

## CHAPTER X

### An economic approach to education policy implementation

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This chapter describes an economic approach to understanding education policy implementation. Economists helped establish policy analysis as a field of study in the middle of the last century and economic methods long have been brought to bear on examinations of various policy processes essential to education outcomes from Congressional voting behavior to education productivity (Becker, 1993; Hanushek, 1986, 1997). However, explicit discussions of the relationship between economic methods and education policy *implementation* are rare. Economists seldom use the term “implementation” when addressing policy processes and outcomes, not defining it as a separate field of inquiry from policy analysis. Yet, recent trends in education policy bring to light the utility of economic methods for education policy implementation studies. For example, economic constructs fit well with assumptions about various incentives imbedded in accountability policies and alternative wage policies to increase teacher workforce supply and quality.

This chapter highlights the utility of an economic framework for understanding the implementation of contemporary education policies. The defining feature of this approach is its focus on individual actors at multiple levels of educational systems—teachers, principals, school board members, community residents, governors, and others— and how implementation is

shaped by their decisions in the face of resource and knowledge constraints. This perspective highlights how these actors' interact to determine how implementation unfolds.

The approach to understanding policy implementation that we discuss in this chapter is broadly consistent with other approaches in the implementation literature. For example, McLaughlin (1991) notes that implementation is fundamentally determined by local implementers, such as teachers, principals, and students. Their will to implement a policy, as well as their capacity to do so, determines the success of implementation. Likewise, we emphasize that preferences (“will”) and resource and knowledge constraints (“capacity”) determine individual behaviors that are at the foundation of policy implementation.

We start by elaborating these and other dimensions of an economic approach to examining policy implementation. In the subsequent section we illustrate how actors' preferences and constraints may affect policy implementation using examples from teacher policy, school choice, and accountability reforms.

### **An Economic Approach to Implementation**

Economic approaches to a variety of social phenomena rest on models of individual decision makers guided by their preferences and constrained by their resources and knowledge. Economists use these approaches to predict future implementation outcomes as well as to explain current policy effects. At their most general level, economic approaches involve (1) identifying important policy participants, (2) predicting or assessing the preferences of these individuals, (3) determining how a given policy is likely to alter the incentives or constraints facing these individuals, and (4) using data about how individuals have responded to constraint changes in the

past to predict how the relevant individuals will respond to the policy change and how this response will affect implementation and the achievement of the policy goals. Economists also exert substantial effort empirically estimating the actual responses of the individuals and the implications of these responses for understanding policy effects.

To elaborate, in order to predict and explain how individuals will respond to policy changes, one must understand the preferences that guide individuals' decisions. As an example, economists have examined school finance formulas that compensated school districts for the added cost of special education students (e.g., Cullen, 2003). Such analyses identify district administrators as important actors in the system. They predict that these administrators have preferences for increased revenues in their district. If a special education finance reform provides more money to districts when a greater number of students are classified as special education students, economists then will predict that the policy provides incentives for administrators to increase the fraction of students classified as special education. This effect may be large, impacting the lives of many students, or it may be quite small and not important for the overall success of the policy. By examining data on districts that have undergone such a policy change researchers have been able to predict and explain the extent to which the incentive change affects student classifications and other outcomes. Cullen (2003) finds that fiscal incentives such as these can explain over 35 percent of the recent growth in student disability rates in Texas.

Not all individuals have the same goals. Attention to these differences across all the relevant actors is essential for understanding implementation. For example, in a given neighborhood, community members outside of school may have goals focused on the long-term success of the community, whereas students and their families may be more interested in benefits

of education that accrue to them individually such as income, prestige or happiness. These differences in goals may lead to differences in which policy approach they favor. Similarly, teachers, administrators, and elected officials may have different goals. All are likely to be concerned about student outcomes, but they also care about their own income, working conditions, and opportunities for advancement. These self-focused goals may lead to decisions that conflict with stated goals of reforms.

Microeconomic theory offers explanations for how these preference differentials play out in various contexts. For example, one theory frames differences between the goals of firms and the goals of employees as a *principal-agent problem* (Holmstrom & Milgrom, 1991). The worker or *agent* in the firm pursues individual goals of advancement, income, ease of work, and so on. When these goals are in line with the goals of the firm's owner, known as the *principal*, workers' practice tends to reflect firm interests. At other times, agents pursue strategies that promise to improve their own outcomes at the cost of the principal's goals. One aim of policy may be to align worker and owner goals, or in the case of education, the goals of teachers and administrators with the goals of parents and the community. In the firm example, such alignment may come from linking worker pay to firm profits. In the case of schools rewards and sanctions based on student performance may help to accomplish such alignment.

This discussion points to the importance of understanding individuals' knowledge, as well as preferences and the incentives imbedded in reforms, when attempting to predict or improve implementation. When the principal has perfect knowledge of the output that the agent is producing, then he or she potentially can design the agent's compensation to be a function of this output—in other words, he she can design an incentive system that aligns the agent's interests with the firm's goals. For example, the owner of a firm can pay a worker based on the

number of units of the good that are produced which serves to align the individual goal of increasing pay and the firm goal of increasing production. However, in many industries – and education is clearly one of these – organizational output is difficult to measure and even more difficult to match to particular employees.

Output is multidimensional and difficult to measure in education and much of what a school “produces” in terms of increased test scores or graduation rates is the result of collections of actors engaged in various activities. In such a case, even without the ability to *perfectly* align workers’ incentives with those of owners, some employment contracts and public policies are more effective than others at aligning the preferences and goals of an organization’s actors. For example, special education finance policies that provide money to districts based on factors that cannot be manipulated by administrators, such as the number of students in the district and the poverty rate, do not increase incentives to classify students as special education, and thus may reduce unnecessary classification, in comparison to a finance policy in which the funds are linked to the number of students classified.

The complexity of the education system comes not just from the complexity of the outputs. The input mix – teachers, administrators, textbooks, ... – is also complex. Economists model the interactions within organizations, or *firms*, of individuals working together to produce a given output. Firms have a specific production process (also known as the production function) through which they produce tangible outputs -- from books to automobiles -- by combining inputs such as labor and machinery. The available technology, including both the workings of the machinery and the knowledge of how best to utilize resources and work together, determines how effective firms can be at transforming inputs into outputs. In the typical market, the firm’s owner wishes to maximize profits. To do so, he or she chooses a quantity of output to produce,

based on the inputs needed, the costs of those inputs, and the market price that can be fetched for the output. When inputs cost less the firm can produce outputs more cheaply; when the technology of production improves it can produce more with a given mix of inputs.

This portrait of firm decision-making based on profit maximization is clearly germane only to a few education firms such as education management organizations that explicitly aim to maximize profits (Levin, 2002). In addition, while some firms can choose almost all of their inputs, education organizations often have more limited control over inputs. For example, while public school districts or public schools can choose how they spend some of their revenues, they often cannot control the level of revenues they receive. Despite these differences, certain aspects of the firm model can be usefully generalized to education. For one, as noted above, the firm model calls attention to how individual preferences shape implementation outcomes. In addition, the model of the firm highlights how production processes use inputs and the technology of production to affect student outcomes and other shared goals. Third, economic models of the firm applied to education routinely look beyond the school walls and rest on assumptions that student outcomes are produced by the cumulative application of a range of student, family, and school-based inputs.

By modeling production functions for education, researchers describe how inputs combine with the available technology (or processes) of production to produce student outcomes. In education, as in all other industries, firms are interested in improving the technology of production; because by improving technology, firms can then produce more outputs for a given level of inputs. This model then calls attention to how the search for new technologies such as curricula, teacher recruitment strategies, and school structures impacts preferences, decisions and the implementation of policies.

Economic studies of complex social phenomena like education are sometimes criticized for resting on assumptions that there is a straightforward process by which inputs are transformed into outputs—that technology is well understood and consistently implemented. However, economists long have realized that even in profit-maximizing industries, there is much about the current technology of production that is uncertain or ambiguous. For example, economic researchers grapple with how organizational structures or management practices affect worker productivity especially in large industries where less control over the means of production increases variation in the production process and difficulty in understanding the process that produces the outputs. These questions about control and scale are particularly applicable to education, given that a typical school’s output is produced in semi-autonomous classrooms. Thus, the technology of education is often opaque and highly variable (Murnane, 1984). Indeed, quantitative social scientists have spent more than 30 years attempting to discern the technology by using regression analysis to estimate education production functions. Studies of the effects of inputs such as parental characteristics, smaller class size, and different curricula are aimed at discerning production technology (Burtless, 1996; Hanushek, 1997; Krueger, 1999).

The simplest economic models assume that firms are able to choose their inputs so as to produce the greatest output at the least cost, constrained only by the costs of their inputs. In reality, most firms are constrained by regulations, contracts, and previous investments in durable goods. Firms in the education industry, including public schools and districts, face even greater constraints. Accordingly, economic models of education policy implementation seek to illuminate the various constraints on actors’ goals, preferences, and ultimate decisions. For example, many schools and districts are constrained by the dollars allotted to them by federal, state and local governments; school boards and other elected bodies hold them accountable for

ensuring that expenditures on resources cannot exceed their revenues. Schools and districts are further constrained because their input mix is partially determined by federal and state regulations on class size, teacher characteristics, and other aspects of production. Finally, and perhaps most importantly, education firms generally do not choose their student and family inputs. These inputs are simply beyond school or district control, at least in the case of non-magnet public schools and other schools with neighborhood-based enrollment policies. The completely autonomous firm can choose its resource mix. In this case, if there is a “best practice” way of maximizing outputs, this firm can choose its inputs to fit with this system. However, when one input is fixed at different levels across schools, these schools may each face different best practices for maximizing inputs. Schools and districts clearly fit into this group of firms for which there is likely to be no single best technology. In keeping with this understanding, much empirical work in economics explores the differential effect of resources such as class size, vouchers, and teacher characteristics in varying contexts.

In summary, an economic approach to education policy implementation calls attention to how preferences and constraints lead individuals to make decisions that affect policy implementation. Within this framework, models of firms describe the interactions of individuals with different and often competing preferences. They highlight the importance incomplete knowledge, resource constraints, and technology of production for shaping policy outcomes. This approach moves beyond the simple view of education production that posits a firm in which the technology of production is well understood and implementation occurs without a hitch because of shared preferences and knowledge. Rather, economics provides tools for thinking about how divergent and multi-dimensional preferences, incomplete knowledge, and input constraints affect implementation. In the following sections we use examples from teacher



policy, school choice, and accountability reforms to elaborate how economic tools can be used to capture the dynamics of policy implementation in the context of these constraints.

## **Applications**

### **Divergent Preferences and Goals**

*The case of teacher policy.* Teachers -- among the most important actors in the education system -- are the main focus of these examples. Teachers make decisions based on a wide variety of preferences only some of which involve student outcomes. While most teachers care about the outcomes of their students, teachers are also responsive to wages in their decisions to enter or quit teaching as are workers in other occupations. When wages increase, more college graduates express interest in teaching. When wages in other occupations increase, more teachers leave teaching for alternative jobs (Baugh & Stone, 1982).

Non-wage job characteristics also affect teacher choices including attributes of students, class size, school culture, facilities, leadership, and safety. Research has found that teachers prefer to teach in schools with higher achieving students. For example, when teachers switch schools, they are more likely to move to schools with higher-achieving and higher socioeconomic-status students (Hanushek, Kain, & Rivkin, in press; Lankford, Loeb & Wyckoff 2001). Teachers also choose schools that have better facilities or that offer more preparation time. A recent survey of California teachers shows that turnover is a greater problem and vacancies are more difficult to fill in schools with larger class sizes, where teachers share classrooms (multi-tracking), or where teachers otherwise perceive the working conditions to be less favorable (Loeb, Darling-Hammond, & Luczak, 2003). Principals also strongly affect the

working conditions in a school; some principals are able to create environments that teachers find favorable, regardless of the facilities or the characteristics of the student body.

Finally, teachers appear to care about school location. Most teachers prefer to teach close to where they grew up and in districts that are similar to the district that they attended for high school (Boyd, Lankford, Loeb, & Wyckoff, forthcoming). Such preferences pose particular challenges to urban districts because the number of teacher recruits whose hometown is in an urban area tends to fall short of the number of positions that need to be filled in urban districts. As a result, these districts must attract teachers from other regions. To induce sufficiently qualified candidates whose hometowns are in suburban regions, urban schools must have salaries, working conditions or student populations that are more attractive than those of the surrounding suburban districts to induce sufficiently qualified candidates. When urban districts do not offer these inducements, teachers with suburban hometowns who take jobs in urban areas are likely to be less qualified than those who teach in the suburbs. Many urban districts face a second disadvantage as a result of this preference for proximity. Historically, the graduates of urban high schools have not received adequate education, forcing cities to choose from a less-qualified pool of potential teachers, even if they do not hire teachers from other areas. Accordingly, preferences for proximity lead to the perpetuation of regional inequities in the qualifications of teachers (Boyd, Lankford, Loeb, & Wyckoff, forthcoming).

So how do teachers' preferences for wages, working conditions, and location affect policy implementation? Consider a policy that sets a uniform salary schedule at the state level. Within the state, some districts are in locations or have working conditions generally not preferred by teachers and beyond district control. Districts with poorer conditions will not be able to attract the same teachers as other districts even with equal salaries. The same

phenomenon holds true within districts where schools vary by working conditions or other dimensions that resonate with teachers. This leads to the substantial sorting that we see in the characteristics of teachers across schools within large urban school districts, where schools with fewer poor and low-performing students have more experienced teachers who score higher on measures of academic achievement and teacher preparation (Lankford, Loeb & Wyckoff, 2001). Thus, salary equalization policies that aim to strengthen teacher quality across districts and schools may result in substantial inequality in teacher characteristics across schools.

Teacher preferences also mediate the effects of requirements for entry into teaching. For example, suppose we know that certain forms of pre-service and in-service training improve teachers' ability to teach reading; and that such knowledge leads policymakers to impose training requirements for teachers that include classes on methods for teaching reading. Raising education and certification requirements for entering teachers may improve skills and prepare potential teachers for the difficulties of classroom teaching. However, the additional requirements necessitate that teachers spend more time and money on training before entering the classroom. The greater this cost, the greater the wage needed to entice potential teachers into the profession. Thus, policies aimed to improve the quality of teaching through increased certification requirements may decrease teacher quality if they pose an inhibitive cost. Effective training requirements seek to minimize the costs of entry for teachers while providing skills needed to be successful in the classroom (Boyd, Lankford, Loeb & Wyckoff, 2003).

*Accountability and Choice.* The lack of goal alignment among various educational actors including superintendents, teachers, school principals, and community members has been a source of concern for policymakers. Accordingly, policymakers have developed various policy approaches to better align such goals based on the assumption that greater goal alignment will

improve implementation and ultimately school performance. While empirical studies have illuminated the extent to which these policies seem associated with such outcomes, economic theory helps highlight the underlying reasons why such alignment policies do and do not play out as intended.

Teachers and administrators pursue a range of goals, not all of which are consistent with community (society) goals. This lack of alignment is a source of concern for policy makers. Two recent policies, school choice and accountability, are motivated by the similar objective of realigning these goals. The theory behind both policy approaches is to target resources towards administrators and teachers that work towards community goals and away from those who do not. A change in resource constraints facing school employees could, in theory, increase incentives for these employees to act in alignment with community goals. While both choice and accountability policies aim to re-align the goals of teachers and administrators, they represent different approaches to this re-alignment. Accountability policies usually reward or sanction schools for the performance of their students on standardized tests (Carnoy & Loeb, 2003; Hanushek & Raymond, 2002). Tests are designed to measure how well students are doing at reaching goals set forth by the state. Choice-based policies allow families to choose which school their child attends (Levin, 1991). Schools that are pursuing goals that are consistent with the goals of families will presumably be more popular among families, while those not performing well will lose students and funding. The process provides incentives for the schools that are not meeting parents' goals to improve. If they do not improve they should, in theory, be forced out of the market.

If the goals of the community are similar to the goals of individual families, then, ignoring differences in knowledge or resources, both policies should produce similar outcomes.

For example, one might presume that state-level goals represented in accountability plans are focused upon raising achievement in reading and mathematics, and that families broadly share these goals both for their own children and for other children in the community. Accountability systems reward schools for improved test scores. Choice systems allow parents to choose schools that are most effective at improving their children's reading and math ability.

However, if the goals of parents and of the community are not similar, then the results of the two systems may be quite different. As one example, consider the implementation of school choice plans and the issue of racial integration and segregation of schools. Integration of schools may have benefits for the society or community, either because it promotes an equitable distribution of achievement across groups or because it promotes other social benefits, such as cooperation among diverse students. Yet, it often has been noted that many families prefer that their children attend school with children of the same race or culture (Clotfelter, 2001; Schneider & Buckley, 2002). In a school choice plan that allows families choice among a wide range of schools, many families will indulge their preferences, potentially leading to sorting along racial or ethnic lines.

In accountability plans that directly reward or sanction schools that fulfill, or fail to fulfill, social goals, there is less potential for family preferences to triumph over community preferences. This is because, unlike choice plans, accountability policies don't reduce the barriers that keep parents from choosing which schools their children attend (though private schools and residential sorting are both commonly used methods of sorting). However, there are difficulties with accountability policies, as well. While the goal of accountability is to re-align the preferences of education actors, it is not a simple task for policies to re-align preferences of any group. In many accountability plans, the broad aim is to encourage principals and teachers

to focus greater efforts on improving various measures of school performance, such as test scores. Early experiences with the implementation of such accountability plans suggest that these individuals will continue to pursue their own goals and preferences, while searching for low-cost ways to appear as though their preferences have altered. The growing body of empirical evidence on accountability suggests that “gaming” occurs with some frequency. That is, teachers and school administrators search for ways to improve measured performance without improving actual performance. This might be accomplished by excluding low-performing students from testing (e.g., Cullen & Reback, 2002; Figlio & Getzler, 2002), coaching students on test-taking to the exclusion of actually improving what students know and can do (e.g., Glewwe, Ilias, & Kremer, 2003), outright cheating (Jacob & Levitt, 2003) or even increasing students’ caloric intake on the day of the test (Figlio & Winicki, in press).

Both choice and accountability policies illustrate the difficulty of aligning the diverse preferences of actors. School choice confronts problems because parental preferences are not the same as community preferences. Accountability faces problems because it is often easier to game the system than to implement different instructional strategies. If policy designers do not attend to differential preferences across the system, they may miss opportunities in policy design to create adequate incentives for implementation.

### **Binding Resource Constraints**

While successful implementation of policies and the achievement of policy goals may require the alignment of incentives, this is often a necessary but not sufficient condition for effective implementation. Actors may wish to carry out a given policy but may be limited by either resource or knowledge constraints. This section discusses the importance of constraints to

implementation using examples from teacher, school choice, and accountability policies as illustrations. It first addresses knowledge constraints and then other resource constraints.

*Incomplete Information and Local Actor Advantage in Teacher Policy.* If education administrators and policy makers could obtain perfect knowledge of teacher effectiveness, then they could use such knowledge to optimize teacher compensation and hiring policies, thus, improving student outcomes. On the other hand, incomplete knowledge can limit the ability of teacher policy to improve teaching, in keeping with the principal-agent model discussed above. That is, when the principal cannot measure what the agent is producing, it is more difficult to create incentives to increase productivity.

There are two common approaches for measuring teacher effectiveness. Both are inaccurate and these inaccuracies lead to problems for designing policies to improve teaching. The first approach is based on measures of teachers' knowledge. For example, the vast majority of states require teachers to pass an exam before they are certified to teach (Angrist & Guryan, 2003). The exams provide information concerning potential teachers' abilities to solve math problems and comprehend reading passages, among other skills. The second approach measures teachers' performance by the test-score gains of their students. Students are tested at the beginning of the school year or at the end of the prior school year and then again at the end of the school year; the gains during this time are attributed to the teacher. Yet, despite their prevalence, both approaches provide limited knowledge of teacher effectiveness. Researchers have found that certification tests are incomplete measures of teacher knowledge, and teacher knowledge is an incomplete measure of teacher effectiveness (Ferguson & Ladd, 1996). Similarly, student tests are incomplete measures of student knowledge, and student knowledge is an incomplete measure of the student outcomes that families and communities value (Carnoy & Loeb, 2003).

Consider these knowledge constraints in the context of teacher hiring. Districts and schools often do not appear to be making wise choices when hiring teachers (e.g., Levin & Quinn, 2003). There are a number of reasons why poor hiring decisions occur. The goals of the hiring authority may not be aligned with the state goals, perhaps leading administrators to hire friends or family. Hiring authorities may be constrained by budget uncertainties that do not allow hiring until late in the season. Relevant to this discussion, knowledge limitations also may lead to poor hiring decisions. When schools or districts are recruiting teachers they do not know how good a teacher each candidate will be. They obtain some relevant information from where applicants received degrees, from prior work experience, and, in some cases, from interviews. Tests of basic knowledge provide another layer of information that can improve hiring decisions. Hiring authorities can balance the results of tests with other candidate characteristics such as experience working with children or youth.

Test results for teachers, thus, can provide information for hiring authorities. However, many policies distort the potential benefits of these tests. For example, according to some policy designs, teachers must pass exams for certification, but their test score results are not reported to schools or districts; hiring authorities simply may not employ uncertified teachers. This policy aims to improve hiring decisions; however, there are two drawbacks of this approach that reveal the importance of knowledge constraints on implementation. First, certification status does not provide hiring authorities with complete information about test scores and there may be a substantial difference in knowledge between teachers who perform just above the test score cutoff and those that perform at the top of the distribution. While this is not the only information relevant for identifying high quality teachers, it may be useful. The second drawback of this approach is that it does not allow the hiring authority flexibility in which teachers it hires at the



lower end of the test score distribution. Some schools, especially those in high poverty areas, hire from a small applicant pool. The new requirements may remove the worst candidates from this pool, making this a beneficial policy. However, if requirements are imprecise in their ability to identify good teachers – perhaps driven by the relatively poor performance of non-native English speakers – and local administrators have additional knowledge and are effectively choosing from the pool of candidates available to them, increased requirements may eliminate some of the candidates that are actually better in practice from an already insufficient pool and disadvantage these schools to a greater extent. Here the implementation of a policy aimed at improving teacher quality may have the perverse effect of lowering it in the most difficult-to-staff schools.

Measurement of teacher quality by the test-score performance of students further reveals the importance of considering knowledge constraints on school actors' choices. A few policies have attempted to link teacher pay to the test score levels or gains of their students (e.g., Glewwe et al., 2003; Lavy, 2002; McEwan & Santibañez, 2004). The argument for this policy approach is similar to that for accountability: teachers' goals are not aligned with community goals for students; the tests measure society goals; thus, linking teacher pay to test-score gains aligns teacher and community goals and otherwise improves schools. However, most tests do not address the broad range of skills that teachers cover in the classroom. Accordingly, the policies may provide incentives for teachers to focus instruction on material contained in the test and neglect other important areas of the curriculum (Hannaway, 1992; Holmstrom & Milgrom, 1991). Moreover, these policies may discourage teacher interaction and collegiality essential to school performance. This lack of interaction may, for example, increase the time it takes for

new teachers to become effective and otherwise contribute to turnover if new teachers are dissatisfied by their abilities in the classroom.

Given these limitations, a merit pay plan which allows principals discretion in dispersing bonuses may have more success than one based solely on test scores. Administrators may use the information provided by student test scores, but could balance this data with more qualitative information on the students in each teacher' classroom and contributions that teachers make to the school as a whole. In a system with high-quality administrators, this would have the benefit of rewarding classroom effectiveness while avoiding the testing problems highlighted above. However, if administrators' goals are not aligned with community goals or if administrators do not have the knowledge to make use of the data available to them, then such a system may not be preferable to the current system of fixed salary schedules and state regulations. Many factors that plague the teacher labor market, such as the inequitable distribution of highly skilled workers, affect the administrator workforce as well. Administrators may not have the skills or inclination to use discretionary funds wisely. These failures can affect how teacher policy, however well-intentioned, is eventually implemented.

These examples from the teacher labor market provide illustrations of two important policy considerations pertaining to the role of knowledge constraints in policy implementation. First, incomplete knowledge may require an alternative set of policies than would complete knowledge. The incomplete knowledge of teaching ability provided by student tests, suggests that tests should only be one aspect of teachers considered when designing compensation policies. Second, the relative knowledge at different levels of the education system affects policy implementation. Due the importance of context for the optimal use of resources (schools may differ substantially in their optimal resource mix), local administrators may be able to

incorporate the complexities of their local environments with the knowledge provided by the test score performance of teachers and their students. However, if local administrators do not have the knowledge necessary to use test score data effectively or their goals are not aligned with societal goals than hiring and compensation decisions may be better left to other actors.

*School Choice and Accountability: Incomplete Information, Family Advantage and Inequality.* School choice and accountability policies provide a second example of how attention to the importance of knowledge helps reveal how preferences and resources shape implementation. If the states had perfect knowledge of the optimal technology of production for each school, then they could require each school to use this production process with a given set of inputs. However, production processes in education are complex and likely to differ across schools, based on student populations, teachers' abilities, and other local factors. States have not been able to assimilate and regulate all the information needed to run schools effectively. The failure of state-wide policies is, at least partially, a result of this limited knowledge. States are left to construct policies that utilize local knowledge, while aligning local actors with state and community goals. School choice and assessment-based accountability are examples of such policies.

Most school choice policies attempt to align the preferences of the actors in the education system with the preferences of the "choosers" (i.e., parents and children). Families will choose schools that best fit their goals; schools that are not meeting families' goals will fail to attract students. In traditional systems of neighborhood public schools, most parents, especially lower-income parents, are constrained in their choice of schools. In part, these constraints stem from the fact that to exit their local public school they would need to change residences or pay private school tuition (Levin, 1991). School choice policies aim to diminish these important constraints.

In doing so, choice plans promise to provide incentives for actors in the public school system to cater more directly to parental preferences, or risk losing students and funding. If parents can identify the schools that best fit their needs, their choices will support these schools and encourage other schools to change in line with these preferences.

The ability of school choice systems to utilize the knowledge that parents have about the education their children are receiving is particularly important because the education production process is so complex that it is difficult for state government to accurately identify effective schools. Choice programs draw on local knowledge to realign schools toward shared goals. Yet, this simple theory of choice driven by parental preferences has not always been reflected in the implementation of choice plans. Many parents do not exercise choice and when they do they do not always choose “good” schools. School-level actors do not always respond by improving (McEwan, 2000).

While the use of local knowledge is a potential benefit of school choice policies, knowledge constraints at the local level may be partially responsible for unexpected hitches in their implementation. To elaborate, according to a simple theory of choice, all parents are assumed to possess full knowledge of each school’s current outputs and inputs (both their current school and other potential choices). Moreover, they are assumed to possess full knowledge of each school’s production technology (e.g., curriculum and instructional methods) and how their own child could benefit (or fail to benefit) from it. This knowledge, in concert with their preferences and resource constraints, is used to make decisions about whether and, if so, how to exercise school choice. If the presumption of full knowledge fails to hold, then the choice policy may be implemented in unexpected ways. For example, instead of realigning goals towards parent preferences, schools may use advertising or other non-academic symbols to delude

parents about the benefits of their schools (Hsieh & Urquiola, 2003; Cullen and Loeb, 2004). To the extent that this advertising is effective and leads parents to make poor decisions, school choice programs may do no more than take dollars away from the instructional goals of the schools.

Differences in knowledge among groups of parents may also lead to unwanted consequences. Some parents have less knowledge of schools and their production possibilities than other parents. The common concern is that families of lower socioeconomic status possess less knowledge (Levin, 1991). If that is the case, then such families may be less likely to exercise choice or more likely to make incorrect choices that are not aligned with their own preferences for better schools. Such families may have similar preferences for enrolling their children in better schools, but they may be harder-pressed to act upon those preferences if they have less knowledge of how schools are reflecting those preferences. Knowledge constraints may result in cream-skimming, in which families of higher socioeconomic status exercise choice more actively (Hsieh & Urquiola, 2003; McEwan, 2000). In sum, school choice plans may benefit the education system by drawing on local knowledge, but lack of sufficient local knowledge may lead to implementation problems.

By contrast, instead of relying on parents to informally gauge school quality and how it aligns with their preferences, accountability plans remove that responsibility. Instead, they attempt to directly measure school quality, distribute information about it in school “report cards,” and then administer a variety of rewards, sanctions, or assistance on the basis of such information (Carnoy & Loeb, 2003). These policies are similar to traditional state regulation policies except that they monitor and regulate school outputs (i.e., student achievement) instead of inputs. While the implementation of input-based regulation is severely constrained by the

lack of knowledge at the state level concerning effective resource allocation and local production processes, accountability plans are constrained by incomplete knowledge of outputs such as student achievement.

To elaborate, in most states, a limited range of outcome measures (e.g., reading and mathematics test scores) are used to construct a single rating of school quality that is reported in a public forum (e.g., a school report card). State actors are unable or unwilling to fully measure and describe the multi-dimensional aspects of school quality that reflect community preferences. The policy aim is for schools to broadly improve when subjected to the provisions of accountability. However, it is more likely that teachers and administrators will seek to improve the specific measures of outcomes that are used to allocate rewards and sanctions. This may lead schools to reallocate efforts towards the improvement of outcomes that are emphasized, while neglecting others (e.g., science or art) that do not form part of the overall measure of school quality (Carnoy & Loeb, 2003; Hanushek & Raymond, 2002; Jacob, 2002).

Lack of knowledge about school effectiveness at the state level impedes the implementation of accountability policies. Lack of knowledge among parents may similarly impede the implementation of choice plans. In addition, knowledge constraints on the part of local-level actors in the education system may impede the successful implementation of both policy approaches. Imagine that in an accountability policy state-level actors succeed in fully describing school quality and attaching rewards and sanctions to such descriptions, or that in a school choice policy all parents have complete knowledge about the production process in each school in their area. Schools should respond by improving their quality (and the outcome measures used to describe quality). Yet, this presumes that the main constraint to improving school quality is a misalignment in preferences of various actors in the education system. Local

actors may simply not know how to improve. Superintendents, principals, teachers, and other school personnel may not possess adequate knowledge of production technology to improve selected outputs, especially among the most challenging populations of students.

Legislators' uncertainty concerning whether low-performing schools are a result of local knowledge constraints or goal misalignment is reflected in the disparate ways that "bad" schools are treated in states' accountability schemes (Education Week, 2004). In some cases, direct sanctions are applied (e.g., school closure). In other cases, or often concomitantly, low-performing schools receive instructional assistance from more central levels. The apparent difference in the underlying assumptions of the two sets of policies reflects a recognition by states that schools may have low performance either because of misaligned preferences or because of knowledge constraints—and sometimes a combination of both.

*Bought Knowledge and Monetary Resources in Teacher Policy.* Prior examples have illustrated how policies can fail to meet their goals because of divergent preferences or because of knowledge constraints. However, simple monetary resource constraints also affect implementation. While lack of knowledge clearly constrains education actors, many knowledge limitations can be reduced with additional investments in acquiring knowledge. For example, better-designed report cards can provide added knowledge to parents in school choice programs. Trained consultants can help administrators and teachers interpret student test-score results. Yet, not all resources are related to knowledge. Age-appropriate and well-designed textbooks are necessary to carry out many instructional strategies. Adequate art supplies and musical instruments facilitate teachers' ability to teach music and art. Inadequate buildings that are too cold, too hot, or too crowded may also reduce teacher effectiveness. To illustrate the importance

of resource constraints for understanding an economic approach to policy implementation, we briefly return to an example of teacher policy.

Many education reforms ultimately aim to improve classroom teaching. Economic theory calls attention to ways in which the implementation of these policies may be hindered by resource constraints. Consider a hypothetical policy designed to improve students' computer knowledge. The policy provides computers to each classroom and professional development to teachers regarding the use of software and hardware (see Rouse & Krueger (2004) for an assessment of a similar policy). Imagine that an assessment of students' knowledge indicates that the policy does not successfully improve student performance. The economic approach would identify important actors, their preferences and constraints. In this case students and teachers are clearly important actors. Teachers' preferences may hinder successful implementation if they do not believe that student knowledge of computers is important. Resource constraints may also affect implementation. While the program provides professional development, it does not provide the technical support that teachers might need to successfully utilize the computers. This can be viewed as either a knowledge constraint or a monetary constraint, since dollars can buy the extra support needed. Alternatively, teachers may simply not have the skills to effectively operate computers and integrate them into their classroom, even with the basic knowledge of the software and technical support. This skill may also be bought, although the cost may be prohibitive. For example, schools may need to spend more to hire skilled teachers or to send their current teachers back for substantial additional education. Many schools are constrained in their ability to hire and fire teachers, and these limitations combined with expenditure limits lead to resource constraints affecting the implementation of policies that require highly skilled teachers.



*Inherent Costs, Bought Knowledge and Institutional Constraints in School Choice and Accountability Policies.* Resource constraints among families or school actors may also constrain implementation of school choice and accountability policies. In school choice plans, families may remain in poor schools, not opting to exercise choice, due to resource constraints. For example, voucher plans may require additional tuition payments (so-called “add-on” payments) that are not feasible for low-income families. This is typical among privately funded choice programs, though less likely in publicly funded programs (McEwan, 2000). There may also be transportation costs associated with choice (Levin, 1991). In addition, some schools of choice demand additional time commitments by families, perhaps as classroom volunteers or in another capacity. The sacrifice of time represents an additional cost to families, albeit a non-monetary one. There is also a cost to gathering information about schools, a necessary input to decisions about school choices. Many families have ready access to such information or find it relatively low-cost to obtain. For other families, obtaining and interpreting such information is onerous. Thus, resource constraints may be the proximal cause of the knowledge constraints discussed in the previous section. Some families lack knowledge, but can overcome this constraint by purchasing advice or data; this option is unavailable to other families.

The implementation of choice plans is also potentially hampered by resource constraints on the part of school actors. Let us presume that choice provides schools with strong incentives to respond to parental preferences for school quality, and that school-level actors possess sufficient knowledge to do so. They may still lack sufficient resources to adjust effectively. For example, schools may face binding constraints in their ability to move existing resources away from unproductive uses and towards productive uses. As discussed above, schools may be inclined to fire an incompetent teacher, and hire a better one, but face external constraints in

doing so. These resource constraints may be particularly severe for schools that are losing students and, with them, dollars from the state. Students that leave traditional schools are often less costly than the average student in the school or district; yet the revenue loss is usually based on the average student. This drop in revenue may constrain response to choice incentives, especially if much of the remaining revenues are already committed.

In a similar vein, implementation problems in accountability plans may result from resource constraints. Sometimes schools lack knowledge about how to improve schools, but this knowledge can be acquired with additional resources, if available. As one example, many schools are inundated with reams of data on student outcomes. However, the data provide little usable knowledge for school improvement, unless additional resources—particularly the time of principals, teachers, and other staff—are expended on analysis. In other cases, knowledge constraints are more binding, and even additional resources are of little use.

## **Conclusion**

This chapter began by describing an economic framework for understanding education production and the related issue of education policy implementation. The key to this framework is its focus on individuals. Individuals make decisions and take actions based on their preferences, as well as the knowledge and resource constraints that they face. In order to understand and predict policy effects, economists seek to identify important actors in the education system and the preferences that drive these actors' decisions. The economic approach then focuses on understanding how policies affect the constraints these individuals face. By understanding individuals' preferences and their changing constraints, economists identify

potentially important processes resulting from policy changes. By estimating the extent and impact of these processes using available data or by drawing estimates from similar policy changes, this approach explains and predicts how policies are implemented. Economists have also expended considerable effort at developing empirical methods for estimating the responses of individuals and the effects of policy. The approach combined with the empirical methodology provides a broad but organized structure for analyzing education policy implementation.

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