

WYOMING EDUCATION FINANCE ISSUES REPORT

External Cost Adjustment

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I- Background

The April 1997 Management Analysis and Planning, LLC (MAP) report to the Wyoming Legislature was based on available national research about educational adequacy, consultations with professional experts in Wyoming, and data on expenditures, prices and costs available in the fall or early winter of 1997¹ when the MAP report was prepared. The judgments and data on which MAP's recommendations were based were specific to the time when the research was conducted and the report transmitted. Some of these judgments and data may already be obsolete. If not, they may become obsolete at some future time.

In a conference call of the Legislative Service Office's working group on the "external cost adjustment" of November 14, 1997, several important issues were raised regarding these problems.

MAP has been asked by the Legislative Service Office to propose methods for bringing its original recommendations up to date, as well as for maintaining the timeliness of the judgments and data on which the report was based, on an ongoing basis.

This memorandum responds to the request to MAP by the Legislative Service Office. This memorandum also addresses issues raised in this connection by the working group, including whether (and when) the costs calculated in MAP's May 1997 report should be recomputed, how to avoid endogeneity in recomputation (referred to in the working group as "circularity"), the relationship of WCLI-based regional cost adjustments to temporal inflation, and the need for state government to control and verify data collection on which future calculations are based.

The following pages describe how inflation affects different components of the Wyoming education model differently. The memorandum divides the revenues distributed to Wyoming school districts into three broad groups of components: professional compensation, non-professional compensation, and other goods and services. It sets forth procedures by which the State of Wyoming can separately estimate inflation in each of these groups and how these separate estimates can then be combined into an inflation estimate for education revenues as a whole.²

¹ Throughout, this memorandum refers to a school year by the year in which that school year ends. Thus, "1997" should be read to mean "school year 1996-97".

² MAP is not sufficiently familiar with Wyoming legislative processes to permit it to specify the precise timing of legislative decision making, where decisions about the distribution of education revenues are concerned. Therefore, this memorandum describes procedures for making annual adjustments in the distribution of education revenues to school districts. If, in fact, the Wyoming decision making process calls for

As in previous work MAP has performed for the State of Wyoming, this memorandum emphasizes that absolute precision is not possible in the calculation of education inflation. Appropriate estimates of inflation combine careful analyses of data with professional judgment about how these data should be interpreted. Alternative interpretations will often be available. This memorandum provides a guide for Wyoming policymakers in making these interpretations, but can offer no certainty that one "best" interpretation will be obvious or that careful professionals will always agree about how to choose between several reasonable interpretations.

II - Component Costs

1. Teachers

a) Base Salary Cost. The salary cost for teachers in the MAP model was calculated to include the state average beginning salary for teachers with bachelors' degrees and no additional higher education in Laramie and Albany Counties in 1996 (for which the model substitutes, as an approximately equivalent number, the statewide average beginning salary), plus the statewide mean salary payment for academic credits in 1996, plus the statewide mean salary payment for years of service in 1996. The model then verified the legitimacy of the beginning salary level by insuring that it was competitive with surrounding states, and that professional experts in Wyoming generally agreed that the quality of teachers obtained at such a salary level was satisfactory.

There are two possible approaches to updating these data for the first year of implementation. One is to obtain data on Albany, Laramie and statewide average beginning salaries, statewide mean salary payments for academic credits, and statewide mean salary payments for years of service for the year immediately prior to implementation, verify the regional competitiveness of these more recent data and the adequacy of teacher quality presently obtained (see section V, below for further discussion of this issue), and then apply an estimated inflation rate to this updated salary cost.

The second approach is to simply update for inflation the 1996 data used in the MAP report.

Although it is more time-consuming to do so, MAP recommends that the first approach be taken. The advantages are, first, that there is now time for the state to verify, by independent data collection, that the data on actual salaries paid are accurate. Because the state did not have an adequate data collection system in place when MAP prepared its report, MAP had to rely on data

biennial adjustments, the procedures described in this memorandum should be revised accordingly.

collected by the Wyoming Education Association. While MAP admires the effort and thoroughness which went into the WEA data reports, the data collections of the WEA cannot permanently substitute for official data.³ The second advantage of updating the underlying data of the MAP model, rather than adjusting 1996 data for inflation, is that an inflation adjustment is inherently imprecise, and the underlying data for the most recent year will more accurately reflect the cost-based philosophy of Wyoming's new education model.

The disadvantage of this approach is that, once the MAP model was published in the winter of 1997, an incentive existed, in theory, for districts to manipulate salaries in 1998 in the expectation that future year revenues would be based on actual 1998 salary levels. MAP does not regard the existence of this incentive as realistic, when applied to the 1998 school year. Not only could districts have had no way of knowing that the MAP model would later be updated using 1998 data, but there is no evidence or reason to believe that any district in Wyoming has attempted to manipulate its 1998 salary structure for this purpose.

Of course, once the new education funding system is implemented, the model cannot be continually updated using actual expenditures for prior years because such a procedure, utilizing endogenous data, might eventually create incentives for districts to structure salary schedules to maximize revenues. Therefore, beginning with the first year (or biennium) of implementation (i.e., the year following 1998), teacher salary costs from 1998 should be increased using "external" (exogenous) estimates of inflation.

b) Adjustment for Inflation. In any given year, inflation data for that year will not be available. In other words, when the state determines revenue amounts to be distributed for school year 1999, it will have no way of knowing what the inflation rate from school year 1998 to school year 1999 will be. Nonetheless, school districts will have to establish teacher salaries based on their best judgments of real costs in 1999.

Therefore, revenues for 1999 should be adjusted for an estimated inflation rate. Specifically, the teacher salary cost component of the education model for 1999 will have to consist of an actual 1998 salary cost, plus expected inflation from 1998 to 1999.

MAP recommends that the inflation adjustment in this case be based on the annual inflation for the most recent year for which data are available, as of

³ The WEA salary tables may, for example, not distinguish salary step amounts paid for Wyoming experience from amounts paid for district experience or for prior (non-Wyoming) experience; the tables also may not reflect salary "bonuses" paid in addition to published schedule amounts. These and other limitations in the data contained in the WEA tables were not known to MAP when the initial MAP report was researched and published.

the date the Legislature normally begins debating the appropriation of revenue for the following school year. Thus, if the Legislature normally begins debating its 1999 school-year appropriation in January, 1998, the teacher salary cost component of the education model should be teacher salary cost for school year 1998, plus annual inflation from the most recent twelve-month period for which data are available. Because, as explained below, a variety of data sources will be utilized to construct this inflation adjustment, this adjustment will be based on a variety of data sources for periods beginning with a specific calendar month in late 1996 and ending with the same month in 1997. (The specific months for each data series used may be different, but each will be reasonably close together.) MAP further recommends that, when school revenue is adopted in the following January (1999) for school year 2000, the actual teacher salary cost for 1999 (i.e., the teacher salary cost on which the 1999 appropriation was based, including estimated inflation for 1997-1998), be adjusted for actual inflation from late 1997 to late 1998.

Example: The Legislature begins debating its year 2001 school appropriation in February 2000. The legislature bases the teacher salary cost component of its appropriation on the school year 2000 teacher salary cost component (adopted in revenue decisions made in the previous year). This component, however, must now be adjusted (prior to being used as the following year's base) for the difference between inflation from late 1997 to late 1998 and inflation from late 1998 to late 1999. Following this adjustment, an inflation factor based on inflation from late 1998 to late 1999 is applied to the school year 2000 teacher salary cost, to yield the school year 2001 teacher salary cost to be used in the year 2001 school appropriation. Assume that the 2000 school year teacher salary cost component is \$35,055, that late 1997 to late 1998 inflation was 2.6 percent, and that late 1998 to late 1999 inflation was 2.4 percent. In January, 2000, the Legislature then calculates the teacher salary cost for school year 2001 revenues as follows: $35,055 \times (1.024/1.026) \times 1.024 = \$35,826$.

A simpler way of calculating this is simply to say that the teacher salary cost of the school revenue appropriation should be increased for the year 2001 by 2.2 percent [$(1.024/1.026) \times 1.024 = 1.022$]. As will be explained below, the adjustment will be further simplified when this inflation factor for teacher salary cost becomes part of an overall inflation adjustment for education revenue, based on the estimated weight of teacher salaries in the cost-based education model overall. But each element of the overall inflation calculation should be adjusted in a similar fashion, for the difference between estimated inflation and actual inflation for the most recent year.

Note, however, that in the very first year of implementation, no adjustment would be necessary for the prior year's corrected inflation estimate. As recommended above, for the very first year of implementation, the model should be updated to reflect costs at the time the Legislature is debating its appropriation, and the only adjustment required would be for estimated future

inflation, estimated by the inflation rate for the twelve-month period ending with the most recent data reports late in the previous year.

2. Other Components

In principle, each of the components of the cost-based education model can be adjusted each year (or each biennium), utilizing the same procedure: each component of the cost-based education model should be re-priced for the year immediately preceding the year of implementation. Following this final updating of the MAP model, the appropriation can be adjusted for subsequent inflation using the procedures described above. It is not necessary in practice, however, to adjust each component separately, although that is what, in principle, is recommended. Rather, once the model costs are updated a final time before the model is put into practice, an overall inflation adjustment to education revenue can be calculated, utilizing individual inflation rates weighted by their relative importances in the Wyoming education model as a whole.

III - Inflation vs. Geographic Cost Differences

The Wyoming procedures for calculating school district revenues begin, based on a MAP recommendation, by an allocation of revenue to districts in Laramie and Albany Counties (not including later adjustments made to these districts' revenues based on abnormal teacher seniority, EDY youth in excess of certain percentages, etc.), on a per pupil basis. Revenues to other districts in the state are then adjusted based on differences in geographic costs.

MAP recommends that this procedure continue for future years. In other words, the allocation of revenue to Albany and Laramie County school districts should be the allocation of revenue called for by the model, now including the inflation adjustment as described in this memorandum. Revenues to other districts should then be based on application of the WCLI-derived geographic cost adjustment to the per-pupil model-based allocations for Albany and Laramie Counties, including the inflation adjustment. To put it simply, the inflation adjustment should be applied to the model (and to Albany and Laramie County revenues) before the geographic cost adjustment is applied to other district revenue allocations.

If the model contains other adjustments which are applied on a flat dollar basis (for example, a dollar amount for EDY when these youths number in excess of a trigger point), these amounts will also have to be adjusted periodically for inflation, and should then be added, for districts to which they apply, to the new inflation-adjusted model per pupil amount, prior to geographic cost adjustments being made. In other words, the geographic cost adjustment should be the last adjustment made to the revenue allocation.

IV - Calculating the Inflation Adjustment

1. Distinguishing Consumer Price Inflation from School Price Inflation

When we speak of inflation, it is common to assume that reference is being made to price changes reflected by the "consumer price index." In Wyoming, it may be assumed that inflation refers to changes in consumer prices calculated by the Wyoming Division of Economic Analysis as part of the "Wyoming Cost of Living Index" (or WCLI).

Inflation in consumer prices, however, is not necessarily similar to changes in costs of education over time. Inflation in costs of education are frequently more rapid than inflation in consumer prices, and so if Wyoming education revenues are adjusted by inflation in consumer prices, it is likely that, over time, education revenues will fall below actual costs.

The reason for this is that the consumer price index (CPI-U) is a weighted average of the price increases of all the products that a typical urban consumer purchases. This "market basket" is different from the "market basket" purchased by school districts. Urban consumers mostly purchase shelter, food, clothing, transportation, etc. But these products and services are only purchased in small quantities, if at all, by school districts. Instead, school districts spend most of their funds purchasing professional labor, the services of whom are purchased only in small quantities by urban consumers. Because every product and service rises in price at a unique rate, an index which assumes that these price increases should be weighted in proportion to their relative importances in urban consumers' market baskets may not reflect the actual average inflation faced by schools. School price inflation can be significantly different from consumer price inflation.⁴

There is, however, no generally accepted index for measuring school price inflation, comparable to the index used for measuring inflation in consumer prices. It might initially be thought that school price inflation for Wyoming could be measured by the per-pupil spending increases of public education nationally, or of per-pupil spending increases in surrounding states. However, such data are not usable for this purpose, because per-pupil spending increases can result either from inflation in the prices of education inputs, or from common decisions by the nation or these states to purchase a greater quantity or quality of inputs. For example, an increase in per-pupil spending in Nebraska might be the result of an increase in the salaries Nebraska had to pay in order to hire the same

⁴ For a detailed explanation of why school price inflation will differ from consumer price inflation, see Richard Rothstein, with Karen Hawley Miles, *Where's the Money Gone?* (Washington, D.C.: Economic Policy Institute, 1995), Chapter 1 ("Inflation and the Measurement of School Spending"); and Lawrence Mishel and Richard Rothstein, *Measurement Issues in Adjusting School Spending Across Time and Place* (Washington, D.C.: Economic Policy Institute, 1997).

quality of teacher it hired in previous years, or it might be the result of a Nebraska decision to lower class sizes. Spending increases attributable to the former should be charged to "inflation." But spending increases attributable to the latter do not result from inflation, but rather from purchasing more education services. There is no data series on which Wyoming can rely that satisfactorily separates these two types of price increases.⁵

Instead, MAP recommends that Wyoming construct an inflation index to apply to school district revenues by estimating the inflation rates in the "market basket" of goods and services that the MAP model funds. These include, with their relative importances, the following:

- compensation of professional and managerial labor, 65.8 percent
- compensation of non-professional labor, 14.2 percent
- purchase of other goods and services, 20 percent⁶

By averaging, weighted by relative importance, these three components, an inflation rate can be calculated for Wyoming education, to be applied to the basic per pupil funding (of the Laramie and Albany County districts). Remember, however, that this average inflation rate must also be adjusted to offset prior-year estimating errors, as described in Section II, above.

Obviously, these three components can each be subdivided many times, because each component is made up of sub-components each of which may have a different rate of inflation in any year. At some point, however, the additional precision gained will be outweighed by the complexity and time involved in the calculations. It is MAP's judgment that these three components provide sufficient detail to capture the inflation rate generally applicable to schools. MAP is aware of no reason why aggregating Wyoming school inputs into these three categories might inherently incorporate a bias towards higher or lower school inflation than Wyoming schools will actually experience.

⁵ As is discussed below, Research Associates of Washington publishes an annual *Inflation Measures for Schools and Colleges* that calculates inflation based on fixed weights of elementary and secondary inputs, with weights based on 1975 national data. Thus, changes in resource mix would not affect the index, although the index would be affected in inappropriate ways by other unmeasured quality changes. However, as described below, MAP does not recommend utilizing this index because it does not properly account for endogeneity in its teacher salaries series.

⁶ These percentages are not based on relative importances in the MAP Wyoming model, but rather on recent national average data (See Nancy Protheroe, "ERS-Local School Budget Profile Study," *School Business Affairs*, October, 1997). When a final Wyoming model is adopted in legislation, these relative importances should be recalculated to reflect the resource mix funded by the block grant model. The Wyoming resource mix (as opposed to resource level) is not likely to be significantly different from national averages, however.

2. Choosing Appropriate Regional Data

Ideally, the inflation experienced by Wyoming schools would be best reflected by indices for professional labor, non-professional labor, and other goods and services, based on data from Wyoming and its surrounding states. However, no data with such a geographic breakdown are available. Instead, the Bureau of Labor Statistics reports national price indices, and in the case of some limited indices where samples are sufficiently large, for four regions: Northeast, South, Midwest (also called North Central) and West. Wyoming data are included with Western data, as are data for Wyoming's surrounding states except for Nebraska and South Dakota, whose data are reported with Midwestern data.

Neither the Western nor the Midwestern regions are fully appropriate for Wyoming's use. The Western region includes some states (Alaska, Hawaii, California) with economies that may experience conditions very different from those experienced in Wyoming. But so, too, does the Midwestern region, which includes heavily industrialized states (Ohio, Michigan, Illinois) whose economic trends may not parallel Wyoming's.

As with most data problems with which Wyoming's cost-based education model must be concerned, there is no perfect solution to this problem. MAP recommends that data from the Western region be utilized to the extent they are available, but that the Legislature reserve the option of utilizing Midwestern data in years when it determines that Western data were distorted by economic trends that do not apply to Wyoming and when Midwestern trends are more appropriate.

3. Selecting the Proper Indices

a) Compensation vs. Salaries Plus Benefits. The Bureau of Labor Statistics produces an Employment Cost Index (ECI) for salaries, for benefits and for total compensation (salaries and benefits combined). MAP recommends that Wyoming base its inflation adjustment of the total compensation component of the education model on total compensation indices, not on separate indices for salaries and benefits. This recommendation is made for three reasons. First, it is simpler to make one inflation estimate than to make separate estimates for the salary and benefits portions of the model. Second, in the event health care inflation again deviates significantly from inflation in other services (as it did in the 1980s and early 1990s, when health care inflation was much more rapid), this deviation will be reflected to an appropriate extent in the total compensation index, reflecting the fact that some firms will temporarily absorb higher benefit costs, while others will recapture some of the higher costs by restraining the growth of salaries. School districts will (and should) behave similarly. Third, the distinction between salaries and benefits in school districts is different from the distinction reflected in BLS employment cost indices. For example, BLS indices

include vacation pay as a benefit, while teachers, whether paid in 10 or 12 annual installments, do not receive separate vacation pay. Therefore, total compensation of professional workers is a more accurate analogue to total compensation of teachers than would be separate salary and benefit calculations.

b) Utilizing education-specific or economy-wide indices. The Bureau of Labor Statistics does produce an employment cost index for "State and Local Government Workers, Elementary and Secondary Schools". MAP does not recommend the use of this index, because an index this narrowly focused may confuse real spending changes with inflation. For example, a broad national (or regional) trend to upgrade the quality of the teaching profession (by paying more for higher quality teachers) will likely result in an acceleration of this index because inflation and real cost increases cannot properly be separated. If Wyoming chooses to upgrade the quality of its teaching force, it should do so as an explicit policy choice, not be backed into such a decision by an inaccurate inflation index. A broader index, of course, will be subject to a similar distortion (of broadly-based quality improvements), but the broader the index, the less important such a distortion in a particular sector will be. Each decision relating to the choice of an index must balance the increased accuracy gained by a more narrowly focused index, with the problems of endogeneity that begin to arise as more narrowly focused indices are considered. There is no science to making such decisions. It is MAP's judgment that the balance is best struck by an index that is not restricted to elementary and secondary schools, but rather one that captures compensation trends in comparable workers throughout the economy. Wyoming policymakers may wish to make a different choice in this regard.

The Bureau of Labor Statistics reports data for private employers, for state and local government, and for civilian employment. Civilian employment combines data for both private and state and local government employers. However, not all data is reported in each of these ways. MAP would recommend utilizing the data series for civilian employment, if it were available. For most purposes, however, it is not available, and as a second-best alternative, MAP recommends using the data series for private industry workers.

c) Choosing an index for professional employee compensation. MAP recommends that the approximately 65.8 percent of the Wyoming education model that is based on professional labor be adjusted for inflation by the Bureau of Labor Statistics' Employment Cost Index-based sub-index for compensation of "professional specialty/technical and executive, administrative and managerial" occupations. This sub-index is not published by BLS, but has been created by MAP for this report utilizing BLS ECI index numbers for "professional specialty and technical occupations" and for "executive, administrative and managerial occupations." This combined index is based on compensation of the following occupational sub-groups: Engineers, architects and surveyors; mathematical and computer scientists; natural scientists, health diagnosing occupations (physicians, dentists, etc.); health assessment and

treating occupations (registered nurses, pharmacists, physical therapists, etc.); teachers; librarians, archivists, and curators; social scientists and urban planners; social, recreation, and religious workers; lawyers and judges; writers, authors, entertainers, and athletes; health technologists and technicians; engineering and related technologists and technicians; science technicians; miscellaneous technicians; and executive, administrative and managerial occupations.

For some Employment Cost Index series, the Bureau of Labor Statistics reports data for "all civilian workers" combined, as well as separate component series for "private industry workers" and "state and local government workers." However, for these detailed occupational groupings, the ECI does not report data for "all civilian workers." Therefore, MAP recommends using data for "private industry workers."

In selecting this index, MAP does not assume that the compensation levels for any of these professions are comparable to the compensation levels for professional school employees. The purpose of this index is not to establish compensation levels, but rather rates of change. College-educated workers make choices of profession by weighing a variety of factors, the level of compensation being only one of them. But MAP assumes that the rate of change in the average compensation levels of these occupations is a good estimate in the inflation rate of professional school employee compensation. This is because, if the compensation levels of alternative occupations open to college graduates begin to change in relation to the compensation levels of school employment, potential teachers or potential professionals in other sectors (on the margin) will reconsider their decisions to teach or not to teach. This competition for labor between teaching and other professions will result in teaching and other professions generally having the same rate of compensation change, i.e., inflation in employment cost.

As with all such data, this index (civilian professional/technical and executive, administrative and managerial compensation) is only a way of estimating the portion school inflation that is attributable to inflation in professional salaries, and the Legislature should examine it carefully to ensure that its use does not over- or under-compensate for actual school inflation. The Legislature might do so by examining whether application of this index to the teacher salary cost in the Wyoming education model tends, over time, to change the alignment of Wyoming beginning teacher salaries with those of neighboring states. The Legislature should also examine this index, when combined with the index adopted for non-professional labor (below), in comparison to the BLS' index for "State and Local Government Workers, Elementary and Secondary Schools", described above. If the blended index for professional and non-professional labor begins to deviate substantially from the index for "State and Local Government Workers, Elementary and Secondary Schools", the Legislature should attempt to determine if this deviation results from inaccurate inflation measurement in one or the other indices, or from other identifiable causes.

Beginning in October, 1997, the Wyoming Department of Employment initiated a report of salaries and wages in the state, by occupation. These occupational data could be aggregated into "professional/technical/ managerial" and "other" groupings, to provide data comparable to that provided by the ECI. Beginning in late 1998, the first annual calculation of inflation in Wyoming occupational wages will be available. At some subsequent time, when this series has been established and the methodology for adjusting Wyoming education expenditures for inflation is being reviewed, these new data should be examined and the inflation rates they generate compared to those generated by the other indices discussed above. A decision can then be made about whether these Wyoming-specific occupational data should be utilized for the purpose of making adjustments for education inflation. Among the issues to consider at that time are whether there are sufficient numbers of "professional/technical/managerial" employees in Wyoming to give confidence in the inflation estimates these data might generate; the fact that the new Department of Employment report includes only salaries and wages, not benefits, and so no inflation in total compensation can be calculated; and whether the Wyoming occupational wage averages are distorted by an inability to control adequately for wage reports for part-time workers.

d) Choosing an index for non-professional employee compensation. MAP recommends that the approximately 14.2 percent of the Wyoming education model that is based on non-professional labor be adjusted for inflation by the Bureau of Labor Statistics' Employment Cost Index (total compensation, civilian workers) for all employees except those utilized for purposes of the professional component, described above. (Again, because the BLS does not report occupational data for "all civilian" workers, MAP recommends, as a second-best alternative, utilizing a data series for "private industry" workers only.) The remaining occupational groupings included in this adjustment are: Sales occupations; administrative support, including clerical; precision production, craft, and repair occupations; machine operators, assemblers, and inspectors; transportation and material moving occupations; handlers, equipment cleaners, helpers and laborers; service occupations.

In practice, it will not be necessary to create a separate non-professional compensation index by aggregating the employment cost increases for each of the occupational groups described in the preceding paragraph. Rather, the non-professional employment cost index can be calculated as a residual, once the professional/technical and managerial components are removed. Then, another simplification will result if a single employment cost adjustment is applied to the Wyoming education model, by re-weighting BLS' Employment Cost Index to reflect the relative importances of professional and other employment in Wyoming education. Thus, the BLS' Employment Cost Index has a fixed weight for professional/technical and executive, administrative and managerial

occupations of 27.4 percent, compared to a 65.8 percent relative importance in education. (Similarly, the fixed weight of other occupations in the ECI is 72.6 percent, compared to 14.2 percent in education.) Re-calculating the Employment Cost Index, utilizing Wyoming education weights, is a simple procedure, and will result in a single compensation index number that can be applied to 80 percent of the per-pupil cost.

Greater precision might be achieved if the re-weighting were based on the relative importances of more detailed occupational groups in the Wyoming educational model, rather than only a "professional/technical/managerial" vs. "other" breakdown. For example, the relative importance of transportation salaries in Wyoming education, compared to other occupations, could be the basis for re-weighting the index, rather than grouping transportation with all other non-professional/technical/managerial occupations. While MAP is not persuaded that the resultant additional precision would be sufficient to justify the additional time and complexity that such an education-based weighting system would involve, the Legislature may choose to invest in such greater precision. In any event, it should periodically examine the index to make certain that persistent distortions in school inflation estimates are not being caused by this failure to weight non-professional labor components by their relative importances in schools.

While the Bureau of Labor Statistics reports the full Employment Cost Index for the Western Region, it does not report regional data for occupations at a lower level of detail, nor does it utilize fixed weights for occupations within regions. Therefore, MAP recommends that the above operations be done utilizing national ECI data (private industry workers), and then adjusted for the overall difference in the Western regional vs. national ECI. For example, assume that the re-weighted Wyoming education employment cost growth, calculated as described above, for a particular year is 2.6 percent. Further assume that the national ECI grows in that year by 2.4 percent, while the Western regional ECI grows in that year by 2.2 percent. In this case, the inflation factor applied to the 80 percent of the Wyoming per-pupil revenue amount attributable to compensation should be 2.38 percent $[(.026 \times (.022 / .024))]$. (As noted above, the Legislature, in any particular year, may conclude that unique economic circumstances rendered the Midwestern regional index more appropriate for Wyoming's use than the Western regional index.)

e) Choosing an index for other goods and services. To adjust for inflation affecting the approximately 20 percent of Wyoming education revenues not accounted for by personnel, Wyoming decision makers again must balance the benefits of somewhat greater precision against the time, effort, complexity and expense that would be necessary to adopt a possibly more precise alternative. Because the relative importance of other goods and services in Wyoming's education model is small, the payoff to greater precision is also small.

i) A Consumer Price Index Approach: One approach is to utilize a consumer price index to estimate inflation in "other goods and services." As discussed above, inflation in consumer prices will not, in principle, be identical to inflation in the particular market basket of non-personnel goods and services purchased by Wyoming school districts. Yet while distortion generated by using a consumer price index in place of an inflation index for school personnel costs are well known (and generally in the direction of understatement), MAP has no hypothesis about whether there is a consistent pattern in the deviation of consumer price inflation from inflation in school districts' "other goods and services." For this reason, and because "other goods and services" are a small proportion of total costs, MAP believes that a consumer price index is an appropriate surrogate for a more precise calculation of inflation in these other goods and services.

There are two consumer price indices to consider for this purpose.

1 - One alternative index is the CPI-U published by the Bureau of Labor Statistics. This index is generally available by region, and by city-size within regions. If a consumer price index is the approach chosen for estimating inflation in "other goods and services," then MAP would prefer to recommend, with similar caveats to those described above, that Wyoming use the Western regional CPI-U data, as reported for "city-size D" (communities with population less than 50,000), to estimate inflation in school districts' other goods and services. If the Legislature determined that unusual economic trends made the Western regional data inapplicable in a particular year, it could utilize the Midwestern data as an alternative.

However, inadequate sample size makes it impossible for the BLS to report a CPI-U for Western Region City-Size D. The BLS does report a CPI-U for all cities in the Western Region, and it also reports a CPI-U for the North Central (i.e. Midwestern) Region City-Size D.

Because small cities in the state of Wyoming can be assumed to share some economic characteristics with all cities in the Western Region, and can also be assumed to share some economic characteristics with small cities (size D) in the adjacent North Central Region, MAP recommends that the external adjustment be calculated utilizing, for "other goods and services," the BLS' consumer price index for all cities in the Western Region, and that it then be calculated a second time utilizing, for "other goods and services," the BLS' consumer price index for Size D cities in the North Central Region. A final external adjustment should be based on the average of these two methods.

2 - A second alternative index is a consumer price index calculated by the Wyoming Division of Economic Analysis, on the basis of price information collected as part of the WCLI semi-annual survey. (Note: MAP does

not recommend removing housing, or any portion of housing, from the index when used to estimate inflation, as opposed to geographic cost differences. The state's amenities are not likely to change significantly from year to year.)

There are advantages to each of these approaches. The WCLI data collection methods are relatively less sophisticated than those employed by the Bureau of Labor Statistics. Therefore, WCLI price data are less likely to be accurate when decisions about product substitution, quality changes, etc. must be made. In making this judgment, MAP implies no criticism of the Wyoming Division of Economic Analysis, and believes that the DEA does the best possible job given the resources available to it. DEA administrators would, MAP believes, concur in the judgment that BLS is able to conduct a more sophisticated and professional price survey than is the DEA. MAP relies on the WCLI for making geographic cost adjustments because DEA data are the only data available for this purpose; there is no comparable BLS cross-sectional price index.

On the other hand, the BLS Western Region, as well as the BLS Midwestern Region (D-Size), include many states and communities whose consumer price inflation may differ from that experienced by Wyoming school districts, and the WCLI may be sensitive to Wyoming phenomena not picked up by BLS index numbers.

On balance, MAP recommends that, if a consumer price index is used to estimate inflation in the "other goods and services" component of Wyoming education revenues, that Wyoming utilize the BLS CPI-U for the Western Region and the North Central Region (D-Size) for this purpose. However, MAP also recommends that each year, this inflation rate be compared to the rate calculated by the Division of Economic Analysis for the State of Wyoming, and if there are convincing explanations for disparities, the Legislature should use, if appropriate, the WCLI inflation index.

ii) A School-Input Price Index Approach: An alternative to the use of a consumer price index for estimating inflation in "other goods and services" is to use indices based on price trends in the particular basket of goods and services utilized by elementary and secondary school districts. This approach was rejected (above) for estimating inflation in Wyoming schools' personnel costs, because of problems of endogeneity in utilizing school personnel data for this purpose. However, endogeneity is less of a problem in non-personnel inputs. While the uncompetitive nature of school labor markets may render the use of school personnel compensation trends suspect, as a means to estimate school personnel compensation inflation, other goods and services utilized by schools are purchased in a market shared by many competitive enterprises. Thus, while a broader employment cost index may be necessary to capture the influence of salary trends for engineers or accountants on the supply and demand (and thus the price) of teachers, the price increases school districts face in their purchase of

janitorial supplies are more likely to represent the actual inflation rate in janitorial supplies.

Research Associates of Washington publishes an annual report of inflation in the inputs used by elementary and secondary school districts (*Inflation Measures for Schools and Colleges*).⁷ As described above, MAP does not recommend that Wyoming consider use of this firm's data to estimate inflation in personnel compensation. For other goods and services, Research Associates of Washington's price index includes the following components and their respective weights: contracted services, 24.5 percent; supplies and materials, 30.2 percent; equipment replacement, 3.2 percent; library materials and textbooks, 5.7 percent; utilities, 18.9 percent; fixed costs, 17.5 percent. Some of these categories may not, however, be applicable to Wyoming, and if this service is utilized, Wyoming should contract with Research Associates for some customization of the data -- for example, Research Associates includes district contributions to state employee retirement systems as part of its "fixed costs" category, not as a part of employee compensation.

The advantage of utilizing school input price data from Research Associates is that the basket of goods and services priced is very similar to the basket of goods and services included in the "other goods and services" portion of the Wyoming education model. The primary disadvantage to utilizing this service, rather than one of the consumer price indices described above, is that Research Associates' data are available only on a national basis, while consumer price data are available on a regional and city-size basis (if the CPI-U is used) or on a Wyoming basis (if the WCLI is used). While in some cases (e.g., textbooks) there will be no meaningful regional price differences, in other cases (utilities) the price differences can be considerable. Another disadvantage of Research Associates' school price index is that the fixed-weights on which the index is based have not been revised for two decades. Therefore, it is MAP's judgment that the possible additional precision gained by utilizing an index based on school inputs might not be sufficient to justify this additional complexity, and MAP provisionally recommends that consumer price inflation be used to estimate the inflation in the 20 percent of Wyoming school revenues designed to be used for "other goods and services." If the Legislature wishes to seek this additional precision, however, such an approach is feasible, using the services of Research Associates. It may be useful for the State of Wyoming to explore with Research Associates whether customized data is available, and at what cost.

⁷ A promotional brochure from Research Associates of Washington has been furnished to the Legislative Service Office. Research Associates can be contacted at 703-243-3399. Its principal is Kent Halstead

4. Creating a Properly Weighted Wyoming Education Inflation Index

Once appropriate inflation rates have been calculated for compensation (by re-weighting the ECI) and for other goods and services, these rates should be combined, according to the relative importance of these broad expenditure categories (80 percent personnel compensation and 20 percent other) in the Wyoming education model, to create an annual inflation adjustment for model per-pupil revenues.

The Appendix to this report includes a table (Table A-2) which displays, for the last 10 years, the inflation rates obtained for Wyoming education by utilizing the various inflation indices discussed in this memorandum. For purposes of this table, in the columns in which MAP's recommended index and its components are displayed, the relative importances of professional labor, non-professional labor, and other goods and services are assumed to have been unchanged, and are calculated at the model weights used in this memorandum.

A careful examination of this table may result in modification of some specific recommendations made in this memorandum. An examination of a particular data series recommended for use may reveal great instability in that series, compared to another series where the growth rate is not subject to great fluctuation. If long term trends show that one data series leads to less fluctuation in estimates of inflation than another series, Wyoming policymakers may determine they have more confidence in the former than in the latter. It will be less disruptive to Wyoming school districts if, for example, per-pupil revenue grows evenly for two years at the rate of 2 percent a year, then if per-pupil revenue grows by five percent the first year and then declines by 1 percent the second year. ($2 + 2 = 5 - 1$. For purposes of simplicity, the effects of compounding are not considered in this example.) If two alternative indices tend to have similar long-term growth rates, the less erratic path to the same result may be preferred. The detailed recommendations in this memorandum should not be considered final until policymakers have analyzed the tables in the Appendix. In MAP's view, however, the actual behavior of particular data series in the tables confirms the overall approach recommended in this memorandum.

V - Reviewing the Model Components.

Because there is no precise way to calculate inflation, these recommendations put forward the best available means for estimating it. But it is possible that the inflation index here recommended, when applied to beginning teacher salaries in Wyoming, may, over the long run, tend to result, in itself and absent policy decision, in increases or decreases in teacher quality. If Wyoming policymakers come to be concerned about this possibility, the Legislature may wish to consider commissioning, some years hence, a study of whether the ongoing adjustment of beginning teacher salaries for inflation has resulted in the misalignment of this salary level with desired teacher quality.

MAP emphasizes, however, that this should not be a matter of immediate concern, although we cannot state precisely how many years should pass before the Legislature revisits it. The best approach to this problem is probably to consider this relationship of inflation adjustment to teacher quality as part of a broader re-evaluation of the MAP model.

Such a re-evaluation will be necessary because it would be mistaken to think that the model can retain its validity in future years if only adjusted properly for inflation and a few other factors (teacher seniority, EDY youth, etc.), while other components of the Wyoming education model do not change.

MAP cautions against this assumption. The Wyoming cost-based education model was created by consultation with professional experts in Wyoming, in light of national research about resources necessary to provide American students with the basket of educational goods prescribed by the Wyoming legislature.

New national research may suggest revisions in the specification of resources in the Wyoming education model. Wyoming professional experts may revise their judgments about resources that are or are not needed to provide the basket of educational goods.

MAP therefore recommends that the Legislature commission a systematic review of the resources included in the Wyoming educational model every five years. The resource specifications in the model may be revised following such a review. Such a revision may also necessitate a revision in the relative importances of professional compensation, non-professional compensation, and other goods and services utilized for the annual inflation adjustments.

Wyoming Education Finance Issues Report External Cost Adjustment

Appendix

This appendix to the Wyoming Education Finance Issues Report, External Cost Adjustment (January 8, 1998) illustrates the recommendations of the body of this report, by displaying alternative indices and inflation rates for the 1987 to 1997 period.

Table A-1

Table A-1 displays the index recommended in this report, and compares it with several other measures of inflation. Each measure of inflation has been converted for purposes of display in this table to a 1987 base year (1987 = 100), permitting easier comparability of the various indices.

Column 1 displays the external adjustment recommended in this report for use by Wyoming to estimate inflation in the costs of elementary and secondary education. This recommended index is an average of two sub-indices. As explained in the text of this report, each of the subindices is composed of a component for professional (including professional and technical, administrative, executive and managerial) compensation, a component for other employees' compensation, and a component for other goods and services purchased by districts. The components are weighted by the relative importances of these three components from national data (65.8%, 14.2% and 20%, respectively). Wyoming policymakers should substitute actual relative importances from the model funding scheme eventually adopted by the Wyoming legislature. In the case of the two personnel components (professional and other), the index is then adjusted by the ratio of Employment Cost Index data for total compensation for all private industry workers in the Western Region, to Employment Cost Index data for total compensation for all private industry workers nationwide. Subindex "a" and subindex "b" differ only in the way they treat the "other goods and services" component. Subindex "a" uses an all-items consumer price index (CPI-U) for the North Central (midwest) Census Region for City Size D (cities with less than 50,000 population). Subindex "b" uses an all-items consumer price index (CPI-U) for the Western Census Region for all cities. For the last ten years, the two versions of this recommended index have been different by only small amounts. Nonetheless, MAP recommends that Wyoming track each subindex, and average them, in the event the indices diverge at some time in the future. The recommended index, an average of the two subindices has had average annual education inflation from 1987 to 1997 has been 3.7 percent.

Column 4 displays the inflation estimates generated for Wyoming consumer prices by the State of Wyoming, Economic Analysis Division of the Department of Administration and Information. According to this "Wyoming Cost of Living Index (WCLI)," average annual consumer price inflation from 1987 to 1997 has been 3.6 percent.

Column 5 displays the national consumer price inflation rate, the "Consumer Price Index for all Urban Consumers (CPI-U)" published by the U.S. Department of Labor, Bureau of Labor Statistics. According to the CPI-U, average annual consumer price inflation nationwide from 1987 to 1997 has been 3.5 percent.

Column 6 displays the "Employment Cost Index (ECI)" for all civilian workers nationwide (private industry and state and local government workers), published by the U.S. Department of Labor, Bureau of Labor Statistics. It is based total compensation (salaries and benefits). According to the ECI, average annual inflation nationwide in civilian compensation from 1987 to 1997 has been 3.8 percent.

Column 7 displays one component of the nationwide ECI, an index for total compensation for employees of elementary and secondary school districts. According to this component of the ECI, average annual inflation nationwide in compensation of school district employees from 1987 to 1997 has been 4.2 percent.

Column 8 displays one component of the nationwide CPI-U, an index of nationwide inflation in prices of services purchases by consumers. The relative merits of a "services" index for measuring inflation in education is discussed in publications referred to in footnote 4 of the main text of this report. According to this component of the CPI-U, average annual inflation nationwide in services purchased by consumers from 1987 to 1997 has been 4.1 percent.

Column 9 is the same as column 5, except that Column 5 is a nationwide measure, whereas Column 9 measures consumer price inflation in the Western Census Region only. Wyoming is part of this region although, as explained in the text, the state may in some ways be dissimilar to the region as a whole. According to the CPI-U, average annual consumer price inflation in the Western Region from 1987 to 1997 has been 3.5 percent.

Column 10 is the same as column 9, except that Column 9 is a measure of consumer price inflation in all Western Region cities, whereas Column 10 measures consumer price inflation only in those Western cities ("Size C") with population from 50,000 to 330,000. As explained in the text, data on cities ("Size D") with population less than 50,000 would be preferable, but inadequate sample sizes preclude BLS reporting of such data. According to the CPI-U, average

annual consumer price inflation in Western Region cities with population between 50,000 and 330,000 from 1987 to 1997 has been 3.9 percent.

Column 11 is the same as column 8, except that Column 8 is a nationwide measure, whereas Column 11 measures consumer price inflation for services in the Western Census Region only. Wyoming is part of this region although, as explained in the text, the state may in some ways be dissimilar from the region as a whole. According to the CPI-U, average annual consumer price inflation for services in the Western Region from 1987 to 1997 has been 4.0 percent.

Column 12 is the same as column 5, except that Column 5 is a nationwide measure, whereas Column 12 measures consumer price inflation in the North Central Census Region only. Wyoming is not part of this region although it is adjacent to it. As explained in the text, the state may in some ways be similar to this North Central region. According to the CPI-U, average annual consumer price inflation in the North Central Region from 1987 to 1997 has been 3.4 percent.

Column 13 is the same as column 12, except that Column 12 is a measure of consumer price inflation in all North Central Region cities, whereas Column 13 measures consumer price inflation only in those North cities ("Size C") with population from 50,000 to 330,000. This column is displayed so that readers can compare inflation in "Size C" cities to inflation in "Size D" cities (shown in column 14). Such a comparison is possible for the North Central Region because, unlike the Western Region, sample sizes in the North Central Region are adequate to permit reporting of data for "Size C" and "Size D" cities. According to the CPI-U, average annual consumer price inflation in North Central Region cities with population between 50,000 and 330,000 from 1987 to 1997 has been 3.6 percent.

Column 14 is the same as column 12, except that Column 12 is a measure of consumer price inflation in all North Central Region cities, whereas Column 14 measures consumer price inflation only in those North cities ("Size D") with population less than 50,000. According to the CPI-U, average annual consumer price inflation in North Central Region cities with population less than 50,000 from 1987 to 1997 has been 3.4 percent.

Column 15 is the same as column 8, except that Column 8 is a nationwide measure, whereas Column 15 measures consumer price inflation for services in the North Central Census Region only. According to the CPI-U, average annual consumer price inflation for services in the North Central Region from 1987 to 1997 has been 4.0 percent.

Column 16 is an index based on beginning teacher salaries in the six states surrounding Wyoming. According to this regional teacher price index, average

annual teacher price inflation in the Wyoming region has been 3.4 percent. (The detailed data supporting this Column 16 are displayed in Table A-3.)

Our conclusion from Table A-1 is that the external adjustment recommended in the body of this report for use by Wyoming seems reasonable.

Table A-2

Table A-2 is calculated from the same underlying data as Table A-1. Rather than displaying the index numbers (1987=100) of Table A-1, Table A-2 displays annual average inflation rates for 1987-88 to 1996-97. The important thing to note about this table is that there is greater variation between indices in any given year than there is over a 10 year period. Thus, even if Wyoming chooses to utilize a different index for making external adjustments to its education funding than the index recommended in this report, the long term consequences of different choices will be less severe than the short term consequences.

Table A-3

Table A-3 displays teacher salary inflation in Wyoming and each of states surrounding Wyoming. Columns 16 in Tables A-1 and A-2 is taken from Column 9 in this Table A-3.

Table A-4

Table A-4 displays and explains the calculations behind the Recommended Index.

Note on Sources

1 - The Consumer Price Index for all Urban Consumers is produced by the Bureau of Labor Statistics:

All Items, National (CPI-U) is Series CUUR0000SAO.

Services, National, is Series CUUS0000SAS.

CPI-U, Western Region, is Series CUUR0400SA0.

CPI-U, Western Region, C Size, is Series CUUSC400SA0.

CPI-U, North Central Region, is Series CUUR0200SA0.

CPI-U, North Central Region, C Size, is Series CUUSC200SA0.

CPI-U, North Central Region, D Size, is Series CUUSD200SA0.

CPI-U, Services, Western Region, is Series CUUS0400SAS.

CPI-U, Services, North Central Region, is Series CUUS0200SAS.

2 - The Employment Cost Index is produced by the Bureau of Labor Statistics and published quarterly. Historical data can be found in U.S. Department of

Labor, Bureau of Labor Statistics, *Employment Cost Indexes and Levels, 1975-95, October 1995, Bulletin 2466*. Recent data comes from a BLS quarterly release, *Employment Cost Index - June 1997, USDL 97-247*. Employment Cost Index data is also available on the Internet in a series entitled "Employment Cost Trends" (<http://stats.bls.gov/special.requests/ocwc/ect/echistry.txt>).

3 - Weights for components of the Employment Cost Index were provided by the U.S. Department of Labor, Bureau of Labor Statistics, Office of Compensation Levels and Trends, in a spreadsheet entitled "eciwgts.xls".

4 - The "Wyoming Cost of Living Index, Annual Inflation Rates (WCLI)" is produced by the State of Wyoming, Economic Analysis Division, Department of Administration and Information.

5 - Beginning teacher salaries by state are reported an annual publication of The American Federation of Teachers (AFT), *Survey and Analysis of Salary Trends*. Most years' data are also reported in the U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics*, based on data from the AFT's report. In Table A-3, missing data were estimated for Montana for 1986-87. The data reported in *Survey and Analysis of Salary Trends* is reported as they are provided to the AFT Department of Research by state departments of education. The methodologies used may be inconsistent for different states. We display these data here on the assumption that data for any particular state were developed utilizing a consistent methodology from 1987 to 1997, even if the methodologies have been inconsistent from state to state. However, we have made no effort to investigate the validity of this assumption.

6 - The accompanying tables report an enrollment weighted average for beginning teacher salaries. Enrollment data by state are available in the U.S. Department of Education, *Common Core of Data*. For calculations in Table A-3, missing enrollment data were estimated for all states for 1987, 1988, 1989 and 1997.