FISCAL DECENTRALIZATION AND LAND POLICIES

Edited by Gregory K. Ingram and Yu-Hung Hong

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Public and Private School Competition and U.S. Fiscal Federalism

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Within the United States and around the world, an increasing focus has been placed on the potential of school competition to improve student outcomes. Such competition can take many shapes and is present in one form or another almost everywhere. The debate is therefore not about whether competition should play a role in primary and secondary education; rather, it is about what form of competition can most effectively achieve particular policy goals. The necessary policy analysis is complicated by such factors as the existence of peer externalities, the role of land markets in "pricing" access to schools, and the many possible ways of financing schools through both public and private means.

The fundamental question common to all debates on school competition revolves around appropriate ways of rationing access to the scarce resource of seats in different schools. In many settings, market prices are relied upon to ration such access, but a pure reliance on prices in education markets may inherently disadvantage children from poorer households and may not appropriately account for social benefits that the price system might ignore. The absence of prices in markets (like those involving most public school systems), however, does not imply the absence of a rationing mechanism itself. Such a mechanism can be explicitly designed or can emerge endogenously in a variety of ways, but it is always there. Understanding the underlying rationing mechanism is key to understanding the effects of different forms of school competition.

In the United States, rationing access to schools takes three different forms. First, access to traditional public schools has typically been rationed through the setting of school district and neighborhood boundaries that assign families in

particular residential locations to particular public schools. Such access therefore involves rationing through housing markets. Second, conditional on having chosen a place of residence, families often can choose between the local public school to which they are assigned or a private school located within reasonable commuting distance. Access to private schools, then, largely involves rationing through tuition pricing and admissions policies that may be aimed at creating the "right" peer group. Finally, an increasing number of "choice experiments" within the public school system have emerged recently. In some areas, they have involved the emergence of charter and magnet schools that operate alongside traditional (neighborhood-based) public schools. In other areas, "choice" has been extended to all public schools. Because access to such "choice" schools is not priced, some explicit mechanism determines who is allowed into a choice school whenever such a school has more applicants than seats. Access to these schools is therefore rationed through assignment mechanisms. These mechanisms are typically based on parental preferences that are fed into an algorithm with elements that define priority classes (such as "walk zones" and sibling preferences) and elements that break ties through lotteries.

How do these three rationing mechanisms give rise to different forms of school competition? How do they affect the larger economy in which schools operate? The results referenced in this chapter are drawn from research that has analyzed school choice within a model in which households choose where to live, what school to attend, and how to vote on public school spending. This model provides a useful framework because it permits comparisons of different policies and rationing mechanisms in an environment in which the most salient features of education markets are taken into account—including the important role played by housing and land markets—as well as the role of nonfinancial inputs in education production. In this discussion, the main features of this model, together with some preliminary simulations, are introduced first, followed by a discussion of the effect of two historically dominant rationing mechanisms on residential choices: rationing through housing markets and rationing through tuition and admissions policies. The effect of increased private school competition on public school quality depends critically on the dimensions along which private schools compete, and this subject is discussed next. The term *school quality* here refers to parental perceptions of school quality, which may include, but are far from limited to, the narrow definition of test scores so often employed in the literature. The analysis then turns to the issue of nonresidence-based public school competition, which involves rationing through explicit assignment mechanisms, and compares such public school competition with traditional private school competition. Building on these insights, a natural extension of recent public school choice initiatives is proposed, an extension that offers pathways for private schools to compete within the same framework as new "choice" public schools. Such a system would permit localities to achieve a more appropriate balance between the three different rationing mechanisms that operate in education markets, which becomes even

more compelling when more realistic models of school competition (that build on insights from other social sciences) are taken into account.

A Benchmark Framework for Thinking About U.S. School Competition

Two separate literatures suggest that school competition in the United States is shaped by two primary factors: (1) the bundling of household residential and public school choice; and (2) the importance of both financial and nonfinancial inputs into school production.[1] Together, these factors enable the coexistence of good and bad public schools within a system that offers nominally "free" access to all public schools. Without the bundling of housing and schooling, there would be no mechanism to keep public school quality (that is, parental perceptions of school quality, not only test scores) from equalizing as parents choose the best available "free" public school.[2] In the presence of this bundling, however, equilibrium housing prices ration access to housing markets in good school districts and thus price access to public schools in ways that cause lower-income households to "choose" worse public schools. Even in the presence of such rationing through housing markets, though, public school quality could be fully equalized by equalizing school spending if only financial inputs mattered to what parents perceive as school quality. Given the overwhelming evidence that school quality—whether measured by test scores, parental perceptions, or any other metric—is not equalized solely through financial inputs, nonfinancial inputs must play an important role.

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1. The first literature in public and urban economics, summarized in Epple and Nechyba (2004), begins with Oates (1969) documenting the strong capitalization of school characteristics into housing prices. More recent contributions by Black (1999) and others have refined this approach through the use of regression discontinuity models that document sharp differences in housing prices on different sides of neighborhood school boundaries (for otherwise identical houses). An increasing number of discrete choice models document more directly the importance of public schools and other amenities in residential location decisions (Bayer, McMillan, and Reuben 2005; Epple and Sieg 1999; Nechyba and Strauss 1998). The second literature on education production functions has investigated the extent to which various measurable inputs translate into academic achievement or other student outcomes. Although considerable recent evidence suggests that inputs related to per-pupil spending (such as class size) have some effect on student achievement (Angrist and Lavy 1999; Krueger 1999), this evidence remains subject to controversy (Burtless 1996; Hanushek 2002). Furthermore, increasing attention has focused on nonfinancial inputs such as peer quality, parental monitoring, and nonrandom teacher assignments (Nechyba 2006).

2. In fact, theoretical models of public/private school choice that do not model housing markets typically assume a single quality for all public schools based on public school quality having to equalize in the absence of housing markets that ration such access. See, for instance, Epple and Romano (1998).

These nonfinancial inputs are often lumped together under the label "peer effects." Such effects may indeed arise if peers directly influence one another in classrooms. Nonfinancial inputs, though, can emerge and be correlated with parental income through a number of alternative channels. Higher-income parents may invest more in "home production" of various child characteristics (Gronau 1980), thus freeing schools to focus on producing greater academic achievement. They may play a larger role in monitoring public schools and inducing improved performance by teachers and administrators (McMillan 2000). In addition, given the general sense that children from higher-income families are "easier" to teach, public school systems may reward "good" teachers with assignments in higher-income public schools (Loeb and Page 2001). Nonfinancial inputs that matter (and that may be lumped under the category "peer effects") can therefore include parental inputs and teacher quality. When such inputs are correlated with parental income (as the data suggest they are) and access to public schools is priced through the housing market, good and bad public schools coexist, even if financial inputs are equalized.

The empirical framework in this chapter therefore includes an explicit housing market and a school production process sufficiently rich to incorporate roles for both financial and nonfinancial inputs. A full description of the technical details of the model can be found in a series of previous papers (Nechyba 1997a, 1999, 2000, 2003a, 2003b), but the basic elements are as follows. The model begins with three school districts characterized by overlapping housing quality distributions that are calibrated to the distributions observed in average low-, middle-, and high-income New Jersey school districts in 1990. At this time, the New Jersey school system consisted of largely traditional residence-based public schools in geographically small districts.[3] Each district provides a public school open to any family living in the district, with the level of per-pupil financial inputs in each district determined through voting on local property and state income taxation.[4] The level of nonfinancial inputs in each public school is determined endogenously by the income and child ability characteristics of families that attend

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3. Several hundred school districts in New Jersey are divided equally into low-, middle-, and high-income districts. The average characteristics of each category of districts are then used in the calibration, with house quality distributions inferred from housing price distributions. The calibration method implies that the distribution of house quality captures both house and nonschool-related neighborhood qualities such as crime rates and environmental conditions.

4. The model can be run for a purely decentralized (property tax financed) system, a purely centralized (state income tax financed) system, or any hybrid system involving local property tax funding supplemented by a state aid formula. Previous theoretical and simulation evidence suggests that local governments in the model will choose local property taxes, whereas state governments use state income taxes (Nechyba 1997b), which matches well to what is generally observed. The benchmark version of the model is calibrated using the New Jersey financing formula.

the school,[5] with families choosing a house and simultaneously either the local public school or an alternative school not linked to residential location. Families differ in their income and peer quality level, but they share the same underlying preferences for housing, consumption, and school quality.[6]

In the initial benchmark models, school quality s for a given school emerges from the combination of financial and nonfinancial inputs. In other words, parents observe both financial and nonfinancial aspects of schools as they determine which schools are better than others. To be more specific,

$$s = x^{(1-\rho)}q^\rho \quad \text{with } 0 \le \rho \le 1,$$

where x is the per-pupil spending level in the school, ρ is the weight put on nonfinancial inputs relative to financial inputs in school production, and q is the average peer quality. (In later models, this production function is changed to incorporate other factors.) The structural parameter ρ is then calibrated to yield the empirically observed level of private school attendance in the data.[7] Because the data used to calibrate the model are from 1990, private schools represent the only viable alternative to public schools. In public schools, the level of each of the two input types emerges as described above, with financial inputs resulting from a political process and nonfinancial inputs arising from parental choices of housing and schools. Private schools, on the other hand, are assumed to set tuition rates (equal to per-pupil spending) and minimum "peer quality" standards that survive competitive pressures. Thus, the model assumes for now that private schools are able to compete against "free" public schools by directly controlling nonfinancial inputs through admissions policies, an option not open to public schools, which are legally required to accept all students who reside within the school district.

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5. A household's peer quality is assumed to result from a Cobb–Douglas aggregation of household income and child ability, and the average peer quality level in the school represents the nonfinancial input level to the school. Parental income and child ability, which, as suggested by the data, are imperfectly correlated, are assumed to play equally strong roles in forming the peer quality of the child. In addition, sensitivity analysis suggests that the results reported here are not qualitatively sensitive to altering the relative role of parental income and child ability in constructing peer quality measures.

6. The model contains 2,500 different household types. Preferences are assumed to take a Cobb–Douglas form, with exponents in the underlying utility function calibrated to yield empirically relevant levels of housing consumption and (majority-rule-determined) school spending.

7. Excessive weighting of financial inputs results in the absence of any private school sector in the model, whereas excessive weighting of nonfinancial inputs results in too large a private school sector. Thus, the level of private school attendance observed in the New Jersey data determines the relative weights of financial and nonfinancial inputs (as captured by ρ).

Table 12.1 reports simulation results using this framework under three different public school financing methods. First, results that mirror the New Jersey financing formula (of 1990) are reported in the initial columns. All variables expressed in dollar or percentage terms are observable in the data, with the housing, production, and preference parameters of the underlying model calibrated to replicate those values.[8] The second and third sets of columns report simulations of the new equilibrium that is predicted by the calibrated model if public funding were changed to be either fully decentralized or fully centralized.

The main message from table 12.1 is that policy decisions over the details of public school financing systems can only be analyzed within the context of the economic environment in which these decisions are implemented. To the extent to which the public system is subject to the two factors introduced above—that is, to the extent to which it rations access through housing markets and is affected by nonfinancial inputs that are correlated with parental income—substantial differences in public school quality emerge under any public financing system, even those that fully equalize financial inputs. Although these simulations suggest that a move away from purely decentralized school financing has reduced inequalities across public schools, it also suggests that average school quality declines under greater centralization, as explored in Nechyba (2003a, 2003b).[9] The underlying economic environment faced by traditional public school systems therefore places severe limits on what can be accomplished through changes in public school financing mechanisms.

To be more precise, changes in public school financing systems can alter the level and distribution of per-pupil spending across public schools, but they have little effect on the spatial segregation of households across districts and thus do not substantially affect the distribution of nonfinancial inputs across schools. As long as housing markets ration access and sort families into public schools, nonfinancial inputs continue to be distributed through essentially the same mechanism. Put differently, if nonfinancial inputs are related to how families select schools under residence-based rationing, public school finance reforms are unlikely to alter the distribution of nonfinancial inputs in any significant way.

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8. Most of these values come very close to matching the corresponding values in the data. For details, see Nechyba (2003a, 2003b).

9. Under state financing, the median voter in the state determines per-pupil funding. Under local financing, on the other hand, the median voter in each district determines the spending level in that district. If we assume that we can approximate the median voter in each case as the median income household (in the relevant jurisdiction), it is then implied that average per-pupil spending in the state is determined by the *median* income household under state financing and by the *mean* income household under local financing. Although income distributions are skewed to the left, the median income in the state is lower than the mean income, implying a drop in average school spending under centralized financing.

Table 12.1
Baseline Simulation Results

	Decentralized System Plus New Jersey 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[a]	$6,652	$7,910	$8,621	$5,000	$7,326	$10,215	$7,195	$7,195	$7,195
Peer inputs[b]	0.2684	0.4701	0.6521	0.2613	0.5142	0.6404	0.2826	0.5469	0.6470
School quality[c]	69.96	100.00	126.30	59.47	100.23	132.45	74.72	102.23	110.73
Average spending[a]		$7,753			$7,731			$7,195	
Average quality		99.58			100.42			96.47	
District income[a]	$31,120	$46,216	$65,863	$29,725	$50,262	$63,212	$29,891	$51,309	$62,000
Property values[a]	$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%

[a]Expressed in 1990 dollars.
[b]Index of peer-quality inputs arises from aggregation of household peer quality normalized to lie between 0 and 1.
[c]School quality index normalized to equal 100 for the middle-income district under the New Jersey formula.

The Effect of Two Forms of Rationing on Local Economies

The simulations reported so far have incorporated two of the three rationing mechanisms discussed earlier: (1) rationing into public schools through housing markets; and (2) rationing into private schools through tuition and admissions policies. A further look at how the combination of these rationing mechanisms affect local urban economies, and with it the distribution of nonfinancial inputs into different schools, is now in order. Understanding these impacts leads to an examination of the third type of rationing that has emerged since the 1990s within some public school systems: rationing school access through explicit assignment mechanisms based on parental preferences.

Table 12.2 presents a series of hypothetical simulation exercises using the same calibrated model used in table 12.1. The table's first row assumes away the existence of public schools, thus removing price distortions from the bundling of housing and schools. Under this simulation, households therefore choose housing

Table 12.2
School Finance, Private Schools, and Residential Segregation

Private Schools Allowed?	Public School Financing	Average District Income			Average District Property Value	
		Low-Income District	High-Income District	Ratio	Low-Income District	High-Income District
Yes	None	$25,700	$67,325	2.62	$158,327	$266,474
No	Local property tax	$17,628	$85,925	4.87	$101,683	$392,402
	State income tax	$19,875	$81,075	4.08	$102,086	$387,549
Yes	Local property tax	$29,725	$63,212	2.13	$123,224	$294,825
	State income tax	$29,891	$62,000	2.07	$118,486	$316,308

independent of schools, with segregation across districts arising solely from the different housing quality distributions in the three districts. The simulation is not meant to be a serious policy proposal; rather, it allows us to establish the levels of income segregation and housing price differences that would exist in the absence of any policy distortions. For instance, the table suggests that the expected average income in the high-income community is 2.62 times the average income in the lowest-income community when households choose housing from existing housing stocks, without considering any bundling of housing with school access.

The next two rows of table 12.2 reverse the experiment by replacing the private school sector with a residence-based public school system, either decentralized and financed through property taxes or centralized and financed through state income taxes. Both types of public school systems dramatically increase the segregation across district boundaries, with the ratio of average income in the high-income district to average income in the low-income district rising by 55 to 85 percent. The bundling of public school access with housing markets thus introduces a significant segregating force into the local economy, depressing housing prices in low-income districts and inflating them in high-income districts.

Finally, the last set of rows in table 12.2 allows the private school market to coexist with the public school system. With the same underlying housing market, the mere introduction of private schools then dramatically decreases the level of residential segregation across school districts because private school attending, relatively higher-income households are not as willing to pay a housing price premium for good public schools in higher-income districts.

Private schools in the model therefore not only enjoy the competitive advantage of being able to shape their nonfinancial inputs through tuition and admissions policies, but they also have an implicit advantage: they can permit households to unbundle their housing decision from their school choice. In a residence-based public school environment where housing prices are depressed in low-income districts (because of bad public schools), the implication is that private school attending households will tend to live in lower-income districts than they would if there

were no public school distortions in the housing market. These households also tend to have incomes above the community average and thus raise the average community income. Unbundling school choices from housing choices therefore appears to have a much greater effect on residential location and segregation patterns than does varying the method of public school financing (i.e., central versus local, income tax versus property tax). This unbundling tends to have a desegregating effect within the urban economy, whereas residence-based public school systems by themselves have the opposite effect.

So, for cities that are concerned about the segregation of poor residents within cities from wealthier residents in suburbs, there is a strong incentive to introduce policies that allow parents to unbundle housing and schooling choices. To the extent to which higher-income parents choose suburbs for schools, such unbundling would result in an inflow of higher-income residents into cities. In fact, this point became one of the major arguments in favor of increasing school choice in the 1990s debate over Milwaukee's choice-based reforms.

Public School Quality and Private School Competition

The prediction that private school markets reduce residential housing segregation does not, however, imply that they reduce the variance in nonfinancial inputs across schools. In fact, if private schools compete by selecting among applicants (and thus control their nonfinancial inputs), they will "skim the cream" off the public system, leaving the public system as a whole with fewer high-achieving peers, fewer parents who monitor public schools, and fewer good teachers. Unless there is some counteracting force, average public school quality must fall with an increasingly active private school market. Simulations in Nechyba (1999, 2000, 2003a, 2003b) furthermore suggest that this decline in average public school quality, accompanied by a modest decline in the variance of public school quality, has higher-income districts suffer a greater loss of nonfinancial inputs.[10]

Although a decrease in urban residential income segregation may, in itself, be desirable, few would advocate altering school policy solely to change the residential location patterns in cities, particularly if the effect on public schools would be negative. At this point, however, the model has deliberately excluded any of the potentially positive aspects of increased competition that are cited by school reformers. In particular, no allowance has been made for the possibility that public schools might, all else equal, perform better in a more competitive environment, nor has the model considered the possibility that pedagogy or curriculum could

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10. In some instances, predicted public school quality actually rises in the poorest district as the private school sector becomes more active because the increase in local tax bases, combined with the decrease in public school attendance within the district, raises per-pupil spending, even though the political constituency for school spending within the district falls with higher private school attendance (Nechyba 1999).

be targeted more effectively if the variance in child abilities within a school narrows.[11] It is useful to consider some simple ways in which such factors could be included in the model and then to return to a final, but more complex, channel through which competition might operate.

The structure of the underlying model permits us to include additional competitive effects and trace their effect through the full general equilibrium model, but it also requires a recalibration of the model so that it will still be able to replicate the data. In our benchmark model thus far, we assumed that the primary competitive advantage private schools have over public schools is that they are able to "cream skim" nonfinancial inputs from public schools. As other competitive advantages for private schools are introduced, the model has to be recalibrated so as to avoid overpredicting private school attendance. For instance, if we assume that private schools are more efficient at translating inputs into school quality, the model would predict more private school attendance than is observed in the data unless we reduce the "cream-skimming" advantage assumed for private schools thus far. So, when a second competitive advantage is introduced, the first has to be reduced in magnitude as the model is recalibrated to match the data. The stronger the second advantage is, the weaker the first has to become. One advantage of using this kind of structural model is that it disciplines the researcher in terms of how strong different potential channels can be and still permit the model to replicate the data under current school finance institutions.

To illustrate the range of possible effects of private school competition on public school quality, two possibilities may be considered: (1) a "resource efficiency" advantage for private schools; and (2) a "pedagogical targeting" advantage. In each case, the assumption of cream skimming on the part of private schools is maintained, but the magnitude of this competitive advantage is reduced to make it approximately equal in magnitude to the second private school advantage that is introduced. In the case of "resource efficiency," it is assumed that private schools operate on the efficient frontier of translating inputs into school quality, whereas public schools operate inefficiently but become increasingly efficient the more private school competition they face. In the case of "pedagogical targeting," it is assumed that, for any average level of nonfinancial inputs within a school, the lower the variance in the peer quality of the households within the school, the greater the quality schools are able to produce.

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11. Chubb and Moe (1990), for instance, argue that competition reduces rent seeking in the public system, and Hoxby (2000) suggests that competition tends to raise performance and lower costs (though it should be noted that these results are the subject of some controversy [Hoxby 2007; Rothstein 2007]). A considerable literature on peer effects within classroom—and particularly on whether or not a greater variance in abilities within classrooms benefits some children—is still evolving (Nechyba 2006). That literature, particularly within economics, typically takes pedagogy and curriculum as exogenous, however. It also fails to consider whether strategic adjustments in pedagogy and curriculum might be made within competitive environments if the distribution of student characteristics changes.

To be more precise, we assume an underlying school production function

$$s = \phi x^{(1-\rho)} q^\rho,$$

where, as before, s is school quality, x is per-pupil spending, and q is average "peer quality." Until now, $\phi = 1$ has been implicitly set and ρ was set to provide a sufficiently strong peer effect to allow private schools to compete using their cream-skimming advantage. When "resource efficiency" is introduced, ϕ remains 1 for private schools, but it falls to $(1 - \lambda PUB^2)$ for public schools, where λ is calibrated (conditional on ρ) to replicate the observed levels of private school attendance and PUB is an endogenous variable equal to the fraction of the population attending public school. If ρ remains as in the earlier benchmark case, then $\lambda = 0$. As the cream-skimming advantage falls through a decline in ρ, the value of λ has to increase in magnitude. Under pedagogical targeting, on the other hand, $\phi = (1 - \mu\sigma)$, where σ is the variance in peer quality within the school. In the results reported in table 12.3, ρ is set to half its previous value under both the resource efficiency and the pedagogical targeting scenarios, implying that the cream-skimming effect has been reduced by half.

The strong residential segregation and housing price predictions of public and private school markets (in table 12.2) remain largely unaffected as different

Table 12.3
Private School Competition and Public School Quality

Voucher Amount[a]	$0	$1,000	$2,500	$4,000	$5,000
			Public School Quality[b]		
Cream Skimming Only					
Low-Income District	69.96	68.05	65.82	39.83	[c]
Middle-Income District	100.00	98.80	89.43	78.93	44.59
High-Income District	126.30	120.22	112.96	93.19	80.27
Cream Skimming + Pedagogical Targeting					
Low-Income District	70.36	76.46	80.55	81.61	76.85
Middle-Income District	100.00	101.52	104.96	105.99	101.55
High-Income District	131.05	130.11	129.67	131.74	127.02
Cream Skimming + Competitive Resource Efficiency					
Low-Income District	65.72	67.42	69.81	71.08	71.74
Middle-Income District	100.00	101.83	104.90	107.68	109.75
High-Income District	124.64	126.96	128.23	131.24	132.59

[a] Expressed in 1990 dollars.
[b] Indexed to be equal to 100 in middle-income districts in the absence of vouchers under the assumption of pure cream skimming by private schools under the 1990 New Jersey financing system.
[c] Public school ceases to exist.

competitive advantages for private schools are introduced and therefore are not reported separately here. Instead, it is useful to focus on the effect of private school competition on public school quality under different assumptions about the nature of private school advantages. One convenient way to do so is to introduce different levels of private school vouchers into the model, assuming decentralized local school funding under the 1990 New Jersey state aid formula.[12]

Table 12.3 reports the effect on an index of public school quality as private school markets become more active through the introduction of different levels of private school vouchers. As in table 12.1, the public school quality index is normalized to be equal to 100 in the middle-income district under the benchmark model in which cream skimming is the primary private school advantage (aside from allowing parents to unbundle their housing and schooling choices). In the first three rows of the table, the decline in public school quality under increased private school competition is illustrated for the case in which private schools compete by removing nonfinancial resources from the public system. Given that the set of such nonfinancial resources is fixed, competition for them, in essence, creates a "tragedy of the commons," with private schools using their advantage to remove high-quality resources from the common pool that would otherwise end up in public schools.[13]

The next two sets of rows in table 12.3 each introduce a different private school advantage while reducing the importance of cream skimming proportionately. In each set of simulations, the cream-skimming advantage of private schools is reduced by half, with pedagogical targeting (in the middle rows) and resource efficiency (in the final rows) making up for this loss. Together, these simulations suggest that it is plausible for private school competition to increase public school quality to the extent to which private schools are not competing primarily by shifting nonfinancial resources from the public to the private system (i.e., to the extent to which there are sufficient competitive channels that raise productivity rather than compete for a fixed pool of resources). The positive effect on public school quality from greater private school competition could, of course, become even larger if the "cream-skimming" advantage were reduced further. The main message here is simply that competition can be akin to a zero-sum game when schools

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12. A "private school voucher" in these simulations is a lump sum amount made available to any family for the purpose of paying for a portion of private school tuition in a private school chosen by that family.

13. When peer quality is interpreted strictly as child ability, the pricing of peer externality within private schools can, under some circumstances, nevertheless be efficiency enhancing (Epple and Romano 1998). Even when it is efficiency enhancing, though, the public school system inevitably must suffer as high-ability peers are attracted to private schools. In the model used here, explicit pricing of peer quality is not permitted; thus, it is assumed that private schools will charge the same tuition to all students, implying that the efficiency-enhancing effect of externality pricing does not emerge.

compete for a common resource pool, but can also be a positive-sum game when schools are forced to compete in more productive ways.[14]

Nonresidence-Based Public School Competition

As mentioned earlier, competition between schools can take many forms, with different forms resulting in different ways students are rationed into schools (and different ways in which nonfinancial resources are rationed with students). A primary reason often offered for not fostering private school competition through public policy is that private schools will divert resources from public schools, thus reducing public school quality. In virtually all simulations of the effect of private school vouchers, such diversion of resources is solely in terms of nonfinancial inputs (as in the cream-skimming simulations above), with per-pupil funding in public schools typically remaining constant or increasing with use of private school vouchers.[15] The primary concern about private school competition then boils down to how such competition rations students (and the nonfinancial inputs that come with them). Thus, advocates for school reform often favor increased public school competition but oppose private school competition because public schools are typically not permitted to explicitly select students, whereas private schools can.

Although public school competition has traditionally taken the form of interdistrict school competition (with rationing through housing markets), a number of new innovations that foster greater competition between public schools, with rationing of students taking place at least partially outside housing markets, have gained favor. Such public schools do not charge tuition, so when a school is oversubscribed, it may use a lottery mechanism to determine who is admitted. Rarely, however, is the rationing mechanism entirely driven by lottery. Rather, the assignment algorithms typically take into account parental preference rankings of schools and define a priority system in which applicants in higher-priority categories are treated preferentially; a lottery can then be used to break ties when necessary.

The most common priority categories are whether the household lives within the "walk zone" of the school and whether a sibling is already in the school. The greater the geographic area around the school that is included in the walk zone and the greater preference given to those living within that zone, the more the public school represents a traditional residence-based public school. Likewise,

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14. The concern about schools competing for nonfinancial resources or peer quality is not limited to private school competition. Fiske and Ladd (2000), for instance, document how such competition can emerge in primarily public school choice systems when inadequate attention is paid to this possibility.

15. The change in public school quality in the first set of cream-skimming simulations of table 12.3, for instance, is almost entirely due to a drop in nonfinancial inputs in public schools. One exception is that per-pupil funding in low-income districts actually increases with vouchers because they are primarily used in lower-income districts, by households that nevertheless continue to pay taxes for local public schools.

the smaller the defined walk zone and the lower the preference for living within that zone, the more seats in the school are unbundled from residential location choices. Thus, by varying the size of the area included in the walk zone and the degree of preference given to those living within the area, public school competition can result in as little as no rationing through housing markets (when there is no walk zone) and as much as full rationing through housing markets (when the walk zone is defined sufficiently large that all seats are filled with children from within this priority category). Put differently, traditional residence-based public school competition can be partially or fully replaced by nonresidence-based public school competition by altering the role walk zones play in public school assignment processes. The traditional residence-based school system can therefore be thought of as a special case of a more general public school choice system in which walk zones play a role in the assignment mechanism.

An increasing number of cities are choosing public school competition systems in which walk zones play some, but not the only, role in public school assignments and are thus moving away from the "corner solution" of making walk zones the only criterion for school assignments. In such cities, parents are asked to provide preference rankings of public schools. These rankings are then used to fill the seats in public schools, with preference given to children who fall in high-priority categories (e.g., walk zones, sibling preferences). The precise assignment algorithms that derive the allocation of students to schools from parental preference orderings have been studied in some detail by economists. Some algorithms (such as, for instance, those used in Charlotte-Mecklenburg, North Carolina) are such that parents have an incentive to misrepresent their true preferences, and the resulting matches of students to schools is unlikely to be optimal. Others (such as those used in Boston and New York) are deliberately designed to be strategy proof, giving no incentive to parents to "game" the system and ensuring an optimal allocation of students across schools.[16]

Given the multitude of ways in which nonresidence-based systems of public school competition can be designed, it is difficult to find compelling ways to introduce them into our model and produce additional insights. Some general

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16. Such strategy-proof assignment mechanisms were first suggested and developed by Abdulkadiroglu and Sönmez (2003) and have since replaced less efficient mechanisms in several cities (see Abdulkadiroglu, Pathak, and Roth 2005; Abdulkadiroglu et al. 2005). The inefficient and nonstrategy-proof mechanisms these new mechanisms are replacing tend to fill up the seats in good schools with applicants in high-priority categories. Parents with either low lottery numbers or in lower-priority categories therefore have an incentive to not rank their most preferred school—a school that was likely filled before they had a chance to apply—truthfully. Instead, they may attempt to "game" the system by ranking a second or third school more highly, aiming for a more realistic chance of getting into a good, if not the best, school. Preliminary evidence suggests that higher-income parents were "better" at gaming these systems. Reported preference rankings changed dramatically when new strategy-proof mechanisms were implemented.

conclusions that follow from the earlier-mentioned simulations, however, may be drawn. (1) To the extent to which such public school competition relies heavily on walk zone priorities, it is no different than traditional residence-based public school competition and thus produces all the same capitalization and segregation effects with the accompanying rationing of nonfinancial resources through housing markets; (2) To the extent to which walk zones do not play a prominent role in such public school competition, the system unbundles housing and schooling choices much as private schools do, with similar effects on capitalization and desegregation in housing markets; (3) Under public school rationing mechanisms with little reliance on walk zone priorities, the competition between public schools cannot easily be based on cream skimming because all public schools must accept the assignment from the assignment algorithm and thus cannot "choose" from an applicant pool. Therefore, the nature of the competition that arises is likely to be similar to that in the second and third set of rows of table 12.3, with generally positive effects on public school quality.[17]

Integrating Decentralized Public and Private School Competition —

The ideal of public education is to guarantee access to quality education to all children regardless of background, and this ideal is often in mind when comparing "public" education to "private schools." This ideal has led many to caricature public schools as "accepting everyone for free" and private schools as "rationing access to the privileged." Once we explicitly recognize that traditional public school systems in the United States have rationed access through housing markets and have thus limited access to good public schools to those who can afford housing that provides access to those schools, however, it becomes evident that public schools do not live up to the "ideal" of "accepting everyone for free." Similarly, although there are undoubtedly private schools that screen applicants carefully and provide access only to the privileged, many private schools (such as parochial schools in many U.S. cities) are open to most applicants and are hardly exclusive to the privileged. The caricatured distinction between public and private schools is therefore quite artificial, with many private schools in inner cities coming closer to the public school ideal than many rather exclusive suburban public schools in high-income neighborhoods.

In light of this fact, it is puzzling that many draw such sharp distinctions between fostering greater (nonresidence-based) public competition and greater private school competition. Both categories share much in common: they permit households to unbundle their housing and schooling choices, and they permit competition on efficiency or pedagogical grounds. What appears to separate them

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17. Evidence on the performance of nontraditional public schools is still evolving, although much of it focuses narrowly on test scores. At this point, some charter schools succeed at raising scores and others do not, but parents appear to be significantly more satisfied.

is that private schools typically ration access in part through tuition and admissions policies, whereas nonresidence-based public schools ration access through assignment algorithms that involve some element of randomization. Put differently, the rationing mechanism used by private schools may (and, in some instances, surely is) used to cream-skim nonfinancial resources from a fixed common pool, even though the randomization element of nonresidence-based public school rationing explicitly prohibits such cream skimming.

With the nationwide move toward increased nonresidence-based competition in the public sector, a natural bridge has emerged. This bridge may permit an evolution of a more inclusive school system that contains elements of traditional public school competition, "new" nonresidence-based public competition, and private school competition to the extent to which private sector schools choose to participate in the system. "New" public schools (such as charter schools) are already attempting to do what some private schools do: make more efficient use of resources while targeting pedagogy and curriculum in ways that are appealing to a subset of households. States have determined per-pupil funding for such schools, but the assignment mechanism prohibits these schools from competing primarily through cream skimming. If a private school were willing to accept the same per-pupil level of state funding and to participate in the same assignment mechanism as that which governs the rationing of students to schools in the public system, there appears to be no reason to view that private school differently than a charter school that is attempting to compete within the public system.[18]

Advocates of increased private school competition argue that cream skimming is, in fact, not the primary channel through which private schools compete with "free" public schools; rather, they believe that private schools are simply more efficient at using resources and better at matching pedagogy and curriculum to the needs of particular subsets of children. If true, opening existing systems of nontraditional public school choice to private schools on the same terms (i.e., the same per-pupil funding level and the same assignment mechanism that governs nonfinancial inputs) ought to appeal to private schools. By making acceptance of the assignment mechanism a condition of receiving public funding, this way of fostering private school competition removes the fundamental objection made by public school competition advocates.

Even more competition (that is not based on cream skimming) could be introduced by making the private schools' decision of whether to participate in the system more continuous; that is, rather than asking private schools to participate or not participate, the system could permit a private school to partially

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18. One concern often raised relates to children with special education needs that make them inherently more expensive to educate. This concern, however, applies equally to public and private school competition. Because states already have developed formulas for assessing per-pupil costs to such cases, one solution is to simply provide additional per-pupil funding that accompanies such students.

participate and provide public funding (at charter school per-pupil levels) only for the subset of seats within a private school that the school agrees to fill through the common assignment mechanism. This system would, for instance, permit parochial schools to reserve some seats for parishioners who pay tuition while opening other seats to interested parents (who would not be charged tuition, but would instead be funded publicly).

Such a system seems like a natural next step in the evolution of choice-based school reform. The previous insights suggest that the form of competition fostered under this kind of system has many attractive features that emerge from combining the three forms of rationing. First, by permitting a role for walk zones, the system does not eliminate the role of residence-based admissions. Although the rationing through housing markets that comes with such walk zones gives rise to capitalization and income segregation, it becomes problematic only when walk zones are defined to be so large that they create entire enclaves or communities (as is the case in a purely residence-based public school system). If walk zones are kept relatively small, the system therefore maintains many of the benefits of local school ownership that comes with residence-based systems, without producing the larger segregation that becomes problematic. Second, the nonresidence-based rationing (based on parental preferences and lotteries) that is introduced into the system is deliberately designed to foster "healthy" competition (based on greater resource efficiency or better matching of students to schools) rather than "unhealthy" competition for scarce nonfinancial inputs. That is true for both public schools and private schools, to the extent they choose to participate in the system. Third, those private schools that view selection of students (and the nonfinancial inputs that come with them) as sufficiently important to keep them from obtaining public funding are not subsidized in the system, thus eliminating the fear that cream skimming drives the competition induced through public funding. In fact, if anything, the increased number of both public and private schools competing for students would tend to decrease the number of private schools that can rely primarily on cream skimming as their competitive advantage. The proposed system thus maintains a role for all three forms of rationing of students into schools while giving flexibility to localities to determine the appropriate balance given the particular local circumstances (for instance, by setting the size of walk zones differently in different cities).

Horizontal Versus Vertical Differentiation

Although much of the economics literature treats school quality as a concept that allows us to rank schools hierarchically, other social sciences suggest that a particular school may be "high quality" for some but not for others. In the language of industrial organization, economists often emphasize the vertical differentiation between good schools and bad schools, leaving aside the issue of potential horizontal differentiation between different schools that set different objectives, objectives that represent good matches for some children but not for others. The

focus on vertical differentiation is natural when one thinks of all schools—such as all traditional public schools—as aiming to achieve the same objective loosely referred to as "academic achievement," and this focus is reinforced in an environment of "accountability" where very particular aspects of education production are measured to the exclusion of others. It is less natural, however, for parents who are searching among, for instance, private schools, where such searches typically focus on the right "match" of school characteristics to child characteristics. Thus, parents may choose between two schools they consider equally "good," but where one school is "better for their child" than the other.[19]

The simplest way to model such horizontal differentiation is to specify child "types" in addition to child "abilities." As before, child abilities and parental income produce the peer quality characteristic of a household. A child's "type," on the other hand, determines how well a particular school "type" matches a child's characteristics, with closer matches resulting in higher school quality as experienced by this particular child. A school then chooses a "type" (of curriculum or pedagogical approach) and uses financial and nonfinancial inputs to produce quality targeted at this type. Specifying types is conceptually different from the "pedagogical targeting" previously discussed, where it was simply assumed that lower variance in (hierarchical) child abilities within a school raises school quality (all else being equal). Put differently, the pedagogical targeting modeled in the previous section is a special case in which a child's "type" is equal to her "ability." The intent here, however, is to recognize horizontal differences between children and model them as "types," while continuing to acknowledge that for any child "type," there exist many different (vertical) ability differences.

To be more precise, suppose that child types, denoted τ, can fall anywhere between 0 and 1. A school of type t then produces quality $s_{t\tau}$ for a child of type τ in accordance with the production function

$$s_{t\tau} = \phi_{t\tau} x^{(1-\rho)} q^{\rho},$$

where $\phi_{t\tau}$ is a function that increases as the difference between t and τ shrinks. Children of different types therefore experience the same school differently, opening the door for horizontal differentiation between schools. At the same time, a school of a particular type with the same distribution of child types is better able to produce "quality" if it has more financial and nonfinancial inputs available.

In a residence-based public system in which all public schools are of the same type, the ability of private schools to horizontally differentiate themselves becomes yet another possible—and even more promising—competitive advantage for private schools. Incorporating this advantage into the model again disciplines

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19. Akerlof and Kranton (2002) explore this idea in rich detail in work that draws heavily on insights from sociology. Such insights place emphasis on concepts like "identity," with children identifying as certain types and schools creating local cultures that match some identities better than others. When this match is close, the school is more able to achieve academically.

us to recalibrate the cream-skimming advantage by lowering the value of ρ (so that the model predicts private school attendance levels accurately). When the cream-skimming advantage is lowered by half (and replaced by this new horizontal differentiation advantage), the predicted effect of increased private school competition on public school quality is then again similar to the second and third sets of rows of table 12.3. The average public school quality rises even when public schools do not explicitly respond to competition because the students exiting the public system are those who are most different from the public school type (and thus the students who experience the lowest school quality in the public system). At the same time, without some response by the public system (whether in terms of increased resource efficiency, increased pedagogical targeting, or strategic horizontal differentiation), those students who remain within the public system would suffer a decrease in quality because the students who exit to private schools are also students with higher peer quality characteristics.

Although simplistic, this model of horizontal differentiation suggests additional ways in which the integration of public and private school competition might create substantial new educational opportunities. Parents would attempt to create matches between child types and school types as they express their preferences for schools, and assignment mechanisms that prohibit cream skimming would tend to keep competition from being based on competition for peer characteristics. More general models of horizontal differentiations, particularly those that draw on a rich sociological literature on the matches of school identities with individual child identities (Akerlof and Kranton 2002), suggest even more subtle ways school entrepreneurs can generate horizontally differentiated schools for the benefit of children who themselves are choosing participants in the education production process. Under a system that minimizes the opportunities for schools to compete through cream skimming, horizontal differentiation offers a promising channel for competitive pressures in education. At the same time, opportunities for competition to evolve in this fashion are likely to be limited by the extent to which participation in the public funding system entails excessive requirements of conformity to particular uniform standards.

Conclusions

Any mechanism that allocates resources in the absence of prices must be based on some nonprice rationing mechanism. Traditional public school systems in the United States have relied heavily on housing markets to ration resources and students to schools, thus creating a system of publicly funded schools that are quite heterogeneous in quality. Private schools have existed alongside this public system, with such schools using a combination of (tuition) prices and admission policies to ration access. These two rationing systems have resulted in some schools that cater to high-income clienteles, whether in exclusive suburban public schools, in high-tuition, elite private schools, or in others (both public and private) that admit a more economically diverse set of students. With a wave of new publicly funded

"choice" schools that have developed rationing systems that rely less on housing markets, the distinction between private and public schools has become even more blurred, thus opening the possibility of shaping policy that treats most public and private schools as part of a single system.

This analysis has drawn on insights regarding the effect of the previously dominant rationing mechanisms used in public and private schools to suggest one possible way of integrating private and public competition. It was noted that all systems are subject to competitive forces because scarce resources are rationed in education markets and that the true debate is therefore not as much about whether competition should play a role in education, but, rather, about what form such competition should take. Competition becomes less desirable to the extent to which it results in efforts to compete for scarce (typically nonfinancial) resources from a common pool. Such competition can become a zero-sum (or even a negative-sum) game. It becomes more desirable to the extent to which it fosters innovation, raises resource productivity, and creates better matches of schools to children. Both the traditional residence-based public school competition and cream-skimming private school competition have strong elements that fall into the former type of less desirable competition (although there is also evidence that both contain elements of the latter). New policies that limit the schools' ability to cream-skim while putting into place incentives to innovate hold the promise of fostering more socially integrated housing markets while creating better and more diverse opportunities for school children.

The move toward greater (nonresidence-based) choice, including a move toward integrating larger segments of "private" schools into public funding (as suggested here), also carries implications for U.S. fiscal federalism as it relates to school financing. With the unbundling of residential and school choices, the local property tax becomes a less obvious candidate for such financing, with more central income and sales taxes taking its place. Although decisions on how financial and nonfinancial inputs are used therefore become more decentralized under greater (nonresidence-based) choice, the actual financing of schools may well become more centralized. This change would open avenues for ensuring greater equity of appropriate per-pupil funding while simultaneously strengthening local control, where "local" increasingly means parents, not local school boards.[20]

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20. A system that integrates public and private schools in ways suggested in this study would also require some state-level oversight for two reasons. First, the public needs to be ensured that equal access through assignment mechanisms are indeed in place. Second, the state must enforce some standards that all participating schools must meet. Setting such standards would require finding a balance between fostering innovation and ensuring some uniformity in some dimensions. (For instance, one would surely want a system in which the Ku Klux Klan cannot set up a school that receives public funding.) In many ways, the current system in many cities and states is already evolving mechanisms for addressing such potentially undesirable outcomes as they struggle with what types of charters to approve for charter schools and what types of exemptions from typical public school rules such schools will receive.

Even though a system such as the one envisioned in this chapter provides straightforward mechanisms to ensure greater equity in per-pupil funding, more equality of opportunity to access good schools, and increased incentives for innovation, it does not lend itself to simple predictions about how the composition of schools will change. The current system is one with high degrees of racial, socioeconomic—and, to some extent, religious—segregation, but some would fear that the kind of system suggested will increase such segregation (as it has in some charter schools). Although that is a possibility, it is by no means a certainty. If a system such as the one proposed here indeed opens the doors to greater horizontal differentiation between schools, it would open the door to a new metric along which children would segregate into schools, a metric that may have no particular correlation with race, class, or religion. Schools may, for instance, differentiate on pedagogy, on subject emphasis, and on extracurricular activities, and preferences for such school features will no doubt cross the typical lines of race, class, and religion. The more the system permits schools to innovate in these dimensions, the more it introduces a force orthogonal to the usual segregating forces that cause concern. At the same time, certain disadvantaged minorities have consistently felt underserved in public school and may indeed initially segregate to provide a "safe haven" for their children, a haven that directly addresses the particular needs such families believe are currently being ignored. Such segregation has occurred in some charter schools that are specifically targeted at minority children from households that are disaffected with traditional public school options. Although this practice may, at least in the short term, result in increased racial segregation across schools in some areas, one cannot equate it with the forced segregation systems of the past. In fact, denying opportunities for minority parents who are ill-served in the traditional system to establish schools that more directly address their concerns may be the very reason traditional public schools are not meeting the needs of such families.

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