

Chapter 1. Introduction



Most people intuitively recognize geographic differences in costs. For example, the median 1990 price of housing in the Edgemont school district in downstate New York was about \$462,081, while the median price of housing in the Watervliet City school district in upstate New York (near Albany) was about \$81,891.¹ Many states show this kind of geographic cost difference between “upstate” and “downstate.” In addition, there are pronounced differences across the United States in the cost of living, from coast to coast, from either coast to the Mississippi River, and from the Great Lakes to the Gulf of Mexico.

While housing values are the most commonly cited example of differences in geographic cost differences, they are a poor illustration because the price of housing is as much a component of the size, quality, design, and features of each house as it is of geographic cost differences.

¹ These figures were obtained from the National Center for Education Statistics (NCES) School District Mapping Project, which took 1990 decennial Census information and mapped it to school district boundaries.



A Primer for Making Cost Adjustments in Education

Therefore, simply comparing the two median prices does not reveal the differences in the cost of two identically similar houses. Efforts to compare the costs of exactly the same things in different geographic regions involve comparisons of the same “market basket” of goods in two geographic areas. The difference in the prices of the same market basket of goods is designed to reveal the differences in the geographic cost of living.

Retirees often search for areas of the country where it is not costly to live, and use the prices of the same market basket. The dilemma is that the average market basket may not represent the choices of a person in a particular geographic area. A retiree who relocates near the seashore, for example, may be more typical if he or she purchases a boat. However, “boat purchases” may not be included in the market basket but certainly are part of the cost of living in that geographic area. For the Consumer Price Index (CPI), created by the U.S. Bureau of Labor Statistics (BLS), a market basket is developed from expenditure information provided by families and individuals on what they actually bought. In 1993, 1994, and 1995, data were collected by BLS via a national sample of over 30,000 families who provided detailed information on their spending habits. This data enabled BLS to construct the CPI market basket of goods and services and to assign each item in the market basket a weight, or importance, based on total family expenditures. The final stage in the sampling process was the selection of the specific detailed item to be priced in each outlet, which was undertaken by BLS field staff. Examples of some of the more than 200 items included in the CPI market basket appear in table 1-1 (Williams 1996).

Of course, the reader can immediately detect two difficulties with this market basket. Where, for example, are personal computers, something many households are currently purchasing, but did not between 1982 and 1984? In addi-

Table 1-1. —Items included in the CPI market basket

Item category	Examples
Food and beverages	Cookies; cereals; cheese; coffee; chicken; beer and ale
Housing	Rent; homeowner's costs; fuel oil; house-keeping supplies; local phone service
Apparel	Men's shirts; women's dresses; jewelry
Transportation	Airline fares; new and used cars; gasoline; auto insurance
Medical care	Prescription drugs; eye care; physicians' services; hospital rooms
Entertainment	Newspapers; toys; musical instruments; admissions
Other goods and services	Haircuts; college tuition; bank fees

SOURCE: U.S. Department of Commerce, Bureau of Labor Statistics. December 1996. *Monthly Labor Review*, Appendix 1 "Item structure," 1987 and 1998.



tion, corporate downsizing may have caused families to change their spending behavior in 1995 and not engage in as many, or as expensive, apparel and entertainment purchases and restaurant meals between 1982 and 1984. Thus, the composition of the market basket changes over time, as does the relative weight of any component. Since January 1999, a geometric mean formula has been used to calculate most basic indexes within the CPI; in other words, the prices within most item categories (e.g., apples) are averaged using a geometric mean formula. This improvement moves the CPI somewhat closer to a cost-of-living measure, as the geometric mean formula allows for a modest amount of consumer substitution as relative prices within item categories change.

The most difficult problem in using a market basket is assessing differences in the quality of the items included in the market basket. For example, a 1984 automobile and a 1999 automobile have substantially different features, even for the same "base" price. How does one adjust the price of the 1984 automobile for air bags or anti-lock brake sys-



A Primer for Making Cost Adjustments in Education

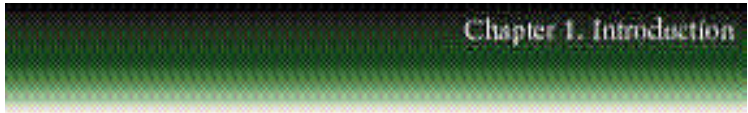
tems, which did not exist in 1984? BLS added an improvement to the CPI in 1987 to recognize quality adjustments of used car prices (Greenlees and Mason 1996).

Our quick exploration into geographic differences in the cost of living have also brought to mind other uses of price indexes. The CPI, when properly used, is a measure of the average change over time in the prices paid by urban consumers for a fixed market basket of consumer goods and services. In this sense, it is a “deflator.” That is, 1999 purchases can be recast to reflect what they would have cost in 1984 dollars. It is *not* appropriate to use the CPI to compare geographic differences in the cost of living because the CPI measures only time-to-time changes in each place. A higher index for an area may simply mean that prices have risen faster since the 1982–84 base period. In addition, the CPI does not capture all living costs. Not only does the market basket not include new components that consumers are purchasing, but the CPI does not include changes in taxes.

When contemplating costs, people wish to:

- (1) understand the difference in costs from one geographic area to another (cost of living);
- (2) understand how costs have changed over time (inflation); and
- (3) recognize changes in the quality and quantity of what is being purchased.

To discern these aspects of costs, most people desire an index in which to compare one location or time to another. The CPI uses an index, for example, 112, which is interpreted as meaning that a 12 percent increase in price has



taken place between the base time period [index = 100] and the year in which the index is reported as 112. An index of 80 would be interpreted as a 20 percent decrease in prices. Usually, the CPI base is recalculated every decade or so.

We have demonstrated with both houses and automobiles that measuring the cost from one geographic area to another, or the price of automobiles in one decade versus another, is problematic, as the quality and features are difficult to compare. We now turn to an even more difficult task: making these cost comparisons in education.

COST ADJUSTMENTS IN EDUCATION

Currently, per pupil expenditures or teacher salaries are commonly reported as nominal state or school district averages, without correction for differences in the geographic cost of living (U.S. Department of Education 1999). There is good empirical evidence that geographic cost differentials exist, however. For example, Barro (1994) states:

The fact that Florida spends 36 percent more than Arkansas to provide virtually the same staff-to-pupil ratio is largely explained by Florida's 28 percent higher instructional staff salaries (p. 7).

Of course, as Barro notes, approximately 10 to 15 percent of the differences in average teacher salary is attributable to differences in average teacher experience and training. McMahon also notes differences in the cost of living between various counties in Illinois (McMahon 1996). As one might imagine, counties in the northern portion of the state, near Chicago, are more costly than those in the southern portion of the state.



A Primer for Making Cost Adjustments in Education

Most of the cost of providing public education are personnel costs, such as providing employees' salaries and fringe benefits.² Salaries average about 65 percent of total current expenditures and employee benefits about another 16 percent, so that these two categories alone are responsible for over 80 percent of a school district's expenditures (Fowler 1993). Purchased professional services, which in part acquire the services of professionals,³ account for more personnel expenditures, as does purchased property services⁴ and student transportation. Supplies are truly minor in such an enterprise.

Although supplies represent less than 6 percent of all current expenditures for the average school district, the first work on cost indices was undertaken to understand the differences in the costs of supplies that school districts in differing geographic areas might encounter (Furno and Cuneo 1971). In one sense, the work was undertaken because the quality of school supplies differs minutely. The category "supplies" has a very specific meaning to accountants. They are materials that are consumed and have a life of less than 1 year, in contrast to equipment, which is more durable. Examples of supplies include photocopy paper, personal computer diskettes, and student workbooks. While some may wish to debate the attributes of one brand of personal computer diskettes over another, most persons will generally concede that they are interchangeable.

² Benefits may include retirement, Social Security contributions, medical and group life insurance, unemployment, tuition reimbursement, workman's compensation, accrued sick leave, and professional dues and fees.

³ Examples include architects, engineers, auditors, dentists, medical doctors, lawyers, consultants, computer programmers, psychologists, social workers, and accountants.

⁴ Examples include utility and cleaning services, snow plowing, custodial services, lawn care, and repair and maintenance.

The personnel that staff school districts, however, are certainly not interchangeable, and have vastly different attributes, even if one compares them on such uniform characteristics as educational attainment and occupational experience. These differences make comparing geographic differences in the price of personnel difficult, as one might mistakenly measure differences in the jobs they perform or in their personal characteristics, such as the nature of the undergraduate institution they attended. Imagine, for a moment, that one school district is located in a suburban college town, while another is located in a rural area. Both spend the same per pupil, but the school district with the college offers post retirement positions to college faculty to teach secondary courses and to work in administrative and support services. Assuming such retired staff are still capable, the staff are of vastly different quality, despite comparable degree status, teaching experience, and expenditures.

It is these quality differences in education that make geographic cost differences so difficult to measure. School districts can choose to employ better educated, more experienced staff, or to reduce class size, or to hire more specialized staff, all of which are more expensive staff choices. They may wish to maintain small school systems, which may be more expensive to operate, or they may choose to hire expensive administrators. In short, while school districts must adhere to numerous rules and regulations from federal as well as state sources, they retain a significant amount of discretion over spending, particularly spending that goes beyond what mandates require.

Of course, if we could hold these discretionary choices of school districts constant from place to place, then measuring the costs school districts encounter that account for higher spending becomes easier. Certainly there are differences in the geographic cost of living, such as higher prices for land, which translates into higher salary and benefit





A Primer for Making Cost Adjustments in Education

demands. Mediating such differences in the geographic cost of living are amenities associated with a given location. School district staff, like everyone else, would rather live near water (ocean, lake, or stream), where it does not snow (at least in Syracuse-size amounts), where crime is very rare, but with access to all urban amenities (shopping, arts, airports). Just as school districts choose to trade cost and class size, people trade salary and benefits for amenities. As Chambers and Fowler put it,

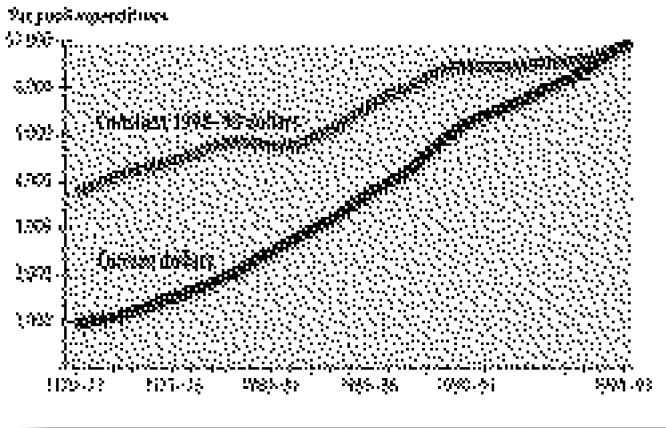
The intuitive notion underlying [the hedonic wage model] is that individuals care both about the quality of their work environment as well as the monetary rewards associated with particular employment alternatives, and that they will seek to attain the greatest possible personal satisfaction by selecting a job with the appropriate combination of monetary and nonmonetary rewards. (Chambers and Fowler 1995, xv).

A cost-of-education index, therefore, must simultaneously take into account those discretionary factors that a school district might manipulate, such as quality and quantity of staff, and those nondiscretionary factors that the school district cannot control, such as the cost of living, the competitiveness of the labor market, and amenities, such as climate, absence of crime, and geographic location (such as proximity to water). The resulting index might be used to determine the cost to school districts, in different geographic locations, to acquire and retain similar qualities and quantities of staff. However, such an index does not describe what the CPI does, that is, it does not measure the change over time in the prices paid by school districts.

EDUCATION EXPENDITURES OVER TIME

Per pupil expenditures from 1970 to the present are sometimes reported in both current and “constant” dollars (see figure 1-1). Inflation has been removed from these expendi-

Figure 1-1.—Current per pupil expenditure in average daily attendance in public elementary and secondary schools: 1998–99



SOURCE: U.S. Department of Education, National Center for Education Statistics, *Statistics of State School Systems, Revenues and Expenditures for Public Elementary and Secondary Education*; and Common Core of Data surveys, unpublished tabulations.

tures by using the CPI. Thus, the reported 1970–71 per pupil expenditure of \$3,774 is reported in constant 1998–99 dollars as \$6,915. Unfortunately, the CPI is not specifically designed to measure changes in education costs between time periods, that is, the market basket does not include public education costs (or taxes) (although it does include private school tuition). In addition, some argue that the CPI consistently overestimates inflation, which will make the 1970–71 per pupil expenditure higher than it should be; it makes us think that the investment in education has been greater than, in fact, it was (U.S. Senate 1996 [better known as the Boskin Commission]).

What would be ideal when wishing to report education expenditures over time would be a cost-of-education index that was computed each year (or every several years), that both held constant the average school district discretionary costs, while measuring those costs that a school district can-





A Primer for Making Cost Adjustments in Education

not influence, including geographic amenities. Such an “education inflation index” would more accurately portray increases in education spending.

In this overview, we have tried to convey some flavor of the complexity of what most people intuitively know: there are differences in costs in differing geographic locations and in measuring inflation. These differences are difficult enough to measure in price indices, given item substitution and changes in item quality. However, measuring cost differences in education is even more difficult, since most of the costs are in personnel, rather than in supplies. In the chapters that follow, we will endeavor to explain the differences between educational costs and expenditures; followed by two chapters that deal, in turn, with differences in the “unit price” of teachers and differences over time in the level of inflation. Chapter 5 examines existing indices that can be used to make adjustments for these differences in cost, and Chapter 6 reminds us all of what remains to be done.

Chapter 2. *Making Sense of Differences in Education Costs*



INTRODUCTION

“Cost” is a commonly used and widely misunderstood term. It lies at the center of many policy debates and is featured prominently in headlines that capture public attention. Debates over the cost of education are particularly common. Education is a costly activity, the resources flowing into the educational sector of the economy are large by any measure. For example, the National Center for Education Statistics (NCES) estimates that in 1995–96, the United States spent \$287.7 billion on its public elementary and secondary schools.⁵ The general public often thinks of “cost” in a comparative manner that implies excess, for example, “special education classes are very costly.” Indeed, several researchers have ar-

⁵ This figure excludes the resources devoted to all higher education and nonformal education, not to mention private elementary and secondary education (U.S. Department of Education 1998).



A Primer for Making Cost Adjustments in Education

gued that additional funds in the last quarter-century have gone toward special education, rather than regular education programs (Rothstein and Miles 1995; Lankford and Wyckoff 1996).

It is true that many contemporary reform efforts in education are associated with significant costs. California has initiated a program that is designed to hire additional teachers, in an effort to lower class sizes statewide. In May 1997, the New Jersey Supreme Court ordered the state to provide \$246 million to 28 urban school districts for “regular” education in 1997–98 to bring their per pupil spending levels to comparable levels of the wealthiest school districts in the state.

Unfortunately, this widespread interest in cost is not paralleled by a comprehensive understanding of what costs are and why they can vary both geographically and over time.

It is important for those concerned with education policy to have a good working understanding of the concept of cost, and the purpose of this chapter is to provide an introduction to the issues that are involved. While a comprehensive treatment of cost can easily fill multiple volumes, we place our emphasis here on preparing the reader to better understand what gives rise to costs and why they can vary across regions as well as over time.

THE DIFFERENCE BETWEEN COST AND EXPENDITURE

It is useful to maintain a sharp distinction between the idea of a cost and an expenditure as we think about why costs vary and what policymakers might do in response. We shall use the term “cost” to characterize what must be given up in order to accomplish some result. “Cost” in this context



also implies expending the minimum expenditure needed to obtain the item or service purchased. Economists place considerable emphasis on this idea of sacrifice or foregone opportunity when they speak of “costs.” When a resource is utilized in one way, the idea is that there are any number of alternative uses that are being missed. The best of these constitutes the “opportunity cost” of using the resource in a particular way. Under certain circumstances, market prices provide accurate indications of opportunity costs. However, if the markets are not competitive or if there are restrictions on the ability to trade resources in markets, then observed market prices may misrepresent the real opportunity cost of a particular resource.

On its face, this conception of cost seems straightforward, but there are several complexities that need to be kept in mind. First, cost is measured by the “best” opportunity foregone and there remains ambiguity about what counts as “best.” For example, what is the “best” use of a young child’s time? How might we compare the relative merits of time spent learning to read with time spent playing with peers? Second, notice that there is no explicit reference to monetary units. This idea of cost is relatively abstract and may or may not lend itself to a dollar and cents metric. Continuing with the example of a young child’s time, the use that is easiest to associate with a dollar metric (i.e., time spent being employed in a labor market) could suggest that the time has a low value in contrast to a better use that is less easily measured in immediate monetary terms (i.e., time spent learning to read).

Third, notice that this treatment of cost requires insight into what the resource could be used to accomplish. Resources are not valuable for their own sake. They acquire value because they are instrumental in realizing desired results. It follows that the idea of cost cannot be divorced from benefits received.



A Primer for Making Cost Adjustments in Education

“Expenditure,” in contrast, is primarily an accounting concept and is intended to capture flows of resources, typically measured in monetary units. An expenditure need not be tied to outcomes or benefits. Dollars can move from one account to another with little consequence. Perhaps most importantly, expenditures can exceed costs, which can happen for a variety of reasons. For example, school districts vary enormously in the percentage of revenues they receive from federal and state sources. When the percentage of revenue coming from non-local sources is high, there is sometimes a worry that local decisionmakers will have less of an incentive to be diligent in their efforts to keep expenditures in line with actual costs. These cases can be thought of as instances where local decisionmakers are expending other taxpayers’ resources, and worries of this sort give rise to various kinds of oversight and regulatory efforts. Although it is common to think of affluent school districts in this regard, in public elementary/secondary education there is some evidence that poor, heavily state-subsidized school districts spend less efficiently (Barrow and Rouse 2000).

Perhaps more common is that school programs operate almost independently and in ignorance of expenditures. Few principals or teachers know what the program they are involved in expends. Rather, such information is held by the school district business official. Principals and teachers often only become aware of the expenditures of their program when they are told by the school district business official that some reduction in the program must occur because of a lack of funds. This reduction seldom results in operating a program at a level of minimum expenditures. Programs operate at the level of funds available, and if greater funds are available than in a previous year, program expansion may occur, regardless of the theoretical “cost” of the program, that is, the minimum expenditure required to operate the program at a successful level.

Chapter 2. Making Sense of Differences in Education Costs

Another reason for expenditures to exceed costs can be traced to differences in views over the level of outcome that is expected from the system. Disagreements can exist about what the minimum level of educational outcome should be. A local decision to set the level at a relatively high magnitude will involve an expenditure of resources beyond what it would cost to operate the system at a lower magnitude. States will sometimes stipulate a minimum level of offering along with a willingness to permit individual districts to exceed the minimum so long as local taxpayers cover the costs. This practice can lead to a great deal of inequality across districts, along with instances where districts are spending beyond what is required to provide the state-specified minimum offering. If the state-specified minimum is sufficiently low, the result can be instances where some districts provide attractive, modern, climate-controlled classrooms with many adults helping students learn, while other districts rely heavily on the individual teacher working with many needy students in unattractive, ancient, unrenovated classrooms that are unbearably hot or cold.

Notions of expenditure and cost can become mixed as in a case in which one hears that a preschool tutoring program costs more than a preschool program such as Head Start. A simple comparison of the resources expended on each program provides little direct insight into how the *costs* of these two activities compare. A valid cost comparison would require some ability to control for differences in the outcomes or benefits being realized. Only then can a comparison of expenditure data be interpreted as a comparison of costs, assuming, of course, that there has been a comprehensive accounting of all of the resources that are involved, and assuming that the identified resources all lend themselves to dollar and cents metrics. Similarly, the fact that one local education agency (LEA) spends two or three times more per pupil than another local education agency provides little





A Primer for Making Cost Adjustments in Education

direct information about how education costs vary between the two. It is even possible for the costs to be lower in the higher spending place.⁶

We shall be concerned in this monograph with differences in cost rather than differences in expenditure. We are interested in the minimum resources required to generate a certain set of benefits or outcomes and how these vary cross-sectionally across geographic regions as well as over time. A problem we face is that while expenditure data are plentiful, bonafide cost data are difficult to obtain. Indeed, much of what we talk about in this monograph can be thought of as efforts to adjust available expenditure data so that they become reasonable to interpret in terms of underlying differences in cost.

SOURCES OF COST

In addition to maintaining a distinction between expenditures and costs, it is useful to conceive of a multilevel terrace or a resource allocation hierarchy that exists within education. At the bottom of the hierarchy are the individual ingredients or inputs (such as teachers) that comprise educational activities. At the next level, there are specific configurations of inputs (i.e., ways in which inputs are combined to provide educational services), each with different cost implications. At the top of the hierarchy are the long-term social and economic consequences or outcomes of education, through which we can truly arrive at a notion of the cost of a program. We shall discuss the individual levels of this hierarchy in turn, beginning at the bottom and working toward the top.

⁶ For a more detailed treatment of differences between costs and expenditures, see Monk (1996). For a cost analysis of education reform that places emphasis on the use of donated resources that are difficult to measure in terms of dollars and cents, see King (1994).



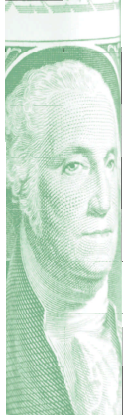
Inputs to Education

Examples of educational inputs include things such as the time of a teacher, a supply of computer software or hardware, and the electricity needed to light a room or operate a computer. Of course, these “inputs” themselves are the outcomes of production processes located elsewhere within the economy. Computing software is developed by specialists, electricity is the output of a power plant, and teaching expertise arises out of a lengthy production process experienced by aspiring teachers. But for our purposes, it is sufficient to think of these inputs as the ingredients or building blocks of educational services.

An important type of cost arises at the ingredient level of the education production hierarchy. These are often referred to as “unit costs or unit prices,” as in the unit cost of a teacher’s time or the unit cost of electricity. The cost of an hour of a teacher’s time, the cost of a box of pencils, and the cost of a kilowatt of electricity all constitute unit costs that contribute to the ultimate cost of education. It costs something (i.e., an alternative use must be given up) to acquire the use of a unit of all these educational inputs, and these unit costs constitute an important source of the bottom-line costs of education. Normally, these ingredient building blocks appear in a classroom.

Configurations of Education Inputs

It is one thing to think of the various purchased, hired, and donated resources or inputs that can be identified as the ingredients of education. The list can be quite lengthy and comprehensive. But, it is quite another matter to recognize that these inputs are configured thanks to a complex set of resource allocation practices to form what constitute educational services or opportunities for students. Any number of decisions are made that give rise to the things that have the modern trappings of “classrooms,” “schools,” and “school districts.”



A Primer for Making Cost Adjustments in Education

These decisions about the “configuration” of inputs have important implications for cost because they specify how much of each resource will be devoted to each educational service that is being provided. For example, a decision might be made to hire teachers at the rate of 1 full time equivalent (FTE) per 20 students in enrollment. This decision has implications for how many teachers the school in question will hire, and the number of teachers on the school’s payroll has straightforward implications for the level of resources that is being invested in the school. Similarly, decisions need to be made about how much floor space to provide, how many computers to provide, how many teacher aides to hire, and how often to replace textbooks and software, to name just a few. All of these decisions have implications for the overall level of resources that are to be invested in the school.

Clearly, some configurations of inputs will be more resource intensive than others. A school that provides extensive amounts of small group and tutorial instructional settings with teachers will find itself making use of greater quantities of teacher resources than will a school that is structured around whole class and large lecture types of learning opportunities.

The important point to keep in mind is that decisions about how to configure the resources give rise to costs that are conceptually distinct from the unit costs that were introduced earlier. A decision to provide smaller classes will require more resources even if the hourly wages of the teachers involved remain unchanged. While these sources of cost may be conceptually distinct, it is worth noting that they may be connected. For example, in the face of limited budgets, high teacher wages can lead to larger class sizes. Moreover, a decision to reduce class size on a large scale will generate additional demand for teachers, which, in turn, can bid up the cost of teacher salaries.

It is useful to consider the role of central administrative services in the context of this middle level of the resource allocation hierarchy that we are exploring. If schools and classrooms are where individual ingredients are configured to provide educational services, the school district is the place where the configurations are organized to operate. Business functions such as budgeting, payroll, purchasing, warehousing, printing, and auditing reside here. Staff services, such as recruiting and hiring, in-service training, and health services also predominate here. Student transportation and food service are frequently organized at this level, as are planning, research and evaluation units, and management information systems. Large school districts might also have school facilities repair, renovation, and even construction at this level. These costs might be more appropriately examined neither on a unit basis, nor on a service configuration basis, but rather as a proportion of all the resources a school district has to employ. Thus, the ratio of administrative expenditures to instructional expenditures becomes a metric of costs that is neither a “unit cost,” such as the hourly wage of a teacher, nor a “delivery configuration cost,” such as smaller classes, even with similar unit costs. Rather, it is again conceptually distinct, examining what a school district chooses to forgo by making certain other choices. School districts with exceptionally high ratios of administrative spending to instructional spending demonstrate a choice about how resources are allocated within the school system. While Dougherty (1996) found that small, wealthy school districts with high percentages of limited-English-proficient (LEP) students had higher administrative–instructional expenditure ratios, his site visits gave him insight into choices that these school districts had made. In one case, the district had one of the highest ratios of nonteachers to total staff, because the school district moved ineffective principals to the central office. In another district, three superintendents were receiving compen-





A Primer for Making Cost Adjustments in Education

sation: two from previous contracts in which they had been dismissed prior to the termination of the contract; one of the former superintendents also was creating high legal costs for the school district, by suing it for wrongful termination. The resulting expenditures can be viewed as transactions costs, although to qualify as a transactions cost it would have to be the case that the dispute was unavoidable. If the district carelessly handled the dismissal and unnecessarily embroiled itself in litigation, the resulting legal expenses are quite real but strictly speaking do not count as costs.

Outcomes of Education

In our conceptualization of the production of education services at the school, we deliberately omitted reference to the supply of student time. We prefer to think of an educational service as a distinct configuration of purchased, hired, and donated resources where there is an intention to foster growth in student learning. However, we recognize that this growth can occur only if and to the extent that student time and effort are combined with the resources being made available by the school and perhaps others. Indeed, we recognize that students themselves have considerable discretion over their supply of time and effort to educational pursuits and that these decisions in part depend on the nature of the services or opportunities that they encounter.

For our purposes, it is sufficient to recognize that students can vary dramatically in their needs and ability to benefit from alternative configurations of resources, and that explicit decisions are made about which type of service to provide to which type of student over the course of time. These decisions have significant implications for cost given the large variation that can exist in the resource requirements of the various kinds of services that schools make available.

Chapter 2. Making Sense of Differences in Education Costs

Thus, we view the mix and level of educational outcomes arising from schools as the byproduct of what happens when the highly varied nature of student time is added to the educational process. A school that finds itself populated by students with a high incidence of special needs will feel pressure to provide services that respond to these needs. We presume that greater needs translate into demands and expectations for more resource intensive configurations of schooling resources, and it follows that the presence of special needs within a school's clientele will contribute to the cost of producing a given level and distribution of learning outcomes.

This upward pressure on cost comes from the school's efforts to provide an appropriate mix of services (some more costly than others) to its clientele. Of course, limits on the availability of resources can severely restrict a school's ability to be responsive to these needs. What we can observe is the net result of a confrontation between need for appropriate services and the availability of resources. This was reflected in Dougherty's (1996) findings that small school districts in Texas that had high percentages of LEP students also had high administrative/instruction ratios. Parrish, Matsumoto, and Fowler (1995) found that school districts serving relatively higher percentages of students who are in poverty, and who are minority, spent a greater percentage of funds available to them for core instructional purposes. These districts also allocate a lower percentage of funds for administration and capital outlay. As minority enrollment and poverty increases, so does the student/teacher ratio.

To sum up: Decisions are made about the *mix* of services that are provided to students as well as about the *means* employed to provide each service. Decisions about the mix of services are driven in part by the incidence of special needs in the population of students being served by a school. De-





A Primer for Making Cost Adjustments in Education

cisions are also made about the means (e.g., level of teacher qualification, class size, supply of paraprofessional support, etc.) and are driven by the technical properties of the services being delivered as well as by demand and supply considerations. Finally, decisions are made about how much to pay for each of the inputs that comprise the various services that are being provided. Each of these decisions has a bearing on the cost of producing educational results. The decisions may be inter-connected, but they arise out of conceptually distinct points in the production process, and it is useful to keep them distinct.

It is possible to look at state-by-state comparisons of expenditure data and work backwards to gain some first approximation estimates of the relative size of the various components of cost. Barro (1994) conducted this kind of analysis, and we provide an updated version in table 2-1.

Table 2-1. —Selected attributes of public elementary and secondary school districts, by state: School year 1994–95

State	Current per pupil expenditure (ADA)	Average annual teacher salary	Pupil/teacher ratio	Indices		
				Current per pupil expenditure	Average annual teacher salary	Pupil/teacher ratio
Connecticut	8,817	52,873	14.4	1.47	1.37	0.83
District of Columbia	9,335	46,170	13.2	1.56	1.19	0.76
Hawaii	6,078	40,695	17.9	1.02	1.05	1.04
Michigan	6,994	44,263	20.1	1.17	1.14	1.16
New Jersey	9,774	48,692	13.8	1.63	1.30	0.80
New York	9,623	50,303	15.2	1.61	1.30	0.88
Oregon	6,436	40,734	19.9	1.08	1.05	1.15
South Dakota	4,775	27,463	14.4	0.80	0.71	0.83
Utah	3,656	30,726	24.3	0.61	0.79	1.41
United States	5,988	38,678	17.3	1.00	1.00	1.00

SOURCE: U.S. Department of Education, National Center for Education Statistics. *Digest of Education Statistics 1997* (NCES 98-015).



The first three columns of table 2-1 provide breakdowns of the current per pupil expenditure, average teacher salaries, and the pupil/teacher ratio for 1994–95 for selected states. The next three columns of the table express this same information in the form of ratios to the relevant national average. These data provide a sense of how a state compares with the average for the Nation as a whole. For example, New York spent \$9,623 per pupil in 1994–95 which placed it at 161 percent of the national average. New York’s average teacher salary for that year was \$50,303 which placed it at 130 percent of the national average. Finally, the pupil/teacher ratio in New York was 15.2 which was 88 percent of the national average.

From these data for New York, we gain some insight into the sources of the relatively high spending levels for school districts in the state. We see a state in which salary differences are above average for the Nation as a whole but not to the same degree as the district’s overall spending levels. It is the relatively small class sizes in New York that boost spending levels above what can be expected from salary levels alone.

Note that the salary differences correspond to unit price differences of an important input, while average class size data correspond to costs that arise from the second level of the resource allocation hierarchy where inputs are combined in particular ways. Table 2-1 does not provide direct insight into the incidence of special-need student populations, although this can certainly be part of what lies behind the variation that can be observed in average class size across the states shown in the table.

If we compare per pupil expenditure data across states, we find that there is quite a lot of variation (Utah is the lowest at \$3,656, per pupil and New Jersey is the highest at \$9,774 per pupil, a 3 to 1 difference). Table 2-1 provides compari-



A Primer for Making Cost Adjustments in Education

sons across the states in some key data elements that help to illustrate the different sources of cost. For example, the data shown in the table makes it clear that there is much more interstate variation in per pupil spending than in the amount of teacher resources being supplied by each state. The easiest way to see this is to look at the range of the index numbers of per pupil expenditure and the pupil/teacher ratio. The index numbers for current per pupil expenditures range from 1.63 (New Jersey) to 0.611 (Utah) or 2.67 to 1. The index numbers for average teacher salaries range from 1.37 (Connecticut) to 0.710 (South Dakota) or 1.93 to 1. The index numbers for pupil/teacher ratios range from 1.41 (Utah) to 0.76 (District of Columbia) or 1.84 to 1.

It is very clear that differences in per pupil spending are related to differences in pupil/teacher ratios but that much more is occurring. In fact, there are some instances where states with high per pupil spending actually have relatively high pupil/teacher ratios. For example, Hawaii is over 1.0 for both per pupil spending and pupil/teacher ratios; this is also true in Michigan. The high levels of teacher salaries in both Hawaii and Michigan help to explain the high spending levels despite the relatively large class sizes, but this need not be the case as data for Oregon demonstrate. It is clear that costs and the associated levels of spending arise at many different points within the education production process.

Table 2-1 attempts to illustrate some first approximation estimates of the relative size of the various components of cost. To reiterate, there are theoretically different costs that arise within each terrace or level of the resource allocation hierarchy. At the classroom level, we might refer to the unit cost of educating a student with special needs of some kind. We note that because teachers of special needs students require unique skills, it may be necessary to pay them a salary premium. These premiums will exert upward pressure on costs, and one reaction of the system could be an

effort to economize by increasing class size. In addition, we find that school districts with high concentrations of special needs students have high administrative instruction expenditure ratios, implying that they are making choices among alternatives in distributing resources.

It is clear that costs and the associated levels of spending arise at many different points within education production process.

IMPLICATIONS OF VARIATION IN COST FOR THE PUBLIC FINANCING OF EDUCATION

Existing Adjustments for Differences in Cost

Now that we have introduced the idea of “cost,” and have begun to explore the various ways that costs are generated, it is clear that variation is likely to exist across schooling units. Different schools may face different unit costs for the ingredients they seek to provide; they may find themselves combining the inputs in different ways; and they may face dramatically different types of students with differing educational needs. Moreover, whatever the variation is at one point in time it is not likely to remain constant. Conditions can and surely will change, and the cross-sectional differences that exist today may be quite different from the cross-sectional differences that existed yesterday or will exist tomorrow.

If education were an entirely private matter, these cross-sectional as well as longitudinal differences of cost would not be a major source of concern for policymakers. However, education plays a significant public role, and public revenues from one or another unit of government are present within most schools, particularly at the elementary and secondary levels. As we have seen, in 1995–96, elementary and secondary education revenues were estimated by the





A Primer for Making Cost Adjustments in Education

NCES to be in excess of \$287 billion dollars, of which approximately half come from local revenue, about 45 percent from state revenue, and the remainder from federal revenue.

The presence of these public resources within the schools prompts important policy questions about how best to make distributions of these public revenues. Disparities in resources between property-wealthy and property-poor school districts has been a continuing problem in American elementary and secondary education. State aid to local school districts often is driven primarily by considerations of creating resource equality for property-poor school districts. Property-poor school districts are also often populated by students with exceptional educational needs, including residing in poverty, LEP status, and disabling condition. Paradoxically, many urban school districts with limited local revenues and large numbers of students in poverty are located in metropolitan centers with high costs of living.

One of the purposes of providing public revenues for education is to offset differences in the costs being faced by schooling units, and attempts have been made over the years to provide adjustments for all three of the sources of cost variation that we identified in the previous section (input costs, configuration costs, and output costs). For example, efforts have been made in different states to take account of cost differences associated with the presence of students with special learning needs. It is common, for example, to build weights into aid formulas that provide public aid to local education agencies with high proportions of students with special educational needs. These special needs include attributes like limited-English speaking ability, the presence of economic disadvantage, and the presence of disabilities, to name just a few. Both the federal and state governments make use of student weights to send aid to places that are

Chapter 2. Making Sense of Differences in Education Costs

perceived to face higher costs due to the presence of special populations of students.

A small number of states provide explicit adjustments for differences in the input costs of the ingredients of schooling. The rationale for these input cost adjustments is straightforward: if a given ingredient costs more in some places than in others, an adjustment needs to be made in the distribution of dollar amounts to reflect the underlying differences in cost. Interest seems to be growing in these unit cost adjustments, and a literature is developing to begin to provide estimates of the magnitudes that exist (Chambers 1978, 1981, 1997, 1998; Chambers and Fowler 1995; Duncombe, Ruggiero, and Yinger 1996; Guthrie and Rothstein 1999; McMahon 1996; McMahon and Chang 1991; Monk and Rice 1999; Monk and Walker 1991; Reschovsky and Imazeki 1998).

In addition, a number of states provide special allocations to local education agencies based on considerations of how resources are combined to form educational services (configuration costs). Perhaps the most common adjustment of this type involves paying additional aid to school districts that face diseconomies of small scale. In these cases, aid is paid to offset the costs of operating unusually small classes due to low counts of pupils.

Finally, Texas is an example of a state that examines the relative efficiency of school district operations, by examining the ratio of administrative expenditures/instructional expenditures. The state has implemented a program for flagging those school districts whose administrative expenditures/instructional expenditures are outliers, which, if not remedied within a few years, would lead the state to recover the excess (Lewis 1996).





A Primer for Making Cost Adjustments in Education

We close this chapter with observations about two common problems that surround efforts to use public revenues to compensate or offset differences in the cost of education.

Risks of Over/Under Adjustment for Differences in Cost

We note above that there is ample precedent for units of government at both the state and federal levels to make adjustments in the distribution of school aid for differences in the costs of education. We also have noted that there is precedent for cost adjustments that are targeted on each of the three levels of the production hierarchy. However, the mere fact that an adjustment is made does not mean that the magnitude of the adjustment was correct. For example, there is an on-going and very lively debate over the correct magnitude of the weight to use to adjust for the costs of educating students with special educational needs. Currently there are proposals to move away from a weighting approach, in part, because it is so difficult to derive uncontroversial weights (Parrish 1996). Similarly, there is controversy over the best way to adjust for differences in costs that stem from scale diseconomies, that is, in the size of schools and school districts, and there is a great deal of disagreement about the best way to adjust for differences in the unit costs of individual ingredients, such as teachers' salaries.

The difficulties associated with developing clean and non-controversial estimates of cost differences are intensified by the fact that a given feature in a school aid formula (be it state or federal) can function to adjust for multiple sources of cost. For example, suppose it is the case that the unit costs of important schooling ingredients are high in places that also enroll high percentages of pupils with special educational needs. More concretely, suppose it is the case that teachers' salaries in urban school districts require a "battle-



pay” premium, and it is in precisely those urban school districts that children do not learn unless a variety of special programs are implemented.

A policy-making body might reason that urban districts tend to be located in areas with high incidence of students with special needs and that urban districts also tend to be located in places where the costs of key inputs (like teachers’ time) are high. Such a policy-making body might conclude that it is therefore prudent to provide relatively large adjustments for urban settings per se or for the presence of students with special needs on the grounds that costs of inputs also tend to be high. The result could be a set of weights or other adjustments that implicitly introduce beliefs about differences in the costs of inputs without doing so explicitly in the formula.

The potential for “overlap” of this kind needs to be kept in mind. It is not wise to focus on one portion of an aid system as if it exists in isolation from all remaining parts; however, components of an aid system that are disequalizing should be closely examined in light of the entire funding system. Ideally, a school aid system should be calibrated so that overlap is taken into account and aid offsets actual differences in cost.

Maintaining the Difference between Costs and Expenditures

A second recurring difficulty involves maintaining the distinction introduced earlier between costs and expenditures. It is possible to total expenditures on education, and it is possible to apportion them across the three major sources of cost difference that were identified earlier. What is more difficult is determining how much of the observed differences in resource allocation is attributable to differences in cost rather than *nominal differences in expenditure*. An



A Primer for Making Cost Adjustments in Education

example from the economies of scale research literature (that is, the efficacy of schools and school districts of different sizes) provides good insight into this problem.

One of the questions that arises in the debate over whether or not to compensate local education agencies for diseconomies of small scale is whether the diseconomies are unavoidable. It could be the case that a given unit is small in size and finds itself offering unusually small classes because it refuses unreasonably to join with a neighboring school district. In such a case, why should the taxpayers of a state provide extra resources to a school district that could operate more efficiently as a merged unit?

Notice the use of the word “unreasonably” in the previous paragraph. Much turns on what counts as a “reasonable” refusal to reorganize into a larger unit, and herein lies the potential for considerable controversy. From a cost perspective, the element of discretion needs to be removed. Pure cost differences arise when there is no choice but to operate the smaller classes. Moreover, attention needs to be paid to differences that might occur on the outcome side.⁷

A second example arises in the case of adjustments for differences in the incidence of students with special needs. Some districts may recognize more of these than others. A common standard needs to be imposed before the differences can be safely interpreted as differences in costs.

A final example concerns adjustments for differences in the unit costs of individual inputs. The fact that one district pays higher teacher salaries than another does not necessar-

⁷ Student outcomes in very small classes may be quite different from what arises out of larger instructional settings. Recall that cost analyses require controls on the benefits being realized. True economies of scale exist when the unit cost of producing the *identical* outcomes drops as size increases. See Lee and Smith (1997).

Chapter 2. Making Sense of Differences in Education Costs

ily mean that the resulting differences in expenditures constitute differences in actual costs. A district may choose to spend more than is necessary to hire teachers with given characteristics. Such a willingness to spend at higher levels should not be confused with the idea that it costs this district more to provide education.

Much of what follows addresses efforts that have been made to disentangle costs from expenditures. We begin in Chapter 3 with cross-sectional differences in the unit price of an important educational ingredient—namely, the time of teachers. Chapter 4 focuses attention on adjustments for changes in costs over time.





A Primer for Making Cost Adjustments in Education