

Education Policy in Developing Countries

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Competition and Educational Productivity: Incentives Writ Large

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[-] Abstract and Keywords

Friedman (1962) suggested that unfettered markets generally ensure efficient provision of goods and services. Applying this logic to education, he recommended that students be provided vouchers to purchase schooling in a free market. Hoxby (2002) agrees, and suggests that more choice increases school productivity. This chapter discusses the evidence in this area, concluding that competition has more mixed and modest impact than expected. This should not be surprising, since economic theory on incentives and incomplete contracts (beginning with contributions from the 1950s) leads to more nuanced expectations. An examination of the incentives faced by schools, parents, and students yields predictions that are broadly consistent with the evidence, and suggests little reason to expect that school choice will dramatically improve test scores. The chapter describes a simple model that illustrates this point and implies that elements of market design might be necessary to ensure that competition enhances educational performance.

Keywords: Education, developing countries, competition, educational productivity, incentives, private schools, contract theory, market design

1. Under-recognition of the power of what psychologists call “reinforcement” and economists call “incentives.”—Well I think I’ve been in the top 5 percent of my age cohort all my life in understanding the power of incentives, and all my life I’ve underestimated it. And never a year passes but I get some surprise that pushes my limit a little farther.

Charlie Munger’s first cause of human misjudgment, speech at Harvard Law School

7.1. Introduction

At the core of modern economics is an effort to understand how institutions shape incentives and how this affects the performance of the economy. A central institution is the market mechanism, under which firms are free to enter with new products, and consumers are free to

decide whether to purchase them or not. One of the most influential proponents of this institution was Milton Friedman, who argued in his classic book *Capitalism and Freedom* (Friedman 1962) that all areas of economic activity can be enhanced with more reliance upon free markets and less reliance upon government provision of goods and services.

(p.244) In the case of education, Friedman (1955, 1962) argued that allowing a greater role for private schools, and more freedom of choice for parents, would improve outcomes. He acknowledged that doing so might have distributional implications, but pointed out that these could be addressed via the distribution of vouchers, ensuring that each student received at least a minimum amount of education. This view has been influential; for example, it figures prominently in the World Bank's *World Development Report* (2004) on improving public service delivery.

In a review of the literature, Hoxby (2002) describes how these ideas have been explored theoretically and empirically. Hoxby points out that, partially due to its origins in public finance, research on school choice has emphasized questions related to distribution rather than to productivity: "School choice research has concentrated on *allocation* questions, which include: Who exercises school choice? Who chooses which school? How does choice change the allocation of resources? How does reallocation of students change peer effects?"

Hoxby argues for research to place greater emphasis on school productivity. In her definition, "a school that is more productive is one that produces higher achievement in its pupils for each dollar it spends." This definition is precise and useful, and since it concerns testing achievement, we will call it *test productivity*. Hoxby argues that competition would have large effects on test productivity, rendering distribution-related concerns less salient (i.e., it would be "a rising tide that lifted all boats").

In making these statements, our reading is that Hoxby (2002) refers to two strands of the literature. First, it is indeed the case that seminal theoretical papers (e.g., Arnott and Rowse 1987; Epple and Romano 1998) focus on peer effects and hence on how competition would affect the *distribution* of students and educational outcomes.¹ Second, a focus on productivity is quite reasonable given findings that many school systems have experienced a test productivity "collapse." For example, Hanushek (1996) describes an apparent test productivity decline in American schools, and Pritchett (2003) suggests that this development is common among OECD countries. Data restrictions make it harder to make analogous statements about developing countries, but the *prima facie* evidence is consistent with many of those countries also having experienced rising real expenditures in education, with at best small test score gains to show for it.

Given this background, this chapter carries out three tasks:

1. We review the empirical evidence on the effects of competition on test productivity. We do not attempt to provide an exhaustive accounting **(p.245)** of the literature; rather, we begin with a discussion of recent reviews of the voluminous US literature. We then discuss the evidence from developing countries, focusing upon Chile, Colombia, India, and Pakistan—cases where there has been important work that extends the insights from the US literature. We conclude that the impact of competition upon test productivity has proven to be more mixed and modest than would be expected given the evident success of privatization in other industries.²

2. We then take a step back and ask if—given the advances in the economics of industrial organization, contract theory, and asymmetric information since the 1950s—this is so surprising. We argue that in fact the literature in these areas suggests that there is no a priori reason to believe that school choice will lead to much higher test productivity. The fundamental reason is that in a rational choice framework parents and teachers care about the impact of education upon future wages, and not about test scores per se. In MacLeod and Urquiola (2012) we show that a school’s reputation is a function not only of its value added, but also of its students’ ability and effort. It is not always possible for the market to disentangle these three components, with the consequence that free competition may even lead to lower overall performance.

3. We conclude with a discussion of the implications of these observations for the design of education markets. In particular, effective school competition entails restricting the right of schools to select their student body (consistent with the requirement that charter schools use a lottery system for admissions under No Child Left Behind legislation in the United States). This can be combined with high-quality national exams, as suggested by Bishop (1997). As in chapter 2, our analysis suggests that the design of educational systems must carefully consider incentives.

7.2. The Empirical Evidence

The educational literature contains an expectation that competition will substantially raise school test productivity. The reviews of the literature, such as McEwan (2004) and Barrow and Rouse (2009), emphasize that the benefits of allowing private schools to enter the market, and distributing vouchers to students, would originate from three effects:

1. A private school productivity advantage. If private schools are more productive than public schools, then simply shifting children into the private sector increases learning.

(p.246)

2. A productivity-enhancing incentive for incumbents—particularly public schools—as they are forced to compete with entrants.

3. Better matching of students with specialized schools. For example, some schools may invest in high-quality arts or athletics programs, such that students with these interests are better served.

From an empirical perspective, a relevant contrast between these factors concerns the settings in which they can be studied. The first one can be analyzed in any country with a private school sector, regardless of its size. Analyzing the second requires situations in which the amount of competition observed in a given market changes substantially, for example, when a large scale voucher program results in substantial private sector growth.

In this section, we summarize the evidence on effects (1) and (2) in the United States. We then discuss four developing countries that offer settings and data that usefully complement/extend this research: Chile, Colombia, India, and Pakistan.³

7.2.1. The Relative Performance of Private and Public Schools.

In the vast majority of education markets, private school students on average have higher absolute test scores than public school students. This often leads to the suggestion that private schools also have higher productivity.⁴ Establishing a productivity advantage in a causal sense would ideally require observing the outcomes of the same student under public and private schooling. Since this is not possible, the literature attempts to compare groups of students that

are identical except with regard to the type of school they attended, with only a few (quasi-) experimental studies approximating this ideal.⁵

In the United States, such comparisons have often focused upon the impact of attending Catholic school relative to attending a public school. In general, the resulting literature does not produce evidence of a consistent and substantial advantage of private over public provision of education.⁶ For example, in a recent review Neal (2009) states: “Measured solely by achievement and attainment effects, existing evidence does not support the view that private schools are generally superior to public schools in all settings.” Barrow and Rouse (2009) conclude that “the best research to date finds relatively small achievement gains for students offered education vouchers, most of which are not statistically different (p.247) from zero.” (Table 7.1 presents a summary of the key empirical studies we discuss below.)

The studies that lead to such conclusions are often based upon a careful experimental design. For example, in 1997 New York City ran an experiment that randomly allocated school-choice vouchers to low-income students. Though the analyses of this experiment were controversial,

Table 7.1. Key empirical studies on the effects of competition on test productivity

Study	Sample	Key findings
<i>Relative Performance of Private and Public Schools</i>		
Neal 2009	Literature review on the effects of public versus private schooling	The empirical evidence does not suggest that private schools are always superior to public schools in terms of achievement or attainment.
Barrow and Rouse 2009	Literature review on the effects of vouchers on student achievement	Empirical studies generally find small and statistically insignificant gains in achievement for students offered vouchers.
Angrist et al. 2002	Applicants to Colombian lotteries distributing secondary school vouchers from 1992 to 1997	Lottery winners were 10 percentage points more likely to have completed eighth grade and scored 0.2 standard deviations higher on an achievement test.
Angrist, Bettinger, and Kremer 2006	Applicants to Colombian lotteries distributing secondary school vouchers from 1992 to 1997	Lottery winners were 5–7 percentage points more likely to graduate from high school and scored 0.2 standard deviations higher on a college entrance exam.
Sekhri and Rubinstein 2010	Applicants near the cutoff score for admission to public colleges in India from 1998 to 2002	There is no evidence of a difference in the performance of students attending public and private colleges on a college exit exam.
<i>Effects of Large-Scale Competition</i>		
Hsieh and Urquiola 2006	Chilean municipalities affected by a universal voucher scheme introduced in 1981	Municipalities with faster growth in the share of private schools exhibit greater stratification but no increase in the growth of test scores or average years of schooling.
<i>Parents’ Valuation of School Testing Performance</i>		
Black 1999	Houses on the boundary of school districts in Massachusetts from 1993 to 1995	Parents are willing to pay 2.5% more for houses that give their children access to schools with 5% higher test scores.

Study	Sample	Key findings
Hastings and Weinstein 2008	North Carolina households receiving school test score information via natural or field experiments from 2002 to 2007	Parents who receive information on school test scores are significantly more likely to choose high-performing schools for their children.

(p.248) both Mayer et al. (2002) and Krueger and Zhu (2004) agree that if one considers the entire eligible population, winning a voucher to attend a private school had a modest, statistically insignificant impact on student learning.⁷

There is increasing use of such careful evaluation techniques in developing country settings. We consider the cases of Colombia and India, where there have been several good studies.⁸

7.2.1.1. Colombia.

From 1992 to 1997, Colombia operated a secondary school voucher program. A central stated goal of this initiative was to increase secondary (sixth-eleventh grade) enrollment rates, using private-sector participation to ease public-sector capacity constraints that most affected the poor. As a result, the vouchers were targeted at entering sixth-grade students who were residing in low-income neighborhoods, attending public school, and accepted at a participating private school.

The initiative was implemented at the municipal level, with the national government covering about 80% of its cost, and municipalities contributing the remainder. Resource constraints at both governmental levels resulted in excess demand in most jurisdictions. When this happened, the vouchers were generally allocated via lotteries.

These lotteries make it feasible to estimate the causal effect of winning a voucher to attend private school. A series of papers (Angrist et al. 2002; Angrist, Bettinger, and Kremer 2006; Bettinger, Kremer, and Saavedra 2008) use them to show that, in general, lottery winners have better academic and nonacademic outcomes than lottery losers. This result holds both for achievement measured using administrative data and for outcomes (such as performance in external standardized exams) that the researchers themselves measured.

This voucher program provides an excellent example of how an intervention not designed for evaluation purposes can be used to carefully measure the impact of vouchers. All the same, in terms of identifying a private test productivity advantage as defined by Hoxby (2002), the Colombian voucher experiment has a few disadvantages. First, the vouchers were renewable contingent on grade completion, and thus the program included an incentive component—voucher winners faced a stronger reward for doing well at school. Therefore, it is impossible to rule out that the superior test performance of lottery winners was due to external incentives rather than to their schools' test productivity.

Second, both lottery winners and losers tended to enroll in private schools, particularly in larger cities. Focusing on Bogota and Cali, Angrist et al. (2002) point out that while about 94% of lottery winners **(p.249)** attended private school in the first year, so did 88% of the losers. This is not surprising to the extent that a high private enrollment rate in secondary was symptomatic of the very supply bottlenecks that the program was implemented to address. Since the reduced form estimates in these papers are based upon a comparison of lottery winners and losers, they

may in some cases measure a “private with incentives versus private without incentives” effect, rather than the effect of private versus public schooling per se.

Finally, the institutional setup implies that many voucher winners (who, again, would have enrolled in private school even if they did not win the lottery) used the vouchers to “upgrade” to more expensive private schools. Specifically, Angrist et al. (2002) discuss that the maximum tuition the voucher covered was roughly equivalent to the cost of a low-to mid-price private school, and that it was common for voucher recipients to supplement this amount. Thus, part of the effect of winning a lottery could reflect the access to greater resources, as opposed to a true test productivity difference.

To summarize, these studies support the hypothesis that the Colombian voucher program enhanced student performance. However, the studies cannot distinguish between three plausible mechanisms that may explain their results: increased competition/choice, a direct effect on student incentives, and an increase in resources allocated to education.

7.2.1.2. India.

The developing country literature also provides arguably causal estimates of a private/public advantage at other educational levels. For example, Sekhri and Rubinstein (2010) consider whether public universities in India have higher value added than private colleges. This raises the interesting point that while the expectation in most developing countries is that private K-12 institutions perform better than public ones, the reverse is sometimes the case for higher education.⁹ This generally happens in settings in which public universities are on average older and more selective. This stacks any cross sectional comparison in their favor.

Sekhri and Rubinstein (2010) suggest that this is also the case in India, where a perception of greater productivity by public colleges has led to calls for constraining the rapid growth of the private sector. For example, they point out that in 1970, 4 out of 139 engineering colleges were private; by 2006, 1,400 out of 1,600 were private.

Sekhri and Rubinstein explore whether a true public university test productivity advantage exists by using a regression discontinuity design. Specifically, they take advantage of the fact that by regulation, private (**p.250**) colleges must affiliate with public universities to grant degrees. They must implement the same curricula and admissions and exit examinations as the public universities they associate with. The authors compare the academic performance of students who just missed gaining admission into a selective public college—and are therefore more likely to attend a private institution—with that of individuals who just achieved it. By construction, these individuals have similar admissions exam scores, and any difference in their exit exam performance is suggestive of a public/private productivity differential. This strategy produces no evidence of such a difference.

Finally, Sekhri and Rubinstein calculate the costs of these institutions, and find average costs of 13,000 and 13,700 rupees for private and public colleges, respectively. They conclude that public colleges do not have a cost-related advantage either.

To summarize, the literature on whether there is a private test productivity advantage produces mixed results; the estimated effects do not seem to be of a regularity or magnitude such that transferring students into private schools would by itself substantially and reliably raise achievement. This finding is consistent with a broader literature on the effects of attending a higher-achieving school or class on academic performance, even when these transfers occur

within a given (public or private) sector. Here again several papers find little or no effect (e.g., Abdulkadiroglu, Angrist, and Pathak 2011; Clark 2010; Cullen, Jacob, and Levitt 2005, 2006; Dobbie and Fryer 2011; Duflo, Dupas, and Kremer 2008) and some find positive effects (e.g., Jackson, 2010; Pop-Eleches and Urquiola 2013) but no uniform pattern emerges.

7.2.2. The Effects of Large-Scale Competition.

Private/public comparisons essentially address a “partial equilibrium” question: how would a given student’s achievement change if she transferred from a public to a private school? In contrast, studies of generalized school choice address the general equilibrium effects of competition: for example, what would be the effect of substantial private school entry into a market?

This is a relevant contrast because the magnitude of the private advantage may not be stable with respect to the private sector’s market share. For example, Hsieh and Urquiola (2006) and Bettinger, Kremer, and Saavedra (2008) point out that if the private productivity advantage originates in positive peer effects, then the magnitude of this advantage may change with growth in the private sector. This in turn reflects that the composition of the students in the private and public sector is likely to change with private entry.

(p.251) Tiebout choice (arising from the fact that many households can choose to settle in one of multiple school districts) provides the main opportunity to study large-scale competition in the United States. Here again, the literature produces mixed results rather than a distinct sense that greater choice raises testing outcomes (e.g., Hoxby 2000; Rothstein 2007). At the same time, there is evidence that Tiebout choice can lead to stratification (e.g., Clotfelter 1998; Urquiola 2005), which combined with causal peer effects would lead to the distributional considerations treated in models like Epple and Romano (1998).

These issues also arise in developing country settings in ways that potentially productively contribute to the literature. We begin with the case of Chile, which provides one of the central examples of the application of the principles put forth by Friedman (1962). (Several of the studies we touch upon are also discussed in chapter 5 of this volume, which discusses reforms that alter student and parent incentives.)

7.2.2.1. Chile.

In 1981 Chile introduced a universal voucher scheme.¹⁰ Prior to this reform, three types of schools were in operation: (a) public schools managed by the national government, which accounted for about 80% of enrollment; (b) unsubsidized private schools catering to upper-income students and accounting for about 6% of enrollment; and (c) subsidized private schools that did not charge tuition, received limited lump-sum subsidies, were often Catholic, and accounted for roughly 14% of enrollment.

The 1981 reform had two main components. First, it transferred public school management to municipalities, awarding them a per-student subsidy sufficient to cover their costs. Second, subsidized (or “voucher”) private schools began to receive the same per-student subsidy as municipal schools.

The key elements of the reform persist to the present day, and place few restrictions on private schools. These schools can be religious and can operate for profit. They are allowed to implement admissions policies subject to few regulations, and as of 1997 can charge tuition

addons. In contrast, public schools are not allowed to turn away students unless oversubscribed and cannot charge tuition at the primary level.

These changes resulted in substantial private school entry. By 2009, about 57% of all students attended private schools, with voucher schools alone accounting for about 50%. The latter, combined with a public share of 44% means that about 94% of all children attend effectively voucher-funded institutions.¹¹

The analytical virtue of this reform is that it provides an example of **(p.252)** a large-scale introduction of competition into an educational market. The main drawback is that the simultaneous nationwide implementation makes it difficult to establish counterfactuals. As a result, most studies have adopted quasi-experimental methodologies. Hsieh and Urquiola (2006) apply a difference-in-differences approach to municipalities for the 1982–1996 period. They find that municipalities that experienced faster growth in private sector market share show distinct signs of increasing stratification (with the higher-income students in the public sector moving to private schools), but do not display higher growth in test scores or years of schooling.

Even setting identification issues aside, these estimates do not isolate the effects of competition on school test productivity in the sense of Hoxby (2002). Many things were changing for Chilean schools during this period, including the distribution of students (and hence potential peer effects) and levels of funding.¹² Taken at face value, however, these findings suggest that competition had a modest effect on average school productivity. However, despite the use of some candidate instrumental variables, private entry into school markets is endogenous and hence there is always the possibility that the estimates are biased.

Auguste and Valenzuela (2006) and Gallego (2006) analyze cross-sectional data, using instruments for the private market share. Auguste and Valenzuela use the distance to a nearby city, and Gallego uses the density of priests per diocese (with the motivation that this lowered the costs of Catholic schools). The results from both papers differ with Hsieh and Urquiola (2006) in that both find that private entry results in higher achievement, and concur (in the case of Auguste and Valenzuela—Gallego does not analyze the issue) in finding that it also leads to stratification. Again, however, a key issue is the validity of the instrumental variables.¹³

This research must also be considered alongside aggregate trends. If there exists a substantial private productivity advantage, then one would expect Chile's relative performance on national and international tests to have improved over the years in which large numbers of children were transferred into the private sector. Furthermore, one would expect Chile to outperform other countries with similar levels of gross domestic product per capita. Neither of these predictions receives much support in the data. Other than a recent improvement in PISA test scores, national test scores in Chile have been largely stagnant even as educational spending has increased substantially.¹⁴ Privatization has thus been associated with a decline in school test productivity.

(p.253) Finally, Bravo, Mukhopadhyay, and Todd (2010) analyze the effect of Chilean reform not on test scores but on graduation rates and wages.¹⁵ Specifically, they use retrospective survey data to estimate a dynamic model of school attendance and work decisions. The impact of the reform in this case is identified using differences in the schooling and work choices of individuals who were differentially exposed to the voucher system—that is, individuals from different cohorts were exposed to different amounts of educational competition. They find that

the voucher reform increased primary and high school graduation rates by 0.6 and 3.6 percentage points respectively. They also find that it did not increase average earnings.

In short (as also discussed in chapter 5 of this volume), the research on the effect of large-scale school-choice reforms on average outcomes in Chile produces mixed results. In contrast, there is robust evidence that competition resulted in increased stratification by family background and ability. These results are consistent with the consensus within Chile (as articulated recently by the country's conservative President Piñera) that the school-choice system "perpetuates inequality" and has not done enough to raise learning. This is in marked contrast with Chile's track record of success with market-oriented reforms in many other sectors of the economy.

7.2.2.2. Pakistan.

The cases of Chilean and Colombian K-12 schooling, and Indian higher education, illustrate situations in which the use of private institutions takes place in middle-income settings and with significant state subsidies. However, developing countries also provide settings in which private schools enter and compete unaided in low-income markets. These cases are frequently more challenging to study, if only because the necessary data are not as readily available.

Andrabi, Das, and Khwaja (2008) document substantial growth in private enrollment in four large provinces in Pakistan during the 1990s. For example, they find that private enrollment grew from 4% to 6% in Balochistan, and from 15% to 30% in Punjab. This expansion took place in both urban and rural areas. The result is that "by the end of the 1990s, nearly all rich Pakistani children in urban areas, almost a third of the richer rural children, and close to 10% of children in the poorest deciles nationally were studying in private schools."¹⁶

Andrabi, Das, and Khwaja (2008) emphasize that this growth is not due to an expansion of religious schools (e.g., Madrasas), but rather reflects an expansion in for-profit institutions that charge very low fees—a (p.254) typical village private school in these provinces charges about 18 dollars per year.¹⁷ These schools achieve extremely low costs by hiring young, single, untrained local women as teachers and paying them much less than the trained men more common in public schools.¹⁸

These observations imply that Pakistan could in fact buy education for much lower cost if it further shifted enrollments to the private sector. Would these savings come at a cost of lower educational attainment? "Not necessarily," according to Andrabi, Das, and Khwaja. First, they note evidence by Das, Pandey, and Zajonc (2006) suggesting that an estimated private school test advantage persists in Pakistan even after controlling for child, household, and community characteristics. Andrabi, Das, and Khwaja point out, however, that this result relies on less solid empirical identification than, for example, the studies on Colombia reviewed above.

In summary, Pakistan illustrates that in much of the developing world, private schools can enter and provide competition even without state support. As in the case of Chile, private entry is associated with significant stratification (as suggested by the authors' broad description of the users of these schools, cited above) but need not result in lower achievement. Andrabi, Das, and Khwaja (2008) also highlight the potential limits to such expansion. A notable one is that private entry has mostly occurred at the primary level. Secondary education would require for-profit private schools to hire trained teachers, driving their costs up significantly.

To summarize the contents of this section thus far, the evidence from developing countries suggests that large scale expansions of the private school sector lead to stratification, but there is less evidence that they lead to substantial gains in average school productivity.¹⁹ This is consistent with the lack of a systematic private school advantage, and additionally suggests that the introduction of competition may not by itself have a large impact on public school productivity.

7.2.3. Other Pieces of the Puzzle.

Overall, the evidence is, perhaps surprisingly, not strongly supportive of Friedman's hypothesis that parental concern for school quality, combined with schools' concern for their reputation, implies that increased competition would produce substantial improvements in school productivity.

This result is even more surprising given the usual expectation that parents value school testing performance. For example, Black (1999) uses US data and quasi-experimental methods to show that households are willing to pay more for houses that give them access to schools with **(p. 255)** higher test scores.²⁰ In an experimental setting, Hastings and Weinstein (2008) show that parents react to information on school performance by requesting higher-scoring schools. While the developing country literature does not provide such direct evidence, households in many countries (including Chile, Colombia, and Pakistan, as discussed above) are willing to leave the public sector to move into private schools with higher absolute outcomes, often at substantial cost to themselves.

This willingness to pay for schools with higher absolute achievement—combined with the evidence reviewed earlier—suggests that in many cases parents prefer such schools even if they do not provide higher value added (e.g., Abdulkadiroglu, Angrist, and Pathak 2011). The question, then, is why are parents so eager to access selective schools given the paucity of evidence that they provide higher test productivity? As emphasized by Hoxby (2002), the standard explanation has centered on peer effects. Positive human capital spillovers would warrant a preference for higher performing schools even if these do not supply higher value added. Two problems immediately arise with this explanation, however.

The first is simple but often not appreciated. It is that human capital spillovers are conceptually and empirically part of a school's value added. When papers like Cullen, Jacob, and Levitt (2005), Clark (2010), and Sekhri and Rubinstein (2010) produce a reduced form estimate that suggests no benefit to attending a higher-achievement school, this estimate includes peer effects. If academic peer effects are truly positive, then these schools may have even lower value added than the lower absolute achievement schools that families so eagerly pay to escape. Since the higher-achievement schools are often more expensive, they could be of substantially lower productivity.

Second, the direct evidence on the significance and magnitude of peer effects is rather mixed and suggests these are small (Angrist and Lang 2004; Katz, Kling, and Liebman 2006; Oreopoulos 2003). In a recent study Carrell, Sacerdote, and West (2010) directly control classroom composition as a function of student performance. They find no reliable effect of peer group composition on student performance. In conclusion, when studies are better able to control for selection based upon ability, they find modest peer effects.

7.2.4. Where Is Empirical Research 50 Years after Friedman?

Five decades after Friedman's seminal 1962 work on school choice, economists do not have a full understanding of the impact of private participation and competition on the performance of educational markets. The evidence **(p.256)** thus far is mixed. When it comes to policy in developing countries, this stands in stark contrast to our more successful policy interventions, such as, in many cases, using privatization to enhance the performance of the telecommunications sector.

Another way of seeing that competition has not produced the desired results is by taking stock of where empirical economic research on education is today. Two topics receiving a great deal of attention are:

1. Randomized evaluations of educational interventions, and
2. The design and implementation of methodologies to identify and reward/terminate especially effective/ineffective teachers.

Neither of these approaches is particularly consistent with Friedman's market and incentive-centered approach. Underlying Friedman's idea is the theme that bureaucrats (and perhaps researchers) might not be able to discover how to improve education, but that given the right incentives, market actors would do so. Hanushek (1995) articulates this view: "My own interpretation of the existing evidence ... is that schools differ in important ways, but we cannot describe what causes these differences very well." Given this perspective, Hanushek argues for providing incentives and letting market actors figure out the production function:

Performance-based policies are those that reward accomplishment—such as good reading skills or adequate numeracy skills. These policies would specify end goals, provide carrots and sticks related to them, and harness the energies of the actors in the system, but they would not specify how individual schools would achieve these goals.

In contrast, in his review of approach (1), Banerjee (2007) calls for economists to "step into the machine"—to enter schools and discover the specifics of the educational production function. In advocating for this planning approach, Banerjee explicitly criticizes Friedman's market and incentive-centered approach: "To those who believe in it, the word 'incentives' is an abstraction, a metonymy for faith in the power of the market. They do not claim to know how exactly the market will achieve the promised miracle, but it will do it (indeed for them this unpredictability is part of the appeal)." To summarize, by calling for economists themselves to use randomization to discover the educational production **(p.257)** function, Banerjee suggests an approach manifestly distinct from letting markets figure out the best course of action.

Similarly, in presenting explicit recipes regarding when/how teachers should be hired and fired, Hanushek (2011) differs from an approach that would leave such decisions to incentivized principals or private-school owners. This is obviously not how other competitive markets are designed. For example, it would be considered heavy-handed for government to dictate when/how restaurants should fire line cooks.

It might be the case that the focus on randomization and teacher hiring/firing is in response to the difficulty of implementing competition, due to political and other constraints. Yet, at least in the case of Chile, randomization and teacher accountability remain central to the current academic/policy discussion, despite massive privatization. Thus, we conclude that the continued

interest by economists in carrying out randomized evaluations and teacher-related interventions reflects that simply liberalizing the market has proven to be disappointing.

7.3. Incomplete Markets, Incomplete Contracts, and Incomplete Knowledge

In this section we trace the intellectual history of some important ideas in modern economics that are necessary for building a sound economic theory of the market for education. We shall show that, in light of these ideas, Friedman's case for free markets cannot be directly justified by an appeal to economic theory. Rather, we suggest that the theory is consistent with the desirability of a regime of managed competition, a ubiquitous feature of all complex markets in advanced market economies.

Our story begins with some foundational contributions dating as far back as the 1950s. These include:

General equilibrium theory (Arrow and Debreu 1954; Debreu 1959)

Game theory (Luce and Raiffa 1957; Nash 1951)

Decision theory (Savage 1954).

This work is technical and, to many, even esoteric. However, the ideas from these contributions are the foundation of modern graduate economics training, and even if not always acknowledged, form the intellectual framework within which economists view the world.²¹

We show that if one takes this research seriously, then there is little **(p.258)** reason to expect school choice to enhance school test productivity—in the end it comes down to Charlie Munger's observation (in the quote opening this chapter) that we continually underestimate the power of incentives. Specifically, in this section we review each of these three contributions, discussing how it might suggest that the empirical findings discussed above are not surprising. In Section 4, we describe a model that brings these ideas together, and show that it is consistent with much of the evidence we have discussed.

7.3.1. What Is a Commodity?

Let us begin with general equilibrium theory. The first welfare theorem states that when markets are complete, a competitive equilibrium is efficient. This result does not deal explicitly with the problem of distribution. This is addressed in the second welfare theorem: If markets are complete, and the production technology is "convex," then every efficient allocation can be achieved as a competitive equilibrium after the appropriate redistribution of resources. In principle, there is no tension between efficiency and equity.

One can see immediately that Friedman's idea of introducing competition via vouchers has its root in the second welfare theorem—school vouchers can be used to appropriately redistribute income, while the market efficiently supplies education services. These results explicitly depend upon the existence of complete markets and a convex technology (essentially, there are no economies of scale or other frictions). Education services do not even come close to satisfying either precondition.

First, consider the complete markets assumption carefully defined in chapter 2 of Debreu (1959). At a minimum, it must be possible to price every commodity that is in the market. Technically, a commodity is a good or service that is delivered at a specific time and place, and conditional

upon the state of the world at that time (the model is sufficiently rich to deal with uncertain future events).

The first question is what exactly “education” is—what is being supplied to the buyer? In labor economics, education is measured by the number of years of consumption of this service. Yet in practice education consists of many distinct services and goods, including listening to lectures, making presentations, working on assignments, receiving grades as a function of performance, and so on. If one were to use the Arrow-Debreu model (and apply the associated welfare theorems), then each of these various components would have to be measured and priced.

One might argue that these are details for technical nitpicking; however, parents *do* care about such details, and the fact that they are not priced explains many observed behaviors. For example, parents who use **(p.259)** a given school often form a preference regarding specific teachers and sometimes lobby to get their children assigned to them. If a teacher’s performance is lacking, then parents may file a complaint with the principal. If the market were truly competitive, each teacher-class combination would be priced, and there would be an equilibrium where the teacher-class price would be set so parents were indifferent between the available options.²²

The fact that there is politicking and lobbying is a natural consequence of market incompleteness. Williamson (1975) makes this point explicitly, and uses the general term “transactions cost” to denote the reason why organizations such as firms and schools use nonmarket mechanisms to allocate resources. One may view the move toward more school choice as an attempt to make the market more complete, which one might expect to lead to enhanced performance. This is not generally correct, however. As shown in Hart (1975), not only is a competitive equilibrium with incomplete markets not necessarily efficient, but making the market more complete by allowing ex post trading can make things worse.

The second welfare theorem also supposes that the technology of production is “convex”—essentially there are no economies of scale. In practice, education is rife with fixed adjustment costs—costs that Williamson (1975) has identified with large potential market failures. In a paradigmatic competitive market, consumers can easily change their choices over time. This is not the case with schools. For starters, the best schools ration supply. Moreover, if one month into the academic year a student discovers that his school is substandard, he might have to wait until the end of the year to switch. Changing schools mid-year is costly, and not feasible for many parents.

To summarize, the welfare theorems show that if markets are complete, then one can use the market mechanism to achieve an efficient and equitable allocation of resources. However, not only are markets in general incomplete, there is no known result—either theoretical or empirical—that proves that making a market *more* complete by allowing free entry and reducing price controls will *necessarily* improve performance.

7.3.2. What Is the School’s Obligation?

Friedman (1962) anticipated many of the observations we have made regarding the fact that the market for education is incomplete. What he claimed was that free entry and competition would still enhance outcomes because schools would develop reputations for quality that would discipline their behavior. However, a reputation is nothing more than the market’s belief regarding the **(p.260)** quality of the good that a school is producing. A necessary condition for the efficient operation of a market is that parties can enter into a contract with a well-specified

performance obligation, the breach of which leads to a loss in reputation or damages (MacLeod 2007).

Hoxby (2002) introduces a clear definition of a school obligation— namely, producing an increase in test scores at an agreed-upon cost. More productive schools either have better test score performance at the same cost, or the same performance at a lower cost. If test score gains are indeed the output that parents wish to achieve, then the natural way to do this is to have a contract with the school that sets test score gains as an explicit product that the school is expected to deliver. The contract would specify damages for failing to meet this obligation, and at the end of the year the school would simply pay out to parents whose children did not achieve the agreed upon improvements.

Such a contract would lead to obvious incentives to game the system. At the end of a year, parents would have a financial interest in having their children perform poorly in exams, regardless of their actual learning during the year. Further, test scores are noisy and only imperfectly controlled by schools (e.g., Chay, McEwan, and Urquiola 2005; Kane and Staiger 2002). One can create systems that control for this behavior and improve the precision of test scores, but one cannot escape from the fundamental problem that any school performance measure that is not *directly controlled* by the school can be gamed.

More generally, as MacLeod (2007) emphasizes, a well-designed contract imposes obligations that are easy to observe and under the control of the agent who has the obligation. In the case of education, the school can control the curriculum, the qualifications of teachers, school hours, amount of homework, and so on.²³ Many jurisdictions, such as New York City, have experimented with systems that reward test score productivity, ignoring these other measures. Yet there is little evidence that these experiments have been successful. This finding is consistent with the more than 100 years of evidence on compensation systems, as we discuss next.

7.3.3. Strategic Behavior.

When markets are incomplete, firms/schools have incentives to make strategic product choices. The industrial organization literature, having long recognized this point, contains an extensive literature on product differentiation. This research builds upon the second theme from the 1950s—the use of Nash equilibrium to model choice behavior.²⁴ This approach yields several insights.

(p.261) Suppose schools competing with each other choose the bundle of services to sell taking as given the bundles provided by other schools. The literature identifies two strategies they might follow, both of which complicate the link between free entry/competition and increased productivity.

The first is horizontal differentiation. This involves characteristics over which parents are not unanimous in their preferences. For example, some schools may emphasize sports, while others focus on academics or music. A particularly important characteristic in education is location— parents often prefer schools that are close to their homes. Spence (1973) and Dixit and Stiglitz (1977) introduce a model of “Chamberflinian competition” and show that with strategic product choice there may be too few or too many products in the market. Another example is the popular model of product choice on a line due to Hotelling (1929). An interesting feature of this model is that if the world has well-defined boundaries, and firms can choose price and location, then in

some cases firms all crowd in the middle of the market, leaving students away from the center poorly served.²⁵

Second, there is vertical differentiation, where firms sort in terms of quality (Gabszewicz and Thisse 1979). Below we will describe a model we have developed (MacLeod and Urquiola 2012), which shows that when schools can vertically differentiate through their admissions policies, then a competitive equilibrium need not be efficient. Moreover, increasing private participation may have ambiguous consequences on skill accumulation. Before turning to that illustration, we discuss a few more points related to strategic behavior.

7.3.4. Expectations and Hope.

Let us now move from the issue of the supply of educational services to the issue of student demand. In general, education is a multi-product good, of which test-score performance is only one dimension. Parents also care about the physical attributes of the school, dress codes, athletic programs, and so on. This implies that expanding school choice might raise parents' and students' welfare because they obtain more of a commodity they desire; it does not imply that test scores will necessarily increase.

Further, a test score is merely a signal that many parents hope is correlated with future labor market success, as emphasized in the labor economics literature. In this case, parents, and perhaps policymakers, should focus on schools' *wage* as opposed to *test* productivity. It is difficult to measure wage productivity, but we are seeing some progress. **(p.262)** Bravo, Mukhopadhyay, and Todd (2010) examine the impact of the Chilean school reform on wages and find that while the reform slightly reduced inequality, it had little effect upon lifetime earnings.

To illustrate the notion of wage productivity, let $\hat{w}_A(x, A)$ be the average wage of a person of age A , with x years of schooling. Then the return to an additional year of schooling is $r(x, A) = \frac{\hat{w}_A(x+1, A) - \hat{w}_A(x, A)}{\hat{w}_A}$. From this the *wage productivity* would be:²⁶

(1)

$$WP(x, K, A) = \frac{r(x, K) \hat{w}_A}{K} = \frac{\hat{w}_A(x+1, A) - \hat{w}_A(x, A)}{K},$$

where K is the cost of the additional year of schooling. This is the increase in income due to an additional year of schooling, divided by its cost.

Despite the work of Bravo, Mukhopadhyay, and Todd (2010) and studies like Card and Krueger (1992), measuring a concept like wage productivity at the level of individual schools (a precondition if parents are to evaluate schools based on such a measure) is very difficult. This point is emphasized by Speakman and Welch (2006), who review attempts to measure the relationship between school quality and future wages. They conclude that there are serious problems associated with establishing such a link, and hence parents and students have no reliable way to assess the causal impact of school quality on future labor market outcomes. If so, how can students and parents rationally choose a school?

This is where the third major contribution from the 1950s is relevant. Savage (1954) introduced the idea that the first step when making a rational choice is to build a model of the future. In particular, even if there is little evidence, rational individuals will form subjective probability

assessments that link current actions to future outcomes. Without such beliefs, decisions would just be noise.

In the context of education: How should a parent evaluate the consequences of attending a particular school? The algorithm that many parents (at least the authors of this chapter) use is to see how the previous graduates of a given school performed: Did they go to college? Are they now “successful”? Do they exhibit “good” behavior? This is rough and ready, but it is nonetheless based upon concrete evidence. As a result, parents and students may place weight upon tangible evidence that comes from peer success at a school. Given that there is no easy way to relate marginal test-score performance to future “hopes and dreams,” they are unlikely to respond to such signals.

Notice that employers are likely to use similar algorithms—for example, college recruiting firms explicitly target campuses where they have **(p.263)** had previous success. In section 7.4 we describe research (MacLeod and Urquiola 2012) that makes these ideas more precise and, again, shows that if competitive firms use the reputation of a school an employee attended to assess her quality, then competition may not necessarily raise test score levels.

There is an important caveat. Here we have assumed that test scores are merely a measure of student learning. In some countries, there are real labor-market consequences to test-score performance. For example, China, France, Romania, Singapore, and Turkey have national exams whose results are published and have real consequences for higher-education and labor-market outcomes. Both Bishop (1997) and Woessmann (2007) suggest that these jurisdictions outperform others in terms of test-score productivity, although making causal assertions in this area is difficult.

These observations are consistent with the hypothesis that what is driving school demand are expectations regarding future outcomes. When test scores and future labor-market outcomes are more tightly linked, then individuals respond. When they are not linked, then individuals respond to other measures of future performance, such as the past outcomes of peers at one’s school.²⁷ It is these expectations writ large, balanced against the many other amenities supplied by schools, that drive school demand.

Consider some empirical motivation relevant to developing countries. Figure 7.1 is based on IPUMS (Integrated Public Use Microdata Series) information and shows the proportion of individuals who are not working (“not in the universe” for area of work in the IPUMS terminology) as a function of their level of schooling. For a benchmark, the top segment refers to the United States, and the lower two segments refer to Tanzania and Ghana.

A first observation is that among people with very low levels of schooling (no schooling or only primary completed), a large fraction does not work in the United States. This is not surprising as this is a highly selected sample in high-income settings (e.g., disabled individuals). The more notable fact for our purposes is that while the fraction not working descends significantly and consistently with schooling in the United States, that is not as much the case in Tanzania or Ghana. In these two countries it displays a more gradual descent with occasional increases as one moves to higher-education categories. The implication is that if one of the objectives individuals have in pursuing schooling is avoiding unemployment, then the incentives to study will be lower in Tanzania and Ghana than in the United States. **(p.264)**

7.3.5. Compensation Policies.

Before proceeding to an illustration of these ideas we touch upon compensation policies. Taylor (1911) is often regarded as the father of modern management science. He observed closely the behavior of manufacturing workers and found that in many cases employment was inefficient. By this he meant that the firm would like to pay the workers more for higher output, and at the same time the workers themselves would agree to work harder for the increased compensation. These findings suggested that a pay-for-performance system would be Pareto-improving.

Implementing performance-pay systems has proven to be extraordinarily difficult. The fundamental issue is that mechanical performance-pay systems are almost always subject to some form of gaming. In what has become a business school classic, Kerr (1975) documents several examples of failed incentives systems. The problem is not that individuals do not respond to incentives—quite the contrary—they respond too readily. Thus, Kerr points out that many organizations claim, or hope, to be rewarding B when in fact they are rewarding A.

(p.265) For example, universities often stress the importance of teaching. Yet, compensation is typically linked to a person’s outside opportunities, which, for most academics, is more closely related to research rather than teaching performance. To the extent that compensation is linked to teaching performance, this is achieved via teaching evaluations. Having sat on faculty promotion committees, we can attest to the fact that teaching evaluations do have some weight in faculty evaluation. Yet, as Arum and Roksa (2011) observe, these evaluations sometimes result in faculty making courses easier so that their student/clients are happier, rather than in necessarily improving their future job prospects.

In a recent analogous example, Reback (2008) documents that schools strategically respond to accountability systems that specify minimum competency requirements (e.g., systems that measure the proportion of students who pass a given statewide test). Schools focus their effort on students who are close to the passing score, diverting it away from, for example, students who will clearly score above it.

More generally, there has been extensive research on pay-for-performance systems in the hope of reducing the inefficiencies that Taylor (1911) noted. The National Academy sponsored a study in 1991 (Milkovich and Wigdor 1991) that explored the extent to which performance pay could be used to enhance government. They concluded:

The search for a high degree of precision in measurement does not appear to be economically viable in most applied settings; many believe that there is little to be gained from such a level of precision. The committee concludes that federal policy makers would not be well served by a commitment of vast human and financial resources to job analysis and the development of performance appraisal instruments and systems that can meet the

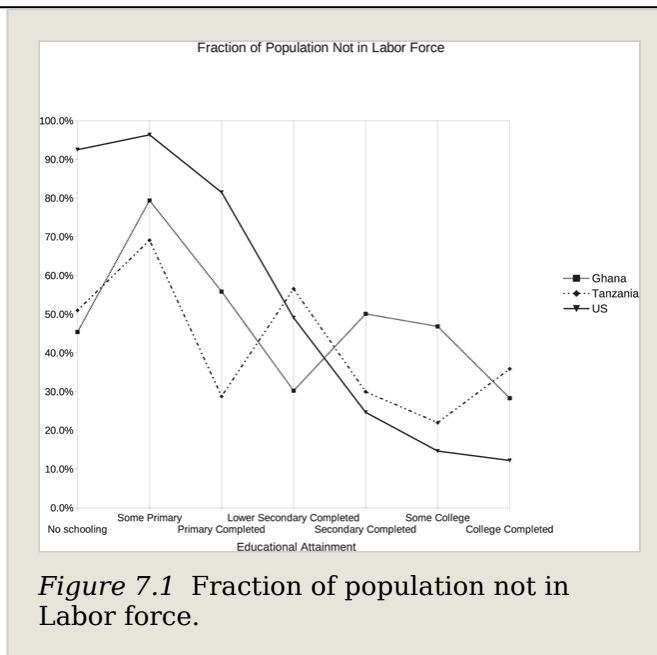


Figure 7.1 Fraction of population not in Labor force.

strictest challenges of measurement science. The committee further concludes that, for most personnel management decisions, including annual pay decisions, the goal of a performance appraisal system should be to support and encourage informed managerial judgment, not to aspire to the degree of standardization, precision and empirical support that would be required of, for example, selection tests.

Despite this skepticism, there has been increased interest in implementing performance-pay systems for teachers. For example, the US Department of Education has introduced a fund to encourage states to measure and reward teacher performance (the Race to the Top Fund).²⁸ Recently, **(p.266)** the National Academy returned to the issue of performance pay with particular attention to teacher compensation (Hout and Elliott 2011). The conclusion:

Our review of the evidence uncovered reasons to expect positive results from incentive programs and reasons to be skeptical of apparent gains. Our recommendations, accordingly, call for policy makers to support experimentation with rigorous evaluation and to allow mid-course correction of policies when evaluation suggests such correction is needed.

This nuanced view is consistent with a century of experimentation with performance pay systems. MacLeod and Parent (1999) document the use of performance pay in the US economy, finding that performance pay is explicitly used in about 30% of jobs. Its use is highly correlated with job characteristics: the incidence of performance pay is much higher for jobs for which there is a clean, unambiguous measure of performance. This is particularly evident in sales, where revenue is often a good measure of a salesperson's productivity.

If there are significant subjective elements to employee performance, then explicit performance pay is not a silver bullet. Holmström and Milgrom (1991) highlight the fact that if one can measure only a single dimension of individual performance, then rewarding only that element can distort behavior away from the efficient solution. If there are differences of opinion regarding what constitutes good performance, then the optimal contract is flat or there is increased conflict between management and employees as one increases the link between measured performance and pay (MacLeod 2003).

In the case of education, one should keep in mind that test scores are diagnostics, and not goals in and of themselves. They measure a student's command of information that is correlated with the ultimate goal—namely, obtaining meaningful employment in the future. The fact that many educators focus upon test scores, while students care about future employment, helps explain why educators and students/parents may not always agree on the way forward.

7.4. An Illustration

In recent work we attempt to provide a concrete illustration of the ideas raised in section 7.3. To do so, we add elements of industrial organization and labor economics to the more public finance-focused theory of **(p.267)** school choice. Specifically, in MacLeod and Urquiola (2012) we construct a model in which students go to school, acquire skills, and then work in a competitive labor market.

7.4.1. Setup.

Relative to the existing literature the model has three key novel ingredients:

1. *Students have to exert effort to accumulate skill.* Although student effort has not been a focus of the literature, Bishop (2006) has emphasized its importance; student learning is a joint product of school and student inputs. Moreover, it is clear from cross-country evidence that societal levels of educational effort display wide variation. Dang and Rogers (2008) illustrate such variation in their review of evidence on private tutoring industries that exist in many countries. For example, Korean households spend 2.9% of GDP on private tutoring, which approaches the 3.4% the public sector allocates to education. In Turkey, private spending similarly approaches the public effort. Tutoring expenditures have been growing quickly in Canada, Kenya, and Vietnam.²⁹ Finally, there is growing empirical research on interventions to elicit effort (see, e.g., Angrist, Lang, and Oreopoulos 2009; Kremer, Miguel, and Thornton 2009).
2. *Schools have reputations given by their graduates' expected skill.* Since Spence (1973), the idea that an individual's years of schooling can signal her ability has been standard in labor economics. We introduce school reputation to capture the idea that *conditional* on years of schooling, the identity of the school a person attended can provide the market with information regarding her ability. This is consistent with research on Colombia (Saavedra 2009) and the United States (Hoekstra 2009) that uses regression discontinuity designs to show that school identity/prestige has a positive effect on wages—upon entry into the labor market and about five years later, respectively.³⁰
3. *The school sector is perfectly competitive in that private schools with selective admissions and different levels of value added are free to enter.* We assume educational systems consist of a continuum of schools, each of which contains a continuum of students. We thus abstract from small numbers problems, which differentiates our model from earlier work on school choice, such as Epple and Romano (1998). These models focus on monopolistic competition where there is an efficient scale for schools, and hence each school has some market power. Conceptually, such a setup supposes that the number of schools is fixed in the short run, and that students select into schools (see Nechyba 2006 for a general discussion of this class of models). Our concern, rather, is with **(p.268)** understanding the implications of perfect competition in the presence of reputation effects. Thus, the model incorporates elements of test productivity, wage productivity, school reputation, and parental demand, factors that are central concerns of the literature we have reviewed.

The model has two periods. In the first, student *innate ability* is realized when individuals are born, but it is not directly observed. Ability can be revealed only after an individual learns and engages with the world. When this happens, individuals, schools, and the labor market observe signals that lead them to update their beliefs regarding individual ability.

One such signal is *family background*, which is observed by all agents.³¹ Another is an *admissions test* observed by individuals and schools prior to enrollment. This measure is soft information that is not verifiable by employers.

Schools select admissions policies that, to different extents, exploit the admissions test and family background; these policies are public information. Schools also set their value added. Students then choose among the set of schools that have offered them admission. They also

make consumption choices and decide how much effort to allocate to study. Finally, student skill is realized as a function of three factors: student innate ability, student effort, and school value added.

In the second period, students graduate and enter the labor market. The market observes two signals of individual skill:

1. The *identity/reputation* of the school attended by each student; when schools are selective, this provides a signal of the student's innate ability. We assume that no given individual can (through his own effort) affect his school's reputation. Intuitively, this reflects that in reality a school's reputation is based on the characteristics of multiple cohorts of graduates, and no single person can easily manipulate such a measure.
2. An individual-specific measure of skill we term a *graduation test*. As its name indicates, this measure can be motivated using the highly publicized standardized high school graduation or college entry exams in countries such as Germany, Romania, South Korea, and Turkey. Other individual-specific measures are seen in other settings and educational levels. For example, in the United States college graduates distribute letters of recommendation and lists of honors received, while economics PhD students distribute "job market papers." Finally, in contrast to her inability to affect her school's reputation, we assume that through her effort a student can directly affect her graduation assessment.

The labor market sets wages equal to expected skill given these two signals. To summarize, we situate an analysis of school system test productivity (**p.269**) (how much learning is produced for a given level of resources) in a context in which individuals and schools respond to incentives.

In this setup we have focused upon signals of ability that follow from family background, an assessment that takes place before students apply to school, and an assessment given immediately upon graduation. In practice, the evaluation of an individual's ability is an ongoing process. What is important, and we feel realistic, is that no test or assessment is perfectly predictive of future ability.

For example, the background of American presidential candidates is carefully scrutinized, yet there still seems to be a great deal that one learns about their abilities after they get the job. Our economics department has an analogous discussion during each graduate admissions round—we have plenty of information on individuals' test scores, but these signals are only imperfectly correlated with a student's future ability for research.

Our graduate students realize this, and so even if they do not have the top test scores, they can still hope to make significant contributions to research. However, they cannot do so if they do not get admitted to graduate school. Moreover, getting into a more prestigious graduate program means that they will have a step up in the job market. This in turn means that they *do* care about a program's reputation, and all else equal would want admission to the most prestigious department possible. We now turn to the implications of these observations for school choice.

7.4.2. Implications: The Anti-Lemons Effect.

The first result from our setup is that parents/students will prefer schools with better reputations—they will value selectivity and better peers per se. Due to signaling concerns, students will prefer schools with higher achievement even if this advantage does not originate in higher value added or positive peer effects (indeed, our model does not even feature the latter).

This result can reconcile three observations highlighted in section 2: (a) there is clear evidence that parents prefer higher achieving schools; (b) the evidence on whether higher achieving schools produce higher *value added* is mixed; and (c) the evidence on the significance and magnitude of peer effects is also mixed. Note that in our model the concern for peer quality emerges *endogenously*—students will wish to attend schools whose graduates have been successful in the past. As previewed above, this highlights a contrast with earlier theoretical work on school competition by Benabou (1996) and Nechyba (2000), which also predicts stratification; in these models sorting originates in unpriced peer externalities.

(p.270) A second set of results concerns the impact of private entry and competition on the system's performance. These follow from an *anti-lemons* effect that arises when firms (schools) can influence their reputation by positively selecting their buyers (students). Specifically, in MacLeod and Urquiola (2012) we show that:

1. All else equal, competition will raise school productivity, capturing Friedman's (1962) intuition. However, this need not always be the case. In some situations, students will prefer a school with lower value added, provided its reputation (due to an outstanding peer group) is strong enough. In such settings, increasing choice and competition may actually lower average school productivity.³²
2. Private entry may have detrimental effects on effort, and therefore on skill accumulation. Suppose there is a system that originally consists of nonselective public schools (i.e., of schools that essentially admit applicants at random). Now consider the entry of selective private schools (i.e., schools that admit based on students' performance in the admissions assessment) into this setting. This will tend to lower student effort among the students who attend such schools. This is a straightforward application of Holmström (1999). The intuition is that as selectivity increases, school reputation provides a more precise signal of student skill. As a result, the extent to which an individual is able to affect the market's assessment of his skill through the one signal he can affect—the graduation test—falls, and hence so does the incentive to study. This implies, for example, that if the introduction of school choice results in stratification, then it might not result in large academic achievement gains. The prediction that school selectivity lowers effort is also consistent with anecdotal and circumstantial evidence on student behavior. For example, students in Japan work very hard to get admitted to elite schools like the University of Tokyo, yet those who are successful are said to dramatically lower their effort once there. In the United States, Hoxby (2009) shows that the selectivity of colleges has increased over the past decades, while Babcock and Marks (2010) document that during this same period, the amount of time spent studying declined from 40 to 27 hours per week.
3. The entry of private selective schools has adverse effects on the effort of students who remain in the nonselective sector³³—an illustration of the effect of stratification on student hope and aspirations.³⁴ The intuition is that the students left behind in these schools are revealed to the labor market as being of lower ability. By a logic similar to that in the previous point, they therefore have a lower incentive to signal their **(p.271)**

skill via the graduation test. Individuals left behind in the nonselective public schools find that their peers are less successful than the students from more selective schools, and this lowers their motivation. This result is a natural consequence of a Bayesian framework in the spirit of Savage (1954). Note also that social learning research indicates that peer success is salient for individuals when forming beliefs regarding their future (Bandura 1986).

These predictions are consistent with cases in which independent schools are subsidized and allowed to be selective. As described above, in 1981 Chile implemented school choice in a manner that fits our framework. Consistent with our predictions, private schools entered by cream-skimming, enrolling the wealthiest children. Further, the private sector itself is highly stratified. For instance, Mizala, Romaguera, and Urquiola (2007) show that the identity of the school a child attends is a good predictor of her household income. Meanwhile, the market share of the private sector has grown—particularly in urban areas, the public sector accounts for a distinct minority (20–30% of enrollments in some cases), and is composed primarily of the lowest-income students.

More generally, our model implies that educational markets will display a strong tendency toward stratification—in fact there is no equilibrium to the simple framework described above if only nonselective private entry is allowed. This suggests that schools will rationally try to engage in some kind of selection as a means of securing a market niche. Consistent with this notion, even in cases in which selection by independent schools is not allowed, one sees that it emerges in different ways.

For example, in the United States most states require that charter schools select by lottery if oversubscribed. But even in this context, there is anecdotal evidence that some charter schools (potentially for quite understandable reasons) engage in selection within the constraints imposed by the law. For instance, the well-known KIPP academies require that parents and students sign certain participation commitments to apply (e.g., students may have to commit to attend schools on Saturdays, or parents to take part in PTA meetings). The result is that at least in terms of motivation these schools are not equivalent to the public ones they compete with. Similarly, in the case of Sweden, independent voucher schools operate under similar selection restrictions as US voucher schools. Yet Bjorklund et al. (2005) conclude that their entry increases segregation across schools, as immigrants and children with highly educated parents are more likely to enroll in them.

(p.272) This analysis suggests that selection/stratification may be a central feature of stable education markets. For example, the US higher-education market features substantial private participation, and also substantial stability; the group of institutions that comprise the top 20 universities or colleges changes little over time.

Finally, one way to mitigate the negative impact of private entry— and more generally raise educational systems' performance—is by raising the precision of individual-specific measures of skill, as emphasized by Bishop (2006). Consistent with this idea, Woessmann (2007) points to a country-level correlation of standardized graduation or college admissions exams and international test performance. In anecdotal evidence, few observers disagree that such high-stakes examinations result in high levels of student and parental effort. Additionally, casual observation suggests that the presence of such examinations may be one of the driving factors behind the large private tutoring industries studied by Dang and Rogers (2008).

7.5. Conclusion

Given the fall of communism and the success of the deregulation movement over the last 40 years, it is widely agreed that free markets have the potential to dramatically improve the quality and lower the cost of many goods and services. At the same time, this period has seen increased dissatisfaction with the public provision of education, leading to calls for more choice and competition in the market for education. This view is illustrated in the introduction to the World Bank's (2004) *World Development Report* on public service delivery:

Poor people—as patients in clinics, students in schools, travelers on buses, consumers of water—are the clients of services. They have a relationship with the frontline providers, with schoolteachers, doctors, bus drivers, water companies. Poor people have a similar relationship when they buy something in the market, such as a sandwich (or a samosa, a salteña, a shoo-mai). In a competitive-market transaction, they get the “service” because they can hold the provider accountable. That is, the consumer pays the provider directly; he can observe whether or not he has received the sandwich; and if he is dissatisfied, he has power over the provider with repeat business or, in the case of fraud, with legal or social sanctions. For the services considered here—such as **(p.273)** health, education, water, electricity, and sanitation—there is no direct accountability of the provider to the consumer.

The implication, as the report goes on to discuss, is that introducing greater choice and competition in these services would produce greater accountability and enhance outcomes.

We have discussed a large literature on the effectiveness of this approach, finding that increased competition has had mixed success in raising school test productivity. The key insight we use to explain this finding is that education is not a commodity in the normal sense of the term—in other words, education is *not* like a sandwich or a samosa.

For instance, in many ways education can be better understood as an employment relationship. Students are in some sense “employed” by teachers who must encourage, coach, and otherwise cajole their flock into acquiring a set of skills that is beneficial to them in the distant future. Most economists would be surprised if a particular industry was required to perform well while not having the right to choose its employees. Yet, we expect (at least public) schools to “employ” all students and to successfully engage them. In a sense, schools are students’ first and last opportunity to be treated in this way. Upon graduation, they face a labor market where employers have no obligation to employ them or to keep them if hired.

Accordingly, we have discussed a model of education that builds upon the employment model of Holmström (1999) to capture some of the ways in which education is a complex commodity. These include (a) several of its key outputs are difficult to contract upon; (b) from a consumer’s perspective, many of its key products (e.g., long-term job-market outcomes) are observed significantly after the transaction between student and school has taken place; (c) education requires significant relationship-specific investments that imply that it is costly for students to switch schools; (d) schools’ productivity is extremely difficult to disentangle from their student composition (hence the reason for the whole private/public comparison literature), and so reputations can be durably built on student composition; and (e) unlike policymakers, parents and students do not care about test scores per se—they care about the opportunities that attending a particular school will offer them in the future, and perhaps also about what consumption the school’s amenities allow them in the present.³⁵

These and other such considerations suggest that “competition plus reputation” is not sufficient to improve school productivity. It is worth **(p.274)** highlighting the fact that in a modern market economy, free competition is really a fiction. All markets for sophisticated goods rely upon a complex legal and regulatory framework operating in the background. In the case of transportation, there are safety regulations that must be respected. New drugs must pass regulatory approval before entering the market place. In China recent experiences with tainted food products are likely to lead to greater food-industry regulation.

Since education is also a complex good, the issue is not really one of private versus public provision, but one of market design, and what might be better called “managed competition.”³⁶ Our analysis has highlighted that one key design issue is the link between education and future rewards. In an environment where the labor market cannot easily observe individual productivity, then it will rely upon other signals such as school reputation. This leads to an anti-lemons effect that adversely affects the least able students.

This again reflects that the challenge facing education is similar to an employment relationship, where the firm confronts the problem of motivating its marginal workers. Successful individuals continually receive positive feedback and hence are encouraged to work hard to get more rewards. It is harder to provide rewards to effort for less-able individuals. We have argued that the evidence is consistent with the hypothesis that unfettered competition in the market for schools, combined with imperfect information about ability, leads to a stratified school system and an anti-lemons affect—less-able individuals are negatively selected when young. These individuals may not expect to receive significantly higher rewards in the future, regardless of how hard they work. Given this prospect, many young people rationally work less hard, perpetuating the cycle of inequality.

To overcome the anti-lemons effect, countries that want to raise their testing performance might choose to make their test scores more meaningful in terms of determining individuals’ outcomes. China is an example of such a design, since in its case doing well in national tests has been a route to success for hundreds of years. In short, our point is that if the goal is to improve testing performance to Shanghai levels, this might be very hard to achieve merely by introducing private or charter schools. Rather, the structure of the educational system might have to be changed significantly, such that parents and students are able to see clear links between their effort and the outcomes they care about. For example, a system that allows free entry by schools but restricts their ability to select students, combined with high-quality individual performance measures, may perform better than a pure *laissez-faire* system.

(p.275) In terms of dealing with the lower tail of the distribution, a solution may lie in an observation made by Holmström and Milgrom (1987) regarding the design of incentives in a complex dynamic environment. They show that optimal rewards should be designed so that, regardless of one’s past performance, one is always rewarded for improved effort. In the context of education, it is important to avoid reward systems with the feature that students who fall below a certain performance level view engaging in noneducational activities as more rewarding. A similar principle applies to teacher rewards—weak teachers should face positive rewards for incremental improvements in performance. The current trend to threaten them with dismissal may simply lead to low morale and worse performance until the day of judgment arrives. In the meantime, both students and society pay the costs. This is just the theory. Putting effective solutions into practice is much harder and will require more research.

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Notes:

- (1) . Later versions of such models do feature reduced-form productivity effects from competition, see, e.g., Epple and Romano 2008.
- (2) . For instance, The World Bank (2004, chapter 9) provides examples of success stories in utility privatization.
- (3) . Due to space constraints we do not focus on point (3).
- (4) . For example, in a recent World Bank report, Patrinos, Barrera-Osorio, and Guaqueta (2009) open their review of the literature by stating that "the existing evidence from around the world shows that the correlation between private provision of education and indicators of educational quality is positive, which suggests that the private sector can deliver high quality education at low cost."
- (5) . Holland (1986) calls this—not being able to observe the outcomes of the same student under public and private schooling—the fundamental problem of causal inference.
- (6) . In this literature the focus is mainly on determining if private schools have an advantage in terms of value added as opposed to cost-effectiveness. Chapter 8 in this volume describes a general framework for evaluating cost-effectiveness in the context of developing country education policy. For a general discussion on cost-effectiveness issues in education, see Levin and McEwan 2001.
- (7) . The controversy surrounds the effects on subgroups—the conclusion for these varies with how subgroups are defined.
- (8) . There is of course a large literature on private/public comparisons in developing countries, one that extends beyond these two cases. As is the case in the United States, papers meet with varying success in terms of establishing credible control groups; some implement cross-sectional analyses only, others look for explicit sources of exogenous variation. For a review of several countries, see Patrinos, Barrera-Osorio, and Guaqueta 2009. For reviews on Latin America, see Somers, McEwan, and Willms 2004. For reviews on Chile see Bellei 2007 and McEwan, Urquiola, and Vegas 2008. For work on India see Kingdon 1996; on Indonesia, Newhouse and Beegle 2006; and on Pakistan, Das, Pandey, and Zajonc 2006.
- (9) . Brazil and Chile are relevant examples. Newhouse and Beegle (2006) suggest that Indonesian public schools benefit from positive selection even at the primary level.
- (10) . For further institutional details see McEwan and Carnoy 2000 and Urquiola and Verhoogen 2009.
- (11) . The "elite" unsubsidized private schools account for about 6% of enrollments.

(12) . The value of the school voucher fell significantly during the 1980s and grew substantially during the 1990s.

(13) . It is possible, for example, that more motivated parents migrate toward cities in search of better schools, or that priests were allocated to communities in a manner correlated with characteristics (e.g., population density) that might affect educational achievement.

(14) . This improvement in PISA test scores is observed in reading and not in math, and it is concentrated among low-income children, who predominantly attend public schools. Given the numerous reforms that have occurred in Chile over the past two decades (e.g., compensatory funding for schools with low-income students, accountability initiatives, teacher pay reform, early childhood programs, and so on) it is difficult to attribute this change to a particular intervention, let alone to the introduction of school choice three decades back.

(15) . The latter is an outcome we focus on below; we cite the results here but return to this aspect of the study below.

(16) . This is certainly not the only case of large-scale unsubsidized private school entry in low-income areas. For instance, Kremer and Muralidharan (2006) point out that about 25% of children in rural India have access to fee-charging private schools. There is less data on such low-cost private schools in Latin America, but the anecdotal evidence is certainly consistent with a significant role for them, particularly in poor urban neighborhoods.

(17) . See also Alderman, Orazem, and Paterno 2001.

(18) . Andrabi, Das, and Khwaja (2008) note that the fact that these women are often high school graduates from public schools is one way in which the public sector indirectly supports the private sector.

(19) . For other examples of school market liberalization leading to stratification see Bjorklund et al. 2005 and Mbiti and Lucas 2009 for the cases of Sweden and Kenya, respectively.

(20) . See also Fack and Grenet 2010.

(21) . Even many economists may not be familiar with the formal details of these contributions. This work shows that the concepts that are used daily in economics, such as free markets, opportunity cost, the irrelevance of sunk costs for current decisions, market equilibrium, risk, rational expectations, and so on can be placed into a coherent and unified mathematical framework. This, we suggest, explains in part why the economic mode of reasoning has been so powerful in policy debates.

(22) . In addition, parents and students consume a collection of other goods that are packaged with the education services, including afterschool programs, the quality of the physical plant, and so on. In a competitive market, each of these would be priced.

(23) . A nice example of an enforceable contract that produces skill acquisition is the apprenticeship contract. See Malcomson, Maw, and McCormick 2003 on how this contract is designed to achieve an efficient skill acquisition.

(24) . See Tirole's (1988) classic text for an illustration of the power of game theory for understanding market structure.

(25) . D'Aspremont, Gabszewicz, and Thisse (1979) showed that for such a model there does not exist a Nash equilibrium in prices (a result that MacLeod [1985] generalized to the multiproduct case that is particularly relevant for schools). Existence would be restored if schools could collude on prices, in which case the market equilibrium would be characterized by schools moving to the center of the preference distribution and earning rents, leaving students with specialized needs underserved.

(26) . It is worth observing that we are measuring productivity only with regards to the pecuniary cost of education. A more complete measure would also include the disutility/cost of attending school, as in Spence 1973. Even though individual effort does play a role in the theory, since it is not easily measured it plays no role in traditional measures of school performance.

(27) . See also recent work suggesting that the schooling choices of individuals in developing countries respond to changes in the perceived wage returns to schooling, e.g., Jensen 2010 and Oster and Millett 2010.

(28) . See <http://www2.ed.gov/programs/racetothetop/index.html>.

(29) . For other work on how the presence of a private tutoring industry affects incentives in the public sector, see Jayachandran 2008.

(30) . Dale and Krueger (2002) find no effect of school selectivity on wages about 20 years after graduation. Note, however, that all three studies could be consistent with an impact of school selectivity on *starting* wages, since a Bayesian framework would predict this effect would become attenuated over time as the market gained more information on individuals' ability — this is in fact the prediction of the model we describe below.

(31) . There is evidence that family background provides some information regarding a person's likely future ability (Almond and Currie 2011).

(32) . For example, this case can arise if the government constrains the number of schools, as happens in many jurisdictions.

(33) . In MacLeod and Urquiola 2012 we show an equilibrium exists where selective private and nonselective public schools coexist.

(34) . Coate and Loury (1993) make a similar point about the negative effect of racial stereotypes. Austen-Smith and Fryer (2005) show that behaviors, such as "acting white," can be viewed as signaling phenomena.

(35) . The World Bank (2004) arrives at conclusions distinct from ours precisely because it assumes education is like a conventional good. For example, implicit in its arguments is that parents can easily evaluate a school's wage productivity, when as discussed by Speakman and Welch (2006), this might be close to impossible.

(36) . Chapter 6 in this volume also highlights the importance of market design for education policy in the context of School Management interventions.