Alternative Options for Deflating Education Expenditures Over Time

Richard Rothstein
Lawrence Mishel
Economic Policy Institute
Washington, DC

About the Authors

Richard Rothstein is a research associate of the Economic Policy Institute, adjunct professor of public policy at Occidental College in Los Angeles, and contributing editor of *The American Prospect*. He edits an "education page" on the Electronic Policy Network (http://epn.org).

Rothstein authored, with Karen Hawley Miles, *Where's the Money Gone? Changes in the Level and Composition of Education Spending* published by the Economic Policy Institute (1995). He co-edited, with Edith Rasell, *School Choice: Examining the Evidence*, also published by the Economic Policy Institute (1993).

In addition to education, he also researches international trade and labor standards, and is a founding member of the Pacific Council on International Policy. Prior to his work at the Economic Policy Institute, Rothstein was a program analyst for the Los Angeles School Board, a high school teacher, and union officer.

Rothstein welcomes comments and inquiries about his work, via e-mail to <rothstei@oxy.edu>.

Lawrence Mishel is the research director of the Economic Policy Institute. He is the author, with Jared Bernstein and John Schmitt, of *The State of Working America, 1996–97*, published by the Economic Policy Institute (1997), and has authored previous editions of *The State of Working America*. He is also author, with Ruy Texeira, of *The Myth of the Coming Labor Shortage* (EPI, 1990); and of *Manufacturing Numbers* (EPI, 1988). He edited, with Paula Voos, *Unions and Economic Competitiveness* (EPI, 1992).

Mishel holds a Ph.D. in economics from the University of Wisconsin, and his articles have appeared in a variety of academic and non-academic journals. His areas of research are labor economics, wage and income distribution, industrial relations, productivity growth, and the economics of education.

Alternative Options for Deflating Education Expenditures Over Time

Richard Rothstein
Lawrence Mishel
Economic Policy Institute
Washington, DC

There is widespread interest in the problem of how to compare nominal education spending figures from different points in time or place. There are two distinct policy concerns involved:

a) Policymakers want to know if, at a single point in time, federal aid to education is being distributed fairly between localities. If the cost of education in different states or regions differs, then a given number of dollars in aid to one location will purchase a different quantity of real resources than that number of dollars in aid will purchase to another location. A similar question arises in large or diverse states, where the cost of living (and thus the cost of education) may vary considerably by urbanicity or geographic location. If these states seek to equalize spending or state aid between districts, an equalization of nominal dollars may not provide an equalization of real resources.

b) Policymakers want to know if, for a particular district, state or nation, the productivity of education spending is growing or declining over time. An industry's productivity grows if its outputs grow faster than its inputs. Education analysts have no satisfactory way to measure the industry's output, although test scores are used as a proxy. But even if this problem were addressed satisfactorily, we would still not know whether the productivity of education was growing or declining unless we can properly measure inputs. This is because, in any geographic location, the value of dollars spent will change over time because of inflation. Assume, for example, that measured school outputs have been unchanged from Year 1 to Year 2, but per-pupil spending has doubled. If inflation from Year 1 to Year 2 has been 100 percent, then school productivity will have been unchanged because output did not grow and neither did input (grow or shrink). But if inflation from Year 1 to Year 2 has been 50 percent, then school productivity would have been cut in half. Thus, the proper

measure of inflation is necessary to make accurate assessments of historical changes in education productivity. Because the willingness of the public and legislators to increase education spending is dependent, in part, on judgements about whether past increases have been well spent or wasted, a proper analysis of inflation has great practical importance.

This problem of making proper inflation adjustments as a basis for making judgements about productivity exists in all economic sectors, not only elementary and secondary education. In the public sector generally, there is widespread policy concern about the extent to which expenditures have apparently increased in recent decades, without an apparent corresponding improvement in the quality or efficiency of the services provided. Americans pay higher taxes and receive public services whose quality, when not in decline, does not seem to improve commensurate with our higher payments. It is not only school officials, but all government, whose credibility is low, in part because Americans believe their tax revenues simply disappear into a bloated, bureaucratic hole: In the last quarter century, government spending jumped from 26 to 31 percent of our gross national product, while schools are not noticeably better, police protection has apparently declined, mail is delivered less often, streets are dirtier, and roads have deteriorated. This apparent conflict between rising public expenditures and declining quality of public service may be one of the causes of the resistance to taxation which increasingly affects public decision-making. If inflation in public services has been greater than experts usually estimate or than the public perceives, then real expenditures in public services may have increased less than public debate assumes. A proper understanding of recent inflation in public services is critical to decision-making about future appropriations because legislators generally must decide how many future dollars would be required to provide real increases in services, over and above the funds required to offset inflation. In general, this estimate must largely be based on patterns of inflation from the recent past.

...there is widespread policy concern about the extent to which expenditures have apparently increased in recent decades, without an apparent corresponding improvement in the quality or efficiency of the services provided.

There is also widespread policy concern about the extent to which non-public human services expenditures have also apparently increased in recent decades, and there is great confusion in our public debate about the extent to which these expenditures represent real increases or simply compensate for inflation. The clearest example of this is in medical care: considerable political energy was expended in the last year over whether various proposals to budget more funds for Medicare represented "cuts" from previous funding levels or simply "restrained growth" in funding. Much of the debate over President Clinton's failed proposal to provide universal health care coverage concerned the extent to which various elements of his (and others') proposals would provide real new health care services to Americans, or would, instead, stimulate greater inflation in health care resulting in more money being spent for the same services.

In sum, there are two clearly distinguishable problems in education cost adjustment theory. The first is a cross-sectional problem: adjusting nominal dollars so that the real purchasing power of expenditures can be compared between different geographic locations at a given point in time. This is related to the widely appreciated differences in the "cost of living" in different areas. The second is a longitudinal problem: adjusting nominal dollars so that the real purchasing power of expenditures can be compared between different points of time for the same geographic location. This is related to the widespread appreciation of the effects of "inflation." For overwhelming practical reasons, solving these two problems may require different

conceptual approaches. We will return to this point later in this paper.

In a report we issued in November (Rothstein and Miles 1995), we began to deal with the problem of making longitudinal adjustments for inflation in education. Following a path suggested by William Baumol, we noted that inflation in school spending would normally be higher than the consumer price inflation with which most of us are familiar; so, to understand what portion of the nominal spending increases for education we should attribute to inflation, we sought to use a more appropriate index than the "consumer price index" used to measure inflation in the economy as a whole. For purposes of that report, we utilized a modified version of the "services" index calculated by the Bureau of Labor Statistics (BLS).

We will not review the details of that argument here, but have attached the relevant sections of that report as Appendices 1 and 2 to this paper. We plan to continue to work on these issues, and we know that others, more expert than ourselves, have done and continue to do important work here. In this paper, we state some of further questions we are now exploring and describe our current thinking about how to answer these questions.

Question 1: *Does a specific inflation index for education mask the public choices we make?*

The report by Hanushek et al. (1994) states that productivity of public elementary and secondary schools is declining. Hanushek's analysis is based on his claim that real expenditures have tripled since 1960. This claim, in turn, assumes that it is appropriate to compare current expenditures to those in 1960 (and other years), after adjusting earlier expenditures by the "Gross National Product deflator." For practical purposes, this adjustment is similar to the more common adjustment made by other analysts (see, for example, Odden 1992, 10) who use the "consumer price index" to convert nominal to real dollar expenditures.

As noted, we have argued that because education is an inherently low productivity industry in the sense that cost efficiencies are hard to achieve, analysts should not assume education faces an average inflation rate. A consumer price index measures the average inflation of all goods and services, weighted by their importance in the consumption of urban families. A GDP deflator measures the average inflation of consumption, investment, government purchases and net exports in the economy. We suggest that a "net services" index corresponds more closely to the inflation facing industries such as education where cost efficiencies are hard to achieve.

The inflation rate chosen makes a large difference in one's measurement of school spending.

The inflation rate chosen makes a large difference in one's measurement of school spending. Switching from the average consumption index, the CPI-U, to the net services index lowers the estimate of the real growth of per pupil spending over the 1967–91 period from 99.2 percent to 61.1 percent, a growth roughly 40 percent less. Using a GDP price index would suggest 121 percent growth, or double that shown if inflation were measured by net services.

In response, Hanushek and Rivkin (1996, 4) note that "if school expenditure is deflated by an output deflator—such as the GNP deflator—changes in the series of real expenditures indicate changes in society's resources that are devoted to education." This, they add, "yield[s] an indication of society's overall resource investment in schooling." Tracking society's investment is useful, but this is not the issue addressed in our previous report where we examined

how much the inputs into the education process grew: did schools have more teachers, books, facilities, etc. with which to educate students and from which we can expect better education outcomes? Hanushek and Rivkin's method can't answer this question.

Second, if education and GDP are both adjusted for inflation by the same index (the GDP deflator), then the computation of education spending as a share of GDP is equivalent to a simpler calculation where no adjustment for inflation is made (i.e., just use nominal dollars). That education's share of GDP in nominal terms is essentially what one expects given Baumol's disease, as would be true in many industries (depending on demand elasticities) which have low productivity. In these situations, more spending (proportionately) is needed each year in order to keep the same real resources (staff, facilities, etc.) available to students. It is possible that education's share of nominal GDP will grow while its share of real (inflation-adjusted) GDP will not, a manifestation of higher inflation in education.

Does this mean that the growth of education's share of GDP, or total spending, squeezes out other spending or consumption? It certainly means we spend more nominal dollars on education, but the pattern of productivity and inflation across sectors described by Baumol means that spending can decline in sectors with above average productivity growth.

Consider two extreme examples, education and personal computers. Because of different rates of technological change (see Appendix 1), inflation has been much higher in education than in manufactured products like personal computers. The cost of delivering education services has increased relatively rapidly, while the cost of comparable-quality computers has actually declined. Does the fact that we now spend more of "society's resources" on education mean that we must sacrifice spending on personal computers? Not at all. We can spend more on education precisely because we do not need to spend more on computers, as computers become less expensive.

In summary, we do not accept the Hanushek-Rivkin attempt to defend their adjustment of education spending by the GNP deflator, rather than a services deflator more appropriate to education, by arguing that this method best illustrates social choices. If one wants to analyze the growth of inputs available to schools then it is necessary to take into account the inherent difficulties of achieving cost reductions in education, a factor which leads to higher inflation facing schools. The fact that education's share of spending has grown is just another manifestation of Baumol's disease. The fact that education's share of nominal spending has grown tells us nothing about whether its share of real resources has grown.

The reason for attempting to measure inflation in education is to measure the growth of inputs...

Question 2: *Is the inflation in education best measured by examining changes in the prices of education inputs, like teachers and textbooks?*

In short, the answer to this question, we think, is "no," despite the fact that we ourselves use, in our own work, the term "inflation" to describe input price changes in education.

The reason for attempting to measure inflation in education is to measure the growth of inputs (i.e., translate increased spending on inputs into a "real" growth of inputs). There is no developed theoretical consensus about how to measure productivity (and thus inflation) in public or private services. In the manufacturing sector, the task is relatively straightforward. Economists calculate the value of enterprise shipments and subtract the cost of purchased inputs,

yielding a resulting "value added" which includes the productivity of the enterprise's labor and capital. In public sector services like schools or welfare services, however, there are no shipments generating revenues from which purchased inputs can be subtracted. Thus, we are faced with the challenge of directly deflating nominal value-added, a challenge not faced in the manufacturing sector where real value added is a residual after real purchased inputs are subtracted from real shipments.

Note that the private sector methodology depends on the valuation of both purchased inputs and purchased outputs. But there is no way to price the outcomes of education. Thus, were it even possible to accurately count the changing nominal prices of real resources purchased by schools (inputs other than employment related costs), and to separate these prices into a "real" component (increased resources) and a component which represents price increases for the same resource, we would still not have an estimate of real value-added because such an estimate requires a valuation of shipments or output which is unavailable in education.

…there is no way to price the outcomes of education.

Question 3: *Do price increases necessarily reflect "inflation" if the price increases do not result from either new resources or higher quality?*

As we hope to show, this is another way of posing the question which has recently been emphasized by Chambers and Fowler: "What is the difference between 'expenditure' and 'cost'?"

We begin to answer this question by asking why policymakers and the public want to know the education inflation rate. The reason, it seems to us, is "accountability." We want to know how much of the price increase of education (rising per pupil spending) is the "fault" of elementary and secondary institutions, and how much is beyond their control. If the price of education has gone up because school administrators have "had to" pay more for education inputs, our first inclination is to increase the amount of money we give schools, to compensate educational institutions for their higher expenses. But if the price of education has gone up because school administrators have chosen to spend more money, then we may want schools to demonstrate improved outcomes to justify this increased spending.

A complication arises, however, when we try to define what it means to "choose" to spend more money. Clearly, if administrators add more resources (for example, lowering class size by adding more teachers), this is a choice for which we hold administrators accountable—outcomes should improve as a result. Or, if administrators add more money by upgrading the quality of resources (for example, hiring teachers with more advanced degrees, or from more prestigious universities, for whom higher salaries must be paid), this too is a choice for which we should hold administrators accountable.

But what if per pupil spending goes up because school administrators decide to pay school teachers at above market rates? The higher salary level might be more than is necessary to attract the desired quality of college graduates into the teaching profession, or it might be more than is necessary to attract better quality teachers from neighboring school districts (because salaries in the district are already higher than those in neighboring districts). In these cases, economists would say teachers receive "rents" in addition to their market wages.

The question we pose is this: Should "rents" paid to teachers or to other education inputs be considered a cost over which education institutions have no control? When we apportion the increases in

prices of school inputs into the expenditures attributable to more (or higher quality) resources or to higher prices paid for the same resources, into which category should "rents" be assigned?

In our view, "rents," because they are within the control of education institutions and are not externally imposed higher costs, should be counted as real expenditures, not attributable to inflation. In other words, if school districts choose to spend more than is necessary for a given collection of education inputs, districts should be accountable to the public for improved results from such decisions, in a way that districts should not be held accountable for price increases of inputs which are beyond the districts' control. And, we emphasize again, when we say that districts should be accountable for unnecessary expenditures we do not suggest that these expenditures are wrong or that the public should prohibit them. Necessity is not the only basis for public decision-making. We would also add that the change in the size of "rents" in education over time may not be quantitatively large enough to materially affect inflation measures.

...if school districts choose to spend more than is necessary for a given collection of education inputs, districts should be accountable to the public for improved results from such decisions...

If we want, therefore, to define inflation in education as only those price increases over which education institutions have no control, we cannot calculate it simply by compiling a weighted average of actual prices paid by educational institutions for their various inputs. We must find a way to estimate what those institutions "would have" paid if markets for the provision of each of those inputs were fully competitive.

The distinction we make here is similar to that made by Chambers and Fowler (1995) and by Fowler and Monk (forthcoming) between "expenditure" and "cost." As they see it, "cost" is the minimum school districts must pay to obtain needed inputs. "Expenditure" is what school districts actually do pay, including what they term "discretionary" factors in payment. They have assumed, then, the challenge of constructing an education "cost" index which consists only of those prices schools must pay.

Thus, Chambers and Fowler describe districts' competition for teachers in terms (among other factors) of the concentration of teachers in a county who work for a single district. As theory predicts, they find that teacher salaries are lower where large percentages of teachers in a county are employed by a few large districts. Teacher salaries are lower where districts have monopsonistic power over their employment. This is shown in table 3.1 of Chambers and Fowler (page 37): in counties where the largest district has no more than 5 percent of total county enrollment (and thus, class sizes and other factors being equal, employs no more than 5 percent of the county's teachers), teacher salaries are 7.9 percent higher than in monopsonistic counties where all teachers are employed by a single county-wide district.

We differ with Chambers and Fowler, however, in that they consider that the single-district county has a teacher "cost" which is 7.9 percent lower than that of a district in the 5 percent enrollment category. In effect, they claim that the large district experiences a lower inflation rate than the small district. We, on the other hand, consider this negative rent imposed on teachers by the single-district county by dint of its monopsonistic power to be a "discretionary" factor. If we assume that prior-year expenditures for teachers in each district of type = 100 and we were to decompose per-pupil spending increases for the single-district county, we would still assign 7.9 percent of the teacher cost to inflation, for this represents an increased cost the district would have had to pay were it behaving in a competitive fashion. Because of its market power, this district is able to hold its per-pupil spending increases below the rate of

inflation, without any reduction in real resources provided to pupils.

We take the argument a step further. We can imagine a table similar to Chambers' and Fowlers' table 3.1 in which teacher costs were indexed, not by the concentration of enrollment (i.e., teachers) in a county's districts, but by the concentration of all college graduates in a county employed as teachers by school districts in that county. We suspect there would be similar results: counties in which a large proportion of college graduates were employed as school teachers would have lower average teacher salaries than would counties in which a small proportion of college graduates were employed as school teachers.

This suggests that to construct a specific education price index, it would be more appropriate to utilize, as the component representing teacher salaries, an index representing the prices (salaries) of all college graduates in a region who are substitutable for teachers. In other words, a teacher cost index, to reflect inflation in teacher salaries, should be based on the salaries of "comparable" workers, not on teachers alone. Only in this way can the effects of market imperfections in education be reduced.

...a teacher cost index, to reflect inflation in teacher salaries, should be based on the salaries of "comparable" workers, not on teachers alone.

We have used the example of concentration of teacher employment to illustrate these problems of calculating inflation because Chambers and Fowler have provided such useful data in table 3.1. However, we conclude this section of our discussion by observing that the concentration of teacher employment by a single district, or by all districts relative to other college graduates, is probably not the most significant "discretionary" factor which causes the actual increase in teacher salaries to deviate from the true inflation rate for teachers. The most significant market imperfection undoubtedly remains the cultural, historic, and current discriminatory practices that foreclose other traditionally "male" occupations to many female college graduates. This is probably the largest single factor causing salaries of college graduates generally to exceed salaries of comparable teachers. We cannot say whether, at the present time, this gender stereotyping causes a difference in rates of change in teachers' vs. comparable college graduates' salaries. But, to the extent that it does create different rates of change, an employment cost index that reflects comparable college graduates will contain a smaller proportion of women, and thus describe a truer measure of inflation, than an index of teachers alone.

While, as discussed in another section of this paper, we believe that a sectorally-specific inflation index may be too difficult to construct and may not be the most useful for policy purposes, we have no theoretical disagreement in principle with a sectorally specific index, an education price index. Our point here is only that, if an education specific index is desired, its component parts should not be the prices of the actual inputs used by schools, but should be the prices of "comparables" or "substitutables" (weighted by the relative importance of these inputs in education), because only by using such surrogates can the impacts of wage setting in education and its quality effect be judged. Only in this way can an inflation index tell the public how much more schools have "had to" pay for similar resources.

Question 4: *Can an education price index be properly used to interpret changes in spending for components of education spending?*

Hanushek and Rivkin not only adjust total per pupil spending by the GNP deflator, based on the argument on "opportunity costs" described above, they then go on to adjust specific components of

education spending by this deflator as well, an operation which we can't understand, even in their own terms of social choices. Thus, they note, the real inflation-adjusted (based on the GNP deflator) "daily wage" of teachers has risen from $34.20 in 1890 to $182.80 in 1990. We regard the deflation of one specific input, like teacher salaries, by an economy-wide deflator as being even less meaningful than the deflation of a single sector like education by an economy-wide deflator. Indeed, we think that it is not even meaningful to deflate the input by an education specific deflator.

Assume that we have an education price index (or as we suggest below, a broader services index) by which we can track changes in real education spending over time. What if we want to know how much teacher salaries have risen over time or how many teachers can be hired based on a certain salary pool—what deflator should we use?

Our answer to this question depends on why we want to know. Here are the possible answers:

- If we want to know whether teachers generally are overpaid or underpaid in market terms, we would calculate their real salary patterns using an employment cost index for comparable workers (college graduates). As explained in the previous section, use of such an index would effectively explain whether schools were using monopsonistic power to "underpay" teachers, or whether teacher unions were using monopolistic power to win "rents" for teachers.

- If we want to know whether teachers pay has kept up with (or exceeded) the "cost of living," we would deflate their salaries by the consumer price index, for this would tell us whether their salaries in different periods enabled them to purchase more or less of the typical collection of goods and services purchased by urban consumers.

- If we want to know whether teacher salaries are a greater or smaller share of total school expenditures than they were in an earlier period, we would not deflate the salaries at all. We would simply calculate the share in nominal terms. Note here that, as we described above, if teachers represent a greater share of all school expenses, this does not represent districts' greater opportunity cost for hiring teachers. If the employment cost index for comparable college graduates rose faster than the overall education cost index, and if the book publishing index rose more slowly than the overall index, districts could spend a relatively larger share of their total expenditures on teachers, and a relatively smaller share of their total expenditures on textbooks, without having to give up real textbook resources in order to meet their teacher payrolls.

...inflation rate for services like education was an average of 6.7 percent a year, compared to 5.8 percent for consumer purchases and 5.4 percent for the GNP.

Question 5: *Should the "Net Services Index" be extended and made more generally available?*

In *Where's the Money Gone?* we calculated the real growth of per pupil elementary and secondary education spending from 1967 to 1991 by subtracting the cost increases attributable to inflation. As table 1 shows, we concluded that the inflation rate for services like education was an average of 6.7 percent a year, compared to 5.8 percent for consumer purchases and 5.4 percent for the GNP.

Since the publication of this result, we have received inquiries from many scholars and practitioners who wanted to know if we could either provide a "net services index" for other locations and/or time periods, or whether we could provide a relatively simple guide for how these scholars or practitioners could make the calculations themselves.

Table 1.—Growth in per pupil spending using different inflation measures, 1967–91

	Per pupil spending			
	Current dollars	1991 dollars using net services index	1991 dollars using CPI-U	1991 dollars using GDP
Year				
1966–67	$687	$3,456	$2,794	$2,513
1990–91	5,566	5,566	5,566	5,566
Change, 1967–91				
Dollars ($)	4,879	2,110	2,772	3,053
Percent (%)	710	61.1	99.2	12.2
Inflation				
Total (%)		403.7	306.7	265.8
Annual (%)		6.7	5.8	5.4

SOURCE: Rothstein and Mishel, unpublished tabulations.

We made these calculations for the nation as a whole, as well as for each of 9 sample districts. We calculated inflation by taking the "Services" index published by the BLS, and then removing from this index the items attributable either to medical care or to shelter rent. In practice, because the BLS already publishes a "Services, Less Medical Care Services" index, it was necessary for us to remove the shelter rent components, using raw data provided to us by the BLS. The specific methods used are described in Appendix 2. The process was cumbersome and time consuming, largely because the weights of rent and medical care in the overall services index changed at various times during the 24 year period we studied.

After all this was done, however, we found that the "net services index" rose at approximately the same rate as the "services" index before medical care and shelter rent were extracted; over the entire 24 year period, the services index rose less than 1 percent more than the net services index. (With 1967=100, the 1991 index number for net services (national) was 503; for all services (national) it was 508). While medical care services had more rapid inflation than services generally, shelter rent had less rapid inflation than services generally, and these mostly cancelled each other out.

This was also the case for the local indices we constructed, but to a lesser extent. Some local net services indices varied by as much as 8 percent from the corresponding local services indices. Still, these were not large differences over a 24 year period. Thus, we concluded, given the parallel trends, that it might be easier for future research simply to rely on the service index.

We emphasize, however, that the rough correspondence between the services and net services index, both nationally and in sub-national areas, is purely coincidental. There is no economic phenomenon that we can think of that would explain why shelter rent and medical care inflation would move in opposite directions of roughly the same magnitude. If indices were desired for other locations, or other time periods, the coincidence might be duplicated or it might not.

We are currently in the process of updating the net services index for the 1995–96 school year, and

will be interested in seeing whether the coincidental correspondence of the services and net services index continues to hold in the more recent period. If we could be confident that the unamended services index presented an accurate reflection of inflation in elementary and secondary education, this would greatly simplify our work and that of other analysts.

We hope to test the correspondence of the services and net services index for as many years prior to 1967 as it is possible to do. We also hope to test this correspondence for intermediate periods, such as periods dating from 1970, 1975, 1980, and 1985. If the rough parallelism holds for these earlier and intermediate periods, we would recommend use of the easily accessible services index for adjustment of "real" education expenditures.

This will not enable us to understand the growth of education spending as far back as 1890, as Hanushek and Rivkin wish to do, but it will cover most of the years with which current debates about education productivity are concerned. An index going back to 1890 would necessarily be speculative, based not so much on data, as on investigations of economic historians whose interpretation of economic trends might be used to establish relationships between a surrogate services index and the growth of GNP.

...we urge the use of a broader services-type index which reflects inflation in services like education.

Question 6: *Is the "Net Services Index" (or all services index) preferable to a specific education price index for understanding inflation in education?*

We think yes, for two practical reasons. First, because government statistical agencies, like the BLS, have not published or even computed price indices which use the relative importance of specific education inputs, we believe it to be practically impossible for education researchers to reconstruct the prices of comparable inputs sufficiently far back in time to be useful. The only effort to do so, that of Kent Halstead (1983), resulted in an education price index going back only to 1975. Since, for example, considerable public debate now takes place about education's purported productivity decline since the 1960s, Halstead's index is not adequate to inform participation in that debate.

We do not, however, disagree with current efforts to create a cross sectional cost of education index, without historical data, such as that partially proposed (for teachers) by Chambers and Fowler (1995). Indeed, we are great admirers of these efforts. As we indicated earlier, these remarkable efforts will prove enormously useful to equalization and other fund-distribution tasks. But examination of the enormity of the task attempted in Chambers and Fowler must lead to the conclusion that such a task would not be possible for historical data, with its need for very specific data on things like crime rates, amenities, etc. Therefore, even if desirable, construction of such an index for understanding inflation is not practical.

As a more practical alternative, we urge the use of a broader services-type index which reflects inflation in services like education. While such an index may differ in important respects from a more specific education index, both in the types of inputs counted and their relative importances, this index is likely to be a more accurate surrogate for a sectorally specific index than anything else now available or likely to be so. It is certainly likely to be more accurate than either the consumer price index or the GNP deflator, which most education analysts have inappropriately been satisfied with.

Second, problems of inflation affect not only education but other similar human services: child

welfare services, law enforcement services, etc. Given the difficulty of constructing a sectorally specific education index going back very far in time, it is practically inconceivable that analysts could develop similar indices for each of these sectors. It should be relatively easy to test whether the types of inputs and their relative importances are similar in each of these human services. We suspect that they are and if this suspicion is correct, public policy debates would benefit considerably from having a single human services index that could be used to understand how the real costs of human services in education and other similar sectors have changed.

References

Chambers, J. and W. J. Fowler, Jr. 1995. *Public School Teacher Cost Differences Across the United States*. U.S. Department of Education, National Center for Education Statistics, NCES 95-758.

Halstead, D. K. 1983. *Inflation Measures for Schools and Colleges*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Institute of Education.

Hanushek, E. A. et al. 1994. *Making Schools Work: Improving Performance and Controlling Costs*. Washington, DC: The Brookings Institution.

Hanushek, E. A. and S. G. Rivkin. 1996. *Understanding the 20th Century Explosion in U.S. School Costs*. Rochester Center for Economic Research. Working Paper No. 388.

Odden, A. R., ed. 1992. *Rethinking School Finance: An Agenda for the 1990s*. San Francisco: Jossey-Bass Publishers.

Rothstein, R., and K. H. Miles. 1995. *Where's the Money Gone? Changes in the Level and Composition of Education Spending*. Washington DC: Economic Policy Institute.

Appendix 1

Inflation and the Measurement of School Spending

In 1967, public elementary and secondary schools spent $29.6 billion, or $687 per pupil enrolled in grades K–12. By 1991, spending jumped to $229.4 billion, or $5,566 per enrolled pupil. However, the fact that per pupil spending grew by 710 percent over this quarter century does not tell us the degree to which we have devoted more real resources to education. Much of this increase has been caused by inflation: the prices of most goods and services purchased by schools have gone up each year.

For instance, if food prices rise by 5 percent, families must increase their food budgets and expenditures by 5 percent just to maintain their food consumption. Similarly, schools faced with a 10 percent rise in the price of textbooks must increase textbook spending by 10 percent to provide students with the same number of textbooks. To measure historical growth of real per pupil resources requires knowledge of the inflation, or price increases, in goods and services purchased by schools. What we want to understand is the degree to which more real resources are now used by schools and, if so, whether greater resource intensity generates better outcomes.

Examinations of changes in school spending over time must use some measure of inflation to convert 1967 spending to its equivalent in 1991 dollars. We can then speak of "real" (or "inflation-adjusted") as opposed to "nominal" ("unadjusted") school spending growth. Most analysts make this conversion by use of the "consumer price index for all urban consumers" (CPI-U), the conventional measure of inflation provided by the BLS.[1] Using the CPI-U, $687 in 1967 dollars becomes $2,794 in 1991 dollars. In real terms, therefore, per pupil expenditures went from $2,794 to $5,566, or a quarter-century jump of 99 percent. As Benno Schmidt claimed, we "roughly doubled" real school spending.

It is probable, however, that use of the CPI-U for this purpose causes an overstatement of school spending growth. The inflation rate for school purchases is likely to be greater, and will continue to be greater, than the average urban consumer's price inflation that the CPI-U is intended to measure. Table 2 reviews inflation rates for a range of goods and services. These data show that price increases for particular items can be different from price increases for the "average" items included in the market basket of goods and services used to calculate the CPI-U. For instance, inflation in medical care (681 percent) from 1967 to 1991 was much greater than the average for all items, while inflation in commodities like food and manufactured products (344 percent) was less than the average. Because inflation rates vary widely among particular items, it is important to determine carefully the appropriate inflation index to use for converting nominal spending into real changes.

If a family bought the average market basket of goods and services in 1967, and then spent 408 percent more in 1991, it could still buy similar goods and services in 1991 because "all items" inflation was 408 percent. But consider a family that purchased an above average amount of medical care in 1967 and whose total spending also increased by 408 percent by 1991 (i.e., less than the medical inflation of 681 percent). In order to maintain its standard of living in other respects, this family would have been forced to reduce the amount of medical care services (or an equivalent amount of other spending) it purchased by about a third, because medical care prices rose faster than average prices. In contrast, consider a family that purchased an above average amount of commodities in 1967 and whose spending also increased by 408 percent by 1991. This family could improve its

[1] Eric Hanushek deflates school expenditures using the "GNP deflator," not the consumer price index (CPI) (Hanushek et al. 1994; Chubb and Hanushek, 1990). The GNP deflator, however, suffers from drawbacks that are similar, though not identical, to those of the CPI. A GNP price index reflects the prices of all components of final demand (consumption, investment, government purchases, exports, and imports) and is no more representative of school input prices than is a consumption index like the CPI-U. Schools are unrepresentative of average users of final product as they are unrepresentative of urban consumers.

Table 2.—Selected inflation rates, 1967–91

	Inflation index (1982–84=100)		Inflation
	1967	1991	1967–91 (%)
All items (CPI-U)	33.4	136.2	308
All commodities	36.8	126.6	244
Food	34.1	136.3	300
Other commodities	38.6	121.3	214
All services	28.8	146.3	408
Medical care	26.0	177.1	581
Other services	29.3	143.3	389

SOURCE: Indices from Bureau of Labor Statistics (BLS) as presented in *Economic Report of the President* (February 1995), Table B-61, p. 344.

living standards, purchasing significantly more commodities (or other items), because commodity inflation (344 percent) was relatively low.

Table 2 also shows that prices for commodities have grown more slowly than prices for all services (344 percent vs. 508 percent). A similar contrast is evident when food and medical care are removed from their respective groups: nonfood commodity (primarily manufactured goods) inflation was 314 percent, roughly two-thirds the 489 percent inflation in "services other than medical care."

Inflation in services exceeds inflation in goods or commodities because productivity (the increase in output per employee hour worked) has grown more slowly in services. Productivity growth in manufacturing, for instance, has allowed industrial firms to reduce their costs (or at least slow the growth in costs) and therefore increase the prices of manufactured products more slowly or not at all. In contrast, many service-sector firms cannot automate their production as manufacturers do; these service firms, for whom it is more difficult to achieve productivity growth, have had to increase prices faster than average. Often cited examples include barbers and orchestras: barbers cannot greatly increase the number of haircuts they perform per hour, and orchestras cannot perform music with fewer musicians each year. These insights—that disparities in inflation mirror differences in productivity growth, and that industries (i.e., services, barbers, orchestras) in which it is hard to achieve productivity growth will have higher than average inflation—are associated with the work of William Baumol (Baumol 1967; Baumol, Blackman, and Wolff 1989). Baumol refers to low productivity sectors as having a "cost disease," and the faster inflation in sectors with relatively slow productivity is generally referred to as the "Baumol effect." Table 3 elaborates how differences in productivity between industries will, in the context of a national labor market, generate differences in inflation rates. Table 3 also illustrates how differences in the price changes (i.e., inflation) of individual industries are driven by differences in productivity growth when all industries increase wages at the same rate, as would be expected in a national labor market, assuming each industry's workforce has the same skills and education. Table 3 presents examples of two industries, each of which has 100 workers producing 1,000 units in year one. That is, the examples are constructed so that both industries have the same produc-

Table 3.—The relationship between industry prices and productivity in a national labor market

	Industry A "Fast productivity"			Industry B "Slow productivity"		
	Year one	Year two	Percent change	Year one	Year two	Percent change
Employment	100	100	0	100	100	0
Output (units)	1,000	1,100	10	1,000	1,000	0
Productivity (2)/(1)	10	11	10	10	10	0
Annual pay	$20,000	$22,000	10	$20,000	$22,000	10
Price*	$2,000	$2,000	0	$2,000	$2,200	10

* (annual pay X employment)/output units

SOURCE: Rothstein and Miles, unpublished tabulations.

tivity level of 10 in year one. Because each industry also pays its workers the same (i.e., $20,000), they also have the same price level in the first year of $2,000 per unit.

What happens to the prices of the goods produced in these industries when one industry (Industry A) experiences a 10 percent increase in productivity but the other industry (Industry B) has no productivity growth? We assume that wages increase by 10 percent (reflecting the 5 percent average productivity growth in the economy—the average of 10 percent and zero percent—and five percent inflation). In Industry A, the productivity growth of 10 percent offsets the 10 percent wage increase so that prices do no increase in year two. Industry B, however, enjoyed no productivity growth but did face 10 percent higher wages, the same as Industry A. The result is that the price of Industry B's goods increased by 10 percent. Thus, an industry that pays comparable wages, for comparable workers, but has low productivity, will experience faster inflation.

Education is subject to the Baumol effect because productivity improvements from cost reductions are difficult to achieve in education. In contrast, manufacturing and telecommunications industries are able to automate work and find efficiencies in use of materials; and thereby reduce the resources needed in production and realize productivity gains. From 1967 to 1991, the private sector achieved productivity growth of 1.1 percent per year, or 30 percent overall. This means that the number of workers necessary to produce an average product fell roughly a third from the beginning to the end of this period. What would a comparable growth in labor productivity look like in schools? Assume that schools use only one resource, teachers, and the pupil-teacher ratio was 20:1 in 1967. Then, if 30 teachers were necessary to educate 600 students in 1967, and if schools could have increased productivity the way the private sector did (by reducing labor inputs and using remaining inputs more efficiently), a 30 percent productivity growth would imply that only 23 teachers were necessary in 1991; in other words, the pupil-teacher ratio would have to *rise* from 20:1 to 26:1. With only 23 teachers, school cost increases would be in line with the national economy.[2]

[2] Not all productivity gains come from reducing employment. Some gains can be made through work re-organization.

While education reform should certainly be on the public agenda, continuous industrial-like realization of cost efficiencies are probably not what the public has in mind. Education costs will rise faster than economy-wide inflation, so real spending per pupil as measured with an average inflation index will rise even though per pupil resources are not growing.[3] This is illustrated in table 4. This table illustrates how spending per pupil will necessarily rise if there is not any productivity growth or increase in cost efficiencies. For instance, a school with a pupil/teacher ratio of 20:1 that pays teachers $20,000 annually will be spending $1,000 per pupil, assuming, of course, there are no expenses other than teachers. If wages in the economy, and for teachers, grow 10 percent, then spending per pupil will also rise 10 percent, to $1,100. The cost efficiencies necessary to offset higher wages require that the number of pupils per teacher rise to 22.2. Schools are then faced with a continuous rise in number of pupils per teacher or steadily rising spending per pupil, a measure of school costs or inflation, at least when compared to other sectors that can achieve greater cost efficiencies over time.

A related insight of William Baumol is that because productivity improvements are spread unevenly throughout the economy, changes in prices over time will also vary across products. Consumers, therefore, will spend a greater share of incomes to purchase a constant level of products or services in some sectors and a smaller share to purchase a constant level in others. That is, we must increasingly spend a larger share of our incomes on low productivity goods and services that have more rapid price increases (like education) just to maintain the same level of consumption.

It is thus inevitable that inflation in a low productivity industry like education will be higher than inflation in an average industry experiencing average productivity gains. For this reason, use of the average inflation rate for consumer goods and services (the CPI-U) systematically understates the inflation facing school districts. Put another way, a measure of average inflation to deflate school spending trends will systematically mislead by overstating how much "real school spending" has grown. It will give the impression that more of the nominal spending growth represents real new resources provided to school districts for educating students, and that less of the nominal spending growth represents inflation, than was in fact the case. The issue, then, is whether we can select a more appropriate index to use for analysis of school spending.

Despite problems with use of the consumer price index to interpret historical changes in school spending, few researchers have attempted to create an inflation index specifically tailored to education (although the education research community is increasingly sophisticated about regional differences in the cost of living, a conceptually similar issue).[4] Kent Halstead constructed one index that extends back to 1975 (Halstead 1983 and Research Associates 1993), but no others have attempted to replicate Halstead's work, so its accuracy lacks independent verification. Halstead's index has a theoretical drawback that further militates against its use in the present study.

[3] School productivity gains, therefore, must be thought of as the achievement of higher test scores (and other improved outcomes) as real expenditures steadily increase (assuming the use of an average inflation rate).

[4] School price adjustments are now used by education policymakers to evaluate geographic differences in education expenditures. Concerned with intrastate equalization of school spending, policymakers want to know whether the same dollars purchase similar collections of school inputs in different districts. As early as 1980, Jay Chambers proposed creation of a "cost of education index" to assist California officials in equalizing school funding after the state Supreme Court's *Serrano* decision mandated reform (Chambers 1980). Texas, Florida, Alaska, and Ohio now adjust aid to local school districts for intrastate regional differences in the cost of education inputs (McMahon 1995). The U.S. Department of Education has commissioned analyses of state and region differences in costs of education, calculated from differences in costs of living, amenities, and other factors, for the purpose of determining how school districts' federal aid might be adjusted so that federal dollars have equal purchasing power (Barro 1994; Parrish, Matsumoto, and Fowler 1995). Despite this sophistication regarding geographical differences in purchasing power of nominally equivalent dollars, little effort has been devoted to construction of a historical school price index to replace the CPI-U in school finance debates.

Table 4.—The relationship between spending per pupil and productivity

	Year one	Year two	
		No productivity	Productivity growth
Pupils	1,000	1,000	1,000
Teachers	50	50	45
Pupil/teacher	20	20	22.2
Total annual pay	$20,000	$22,000	$22,000
Salaries*	$1,000,000	$1,100,000	$990,000
Spending/pupil	$1,000	$1,100	$990

* Annual pay of $20,000 multiplied by the number of teachers.

SOURCE: Rothstein and Miles, unpublished tabulations.

Halstead constructed his school price index (SPI) by examining price changes for a "market basket" of 42 items typically purchased by elementary and secondary schools in 1975 (Halstead 1983, 138). In 1975, elementary and secondary schools spent 47.68 percent of their budgets on teacher salaries, 3.75 percent on student transportation, 0.7 percent on textbooks, and 1.1 percent on electric power, etc.[5] By assembling a price series for each of these items, making estimates where necessary, Halstead calculated what it would cost public schools to buy an identical (ignoring most quality improvements) collection of goods and services in each subsequent year. He identified this growth as the school inflation rate, so spending above this rate represented real spending increases.

The Halstead index is not used in this report for two reasons. First, it is not available for the entire 1967 to 1991 period, and second, its treatment of teacher salaries is questionable. Halstead's SPI includes a price series for elementary and secondary teachers based on their actual salary changes. However, what schools pay teachers reflects districts' choices about whether to pay teachers more or less than comparable workers. These choices may be influenced not only by district officials but by legislators and teacher unions as well. When teacher salaries rise relative to salaries of workers with comparable education and experience in other fields, we can presume that schools are upgrading the skill levels of their workforce (in other words, providing additional inputs, more "real" resources to students). But if teachers' salaries fall relative to those of similarly educated professionals, then school districts will have a harder time attracting the best qualified teachers, and there will be an erosion in the teacher skill base. Variance from market norms can be considered either an effort to attract a better (or worse) than average quality workforce, or the provision of a "rent" (positive or negative) to teachers by either overpaying or underpaying them.

It would have perhaps been more appropriate for Halstead to base his index on all college-educated or professional workers, a group "comparable" to teachers. Then, the degree to which schools pay teachers or other school employees more than the market rate would not be obscured by a school price index that ignores the salaries of comparable workers. Conversely, a fall in teacher pay relative to "comparables" would result in a measured decline in

[5] Halstead's weights were based on data collected by the National Center for Education Statistics, but NCES stopped collecting such data in 1976.

real resources provided for students. In the absence of a conceptually correct index, an assessment of real school spending must rely upon some combination of available indices for particular items developed for the CPI-U. One reasonable choice is to use the inflation measure for "services," because schools are a service type industry with "cost disease"/slow productivity characteristics. The actual service index of the CPI-U, however, includes two heavily weighted items that strongly affect the measured inflation rate but that are not relevant to education. Shelter rent (housing) inflation makes up a large part of the service CPI-U and should be excluded. Medical care also has an exceptionally high inflation rate caused by unique characteristics of the health care sector that are not applicable to education. For this reason, the index developed for this report—the "net services index" (NSI)—reflects price increases of services provided to consumers exclusive of shelter and medical care. "Net services" includes items such as entertainment services, personal care services, personal and educational services, public transportation, auto repair, private transportation (other than cars), housekeeping services, and utilities and public services. These tend to be labor-intensive services with low productivity growth (relative to goods or to the average) and therefore are items where increased cost efficiencies are hard to achieve. If schools rely on professional, college-educated workers more than do the sectors in "net services" (as is reasonable to believe), then "net services" will still understate school inflation (because wages for educated workers have risen faster than average over the 1967–91 period). Appendix 2 provides technical detail on how the NSI was constructed, nationally, and for each region and local area.[6]

Application of the national net services index to education spending is shown in table 5. These data show that the $687 spent per pupil in 1967 was equivalent to $3,456 in 1991 dollars. Since 1991 per pupil spending averaged $5,566, we conclude that real school spending—real per pupil resources provided to schools—increased by about 61 percent.[7] Table 5 also shows measured growth in real school spending using the "all items" CPI-U to be 99.2 percent—the much discussed "doubling" of school spending. Selection of the net services index suggests a nearly 40 percent slower growth in school resources than conventional accounts based on the conceptually inaccurate (for this purpose) "all items" CPI-U.

In sum, choice of an inflation measure dramatically affects the portrait of school spending growth. The magnitude of the measurement error from applying the "all items" index cannot be precisely determined because an appropriate school index is not available, but construction of an index from the CPI-U services component, with medical care and housing excluded, seems to be the best alternative. So while it seems certain that conventional estimates have vastly overstated the growth in school resources, the 61 percent growth presented in table 5 is an estimate that, while more accurate than conventional estimates, might still be too high or too low. Development of an improved inflation index for school spending should be a research priority.

[6] Inflation differs not only for different products or services; they also differ for the same products and services in different localities, because price increases in different localities at different rates. Therefore, we have constructed a regionally appropriate NSI for each of the nine sample districts in this study.

[7] Coincidentally, national inflation in "net services" from 1967 to 1991 was almost identical to inflation in the broader services category, which includes shelter rent and medical care. We, nonetheless, removed rent and medical care in the construction of the NSI, believing this to be the most theoretically justifiable approach. This coincidence, however, means that our conclusion about the real national growth of school spending (61 percent from 1967 to 1991) is unaffected in practice by this decision to construct an NSI to replace the all-services index of the BLS. Note, however, that this coincidence may not be true for the regional NSI's we construct.

Table 5.—Growth in per pupil spending using different inflation measures, 1967–91

	Per pupil spending		
	Current dollars	1991 dollars using net services index	1991 dollars using CPI-U
Year			
1967	$687	$3,456	$2,794
1991	5,566	5,566	5,566
Change, 1967–91			
Dollars ($)	4,879	2,110	2,772
Percent (%)	710	61.1	99.2
Inflation			
Total (%)		404	308
Annual		7.0	6.0

SOURCE: U.S. Department of Education. 1994. *Digest of Education Statistics, 1994*. Washington, DC: National Center for Education Statistics. Tables 3 and 32.

References

Barro, S. M. 1994. *Cost-of-Education Differentials Across the States*. U.S. Department of Education, Office of Educational Research and Improvement. Working Paper No. 94-05.

Baumol, W. June, 1967. "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." *American Economic Review*. 57: 415-426.

Baumol, W., S. A. Blackman, and E. N. Wolff. 1989. *Productivity and American Leadership*. Cambridge: MIT.

Chambers, J. G. Winter, 1980. "The Development of a Cost of Education Index: Some Empirical Estimates and Policy Issues." *Journal of Education Finance*. 5.

Chubb, J. E. and E. A. Hanushek. 1990. "Reforming Educational Reform" in *Setting National Priorities*, edited by H. J. Aaron. *Policy for the Nineties*. Washington, DC: The Brookings Institution.

Halstead, D. K. 1983. *Inflation Measures for Schools and Colleges*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Institute of Education.

Hanushek, E. A., et al. 1994. *Making Schools Work*. Washington, DC: The Brookings Institution.

McMahon, W. 1995. "Intrastate Cost Adjustments." Manuscript.

Parrish, T. B., C. S. Matsumoto, and W. J. Fowler, Jr. 1995. *Disparities in Public School Spending, 1989-90*. U.S. Department of Education, Office of Educational Research and Improvement. NCES 95-300.

Research Associates of Washington. 1993. *Inflation Measures for Schools and Colleges, 1993 Update*. Washington, DC: Research Associates of Washington.

Appendix 2

Construction of the Net Services Index

Appendix 2 presents technical information on how the NSI was computed at the national and subnational levels.

The National Level

The NSI represents inflation in services other than rent/shelter or medical care. The BLS does not publish such an index—there is one for "services", for "services less medical care" and for "services less shelter" but not for "services less shelter less medical care." It was necessary, therefore, to derive an NSI; we appreciate the assistance we received in this regard from BLS economist Patrick Jackman, who computed the national NSI for this project. He did so by combining the "relative importance" and price changes in particular periods for "services less shelter" and "medical care" to derive "services less shelter less medical care."

For instance, using the "relative importance" for December 1977 and the inflation rates between December 1966 and December 1977, one can derive the "relative importance" for December 1966. This calculation was made for "services less rent" and "medical care," which allows a computation of the "relative importance" for their difference, net services. The growth in relative importance of net services provides the measure of net service inflation for the period December 1966 to December 1977. The same process was repeated for the 1977–82, 1982–86, and 1986–90 periods. The inflation rates of each period were chained together to obtain an index value for December 1966 and December 1990—the net services index rises from 100 to 503. This inflation rate is almost identical to that of services as a whole, whose equivalent value in 1991 (with December 1966=100) is 508.

Subnational Indices

Inflation rates can differ substantially across regions. Consequently, it was necessary to construct a net services index for each of the localities in which the study examined a school district. Regional indices were also constructed. The BLS, however, provides indices only for major urban areas and for certain size categories of cities within each region. The regional indices that correspond to the nine cities are: Baltimore for Anne Arundel; North Central C-size for Bettendorf; Denver for Boulder; South D-size for Clairborne; South C-size for East Baton Rouge; Boston for Fall River; Los Angeles for Los Angeles; New York City for Middletown; and Houston for Spring Branch.

There were several other constraints faced when constructing subnational indices. First, there are no indices for medical services and shelter for the period before 1977 for the areas outside of the large urban areas (including Denver). The indices for these areas are constructed using national trends for the pre-1977 period. Second, the only "relative importances" or "weights" available at the local level for 1977 were those from the CPI-U. In contrast, the national net services index used the CPI-W weights for the 1966–77 period (it was the only national index in existence during that time) and the CPI-U weights for the 1977–82 period. The local indices were constructed using the 1977 CPI-W weights for the 1967–77 and 1977–82 periods and 1982 CPI-U weights for the 1982–91 period. Third, the indices were constructed for the full years 1967 and 1991. Fourth, the most disaggregated level for which "relative importances" were available is region. Consequently, each locality's index is constructed using the relative importance of the appropriate region.

The weighting method used for the local indices was applied to the national data as a check. It showed that the national net services index grew 5.33 percent more (when more appropriate weights were used and mid-points in the school year—December—were used). To correct for this bias, all of the local indices

for 1991 were increased by 5.33 percent. This step increased their (log) annual inflation rate by 0.2 percent.

The resulting local and regional net services indices were also compared to the local service indices. In all cases (except Denver and South C-size) the service index rose faster than the net service index, and most were within 2 percent of each other (except the Northeast, New York, Boston, South D-size, and Denver, which differed from 4 percent to 8 percent). These are not large differences over a 24-year period. Given the parallel trends of services and net services at the national and local levels, it might be easier for future research to simply rely on the service index.