Adjusting Oregon Education Expenditures
for
Regional Cost Differences:
A Feasibility Study

Submitted by

Management Analysis & Planning Associates, L.L.C.

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Confederation of Oregon School Administrators

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EXECUTIVE SUMMARY

The costs of delivering comparable education services varies from place to place. Therefore, to assure equality in access to educational services, the distribution of elementary and secondary funds should be adjusted for regional differences in education costs. However, despite the reality that there are region cost differences, it is impossible to specify an index that precisely captures these differences. If the Legislature uses its best judgment to approximate these regional differences to distribute education funds, the result will be an imprecise, though fairer system, than one making no regional adjustment at all.

Regional cost differences can be estimated with a mathematical model that regresses all national data on teacher salaries and other costs; from relationships derived from Oregon's statewide employment data; or from a statewide survey of consumer prices. Four other states currently make regional cost adjustments in the distribution of their education funds: Colorado and Florida base their distributions on consumer price surveys; Ohio bases its distribution on wage levels derived from employment data; and Texas utilizes a statewide regression model of education expenditures.

This report recommends that Oregon adopt a regional cost index based on wage data, consumer price data, or some combination of the two. Utilizing available employment data, MAP found that the range of education costs in Oregon can vary by as much as 75 percent or more. Utilizing a consumer price survey, we find that the range of education costs in Oregon can vary by as much as 15 percent. This report recommends that the state rank Oregon districts by these wage-based and price-based cost levels, estimate a range of regional variation of from seven to 15 percent, and then adjust the distribution of education funds within this estimated range by the wage and price-based ranking.

Such a process can never achieve absolute precision in the adjustment of education spending for regional cost differences. Some of those affected by a regionally adjusted distribution will always feel that there are additional cost factors not accounted for by any methodology. Nonetheless, while no methodology can be absolutely precise, a regional adjustment such as that proposed here will make the distribution of Oregon education funds more equitable. It will make this distribution as equitable as is reasonably practical.

1. INTRODUCTION AND BACKGROUND

Oregon recently assumed greater responsibility for school finance at the state level. Based upon the state's new role, this report:

- Summarizes current theory about how regional cost adjustments could be made, and describes three available methodologies: regression of education expenditures, indices based on wage data in state employment statistics, and indices based on consumer price surveys.

- Previews the methods adopted by other states that currently adjust state education expenditures for regional cost differences.

- Develops several indices based on wage data currently available from the Oregon Employment Department.

- Presents indices based on a statewide consumer price survey conducted for this purpose.

Shows how these wage and price based indices could be used by the state to make Oregon's school finance system more equitable by adjusting expenditures for regional costs.

In 1990, Oregon voters approved Measure 5 which, among other provisions, limits total school taxes and charges to $5 per $1000 of each property's real market value. The resulting shortfall in local property tax revenues has been partially made up by the continued growth of assessed values after the measure's adoption. However, it was inevitable that this local tax limitation would result in state funds replacing all or some significant portion of the local funds which were no longer available. Prior to Measure 5, about one-fourth of the state's General Fund was spent to assist elementary and secondary school districts. By 1995, over one-half of the General Fund was spent on public education.

As the State of Oregon assumes primary responsibility for school finance, considerations of equity inevitably come to the foreground, because the state accepts a constitutional obligation to provide all children with equivalent educational programs. It is not necessarily "equitable" to distribute the same nominal dollars per pupil to each school district in the state for three reasons. First, districts may have different needs for dollars, because the characteristics of children, and thus the difficulty of educating them, may vary from place to place.

Secondly, districts may have different needs for dollars because structural factors beyond districts' control (e.g., economies or diseconomies of scale resulting from population density) may vary from place to place. Finally, nominally similar dollars may purchase different qualities or quantities of education inputs (such as teachers, books, and supplies) in different districts, because of differences in the cost of inputs from place to place.

In 1991, the Oregon Legislature began to address problems of equity in school finance. Yet while formulae have been adopted to adjust for differences in student needs, teacher seniority, and district size, a procedure for adjusting for regional differences in the cost of education has not been adopted. While some legislators recognize that the problem of regional cost differences is real, they have not been persuaded that a practical method can be developed for making such adjustments.

To assist the Legislature in dealing with this challenge, the Confederation of Oregon School Administrators (COSA) contracted with Management Analysis & Planning Associates, L.L.C. (MAP), a consulting firm with offices in San Francisco, Sacramento, and Nashville. This report summarizes MAP's findings and conclusions regarding the feasibility of regional cost adjustments for school expenditures in Oregon.

This report's primary message is: While certainly there are differences in the cost of providing education in different parts of Oregon, it is not possible to know precisely what the nature or magnitude of these differences may be. The "science" of understanding and computing regional differences in the cost of education is primitive, and the factors causing differences are so complex that precision may never be possible. To avoid implementing a cost-adjustment system because of uncertainty about precisely what adjustment should be made is no solution to this problem. Instead, inaction leaves in place a system where real differences in cost are ignored, rather than implementing a system where these differences are imperfectly addressed. Certainly, an improper adjustment would be worse than no adjustment at all, but this report shows that adjustment formulae are available that would improve the equity of real resources distributed to Oregon school districts.

2. ALTERNATIVE ADJUSTMENT METHODS

It is widely recognized that prices of goods and services can vary from place to place within a state, and that fewer dollars in one place may be able to purchase quantities and qualities of goods and services that more dollars may be required to purchase these items in another place. This being so, districts in different places may be able to purchase different qualities and quantities of teachers, books, supplies and other school inputs, even if these districts have available the same dollars per-pupil. The consequence is that the state must provide districts with varying amounts of per pupil funding, based on the varying costs of providing education in particular communities, if the goal is to assure equal access to education.

This report proposes two types of regional cost indices for Oregon. One set of indices is based on differences in the cost of labor in different counties. The second set of indices is based on differences in consumer prices in different regions. We propose that adjustments based on these differing costs be applied only to the approximate share of a typical district's budget that is spent for professional and non-professional labor (estimated as 85 percent).

This proposal is appropriate because one of the unique characteristics of elementary and secondary education is the unusually large share of total expenditures devoted to personnel compensation. For most districts, approximately 85 percent of funds is spent on salaries, benefits and fees for professionals (mostly teachers, but also counselors, librarians, specialists, principals, and district administrators), non-professionals (maintenance and operations workers, clericals, bus drivers, and cafeteria workers), and contract workers (such as professional staff development consultants, evaluation specialists).

Of the remaining 15 percent of most district budgets, many expenditures do not vary by region. For example, districts in different regions do not pay different prices for textbooks ordered from national publishers. Supplies may be ordered from the nearest big city, rather than locally. Of the remaining expenditures where regional prices may vary, there is often no precise way to determine purchasing patterns. Even in those cases where purchasing patterns can be determined, non-personnel purchases of goods and services whose prices vary by region (fuel for school buses, for example) consume too small a portion of district's budget to make it reasonable to attempt to adjust for them, when the costs and complexity of the needed data

collection and calculation are taken into account.

Even when the investigation is restricted to personnel compensation, education costs present unique difficulties. In the case of many non-educational goods and services, it is a simple matter to determine how costs vary from place to place. If the prices of apples or shoes are higher in Place A than in Place B, it can generally be concluded that apples and shoes "cost" more in Place A than in Place B. It is a simple matter to compare the quality of these apples and shoes, so we can know if higher prices are being paid for similar qualities.

But similar conclusions cannot be drawn about education. District A may spend more per pupil than District B, but it is difficult to know if District A is providing a higher quality education as a result, especially where the districts have students with different socioeconomic backgrounds and needs. Nor can we compare the prices of education "inputs" to determine true costs. If District A spends more on salaries per teacher than District B, it is not necessarily the case that teachers "cost" more in District A than in District B. Equivalent teachers may cost more in District A, just as equivalent apples may cost more in Place A. But the higher salary levels may also be the result of teachers in District A having better qualifications, or it may be that the school board in District A is more generous than other boards. It may be that other professions are more closed to women in the community where District B is located, so unusually qualified women flood the teacher labor market there, driving down salaries below their market values. Or it may be that the District A administration has adopted an inefficient instructional strategy, raising class sizes and using the money saved to pay teachers more than their instructional value warrants. It may be the case that a teachers' union in District A is unusually strong or a union in District B is unusually weak.

Presumably, the Oregon Legislature would want to compensate school districts for real differences in cost. But it would not seem to be good public policy to pay a premium to districts that choose to offer higher salaries for reasons other than economic "cost." (Nor should the state penalize teachers whose salary levels are below their economic "cost" because they live in communities which are more discriminatory.)

If the market for education services were fully competitive (if, in other words, it was a pure market), "cost" and "expenditure" would generally be identical. If there were many school districts in any region competing for the labor of many college graduates, a school district that paid salaries that were less than the economic cost of teachers would find that its teachers were being bid away by other school districts that paid the

full cost. Teachers who demanded compensation in excess of the full economic cost of providing their labor would find themselves unable to find employment, because equally qualified teachers would take the available jobs at a lower price.

Education, however, is not a fully competitive market. In many—if not most—communities, school districts have monopsonistic power; i.e., districts are the dominant purchaser of college-educated labor. (Districts need not be the sole purchaser to have a market-distorting effect; rather, they need only be a major purchaser to prevent the market from functioning with perfect competition.) And because teachers tend to be more highly unionized than other college-educated workers, teacher unions have a similar monopolistic control over the supply of teacher labor. That boards of education are publicly elected may also inhibit the market from operating in its pure competitive form, because school employees may have dual roles, being both employers (as electors and taxpayers) and employees.

These characteristics of education markets are not necessarily bad, and we do not describe them in order to criticize them. Many deviations from a pure market in education have been politically adopted for good public policy reasons. For example, society wishes to protect children from teachers without minimum qualifications. Therefore, school boards are prohibited from responding to a shortage of qualified teachers by hiring uncredentialed workers, rather than raising salaries to attract those who meet minimum qualifications. To protect teachers from arbitrary or capricious administrators, the law and contracts require due process in personnel actions, with the result that school districts cannot replace competent teachers with equally competent, but less expensive teachers in a period of oversupply. We describe these deviations from a pure market not because we think they should be changed, but solely to explain why simple observation of the economic transactions between school districts and their personnel cannot be sufficient to identify the true "costs" of education from place to place.

The task of the cost-of-education theory, therefore, is to imagine what the cost of education in a community would be if the education market were fully competitive; in other words, what would education really cost, as opposed to what districts actually spend. And the goal of a regional cost adjustment within a state like Oregon is to define the relationship between these costs in different communities, as opposed to actual expenditure levels in different communities.

As is the case with other rules regulating the disbursal of funds to school districts, a formula for regional cost adjustment carries

no suggestion about how districts should actually spend their funds. If it is determined, for example, that it costs more to hire a teacher in District A than it costs to hire a similarly qualified teacher in District B, the state may wish to ensure that District A has proportionally greater funds at its disposal. However, District A will not necessarily use this premium to hire teachers with qualifications similar to those of District B's teachers. District A may, for example, choose to hire less qualified teachers at salaries comparable to those paid for more qualified teachers in District B, and to use its additional funds to maintain class sizes that are lower than those in District B. Such choices are not inconsistent with a regional cost adjustment, whose sole purpose is to ensure that the total value of real resources available to districts in different regions is equal. How districts choose to deploy those resources is an entirely separate matter which may, or may not, be subject to state regulation.

In the discussion earlier, we used the example of "teachers," but the same is true of many of the products and services school districts purchase. For any product or service that is bought and sold in a less than fully competitive market, there is, in principle, a distinction between the prices actually paid for that product or service and what districts would spend in a pure economic environment.

On the other hand, when it comes to many inputs of education, even if we understood the true economic cost of a product or service, school districts would not necessarily be able to purchase that product or service at that price. For example, monopolistic practices may affect the price of energy differently in different communities, but understanding this problem will not make it possible for school districts to purchase energy at a competitive price.

Therefore, a regional cost adjustment for education must consider both the pure economic cost of inputs (like teachers) over which districts have discretion, and the externally imposed prices of inputs (like energy) over which districts have no control.

Nationally, there is growing theoretical interest in developing models of education costs which include an index for regional cost (as opposed to expenditure) variations. Most studies focus on teacher compensation, because teacher compensation, compensation of other school professional employees, and contracts for outside professionals make up the biggest part of school spending (McMahon and Chang 1991; Barro 1993; Chambers and Fowler 1995; Parrish, Matsumoto and Fowler 1995). Several states, in addition to Oregon, have grappled with this problem.

There are three types of approaches which are most often

considered to adjust intra-state expenditures for cost differences.

The "Hedonic Wage" index

The leading work in this field has been and continues to be done by Jay Chambers, an economist at the American Institutes for Research in Palo Alto, California. Chambers notes that hundreds of factors enter into the salary transaction between teachers and school districts. Some of these factors are within district control, and some are not. Only those not within district control are true "cost" factors, but it is difficult to separate these factors from the discretionary ones. For example, in the marketplace, teachers may be willing to accept lower salaries to live in an urbanized community with access to theaters, restaurants, and other amenities. But teachers may demand higher salaries to teach in communities with more crime or pollution, or in communities where parents have low levels of education and thus assist less in their children's education. Teachers who graduated from colleges with better academic reputations may be "worth" more to school districts, and so may teachers with a modest degree of experience. Districts have no control over the amenities (or lack thereof) in their communities, crime or pollution levels, or parental educational attainment. But districts can decide whether to pay more to attract teachers from colleges with better academic reputations or with prior experience.

Using data from any particular district or state, it is impossible to determine the extent to which each of these hundreds of factors have influenced the teacher salary levels in that district or state. The factors interact with each other in ways difficult to decompose. For example, a metropolitan urban district may have both greater amenities and higher crime rates. Is the true "cost" of teachers in that district higher because of crime rates or lower because of amenities, and how much does one offset the other? Chambers suggests that the only way to separate these factors is with a national database that includes information on the characteristics of tens of thousands of teachers and their communities. Using the statistical technique of multivariate regression analysis, Chambers proposes to isolate the effect of each of these factors. If, for example, multivariable equations can be run for each community in the nation with values for its crime and amenity levels (and the hundreds of other factors as well), because these factors will appear in different combinations in different communities, the equations can be solved for the influence of each variable separately. Once we have solved these equations, we should be able to say what the true "cost" of a teacher is in a community with given levels of amenities, crime, density, pollution, parental education, and other factors.

Consider the following imaginary example. If regression analysis of a national sample demonstrated that actual salaries

paid to teachers who lived in communities with warm climates were 10 percent less than the salaries paid to teachers who were identical in every other measurable respect (such as experience and college grades) but who lived in communities with colder climates which were also identical to the warm-climate communities in all other measurable respects (such as pollution and parental education attainment), one might reasonably conclude that it actually costs districts 10 percent less to hire a comparable quality of teacher in warm-climate communities. This statistical finding might be explained by saying that teachers find communities with warmer climates more desirable places to live because of the recreational opportunities offered, that there is therefore a relatively greater supply of teachers in such communities, and that school districts can take advantage of this relative over-supply by paying lower salaries. Another way of explaining this theory is to say that teachers are generally willing to accept part of their total compensation in the form of the opportunity to live in desirable places, rather than in monetary salaries or benefits.

These relationships may not be superficially apparent and can be identified only by statistical analysis. Notwithstanding the willingness of teachers to accept part of their compensation in the form of access to a more desirable place to live, superficial observation may detect that salaries are higher in some resort communities with warm climates than elsewhere. However, this may be because the oversupply of teachers in these communities permits school districts to select a greater proportion of higher quality teachers (for example, more teachers with master's degrees) at relatively lower salaries (but still at higher salary levels than teachers without master's degrees would require) than communities elsewhere can select. Salaries of teachers in such communities may be a product both of the fact that salaries are higher because of greater qualifications, and lower because of the communities' greater amenities. Statistical analysis is required to separate these effects.

If data from the entire nation is utilized, the statistical sample will be large enough that variations of true economic cost from district to district can be separated from the discretionary factors that also affect actual expenditures. If a state legislature were to apply these national formulae to districts within its state, it could determine how much additional funding high-cost districts should receive to compensate them for their higher costs, without at the same time reimbursing districts for discretionary expenditures which were higher than the normal state funding level.

Note that Chambers insists, correctly, that national formulae must be used when adjusting intrastate education expenditures for cost differences. Certainly in

the case of Oregon, the state is neither large enough nor diverse enough to provide the data necessary to separate cost from discretionary factors. If, for example, we wanted to determine if it cost more to attract teachers to communities in Oregon with more pollution, we could not do so with Oregon data alone, because there are not enough polluted communities in the state to support the mathematical regressions.

Because a hedonic wage index for adjusting regional education costs must be based on relatively complex mathematical regressions, some individuals could unfortunately assume that the technique's conclusions were based solely on fact, not evaluation or analysis. This is not the case, and it is important to emphasize how central non-mathematical analysis remains, even to the hedonic wage technique. Consider, for example, the case discussed earlier where statistical analysis can demonstrate that comparably qualified teachers demand lower salaries in warmer climates than in colder ones. The interpretation of this fact, however—that teachers are willing to trade salary for the opportunity to live in places with more warm-weather recreational opportunities—is an interpretation relying on sociological and historical judgment, not data.

Other reasonable interpretations are possible. In the United States, warmer climates were, in the eighteenth and nineteenth centuries, also associated with the cultivation of cotton which, in turn, provided the technological context for the spread of slavery. Slavery, in turn, left a legacy of legal segregation that divided the labor force by race, making it more difficult to unionize, and of political repression based on the disenfranchisement of non-white working class voters. These conditions resulted in lower wage levels generally than exist in colder climate regions without a slave history. If the statistically demonstrated lower salaries of teachers in warmer climates can be explained by teachers' preferences for more desirable places to live with more outdoor recreational opportunities, then policy makers may be justified in allocating fewer education dollars to warmer communities. But if the statistically demonstrated lower salaries of teachers in warmer climates can be better explained by the history of slavery in the United States, then policy makers would err if they allocated fewer dollars to warmer communities. A decision to do so would create unintended incentives for districts to hire less qualified teachers in those communities. Regression analysis itself cannot make these historical analyses and judgments; only careful theorists can do so.

Should Oregon's Legislature adopt Chambers' national "hedonic wage index" as a means of adjusting Oregon school expenditures? We do not

recommend that Oregon do so at this time, for the following reasons:

1) Chambers' work is still in the development stage, and it will be some time before it has been sufficiently peer-reviewed for Oregon legislators to be assured of its reliability.

2) At some future time, the "hedonic wage index" may be adopted and certified by an authoritative official body (for example, it might be endorsed by the National Center for Education Statistics of the U.S. Department of Education, and Congress might use such an index to adjust the distribution of federal education funds to school districts). But unless and until such official sanction is given, any state that uses such an index must defend each element of its methodology to education professionals, taxpayers, and the electorate. The methodology of multiple regression analysis, however, is too complex to be suited to public debate, and the assumptions and sociological and historical interpretations which must undergird the equations are too numerous to be considered on the public agenda. Once, and if, a "cost of education" index is adopted by a nationally authoritative statistical agency, many states and school districts may choose to utilize it, without bearing the burden of justifying its construction. We liken this to the Consumer Price Index, whose construction is also complex and subject to great methodological debate. Yet so long as the Bureau of Labor Statistics (BLS) publishes such an index, many jurisdictions and institutions utilize it without bearing the burden of justifying its construction. Were it not officially published by BLS, however, it would not be useful to those presently relying upon it.

3) Notwithstanding the theoretical necessity of using national data for a hedonic wage index, Oregon legislators and voters may still be more comfortable with varying expenditures based on cost data derived from the Oregon economy itself.

A Statewide Wage Index

While, as noted earlier, elementary and secondary institutions have both monopolistic and monopsonistic characteristics, they are not isolated from other economic institutions in our society. In practice, this was not always the case. Not too many decades ago, if female college graduates wanted to enter the professions, they sought employment mainly at school districts, because other professions were mostly barred to them. School districts could pay uncompetitively low salaries, knowing the labor supply had nowhere else to turn.

While this is still somewhat true, it is far less so today. Other professional careers are open to women to a greater degree than in the past. This situation, along with

teacher unionization and other cultural factors, has raised teacher salaries to a level sufficient to attract men as well. Thus, to an increasing extent, the teacher labor market is part of a broader labor market of college-educated professional workers, including accountants, managers, scientific workers, and health professionals.

To the extent this is the case, insight into the regional variations of teacher salary cost can be gained by looking at the regional variations of salaries of comparable professional workers in this broader labor market. In theory, if teacher salary levels fall too low in comparison to the salaries of accountants, managers, scientific workers, and health professionals, fewer college students will seek teaching credentials and will instead seek to enter the other professions. Or, if teacher salary levels rise too much in comparison to the salaries of these other professionals, then accountants, managers, scientific workers, and health professionals will begin to seek jobs in the teaching profession. (In all cases, we do not refer to each worker in these professions, but only to the marginal workers who will initially be attracted to change careers by relative differences in compensation.) Thus, if teacher salaries are too low relative to other professions, school districts will have to raise salaries to attract qualified teachers, while the other professions in the community will find salary levels falling as more college-educated workers pass up opportunities to teach and instead flood the labor supply of other professions. These processes will continue until an equilibrium is reached.

Note that this theory does not require an observation that teacher salaries are the same, in absolute dollars, as salaries of other professionals in the community. There may be constant characteristics of teachers and teacher working conditions, or of other professionals and their working conditions, which lead to different absolute compensation levels, other things being equal. The theory only requires that teacher compensation bear a relatively constant relationship, across geographical regions, to compensation levels of other professionals.

If this theory has merit, one would expect that if salary levels for comparable professionals (i.e., workers in occupations that generally require a college degree, or perhaps even a master's degree, but not occupations requiring further professional training, such as medicine or law) were higher in Community A than in Community B, then it should "cost" a school district in Community A more to hire a comparable quality of teacher than it would a school district in Community B.

The Legislature would presumably not wish to reward school districts with greater revenues simply because these districts pay their teachers more,

because the Legislature will have no way of knowing whether the higher salary scales were discretionary. But school districts have no discretion over the salary levels of comparable professionals in their communities. Therefore, if the Legislature were to adjust school funds by a regional factor related to the salary levels of comparable professionals, it could be assured it was basing its decision on cost, not discretionary factors.

As will be discussed later, one state, Ohio, currently adjusts its education spending for regional variation in wages, but it uses a formula based on the wages of all workers, not only professionals. The validity of such an approach requires the assumption that in communities where the general wage level is higher, professional wages are higher as well. This assumption is not unreasonable, and while we do not regard the general wage level as being as good a guide to school district salaries as the level of professional salaries, it is better than no adjustment at all. (Ohio attempts to ensure that its formula is not distorted by the mix of workers in a given community—i.e., a community's wage level could be lower because it has more industries using lower-paid unskilled labor than industries using higher-paid skilled labor, even though the absolute wages paid its unskilled workers are not lower than elsewhere—by first adjusting the average wage to a standard mix of economic sectors.)

School districts, of course, do not only hire professional workers, such as teachers, librarians, counselors, and administrators, but districts hire clericals, maintenance and operations personnel, bus drivers, and cafeteria workers as well. But because most of the compensation paid by school districts goes to professional workers, and because professional workers are a far greater percentage of a school district's workforce than of a state's workforce as a whole, an index based on the market compensation for professional workers would be preferable to an index based on the market compensation for all workers. A middle ground between an index based on professional compensation, and an Ohio-type index based on all wages would be an index based on sectoral wage relationships. Such an index would assume that if the average wages paid to "service sector" workers were higher in Community A than in Community B, then it probably costs more for districts to hire teachers in Community A than in Community B.

This assumption is reasonable, because the service sector as a whole shares many economic characteristics with school districts. The human capital (i.e., labor) as opposed to physical capital content in service sector enterprises tends to be higher than in the economy generally, while school districts are still more labor intensive even than most service sector industries. Technology is

more difficult to substitute for labor in service sector industries, although, again, school districts are an extreme case. Similar to school districts, service sector industries overall tend to hire a larger proportion of professional workers than do industries generally; however, there are important exceptions—some personal services or services, such as auto repair—where this is not the case.

On the other hand, while schools are more labor-intensive, and more professional labor-intensive than most other services, they do utilize non-labor inputs (such as textbooks, fuel, and supplies) and non-professional labor such as bus drivers, cafeteria workers, and clerical workers. Therefore, while a professional-only labor index would somewhat overemphasize the importance of professional labor in schools, a services sector index would somewhat under emphasize the professional labor component. We cannot say with certainty which error might be greater in magnitude, although we suspect that a professional labor index would be preferable to the service sector index.

MAP does recommend that the Legislature consider a wage-based approach as part of the solution to the problem of regional education adjustments. As indicated, a professional index would be preferable; a service sector index the next best; and a general wage index a third-best alternative. This approach, however, does have some drawbacks. They are summarized here and discussed in greater detail later in this report.

1) Oregon is a diverse state, and in some communities few professionals are employed, other than schoolteachers. (The types of service sector industries in these communities are also likely to be those most dissimilar in structure to schools.) Without minimizing the seriousness of this problem, we believe it can be addressed by estimation in some communities. The communities where there are too few professionals employed even for estimation purposes are not numerous. We do not believe that a method that works in most cases should be rejected because it does not work in all cases.

2) Oregon's Employment Department collects some wage data on professional workers and data on service sector wages, but the data are not sufficient to support adjustment of education expenditures at this time. The necessary data, however, are not beyond reach. With such substantial education expenditures at risk of misappropriation for lack of a good regional adjustment formula, it may be worth the additional modest expenditure required to upgrade the quality and quantity of data presently collected by the Oregon Employment Department. These problems are discussed in greater detail later in this report.

3) Even if the data were improved, there would remain

serious data quality problems that make professional, sectoral, or general wage indices not fully reliable. It is not conceivable, for example, that data could be improved sufficiently to disclose quality differences between workers with superficially similar characteristics in different communities. A typical accountant in Community A, for example, may earn more than a typical accountant in Community B, because the firms in Community A are larger and more complex, requiring more skilled accountants. Even improved data would not likely make such distinctions.

Similarly, the within-sector mix of service sector industries could vary from community to community, making a service sector index less than ideal. As is discussed later, however, the availability of data at the subsector level in Oregon makes this problem much less serious than it otherwise would be.

A Consumer Price Index

It seems intuitively correct to most people that if school districts are to be given the funds to purchase comparable qualities of teachers, they must be given sufficient funds to pay teachers enough to enjoy comparable standards of living. If apples in Community A cost more than apples in Community B, then if a school district in Community A wishes to hire teachers of comparable quality to those in Community B, it must pay those teachers a premium so they can afford to purchase the more expensive apples. Therefore, it seems reasonable to expect that an index of consumer prices in each region of the state would enable the Legislature to adjust education expenditures so that school districts could acquire teachers of comparable quality by offering these teachers access to a comparable standard of living. (Although we speak here of teachers, similar reasoning applies to all school employees.)

A consumer price index, however, also has serious flaws as a proxy for the real cost of education in a community. In recent months, there has been extensive national controversy about the Bureau of Labor Statistics' Consumer Price Index (CPI), so consumer price indices' limitations are more familiar to many people today than they once were. The CPI attempts to measure inflation by adjusting costs in the same place at different times (a longitudinal adjustment). There are additional difficulties when a price index is used to compare costs in different places at the same time (a cross-sectional adjustment), the subject of this report.

One difficulty is there are many aspects of the "cost of living" in a particular place which cannot be measured by a price index of goods and services, and the implicit prices of these other aspects may move in opposite directions to the prices of goods and services. For example, we noted earlier that

some communities may be considered to have more "amenities" and be more desirable places to live than other communities. Workers in these communities may be compensated not only with wages, but also with access to places such as beaches, museums, restaurants, theaters, clean air, and ski resorts. The implicit price of lack of access to these amenities in other communities is not captured by a price index. This situation is intuitively evident when we consider that many communities with more amenities also have higher prices for goods and services; yet few people choose to move from those communities to places where prices are lower. In economic terms, we might say that people in these "more desirable" communities are implicitly purchasing inexpensive amenities along with more expensive goods and services. But because only the latter prices are incorporated in a price index, the index overstates the cost of living in "more desirable" communities.

There is a possibility that this distortion can be eliminated by excluding the cost of housing from a consumer price index. If a community becomes an attractive place to live, and more people move to it, grocery stores can import more apples to bring demand in line with supply, so a community's desirability should not cause apple prices to rise. But a community cannot similarly expand the supply of land for housing, without creating additional costs (like commuting time). Therefore, as a community becomes a more desirable place to live, its land and thus its housing prices tend to rise. By excluding the price of housing from a consumer price index, we may be able to avoid "double compensating" school employees who live in desirable places—first by offering them access to amenities, and then by reimbursing them for the higher residential land prices they have paid to gain this access.

This solution is not perfect however. While land prices may reflect the desirability of location, housing prices include more than land—e.g., the price of construction, maintenance, replacement insurance, and utilities. Excluding housing prices not only excludes land values, but also other prices which legitimately belong in a price index. Even the exclusion of land is problematic; land prices may increase not only because of a community's desirable amenities, but also because of economic growth specific to a location. Land prices in a port city, a mining community, or a technology center may go up for reasons having nothing to do with amenities, but simply because jobs that must be done in that location require workers who live nearby.

Housing presents a problem for pricing for another reason as well. Home prices reflect not only the price of housing, but also expected appreciation or depreciation. It would surely be contrary to the intent of the

Legislature, however, to offer school districts extra compensation because they hire employees who own an appreciating asset. The BLS has dealt with this problem in the national CPI by pricing only the "rental equivalence" of private homes, eliminating the portion of home sale prices that is attributable to the investment component. This solution is possible in the BLS' longitudinal index for "all urban consumers," because urban areas are places where it is practical to find rented homes that are equivalent to owner-occupied housing. In a state like Oregon, however, it is unlikely that it would be possible to determine the rental equivalence of home prices in many areas, because there is no rental market in these areas. Thus, with a statewide price index, we can never be certain that the price of housing and the asset value of homes have been properly separated.

There are additional difficulties with using a price index to make cross-sectional cost adjustments. Any price index must assume a standardized consumer of a standardized family size with a standardized income, because the survey on which the index is based must price the same collection of goods and services in different communities. Since consumers with different tastes, family sizes, and income levels have different purchasing habits, the "market basket" of goods and services on which the index is based is necessarily inappropriate for most specific consumers. Every consumer, in effect, has his or her own consumption pattern. The value of a price index for adjusting education expenditures depends on the degree to which most teachers resemble the typical consumer and his or her purchasing habits on which the index is based.

This problem becomes particularly troublesome if the degree to which most teachers differ from the typical consumer varies from place to place within the state. For example, large families will spend a higher proportion of their incomes on food at home and clothing than a small family with the same income, while small families will spend a larger proportion of their income on food in restaurants and entertainment than a large family with the same income. This pattern would not be a major problem for the construction of a regional price index for education, if we could be certain that the proportion of teachers with large and small families in all regions of the state is similar. However, we have no reason to believe that this is or is not the case. If teachers in metropolitan areas tend to have smaller average families than teachers in rural communities, then a price index could overstate the importance of grocery items for urban families while overstating the importance of restaurant meals for rural families. If the prices of grocery items vary between regions differently from the prices of restaurant meals, a price index could misstate the differences in consumer experience.

As the national debate has revealed, a price index also does an imperfect job of identifying quality differences. In some respects, however, this problem is much more serious in a cross-sectional index than in a longitudinal one. For example, indices are based on price checks at the outlets where consumers in a community usually shop. If Community A has many discount stores while Community B has many full service stores, a price survey will disclose that prices for goods are generally higher in Community B. But in many cases, not only will the service in a full service store have unmeasured value, but the quality of goods sold may be consistently better in unmeasured ways. The goods will not be strictly comparable, but the price index will assume that they are. This assumption is less of a problem for a longitudinal survey, because the mix of types of outlets in any community is not likely to change very rapidly. It is more of a problem for a cross-sectional survey, where outlet types can vary greatly from community to community, even though the index is based on a single market basket used for all communities.

Despite these difficulties, however, in addition to the wage-based approach, we also recommend that the Legislature consider utilizing a price index to partially solve the problem of making regional cost adjustments for education. Like a regional wage index, a regional price index is not a perfect proxy for regional variations in the cost of education, but the trends it reveals are likely to reflect real differences, even if the precise magnitude of these differences remains uncertain.

3. OTHER STATES

While many states are struggling with the problem of adjusting education costs for regional cost differences, only four states (Colorado, Florida, Ohio, and Texas) actually have a system for making such adjustments. (In a fifth, Wyoming, the Supreme Court has ordered that state's legislature to have a system in place for making such adjustments in time for the 1997-98 school year.)

In each of these states, the method for making adjustments is different, so it is worth reviewing how each state has addressed this problem. The variety of methods used underscores a point made repeatedly in this report: there is a need to make adjustments for regional differences in costs if equal access to educational resources is desired, but there is no precise or "correct" method for determining the proper adjustment. In each of these states, we conclude that the method utilized brings the state's school finance system closer to equality. Therefore, we cannot say with certainty that, given the unique economic circumstances and data availability in each of these states, a different method would be preferable to that actually in place.

Colorado

Colorado utilizes a consumer price survey to adjust state funding of school districts for regional cost differences. The state commissioned its first consumer price survey in 1993, and the results were used to adjust spending in 1994-95 and 1995-96. A second survey was conducted in 1996, and the results were used to adjust spending in 1996-97 and will also be used in 1997-98. In each case, the state contracted with Runzheimer International to conduct the survey. (The state refers to these as "cost of living" studies, but as noted earlier, consumer prices do not entirely reflect the full "cost of living," which also must take into account amenities and product quality. Therefore, we use the terminology "consumer price survey" here, not "cost of living" survey.)

The price of housing is included in the Colorado index. The index is not applied to the full per-pupil state funding for districts, but only to the proportion of a district's budget that is devoted to personnel costs. This makes sense, because the theory of this cost adjustment is to compensate personnel for different price levels in different communities. To avoid creating an incentive for districts to increase the share of expenditures devoted to personnel to qualify for a greater adjustment, the personnel percentage is based on historical data, not current year data, and the personnel percentage is not unique to individual districts, but is common to districts

of similar sizes. The smallest districts, which are presumed to have larger non-personnel overhead costs, have the price adjustment applied to the smallest budget share, 79.6 percent. The largest districts have the price adjustment applied to 90.5 percent of their budgets.

Prices are surveyed for each district's "labor pool area," defined for each district by an analysis of the residence address of each teacher in the district. Because teachers are presumed to shop in their district of residence rather than in the school district that employs them, districts are compensated by the state for the price differences experienced by their labor pool area (weighted by the number of teachers residing in each district within the district's labor pool). This system may create a perverse incentive for teachers to move to higher-cost residential communities, or for districts to hire teachers who live in higher-cost communities, but we are aware of no controversy about this provision within Colorado.

The index results in a large adjustment for Colorado districts. Districts with the highest consumer price levels receive 60 percent more funds for their personnel costs than districts with the lowest consumer price levels. Notwithstanding this very substantial adjustment, we are not aware of any serious disagreement within Colorado at this time about the justice of this system.

Florida

Florida also uses a consumer price index (called the Florida Price of Living Index) to adjust state education funding of local school districts. Each year, school district allocations are modified by a "district cost differential" calculated using the average of the past three years of price information. This three-year rolling average is designed to smooth year-to-year fluctuations, which may not reflect underlying trends. The price index is calculated by the state's Department of Education, but prices for goods and services are collected by Elrick and Lavidge, an Atlanta firm with whom the state contracts for this purpose.

Florida does include housing in its index. For all items, Florida creates a market basket that uses the item weights established by the Bureau of Labor Statistics for the CPI.

All Florida school districts are county-wide. In 1996, the index number for the highest price county (Monroe, in the Florida Keys) was 22 percent higher than the index number for the lowest-price county. The index number for Miami (Dade County) was 20 percent higher than that for the lowest-price county. In recent years, this dispersion of index values among Florida districts has grown. The population-weighted standard deviation of price index values has been about 30 percent higher in the post-1987 period than it was previously, causing about 30 percent more state education

dollars to be shifted to high-price districts than would have been shifted if the dispersion had not grown (Denslow, Honeyman and Rasmussen, 1996).

A group of academic finance experts in Florida have recommended that the price index methodology be modified to reduce the possibility that the index overstates prices in urban areas (Denslow, Honeyman and Rasmussen, 1996). In brief, their recommendation was that, to a greater extent, standard products should be priced at chain stores throughout the state, even if these chains are not equally represented in the shopping patterns of all state residents. Thus, a pair of shoes would be priced at discount stores in all communities, even if, in some urban communities, consumers tend to shop at higher-priced shoe stores where more service is provided. In rural communities where no discount stores exist, prices would be estimated.

This academic study was conducted in response to concerns of Florida's policy makers that the price index inappropriately converts higher-quality goods and services to higher-priced goods and services, with the effect that the Florida district cost adjustment may have permitted large urban districts to recruit the state's best and most highly educated teachers, leaving other districts at a disadvantage. As a result, the methodology of the price survey last year was changed somewhat to emphasize greater use of prices in statewide retail and restaurant chains, disregarding the shopping habits of consumers in some counties to make purchases at chains less than consumers do in other counties. This year, one Florida state senator has introduced a proposal to restrict to 10 percent the range of education adjustments called for by the price level index, believing that the index exaggerates differences in real costs. However, as of this writing, the Legislature seems not inclined to adopt this proposal, as most legislators seem satisfied that recent modifications in the survey methodology accommodate their concerns (Kimble, 1997).

Ohio

Ohio, in contrast to Colorado and Florida, uses a wage-based measure to adjust school expenditures, not a consumer price measure. Using state Bureau of Employment Services data, the Department of Education calculates the average weekly earnings for each county in the following sectors: agriculture and forestry, mining, construction, manufacturing, transportation and utilities, wholesale and retail trade, finance-insurance-real estate, services, and state and local government.

An overall county-weighted average wage is then calculated by assuming that each county has the same share of employment in each sector as does the whole. This weighting prevents a state distortion in average wages from being

created by the varying mix of sectors in each county. In other words, without this weighting, a county's average earnings might be low primarily because a large share of its employment was in a low-wage sector (like retail trade), even though its wages for similar types of employees were not lower than elsewhere. (Note that the important thing about this adjustment is that it calculates each county's average earnings as though that county had the same mix of sectoral employment as every other county. Using the statewide average to derive this standard mix is unimportant to the method. The postulation of any standard sectoral mix would do the job of preventing comparisons from being distorted by different mixes of employment by sector in different counties. The ideal standard would be one which adjusted each county's sectoral mix to the mix of sectors whose employment types most closely resembled the employment types found in elementary and secondary schools.)

Ohio then makes another adjustment which is uniquely possible in that state. Ohio has 88 counties, almost all of which are roughly square in shape, so a county map of Ohio looks something like a checkerboard. The Department of Education, therefore, can make the assumption that the labor market of each county consists not only of the workers in that county, but of workers in all of the counties that surround it. Consequently, education calculations for each county are based on a "cost of doing business factor" calculated from the average of the weighted average earnings for that county, as well as the weighted average earnings for each contiguous county.

Average wages of these contiguous county groups vary by as much as 15 percent. The Ohio General Assembly, however, has determined that it would not be appropriate to adjust school district revenues by so large a cost-of-doing-business factor. Therefore, the Ohio Legislature decided to establish the maximum range as 7.5 percent. The distribution of cost-of-doing-business factors was then pro-rated within a 7.5 percent range, so the highest cost district received only 7.5 percent more state revenue than the lowest cost district.

Recently, however, Ohio education finance experts have argued that, while 15 percent may be too large an adjustment, 7.5 percent has been too small. Responding to these arguments, the General Assembly has been increasing the permitted range. For 1995-96, the range was increased to 8.2 percent, and for 1996-97, the range has been increased to 8.9 percent.

Very recently (March 21, 1997), the Ohio Supreme Court invalidated the state's current system for financing education. The major cause of inequality in district finances has been the local, property-tax-based share of

revenues, not the state's basic grant to which the regional adjustment is applied. Nonetheless, the court decision will require a redesign of the Ohio school finance system, and this redesign may involve the regional cost adjustment as well.

Texas

Texas adjusts state funding for school districts by means of a regression analysis which, unlike Chambers' "hedonic wage index," is based only on Texas state data. This Texas "Cost of Education Index" includes some control for regional variation.

Regional variation is reflected in the formula by the use, as one variable, of beginning average teacher salaries in contiguous counties. The regression therefore attempts to isolate the extent to which teacher salary levels are beyond the discretionary control of a district, because the district must compete for teachers by offering salaries that are competitive with contiguous districts.

Other variables in the equations are not regionally based, although one, whether the district is located in a rural county, shares characteristics with a regional adjustment. An important variable in the equation is the percentage of low-income pupils in the district, a factor for which Oregon already makes an adjustment.

As a result of the adjustments from the Texas index, the highest-cost districts receive as much as 19 percent more state revenue than the lowest-cost districts. Isolating the range attributable only to that portion of the index that reflects regional differences (i.e., beginning-teacher salaries in contiguous districts), the districts with the highest regional costs receive nine percent more state revenue than the lowest-cost districts. Some additional variation may be attributable to the rural county factor.

The Texas formula attempts to avoid creating an incentive for districts to increase beginning salaries by basing state aid not on the salary level in the affected district, but only on salary levels in contiguous districts. However, this protection remains unsatisfactory. Because many districts are contiguous with each other, and because the number of districts contiguous to any district is relatively small, there is always the possibility of collusive behavior by districts to manipulate the level of state aid by increasing beginning teacher salary levels. That there is no evidence that this has ever actually occurred is not the point, but only that its possibility lessens confidence in the index.

The 1995 Texas legislative session adopted a requirement that the entire funding formula for education be reconsidered. Most of the dissatisfaction with the current formula is not based on the regional adjustment, but on the use of "free- and reduced-price lunch" counts as a way of measuring

student need, and on the role of property taxes in education revenues. But all elements in the formula may be reconsidered during the current or following legislative session. While dissatisfaction with the regional adjustment is not expressed as strongly as dissatisfaction with the student-need adjustment or the property-tax mechanism, several influential legislators are uncomfortable with the regional adjustment because they believe a regression method is too complex for this purpose and that a price index based on a market basket of consumer goods might be a more appropriate way of adjusting for regional differences. Presently, however, the variable for beginning teacher salaries in neighboring districts remains in the Texas Cost of Education Index.

Wyoming

Wyoming does not presently adjust education expenditures for regional cost differences, but the Wyoming Supreme Court has ordered the Wyoming Legislature to implement a regional cost adjustment (among other equalization measures) in time for education funding of the 1997-98 school year.

The Wyoming Legislature contracted with MAP to design an equalized system, and the Legislature is currently considering our recommendations. With regard to the regional cost adjustment, we found that the Wyoming economy was not sufficiently diverse, and wage data from the Wyoming Department of Employment were inadequate to provide a basis for calculating regional cost differences. Wyoming did, however, already have in place a consumer price survey, conducted by its Department of Administration and Information, to establish county-specific poverty lines used to grant property tax exemptions for low-income homeowners. Wyoming calls this adjustment the "Wyoming Cost of Living Index" (WCLI). The survey utilizes methodologies borrowed from the Bureau of Labor Statistics in its Consumer Expenditure Survey for calculating the Consumer Price Index. We recommended that this survey be used for making adjustments in education funds to distribute to Wyoming school districts (Guthrie, et. al. 1997).

MAP proposed that, for the purposes of education adjustments, the WCLI be applied only to that portion of standardized model district expenditures expected to go to personnel compensation (in Wyoming, this would be about 76 percent of all expenditures), and that housing and medical care expenditures be removed from the index prior to calculation, with other goods and services re-weighted for greater relative importance. The reasons for excluding housing expenses were discussed earlier. MAP recommended that medical care expenditures be excluded because Wyoming school districts normally provide health insurance to school employees, and so the relative

importance of medical care expenditures (such as co-payments and deductibles) would be less for Wyoming school employees than for typical urban consumers nationwide, and because Wyoming insurers generally do not vary their premium charges to school districts based on regional location. (Note that the consumer price survey conducted by Runzheimer International for Colorado includes medical care expenditures, but with a weight appropriate for consumers who have health insurance.)

This Wyoming methodology results in index numbers ranging from 97.7 in the lowest cost district to 109.8 in the highest cost district, after applying the 76 percent personnel factor; in other words, the analysis suggests that Wyoming's highest cost district requires approximately 12 percent more per-pupil dollars to purchase the same quantity and quality of inputs as the lowest cost district. If an index is utilized with housing included, the variation is substantially greater, with index numbers ranging from 93.0 to 120.7, a difference of 29.8 percent.

As this report is written, it is not known whether or to what extent the Wyoming Legislature will adopt MAP's recommendations in this regard.

Cost of Implementation

In each of these states, there is an administrative cost associated with making these regional cost adjustments.

In Colorado, the state contracts with a private firm to conduct the price surveys on which the regional cost adjustments are based. Colorado has commissioned two such surveys since the cost adjustment methodology was adopted. On each occasion, Runzheimer International received all or part of the commission. In addition to these costs for contracted surveys, the state's administrative costs are minimal; the results of private surveys are utilized in calculations in simple spreadsheets by state education officials. Including the costs of private contractors, these officials estimate that the state spends about $110,000 for the calculation of each biennial adjustment, or approximately 19 cents per pupil (Ward 1997).

In Florida, the cost of compiling the Florida Price Level Index consists both of a contract to a private surveying firm (responsible for surveying about 90 of the 117 items priced for the index), and the time of state employees who utilize state databases to generate price data for the remaining items, and who use these data to calculate the index itself. It is estimated that these costs total $300,000 for each annual index, or approximately 13 cents per pupil (Kimble 1997).

In Ohio, the administrative cost is insignificant, because the Bureau of Employment Services already collects the wage data on which the regional cost adjustments are made. Using these data, one Ohio Department of Education employee is able to calculate the regional cost adjustment in a few hours, at most.

In Texas, the administrative cost is also insignificant, because the Texas Education Agency routinely keeps data on teacher salaries, and utilizing these in the regression formula can be done by officials already in place. If Texas were to substitute a consumer price survey for the existing teacher salary data now used in the regression model, additional administrative costs would be incurred. The Texas Education Agency and the Legislative Budget Board devote professional time, equal to less than two full-time-equivalents (FTEs), to constant evaluation of the index, of which the regional cost adjustment is only a small part (Wisnoski 1997).

Wyoming spends about $45,000 annually to calculate a "Wyoming Cost of Living Index" every six months, but this expense is already incurred before the use of the index for purposes of education-cost adjustments is considered. This expense is partly to pay per-diem costs of price checkers who live in the surveyed communities, and partly to pay the administrative costs of supervising the price checkers, administering the survey, and calculating the index. However, if the Legislature adopts MAP's recommendation to use the index for purposes of making a regional education adjustment, the costs will undoubtedly rise as the state attempts to improve the index's reliability. Additional moneys could be spent on better training of the price checkers to assure that judgments about item similarity and quality changes are being made correctly, on adding additional communities to the survey, and on improving supervision of the survey by the responsible state officials.

4. OREGON INDICES

Before analyzing regional differences in Oregon costs, a definition is required of Oregon "regions" among which the cost of delivering education services might differ. There are 200 school districts in Oregon; yet many are too small to be considered economic regions with distinct differences in cost patterns. There are 36 Oregon counties, but many are also too small (in population and economic activity) to be considered economic regions in themselves. On the other hand, some counties have significant intra-county variation in economic patterns.

Solely for the purpose of this analysis, we have divided Oregon into 25 regions. Some of these regions are contiguous with single school districts or counties; others are composed of groups of adjacent districts or counties. **Figure 1** defines these 25 regions.

Figure 1

Region	Region Description
1	The North Clackamas School District, headquartered in Milwaukee.
2	West Linn, Lake Oswego, Oregon City, and Gladstone.
3	The Medford School District (city of Medford)
4	Josephine County and the balance of Jackson County (excluding Medford). Ashland is the largest community in this region.
5	Coos and Curry counties. The largest communities are Coos Bay and Brookings.
6	The Springfield School District (a suburb of Eugene).
7	The Eugene School District
8	The balance of Lane County (excluding Eugene and Springfield). Cottage Grove and Florence are larger communities.
9	The City of Portland
10	The balance of Multnomah County, excluding Portland. Gresham is a large community outside the inner-Portland metro area.
11	Beaverton, Sherwood, andTigard
12	Hillsboro, Gaston, Forest Grove, and Banks
13	Welches, Mollala River, Sandy, Colton, Canby, Cottrell, Estacada, and Butte Creek.
14	Benton, Linn and Polk Counties. The Corvallis-Albany area is the largest community.
15	Douglas County. Roseburg is the largest community.
16	The Salem/Keizer School District.
17	The Balance of Marion County (excluding Salem-Keizer). Woodburn and Silverton are larger communities.
18	Morrow and Umatilla Counties. Pendleton is the largest community.
19	Yamhill County. McMinnville is the largest community.
20	Eastern Oregon: Baker, Grant, Harney, Malheur, Union, and Wallowa counties. Towns along Interstate 84 include LaGrande, Baker and Ontario.
21	Clatsop, Lincoln and Tillamook counties. Coastal towns include Astoria, Tillamook, Lincoln City and Newport.
22	Columbia County. St. Helens is one of the larger communities.
23	The Bend/Lapine School District
24	Crook, Gilliam, Hood River, Jefferson, Sherman, Wasco and Wheeler Counties, and the balance of Deschutes County (excluding Bend/Lapine). The Dalles is the largest community. Redmond-Prineville is another populated area.
25	Klamath and Lake counties. Klamath Falls is the largest community.

MAP defined these regions in consultation with policy makers familiar with Oregon economic patterns. However, any such

definition requires a degree of approximation. For example, there may be some geographic-based differences within a school district, or even neighborhood differences within a large city. We ignored these, assuming that the state would adopt a school finance system which adjusts the level of funds by district, not by sub-district areas, and that districts would maintain single salary schedules and unified patterns to purchase other school inputs. Some regions in our list of 25 may also be indistinguishable, in economic characteristics, from neighboring regions. Though the data may show such similarities, we retained the 25 regional definitions because we believe they will appear intuitively reasonable to Oregon policy makers. If adjacent regions are similar, this will be reflected in similar index numbers for these regions derived from the calculations.

Having defined these 25 regions, we examined two types of data on which regional cost adjustments might be based: wage data from Oregon state employment databases, and price data from a consumer price survey commissioned for this report.

Wage Difference Data

The Oregon Employment Department collects data which helps shed light on regional differences in the cost of education. While the data could be improved and made more useful for this purpose, the trends illustrated by present data suggest that there are important regional differences, and that their direction is unmistakable.

Indices Based on Oregon Covered Employment and Payrolls

The Oregon Employment Department annually publishes Oregon Covered Employment and Payrolls by Industry and County. The most recent report was published in December 1996, with annual and monthly data for calendar year 1995.

All enterprises covered by Oregon's unemployment insurance program (approximately 90 percent of total employment in the state) confidentially report their total payrolls and number of employees each quarter to the Employment Department. The department then classifies each report by county and separates data by "standard industrial classification." The major private sector classifications are agriculture, forestry, and fisheries; mining; construction; manufacturing; transportation, communication, and utilities; wholesale trade; retail trade; finance, insurance, and real estate; services; and other.

By dividing the total payroll reported in each category and county by the number of employees covered, we can get an estimate of average monthly or annual earnings per employee. This estimate is very rough, however, because the data do not permit separation of part-time from full-

time employees. We have no reason to believe that the frequency of part-time employment is or is not equal among Oregon counties. Therefore, we cannot be entirely comfortable that an index based on these data is a true reflection of the range of wage and salary levels throughout the state.

We have based these calculations on private-sector payroll data only, because the purpose of this analysis is to determine relative wage levels between different regions of the state. Salaries of federal and state employees will not exhibit regional variation, because federal and state salary schedules do not provide different salary levels for comparable employees in different regions. Available payroll data for public employees do not separately report local government salary levels which, unlike federal and state salaries, may vary from region to region.

It may be the case that in some regions of the state, a large presence of state and federal professional employment could influence the cost of teachers to school districts. But presumably, this state and federal employment would also influence private-sector professional salary levels in the region as well as the cost of teachers, and so the influence of public-sector salaries would be reflected in the private-sector data. This would not be the case only in regions where there was little private-sector employment on which to base these data. In these cases, policy makers may want to investigate whether an *ad hoc* adjustment is appropriate. Similar *ad hoc* adjustments would be advised for regions where there is neither significant public nor private-sector professional employment, except for public school districts. As we have indicated elsewhere in this report, a method which works well for most places should not be ignored because it does not work well for every place.

Another limitation to conclusions drawn from these data is that we have developed this analysis using data from Oregon's Employment Department only. Some school districts in border regions, however, may participate in labor markets that extend to neighboring states. A more accurate analysis would include data from complete Oregon labor markets, even where such completion necessitates inclusion of salary data from counties in neighboring states. If the Legislature adopts the methods described herein, in whole or in part, it may want to investigate the possibility of including such data from other states in order to improve the methods' accuracy. Such an investigation, however, was beyond the scope of this report.

Though mindful of these limitations, we have calculated three indices based on these data. The least useful is an index by county of average annual payroll per employee. With the state as a whole = 100, the range is from

Sherman County (.54) to Washington County (1.24).

MAP also converted this county index to an index for the 25 education regions established for this report. Because the regions are sometimes defined by school district and not county boundaries, some adjustment of the initial numbers was required. For each of the education regions as defined in this report, the region index number is computed as follows:

- In cases where several entire counties comprise an education region, the weighted (by number of enrolled students) average of counties is used to calculate the index number.
- In cases where an education region is smaller than a county, the index number for the entire county is used.
- In cases where an education region consists of a combination of school districts and counties, where not all districts are in one county, the index number for the region is calculated by weighting the county index numbers by the enrollment of districts in the applicable counties.

These data are displayed in **Table 1, Part A and B**. Columbia County is an outlier, with an index number of only 0.55. Excluding Columbia County, the range is from Education Region 5 (Coos and Curry counties), with an index number of 0.71, to Education Regions 11 and 12 (Washington County), with index numbers of 1.24. Excluding Columbia County, this total employment index suggests that the costs in the highest-cost education region are 75 percent greater than costs in the lowest-cost education region.

Table 1-Part A

Average Annual Private Sector Payroll in Oregon Counties and Education Regions 1995.		
Payroll Cost Index for 25 Oregon Education Regions		
Education Region	Index Number	Rank
1	1.01	19
2	1.01	20
3	0.83	10
4	0.80	7
5	0.71	2
6	0.88	14
7	0.88	15
8	0.88	16
9	1.12	22
10	1.12	23
11	1.24	24
12	1.24	25
13	1.01	21
14	0.97	18
15	0.86	13
16	0.84	11
17	0.84	12
18	0.79	6
19	0.89	17
20	0.72	3
21	0.75	4
22	0.55	1
23	0.83	9
24	0.79	5
25	0.81	8

Table 1-Part B

Payroll Cost Index for 36 Oregon Counties				
County	Avg # of Employees	Total Payroll ($000s)	Average Payroll per Employee $	Index
Baker	3,506	63,984	17,744	0.70
Benton	24,465	660,563	27,004	1.07
Clackamas	97,813	2,476,570	25,320	1.01
Clatsop	12,307	252,529	20,527	0.82
Columbia	1,358	18,936	13,944	0.55
Coos	4,279	77,319	18,069	0.72
Crook	4,784	105,364	22,024	0.87
Curry	4,526	82,069	17,741	0.70
Deschutes	34,105	708,710	20,780	0.83
Douglas	27,055	585,872	21,655	0.86
Gilliam	521	11,758	22,567	0.90
Grant	1,653	31,719	19,189	0.76
Harney	1,487	26,241	17,647	0.70
Hood River	8,178	142,938	17,478	0.69
Jackson	53,451	1,123,784	21,025	0.83
Jefferson	4,942	106,404	21,531	0.86
Josephine	16,069	299,051	18,610	0.74
Klamath	17,384	365,659	21,034	0.84
Lake	1,528	26,337	17,236	0.68
Lane	104,501	2,307,234	22,057	0.88
Lincoln	12,781	228,458	17,875	0.71
Linn	32,590	802,965	24,638	0.98
Malheur	9,991	174,058	17,421	0.69
Marion	87,433	1,854,795	21,214	0.84
Morrow	2,347	63,258	26,953	1.07
Multnomah	356,638	10,102,020	28,326	1.12
Polk	10,336	200,500	19,398	0.77
Sherman	316	4,321	13,674	0.54
Tillamook	5,773	103,548	17,937	0.71
Umatilla	19,373	365,837	18,884	0.75
Union	6,598	125,912	18,798	0.75
Wallowa	1,373	24,725	18,008	0.72
Wasco	7,125	134,941	18,939	0.75
Washington	160,441	5,001,856	31,176	1.24
Wheeler	133	2,057	15,467	0.61
Yamhill	21,904	490,062	22,373	0.89
Statewide	1,191,474	$30,001,090	$25,180	1.00
Source: Oregon Employment Department, 1995 Oregon Covered Employment and Payrolls By Industry and County (12/96)				

The second index, somewhat more useful, uses the Ohio method of creating a county index number by weighting the average annual payroll for each SIC code in the county by the relative importance of employment in that sector in the state as a whole. This weighting avoids distortions based on mix — a county may have high wages for comparable employees, but a low average wage because of a large number of jobs in low-wage sectors.

As indicated earlier, this index implicitly assumes that the distribution of type of employees hired by school districts (such as professional, paraprofessional, clerical, and blue collar) is similar to the distribution of type of employees in the whole state. This assumption is unwarranted and, if compensation varies regionally in different ways for different types of employees, this index's utility will be limited.

However, the fallibility of this method can be reduced, by going a step further than the Ohio method, and weighting the employment in each county by the two-digit SIC code, rather than by employment in the broader sector as a whole. (In other words, instead of, for example, weighting the payroll of retail employees in a county by the relative importance of all retail employees in the state's overall employment, we weight by sub-sectoral classifications, such as "building material and garden supplies retail employees," "general merchandise stores retail employees," and "food stores retail employees.") To the extent we can assume that wage levels in different sectors vary with a consistent regional pattern, this specificity makes the index much more reliable than an index only weighted at the broad sectoral level.

The index range is considerably attenuated because of an adjustment necessitated by the fact that in every county of the state, there are some two-digit SIC code sectors without any employment, and in some counties, many such sectors are missing. In these cases, the statewide average salary or wage for that sector was used to represent the wage in the missing sector. A more sophisticated methodology, not developed for this report, could avoid this attenuation of range by estimating wages for missing sectors by utilizing the observed relationship of wages among sectors in other counties.

A list of Oregon employment by two-digit SIC code, the statewide weight of each category, and the statewide average salary for each category, is found in **Figure 2**.

Figure 2

Oregon Private Employment Weights by Two-Digit SIC Code, 1995			
[illegible]	[illegible]	[illegible]	[illegible]
Agriculture, Forestry, and Fishing:			
01	[illegible]	0.0183	14,192
02	[illegible]	0.0019	17,464
07	[illegible]	0.0097	15,567
08	F[illegible]	0.0037	21,186
09	F[illegible]	0.0006	38,456
Mining:			
10	[illegible]	0.0000	29,312
13	[illegible]	0.0000	27,642
14	[illegible]	0.0014	34,229
Construction:			
15	[illegible]	0.0140	29,308
16	[illegible]	0.0077	38,773
17	[illegible]	0.0358	29,862
Manufacturing:			
20	F[illegible]	0.0213	23,792
22	[illegible]	0.0013	24,639
23	[illegible]	0.0024	17,366
24	[illegible]	0.0447	29,922
25	F[illegible]	0.0031	24,685
26	[illegible]	0.0076	46,477
27	[illegible]	0.0135	28,371
28	[illegible]	0.0026	37,591
29	[illegible]	0.0004	39,489
30	[illegible]	0.0055	26,432
31	[illegible]	0.0004	20,870
32	[illegible]	0.0036	31,951
33	[illegible]	0.0089	38,797
34	F[illegible]	0.0113	29,136
35	[illegible]	0.0178	38,511
36	[illegible]	0.0224	45,446
37	[illegible]	0.0127	33,008
38	[illegible]	0.0079	45,745
39	[illegible]	0.0039	22,585
Transportation, Communications, and Utilities:			
41	[illegible]	0.0035	14,623
42	[illegible]	0.0242	28,646
44	[illegible]	0.0019	44,380
45	[illegible]	0.0053	32,618
47	[illegible]	0.0042	25,915
48	[illegible]	0.0106	38,440
49	[illegible]	0.0076	46,093
Wholesale Trade:			
50	[illegible]	0.0422	36,198
51	[illegible]	0.0332	32,483

Retail Trade:			
52	[illegible]	**0.0099**	**21,428**
53	[illegible]	**0.0280**	**17,638**
54	**F**[illegible]	**0.0337**	**16,047**
55	[illegible]	**0.0265**	**25,106**
56	[illegible]	**0.0112**	**13,994**
57	**F**[illegible]	**0.0093**	**20,171**
58	[illegible]	**0.0824**	**9,422**
59	[illegible]	**0.0243**	**15,521**
Finance, Insurance, and Real Estate:			
60	[illegible]	**0.0187**	**27,106**
61	[illegible]	**0.0043**	**37,787**
62	[illegible]	**0.0025**	**69,902**
63	[illegible]	**0.0122**	**35,343**
64	[illegible]	**0.0066**	**33,039**
65	[illegible]	**0.0160**	**19,086**
67	[illegible]	**0.0018**	**42,829**
Services:			
70	[illegible]	**0.0166**	**11,729**
72	[illegible]	**0.0096**	**14,713**
73	[illegible]	**0.0649**	**21,290**
75	[illegible]	**0.0112**	**21,397**
76	[illegible]	**0.0039**	**23,916**
78	[illegible]	**0.0050**	**14,991**
79	[illegible]	**0.0138**	**14,813**
80	[illegible]	**0.0800**	**30,126**
81	[illegible]	**0.0078**	**35,773**
82	[illegible]	**0.0108**	**20,496**
83	[illegible]	**0.0286**	**14,156**
84	[illegible]	**0.0009**	**17,071**
86	[illegible]	**0.0173**	**13,027**
87	[illegible]	**0.0215**	**34,599**
88	[illegible]	**0.0024**	**11,616**
89	[illegible]	**0.0004**	**33,747**
99	[illegible]	**0.0009**	**23,840**

With the state as a whole = 100, the range is from Education Region 20 (the Eastern Oregon counties of Baker, Grant, Harney, Malheur, Union, and Wallowa), with an index number of 0.79, to Education Regions 9 and 10 (Portland and the rest of Multnomah County), with index numbers of 1.13. This SIC-weighted total employment index suggests that the costs in the highest-cost education region are 43 percent greater than costs in the lowest-cost education region. These data are displayed in **Table 2**. Despite the cautions expressed about the limitations of this index, this index is more reliable than the unweighted index described in Table 1.

Table 2-Part A

Average Annual Private Sector Payroll in Oregon Counties and Education Regions 1995, With Each County's Two-Digit SIC Payroll Weighted by Statewide Two-Digit Employment Mix

[illegible] 25 [illegible]

[illegible]	[illegible]	[illegible]
1	0.99	19
2	0.99	20
3	0.86	11
4	0.82	5
5	0.83	6
6	0.88	14
7	0.88	15
8	0.88	16
9	1.13	24
10	1.13	25
11	1.10	22
12	1.10	23
13	0.99	21
14	0.88	12
15	0.84	9
16	0.89	17
17	0.89	18
18	0.83	7
19	0.85	10
20	0.79	1
21	0.81	3
22	0.81	4
23	0.88	13
24	0.84	8
25	0.80	2

Table 2-Part B

Weighted Payroll Cost Index for 36 Oregon Counties

	19,191	0.76
	23,534	0.93
	24,977	0.99
	20,549	0.82
	20,467	0.81
	21,232	0.84
	20,754	0.82
	19,192	0.76
	22,086	0.88
	21,153	0.84
	20,609	0.82
	20,489	0.81
	19,966	0.79
	19,825	0.79
	21,700	0.86
	21,723	0.86
	19,279	0.77
	20,116	0.80
	19,895	0.79
	22,243	0.88
	20,314	0.81
	21,467	0.85
	19,525	0.78
	22,350	0.89
	23,147	0.92
	28,399	1.13
	21,263	0.84
	19,848	0.79
	20,277	0.81
	20,426	0.81
	19,701	0.78
	22,264	0.88
	20,976	0.83
	27,619	1.10
	16,655	0.66
	21,295	0.85
	25,180	1.00

1995

(As noted earlier, it is necessary to have some caution about this index's reliability, especially for smaller counties, because the Employment Department data on which it is based has no information on hours worked. In counties with a larger proportion than average of part-time employees, the average annual payroll data will be inaccurately low.)

The important thing in this methodology is to weight the employment distribution within each county by a standard distribution. Utilizing the existing statewide distribution of employment by the two-digit SIC code is not as valuable for our purposes as a standard weighting-system based on comparing the types of employees found in school districts with those found in the various two-digit industrial classifications. Here the existing statewide distribution of employment is used to create this index because data are available from the Oregon Employment Department for this purpose. Creating a standard weighting system comparable to school district employment would require a substantial research effort which is beyond the scope of this report.

As a further approximation of this better method, however, MAP created a third index which may be even more reliable. This index is like the second, but it is restricted to employment in the service sector only. Education shares characteristics (such as labor intensity and utilization of professional labor), which are more likely to be similar to characteristics of other service-sector employment than to employment in all sectors.

For this index, each county's annual average payroll data for service-sector employment is weighted by the relative importance of two-digit SIC service-sector employment (SIC 70 to SIC 89) statewide. To the extent that wage levels in different service sub-sectors do not vary by region in the same pattern, using a two-digit SIC service-sector index is preferable to an index based on a composite of service-sector employment, as well as preferable to an index based on all kinds of employment at the two-digit level. This method prevents distortion based on a mix within the broader service sector. In other words, if personal-services (SIC 72) employees tend to have lower average wages than business-services (SIC 73) employees, this weighting prevents a county whose wages for similar employment are high relative to other counties from having a low index number simply because it has more personal-service employment relative to business-service employment than do other counties.

Again, the index range is somewhat attenuated because of an adjustment necessitated by the fact that in every county of the state, there are some two-digit SIC code

service sectors without any employment. In these cases, we used the statewide average salary or wage for that sector to represent the wage in the missing sector.

With the state as a whole = 100, the range is from Education Region 22 (Columbia County), with an index number of .78, followed by Education Region 20 (the Eastern Oregon Counties of Baker, Grant, Harney, Malheur, Union, and Wallowa), with an index number of 0.80, to Education Regions 9 and 10 (Portland and the rest of Multnomah County), with index numbers of 1.22. This SIC-weighted service-sector-employment index suggests that the costs in the highest-cost education region are 56 percent greater than costs in the lowest-cost education region. These data are displayed in **Table 3, Parts A and B**. MAP regards this index as more reliable than the weighted, all-sector index described in Table 2, or the unweighted index described in Table 1. However it suffers from an inability to adjust for part time-workers.

Table 3-Part A

Average Annual Private Service Sector Payroll in Oregon Counties and Education Regions 1995

[illegible]	[illegible]	[illegible]
1	1.15	21
2	1.15	22
3	0.96	13
4	0.93	10
5	0.87	6
6	0.97	14
7	0.97	15
8	0.97	16
9	1.22	24
10	1.22	25
11	0.88	7
12	0.88	8
13	1.15	23
14	0.95	12
15	0.93	11
16	0.98	17
17	0.98	18
18	0.83	4
19	0.88	9
20	0.80	2
21	0.83	3
22	0.78	1
23	1.03	20
24	1.00	19
25	0.84	5

Table 3-Part B

[illegible]	Average Service Sector Payroll per Employee, Weighted by Statewide Two-Digit SIC Employment Mix $	[illegible]
[illegible]	17,668	0.78
[illegible]	24,058	1.06
[illegible]	26,136	1.15
[illegible]	18,479	0.82
[illegible]	17,644	0.78
[illegible]	20,609	0.91
[illegible]	18,678	0.82
[illegible]	16,032	0.71
[illegible]	23,388	1.03
[illegible]	21,083	0.93
[illegible]	24,856	1.10
[illegible]	17,866	0.79
[illegible]	18,089	0.80
[illegible]	18,314	0.81
[illegible]	21,807	0.96
[illegible]	23,833	1.05
[illegible]	19,778	0.87
[illegible]	19,161	0.85
[illegible]	18,744	0.83
[illegible]	22,075	0.97
[illegible]	18,901	0.83
[illegible]	20,126	0.89
[illegible]	17,357	0.77
[illegible]	22,189	0.98
[illegible]	24,304	1.07
[illegible]	27,715	1.22
[illegible]	20,892	0.92
[illegible]	19,769	0.87
[illegible]	18,979	0.84
[illegible]	17,992	0.79
[illegible]	19,010	0.84
[illegible]	19,615	0.87
[illegible]	29,014	1.28
[illegible]	19,837	0.88
[illegible]	6,244	0.28
[illegible]	19,837	0.88
[illegible]	22,642	1.00

[illegible] 1995 [illegible]

Indices Based on Oregon Job Order Wage Reports

The Oregon Employment Department also reports data generated by employer requests for workers to fill job openings. Each request includes the employer's initial wage offer. Each month, the Department publishes a list of job offers by county (grouped into 14 regions) and by occupational title for the previous 12 month period. For this analysis, MAP examined the reports for the period December 1, 1995 through November 30, 1996, focusing again on occupational titles typical to the private sector.

These "Job Order Wage Reports" of the "Oregon Automated Reporting System" provide data on the median wage offered, mean wage offered, range of wages offered, and percent of openings which are part time for each occupation in each of the 14 county groupings (see **Figure 3**). The data have four major limitations for these purposes.

Figure 3

Job Orders Placed with Oregon State Employment Department, 12/01/95 to 11/30/96, for Job Categories for Which A Bachelor's Degree is Now Typical of Entry Workers in Oregon (Excluding: Teachers and Categories Usually Restricted to Federal and State Government)

13002	F
13005	
13008	
13011	
13014	
13017	
15005	
15008	
15011	
15014	
15017	
15023	
19005	
19999	
21102	
21105	
21108	
21114	
21117	
21199	F
21308	
21508	
21511	
21902	
21905	
21921	
21999	
22105	
22114	
22121	
22123	
22126	
22127	
22128	
22132	
22135	
22199	
22302	
22308	
22502	
22505	
22508	
22511	

22599	
24102	
24105	
24111	
24199	
24302	
24305	
24308	
24502	
24505	
24599	
25102	
25105	
25199	
25302	
25313	
25315	
27102	
27105	
27108	
27199	
27302	
27305	
27307	
27311	
28105	
31114	
31302	
31323	
31502	
31511	
31517	
32305	
32308	
32314	
32317	
32511	
32517	
32521	
32902	
34002	
34005	
34008	
34011	
34035	
34038	
34041	
49002	
53302	
63014	
97702	

First, Oregon employers are not required to list job vacancies with the department, and so those jobs listed tend generally to be those most difficult to fill where employers come to the Employment Department as a last resort. Employment Department officials who administer the system estimate that about 10 percent of all private-sector job openings are listed. We have no way of knowing whether there is any consistent relationship between the wages offered for these 10 percent of job openings and the wages offered in the private sector as a whole, without the offices of the Employment Department. On the other hand, we have no reason to suspect any systematic bias in the relationship.

Secondly, the Employment Department does not collect data on wages actually accepted by employees who fill these jobs, or on whether the openings are actually filled. Again, we have no way of knowing whether there is any consistent relationship between the wages offered for these jobs and the wages actually accepted by successful job applicants. Again, we have no reason to suspect any systematic bias in the relationship.

Third, these data include wage offers for both part-time and full-time employees. While the reports indicate the percentage of job offers for each title which are "part-time," this can mean any schedule of less than 35 hours per week. For comparison purposes with school district professional employees, some of these part-timers are clearly inappropriate. We have not analyzed the data in sufficient detail to determine if the percentage of part-time employees in some regions is significantly greater than in others for similar occupational titles. If the Automated Report distinguished full-time job offers from part-time offers, it would be more useful for these purposes. In addition, if the analysis could be restricted to job offers for full-time employees, it would be more possible to determine in which regions the total sample of job offers for professional employees was too small to support the conclusions drawn by this analysis, and where, for that reason, an *ad hoc* adjustment might be advisable.

Fourth, while data by occupational title are very useful, the department does not have any data on the quality of employees in different regions. As noted above, a typical accountant in Community A may earn more than a typical accountant in Community B, not because the wages paid in Community A are higher for given levels of skill but because the firms in Community A are larger and more complex, requiring more skilled accountants.

While the first three of these data deficiencies could be corrected by more extensive data gathering and more detailed reporting, the fourth is probably not correctable by practical methods.

In addition to the data provided in the Job Order Wage Reports, the Employment Department is in the process of identifying the minimum qualifications usually required in Oregon for each of these occupational titles. The department begins with the education and training system of classification employed nationally by the Bureau of Labor Statistics in its *Occupational Outlook Handbook*, and "Occupational Projections and Training Data." The department then supplements and refines these data with telephone calls to Oregon employers to inquire about minimum education and training requirements.

For this report, MAP used the ongoing development of this database as a guide, and made judgments about the minimum qualifications for occupations in Oregon. By so doing, we have developed a list of all Oregon occupational titles for which a four-year college degree is the usual minimum requirement. We have included occupational titles for which master's degrees are usual, but we have excluded titles for which doctorates or professional degrees (e.g., lawyers and medical doctors) are usually required. The purpose of this list is to create an index of wage offers to professional workers throughout the state of Oregon who are comparable to teachers, i.e., who participate in a common labor market with the majority of school district personnel. Consistent with this purpose of creating a comparison group, we also excluded from the list all teacher occupational titles, even though some job offers for teachers may be for teachers in private sector institutions. We also excluded occupational titles typically filled by federal or state employees ("U.S. marshal," for example), on the grounds that these governmental levels generally have salary schedules which do not vary by region within the state.

Using these data, MAP created an index of employer wage offers for job openings typically requiring a college education, by region. With the state as a whole = 100, the range is from Education Region 20 (the Eastern Oregon counties of Baker, Grant, Harney, Malheur, Union, and Wallowa), with an index number of .57, followed by Education Region 18 (Morrow and Umatilla counties), with an index number of 0.64, to Education Regions 1, 2, 9, 10, 11, 12 and 13 (Clackamas, Multnomah, and Washington counties), with index numbers of 1.15. This professional job order index suggests that the costs in the highest-cost education region are about twice as great as costs in the lowest-cost education region. These data are displayed in **Table 4-Parts A and B**.

Table 4-Part A

Wage Offers for Job Orders Placed With Oregon Employment Department, Jobs Typically Filled by College Graduates, 12/10/95 to 11/30/96

[illegible]	[illegible]	[illegible]
1	1015	19
2	1015	20
3	0774	8
4	0774	9
5	0668	6
6	0880	11
7	0880	12
8	0880	13
9	1015	21
10	1015	22
11	1015	23
12	1015	24
13	1015	25
14	0779	10
15	0772	7
16	0999	16
17	0999	17
18	0664	2
19	0999	18
20	0657	1
21	0885	14
22	0992	15
23	0668	5
24	0667	4
25	0665	3

Table 4-Part B

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	13	6[illegible]43	0[illegible]53
[illegible]	4	8[illegible]99	0[illegible]75
[illegible]	2	13[illegible]84	1[illegible]15
[illegible]	1	11[illegible]07	0[illegible]92
[illegible]	1	11[illegible]07	0[illegible]92
[illegible]	7	8[illegible]19	0[illegible]68
[illegible]	10	8[illegible]15	0[illegible]68
[illegible]	7	8[illegible]19	0[illegible]68
[illegible]	10	8[illegible]15	0[illegible]68
[illegible]	6	8[illegible]69	0[illegible]72
[illegible]	9	7[illegible]85	0[illegible]65
[illegible]	13	6[illegible]43	0[illegible]53
[illegible]	14	7[illegible]53	0[illegible]63
[illegible]	9	7[illegible]85	0[illegible]65
[illegible]	8	8[illegible]88	0[illegible]74
[illegible]	10	8[illegible]15	0[illegible]68
[illegible]	8	8[illegible]88	0[illegible]74
[illegible]	11	7[illegible]82	0[illegible]65
[illegible]	11	7[illegible]82	0[illegible]65
[illegible]	5	9[illegible]64	0[illegible]80
[illegible]	4	8[illegible]99	0[illegible]75
[illegible]	4	8[illegible]99	0[illegible]75
[illegible]	14	7[illegible]53	0[illegible]63
[illegible]	3	11[illegible]89	0[illegible]99
[illegible]	12	7[illegible]74	0[illegible]64
[illegible]	2	13[illegible]84	1[illegible]15
[illegible]	3	11[illegible]89	0[illegible]99
[illegible]	9	7[illegible]85	0[illegible]65
[illegible]	1	11[illegible]07	0[illegible]92
[illegible]	12	7[illegible]74	0[illegible]64
[illegible]	13	6[illegible]43	0[illegible]53
[illegible]	13	6[illegible]43	0[illegible]53
[illegible]	9	7[illegible]85	0[illegible]65
[illegible]	2	13[illegible]84	1[illegible]15
[illegible]	9	7[illegible]85	0[illegible]65
[illegible]	3	11[illegible]89	0[illegible]99
[illegible]		[illegible]12[illegible]04	1[illegible]00

MAP regards these data as unreliable in an absolute sense, because of the questions raised above about the mixing of full- and part-time job offers, the absence of data on wages actually accepted by new hires, and the absence of data on worker qualifications, beyond the minimal typical requirement of a bachelor's degree. The Oregon

Employment Department, however, could easily improve the data with respect to the first problem, by reporting full- and part-time job orders separately. This information is already collected by the Department. The second defect, absence of data on wages actually accepted, could not be cured without an additional follow-up survey of employers about actual wages paid to new hires. Such a survey could be easily undertaken, but it would be expensive and would require a major policy decision because of the anticipated reluctance of employers to disclose this information. As mentioned earlier, the third defect, the absence of more developed data on worker qualifications, could not easily be solved. In its present form, however, this index has some utility. As we shall see later, while the variation of this index may be suspect, the rank order is consistent with other data reported here.

The Oregon Employment Department has also conducted limited surveys of wages paid for a few occupational titles in some regions in the last three years. These data are not systematically collected and are too sparse to provide the basis for a regional index. Nonetheless, two professional occupations were surveyed for several regions, and we have examined these data to see if the median wages actually paid by Oregon employers bear the same regional relationship as the job offer data that underlies Table 4. (Because only a few occupations are surveyed each year in only a few regions, we have compared data from 1994, 1995, and 1996, by imposing an annual inflation factor on the data reported for 1994 and 1995. For data reported for Multnomah, Washington, and Clackamas counties, we have used the Consumer Price Index-All Urban Consumers for the Portland-Vancouver Metropolitan Statistical Area, and for other counties the Consumer Price Index-All Urban Consumers for the Western Region of the U.S.)

These comparisons are displayed in **Table 5**. We would not expect the job order wages and actual wages paid to be similar, because the former are for entry employees, while the latter are for all employees. But the relationship between the regional data in both series is instructive. As can be seen, the limited data that exist (for "Accountants and Auditors" and for "Financial Managers") show a rough, though not exact correspondence, between the relationship of initial wage offers reported to the Employment Department and actual wages paid. The biggest exceptions, the low rank of accountants in Workforce Region 12 (Morrow and Umatilla Counties), and of financial managers in Workforce Region 5 (Lane County) on the job order index, compared to a higher rank on the actual wage index, is unsurprising as only five accountant job orders were reported for Region 12, and only two financial manager job orders were reported for Region 5, not

large enough groups from which statistical conclusions can be comfortably drawn. (Even data for regions where there is greater correspondence are, in some cases, based on very small samples.) On the whole, the comparison seems to confirm that the index of professional wage offers by regional county groupings, calculated in Table 4, have a real, though not a precise relationship, to actual wage levels.

Table 5

Comparison of Job Order Offered Wages, and Actual Wages Paid in Regions Where Data Are Available For Accountants and Auditors, and for Financial Managers

	(1)	(2)	(3)	(4)	(5)
1	13.62	14.70	7	4	3
2	13.94	22.38	8	9	-1
5	12.00	13.48	5	2	3
7	10.00	10.58	2	1	1
8	12.98	14.21	6	3	3
9	11.53	19.25	4	8	-4
10	11.37	18.78	3	7	-4
12	9.05	17.66	1	6	-5
15	13.94	16.56	8	5	3
1	15.17	16.16	2	1	1
2	18.01	17.66	3	2	1
5	6.00	23.78	1	5	-4
8	25.00	19.79	4	3	1
15	18.01	22.71	3	4	-1

Price Difference Data

MAP contracted with Runzheimer International to conduct a consumer price survey in the 25 Oregon regions identified for this report. Runzheimer is a Wisconsin-based management consulting firm, whose specialties include advising major corporations on cost-of-living differences between communities, so that these corporations can adequately adjust the compensation of their executives when they are relocated from community to community.

MAP asked Runzheimer to price a market basket of goods and services purchased by a "typical" Oregon teacher with an income of $43,390 and a family size of three. This income level was the median salary of Oregon public school teachers in 1996 (Drake 1997). Runzheimer utilized the relative importance of goods and services established by the national Consumer Expenditure Survey, conducted by the Bureau of Labor Statistics, for a consumer with this family size and income level. We requested Runzheimer to create two indices: one that included the housing component and one that did not. In the latter case, the relative importance of other goods and services was reweighted without housing, so that the total weights = 1.00 in each index.

Runzheimer's report is attached to this report as the **Appendix**.

With a "standard city" = 100, the range for the price index with housing *included* is from Education Region 20 (the Eastern Oregon counties of Baker, Grant, Harney, Malheur, Union, and Wallowa), with an index number of .94, to Education Region 9 (the City of Portland), with an index number of 1.07. This consumer price index suggests that the costs in the highest-cost education region are about 15 percent greater than costs in the lowest-cost education region.

With a "standard city" = 100, the range for the price index with housing *excluded* is from Education Region 20 (the Eastern Oregon counties of Baker, Grant, Harney, Malheur, Union, and Wallowa), with an index number of .96, to Education Region 9 (the City of Portland), with an index number of 1.01. This consumer price index suggests that the costs in the highest cost education region are about 6 percent greater than costs in the lowest cost education region.

Table 6 displays the price indices for the 25 Oregon Education Regions with housing included and excluded.

Table 6

Price Index for 25 Oregon Education Regions				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]		[illegible]
1	1.02	19	0.99	17
2	1.03	23	0.97	2
3	0.98	8	0.97	2
4	0.98	8	0.98	8
5	0.96	3	0.99	17
6	0.98	8	0.98	8
7	0.99	11	0.99	17
8	0.99	11	0.98	8
9	1.07	25	1.01	24
10	1.02	19	1	23
11	1.03	23	0.99	17
12	1.02	19	1.01	24
13	1.02	19	0.99	17
14	1.01	18	0.98	8
15	0.97	5	0.97	2
16	1	15	0.99	17
17	0.97	5	0.98	8
18	0.96	3	0.97	2
19	0.99	11	0.97	2
20	0.94	1	0.96	1
21	1	15	0.98	8
22	0.99	11	0.97	2
23	0.97	5	0.98	8
24	1	15	0.98	8
25	0.95	2	0.98	8

Note that there are some substantial discrepancies between the "with" and "without" housing price indices. With housing included, Education Region 2 (the Clackamas County communities of West Linn, Lake Oswego, Oregon City, and Gladstone) is shown to be a high-cost region. This is consistent with the wage indices, and suggests that employees in the private sector demand wages to compensate for the high cost of housing, notwithstanding the "amenities" of living in these communities. But with housing excluded, Education Region 2 is one of the state's lower cost regions for consumer prices.

Conversely, Education Region 5 (Coos and Curry counties) appears to be a relatively low-cost region with housing included, but is ranked higher in relative cost with housing excluded. Note, however, that the variation in the "without housing" index is very small, so this difference may not be terribly significant. If it is

significant, we have no ready explanation for it.

As a previous section of this report has emphasized, the Runzheimer price indices provide an added perspective on regional cost differences to that provided by wage indices. But, like the wage indices, price indices can tell only an approximate story. The price indices, for example, are based on the purchasing patterns of a typical consumer earning $43,390, but the purchasing habits of teachers are more likely to be based on their family incomes, not their own salaries considered separately. If a market basket of higher family incomes includes relatively more items whose prices vary regionally than the market basket of lower individual salaries, then these price indices will understate the statewide range of variation of consumer prices. As noted earlier, if teachers in some regions tend to have different size families than teachers in other regions, their purchasing patterns will be different and not accurately reflected by a market basket which uses uniform statewide weights. A consumer price index, based as these indices are on pricing only 140 goods and services, cannot fully capture quality differences in otherwise similar products. Expanding the list of goods and services priced, to capture greater product differentiation, would not only be expensive, but it would also limit the utility of the survey, because fewer goods and services on the list would be obtainable in each of the 25 regions.

Nonetheless, the Runzheimer price survey, like the analysis of wage data, clearly demonstrates differences in the cost of providing comparable education services in different regions of Oregon. We believe that such a price survey could provide a valuable tool to help Oregon policy makers adjust education expenditures.

5. CONCLUSIONS AND RECOMMENDATIONS

Table 7 summarizes the rankings from each of the indices examined in this report. Column 6 of this table shows that the four wage indices examined in this report are remarkably consistent in rankings, except for a small number of cases where the ranking according to the service-sector index seems inconsistent with the rankings in the other indices.

Column 13 of Table 7 is an average of the average of the four wage indices and of the average of the two price indices. Column 11 of Table 7 is the same as Column 13, except that where a single index (wage or price) shows a value for an Education Region greatly different from the pattern of the other indices, the exceptional index has been removed from the average of averages.

Table 7

Rankings of Indices Compared						
[illegible]	(1) [illegible]	(2) [illegible]	(3) [illegible]	(4) [illegible]	(5) [illegible]	(6) [illegible]
1	19	19	21	19	20	2
2	20	20	22	20	21	2
3	10	11	13	8	11	3
4	7	5	10	9	8	3
5	2	6	6	6	5	3
6	14	14	14	11	13	2
7	15	15	15	12	14	2
8	16	16	16	13	15	2
9	22	24	24	21	23	2
10	23	25	25	22	24	2
11	24	22	7	23	19	12
12	25	23	8	24	20	12
13	21	21	23	25	23	3
14	18	12	12	10	13	5
15	13	9	11	7	10	3
16	11	17	17	16	15	4
17	12	18	18	17	16	4
18	6	7	4	2	5	3
19	17	10	9	18	14	5
20	3	1	2	1	2	1
21	4	3	3	14	6	8
22	1	4	1	15	5	10
23	9	13	20	5	12	8
24	5	8	19	4	9	10
25	8	2	5	3	5	4

	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	19	17	18	1	19	2	19	
2	23	2	13	11	17	8	22	
3	8	2	5	3	8	6	8	
4	8	8	8	0	8	0	8	
5	3	17	10	7	8	5	4	
6	8	8	8	0	11	5	11	
7	11	17	14	3	14	0	14	
8	11	8	10	2	12	6	12	
9	25	24	25	1	24	2	24	
10	19	23	21	2	22	3	22	
11	23	17	20	3	20	1	22	
12	19	24	22	3	21	2	23	
13	19	17	18	1	20	5	21	
14	18	8	13	5	13	0	13	
15	5	2	4	2	7	7	7	
16	15	17	16	1	16	1	16	
17	5	8	7	2	11	10	11	
18	3	2	3	1	4	2	4	
19	11	2	7	5	10	7	10	
20	1	1	1	0	1	1	1	
21	15	8	12	4	9	6	9	
22	11	2	7	5	6	1	6	
23	5	8	7	2	9	5	8	
24	15	8	12	4	10	3	9	
25	2	8	5	3	5	1	5	

It has been a theme of this report that while regional cost differences for education do exist, precision in specifying these differences is not possible. Therefore, MAP recommends reliance on an average of indices, no one of which is perfect, rather than choosing a single index for adjusting education costs.

It is also important to remember that it is normal for relative costs within a state to change over time. A region of the state with relatively high costs in one year, measured either in wages or prices, may have lower costs in subsequent years. While these changes are usually gradual, they can certainly be expected, and so the indices presented in this report are valid only at the time they were calculated. If, as a result of discussion stimulated by this report, the Legislature decides to implement a regional cost adjustment, the methods described here may be used (and hopefully perfected with better data). However, the results of these methods, in terms of relative ranking of education regions, may be different from those described herein. As noted earlier where this report surveyed other states that presently have systems for making regional cost adjustments, sometimes states recalculate indices annually, sometimes bi-annually, and in one case an ongoing rolling average of more than one annual index is used.

In summary we conclude that:

- There are real differences in the cost of providing comparable education in different regions in Oregon.
- There are important theoretical and practical reasons why it is not possible to determine these differences with precision.
- Because neither wage indices nor price indices will fully reflect the extent to which higher wages result from more qualified workers, or to which higher prices reflect greater quality or personal service, most regional indices will likely overstate to some extent the range of variation in costs experienced by low- and high-cost school districts.
- The reality of this probable overstatement should not be misinterpreted to mean that real differences in cost do not exist between high- and low-cost school districts.
- Because precision is impossible and some overstatement probable, we recommend that the Legislature establish a range[1] within which to

vary school district revenues based on regional cost differences. Based on an examination of the data provided, and on consultations with policy makers in other states who have grappled with this issue, we think establishment of ranges of anywhere from about 7 to 15 percent would be reasonable and defensible (i.e., where the highest-cost district received from 7 percent to 15 percent more per-pupil funding than the lowest-cost district). Nonetheless, we believe that this is a policy judgment which cannot be proven conclusively with the data available. With further study and information, the Legislature could revise these ranges in the future.

- To illustrate this principle, if the Oregon Legislature initially determined that a regional variation in cost of 10 percent from the lowest-cost district to the highest-cost district was probable, then school districts within Oregon could receive regional cost adjustments based on a ranking we have displayed in **Table 8**.

Table 8

Sample Regional Cost Index with Ten Percent Restriction Applied to School Districts' Typical Personnel Expenditures (85 Percent Estimate)

(1)	(2)	(3)
		(85
20	1.38	100.00	100.00
18	3.63	101.01	100.86
5	4.00	101.18	101.00
25	4.75	101.52	101.29
22	5.88	102.02	101.72
15	6.75	102.42	102.05
3	7.75	102.87	102.44
23	7.75	102.87	102.44
4	7.88	102.92	102.48
24	8.58	103.24	102.75
21	8.75	103.31	102.82
19	10.00	103.88	103.29
6	10.63	104.16	103.53
17	11.38	104.49	103.82
8	12.38	104.94	104.20
14	13.00	105.22	104.44
7	14.13	105.73	104.87
16	15.63	106.40	105.44
1	18.75	107.81	106.64
13	20.75	108.71	107.40
11	21.50	109.04	107.69
2	21.75	109.16	107.78
10	22.38	109.44	108.02
12	22.75	109.61	108.17
9	23.63	110.00	108.50

If Oregon's educational policy makers determine that the typical Oregon school district spends approximately 85 percent of its budget on personnel compensation (including contracted labor), then the Oregon district with the highest costs should receive 8.5 percent more per-pupil funds than the district with the lowest costs, permitting each to purchase the same quantity and quality of school inputs. Table 8 illustrates how such a system would work. Column 2 calculates a cost index for each district, utilizing the average rankings from Table 7, restricted to a 10 percent range. Column 3 displays the regional cost adjustment to be applied to each Oregon education region as defined in Figure 1.

Ultimately, a regional cost adjustment must be the product of both economic science and good political judgment. It has been the purpose of this report to describe the range of reasonable and defensible technical calculations that enter into such decision making. We believe that, if these data are used in making its decisions, the Oregon Legislature can produce a system that is not perfect, but that is fairer than the present unadjusted system, and as good as technical knowledge permits.

End Note

1. The foregoing not withstanding, there remains a potential, probably slight, that a school district in a high-cost region could bring suit, based on numbers in a single index, to compel the state to adjust its funding to reflect a cost differential outside of the range adopted in law. MAP believes, however, that our recommendation is defensible because greater precision is impossible. We offer this caveat only as a possibility for policy makers to consider.

BIBLIOGRAPHY

Barro, S.M. 1993. *Cost-of-Education Differentials Across the States*. U.S. Department of Education, National Center for Education Statistics, NCES Working Paper 94-05.

Chambers, Jay G., 1979. "The Development of a Cost of Education Index: Some Empirical Estimates and Policy Issues." Institute for Research on Educational Finance and Governance, Stanford University, August.

Chambers Jay, and William 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.

Clark, Catherine, 1997. Telephone interview by Richard Rothstein of MAP, March 27, with Catherine Clark, Director, Texas Center for Education Research.

Cohen, Matthew C., 1981. "The Cost of a Basic Educational Program in Ohio: A Proposal for State Funding of Public Schools." Paper presented at the 1981 Annual Conference of the American Education Finance Association, March, New Orleans.

Cohen, Matthew C., 1997. Telephone interview by Richard Rothstein of MAP, March 26, with Matthew Cohen, Office of Policy Research and Analysis, Ohio Department of Education.

Colorado General Assembly, 1993. "Legislative Council Staff Report on the School District Setting Category Study," March. Legislative Council Research Publication No. 376.

Colorado General Assembly, 1993. "Legislative Council Staff Report on the Senate Bill 93-87 Setting Category Study," August. Legislative Council Research Publication No. 378.

Denslow, David, David Honeyman and David Rasmussen, 1996. "Study of the Florida Price Level Index." University of Florida: Bureau of Economic and Business Research.

Drake, Terry, 1997. Telephone interview by James Smith of MAP, with Terry Drake, Oregon Department of Education.

Dunn, David, et. al., 1994. "Foundation School Program Funding Elements." Texas Legislative Budget Board, October.

Florida Department of Education, Office of Education Budget and Management, 1996. "The 1996 Florida Price Level Index."

Fowler, William J., Jr., 1994. "Cost of Education Differentials Across the States." U.S. Department of Education, National Center for Education Statistics, Working Paper No. 94-05, July.

Guthrie, James W., et. al., 1997. "A Proposed Education Resource Block Grant Model for Wyoming School Finance." Submitted by Management Analysis and Planning Associates, L.L.C., to the Joint Appropriations Committee of the Wyoming Legislature, March.

Herrington, Carolyn D. and Susan Trimble, 1997. "State of the States: Florida." Paper presented at the 22nd Annual Conference of the American Education Finance Association, Jacksonville, Florida, March.

Kimble, Steve, 1997. Telephone interview by Richard Rothstein of MAP, March 28, with Steve Kimble, Economic and Demographic Specialist, Office of Education Budget and Management, Florida Department of Education.

Knight, Ronald P., et. al., 1984. "Report of the Price Differential Index Advisory Committee to the Texas State Board of Education," Texas Education Agency, November.

Knight, Ronald P., et. al., 1986. "Report of the Price Differential Index Advisory Committee to the State Board of Education," Texas Education Agency, September.

Legislative Budget Board, 1997. "Foundation School Program Funding Elements," Texas Legislative Budget Board, January.

Legislative Education Board, 1991. "Cost-of-Education Index, 1992-93 Biennium. Final Report of the Legislative Education Board," Texas Legislative Education Board, March

McMahon, Walter W., n.d. "Intrastate Cost Adjustments." Mimeo.

McMahon, Walter W. and Shao-Chung Chang, 1991. *Geographical Cost of Living Differences: Interstate and Intrastate, Update 1991*. Center for the Study of Educational Finance, Illinois State University.

Ohio Department of Education, Office of Research Analyst, n.d. "Explanation of Calculation of the Cost of Doing Business Factor For FY 90-91 Biennium."

Oregon Employment Department, 1996. *1995 Oregon Covered Employment and Payrolls By Industry and County*. State of Oregon; Employment Department; Research, Tax and Analysis, December.

Oregon Employment Department, 1996. **"**Job Order Wage Report. Oregon Automated Reporting System, 12/01/95 to 11/30/96." State of Oregon; Employment Department; Workforce Analysis Section (published monthly for the previous 12 months).

Parrish, Thomas B., Christine Matsumoto and William J. Fowler, Jr., 1995. *Disparities in Public School District Spending 1989-90*. U.S. Department of Education, National Center for Education Statistics, NCES 95-300.

Runzheimer International, 1993. "The Runzheimer Plan of Living Cost Standards. State of Colorado Legislative Council." July.

Texas Education Agency, 1994. "Cost of Education Index. 1994 Study Update. Staff Report, Division of State Funding," September.

Ward, Chris, et. al., n.d. "School Finance in Colorado," Colorado Legislative Council Staff.

Ward, Chris, 1997. Telephone interview by Richard Rothstein of MAP, March 27, with Chris Ward, Legislative Council Staff, Colorado General Assembly.

Wisnoski, Joe, 1997. Telephone interview by Richard Rothstein of MAP, March 28, with Joe Wisnoski, Coordinator for School Finance and Fiscal Analysis, Texas Education Agency.