Vouchers for Basic Education in Developing Countries

A Principal-Agent Perspective

Varun Gauri
Ayesha Vawda

The World Bank
Development Research Group
Public Services
and
Human Development Network
Education Team
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Abstract

Voucher programs consist of three simultaneous reforms: (1) allowing parents to choose schools, (2) creating intense incentives for schools to increase enrollment, and (3) granting schools management autonomy to respond to demand. As a result, voucher advocates and critics tend to talk past each other. A principal-agent framework clarifies the argument for education vouchers. Central findings from the literature, including issues related to variance in the performance measure, risk aversion, the productivity of more effort, multiple tasks, and the value of monitoring are found relevant for an analysis of vouchers. An assessment of findings on

voucher programs in industrial countries, as well as a review of voucher or quasi-voucher experiences in Bangladesh, Chile, Colombia, Côte d'Ivoire, and the Czech Republic support the usefulness of the analytic framework. Gauri and Vawda conclude that vouchers for basic education in developing countries can enhance outcomes when they are limited to modest numbers of poor students in urban settings, particularly in conjunction with existing private schools with surplus capacity. The success of more ambitious voucher programs depends on an institutional infrastructure challenging to industrial and developing countries alike.

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Varun Gauri

Development Research Group
World Bank, 1818 H Street, N.W. MSN MC3-311
Washington, DC 20433
vgauri@worldbank.org

Ayesha Vawda

Human Development Network
World Bank, 1818 H Street, N.W. MSN H 8-800
Washington, DC 20433
Avawda@worldbank.org

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1. Introduction

Educational systems in developing countries face enormous problems. In many of the poorest countries there are significant deficits in affordable access and staggering differences in attainment between children from poorer and rich households. Even in many middle-income countries that have achieved near universal coverage in primary and secondary education, the quality of instruction and learning are low, particularly for poor people. Government spending is often insufficient, and inefficiently and inequitably allocated among educational inputs and across levels of education. And even where educational systems are adequately funded, the systems can be indifferent to families' concerns because they are dominated by an unresponsive state or by elites. In these settings, high rates of teacher absenteeism and low enrollment rates for girls are symptomatic of systems in which incentives are inadequately aligned.

What is the design of an educational system best able to address these problems? Speaking in the broadest terms, there are two archetypes for education systems. In the public archetype, the government finances education and manages all aspects of schooling, including the hiring of teachers and the construction of schools. The public archetype is useful for building a system where one has not existed and for ensuring uniformity among schools, but it is typically less effective at motivating teachers and schools to respond to families' concerns. In the private archetype, schools are privately owned and families pay the entire cost of tuition – this was the standard design of school systems in the 19th century. The private archetype gives parents choices among schools, and schools have a strong pecuniary motivation to keep their clients happy. But in the private archetype families unable to pay for school lose out. A number of analysts and reformers have argued that a combination of the public and private archetypes – public financing with private provision – is the best way to combine universal access with systemic responsiveness. The idea is give parents a voucher that can be redeemed at qualifying private schools, or to reimburse private schools based on their enrollment rates.

In short, the use of vouchers for basic education in developing countries is attractive for some of the same reasons that the idea has caught on in industrialized societies. It is thought that education is critical for individual and national welfare and increasingly so, that the quality of education is poorer than need be, and, especially, that school system governance is the reason for this. The proposed remedy is to let parents choose the schools their children attend, finance schools based on the number of students that choose them, and allow schools substantial management autonomy to make themselves more attractive. This solution draws, obviously, on market principles.

Despite the popularity of the proposal, there remains little empirical evidence on the effects of voucher programs, and still less from developing countries. Programs that

subsidize demand for education are not uncommon in developing countries, particularly those that aim to allay the direct and indirect costs of schooling for girls, low-income groups, and ethnic minorities.¹ Generally speaking, the objective of those programs is to increase the likelihood that children in particular groups enroll in and complete school. Voucher programs, on the other hand, generally aim to increase the quality of education among students who are already enrolled by expanding the range of choices parents enjoy. This review will focus on the latter.

This paper examines the available studies on the impact of voucher programs and, using a principal-agent framework, draws inferences about what might be expected from voucher programs in developing countries, what kinds of voucher programs might be most useful, and what elements of the institutional infrastructure will be important for their implementation. The first section below examines the theoretical arguments for education vouchers from the perspective of the principal-agent problem. The second section compares the theoretical predictions to the evidence on the operation and impact of voucher plans in industrialized countries. The third section reviews five voucher and quasi-voucher experiments in developing and transition countries. Finally, the conclusion draws out inferences regarding the ways in which education vouchers might be useful in low- and middle-income countries.

2. Vouchers and the Principal-Agent Problem

In the public archetype a centralized education ministry designs a national curriculum, finances education out of general revenues, and pays capital and operating costs directly. It also makes all managerial and staffing decisions, negotiates teacher salaries directly with one or more national unions, remunerates and promotes teachers on the basis of negotiated, experience-related criteria, employs evaluations as indicators of need and not performance, and assigns students to schools. Critics of the archetypal system contend that its consequences are usually inordinate education sector employment, too many unmotivated teachers, unnecessarily high taxes, school administrators indifferent to families, and passive parents with no option but to enroll their children in schools with which they are dissatisfied.

Instead, these critics advocate voucher systems, which depart from the archetype in three key aspects. First, students are not assigned to just one school but have choices among, depending on the details of the program's design, other public or private schools. The other common designation for voucher systems, systems of "school choice," draws its name from this facet. Second, schools have intense incentives to expand student enrollments. This follows from the fact that a significant part of school financing is

¹ Patrinos (2002) reviews the evidence on subsidies to demand in developing countries, including, for example, Bolsa Escola in Brazil, Progreso in Mexico, Food for Education in Bangladesh, and a community grants program in Pakistan.

channeled through a direct payment proportional to the number of students enrolled in (or in attendance at) a given school.² The idea is to shift the entity to whom schools are primarily accountable for their performance from the ministry, which is politically compromised in its efforts to enforce quality standards or even “captured” by the teachers unions, to parents and students themselves, who are the best judges of the education they want. In theory, these incentives will lead the better schools to take steps to improve quality, enhance efficiency, and develop innovative approaches to learning. Poorly performing schools will not attract students and will either close or be forced to find a market niche. Some of these schools might then satisfy demands that the bureaucratically constrained archetypal system cannot meet, such as schools that focus on computers, the arts, specific languages, certain ethnic traditions or religions, or learning methods for socially disadvantaged students. It is important to note that this criterion for voucher systems focuses not on the existence of subsidies to private schools, but on the degree to which, in practice, payments to schools vary with enrollment. In several European countries, for instance, political resolutions of religious struggles dating back to the seventeenth century entail notions of equal treatment of different denominations, and the state reimburses sectarian schools for some portion of their costs. Most of these are not really voucher systems, however, because the reimbursements are not proportional to enrollment, are proportional to enrollment but relatively small in magnitude, or are adjusted irregularly, with the result that schools do not have intense incentives to expand enrollments.³ Third, voucher systems require schools to have enough managerial control to respond to parental demand. Substantial control over staffing and personnel decisions, budget, and instructional methods are critical for schools to be responsive to demand. At least limited control over capital expansion, calendar, and curriculum also facilitate flexibility on the part of schools. Voucher programs and proposals differ significantly on the extent of control granted to local schools, in these as well as in other areas, which lead to large variation in the expected outcomes. The extent and manner in which voucher schools can select students, or charge additional fees on top of the per student allocation, for example, is likely to result in substantial differences in the degree of socioeconomic sorting a voucher system will exhibit.

Because voucher programs actually consist of three simultaneous reforms, it is easy for advocates and critics of vouchers to speak past each other, addressing different

² Formally, incentives in a voucher system are modeled as $r = \alpha + \beta(e + x + \gamma y)$, where r represents total payments to the school, α is a base payment for capital costs or in-kind inputs, e is school effort as measured by the number students enrolled, x is noise in the measurement of enrollments, y is a set of factors that varies with enrollment, and γ a parameter that varies from 0 to 1. The higher the voucher value, β , the more “intense” the incentives the school faces (Milgrom and Roberts 1992).

³ It is possible that schools will exhibit competitive behavior even in the absence of explicit, intense incentives. In some cases, rivalry for professional status can lead to a “culture of competition,” as in the New Zealand system, described below.

aspects of the program and drawing on different streams of research. Proponents, for example, draw on literature comparing efficiency in existing public and private schools (Cox and Jimenez 1991), arguing that more flexible management structures in the latter can explain their superior performance; but findings of that sort do not speak to the heart of voucher programs because it is theoretically possible, of course, to introduce school autonomy without subjecting schools to intense incentives. Similarly a critic of voucher programs might cite findings on the link between family or community involvement and student outcomes, and argue that voice, not exit, is critical for school performance; but that ignores the fact that voucher programs might enhance parental voice. Parents will first try to fix a school before exiting because student mobility, particularly at certain stages of learning, can lower achievement and increase the likelihood of dropping out (Swanson and Schneider 1999). Another stream of research argues that choice enhances learning by allowing parents to find schools in which there is a good match between their home cultures and school learning environments (Comer 1989); but that is not by itself an argument for voucher programs because it is achievable by allowing choice within the public sector. Even the seemingly diametrically opposed literature on the effects of top-down accountability and hierarchy in education can be relevant to the voucher debate (Ladd and Armacost 1996). That is because the quality of instruction in schools, on the basis of which parents choose schools, is not self-evident, and requires data on test scores, college admissions, and the like, which themselves are not obvious and need interpretation and explanation to take account of family contributions to learning, student selection effects, dropout, and other problems. So a voucher program is likely to require a good performance measurement system, one run by experts, to work well. But then, if a voucher school reorganizes itself and improves after its enrollments decline, it is reasonable to ask whether the school is doing that in response to declining enrollments or in response to having its outcomes publicized and its name “shamed” by the experts, which is what accountability in hierarchies consists of.

In addition, confusion arises because when parents’ choices determine payments to schools, the benefits flow through two distinct channels. First, schools exert more effort to satisfy parents and attract more students. Second, parental expenditures and choices are more in line with their preferences. The former effect captures the benefits of competition that are at the heart of the voucher argument. The latter, though occasionally cited as a justification for voucher programs, depends largely on the details of the program design, and on assumptions regarding utility. If, for example, voucher programs do not allow parents to “top up” the value of the voucher, household expenditures on basic education are the same in a voucher program and an equally financed archetypal education system. How much utility parents derive from choosing a school depends on how informed their choices are, the time consistency of their preferences over the years their child is enrolled, and the extent to which constraints relating to the compulsory nature of basic education and supply-side homogeneity reduce the utility of choosing.

There might well be a related but distinct issue related to a parental right to choose a religion for children (Wolfe 2003), but that moves beyond efficiency arguments for voucher programs.

The supply-side effect – the idea that intense incentives to expand school enrollment motivate school effort – is the central component of voucher programs. To understand this, it is useful to understand the state as a “principal” which pays schools, its “agents,” for providing educational services that further its objectives. Consistent with the voucher idea, agents are assumed to have sufficient management autonomy to deliver the objectives. Clients are free to choose among the agents. The state rewards schools in a linear compensation contract: payments are proportional to the number of students they enroll. As a result, the compensation scheme employs intense incentives. The state’s educational objectives are, stated loosely, the same for most governments in the contemporary world: to impart literacy, numeracy, a stock of cultural and scientific knowledge, and cognitive skills; to transmit social norms and worldviews; and to provide educational opportunities that structure life chances based on local interpretations of freedom, equality, and non-discrimination. In a voucher system, the state usually continues to rely on a national curriculum, the broader institutional landscape, and civil rights laws to guide schools toward those objectives; but it uses student enrollment as the exclusive indicator of the effort a given school has exerted to achieve them.

Another approach would model parents as principals, either alongside or instead of the state as a principal, with the school remaining the agent. The difficulty with this approach is that parents, unlike the state, are not in a position to modify the terms of the contract. The state, to anticipate one of the findings below, might for instance choose to pay schools not only for each student enrolled but an additional amount for students from minorities or from disadvantaged backgrounds, or less if an inflow of immigrants raises average enrollment rates and lowers marginal costs for all schools in a neighborhood, or link payments to a weighted average of enrollments and test scores. Parents are concerned only with the education of their own children, and will not pay more or less if the school fails to fulfill a social objective. Schools, moreover, are not likely to accept a contract from a parent in which the parent does not pay if the school fails to achieve its educational objective because learning is jointly produced by students and the school. If education were provided individually, as in a tutor-pupil relationship, parents might write contracts with providers. But because schooling, for economies of scale and social and historical reasons, is provided collectively, parents, if they were to write contracts with schools, would also have to negotiate among themselves on the terms of the contract, resulting in a difficult collective action problem. For these reasons, it makes more sense to consider the state the principal in a system of intense incentives created in a voucher program.

The principal-agent literature is now fairly advanced, and a set of findings is available from it that can be applied directly to the architecture of voucher programs in education (Milgrom and Roberts 1992). The remainder of this section reviews those findings and uses them to assesses what can be expected from voucher systems, particularly as they might function in developing countries. The theory of optimal payments includes the following findings regarding the payment formula.

Bias and Noise in the Estimate of Effort

Theory indicates that compensation with intense incentives should be based only on performance measures that are strongly correlated with the agent's effort.⁴ It is reasonable to ask, then, how well does enrollment estimate a school's effort at achieving the state's objectives? Parents probably do observe aspects of school effort that ministry officials might overlook, such as the attentiveness of staff, the dedication of teachers, and help in securing placement in higher-level schools. In developing countries, a simple indication of school effort that parents use is simply whether or not teachers show up for class. It is *prima facie* plausible, then, to include enrollment in a formula for compensation based on intense incentives. But if parents' assessments of schools have systematic biases, then enrollments will be a biased estimator of school effort. A potential systematic bias on the part of parents is the tendency to conflate the composition of a school's student body, particularly along socioeconomic and racial dimensions, with the quality of the education offered, and the latter with the effort a school exerts.⁵ Given that family background, not school performance, usually explains most of the variance in student performance, such a confusion on the part of parents would bias the state's indicator of school effort. That bias would also create a powerful incentive for schools to attract a student body that parents would find "desirable." If that is so, it will make sense to include in the compensation formula additional variables that correct for the effect of student body composition on demand for a school and on the learning outcomes for which the school is responsible.

Moreover, enrollments can also be a noisy estimate of effort. Remoteness or transportation costs, changes in the birth rate, migration, the returns to education in the economy, and (arguably) cultural expectations about who should be in school are all exogenous determinants of enrollment that are uncorrelated with school effort. Compensation schemes that do not include factors like those weaken the intense incentives that schools face. Weights for these factors would not be hard to devise, and

⁴ The use of a poor measure of effort and the exclusion of observable, exogenous, correlates from the contract both raise the expected variance with which effort will be measured. The higher the variance, the higher the implicit costs of contracting. (Holmstrom 1979).

⁵ This "bias" on the part of parents is rational if enrolling one's child in a school with advantaged peers helps the child learn – if there are peer effects – or if enrolling in such a school is construed as a sign of high achievement by employers and higher level schools – if there are signaling effects.

they would not require frequent adjustment because the exogenous factors mentioned change slowly and are generally predictable.

With the respect to the objectives of schools beyond academic achievement, parents are also probably sensitive to whether or not school norms are consistent with the those of the larger society, and whether, at least within the school, principles of non-discrimination are applied. Still, using parents' assessments alone might not be suitable when contested norms, such as gender equality, are emerging; and parents' assessments of particular schools and their consequent enrollment choices are by definition insensitive to equality of opportunity outside the school, in the education system as a whole. But because measures of those objectives are extremely difficult to construct, it makes more sense to use laws and professional norms to achieve them, and not try to incorporate them into the compensation scheme.

Risk Averse Agents

According to theory, the less comfortable an agent is with risk, the higher the welfare cost it bears from intense incentives.⁶ In voucher programs, schools that suffer enrollment declines receive lower revenues. That might result in lower compensation for teachers and staff if their salaries are tied to school performance, or if nationally determined pay scales for principals, say, are tied to the size of the school they administer. Staff in poorly performing schools might also suffer declines in their morale and reputations, which could make it harder to find other employment if they move or if their schools are forced to close. In developing countries, teachers can struggle to make ends meet, in some cases with household incomes below the national poverty line, and are less comfortable with risk than their counterparts in richer countries. As a result, voucher programs impose welfare costs on them and their families, and they might well decline to participate in, or resist, them. A related problem is the welfare impact when a voucher school is forced to close down: the transaction costs of transferring ownership of the facility, or the opportunity cost of letting it sit idle, carry higher welfare costs in countries where capital is in short supply. Of course, it is theoretically possible that improvements in student academic achievement following voucher programs might outweigh the negative welfare effect on teachers, owners, and taxpayers.

The Productivity of More Effort

Intense incentives are worthwhile only if increments of additional effort produce better performance. This idea is implicit in voucher programs because the voucher idea assumes that school management and governance, through their effects on staff effort, are

⁶ With a risk neutral principal and a risk averse agent, a Pareto optimal fee schedule is never one in which the agent bears all the risk (Shavell 1979), but a small degree of risk aversion in a linear compensation contract will permit a solution close to the first best (Holmstrom and Milgrom 1987).

the principal determinant of school performance. There are circumstances, however, in which schools, though motivated by intensive incentives, cannot substantially improve learning outcomes because of factors beyond their control. If, for example, the quality of teacher training is inadequate nationwide, textbooks are routinely stolen, it is difficult to recruit teachers to certain areas, teacher time is siphoned off by political parties for other purposes, or students are malnourished, then intense incentives for schools, though they might elicit greater effort at first, might not improve academic outcomes. If the desired outcome is not quality but merely school attendance, however, there is a stronger *prima facie* case that schools paid to enroll students will expand educational access. Even here, however, exogenous factors, such as social expectations and population density, might dampen the effect of school effort. On the other hand, there might be circumstances in which the marginal effect of school effort is powerful, at least over a certain range of effort, as when modest numbers of public school students are given vouchers to attend private schools, which in many cases have the capacity to accommodate small numbers of new students into their existing schools and classes with just a little more effort. In that instance, an issue emerges about whether the design of the voucher scheme includes intense incentives for the public schools that those students have left, and what effects incremental effort on their part might have on school quality and on the willingness of the students to stay in them. In other words, it is important to distinguish a partial equilibrium effect (the incremental gain in learning for students who use vouchers) from the general equilibrium effect (which sums the effect for students who use vouchers and the effect on students left behind in public schools).⁷

Relative Compensation among Activities

If a compensation scheme with intense incentives rewards certain activities at lower rates, the agent will not perform them. In the case of voucher programs, schools are not rewarded for stressing norms or principles of fairness with which many parents might disagree; so if the enforcement of rules governing, say, equal treatment or ethnic pluralism, are not well-enforced, the payment scheme will not give those schools a reason to pursue those objectives. Of course, the same can be true of compensation schemes without intense incentives, such as subjective evaluation; and it can be argued that since processes are difficult to observe, they should not be included in the compensation scheme.⁸ A related phenomenon is that voucher programs might not stimulate innovation in instruction and curricula, as proponents hope, and might even dampen it, because

⁷ For a formal presentation of this point, see Hsieh and Urquiola (2002).

⁸ Holmstrom and Milgrom (1987) argue that if two of an agent's activities can be separately observed, the weight to attach to each in the optimal compensation scheme depends not only on the costs and benefits of the activities but on their variances. The higher the variance, the lower the weight attached to the activity.

parents in many contexts are conservative about teaching methods, and the formula for compensation does not pay schools for innovation or professional development. Constraints external to the school, such as the selection criteria of higher-level schools or universities, might also limit the interest schools will take in developing new methods. Curricular innovation might well be more easily observed than overall effort, so its inclusion in the compensation scheme might make sense.

The Value of Monitoring

With intense incentives, it pays to monitor the agent's performance carefully (Milgrom and Roberts 1992). In a voucher program, a school will be rewarded if it can exaggerate enrollment rates and get away with it. It will also be rewarded if it successfully lowers standards for expelling students, or if it raises the average grades students can expect to receive, which in turn entices more of them to choose the school. Without reliable inspectors and a strong current of professionalism among educators, education ministries in developing countries will be hard pressed to monitor how schools behave in response to intense incentives, which in turn will lower the usefulness of those incentives. If the costs of setting up a functioning monitoring system are sufficiently high, they will outweigh the benefit of imposing intense incentives, unless, of course, the establishment of a monitoring system itself enhances professionalism and carries its own educational benefits.

3. Voucher Programs in Industrialized Countries

While the expected effects of voucher programs listed above were taken directly from theory, empirical work on voucher programs in industrialized countries supports the usefulness of the framework. It should be emphasized, as the last section suggested, that voucher programs take a variety of forms, depending on, among other things, rules regarding student eligibility, student admissions, information dissemination, fiscal and pedagogical accountability, the mean and the distribution of the voucher value, and school-level management autonomy, which will all have an impact on the expected impact of any given program on academic achievement, equity, innovation, and the state's other educational objectives. Impact evaluations of voucher programs remain sparse. Still, experiences with voucher programs can be analyzed to determine whether or not they provide support for the principal-agent approach.

If enrollments are a biased or noisy indicator of school effort, then the expected impact of voucher programs on school effort is likely to be weak, with little final impact on outcomes. In the United States studies of the academic effect of voucher programs in small, privately funded efforts in New York City, Washington DC, Dayton, and

Charlotte, and targeted, publicly financed programs in Milwaukee, Cleveland, and Florida, have found limited or mixed results, consistent with that expectation.⁹

In New York a private foundation offered scholarships of up to \$1,400 to elementary school students enrolled in low-quality public schools. Some 20,000 students applied for the scholarships, and 1,300 were selected on the basis of a lottery. Using the lottery as an instrumental variable for private school attendance, Myers and others (2000) compared average reading and math test scores of students who enrolled in private schools with a comparable group of students who did not, and found no statistically significant difference; but a disaggregation of the results by race found evidence that students enrolled in the voucher schools did significantly better if they were African-American, but not if they were Latino. Although in their study the advantage for African-American students was driven almost entirely by the effects in grade 6, the finding was consistent with other studies finding some benefit for African-American students in Dayton, Charlotte, and Washington, D.C. (Howell and Peterson 2000a, Howell and others 2000b, Greene 2000). Despite the fact that available data for the evaluation of the publicly financed voucher program in Milwaukee involved only 341 students in seven non-sectarian schools, it has generated a great deal of controversy Witte (2000) found no consistent difference in achievement scores among voucher program participants and public school students, but Greene, Peterson and Du (1997, 1998) re-analyzed the data with a comparison group of voucher applicants who could not find space in a participating school and found that participating students did better after four years of enrollment. Rouse (1998) used the same data and found that voucher students did better in math but not in reading, and that the math advantage increased over time. Studies of the effects of these voucher programs on public schools and students who remain in the public system have been hard to conduct because the number of students involved has been so small. One study of Florida's voucher program (Greene 2001), in which students in schools deemed to have "failed" two years in a row are given the option of using vouchers in private schools, shows that every one of seventy-eight failing schools improved in order to avoid the voucher threat, and argues that this is evidence that voucher programs have positive effects for participants and non-participants alike. But is unclear whether the improvements in those schools can be attributed to vouchers per se or the social and political pressure following a failing grade.

More direct evidence on bias in the estimate of school effort comes from New Zealand. In the late 1980s and early 1990s, successive liberal and conservative

⁹ For a summary of research findings on vouchers in the United States, as well as on charter schools, see Gill and others (2001). That volume argues that differences in academic achievement between conventional public and charter schools in Michigan, Texas, and Arizona suggest are relatively small and mixed in direction, though that might be a consequence of the relative youth of charter schools. Hoxby (2001) argues that areas with greater competition from charter schools exhibit higher achievement. Other reviews include Ladd (2002) and Neal (2002).

governments in New Zealand enacted a series of reforms whose result was a “quasi-voucher” system in basic education (Wylie 1998). Control over the hiring of new teachers, operating budgets, the selection of academic missions, student fees, and local fundraising was transferred to self-governing school boards, which were composed of the principal, one teacher, and elected parents; and residency rules were loosened so that parents could choose any school. The system did not establish intense incentives based on enrollment, but schools started to compete for students anyway because they received more operating funds as enrollment increased, salary scales and prestige for principals were linked to school size, and schools gaining students were widely perceived to be “successful,” which motivated school boards to expand enrollments.

Studies of parental choices in New Zealand found that schools serving largely disadvantaged groups saw their enrollments decline and their shares of minority students increase, and those serving advantaged populations were more likely to have their enrollments rise and their shares of minority students remain steady or fall, controlling for census-based predicted enrollments and, in secondary schools, certificate exam scores, which are not mandatory (Fiske and Ladd 2003, 2000). It appeared that white students were either fleeing schools with large minority populations or pursuing schools with advantaged students, and that minority students were fleeing schools with large minority populations. Additional research suggested minority students were less likely to consider a high status schools an option, and less likely to attend a nonlocal school (Smithfield Project 1995). While parents’ decisions to flee schools with high minority populations might be individually rational, it is also consistent with the notion that in some contexts enrollment rates are biased estimates of school quality. There was also evidence of noise in the correlation between enrollment and quality: when one secondary school suffered a number of suicides, enrollment declined dramatically even though it was far from clear that the school atmosphere was causally associated with them (Fiske and Ladd 2000). In New Zealand, schools also used a variety of clever but legal techniques to recruit more advantaged populations: in 1997 the percentage of schools using these “enrollment schemes” was over 50 percent in Auckland and Christchurch, and 24 percent in Wellington (Fiske and Ladd 2000). The apparent increase in socioeconomic polarization in New Zealand was probably also related to the fact that schools were able to set their levels of student fees, as well as the fact less advantaged parents had a harder time accessing information about and traveling to the better schools.

Though systematic studies are not available, similar accounts have appeared regarding the voucher program in Sweden. From the early 1990s onward, Sweden transferred control and management of schools to municipalities, which began to finance education based on, in approximately equal portions, their own revenues and block transfers from the central government. Municipalities now grant privately managed “independent” schools, some of which had been receiving state assistance, per-pupil

subsidies equal to the per-pupil financing granted to public schools. The enrollment share of independent schools increased from 1 percent in 1991 to 4 percent in 2002. Parents with children in independent schools appear to be better educated than those in public schools, and they seem to be making their choices to avoid schools with large shares of non-Nordic immigrants (Daun 2003). A study in one large municipality found that some schools with large declines in enrollment were unable to attract better teachers, but that others were able to establish new market profiles (Daun 2003).

Evidence on systematic bias in the estimate of effort is mixed in England, and evidence on the outcomes of the voucher program is unclear. A series of laws beginning in 1980 created a quasi-market in government-financed basic education England (LeGrand 1991, Walford 1997, Walford 2003). The 1988 Education Reform Act transferred control of budgets and personnel hiring to state-maintained schools, linked school funding to age-weighted enrollment figures, allowed parents to attend any school with available spaces, and required schools to follow the National Curriculum. In 1993 schools were allowed to select 10 percent of their students on the basis of musical or other abilities, and other legislation that same year permitted existing private schools or independent sponsors to establish grant-maintained schools. Seven new schools were formed from 1993-1997, and seven more have been established under the Labor Government, which has retained the voucher-like system in English education.

A series of case studies has argued that the choice system has led to increased social segregation among schools, as students sorted based partly on the social mix in schools and as schools started to select students (Ball and Vincent 1998, Gewirtz, Ball, and Bowe 1995), but statistical analyses of class segregation have been inconclusive (Gorard and Fitz 2000, Gibson and Asthana 2000, Levacic and Woods 1999), partly because the previous system in which students were assigned to schools based on residence, “selection by mortgage,” had already created substantial sorting. Achievement scores of students in the system increased during the 1990s, and some studies argue that competition among schools, as measured by private sector enrollment share, number of schools, or a Herfindahl index, is associated with higher test scores. (Bradley and Taylor 2002, Millington and Bradley 1998), but other studies find mixed results. One, in particular, used interviews with headmasters to try to establish a link between structural competition in a market, measured by the number of firms or a Herfindahl index, and competitive behavior, and found that the relationship is looser than believed, being mitigated by amount of space available, product differentiation (type of education offered), and other factors. It also found that the impact of competition in performance is sensitive to the measure of competition used (Levacic 2001). Alongside the voucher system, the Conservative government in the early 1990s introduced nationwide testing, required publication of test results, and school inspections – a system of “naming and

shaming.” It is possible that the accountability system, rather than competition for students, motivated school effort.

Some European countries with voucher systems, recognizing the incentive that flat per-pupil payments create for schools to select relatively advantaged students and for parents to choose those “successful” schools, transfer additional resources to schools based on the composition of the student body enrolled. Holland pays 1.9 times the standard voucher value for each minority student and 1.25 times that value for an economically disadvantaged student (Patrinos 2002b). Sweden also transfers additional resources based on numbers of minority students and students with learning disabilities.

With regard to the other predictions of the principal-agent literature, constellations of teachers, local politicians, and voters have successfully resisted efforts to close schools, even those with low enrollments and declining quality, in almost all countries. That is suggestive of the risk aversion (and the political power) of the actors in the education sector, including teachers. The experiences in the industrialized countries also suggest that voucher programs can result in less attention to non-compensated school activities, such as curricular innovation. Case studies have found, consistent with the predictions of the principal-agent literature, that pedagogy in England and Wales have become more uniform as schools have become ranked on the same hierarchical academic scale. Schools seemingly have spent less effort on pedagogical innovation because they were not rewarded for it, perhaps even punished since parents have tended to be pedagogically conservative. (Walford 2003) Fiske and Ladd (2000) also reported that some teachers felt that collegiality declined in New Zealand over the period, and that parents, regardless of socioeconomic status, rated the quality of schools similarly, which resulted in a consistent focus on traditional academics in most schools and little curricular innovation. Both findings are consistent with the notion that when certain activities, in this case professional relations among teachers and pedagogical innovation, are rewarded at lower rates, they will receive less attention. In the United States, voucher students were less likely to have disabilities than the public school population (Myers and others 2000), probably because voucher schools were not compensated for taking on those kinds of students. Evidence on the two remaining theoretical findings, the productivity of more effort and the value of monitoring, were not available from the industrialized countries.

Voucher Programs in Developing and Transition Countries

Although there have been experiments with demand-side financing in a large number of developing and transition countries (Patrinos 2002a), true voucher programs are rarer. The reforms in Chile and Colombia, described below, are probably the only genuine examples. Still, this review includes “quasi-voucher” initiatives in Côte d’Ivoire, the Czech Republic, and Bangladesh, to illustrate the variety of contexts in which voucher programs might be implemented, and the results they might achieve.

Chile. Starting in 1980, Chile transferred management of primary and secondary schools to municipalities, abolished pay scales and civil servant protections for teachers, started to finance municipal and non-fee-charging private schools at equal rates tied strictly to attendance, and encouraged parents, whose enrollment choices were not restricted to residential zones, to choose schools based on performance. The democratic government that assumed power in 1989 re-established salary scales and employment protection for teachers, but in other respects it maintained Chile's voucher system. It remains probably the closest national-level approximation of a voucher system among developing countries (Gauri 1998).

The Chilean voucher system led to a dramatic increase in students enrolled in private voucher schools, whose enrollment share increased from 15 percent in at the beginning of the 1980s to 33 percent in 1996, almost entirely at the expense of the municipal schools' share. Although teachers did shift to the private subsidized sector, almost no municipal schools were closed. There is evidence that the private subsidized schools in Chile perform better, based on test scores, than municipal schools (Aedo and Larrañaga 1994, Rodríguez 1988), but this private advantage disappears or turns negative when student-level socio-economic data are included as controls (Mizala and Romaguera 1998, McEwan 2001). McEwan and Carnoy (2000) find that Catholic schools perform better than municipal and non-religious private voucher schools, but that they spend more per student than the other groups of schools. A study that attempted to measure the effects of private school competition on municipal schools found that communities with higher concentrations of private school enrollment had modestly higher positive test scores in the national capital (a net 0.2 standard deviation gain over fifteen years), but small negative effects in the rest of the country (McEwan and Carnoy 1999). Another study found that communities with higher private enrollment shares saw public school performance fall from 1982-1988 (though the point estimate was significant only at the 10 percent level), and concludes that even if a voucher system creates incentive effects that lead to improvements in municipal schools, the fact that the better students migrate from municipal to private schools could lead to an overall decline in municipal school performance (Hsieh and Urquiola 2002). That same study argues that although small numbers of public students might benefit from vouchers to attend public schools, when a voucher system induces large number of students to move to private voucher schools the overall impact can only be assessed by taking the sum of the (assumedly positive) effect for the migrating students, the (assumedly positive) effect of competition on public schools, and (assumedly negative) effect of the loss to public school students of their most talented peers. It concludes that national aggregate indicators of achievement, including Chile's ranking in international test scores and the achievement gap between subsidized and non-subsidized elite schools, did not change. There is also evidence that schools in all sectors in Chile took active measures to select more advantaged students during this period (Gauri 1998, Espínola 1995).

The Chilean experience with vouchers, consistent with the theoretical predictions, suggests that when enrollments are the estimate for school effort, schools take steps to make themselves more attractive to parents by enrolling a more advantaged clientele. Whereas the New Zealand experience showed that sorting effects of this sort can be problematic when the supply of schools is fixed, the experience in Chile illustrates that sorting can also occur when there is a strong supply response. In Chile, the effects of intense incentives based on enrollment were modest in the national capital, and zero or negative elsewhere. That is also consistent with the expectation that when school effort is not directly related to productivity, intense incentives do not lead to increases in performance. The fact that no municipal schools were closed is consistent with the fact that intense incentives can carry costs for risk averse agents, who will fight efforts to relocate or close schools. Finally, Chile's voucher formula included adjustments for rural schools, in recognition of the need to include covariates of enrollment in intense incentives.

Colombia. Starting in 1992, a program in Colombia offered vouchers to entering sixth grade students residing in low-income neighborhoods and who had previously attended a public school. The vouchers were renewable through the end of secondary school, co-financed by the central government and participating municipalities, and assigned by lottery where local demand exceeded the municipal allotment. The voucher program was designed to help poor students make the transition to secondary school in areas where public schools were filled to capacity. Financing to public schools was not reduced when they lost students to the program. The value of the voucher was initially high enough to pay for tuition at low-cost private schools, but it was not indexed to inflation, and as a result by 1998 participating students were typically making out-of-pocket payments equal to the voucher value to cover tuition costs. Most elite private schools in Colombia elected not to accept the vouchers. The program provided 125,000 students, amounting to about 1 percent of national secondary enrollment, with vouchers before it was discontinued in 1997 (Angrist and others 2001, King and others 1997, King, Orazem, and Wolgemuth 1999, Calderón 1996, Montenegro 1995).

A quasi-experimental study compared educational and other outcomes among a sample of students who won and lost the voucher lottery (Angrist and others 2001). Lottery winners had lower grade repetition rates than losers but were not more likely to be enrolled in school. A sample of lottery winners also scored 0.2 standard deviations higher on standardized tests, controlling for age, gender, parents' schooling, and strata of residence, and almost 0.3 standard deviations higher in a two-stage least squares regression that took into account private school scholarships otherwise obtained by lottery losers and scholarship non-use by winners. The effects for girls were slightly larger, and were estimated more precisely, than for boys. Winners spent \$52 more on school fees than lottery losers, gave up \$41 in reduced earnings since they remained in

school longer, and received scholarships that were \$74 higher, for a net household contribution of \$19. The public spent an extra \$24 for each voucher student, net of reduced public school costs.

An analysis of the overall impact of the program in Colombia would take into account the effect on the public schools of losing motivated students, as well as the effect on participating private schools of taking new students. Short of research of that scope, however, the study cited above at least makes plausible the argument that in certain circumstances the marginal impact of incremental private school effort can be substantial. That is consistent with the theoretical findings above, though it should be noted that programs like Colombia's do not create intense incentives for schools, but instead exploit those incentives in existing private schools. The Colombia program is also consistent with the predictions that the marginal impact of school effort will be lower in rural settings, since most participating schools were in the large urban areas, and that schools behave as if families use the socio-economic composition of their student body as an indicator of quality, since most elite schools in Colombia refused to accept the vouchers.

Côte d'Ivoire. Côte d'Ivoire subsidizes private primary schools at rates that are negotiated with umbrella groups for Catholic, Protestant, and secular schools, that vary with school location and tuition charges, but that are loosely tied to the total number of students enrolled, and that ranged from \$US40-\$66 in 1999. At the secondary school level, reimbursements to private schools resembled a voucher system even more closely: in 1999 the government reimbursed private secondary schools US\$200-\$233 per year for each "state-sponsored" student. These voucher values were above market tuition at some private schools, but about one-tenth the fees at the top ones. The process through which students qualified for sponsorship was not transparent, but it was tied to test scores, which had been the subject of corruption controversies in past years. Generally, private schools had small permanent teaching staffs and hired public sector teachers on a contractual basis or "rental" teachers from the government. Private enrollments were 13 percent of the national total at the primary level and 36 percent at the general secondary level. Some 42 percent of private students at the primary and secondary levels received either direct or indirect state support. The per capita private education subsidy was significantly higher for families in the top quintile than families in the lower quintile, but the same was true for public education, which favored urban areas.

Outcomes studies in Côte d'Ivoire were not available. One analysis compared results of a standardized test administered to five Francophone sub-Saharan countries (Michaelowa 2001). It noted that although primary education expenditure as a share of GDP in Côte d'Ivoire was 50 percent more than Cameroon and three times that of Madagascar, and its per capita GDP higher than both countries, test scores among fifth graders in Côte d'Ivoire were lower. Enrollment rates in Côte d'Ivoire were 54 percent, lower than Cameroon but above Madagascar. For girls in some regions of Côte d'Ivoire,

first grade enrollment rates were as low as 12 percent. Explanations for inefficiency in expenditures included the fact that the teaching year in Côte d'Ivoire was one of the shortest in the world, at 820 hours, that students in double shift classes spent even less time in school, that charges and other obstacles to access resulted in pupil/textbook ratios of 5/1 in urban areas and 10/1 in rural areas, that teacher salaries were high (an average of nine times GNP per capita), and that class sizes were the lowest among the five comparator nations (LaRocque 1999, World Bank 1998).

Although detailed analyses of the voucher program in Côte d'Ivoire were not available, the case illustrates that even if schools are given intense incentives, external constraints on performance, such as the labor market for teachers, national rules regarding the school year, and expectations regarding girls' education, can mitigate the returns to school effort. In those circumstances, compensation based on enrollment will be weakly productive for raising achievement.

Czech Republic. Private schools were legalized in the Czech Republic in 1990. At the same time, state-run schools were given legal status and authority over enrollment and curricula. Although private schools at first received "equal treatment" with respect to public financing, in 1995 their public funding was lowered to 60-90 percent of that going to state schools. Following complaints about the arbitrariness of the state's funding decisions, a new formula in 1999 directed private schools to receive funding based on a set of defined quality measures. In that scheme, state-run schools received separate investment and recurrent budget allocations, the latter being determined on a per-pupil, voucher-like basis. The recurrent component was itself divided into two parts: a base support level varying on the type of school (on average 50 percent of the per-pupil payment to state schools), and a component based on quality, with a maximum total set at 90 percent of the state sector per-pupil subsidy. The average private school received just under 80 percent of the per student allocation that public schools received. Private secondary schools could charge tuition, which in 1998 averaged 55-65 percent of the per student allocation going to public secondary schools. Although the enrollment share of private primary schools remained tiny, the secondary school share went from 0.1 percent in 1990 to 9.8 percent in 1999 (Filer and Munich 2003, World Bank 2001).

Assessments of the voucher-like system of education financing in the Czech Republic remain provisional. One study found that parents with higher earnings and more education were more likely to choose a private school, but that many private schools found their market niche by enrolling students who did not gain admission in the most desirable, oversubscribed public secondary schools. There is little published data on the criteria private schools used to select students, and whether or not enrollments are functioning as a useful estimate of school effort. Provisional evidence suggests that areas with relatively weak public schools were more likely to have private schools established (Filer and Munich 2000).

Bangladesh. Non-government, not-for-profit schools enrolled 80-95 percent of secondary school students in Bangladesh in 2001, depending on how religious schools (madrassas) were classified. The government subsidized 80 percent of the base teacher salaries at these non-government schools, subsidies which in 1997 accounted for 79 percent of total government expenditures at the secondary level. Because these schools were supposedly required to follow state criteria regarding the number of students and recruitment of students, the subsidies functioned as a sort of voucher: when schools attracted enough students to warrant the hiring of another teacher, the government subsidized that increase in enrollments by paying for most of the teacher's salary. Private secondary schools were permitted to charge student fees, and these charges for admission, tuition, books, uniforms, stationery, sports, after-hours tutoring, and other activities constituted, on average, half to two-thirds of private school revenues. Demand for secondary education was strong enough, and entry requirements in the sector liberal enough, that overall enrollments doubled from 1990 to 1997, when they reached seven million students.

But the norms for the transfer of the subsidies were weakly enforced: one survey found that in 1998 only 29 percent of principals reported a visit by an inspector in the recent past. As a result, schools applied for and received subsidies without complying with enrollment-related and other norms, and the quasi-voucher system did not necessarily create intense incentives to expand school enrollments. The private fees, however, did serve that function. By all accounts, however, the quality of secondary education in Bangladesh was inadequate despite per pupil expenditures that by international standards are relatively high. The private schools did not train their teachers or develop new teaching methods, instead relying on the traditional pedagogy of memorization. The principal purpose of secondary education in the country was to screen and winnow university applicants on the basis of the all-important examinations: fifteen percent of students that enrolled in the first year of secondary completed a secondary degree, and six percent went on to a university, with promotion rates as low as 75 percent between successive academic grades. Textbooks were often unavailable, and charges of cheating, both on the part of students and schools, were not uncommon. The Bangladeshi experience with a quasi-voucher system is consistent with several theoretical predictions: intense incentives can fail to achieve objectives without a functioning monitoring system, school effort will not be related to academic outcomes if exogenous factors, such as textbook shortages and examination pressures, limit returns to effort, risk averse actors will lobby to reduce the risk to which voucher programs expose schools, and certain pedagogical activities, such as curricular innovation and teacher training, will not occur in the presence of intense incentives on enrollment and external pressures, such as exams (World Bank 2000).

4. Conclusion

Voucher programs are a potential solution to the problem that governments face when motivating schools, their agents, to put forth effort. The compensation scheme, making school payments proportional to enrollments, creates intense incentives to satisfy parents. Enrollment is a useful measure of school effort. But because parents frequently conflate student body composition with learning opportunities, voucher programs can create a strong incentive for schools to select advantaged students. Findings in Chile and New Zealand are consistent with this concern. Where administratively feasible, it makes sense to set the voucher value for disadvantaged students at higher levels, as Holland does. Where it is not feasible, which is likely in most developing countries, eligibility for voucher programs might be restricted to the poor. Second, intense incentives are worthwhile only if more school effort produces better results. For small voucher programs that send modest numbers of students to urban private schools with surplus capacity, as in Colombia's experiment, that might well be true, and returns to program investments might be high. In programs with wide eligibility, the ability of schools to improve learning among large numbers of students is likely to be limited in many developing countries by factors beyond the schools' control, such as the number of qualified teachers, the availability of textbooks, and pedagogical traditions. Third, principal-agent theory holds that when the principal rewards certain activities at lower rates, those activities will receive little or no attention. Voucher programs, which do not reward innovation, are unlikely to promote diversity and innovation in teaching if parents are pedagogically conservative. Voucher programs in Chile, New Zealand, England and Wales, Bangladesh, and Côte d'Ivoire did not promote pedagogical innovation; in fact, case studies suggest that pedagogy might have become more uniform in those countries. In voucher programs, governments will need to continue to finance and support teacher training and professional development in private schools. Fourth, the principal-agent literature indicates that intense incentives carry a welfare cost for risk averse agents, such as teachers, school owners, and poor parents in developing countries. As a result, outright voucher programs, in which teachers are laid off and schools are closed, are more costly in those contexts. Finally, a voucher program reward schools that can get away with exaggerating enrollment rates or loosening educational standards; so the effect of intense incentives to expand enrollments will be distorted unless a government is able to establish a functioning monitoring system, which can be expensive for some countries.

In developing countries, vouchers for basic education can be useful in small doses. Programs involving limited numbers of poor students in urban settings, particularly in conjunction with existing private schools with surplus capacity, can have dramatic effects on the achievement of participating students. But programs with wider eligibility entail an institutional infrastructure challenging to industrialized and developing countries alike. Creating a system to monitor enrollment rates and processes

within schools, devising a system to mitigate pressures for schools to select advantaged students, working with risk averse teaching staffs, and promoting professionalism in private schools are all necessary to make ambitious voucher programs effective. As experiences in those developing countries that have voucher or quasi-voucher programs suggest, that is easier said than done.

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