (UTCPs) influence rates of entry into teaching among recent college graduates. These UTCPs allow students to obtain both their BA and certification within four years. The study uses data from the Baccalaureate and Beyond Longitudinal Study, which tracks college seniors into the workforce. The analyses control for regional or state fixed effects, as well as detailed individual- and college-level variables. Furthermore, while some individuals select their college based on the availability of the UTCP, the models measure conservative effects of UTCPs by generously correcting for this potential bias.¹⁰

The findings suggest that the presence of a UTCP increases entry into teaching by more than 50 percent for graduates of "highly competitive" colleges but does not affect entry rates among graduates of less selective colleges. The "highly competitive" group of colleges is based on Barron's second-highest selectivity rating and includes selective public universities (e.g., UC Berkeley, UCLA, University of Wisconsin–Madison), private universities (e.g., George Washington University, Tulane University), and liberal arts colleges (e.g.,

10. The models correct for this bias based on data from the National Education Longitudinal Study and Yatchew and Griliches's (1985) framework for measuring the bias of an omitted variable in a probit model.

Carleton College, Union College). These results are confirmed in a second study (Reback 2006), which uses the National Education Longitudinal Study (NELS) and an improved methodological approach to find point estimates of the impact of UTCs. Given that the NELS surveys high school seniors about their career interests, one can estimate the impact of UTCs tracking the careers of individuals who did not reveal an interest in a teaching career when they were in high school. More than half of the individuals who eventually teach did not reveal an interest in teaching when they were high school seniors. The estimates suggest that the presence of a UTC more than doubles rates of entry into teaching among individuals who attend highly competitive colleges without a pre-existing interest in the career. This effect does not extend to the less selective colleges. The opportunity cost of a post-baccalaureate certification program is lower for graduates of these less selective colleges, and many students at these colleges take longer than four years to complete their undergraduate studies.

While academic abilities alone do not make someone a successful teacher, it is noteworthy that the lack of UTCs at selective colleges decreases entry into the teaching field because graduation from a selective college is one of the few observable teacher characteristics linked with better student outcomes.¹¹ Although only about 9 percent of new teachers are graduates of the 133 colleges in Barron's top two selectivity categories, there is potentially room to increase rates of entry among this group, because these colleges are far less likely than other colleges to offer UTCs.¹²

Whether increasing the availability of UTCs is a worthwhile policy depends on whether the benefits of lower barriers to entry are outweighed by other effects, such as lower rates of entry into other professions among this group, a shift in training from post-baccalaureate programs and alternative certification programs toward UTCs, and a shift away from other types of undergraduate coursework toward teacher training courses.

The popularity of alternative teacher certification programs among individuals attending selective colleges has recently surged, with Teach for America selecting 2,400 new participants from more than 19,000 applicants during

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11. Using data from the High School and Beyond study, Ehrenberg and Brewer (1994) find evidence that students earn higher test scores if their teachers graduated from relatively selective colleges. While few other types of observable teacher characteristics have been associated with better student test score gains, variation in teacher effectiveness has substantial impacts on student performance; studies have found that a one standard deviation change in teacher effectiveness is associated with about a .1 standard deviation increase in student performance (Aaronson, Barrow, and Sander 2003; Rockoff 2004; Rivkin, Hanushek, and Kain 2005).
 12. Only 48 percent of these colleges offered UTCs for elementary school teaching, and 52 percent offered UTCs for secondary school teaching. Among colleges in the third-highest selectivity category, these rates were 74 percent and 72 percent, respectively (Reback 2006).

2006 (Teach for America 2006). Whether this potential supply of teachers should be met through alternative certification programs or university-based programs depends on the relative impact of each type of training. UTCs will not only provide a different type of preparation than alternative certification programs, but they could also lead to different career profiles. Teach for America asks for a two-year commitment, and the majority of participants do not stay far beyond their second year, though they often remain involved in education throughout their careers. Among recent graduates of highly competitive colleges who are teaching, graduates from institutions offering UTCs are more likely to say that they plan to continue teaching for several years (Reback 2004a).

While time-intensive entry costs exclusively affect individuals from fairly selective colleges, other types of entry requirements could have different effects. Most states require teachers to pass one or more tests in order to obtain certification, with the tests measuring basic skills, subject mastery, or pedagogical knowledge. Angrist and Guryan (2004) conduct the most rigorous empirical investigation to date of the impact of states' certification test requirements on teacher characteristics. Exploiting variation in the timing of states' adoption of testing requirements and including detailed control variables, they find that the presence of a basic skills or subject testing requirement did not affect the educational backgrounds of new teachers. It is noteworthy that states raising their testing requirements did not enjoy a substantial increase in the share of teachers from selective colleges or the share possessing master's degrees, while the fraction of new teachers who were Hispanic significantly declined in these states.

While this is suggestive evidence that states' testing requirements may not be beneficial, it is difficult to isolate the causal effects of a single certification policy. Even with detailed control variables, the adoption of these programs may be related to unobserved, inter-temporal variation in other policies and labor market conditions affecting the supply of teachers. Table 2 shows how states' certification policies in 2000 were related to a potentially exogenous measure of changes in teacher labor markets: the percent change in the ratio of recent college graduates living in the state to the number of school-aged children in the state. States enjoying growth in this measure likely had an easier time finding enough teachers, *ceteris paribus*. Not surprisingly, these states were less likely to offer emergency certification and more likely to require teachers to pass a subject test. Table 2 certainly reveals the endogeneity problem with cross-sectional analyses of states' certification policies, and it is possible that states' changes in these policies over time are also endogenously determined.

Recent studies have also examined whether teachers' effectiveness, measured by their students' test score gains, varies based on teachers' certification

Table 2. Was Cross-Sectional Variation in State Teacher Certification Policies Related to Growth in the Number of Recent College Graduates in Residence per School-Aged Child?

	Teachers Can Have Emergency Certification		Teachers Must Pass a Subject Test for Certification		Teachers Must Pass a Basic Skills Test for Certification	
	No (N = 35)	Yes (N = 15)	No (N = 19)	Yes (N = 31)	No (N = 20)	Yes (N = 30)
Mean percent change in the number of recent college graduates in residence per school-aged child, 1985–95	3.3%	1.3%	0.3%	4.2%	3.6%	2.1%
Median percent change in the number of recent college graduates in residence per school-aged child, 1985–95	2.9%	−0.3%	0.01%	4.5%	2.6%	2.2%
p-value for rejecting the equality of means in favor of a greater mean percent change among states adopting stricter requirements	.085		.005		.848	

Notes: The number of recent college graduates in residence in state X is calculated by multiplying the number of bachelor’s degrees awarded in each state by the estimated fraction of college-aged people from that state living in state X five years later, and then summing these products across all of the states. School-aged children refers to individuals enrolled in either public or private school in grades K–12. Bachelor’s degree and K–12 enrollment data are from the NCEES “Digest of Education Statistics”; inter-state residential migration rates are estimated using the U.S. Census Public-Use Micro-Sample. State teacher certification policy information is based on NASDTEC (2000).

pathways. (Of course, teacher quality may also vary in important ways that are not necessarily picked up by students’ annual test score gains, but these gains offer an explicit, objective measure of effectiveness.) Using randomized assignment of students to teachers within high-poverty elementary schools, Decker, Mayer, and Glazerman (2004) find that students’ test score gains were slightly greater for math and similar for reading if their teacher had entered the profession through Teach for America. A couple of recent studies examine the relative effectiveness of New York City teachers who entered through Teach for America or through the New York Teaching Fellows program, an alternative certification program that is somewhat selective and requires participants to make a long-term commitment to teaching. Boyd et al. (2005) find that teachers entering through these alternative certification routes are initially slightly less effective than fully certified teachers, but these gaps close over time as relatively ineffective alternative certification participants leave teaching. Kane, Rockoff, and Staiger (2006) find that New York City Teach for America participants are slightly more effective in raising math scores, and inexperienced New York City Teaching Fellows are slightly less effective in raising reading scores. They also find that variation in teacher effectiveness among teachers

within the same pathway is far greater than variation in teacher effectiveness across pathways, suggesting that certification status alone tells relatively little about which teachers are most effective.

Using data from North Carolina, Clotfelter, Ladd, and Vigdor (2006, 2007) discuss how observed estimates of teacher effectiveness will be influenced by nonrandom matching with students, so they either examine schools that randomly assign students to classrooms (2006) or test the sensitivity of the results to alternative ways of measuring student progress (2007). They find that teachers with more experience or higher test scores on licensure tests positively affect student performance, with particularly high returns among economically advantaged students.

From a policy perspective, it is important to keep in mind that all of these comparisons are based on the average differences in teacher effectiveness given the types of individuals currently pursuing various pathways into teaching. These inter-group differences thus reflect both variable training and variable characteristics of the individuals pursuing each pathway. There is no evidence revealing whether a specific type of person would be a more effective teacher receiving one type of training rather than another, nor is there evidence concerning whether the average effectiveness of teachers would change from an expansion or contraction of nontraditional certification programs. We should soon have a better sense of these issues as these researchers and others investigate the specific components of teacher training and teacher screening that produce relatively effective teachers.

ARE VOTERS INFLUENCED BY THE COMPOSITION OF THEIR SCHOOL DISTRICT'S ELECTORATE?

Approximately 71 percent of districts in the continental United States determine their level of public school operating expenditures through direct democracy.¹³ These districts allow citizens to vote in either referenda or town meetings to determine budget levels affecting the local tax burden. An even larger percentage of U.S. districts require direct voter approval in order to issue debt to finance capital construction for the districts' public school systems. The institutional details of voting vary by state; there are differences in the required approval rates, the agenda-setter's ability to propose multiple budget levels simultaneously or sequentially, and the consequences of a failed expenditure proposal. The most commonly used theoretical model of the political economy of expenditure decisions in this setting is the median voter

13. About 37 percent of the districts always use direct democracy to change operating expenditures, and 34 percent use direct democracy only in cases in which the proposed expenditure increase exceeds a specified threshold.

model—in cases in which the majority rules, the decisions are determined by the preferences of the median voter.

In the median vote framework, the most obvious reason that a change in the residential composition of a school district would affect local public school expenditures is a shift in the identity of the median voter. This would occur due to an increase or decrease in the share of residents with preferred expenditure levels above that of the former median voter. A change in residential composition can also affect public school expenditures by changing the tax price of local public spending for existing residents.¹⁴ Indirect effects of a change in the residential composition of districts are also possible. Given a change in the composition of local residents, some people may change their own voting behavior in terms of both the probability that they vote and what they vote for. The new composition could influence the expected closeness of the vote, and it could also change people's attitudes about the success or failure of the proposed measure.

Why would a shift in residential composition cause the same person to behave differently in two identical referenda with identical tax implications? Recent theoretical models of voter behavior incorporate the idea that, given imperfect information, a voter might behave strategically by conditioning his or her participation and voting decision on the event that he or she casts the pivotal (or swing) vote (Feddersen and Pesendorfer 1996, 1997; Austen-Smith and Banks 1996). Often referred to as “pivotal voting,” this behavior might just as well be called “rational” or “sophisticated” voting, because it is the only regret-free voting strategy—a person following this strategy will never regret his or her voting choice on reading the election outcome and aggregate vote count in the following morning's newspaper. If this vote or abstention influenced the election outcome, then the individual feels that he or she made the right choice. If a local resident has incomplete information about the merits of an expenditure proposal, then her “pivotal vote” may differ from her a priori view of the best outcome because other residents' support for the proposal sends a signal about its merits. The composition of the district's residents can thus influence a poorly informed resident's behavior, because it changes the nature of the signal that would be sent if the poorly informed resident's voting behavior were to swing the election one way or the other.

In theory, the local school district referenda setting is a likely forum for pivotal voting. In this setting, individuals cannot fully share asymmetric

14. For example, Fletcher and Kenny (2006) show that changes in the fraction of the population who are elderly can cause the median voter to change in terms of both income level and tax price, with distinct implications for expenditure outcomes. In a study of the impact of vacation homes on local spending in Minnesota, Anderson (2006) shows that a greater share of vacation homes increases local public spending by reducing permanent residents' tax price.

information through simple communication, and the aggregate information revealed when a voter is pivotal has readily interpretable implications. In addition, the presence of imperfect information is likely to be particularly important. Residents would like to update their information about the productivity of local government. Home-owning residents would also like to update their information concerning how changes in spending levels might affect the market values of their homes. While exit poll studies examining major political elections do not reveal people voting differently than they would based on their *a priori* beliefs, less is known about voter attitudes during local referenda, and the local referenda literature suggests that many referenda participants are uncertain whether expenditures would be beneficial.¹⁵

There is limited empirical evidence concerning whether this type of strategic voting behavior occurs. There is some theoretical and experimental evidence concerning the behavior of juries, but juries can typically deliberate prior to voting, allowing members to share information and removing the value of the signal sent by the vote tally.¹⁶ One study (Reback 2004b) discusses strategic voting behavior in the setting of local public school operating revenue referenda. Using data on these referenda in Minnesota school districts during the 1990s, this study examines whether the impact of elderly residents on school district revenues varies in ways that are consistent with pivotal voting. In Minnesota, these referenda could be held either during general elections in November of even years (along with elections of politicians to federal office) or during special elections in November of odd years. The theoretical model in this study assumes that (1) pivotal voting will not occur in referenda held during special elections, because the marginal cost of participation exceeds the marginal benefits of participation for voters who are uncertain about their preferred outcome, and (2) a subset of elderly voters will participate in either type of referendum and will vote against an increase in expenditures, regardless of their information. The model then predicts that, *ceteris paribus*, the fraction of voters who are elderly will have a greater negative impact on a

15. Though there is a large empirical literature on the demand for local spending (e.g., Romer and Rosenthal 1982; Gramlich and Rubinfeld 1982; Romer, Rosenthal, and Munley 1992), there are few studies that survey voter attitudes during local referenda. Using data from one local referendum, Lankford (1985) examines voters' perceptions concerning the benefits of local spending. He found that 37 percent of voters were "not sure" whether school quality would be affected by moderate expenditure changes (24 percent responded "not affected" and 39 percent responded "is affected"). In addition, 31 percent of voters responded that they were "not sure" whether the school district's authorities spent its budget wisely (29 percent responded that money is "wasted," and 40 percent responded that it is "spent wisely").
16. See Feddersen and Pesendorfer (1998) for an insightful summary of some of these jury studies. More recently, Guarnaschelli, McKelvey, and Palfrey (2000) provide experimental results, and Coughlan (2000) provides theoretical results for cases in which juries may communicate prior to the vote.

district's expenditures if the district holds referenda during special elections rather than general elections.

The intuition is as follows: in general elections, a greater elderly share increases the probability that poorly informed voters vote in favor of the referendum, because a close vote tally would reveal greater levels of support among the non-elderly and thus send a more positive signal about the merits of the referendum. The empirical evidence is consistent with this prediction. Controlling for district-level characteristics, the predicted fraction of voters who were elderly had a more negative impact on 2000–2001 operating expenditures per pupil if, during the prior ten years, the district held referenda during special elections rather than general elections. In fact, the negative impact of the elderly was statistically significant only among Minnesota districts that exclusively held referenda during special elections.

This is far from conclusive evidence of strategic behavior, however, due to identification and interpretation issues. The results may be biased because of omitted variables, faulty assumptions about rates of participation among various types of individuals, or the nonrandom timing of district referenda. Furthermore, the results are consistent with a less sophisticated story—a greater presence of elderly opposing a referendum might make it easier for the referendum's supporters to successfully lobby undecided voters and to “rally the troops,” increasing turnout among supporters.

Better empirical evidence is needed concerning the existence of strategic voting or less sophisticated reactions to the composition of the electorate. In the school district setting, either type of behavior could have important policy implications. First, the elderly share of the population is expected to increase substantially over the next twenty-five years, as the baby-boomer generation continues to age. The equilibrium effect of these demographic trends on public school expenditures is unclear. Second, the impact of required support levels for local tax referenda depends on voters' strategies. Several states' local tax referenda now use supermajority-rule voting rather than majority-rule voting, and the implications of a higher required support level will differ if support is endogenously determined due to strategic behavior.¹⁷ Finally, an important and related issue is the relative efficiency of local taxation through high or low marginal participation cost referenda. During referenda with high marginal participation costs, there might be an efficiency gain associated with participants caring more deeply about the issue than nonparticipants. During referenda with low marginal participation costs, there might be an efficiency gain associated with a more efficient aggregation of private information. Future

17. Knight (2000) finds that the supermajority requirements for state-level tax increases lead to lower state taxes.

research might analyze the general equilibrium effects of adjusting required support or adjusting the marginal cost of participation in local tax referenda.¹⁸

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REFERENCES

- Aaronson, Daniel, Lisa Barrow, and William Sander. 2003. Teachers and student achievement in the Chicago public schools. Working Paper No. 2002-28, Federal Reserve Bank of Chicago.
- Anderson, Nathan B. 2006. Beggar thy neighbor? Property taxation of vacation homes. *National Tax Journal* 59 (4): 757–80.
- Angrist, Joshua, and Jonathan Guryan. 2004. Teacher testing, teacher education, and teacher characteristics. *American Economic Review* 94 (2): 241–46.
- Austen-Smith, David, and Jeff Banks. 1996. Information aggregation, rationality, and the Condorcet Jury Theorem. *American Political Science Review* 90: 34–45.
- Barrow, Lisa. 2002. School choice through relocation: Evidence from the Washington, DC area. *Journal of Public Economics* 86: 155–89.
- Besley, Timothy, and Anne Case. 2003. Political institutions and policy choices: Evidence from the United States. *Journal of Economic Literature* 41 (1): 7–73.
- Bettinger, Eric. 2005. The effects of charter schools on charter students and public schools. *Economics of Education Review* 24 (2): 133–47.
- Bierlein, Louann, K. Sheane, and L. Mulholland. 1993. *A national review of open enrollment/choice: Debates and description*. Tempe, AZ: Morrison Institute, Arizona State University.
- Bifulco, Robert and Helen Ladd. 2006. Charter schools in North Carolina. Paper presented at the National Conference on Charter School Research, Vanderbilt University, September. Available http://www.vanderbilt.edu/schoolchoice/conference/papers/Ladd-Bifulco_2006-DRAFT.pdf. Accessed 5 March 2007.
- Black, Sandra. 1999. Do better schools matter? Parental valuation of elementary education. *Quarterly Journal of Economics* 114 (2): 577–600.

18. See Besley and Case (2003) for a comprehensive discussion and review of existing research concerning the impact of various U.S. political institutions.

Boyd, Donald, Pamela Grossman, Hamilton Lankford, Susanna Loeb, and James Wycoff. 2005. How changes in entry requirements alter the teacher workforce and affect student achievement. NBER Working Paper No. 11844.

Brunner, Eric, and Jennifer Imazeki. 2006. Tiebout choice and the voucher. Working Paper No. 2006-10, University of Connecticut.

Brunner, Eric, and Jon Sonstelie. 2003. Homeowners, property values, and the political economy of the school voucher. *Journal of Urban Economics* 54 (2): 239–57.

Brunner, Eric, Jon Sonstelie, and Mark Thayer. 2001. Capitalization and the voucher: An analysis of precinct returns from California's Proposition 174. *Journal of Urban Economics* 50 (3): 517–36.

Center for Education Reform. 1996. *School reform in the United States: A state by state summary*. Washington, DC: Center for Education Reform.

Clofelter, Charles. 1999. Public school segregation in metropolitan areas. *Land Economics* 75 (4): 487–504.

Clofelter, Charles, Helen Ladd, and Jacob Vigdor. 2006. Teacher-student matching and the assessment of teacher effectiveness. NBER Working Paper No. W11936.

Clofelter, Charles, Helen Ladd, and Jacob Vigdor. 2007. How and why do teacher credentials matter for student achievement? NBER Working Paper No. 12828.

Coughlan, Peter J. 2000. In defense of unanimous jury verdicts: Mistrials, communication, and strategic voting. *American Political Science Review* 94 (2): 375–93.

Decker, Paul T., Daniel P. Mayer, and Steven Glazerman. 2004. *The effects of Teach For America on students: Findings from a national evaluation*. MPR Reference No. 8792-750. Princeton, NJ: Mathematica Policy Research.

Dee, Thomas S. 2000. The capitalization of education finance reforms. *Journal of Law and Economics* 43 (1): 185–214.

Dee, Thomas S., and Helen Fu. 2004. Do charter schools skim students or drain resources? *Economics of Education Review* 23 (3): 259–72.

Downes, Thomas A., and Jeffrey E. Zabel. 2002. The impact of school characteristics on house prices: Chicago 1987–1991. *Journal of Urban Economics* 52: 1–25.

Education Commission of the States. 2005. *Open enrollment: 50-state report*. Available <http://mb2.ecs.org/reports/Report.aspx?id=268>. Accessed 5 March 2007.

Ehrenberg, Ronald G., and Dominic J. Brewer. 1994. Do school and teacher characteristics matter? Evidence from high school and beyond. *Economics of Education Review* 13 (1): 1–17.

Feddersen, Timothy J., and Wolfgang Pesendorfer. 1996. The swing voter's curse. *American Economic Review* 86 (3): 408–24.

Feddersen, Timothy J., and Wolfgang Pesendorfer. 1997. Voting behavior and information aggregation in elections with private information. *Econometrica* 65 (5): 1029–58.

- Feddersen, Timothy J., and Wolfgang Pesendorfer. 1998. Convicting the innocent: The inferiority of unanimous jury verdicts under strategic voting. *American Political Science Review* 92 (1): 23–35.
- Ferreira, Maria M. 2007. Estimating the effects of private school vouchers in multidistrict economies. *American Economic Review*. In press.
- Figlio, David N., and Maurice E. Lucas. 2004. What's in a grade? School report cards and house prices. *American Economic Review* 94 (3): 591–604.
- Fischel, William A. 2006. Why voters veto vouchers: Public schools and community-specific social capital. *Economics of Governance* 7 (2): 109–32.
- Fletcher, Deborah, and Lawrence Kenny. 2006. The influence of the elderly on school spending in a median voter framework. Unpublished paper, Miami University. Available http://pubchoicesoc.org/papers_2006/kenny_fletcher.pdf. Accessed 5 March 2007.
- Fowler, Frances C. 1996. Participation in Ohio's interdistrict open enrollment option: Exploring the supply-side of choice. *Educational Policy* 10 (5): 518–36.
- Gramlich, Edward, and Daniel Rubinfeld. 1982. Micro estimates of public spending demand functions and tests of the Tiebout and median-voter hypotheses. *Journal of Political Economy* 90 (3): 536–60.
- Guarnaschelli, Serena, Richard D. McKelvey, and Thomas R. Palfrey. 2000. An experimental study of jury decision rules. *American Political Science Review* 94 (2): 407–23.
- Kane, Thomas J., Stephanie K. Riegg, and Douglas O. Staiger. 2006. School quality, neighborhoods, and housing prices. *American Law and Economics Review* 8 (2): 183–212.
- Kane, Thomas J., Jonah Rockoff, and Douglas Staiger. 2006. What does certification tell us about teacher effectiveness? Evidence from New York City. NBER Working Paper No. 12155.
- Knight, Brian G. 2000. Supermajority voting requirements for tax increases: Evidence from the states. *Journal of Public Economics* 76 (1): 41–67.
- Lankford, R. Hamilton. 1985. Preferences of citizens for public expenditures on elementary and secondary education. *Journal of Econometrics* 27: 1–20.
- National Association of State Directors of Teacher Education and Certification (NASDTEC). 2000. *Manual on the preparation and certification of educational personnel*. Dubuque, IA: Kendall/Hunt.
- Nechyba, Thomas. 1999. School finance induced migration patterns: The case of private school vouchers. *Journal of Public Economic Theory* 1: 5–50.
- Nechyba, Thomas J. 1996. Public finance in a general equilibrium Tiebout world: Equalization programs, peer effects, and private school vouchers. NBER Working Paper No. 5462.
- Nechyba, Thomas J. 2000. Mobility, targeting, and private school vouchers. *American Economic Review* 90 (1): 130–46.

- Nechyba, Thomas J. 2003. What can be (and what has been) learned from general equilibrium simulation models of school finance? *National Tax Journal* 56: 387–414.
- Reback, Randall. 2003. Public finance in general equilibrium: The case of education. PhD dissertation, University of Michigan, Ann Arbor.
- Reback, Randall. 2004a. The impact of college course offerings on the supply of academically talented public school teachers. *Journal of Econometrics* 121 (1): 377–404.
- Reback, Randall. 2004b. Rational choice in the voting booth: Are voters influenced by the composition of the electorate? Working Paper No. 04-01, Barnard College.
- Reback, Randall. 2005. House prices and the provision of local public services: Capitalization under school choice programs. *Journal of Urban Economics* 57: 275–301.
- Reback, Randall. 2006. Entry costs and the supply of public school teachers. *Education Finance and Policy* 1: 247–65.
- Reback, Randall. 2007. Demand (and supply) in an inter-district public school choice program. *Economics of Education Review*. In press.
- Rincke, Johannes. 2006. Competition in the public school sector: Evidence on strategic interaction among U.S. school districts. *Journal of Urban Economics* 59: 352–69.
- Rivkin, Steven G., Eric A. Hanushek, and John F. Kain. 2005. Teachers, schools, and academic achievement. *Econometrica* 73 (2): 417–58.
- Rockoff, Jonah E. 2004. The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review* 94 (2): 247–52.
- Romer, Thomas, and Howard Rosenthal. 1982. Median voters or budget maximizers: Evidence from school expenditure referenda. *Economic Inquiry* 20 (4): 556–78.
- Romer, Thomas, Howard Rosenthal, and Vincent Munley. 1992. Economic incentives and political institutions: Spending and voting in school budget referenda. *Journal of Public Economics* 49 (1): 1–33.
- Teach for America. 2006. *Record number of top college graduates to lead classrooms in low-income communities nationwide*. Press release. Available <http://www.teachforamerica.org/assets/documents/090706.Back.to.School.pdf>. Accessed 5 March 2007.
- U.S. Department of Education. 2006. *No Child Left Behind: A toolkit for teachers*. Available http://www.ed.gov/teachers/nclbguide/toolkit_pg6.html#provision. Accessed 5 March 2007.
- Wells, Amy Stuart, Ligia Artiles, Sibyll Carnochan, Camille Wilson Cooper, Cynthia Grutzik, Jennifer Jellison Holme, Alejandra Lopez, Janelle Scott, Julie Slayton, and Ash Vasudeva. 1998. *Beyond the rhetoric of charter school reform: A study of ten California school districts*. Los Angeles: UCLA Charter Schools Study.
- Yatchew, Adonis, and Zvi Griliches. 1985. Specification error in probit models. *Review of Economics and Statistics* 67 (1): 134–39.