

ALASKA LEGISLATURE SPECIAL COMMITTEE/SUBJECT FILES 8672

3033 SCOMM 137: HOUSE SPECIAL COMMITTEE ON EDUCATION 2005-2006 719

AMENDMENT

3

OFFERED IN THE HOUSE

BY REPRESENTATIVE JOULE

TO: CSHB 13(), Draft Version "X"

1 Page 1, line 1, following "to":

2 Insert "the school construction grant fund and to"

3

4 Page 1, following line 4:

5 Insert new bill sections to read:

6 **"* Section 1.** AS 14.11.008(a) is amended to read:

7 (a) In order to receive a grant under this chapter or an appropriation under
8 AS 37.05.560, a district must

9 (1) be

10 (A) a rural educational attendance area;

11 (B) a municipal school district and, as of June 30 of the
12 previous fiscal year, have a population of less than 1,000; or

13 (C) a municipal school district that operates schools on a
14 military reservation; and

15 (2) provide a percentage share of the project cost, as determined under
16 (b) or (c) of this section; a [A] district shall provide the required participating share
17 within three years after the date that the appropriation bill funding the grant is passed
18 by the legislature.

19 *** Sec. 2.** AS 14.11.008(a) is repealed and reenacted to read:

20 (a) In order to receive a grant under this chapter or an appropriation under
21 AS 37.05.560, a district must provide a percentage share of the project cost, as
22 determined under (b) or (c) of this section. A district shall provide the required
23 participating share within three years after the date that the appropriation bill funding

1 the grant is passed by the legislature.

2 * Sec. 3. AS 14.11.008 is amended by adding a new subsection to read:

3 (g) Grant funds provided to a municipal school district under (a)(1)(C) of this
4 section may only be used for the costs of school construction or major maintenance for
5 a school located on a military reservation.

6 * Sec. 4. AS 14.11.011(a) is amended to read:

7 (a) A municipality that is a school district or a regional educational attendance
8 area eligible under AS 14.11.008(a) may submit a request to the department for a
9 grant under this chapter.

10 * Sec. 5. AS 14.11.011(a) is repealed and reenacted to read:

11 (a) A municipality that is a school district or a regional educational attendance
12 area may submit a request to the department for a grant under this chapter."

13

14 Page 1, line 5:

15 Delete "Section 1"

16 Insert "Sec. 6"

17

18 Renumber the following bill sections accordingly.

19

20 Page 9, line 17:

21 Delete all material.

22 Insert new bill sections to read:

23 "** Sec. 9. AS 14.11.008(g) is repealed.

24 * Sec. 10. The uncodified law of the State of Alaska is amended by adding a new section to
25 read:

26 CONTINGENT EFFECT. Sections 1 - 7 and 9 of this Act take effect only if, at the
27 first regular session or at a special session, the Twenty-Fourth Alaska State Legislature passes
28 a bill appropriating an amount equal to or more than \$100,000,000 to the school construction
29 grant fund under AS 14.11.008 - 14.11.011, as amended by secs. 1, 3, and 4 of this Act, and
30 that bill becomes law not later than October 1, 2005.

31 * Sec. 11. If, under sec. 10 of this Act, secs. 1, 3, 4, 6, and 7 of this Act take effect, they

1 take effect July 1, 2005.

2 * Sec. 12. If, under sec. 10 of this Act, secs. 2, 5, and 9 of this Act take effect, they take
3 effect July 1, 2006.

4 * Sec. 13. Section 8 of this Act takes effect July 1, 2005.

5 * Sec. 14. Section 10 of this Act takes effect immediately under AS 01.10.070(c)."

AMENDMENT

4

OFFERED IN THE HOUSE

BY REPRESENTATIVE HAWKER

TO: CS HB 13 Work Draft (24-LS0062\X)

- 1 Page 7, line 15 through page 9, line 16
- 2 Delete all material
- 3
- 4 Renumber following sections accordingly



March 4, 1998

Senator Randy Phillips, Chair
Legislative Budget and Audit Committee
State Capitol
Juneau, Alaska 99801

Dear Senator Phillips:

Enclosed is McDowell Group's *Final Report* on the *Alaska School Operating Cost Study*. We thank you for the opportunity to contribute to improving the method for Basic Need allocation of Alaska's largest and most important investment - public education. The study is a technical research effort that focuses only on the influence of school size and geographic location on school operating costs. The study is not intended to address the cost of politically determined issues such as local contributions, capital projects, allocation of federal aid or special programs.

The final report is organized into three sections.

1. The *Supplemental Summary* is our summary of results and recommendations. It includes an explanation of how we arrived at a school size factor for instructional costs, an area cost differential for administration and non-personal services costs, and an overall District Cost Factor (DCF) that provides each district with a single number for simplicity of calculation.
2. The *Final Report* is the main body of the report that explains in detail the research results and methods underlying the "Statistical Method" that is the basis for our findings and recommendations.
3. The *Technical Appendix* includes detailed data supporting the main points of professional inquiry that we pursued in the course of the study.

The major advances of the study are:

- An empirical basis for identifying actual school costs. Prior size and location cost factors were based largely on professional opinion and on outdated proxies not directly related to school costs.
- An equitable system for allocating instructional costs (70% of all school costs) for schools of all sizes, regardless of their current level of funding.
- Provision for recovery of administration and non-personal services costs that are actually incurred in each district as the result of size, geographic location and other factors.
- A system easily amenable to regular updating as school costs change over time.
- Definition of costs by student and by school, rather than by Instructional Unit and Funding Community.

We have these recommendations:

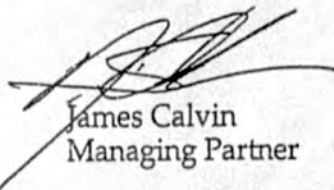
1. We recommend tracking, analyzing and updating school costs by each of the three major cost categories – instruction, administration and non-personal services – on a regular basis. The system we developed uses ongoing data bases so updating these cost factors can be done in an economical and timely fashion. These costs can be expressed as separate factors or combined as we have done in the District Cost Factor.
2. We strongly recommend a transition period as districts adjust to new levels of funding that may result from changes in size and location factors. The change in the cost allocation method could have significant impacts on some districts and adjustment time may be needed.
3. We recommend improvement in the quality and definition of non-instructional data bases on which the statistical approach is based. This will allow for more precise allocation for administration and non-personal services costs in the future.

In closing, we once again thank you for the professional opportunity to contribute in the challenging area of school costs analysis.

Sincerely,



Eric McDowell
Senior Partner



James Calvin
Managing Partner



David Teal
Project Manager

Public School Funding

A Historical Review

Some critics of Senate Bill 36 focus attention on the impact the legislation has on several rural school districts, specifically the loss of state revenue in comparison to the dollar amount previously received. In order to fully understand this argument, it is necessary to put the current funding formula in a historical perspective.

1985

A one year stop-gap funding scheme was adopted.

1985 marked the second year of a three year study to determine a "resource cost model" to fund schools. California consultants were asked to assess the costs involved in educating Alaskan students in three differently sized, hypothetical classrooms. During this lengthy review, school districts were anxious for a change and pressure on the Legislature mounted. For a variety

of reasons, the "resource cost model" was never implemented. Unable to decide upon the funding level, the Legislature approved a stop-gap measure.

An Alaska Geographic Differential Study was conducted in 1985 by Homan-McDowell. The study was based solely on the household cost of living and provided differential data for 19 election districts.

1986

A re-write proved impossible; another one year solution

Still under pressure to adopt a new formula, the Legislature approved SB 408, sponsored by Sen. Frank Ferguson, for one year.

• "[The ACD] has always been a tool used to . . . bring a number up or down, depending upon what a legislator was interested in."

Mike Scott, staff to Sen. Ferguson

• "... most districts generate more special ed. money than they need."

• "... noted the increased need for consolidation of school districts."

Bob Green, School Boards' Assoc.

• "... real equity between urban and rural districts cannot be achieved."

LeRoy Owens, Aleutian Schools

1987

After two years of different stop-gap measures, a new proposal was considered.

The Legislature convened and found itself still in a tenuous position. The funding formula was under attack by the Southwest Region School District and the federal government. (Subsequently, the federal government required \$11 million to be repaid by the state to several school districts.)

Governor Cowper proposed a funding formula based on "instructional units" and the cost of living study conducted in 1985 by

Homan-McDowell. City and borough school districts were required to contribute 4 mills of their assessed property value or 35% of their district's basic need. A district's allocation was determined, in part, by the number of "funding communities" within the district.

The House Finance Committee amended the original bill and increased twenty-nine area cost differentials.

1987

As a result of several years of turmoil, the proposal was adopted even though the legislation "would be a further setback for railbelt taxpayers and students."

Sen. Joe Josephson (5/19/87)

• "[The new area cost differentials] are not based on the benefit of specific supporting data. For this reason, I do not feel these numbers should be included in the Foundation Formula."

Rep. Steve Rieger (4/16/87)

• "[The new area cost differentials] presented are not based on a solid basis of school costs. I do not have confidence in their accuracy."

Rep. Pat Pourchot (4/16/87)

• "[The House HESS Committee] urges that the issue of taxation in the unorganized areas be given serious consideration."

Rep. Johnny Ellis (3/19/87)

• "... would like a survey of the [unorganized] areas to know the potential of the people being able to pay a percentage of the cost of education in their own areas."

Rep. Dave Donley (3/18/87)

• "[I] express concern that surplus funding would be siphoned off by central offices and used to increase administrative hierarchy."

Sen. Paul Fischer (5/19/87)

• "... in the rush to adjournment, the Senate Finance CS was reported out of committee without an opportunity for public testimony. [I] prevailed upon the Senate to return the bill to committee for a public hearing."

Sen. John Binkley (5/19/87)

• "... if the 4 mill rate was in place ... North Slope and Valdez would be paying an unrealistic amount in relationship to [their need]."

Marshal Lind, DOE Commissioner

• "... noted that [House Finance] had proposed twenty-nine [new ACDs] totaling approximately \$4.2 million for all REAAs."

Sen. Paul Fischer (5/19/87)

• "I believe it is dangerous for the Legislature to adjourn without enacting a new formula. Urban members of the Senate HESS Committee acquiesced in a measure that includes area differentials less favorable to urban areas."

Sen. Joe Josephson (5/19/87)

• "... there appears to be no objective definition of funding communities."

Bill Berrier, small districts' lobby

* * * * *

1998

SB 36 proposes a funding formula that is based on actual school costs.

During the past ten years, the Foundation Formula has remained relatively stable. However, the current distribution scheme, developed under pressure with very limited cost data, has proven to be an experiment that has failed.

Issues raised in 1987 – special education spending, administrative overhead, "funding communities," local contribution inequities, inflated area cost differentials – are

still areas of concern and are addressed in SB 36.

Senate Bill 36 is based on a school operating cost study that treats all Alaskan schools equally and fairly. This is the first review of actual school costs in the thirty-nine years of Alaskan statehood.

It is important to remember the historical perspective of the current formula when comparing SB 36 to the existing formula.

FISCAL NOTE

STATE OF ALASKA
2005 LEGISLATIVE SESSION

Fiscal Note Number: 1
 Bill Version: CSHB 173(EDU)
 (H) Publish Date: 4/22/05

Revision Date/Time (Note if correction): _____ Dept. Affected: Education & Early Development
 Title An Act relating to school funding and adjusting RDU K-12 Support
the district cost factors; and providing for an effective date Component Foundation Program
 Sponsor Special Committee on HESS
 Requester Special Committee on HESS Component No. 141

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

OPERATING EXPENDITURES	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Personal Services						
Travel						
Contractual						
Supplies						
Equipment						
Land & Structures						
Grants & Claims	82,561.9	0.0	0.0	0.0	0.0	0.0
Miscellaneous						
TOTAL OPERATING	82,561.9	0.0	0.0	0.0	0.0	0.0

CAPITAL EXPENDITURES						
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CHANGE IN REVENUES ()						
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FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF	82,561.9	0.0	0.0	0.0	0.0	0.0
1005 GF/Program Receipts						
1037 GF/Mental Health						
Other (Specify Type--Do not abbreviate)						
TOTAL	82,561.9	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY2005) cost: 0.0

Mark this box (X) if funding for this bill is included in the Governor's FY 2006 budget proposal: ☐

POSITIONS

Full-time						
Part-time						
Temporary						

ANALYSIS: (Attach a separate page if necessary)

This bill would replace the existing District Cost Factors listed in AS 14.17.460(a) with the recommended District Cost Factors as proposed by the Institute of Social and Economic Research (ISER).

Prepared by: Eddy Jeans, Director
 Division: School Finance
 Approved by: Karen Rehfeld, Deputy Commissioner
 Agency: Education & Early Development

Phone 465-8679
 Date/Time 3/11/05 1:53 PM
 Date 3/11/2005

School District	FY06 Projection @ \$4,576	ISER Area Cost Differential	FY06 Projection w/ ISER Cost Diff.	Difference
Alaska Gateway	4,915,667	1.594	5,946,565	1,030,898
Aleutian Region	1,059,727	1.939	1,139,620	79,893
Aleutians East Borough	3,501,788	1.991	5,162,484	1,660,696
Anchorage	223,154,797	1.000	223,154,797	-
Annette Island	1,398,131	1.338	2,207,976	809,845
Bering Strait	17,205,353	1.998	24,565,824	7,360,471
Bristol Bay Borough	1,239,140	1.478	1,569,350	330,210
Chatham	1,733,593	1.576	2,469,691	736,098
Chugach	1,905,637	1.496	2,008,755	103,118
Copper River	6,032,438	1.316	6,717,655	685,217
Cordova	3,087,845	1.234	3,546,816	458,971
Craig	3,698,050	1.206	4,234,258	536,208
Delta/Greely	8,942,900	1.241	9,851,335	908,435
Denali Borough	4,597,598	1.332	4,648,156	50,558
Dillingham	4,263,506	1.346	4,617,228	353,722
Fairbanks N. Star Borough	72,823,842	1.070	75,592,037	2,768,195
Galena	16,058,992	1.391	16,124,857	65,865
Haines Borough	1,563,785	1.200	1,995,983	432,198
Hoonah	1,535,829	1.399	2,071,394	535,565
Hydaburg	767,366	1.504	971,372	204,006
Iditarod Area	4,427,089	1.846	5,063,528	636,439
Juneau Borough	23,648,457	1.145	28,026,102	4,377,645
Kake	1,190,539	1.459	1,743,462	552,923
Kashunamiut	2,546,629	1.619	3,173,988	627,359
Kenai Peninsula Borough	46,190,906	1.171	56,385,468	10,194,562
Ketchikan Gateway Borough	11,703,837	1.170	14,325,456	2,621,619
Klawock	1,331,394	1.302	1,655,315	323,921
Kodiak Island Borough	15,580,674	1.289	19,069,354	3,488,680
Kuspuk	4,610,680	1.734	5,839,545	1,228,865
Lake & Peninsula Borough	5,980,874	1.994	7,778,228	1,797,354
Lower Kuskokwim	39,975,145	1.663	44,785,881	4,810,736
Lower Yukon	18,120,223	1.861	25,265,422	7,145,199
Mat-Su Borough	83,064,699	1.070	88,345,178	5,280,479
Nenana	3,922,379	1.338	4,036,719	114,340
Nome	6,359,841	1.450	7,067,239	707,398
North Slope Borough	8,451,990	1.791	12,113,054	3,661,064
Northwest Arctic Borough	22,227,553	1.823	26,713,110	4,485,557
Port Barrow	404,184	1.477	428,734	24,550
Petersburg	3,691,527	1.244	4,794,664	1,103,137
Pribilof	1,258,266	1.691	1,604,227	345,961
Saint Mary's	1,992,370	1.624	2,394,123	401,753
Sitka Borough	7,265,034	1.195	9,106,793	1,841,759
Skagway	710,547	1.174	740,579	30,032
Southeast Island	3,069,832	1.403	3,548,052	478,220
Southwest Region	6,817,409	1.685	8,491,697	1,674,288
Tanana	1,027,629	1.786	1,192,986	165,357
Unalaska	2,405,593	1.441	2,988,572	582,979
Valdez	3,684,508	1.170	3,988,859	304,351
Wrangell	2,276,815	1.159	2,729,953	453,138
Yakutat	991,431	1.412	1,314,599	323,168
Yukon Flats	4,617,236	2.116	5,556,357	939,121
Yukon/Koyukuk	11,059,848	1.835	12,285,454	1,225,606
Yupit	4,225,753	1.723	5,223,228	997,475
Mt. Edgecumbe High School	1,842,250	1.195	2,348,977	506,727
Other	26,096,100		26,096,100	
Total	762,255,225		844,817,156	82,561,931

A Review Of
Alaska School District Cost Study

Prepared for the Alaska Legislative Budget and Audit Committee

By

Dr. Bradford H. Tuck
Institute of Social and Economic Research
University of Alaska Anchorage

January 29, 2004

SUMMARY OF CONCLUSIONS

The Alaska Legislature's Legislative Budget and Audit Committee asked the Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage to review the *Alaska School District Cost Study*. The American Institutes for Research (AIR) prepared that study for the legislative committee.

The study was to provide a "geographic cost of education index" that the state could use to help equalize the purchasing power of educational dollars it allocates to school districts across Alaska. Costs of living can vary substantially in different areas of Alaska.

The study, in two volumes plus supplemental materials, was released in January 2003 and supplemented in February 2003. Also, in a response dated April 11, 2003, AIR answered a number of questions that had been raised about the study.

The committee asked ISER to focus specifically on the methodology AIR used and to address the following questions.

- (A) Is the methodology used by AIR generally acceptable? Methodology is to be interpreted to include both the theoretical basis underlying the choice of the index number used and the methodology used in estimating the various components of the index.
- (B) If the methodology is generally acceptable, is there anything unique to Alaska that makes the use of this methodology inappropriate in Alaska?
- (C) If the AIR methodology is generally acceptable for use in Alaska, but is deficient in some respects, can elements of the methodology be adapted so that use of the general AIR methodology is appropriate in Alaska?
- (D) Is an alternative general methodology necessary, and if so, what might it be?

Our conclusions are summarized below, and a more detailed analysis is provided in the accompanying report.

• The methodology reflected in the use of the Törnqvist Index Number is appropriate. However, we have a number of concerns about the way AIR estimated some of the specific components of the index.

The index has properties that, from a theoretical standpoint, should provide a more accurate measure of relative education costs than would the alternative—a fixed market basket index.

AIR defined four major sub-components (or cost categories) of the index that account for almost all expenditures for current operations: personnel services, consisting of costs for administrators, teachers, and classified personnel; energy services; cost of goods—supplies, materials, and small capital items—and costs of travel.

- *AIR's estimation of the teacher compensation component of the index raises several concerns—primarily that the methodology does not adequately address the issue of teacher turnover rates.*

Teacher compensation is a major element in the index, and failure to account for teacher turnover probably imposes a downward bias on the teacher cost component of the index. We also note and discuss more technical aspects of model specification in the body of this report.

- *AIR's estimation of energy requirements and related costs is flawed, in our judgment. What the documentation of the AIR report describes is not how the index is actually calculated.*

Furthermore, the difference between actual energy costs and what the index indicates energy costs should be differs substantially for many school districts. In many cases, the magnitude of discrepancies between the actual and the estimated costs appears to be far too great to be addressed by adjusting the thermostat at night or other usage adjustments.

- *AIR used just two items (paper and windows) as a basis for estimating the cost of goods component of the index. For most indexes, this would be an unusually small sample of items.*

The decision to use two items was a judgment call. A better basis for determining a representative sample (and budget proportions) might be to do a detailed analysis of a small number of representative schools and districts. Alternative pricing methods might also be considered.

- *We find discrepancies between what the AIR documentation states and the actual computation of components of the travel index.*

In some instances, these discrepancies would bias the index downward—that is, reduce the ratio of travel costs between Anchorage and the district in question. While this is a relatively small element of the index, we do not think that it is correct.

- *AIR's definition and measurement of budget categories may or may not be adequate. There is simply no way to tell from the study reports.*

The basic issue is whether or not the measured shares accurately reflect expenditures. AIR excluded revenue funds from expenditures—and that exclusion may be valid, but it raises questions.

A REVIEW OF THE ALASKA SCHOOL DISTRICT COST STUDY

The Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage has been asked by the Alaska Legislature's Legislative Budget and Audit Committee to review the study conducted by American Institutes for Research (AIR) entitled *Alaska School District Cost Study*, composed of two volumes plus supplemental materials. The study was released in January of 2003, with supplemental materials being provided in February of 2003. AIR also provided responses to a number of questions that were raised regarding the study in a response dated April 11, 2003. The study's broad purpose was to construct a "geographic cost of education index" (GCEI) that could be used to assist in equalizing the purchasing power of educational dollars allocated to school districts across Alaska.

ISER has been asked to review the published study, supporting materials, and data sets underlying the estimation of the index. ISER has not been asked to assess the accuracy of data compiled by AIR. After review of the materials ISER has been asked to respond to the following questions.

- (A) Is the methodology used by AIR generally acceptable? Methodology is to be interpreted to include both the theoretical basis underlying the choice of the index number used and the methodology utilized in estimating the various components of the index.
- (B) If the methodology is generally acceptable, is there anything unique to Alaska that makes the use of this methodology inappropriate in Alaska?
- (C) If the methodology utilized by AIR is generally acceptable for use in Alaska, but is deficient in some respects, can elements of the methodology be adapted so that use of the general AIR methodology is appropriate in Alaska?
- (D) Is an alternative general methodology necessary, and if so, what might it be?

This report is divided into several sections. The first considers the theoretical basis for selecting the index number concept utilized by AIR. The second section reviews methodology used by AIR to estimate (calculate) the index. Each of the four major categories of the index (personnel services; energy services; supplies, materials, and small capital items; and travel) is analyzed. Based on the findings of these two sections the specified questions are addressed.

REVIEW OF THE THEORETICAL BASIS FOR SELECTION OF THE TÖRNQVIST INDEX.

From a theoretical basis, the choice of an index number depends on what is to be measured. In essence, the AIR contract statement of work asked AIR to derive measures of geographic cost differentials that are to be used in the calculation of K-12 school funding (similar to those currently found in AS 14.17.450). The stated objective for these measures is to "equalize the spending power of education funding in school districts throughout Alaska". It is also important to note that AIR was specifically instructed to not consider quality of education and school size factor adjustments.

The objective of equalizing spending power is open to several interpretations. The first is that a unit of equalized spending power enables each district to purchase a unit of education output of homogeneous (uniform) quality. A second interpretation is that the receiving district is able to purchase a unit of education output, but not necessarily of a quality comparable to some other district. A third interpretation is that each district is able to purchase a "unit," or some specified set of educational inputs. A final interpretation is that the recipient is able to purchase a collection of inputs that enables it to provide an equivalent unit of educational service (which may or may not equate to a unit of output).

In other words, does equivalence relate to purchase (cost) of output or inputs? These are two fundamentally different issues. In view of the contract language it appears that the Legislative Budget and Audit Committee wanted equivalence with respect to inputs. This interpretation is also reflected in the methodology AIR used.

Once the focus is on inputs, an additional question arises. By equivalence, is it meant that each district is provided with funding that enables it to purchase a specific set (market basket) of inputs, or that the district can purchase some set of inputs that enables it to provide an equivalent unit of educational service? This is the question that is central to AIR's discussion of the fixed market basket versus the so-called superlative index.

To see the significance of these distinctions, consider the nature of the problem that is faced. For the sake of simplicity, assume that there are two school districts. Each district has a "production function" that links a set of inputs (like teachers, staff, physical facilities, or others) to the "production" of education, measured as "output." The production of education entails the costs of purchasing the inputs represented in the production function. The relationship between the total cost of producing the output and the quantity of output is referred to as the total cost function. We can also think of the average total cost function, or cost per unit of output, as the function that reflects total cost of output divided by the amount of output. Suppose further that each district faces a different production function, that the input mix in each district is different, that the "outputs" of the districts differ qualitatively, and that the districts face different relative

prices for their inputs. This is the basic situation in Alaska and the task that the measurement of regional cost differentials must address.

Given these conditions we would expect to observe a number of differences among districts regarding the "production" or delivery of educational services. We would certainly expect the "average cost" of a unit of service to differ among districts, reflecting regional differences in the absolute cost of education inputs. We would also expect districts to organize "production" to reflect differences in relative prices between regions. This is the so-called "substitution effect." Inputs with relatively lower prices will be substituted for higher priced inputs, to the extent that substitution is possible. Thus, the proportion of a district's total budget spent on a particular type of input (e.g., administration, teachers with special certification or subject area expertise) will vary across districts in response to different relative prices.

Data reflecting budget shares spent on the major components of education inputs for Alaska districts do in fact reflect the substitution phenomenon and per student costs clearly vary across districts. It should be noted that variation in per student costs reflect both economic conditions (scale economies and regional differences in costs of inputs) and past policies regarding the level of state funding support to the districts. However, differences in input proportions (i.e., relative budget shares) are expected to primarily reflect economic factors.

These observations suggest that an index number used to measure differences in regional costs should be able to incorporate the consequences of the substitution effect. A fixed weight market basket index (where each district purchases the same set of inputs with the same relative quantities) does not do this.

AIR, Inc. has elected to use an index called the Törnqvist index. This is a geometric mean relative price index weighted (in this application) by the average of the budget shares of the two districts being compared (Anchorage and another district). We have reviewed a number of references in the literature regarding this index, including several of those cited in the AIR study. The Törnqvist index is used in a variety of contexts and the U.S. Department of Labor (Bureau of Labor Statistics) is utilizing it. The index does, in fact, appropriately adjust for the substitution effect.

REVIEW OF AIR'S ESTIMATION OF THE INDEX

The next part of this analysis reviews AIR's application of the index and the measurement of index components. The AIR materials that are part of the review include Volume I – Summary of Results, Volume II – The Technical Report, including appendices, and the index update ACCESS model and supporting documentation (Alaska School District Cost Study: Updating the Geographic Cost of Education Index Using Access). AIR has also provided several data sets that were used in their analysis. These have greatly facilitated our review. Where possible, we have reviewed the ACCESS model and attempted to replicate specific segments of the index number calculations.

AIR has identified four major categories of the index (personnel services; energy services; supplies, materials, and small capital items; and travel). These categories (as defined by AIR) account for almost all expenditures in the operating budget. Before reviewing individual components of the index a brief description of the index is given.

As stated above, the index is a geometric mean of price relatives, weighted by the average of the budget shares of the two districts being compared. A "price relative" is simply the price of an item in a specified district, divided by the price of the same item in the base (or reference) district, which is Anchorage. Thus, the basic steps in estimating the index involve estimating the "price" of each item included in the index for each of the 53 districts, and calculating the share of each district's budget that is spent on the category represented by the respective items.

The focus of the review is on the estimation of the various prices incorporated in the index, but we will also comment on the budget share question. A discussion of individual components of the index follows.

PERSONNEL SERVICES

The review of personnel services is drawn primarily from V.I, pages 7 - 9, V.II, pages 10 - 22, and Appendixes C - E.

The personnel services component of the index accounts for the largest share of budget expenditures, and is made up of three sub-categories (administrators, teachers, and classified employees). AIR uses hedonic wage models to estimate compensation (i.e., the price) in each of the three personnel components. Each of the estimating equations utilizes four sub-groups of independent variables to "explain" compensation; characteristics or attributes of the employee, characteristics of the school, regional amenities, and regional economic characteristics. The primary economic variable is the so-called comparable wage index. The index is discussed in Volume II, pages III-11 to III-16. This is an index that is intended to measure the relative comparable average wage level of twenty-seven Alaska labor market areas. The index is represented as measuring the relative cost of living in each of the 27 areas. This index is then used as one of the economic variables in the regression equations that estimate compensation.

The use of hedonic wage models is an established, and accepted, methodology. However, we have concerns regarding the present application. The first concern relates to the estimation and interpretation of the comparative wage index, and impacts on all three of the compensation model regressions. The second area of concern relates to the specification and estimation of the individual regressions.

As indicated above, the comparative wage index is presented as a measure of cost of living differences across the 27 labor market regions of Alaska, and as a measure of the comparative average cost of labor across regions. Data used to compute the index were provided by the Alaska Department of Labor and reflect average quarterly earnings by occupational classification code for each of the 27 labor market areas.

There are a number of assumptions that underlie this model that may or may not be met in the present application. AIR controls for variation in the occupational mix of employment, but as AIR points out, the available data do not ensure that the comparability of labor in different labor market areas is consistent. AIR notes that working conditions or regional amenities may influence comparability and wage rates, but that these factors are not separated out in the construction of the index. Other factors that may influence the index could include regional differences in the level of employment (e.g., hours worked per year), the rate of unemployment, or the labor force participation rate of a particular region. Differences in personal tastes and preferences may also be significant.

It is expected that average earnings or average hourly wages are also sensitive to the type of employer (i.e., industry), whether the employer is part of the private or public sector, and whether the mix of union and non-union employment for a given occupation is constant across areas. For large labor market areas there would be some tendency for these factors to average out, but for many of the Alaska labor market areas this is probably not the case. It should also be noted that the comparable wage index, if it is to measure the cost of living, is supposed to be based on wages by place of residence. As an index of the cost of employment, it should reflect wages by place of work. If significant commuting between labor market areas occurs, or if data are not correctly reported with respect to location, then potentially serious measurement error may occur.

More broadly, the comparative wage index is a measure of the cost of living only if fairly stringent assumptions are met. In addition to assumptions of comparability discussed above, comparability requires similar tastes and preferences among individuals, costless labor mobility, markets in equilibrium, and the absence of significant market power on the part of employers or employees. The index will not represent an accurate measure of the cost of living if there are other significant sources of income (including, for example, self employment, transfer payments, or subsistence).

Finally, the values of the index presented by AIR (Appendix C, page 74) contradict what most economists familiar with the Alaska economy would expect. The North Slope Borough has a value of 1.33 relative to Anchorage. One labor market area (Aleutians East) is equal to Anchorage, and all other labor market areas in the state (24) are lower than Anchorage. This clearly contradicts the food and energy market basket data compiled by the University of Alaska Cooperative Extension Service for several communities around the state. Alaska Department of Labor data for Alaska regional wages (based on survey data on hourly wages, as opposed to average quarterly or annual earnings) suggest that the pattern of average wages is mixed, with statewide averages exceeding Anchorage averages in some cases, while the opposite is also frequently the case.

In summary, the measurement and estimation of the comparable wage index raise several issues and bring into question the usefulness of the variable in the overall estimation or specification of the compensation model regressions. AIR has addressed some of the

concerns raised by inclusion of a measure of labor force participation, and by inclusion of some regional amenity measures. However, we do not think that it provides a reliable measure of either regional differences in the cost of labor or the cost of living. It is recognized that the variable is statistically significant in the regressions in which it is used, but this does not mean that the coefficient is reliably estimated. If there is measurement error in the variable then its coefficient and all of the other estimated coefficients in the regression are biased.

Use of the variable in the teacher equation is questionable. The variable is probably more likely to reflect labor market conditions for classified employees. The measurement errors discussed above are probably smallest if the index is used as an indicator of the cost of labor relative to classified employees. It should also be noted that the index is used in the calculation of the maintenance service call travel component. The index may be reasonably accurate for this use.

The second aspect of the estimation of compensation relates to specification of the equations. Specification relates both to the functional form of the equation and to the set of variables included in the equation.

The primary concern with the model selected for teacher compensation relates to teacher turnover. The problem of teacher retention (or turnover) in Alaska is often cited as one of the major problems facing public education in the state. The problem has been documented and analyzed in a study prepared for the Alaska Department of Education and Early Development by G. W. McDiarmid (University of Washington) and E. Larson and L. Hill (University of Alaska, ISER) in a December 2002 study entitled *Retaining Quality Teachers for Alaska*. Data in the study indicate wide variation in the turnover rate, ranging from a low of three percent to a high of fifty percent (average of 1996 – 2000). Rural districts tend to face the greatest retention problem.

AIR indicates that it tried a number of alternative models of teacher compensation. (See pages III-8 – III-20, Volume II). These included models where the housing benefit was excluded, where the index was constructed using data from earlier years, and another that specifically adjusted for teacher turnover. The report states that "Adjusting for turnover rates raises index values for all but five districts". The North Slope index was six percentage points higher than the model finally used. Exhibit E-1, page 84, provides a comparison between the index values used (Teacher regression: Salary & Benefits) and the turnover adjusted model (Teacher Tobit). Since turnover rates tend to be highest in rural (and remote) districts the index equation chosen tends to understate the difference between urban and rural school districts.

Furthermore, we do not think that simply using the AIR Teacher Turnover model resolves the problem. For reasons discussed below, there are specification and data measurement issues that need to be addressed.

Other concerns with the teacher regression relate to specification error. First, years of experience in a given district relates to salary level. If compensation is not high enough,

teachers leave. Generally, districts with higher turnover rates will have lower average experience levels. Thus, we could hypothesize that experience is a function of compensation, as well as compensation being a function of experience. In other words, experience is not an independent variable with respect to income, but this is what the AIR model specifies. This specification introduces an error in the estimation of the model (i.e., coefficients are not correctly estimated). This is another aspect of the turnover rate problem.

Another concern is that the data on salary do not reflect market clearing wages. In essence, for districts with large numbers of applicants relative to the number of positions, the quantity of teachers supplied exceeds the number demanded. This means that the wage paid is greater than the equilibrium, or market clearing, wage. If district "X" is in this market situation, while district "Y" with fewer applicants per position pays closer to market equilibrium, then the ratio of salaries of Y/X will understate the cost of comparable teachers between district Y and X. This understatement may reflect the difference in the cost of comparable teachers, or it may reflect an added difference in the form of higher quality of teachers as well as differences in cost.

A final concern relates to the omission of any real discussion of employer provided benefits. The text discussion of compensation does not address employer funded benefits, although Part VII of the survey instruments requests data on employee benefits. In the discussion of teacher compensation two measures are noted, salary, and salary plus benefits. However, the only difference between salary and salary plus benefits is the housing benefit. This is received in 227 of about 7000 cases. In other words salary is the same as salary plus benefits in almost all cases. Benefits that are not incorporated in the measure of compensation, but are received by all teachers, include employer contributions to retirement programs and health and welfare benefits. For teachers, the retirement benefit will be employer contributions to the Teachers Retirement System (TRS) and in some instances employer contributions to supplemental benefit systems (SBS). While the TRS contribution rate is the same for all districts (but may vary from year to year), the health and welfare benefits vary from district to district, and may be as important as the housing benefit in explaining teacher compensation.

Benefits do not appear to be included in the measurement of administrator or classified employees either. In these cases employees are covered under the Public Employees Retirement System (PERS). PERS contribution rates do vary from district to district and health and welfare benefits also vary across districts. This may be particularly significant in the case of administrators, where retirement benefits are heavily influenced by an individual's "high three" years of service. Benefits do appear to be included in the calculation of expenditure shares.

Whether the omission of benefits is a problem is an empirical question. The survey of districts did request benefit data for employees. It may be that variation in benefits is too small to be of significance. If this is the case it should be indicated. If benefits were not analyzed, this should also be indicated.

In summary, we think that the teacher model is mis-specified. While it may allow one to estimate the cost of a comparable teacher in two different districts, we think that the estimate is biased and that the difference in teacher cost is likely to be understated in many cases. The probable consequence of this misspecification is that the teacher index understates the true difference between Anchorage and many of the smaller rural or remote districts, and in particular those with high turnover rates.

COSTS OF ENERGY SERVICES

The review of the energy component of the index is based on a review of the following sections of the various reports; I, pp10-14; II, pp IV-23 – IV-32; Appendix F: Energy Prototypes, pp 89-93, as well as the energy services components of the ACCESS UPDATE MODEL.

AIR has chosen to estimate the cost of energy services using a two step process. First, an engineering model is used to develop estimates of energy consumption. The energy consumption model documentation states that the model relies on three prototypes reflecting three climate zones (moderate, cold, very cold). Prototypes for high school and elementary school facilities are also discussed. Subsequently, another prototype was identified as being needed to reflect distinct characteristics of rural schools (the K-12 prototype). The intent of these prototypes is to construct a "typical" or average facility for a given climatic characteristic. In the present case the heating degree day (HDD) measure is the single climate characteristic utilized. The assumed prototypes are then incorporated into a DOE 2.1 E model (which is never described or discussed) to generate energy consumption requirements.

The report states that energy requirements for school buildings are determined for space heating, hot water, electricity, cooking and swimming pool heating. Obviously, not all facilities will involve all end uses. District buildings and outbuilding energy requirements were estimated more simply. Two energy types were utilized (electric and fossil fuels) in the estimation of energy requirements. The energy requirements estimated are on a BTU per square foot basis. The energy requirement per square foot is then multiplied by the total square footage of a facility to obtain total BTUs for a specific end use.

The cost of energy requirements is obtained by multiplying the energy requirement (BTUs) by the price per BTU of the specific fuel type used for the given end use. Total end use cost is summed across end use types to get the estimate of total energy cost for a given facility. Facilities are then summed to the district level. This results in an estimate of total energy cost for the district.

The total energy cost for all facilities in a given district is divided by the total square footage of the district to obtain the district's energy cost per square foot. The ratio of this figure to the comparable Anchorage figure is the energy component of the overall index. There are a number of observations to be made regarding estimation of energy costs using this methodology.

This methodology estimates the hypothetical cost of energy for a facility of assumed physical characteristics and assumed usage. The only variables in the model are heating degree days and the price of energy, neither of which are under the control of the district. There is a significant "black box" aspect to the use of prototypes and a DOE Energy model. The model presumably tells us what energy consumption *should* be, given physical, operating and climatic characteristics related to the facility. While this modeling information might be useful in defining efficiency standards, it is not clear what its value is in measuring regional differences in energy costs. If the model projections and actual energy costs differ substantially it suggests that either the model does not work very well, or that the stock of existing facilities does not match the prototypes. If the model does not work well (i.e., is not a good predictor) then it should not be used. If it does work well, in the sense that predicted and actual costs are close, then what is the point of going to the trouble and expense of parameterizing the energy model?

To explore the significance of a prototype based energy cost index a rough calculation comparing actual and predicted energy costs has been made. Actual costs were taken from the study's *PART I: District Survey Fiscal Year 2002*, responses to question 1. The average of FY2000 and FY2001 has been used to reflect actual expenditures. Data from the energy section of the ACCESS model were used to replicate the calculation of the energy index. These data also provide the prototype-based estimate of energy costs by facility and by district. The comparison of actual and projected energy cost is done at the district level. A review of these cost estimates suggest that for many districts sizeable discrepancies exist between actual and prototype based estimates. On average (using the Mean Absolute Percent Error measure), there is a forty-two percent difference between actual and prototype-based estimates of energy costs.

The estimate of total energy cost will approximate the actual cost of energy only if the physical and use characteristics of the prototype and the existing facility are the similar. This certainly will not be expected in many instances. One would hypothesize that substantial variation in the physical characteristics of individual school facilities would exist, linked to age, design, construction and maintenance parameters. These variations most likely reflect a number of historical factors over which present administrators have had little control. In short, the stock of school facilities (and in particular, physical attributes) is essentially fixed in the short or intermediate term. The actual energy costs are real costs and are not subject to significant district administration adjustment in the near term. Data regarding the age and other characteristics of school facilities are not available to test this hypothesis, but the wide discrepancies between projected and actual energy costs is consistent with this hypothesis.

To the extent that actual and prototype facilities differ, and projected and actual costs differ, significant over- or under-funding of energy costs could result. It is not clear why AIR has chosen to ignore real costs of energy. This simply is not an area in which short-term policy adjustments can be expected to work. There are no policy variables for district administrators to utilize that will significantly alter energy costs in the short run. Alternatively stated, the short-run elasticity of demand for energy is highly inelastic.

Significant modifications to energy consumption need to be addressed through capital budgets, and not operating budgets.

In addition to questioning the use of prototypes, it does not appear that the set of prototypes described in the text of Volume II and appendices is what was used in the actual calculations in the ACCESS MODEL. For example, Exhibit IV-3 and Exhibit IV-4 (page IV-29, Volume II) indicate end use categories of space heat, hot water, cooking, swimming pool, and everything else. These exhibits also indicate three climate zones. It is not clear what these numbers reflect. The text indicates three physical facility prototypes (high school, elementary school, and rural K-12 school). Appendix F shows detailed assumptions regarding parameters related to the high school and elementary prototypes, but no K-12 parameters. Exhibits IV-3 and IV-4 make no distinctions between any of the three prototypes. Either the two (or three) prototypes have been merged somehow, or Exhibits IV-3 and IV-4 represent something else.

Finally, when reviewing the portion of the ACCESS model that calculates the energy requirements, it appears that only two climate categories are used (see ACCESS TABLE: ENERGY TERMS). Also, the same set of parameters used to calculate energy requirements for an elementary school are used to calculate the energy requirements for a high school (assuming the same fuel and climate type). There is also no distinction between parameters on an urban school and a rural K-12 facility (again assuming comparable climate and fuel type). In short, what is indicated in the text discussion of the model does not appear to be what is computed by the model. It might also be noted that the end use category "everything else" and space heat do not appear in the end use categories in the ACCESS model, but "electricity," and "school" do.

Other inconsistencies in the documentation could be cited. For example, on page IV-25 Kodiak is listed as a "cold" place. On page IV-26 (Exhibit IV-2) Kodiak is cited as an example of a "Moderate" climate zone. This does not inspire a lot of confidence in the underlying model. At best, this is sloppy documentation.

In summary, the energy costs portion of the index has been criticized on two bases. First, the use of a prototype driven energy requirements model does not reflect the decision making environment that a district administrator faces. The modeling process could be useful for design purposes and capital budget planning. However, it appears that historic energy costs would be a more relevant basis for calculating the energy portion of the index. Second, what is promised (or at least suggested) in the description of the calculation of energy costs via an energy requirements model does not appear to be what the access model actually does. This certainly raises questions about the viability and reliability of the prototype based energy index component.

COST OF GOODS

Our review covers V.I, pages 14 – 16, V.II, pages 33 – 39, and Appendix G.

The next component of the index is cost of goods. This component has two parts: office and instructional supplies, and small capital and maintenance supplies. Office and instructional supplies are represented by the average delivered cost of one case of paper. Small capital and maintenance supplies are represented by the delivered cost of one 4' by 5' windowpane, where delivery is to the school. Primary and secondary delivery modes were included. We understand how these items were selected. However, whether or not these are representative samples of purchases and related transportation costs needs more empirical verification. This could be done by limited, in depth sampling of selected schools and districts. An alternative method of measuring delivered pricing would also be appropriate. For example, this might be done by soliciting delivered price quotes from distributors and suppliers.

We have not examined the portion of the ACCESS Model that computes the goods portion of the index.

TRAVEL COSTS

The review of travel cost methodology includes V. I, pages 17-20, V.II, pages 40 - 49, Appendix H, and travel related components of the ACCESS Model.

This is a particularly poorly edited and documented portion of the report. As an example, in Volume I, page 18, it is stated that "Travel costs . . . were aggregated to the district level based on relative enrollment . . ." and "The three subcomponents of travel were aggregated into a single index for travel using the appropriate budget share weights described earlier." Elsewhere in the study it is stated (correctly) that full-time-teacher equivalents (not enrollment) is the weighting factor used and that there are six, not three, components to the travel index, as shown, for example, on page 121 of Volume II (Travel Index). Also, the exhibits referenced on page 18 (Vol. I), VII-2 and VII-3 are nowhere to be found (perhaps the authors meant VI-2 and VI-3). Exhibit VI-1 is never referenced.

As another example of poor editing and documentation, consider the Trip Index equation as shown on page 100 of Volume II and in the *Updating the SGCEI in Access Handbook*, page 8. The stated equation for calculating the index for remote (i.e., overnight stay required) is as follows.

$$\text{Trip Cost}_{ij} = \frac{\sum_j (\text{schoolFTE})_{ij} X (\text{roundtrip cost from school to do})_{ij} + (450)_{ij}}{\sum (\text{schoolFTE})_{ij}}$$

As shown in the equation, the 450 dollar (per diem allowance for three days) term is not weighted by FTE. In the actual computations carried out by ACCESS, it is. Furthermore, the "overnight stay" cost factor varies in ACCESS, depending on the type of travel. When calculating PD1 (teacher professional development to the district office) the cost factor used appears to be \$800. For teacher professional development travel to Anchorage (PD2), the figure is \$450 (and for Anchorage teachers the figure is \$75). The amount of

\$450 is also used for administrators from schools to district office travel (PD3) and superintendents from district office to Anchorage (PD5). However, unlike the Anchorage teacher per diem of \$75, the Anchorage superintendent per diem is \$450. This has the effect of significantly decreasing PD5 relative to PD2, and one would expect the two to be roughly equivalent. Also, travel for school oversight (administrators from district offices to schools (SO1)) a figure of \$84 is used. So far as we can tell, these distinctions are not shown anywhere in the reports or supplements. It is clear that the index values will be influenced by these distinctions. The Superintendent travel index will certainly be understated.

The other travel component is MT1 (maintenance or technical service travel), which is actually a measure of travel plus service, includes travel time in the calculation. When reviewing the ACCESS calculation of this index component it appears that only one-half of the total travel time is included (i.e., travel time to the job site). Return time is not included. If return trip travel time is included as part of normal billing practices, then this index component is understated for districts where maintenance and technical service travel time is significant.

In short, there are really six different formulas used by the model, and they are not what is shown in the documentation. The distinctions may be perfectly valid, but it certainly makes analysis of the travel components difficult.

BUDGET SHARE DETERMINATION

In addition to estimating prices of the index components, it is also necessary to establish relative budget shares. This involves a determination of what should, or should not, be included in total expenditures. The budget matrix presented in Exhibit I-1, page 112 includes both operating funds and special revenue funds. However, the text indicates that only operating funds were used in the determination of budget shares.

This raises two issues. First, on what basis are funds included or excluded from calculation of budget shares? This relates both to the decision to include only operating fund amounts and the assignment of specific fund amounts to specified expenditure categories. For example, if funds from special revenue funds go to pay for instruction that is included in the FTE Teacher count shouldn't those funds be part of the budget share? It is not apparent from the report as to how the budget share determinations were made, or by whom. As a general principle, if the availability of funding (from whatever sources) influences the quantity of an input purchased, then that funding should be included. We are not critical of the specific allocations represented, but do believe that the classification scheme should be more transparent.

Secondly, AIR has provided the budget data for each district, in the matrix format. We can replicate some elements of the budget shares table (Exhibit I-3, page 114), but not those related to administration, teaching and classified (and sometimes energy). While

the differences between what we calculate and what are shown in Exhibit I-3 are small they can have a significant effect in terms of actual dollars.

OTHER OBSERVATIONS

While not part of the methodology review, per se, it is impossible to ignore the quality of editing, documentation, and accuracy of the report. As pointed out in previous discussions there are numerous instances of inconsistencies, typographical errors, undocumented changes in variable names, and mismatches between what the text says the models are doing and what ACCESS actually computes. Overall, there is a real lack of continuity or cohesion in the discussion. This does not impugn the validity of the methodology, but it certainly makes it difficult to understand what the methodology actually reflects.

The ACCESS Model is of limited usefulness. There is no provision for changing the personnel components of the model, and yet this is by far the most important component of the index. The energy component can be updated for changes in energy prices or fuel type, but no other changes are allowed. Travel costs may be updated with respect to trip prices but per diem allowances cannot be updated without modifying the inner workings of the ACCESS model. In short, there are limited changes that can be incorporated without making modifications to the model itself.

It would also be a real help to potential users of the model if it were more adequately documented. There is no overall description or flowchart of the computational process. There is no description of the relation between the numerous table and query objects that are part of the model. Variables often are not defined, and may change in meaning from one query to the next. This makes it difficult for a user to understand or modify the workings of the model. This is particularly troublesome in view of the discrepancies between the text documentation and what the model actually does.

ISER also reviewed the responses to follow up questions regarding the study. Many of these relate to issues that have already been discussed. One area that has not been addressed is that of variations in specific elements of the index when making comparisons between districts (or in some cases, schools). Substantial variation, particularly in the smaller components of the index, can be expected. Extreme discrepancies need to be checked on a case by case basis. As AIR pointed out in its responses, there are usually legitimate explanations for observed differences. What should be of greater concern is significant differences in the overall index. We have made some cursory geographic comparisons but do not observe any systematic patterns of discrepancies.

IMPLICATIONS OF THE REVIEW

We turn now to the implications of the review and to address the specific questions addressed.

(A) Is the methodology used by AIR generally acceptable? Methodology is to be interpreted to include both the theoretical basis underlying the choice of the index number used and the methodology utilized in estimating the various components of the index.

As stated earlier, we think that the choice of index number type is appropriate and methodologically sound. We have raised a number of issues regarding measurement of components of the index. These are discussed below.

(B) If the methodology is generally acceptable, is there anything unique to Alaska that makes the use of this methodology inappropriate in Alaska?

The findings of our review do not suggest that there is anything unique about Alaska that makes the general methodology inappropriate for use in the state. As indicated above, there are problems in the measurement of index components. These may result from an incomplete understanding of Alaska, but do not invalidate the general methodology.

(C) If the methodology utilized by AIR is generally acceptable for use in Alaska, but is deficient in some respects, can elements of the methodology be adapted so that use of the general AIR methodology is appropriate in Alaska?

We have identified a number of problem areas regarding measurement of index components.

Estimation of teacher compensation needs to be modified. The compensation model needs to be re-specified to address issues raised regarding turnover, income/experience interdependence, and measurement errors in market prices for teachers.

The energy costs based on the prototype model are prone to significant error when compared to actual energy costs. We suggest that actual energy costs be used.

The travel cost component should be reviewed with respect to per diem allowances and the cost of travel time for maintenance/technician service call travel.

The cost of goods component may be satisfactory in the short run, but it needs additional validation. In particular, do paper and windows adequately represent expenditure patterns in this budget category? Secondly, alternative measures of delivered prices should be considered.

The definition and measurement of budget categories may or may not be adequate. There is simply now way to tell from the study reports. The basic issue is whether or not the measured shares accurately reflect expenditures. The exclusion of revenue funds from expenditures may be valid, but it raises questions.

(D) Is an alternative general methodology necessary, and if so, what might it be?

In our judgment the answer is no.

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Alaska State Legislature

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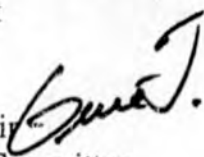


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Legislative Budget and Audit Committee

DATE: February 23, 2005

TO: Legislative Budget and Audit
Committee Members

FROM: Senator Gene Therriault, Chair 
Legislative Budget & Audit Committee

RE: Alaska School District Cost Update by ISER

Attached for your review is the *School District Cost Study Update* recently completed by the Institute of Social and Economic Research (ISER), of the University of Alaska. Additional copies of this report, as well as the other reports cited in this memorandum, can be downloaded under the "publications" link at www.lba.legis.state.ak.us. A limited number of copies of the District Cost Update are also available in my office.

It is important to understand that the information contained in this report recommends modification to the distribution of K-12 funds, but does not suggest a level of funds that should be appropriated to the foundation formula.

BACKGROUND

The passage of Senate Bill 36, Ch. 38, SLA 1998 required the Department of Education and Early Development (DEED) to submit updated district cost factors to the Legislature by Jan. 15, 2001. Additionally, the DEED was required to monitor district cost factors and submit a report to the Legislature every other year beginning Jan. 2001.

The DEED attempted to use the existing cost factor methodology to update the cost factors, but the results were not supported by the underlying data. The McDowell Group reviewed the DEED's work and determined that the 1998 methodology was not usable. Subsequently, the DEED recommended to the Legislature that cost factors remain unchanged as adopted in AS 14.17.460 in 1998 and that a new cost model be developed.

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Funding was added to the FY 02 capital budget for the Legislative Budget and Audit Committee (LB&A) to contract for a new cost study, and the American Institutes for Research (AIR) was selected to develop new district cost factors. In January 2003 the AIR report was released and a joint hearing was held by the HESS Committees. With AIR principals in attendance at the hearing, Legislators and interested parties expressed concerns about the accuracy of the data and the appropriateness of the methodology used in the AIR report. Following the hearing, AIR continued to respond to the many questions and criticisms of their report, but offered no revisions.

In the Fall of 2003, the LB&A contracted with ISER to perform a peer review of the AIR study to determine: 1) if the methodology used by AIR was generally acceptable, 2) if there was anything unique to Alaska that would make the methodology inappropriate, and 3) what alternative methodologies would they suggest. In their January 29, 2004 report, ISER concluded that while the general methodology used was appropriate, it did not adequately address the issue of teacher turnover. Further, they questioned the estimation of energy costs, and in some areas, felt the documentation did not support AIR's findings.

In July of 2004, the LB&A contracted with ISER to update and modify the AIR School District Cost Study by updating certain data, revising the teacher compensation component, using actual rather than estimated energy costs, reviewing the travel cost index, and determining if the budget categories accurately reflect full costs of providing educational services. A working group made up of the Directors of the Finance and Audit Divisions, staff to the Chair and Vice-Chair of the LB&A, and Eddy Jeans with the DEED reviewed the draft report and suggested a number of format changes that have been incorporated in to the final report that was received on February 4.

AIR VS. ISER'S OBJECTIVES FOR THE TEACHER COMPONENT

The new cost differential for each school district, as proposed by ISER, is displayed on page 18 of the report. Using Anchorage as the base, ISER proposes all other district cost differentials be adjusted upward. It appears that ISER's change in the methodology for the teacher compensation component is the most significant contributor to these increases.

In the original AIR report the stated objective was to use "econometric models of school personnel labor markets to provide a basis for simulations of the compensation levels that would be required if all districts employed comparable teachers, school administrators, and classified personnel." They defined comparable as levels of experience, education and other demographic characteristics. The ISER report states that its objective is "to estimate the amount of funds that a district needs, relative to Anchorage, to recruit and retain certificated personnel of equivalent quality to Anchorage."

Whether or not any additional funding provided by the increase in the geographic cost factors will actually result in all school districts having equivalent personnel was not part of either study. As we consider and debate the new recommended geographic cost factors we may also want to consider a reporting or measurement mechanism to determine how successful the school districts are at consistently recruiting and retaining qualified personnel. Further discussion of ISER's revisions to the teacher compensation index is contained on pages 5-8 of the report.

ADDITIONAL ATTACHMENTS

Also attached are two schedules prepared by the DEED on 2/11. The first schedule depicts the impact of implementing the ISER recommended District Cost Factors with no additional state funding, which necessitates reducing the base student allocation (BSA) from \$4576 to \$4210. The second schedule shows what it would cost to keep the current BSA in place, thereby holding Anchorage "harmless" as the base.

attachments

Department of Education & Early Development

Foundation Program - District Cost Factors Implementation no additional state funds

Prepared 2/11/05

BSA @ \$4,576

BSA @ \$4,210

School District	Current FY06 State Aid Projection	ISER FY06 State Aid Projection	Prorated ISER compared to Current
Alaska Gateway	4,915,667	5,455,206	539,539
Aleutian Region	1,059,727	1,078,918	19,191
Aleutians East Borough	3,501,788	4,698,506	1,196,718
Anchorage	223,154,797	198,812,382	(24,342,415)
Annette Island	1,398,131	1,934,713	536,582
Bering Strait	17,205,353	22,063,940	4,858,587
Bristol Bay Borough	1,239,140	1,385,589	146,449
Chatham	1,733,593	2,263,245	529,652
Chugach	1,905,637	1,923,254	17,617
Copper River	6,032,438	6,166,265	133,827
Cordova	3,087,845	3,206,871	119,026
Craig	3,698,050	3,859,836	161,786
Delta/Greely	8,942,900	9,065,822	122,922
Denali Borough	4,597,598	4,232,212	(365,386)
Dillingham	4,263,506	4,182,778	(80,728)
Fairbanks N. Star Boro	72,823,842	67,409,766	(5,414,076)
Galena	16,058,992	14,910,119	(1,148,873)
Haines Borough	1,563,785	1,770,150	206,365
Hoonah	1,535,829	1,886,816	350,987
Hydaburg	767,366	894,455	127,089
Iditarod Area	4,427,089	4,801,001	373,912
Juneau Borough	23,648,457	24,900,688	1,252,231
Kake	1,190,539	1,589,826	399,287
Kashunamiut	2,546,629	2,816,520	269,891
Kenai Peninsula Borou	46,190,906	50,366,946	4,176,040
Ketchikan Gateway Bo	11,703,837	12,832,184	1,128,347
Klawock	1,331,394	1,501,335	169,941
Kodiak Island Borough	15,580,674	17,176,120	1,595,446
Kuspuk	4,610,680	5,273,409	662,729
Lake & Peninsula Boro	5,980,874	7,119,417	1,138,543
Lower Kuskokwim	39,975,145	40,661,632	686,487
Lower Yukon	18,120,223	22,725,118	4,604,895
Mat-Su Borough	83,064,699	80,056,285	(3,008,414)
Nenana	3,922,379	3,709,186	(213,193)
Nome	6,359,841	6,437,719	77,878
North Slope Borough	8,451,990	10,273,813	1,821,823
Northwest Arctic Boro	22,227,553	24,312,483	2,084,930
Pelican	404,184	412,223	8,039
Petersburg	3,691,527	4,329,932	638,405
Pribilof	1,258,266	1,432,800	174,534
Saint Mary's	1,992,370	2,201,805	209,435
Sitka Borough	7,265,034	8,156,335	891,301
Skagway	710,547	649,998	(60,549)
Southeast Island	3,069,832	3,326,828	256,996
Southwest Region	6,817,409	7,618,802	801,393
Tanana	1,027,629	1,093,515	65,886
Unalaska	2,405,593	2,629,592	223,999
Valdez	3,684,508	3,564,944	(119,564)
Wrangell	2,276,815	2,464,852	188,037
Yakutat	991,431	1,221,978	230,547
Yukon Flats	4,617,236	5,139,786	522,550
Yukon/Koyukuk	11,059,848	11,205,461	145,613
Yupitit	4,225,753	4,678,419	452,666
Mt. Edgecumbe High S	1,842,250	2,101,462	259,212
Other Contracts	26,096,100	26,096,100	-
Total	\$ 762,255,225	\$ 762,079,357	\$ (175,868)

Department of Education & Early Development
 Foundation Program - District Cost Factors
 Prepared 2/11/05

Estimated cost to fully implement.

BSA @ \$4576 BSA @ \$4576

School District	Existing	ISER Proposed	Current FY06 State Aid Projection	ISER FY06 State Aid Projection	ISER compared to Existing
Alaska Gateway	1.291	1.594	4,915,667	5,946,565	1,030,898
Aleutian Region	1.736	1.939	1,059,727	1,139,620	79,893
Aleutians East Borough	1.423	1.991	3,501,788	5,162,484	1,660,696
Anchorage	1.000	1.000	223,154,797	223,154,797	0
Annette Island	1.011	1.338	1,398,131	2,207,976	809,845
Bering Strait	1.525	1.998	17,205,353	24,565,824	7,360,471
Bristol Bay Borough	1.262	1.478	1,239,140	1,569,350	330,210
Chatham	1.120	1.576	1,733,593	2,469,691	736,098
Chugach	1.294	1.496	1,905,637	2,008,755	103,118
Copper River	1.176	1.316	6,032,438	6,717,655	685,217
Cordova	1.096	1.234	3,087,845	3,546,816	458,971
Craig	1.010	1.206	3,698,050	4,234,258	536,208
Delta/Greely	1.106	1.241	8,942,900	9,851,335	908,435
Denali Borough	1.313	1.332	4,597,598	4,648,156	50,558
Dillingham	1.254	1.346	4,263,506	4,617,228	353,722
Fairbanks N. Star Boroug	1.039	1.070	72,823,842	75,592,037	2,768,195
Galena	1.348	1.391	16,058,992	16,124,857	65,865
Haines Borough	1.008	1.200	1,563,785	1,995,983	432,198
Hoonah	1.055	1.399	1,535,829	2,071,394	535,565
Hydaburg	1.085	1.504	767,366	971,372	204,006
Iditarod Area	1.470	1.846	4,427,089	5,063,528	636,439
Juneau Borough	1.005	1.145	23,648,457	28,026,102	4,377,645
Kake	1.025	1.459	1,190,539	1,743,462	552,923
Kashunamiut	1.389	1.619	2,546,629	3,173,988	627,359
Kenai Peninsula Borough	1.004	1.171	46,190,906	56,385,468	10,194,562
Ketchikan Gateway Boroi	1.000	1.170	11,703,837	14,325,456	2,621,619
Klawock	1.017	1.302	1,331,394	1,655,315	323,921
Kodiak Island Borough	1.093	1.289	15,580,674	19,069,354	3,488,680
Kuspuk	1.434	1.734	4,610,680	5,839,545	1,228,865
Lake & Peninsula Boroug	1.558	1.994	5,980,874	7,778,228	1,797,354
Lower Kuskokwim	1.491	1.663	39,975,145	44,785,881	4,810,736
Lower Yukon	1.438	1.861	18,120,223	25,265,422	7,145,199
Mat-Su Borough	1.010	1.070	83,064,699	88,345,178	5,280,479
Nenana	1.270	1.338	3,922,379	4,036,719	114,340
Nome	1.319	1.450	6,359,841	7,067,239	707,398
North Slope Borough	1.504	1.791	8,451,990	12,113,054	3,661,064
Northwest Arctic Boroug	1.549	1.823	22,227,553	26,713,110	4,485,557
Pelican	1.290	1.477	404,184	428,734	24,550
Petersburg	1.000	1.244	3,691,527	4,794,664	1,103,137
Pribilof	1.419	1.691	1,258,266	1,604,227	345,961
Saint Mary's	1.351	1.624	1,992,370	2,394,123	401,753
Sitka Borough	1.000	1.195	7,265,034	9,106,793	1,841,759
Skagway	1.143	1.174	710,547	740,579	30,032
Southeast Island	1.124	1.403	3,069,832	3,548,052	478,220
Southwest Region	1.423	1.685	6,817,409	8,491,697	1,674,288
Tanana	1.496	1.786	1,027,629	1,192,986	165,357
Unalaska	1.245	1.441	2,405,593	2,988,572	582,979
Valdez	1.095	1.170	3,684,508	3,988,859	304,351
Wrangell	1.000	1.159	2,276,815	2,729,953	453,138
Yakutat	1.046	1.412	991,431	1,314,599	323,168
Yukon Flats	1.668	2.116	4,617,236	5,556,357	939,121
Yukon/Koyukuk	1.502	1.835	11,059,848	12,285,454	1,225,606
Yupitit	1.469	1.723	4,225,753	5,223,228	997,475
Mt. Edgecumbe High Sch	1.000	1.195	1,842,250	2,348,977	506,727
Contracts			26,096,100	26,096,100	0
Total			\$ 762,255,225	\$ 844,817,156	\$ 82,561,931



AMERICAN INSTITUTES FOR RESEARCH

Alaska School District Cost Study:

Volume I – Summary of Results

Submitted to:

Ms. Heather Brakes
Legislative Budget & Audit Committee
State Capitol, Room 121
Juneau, AK 99801-1182

Submitted by:

Dr. Jay Chambers
Dr. Lori Taylor
Joe Robinson
Phil Esra, Editor

With contributions by
Marc Schuldt, SBW Consulting, Inc.

January 2003

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Joe Robinson is a Research Associate at AIR, and has served as Project Manager for the Alaska School District Cost Study and the Nebraska Cost of Education Index Study. Before joining the AIR staff, Joe taught elementary school. He brings his experience as a teacher to his research projects. Joe holds a B.S. in Industrial and Labor Relations from Cornell University, and is continuing his education in SAS programming and higher mathematics courses.

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Acknowledgements

This study benefited from the input and participation of many people. The study team would like to express their appreciation for the efforts of the Technical Working Group, whose members provided critical guidance over the course of the project. Members of the Working Group are as follows:

- Kerry Jarrell (Bering Strait SD)
- Michael Fisher (Fairbanks North Star Borough SD)
- Melody Douglas (Kenai Peninsula Borough SD)
- Dave Jones (Kodiak Island Borough SD)
- Dennis Niedermeyer (Lake and Peninsula Borough SD)
- Lucienne Harger (North Slope Borough SD)
- Barbara Stocker (Sitka Borough SD)
- Karen Goodwin (Southeast Island SD)

We greatly appreciate their support during the data collection phase of this project and owe a great debt of gratitude for helping us accomplish a 100 percent response rate on virtually all of our data collection instruments. They not only provided encouragement, but help to the beleaguered school business offices who attempted to interpret our needs. This group of hardy individuals also contributed to the design of our approach to addressing the costs of goods, services, and travel.

A special word of thanks goes to Melody Douglas and Dave Jones, who worked closely with AIR in the final stages to review assumptions and make follow-up phone calls to individual school business officers to check data elements that were used in the construction of the final index numbers. Their willingness to work in collaboration with the AIR research team made the results of our work a better product.

The Oversight Committee also provided critical guidance, and helped coordinate our requests for data during the course of the study. Its members are Pat Davidson, Representative Hugh Fate, Eddy Jeans, David Teal, and Senator Gene Theriault.

In particular, Eddy Jeans and his staff were instrumental in helping us obtain data from ADEED and in serving as liaisons with school business officials and superintendents. Elizabeth Sweeney spent countless hours on the phone with the research team, both reviewing the Chart of Accounts and individual district fiscal audits, and guiding decisions about assignment of budget shares. Karen Lipson worked with the research team to quickly provide personnel data in whatever form necessary. Tim Mearig obtained important building and facility data for the energy prototype analysis and served as a liaison with school district facilities managers.

The study team would like to thank all of the school and district personnel who responded to our surveys and requests for information. Without their efforts, this study would not have been possible.

Joanne Lieberman, who laid the foundation for the project and managed it in its early stages, was instrumental in creating a well-conceived study, and demonstrated an uncanny ability to anticipate every contingency and plan for every eventuality.

Gur Hoshen, Ann Win, and Bob Morris all provided technical assistance through their programming skills using SAS statistical software.

Last, but certainly not least, we wish to acknowledge the hard work and significant effort put forth by Phil Esra, who has provided tremendous editorial support in developing this document.

Executive Summary

The purpose of this study is to develop an improved methodology for measuring differences in the cost of school resources across geographic locations within Alaska. State policy makers in Alaska have long recognized the importance of adjusting state education aid for geographic cost differences and, for the past five years, have utilized a cost adjustment index derived from a study conducted by the McDowell Group (1998). The present study is intended to develop a geographic cost of education index (GCEI) that will replace the existing cost adjustment and provide a more sophisticated approach to measuring cost differences. The application of such geographic cost adjustments in state aid is intended to equalize the purchasing power of the educational dollar across local school districts.

The costs of four major categories of school inputs are analyzed as part of this study:

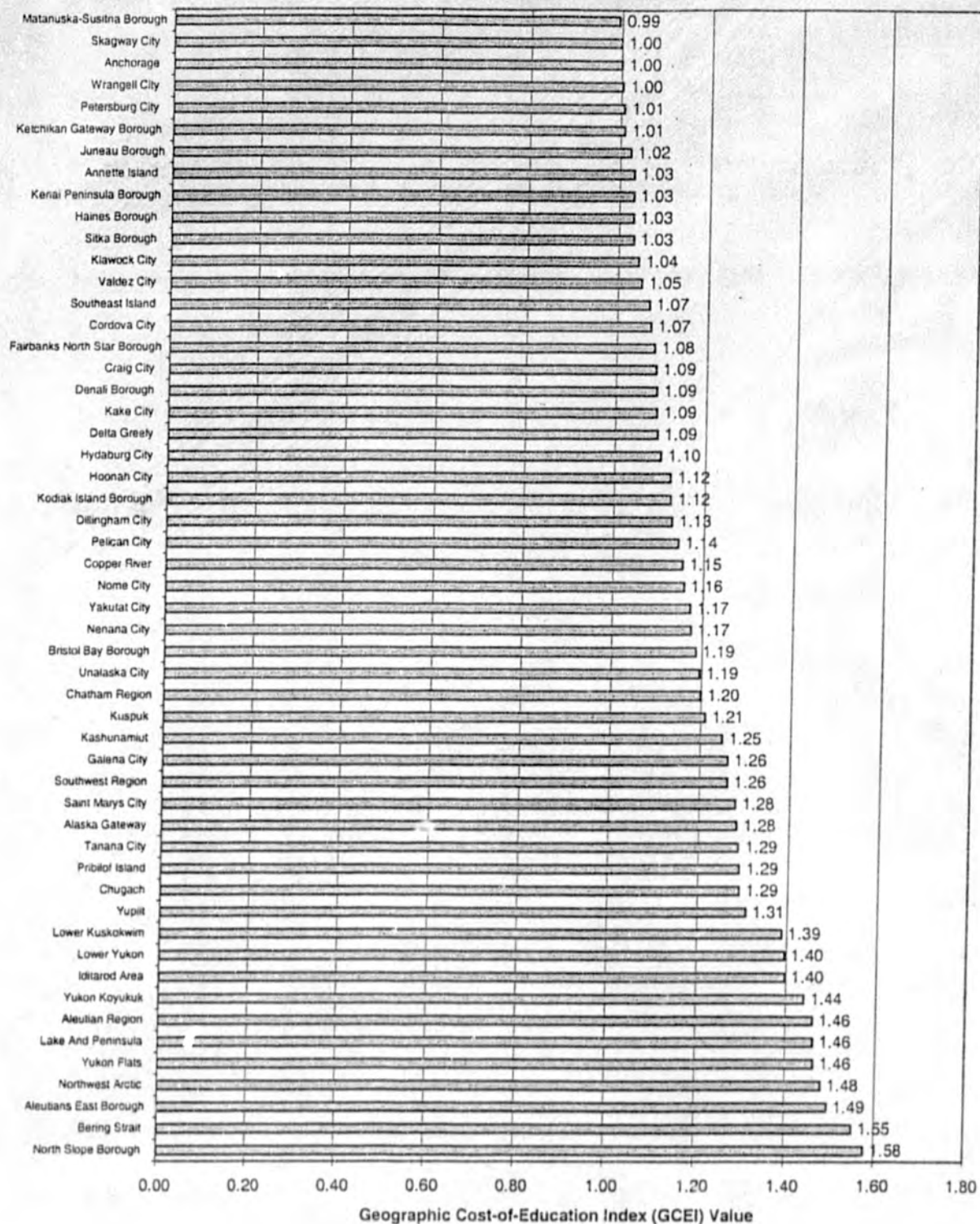
- personnel services
- energy services
- supplies, materials, and small capital items
- travel

The AIR research team collaborated closely with a group of eight school business officers representing a diverse sample of districts from across Alaska. These eight school business officers formed a Technical Working Group (subsequently referred to as the TWG) that provided feedback on components of the methodology for this analysis, assistance in the design of data collection instruments, and support in data collection efforts.

Overall Variations in Costs

Based on the study's analysis, the purchasing power of the educational dollar varies tremendously in the State of Alaska. The highest-cost district needs to spend about 1.6 times what the lowest cost district spends in order to provide comparable educational services. Using Anchorage School District as the benchmark (i.e., with a GCEI of 1.00), the analysis of costs reveals that the North Slope Borough School District exhibits the highest cost of education, with an index value of 1.58 (see exhibit). This means that this district needs to spend about 58 percent more than the Anchorage School District to provide comparable educational services to the students it serves. On the other end of the spectrum is the Matanuska-Susitna Borough School District, with an index value of 0.99. This means that this district needs to spend about 1 percent less than the Anchorage School District to provide comparable educational services.

A GCEI for Alaska School Districts



NOTES TO EXHIBIT: The districts listed on the vertical axis in this diagram are sorted in ascending order according to the value of the geographic cost-of-education index (GCEI), with the lowest on top.

Organizing the school districts by region reveals that the highest-cost districts in Alaska are located in the Far North (with average GCEIs of 1.38) and the Southwest (with average GCEIs of 1.31). The lowest-cost districts in the state are located in the Southeast (with an average GCEI of 1.07).

Differences between the values of the AIR GCEI and the current Alaska cost index for education may reflect a combination of methodology differences and changes in the costs of educational services since the last cost index was calculated. The largest differences are most likely attributable to methodological differences underlying the two studies' calculations.¹ The range, standard deviation, and mean values of the GCEI and the current Alaska cost index are quite similar. The AIR GCEI ranges from a low of 0.99 to a high of 1.58, while the range of the current Alaska cost adjustment is from 1.00 to 1.74. The standard deviation of the AIR GCEI is 0.17, and the standard deviation of the current adjustment is 0.21. Moreover, the correlation between the AIR GCEI and the Alaska cost index is 0.91, suggesting that the general patterns of variation in costs are quite similar between the AIR GCEI and the current Alaska cost index. More than 70 percent (38) of the districts exhibit a GCEI with less than a 0.10 difference from the current Alaska cost index. Forty-four percent (24) of the school districts in Alaska exhibit less than a 0.05 difference from the current Alaska cost index.

Personnel Cost Differences

Looking at the four major component indices reveals what one would expect. School personnel costs play a major role in explaining the variations in the overall costs of education across local school districts. The school personnel category accounts for a major portion of school district budgets, ranging in Alaska from 45 to 90 percent of total expenditures, with a median of 78 percent. AIR used econometric models of the school personnel labor market to provide a basis for simulations of the compensation levels that would be required if all districts employed *comparable* teachers, school administrators, and classified personnel. The key is comparability: what are the costs in different parts of the State of Alaska for school personnel with *comparable* levels of experience, education, and other demographic characteristics?

Using Anchorage as the basis for calculation of the index values (i.e., setting the Anchorage index to a value of 1.00), personnel costs range from a low of 0.93 in Southeast Island School District to a high of 1.28 in North Slope Borough School District. In other words, the highest-cost district pays, on average, about 28 percent more than Anchorage for comparable personnel, while the lowest-cost district pays about 7

¹ The actual values of the two indices are presented for purposes of comparison in Exhibit I-6 In Appendix I of the report entitled "Alaska School District Cost Study: Volume II-The Technical Report."

percent less than Anchorage for comparable school personnel. Comparing these two districts to each other, North Slope pays 38 percent more than Southeast Island for comparable personnel.

Energy Cost Differences

A second component index, energy cost, is influenced by several factors. Alaska's significant climate variation across districts affects the consumption of fuels and energy required to provide heat to classrooms and school buildings. In addition, the degree of remoteness of each district affects the prices of these fuel and energy sources.

The study's approach to calculating energy costs relies on an engineering computer simulation model. This model requires the development of prototype buildings to permit estimation of the energy requirements to provide heating, cooling, and power for all aspects of school and district operations. Each prototype is associated with a specific climate parameter expressed in terms of heating degree-days. The estimated energy consumption levels necessary for the prototype buildings in different climatic zones are then combined with information on the unit energy prices at each school site throughout Alaska to estimate the cost of energy services.

The results of this analysis show a range of index values for the cost of energy services per square foot from 0.74 in the Juneau School District to 9.31 in the North Slope School District. Typically, the school districts with the highest index values are located within the very cold climate zone, largely represented by the Far North region. High costs in less cold districts can be attributed to the relative costs of energy sources faced by these districts.

Costs of Supplies, Materials, and Small Capital Items

The third component index, supplies, material, and capital equipment, is most influenced by geographic differences in shipping costs. The base prices of supplies purchased by districts in different parts of the state may vary to some extent because of volume purchasing, but this difference is small compared to the difference associated with the cost of transporting these items from the major centers of commerce to the remote areas of the state. The costs range from a low of 1.00 in Anchorage School District to a high of 6.81 in Pelican City School District.

In general, larger districts (i.e., districts with higher enrollment figures) tend to exhibit lower costs of goods. Larger districts are able to purchase items in bulk more easily than smaller districts. Another factor contributing to the lower index values for districts with greater enrollments is their proximity to the suppliers of these goods. These districts operate in or near Alaska's major centers of commerce. Transportation costs are

lower, and competition among suppliers in these centers of commerce drives down prices.

Travel Costs

The fourth component index is the cost of travel. Because of the remote locations of some schools and communities in Alaska, travel costs can have a significant impact on the expenditures necessary to operate schools in the state. The majority of the low-cost districts in this index are city school districts and districts located near Anchorage or in another relatively accessible area of the state. These districts tend to have very low costs associated with travel between the district office and the school(s) in the district. For those districts located near Anchorage, travel costs to Anchorage for statewide training tends to be a relatively low-cost item. Districts located close to a center of commerce enjoy low costs for maintenance service travel, resulting in lower cost index values in this travel input index.

Summary of Recommendations

AIR makes a number of recommendations regarding implementation of the GCEI:

- Adoption of the new GCEI presented in this report.
- Improvements and expansion of the personnel databases currently collected by ADEED.
- Adoption of new data collections on non-personnel items including energy fuels; supplies, materials, and capital items; and travel costs.
- Updating the GCEI every 3 to 5 years.
- Using a professional economist for the analysis of personnel costs.
- Phasing in the new index over time to avoid disrupting district budgets.

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I. Introduction

The purpose of this study is to develop an improved methodology for measuring differences in the cost of school resources across geographic locations within the State of Alaska. State policy makers in Alaska have long recognized the importance of adjusting state education aid for geographic cost differences and, for the past five years, have utilized a cost adjustment index derived from a study conducted by the McDowell Group (1998). The present study is intended to develop a geographic cost of education index (GCEI) that will replace the existing cost adjustment used by the State of Alaska and provide a more sophisticated approach to measuring cost differences. The application of such geographic cost adjustments in state aid is intended to equalize the purchasing power of the educational dollar across local school districts.

The costs of four major categories of school inputs are analyzed as part of this study:

- Personnel services
- Energy services
- Supplies, materials, and small capital items
- Travel (as it affects maintenance services, administrative oversight of school operations, district level meetings for professional staff, and statewide professional meetings)

With the exception of energy services, each of these categories includes subcategories of inputs for which separate cost indices were calculated. For example, the personnel service index is derived from separate indices for teachers, administrators and other professional staff, and classified staff. Each subcategory is weighted to reflect its relative importance within each school district's budget.

Combining these subcategories into larger indices requires a technique developed by economists to take into account the substitution between inputs that occurs in response to relative differences in the prices of the inputs across districts.² Using this technique, the calculation of the GCEI value for a district 'j' weights each component cost index by the average of the budget share allocated to this input by the district 'j' and the Anchorage School District. This weight will subsequently be referred to as the budget share weight.³ This weighting allows the overall GCEI to reflect the relative amount of a district's budget allocated to each input.

² For example, as the cost of using external skilled maintenance workers increases relative to the cost of internal maintenance workers (classified employees), one would expect districts to use internal employees more often to maintain the quality and level of services.

³ This technique is referred to as a *superlative* or true cost index. For a more technical discussion, the reader is referred to the work of Diewert (1976) and Caves, Christensen, and Diewert (1982). The budget share weight for input 'i' in district 'j' is defined by $(1/2) \times [S_{ij} + S_{iA}]$ where S_{ij} = the budget share of input 'i' in district 'j' and S_{iA} is the budget share for input 'i' in Anchorage (i.e., district 'A').

The following is an overview of the study's analysis and its results. A more detailed description of the methodology and the assumptions underlying this analysis may be found in a separate document entitled "*Alaska School District Cost Study, Volume II-The Technical Report*" (subsequently referred to as the *Technical Report*).

The AIR research team worked in close collaboration with a group of eight school business officers representing a diverse sample of districts from across Alaska. These eight school business officers formed a Technical Working Group (subsequently referred to as the TWG) that provided feedback on components of the methodology for this analysis, assistance in the design of data collection instruments, and support in data collection efforts.

Limitations to the Scope of the Present Study

It is important to point out what this study does do and what it does *not* do. The study develops a cost adjustment index that reflects the variations in the prices paid for comparable school inputs in different geographic locations in the state. However, this study does *not* address cost differences associated with pupil needs, nor does it address other factors related to the scale and concentration of district operations. For example, it does not address differences in the levels of staff and other non-personnel resources required to meet the different needs of students who are from disadvantaged backgrounds, students who are English language learners, or students with physical or mental disabilities. In addition, this study does not address the different administrative staffing requirements that may be associated with operating school districts in remote and sparsely populated regions of the state. While the study does address the differential costs of personnel travel within large remote school districts and does address the costs of transporting goods within these remote locations, it does not address the increased need for staff that may be required to provide necessary administrative and support services.⁴

Overview of the Report

Section II presents an overview of the results of the study, focusing on the range of costs represented by the GCEI. Sections III through VI describe the methodology and the results of the analysis for each of the four categories of inputs (personnel, energy, supplies and equipment, and travel). Section VII describes the procedure for assigning the budget weights and the calculation

⁴ These additional cost factors related to the measurement of pupil needs and the costs of operating districts in sparsely populated and remote regions of the state must be addressed through more comprehensive studies designed to estimate the costs of providing adequate educational services in Alaska. The previous work done by Chambers and Parrish (1984) represents one model for conducting these kinds of studies, while a newer proposal for costing out an adequate education in New York State prepared by Chambers, Smith, Parrish, and Guthrie (2002) provides an even more comprehensive and more up-to-date approach to addressing these complex issues. The newer methodology for measuring adequacy in education focuses more attention on the relationship between outcome standards for students and the levels of resources necessary to achieve those standards.

of the GCEI. Section VIII discusses implementation issues and issues related to the utilization and updating of the GCEI.

II. Overview of the GCEI

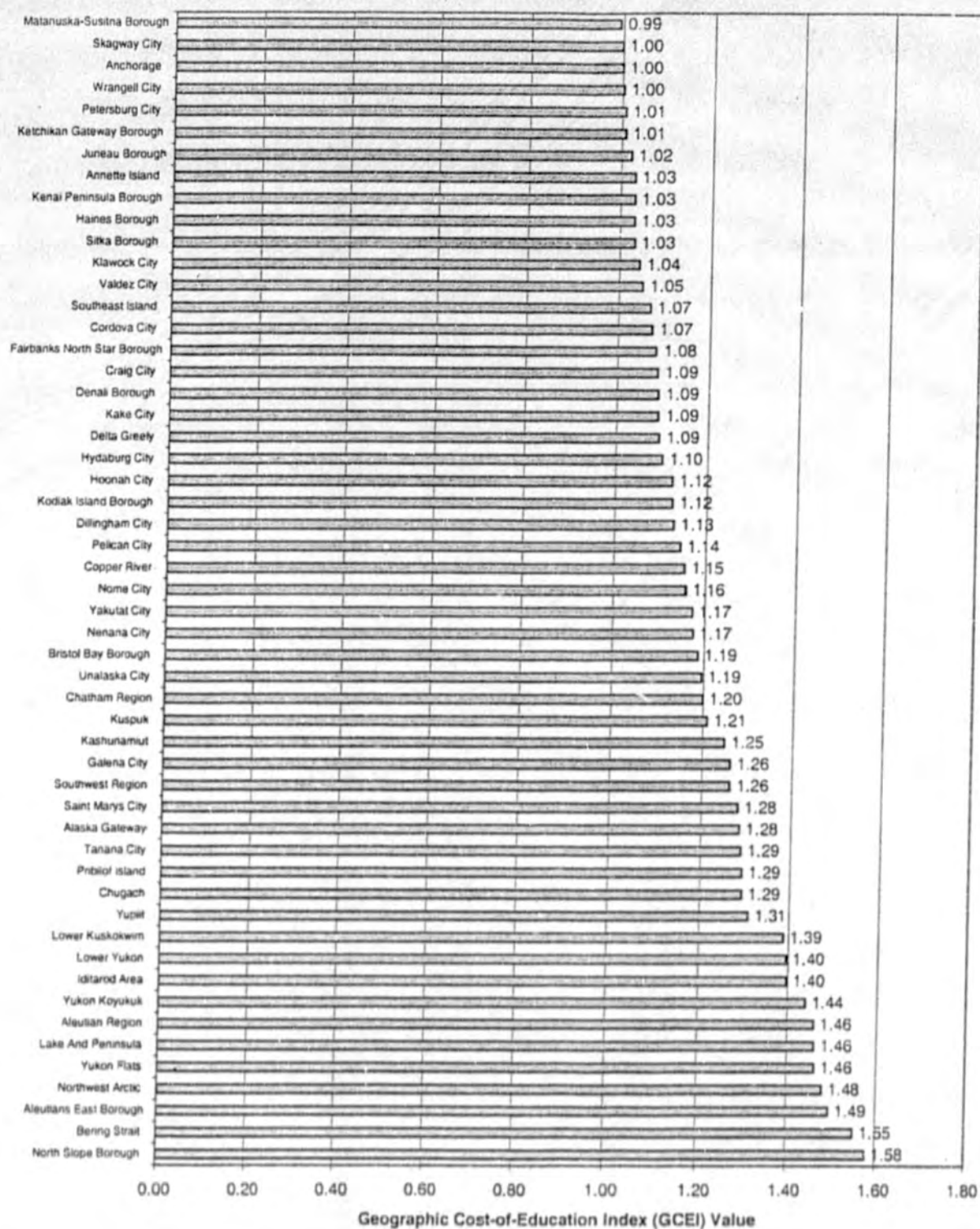
Based on the study's analysis, the purchasing power of the educational dollar varies tremendously in the State of Alaska. The highest-cost district needs to spend about 1.6 times what the lowest cost district spends in order to provide comparable educational services.

Another way to understand these variations is to select a benchmark district to which all districts can be compared. Following the conventional approach that has been used in Alaska for these kinds of studies, we use Anchorage, the largest and most urbanized district in the state, as the benchmark.⁵ Thus, the value for the GCEI in Anchorage has been arbitrarily set at 1.00. Using Anchorage as the base, the analysis of costs reveals that the North Slope Borough School District exhibits the highest cost of education, with an index value of 1.58 (Exhibit II-1). This means that this district needs to spend about 58 percent more than the Anchorage School District to provide comparable educational services to the students it serves.

On the other end of the spectrum is the Matanuska-Susitna Borough School District, with an index value of 0.99. This means that Matanuska-Susitna needs to spend about 1 percent less than the Anchorage School District to provide comparable educational services.

⁵ In most studies, the district attended by the average student is used as the benchmark school district. This is so that the GCEI, when applied to state aid allocations, will have no impact on the overall amount of aid to be allocated. That is, the GCEI would be neutral with respect to the total allocation of state education aid. In these situations, the district attended by the average student, which is in actuality a fictitious district that has been created purely for statistical purposes, is assigned a GCEI value of 1.00. In the case of Alaska, state policy makers have chosen to scale everything to Anchorage, which is far and away the largest school district in the state.

Exhibit II-1. A GCEI for Alaska School Districts



NOTES TO EXHIBIT: The districts listed on the vertical axis in this diagram are sorted in ascending order according to the value of the geographic cost-of-education index (GCEI), with the lowest on top.

Organizing the school districts by region (Exhibit II-2) reveals that the highest-cost districts in Alaska are located in the Far North (with average GCEIs of 1.38) and the Southwest (with average GCEIs of 1.31). The lowest-cost districts in the state are located in the Southeast. As discussed later in this report, the factor behind these numbers appears to be the impact of the degree of districts' remoteness on personnel salaries, transportation costs for goods and services, and travel costs for district staff. In addition, climatic factors have a significant impact on the cost of energy services. The attractiveness of living in the urban centers of Alaska in terms of access to shopping, medical services, and other cultural amenities clearly plays a role in personnel costs.

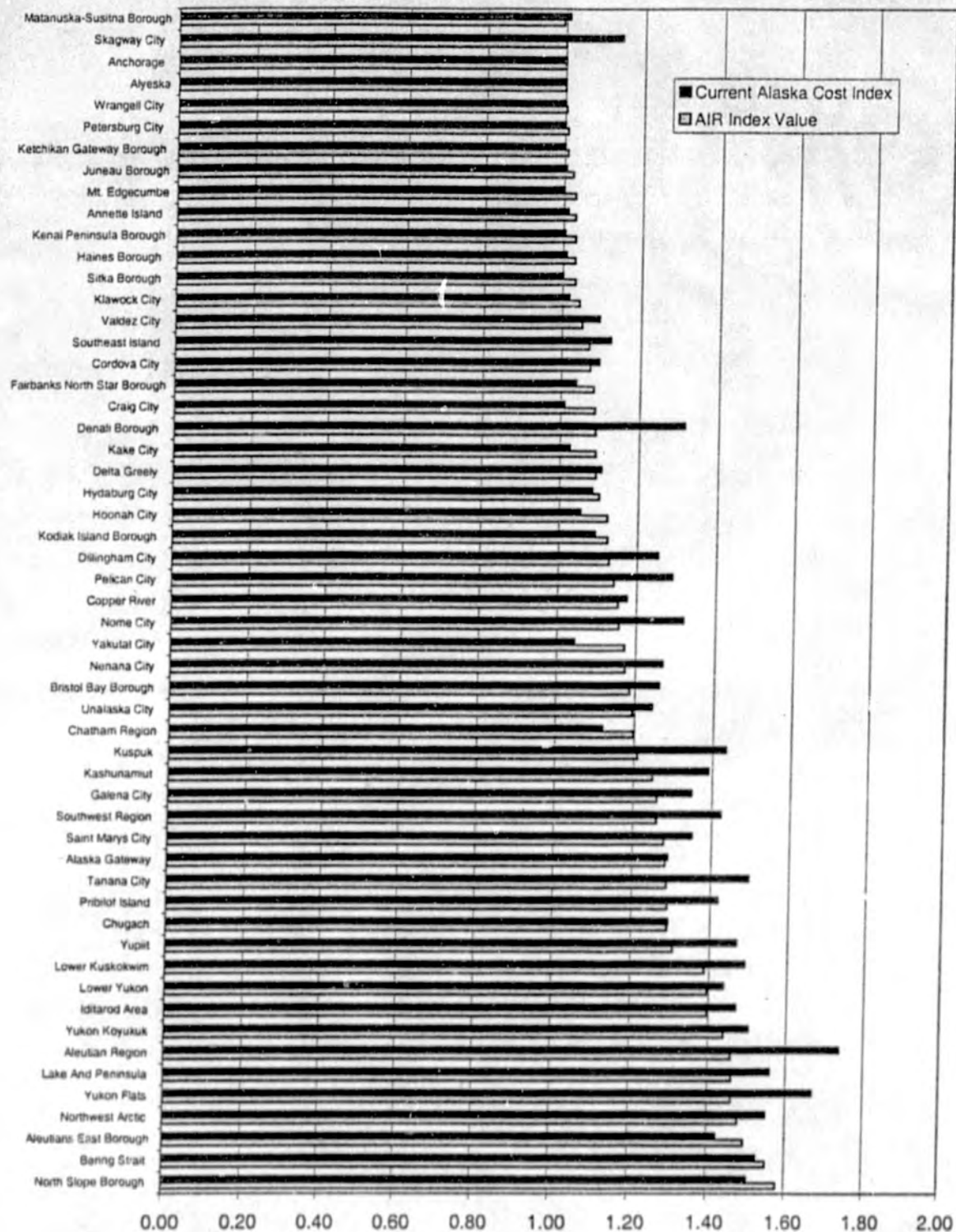
Exhibit II-2. Variations in the Geographic Cost of Education Index by Region

Region	Number of Districts	Mean	Standard Deviation	Minimum	Maximum
Statewide	53	1.20	0.17	0.99	1.58
Far North	10	1.38	0.15	1.16	1.58
Interior	3	1.09	0.00	1.08	1.09
South Central	9	1.11	0.11	0.99	1.29
Southeast	17	1.07	0.06	1.00	1.20
Southwest	14	1.31	0.11	1.13	1.49

Exhibit II-3 compares the GCEI derived from this study with the education cost adjustment that is the current law in Alaska. Districts are in ascending order according to the AIR GCEI calculated in the present study. Differences between these cost index values may reflect a combination of methodology differences and changes in the costs of educational services since the last cost index was calculated. The largest differences are most likely attributable to methodological differences underlying the two studies' calculations.⁶ The range, standard deviation, and mean values of the GCEI and the current Alaska cost index are quite similar. The AIR GCEI ranges from a low of 0.99 to a high of 1.58, while the range of the current Alaska cost adjustment is from 1.00 to 1.74. The standard deviation of the AIR GCEI is 0.17, and the standard deviation of the current adjustment is 0.21. Moreover, the correlation between the AIR GCEI and the Alaska cost index is 0.91.

⁶ The actual values of the two indices are presented for purposes of comparison in Exhibit I-6 In Appendix I of this report.

Exhibit II-3. Current Alaska Index Compared to the AIR GCEI



However, there are a number of districts that exhibit significant differences between the two index values. Nine districts exhibit a difference of 0.15 or more (positive or negative) and 17 districts exhibit a difference of 0.10 or more. A difference of 0.01 means a one-percent difference relative to the benchmark district of Anchorage. For example, the Aleutian Region district exhibits a GCEI of 1.46, while the current Alaska cost index is 1.74, a difference of 0.28. In addition, the Denali Borough, Kuspuk, Nome City, Pelican City, Southwest Region, Tanana City, Yukon Flats, and Yupiit School Districts exhibit GCEI values that differ by 0.15 or more from the current values.

On the other hand, slightly more than 70 percent (38) of the districts exhibit a GCEI with a less than 0.10 difference from the current Alaska cost index. Forty-four percent (24) of the school districts in Alaska exhibit less than a 0.05 difference from the current Alaska cost index.

The next few sections present separate discussions of the four major components of the overall GCEI.

III. Personnel Costs

The Methodology

Because expenditures on school personnel dominate school district budgets, previous research on geographic cost differences in education has focused on analysis of labor markets for school personnel.⁷ This has led to a growing recognition among education policy makers nationwide that districts in different parts of a state face different conditions in local labor markets, and that these conditions impact the ability of local school districts to recruit and employ comparable school personnel.

Many schools in Alaska are located in remote regions of the state, creating challenges in recruiting and employing professional school personnel. Costs of living are higher in the remote regions of the state because the cost of transporting consumer goods and services to these communities results in higher prices. In addition, access to cultural amenities and to shopping and medical facilities is more difficult in remote communities than it is in more urban areas such as Anchorage or Fairbanks. The degree of isolation can be significant, particularly during winter months, because of the time required to reach the more urban centers of the state. All of these factors impact the compensation (salaries and benefits) that must be paid to attract comparable school personnel.

This study addresses these personnel cost differences through sophisticated econometric models of the labor market for school personnel. The study goes beyond simply using average

⁷ For a summary of the early work done on this topic see Chambers (1981a).

wages or annual salaries; the analysis starts by examining all of the factors that are associated with variations in school personnel. For example, the econometric model includes personal characteristics, characteristics of job assignments, and characteristics of the schools, districts and regions in which school personnel live and work. Because of differences in the labor markets for subcategories of personnel, separate statistical analyses were conducted for teachers, school administrators, and classified personnel.

These econometric labor market models for school personnel then provide the basis for a series of simulations of the compensation levels that would be required if all districts employed *comparable* teachers, school administrators, and classified personnel. The key is comparability: what are the costs in different parts of the State of Alaska for school personnel with *comparable* levels of experience, education, and other demographic characteristics?

The Results

As one would expect, school personnel costs play a major role in explaining the variations in the overall costs of education across local school districts. The school personnel category accounts for a major portion of school district budgets, ranging in Alaska from 45 to 90 percent of total expenditures, with a median of 78 percent.

Exhibit III-1 shows the personnel cost differences among Alaska's school districts. This graph displays the district personnel index values, with the lowest at the top and the highest at the bottom. Using Anchorage as the basis for calculation of the index values (i.e., setting the Anchorage index to a value of 1.00), personnel costs range from a low of 0.93 in Southeast Island School District to a high of 1.28 in North Slope Borough School District. In other words, the highest-cost district pays, on average, about 28 percent more than Anchorage for comparable personnel, while the lowest-cost district pays about 7 percent less than Anchorage for comparable school personnel. Comparing these two districts to each other, North Slope pays 38 percent more than Southeast Island for comparable personnel.

CORRECTION

THE FOLLOWING DOCUMENT(S)
HAVE BEEN REFILMED TO
ASSURE LEGIBILITY OR PAGINATION



Central Microfilm Services
Department of Education & Early Development
State of Alaska

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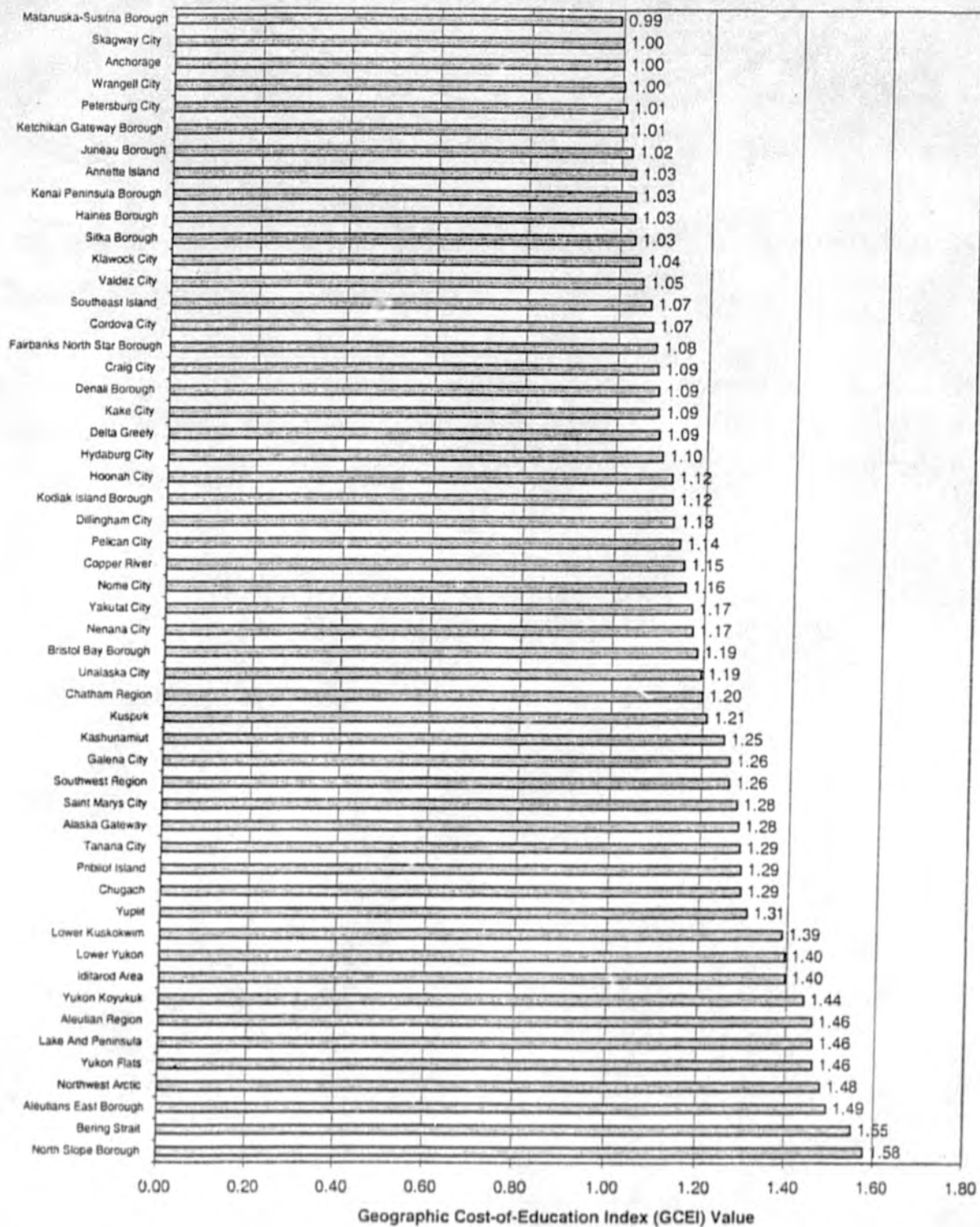
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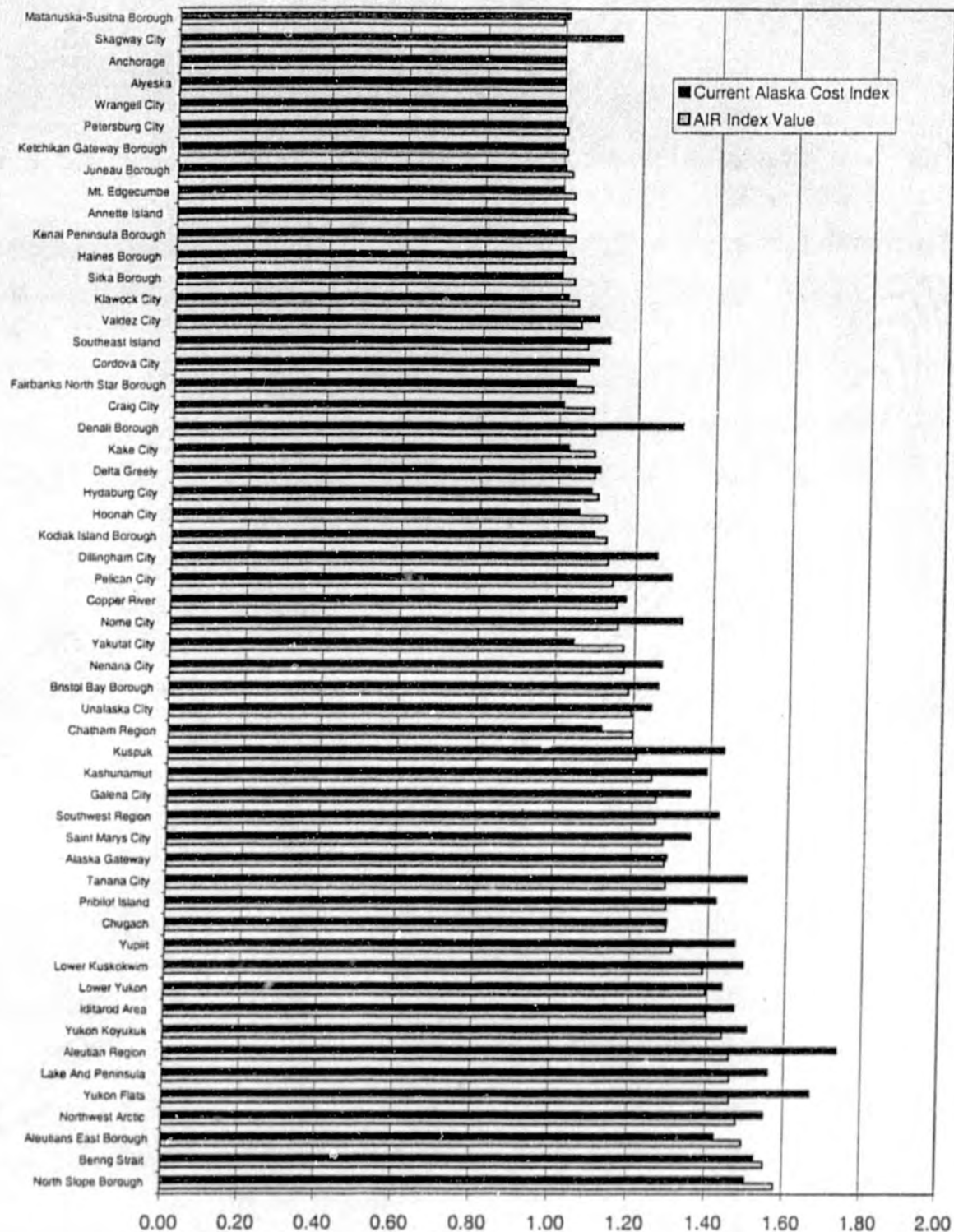
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Exhibit III-1: Personnel Cost Index

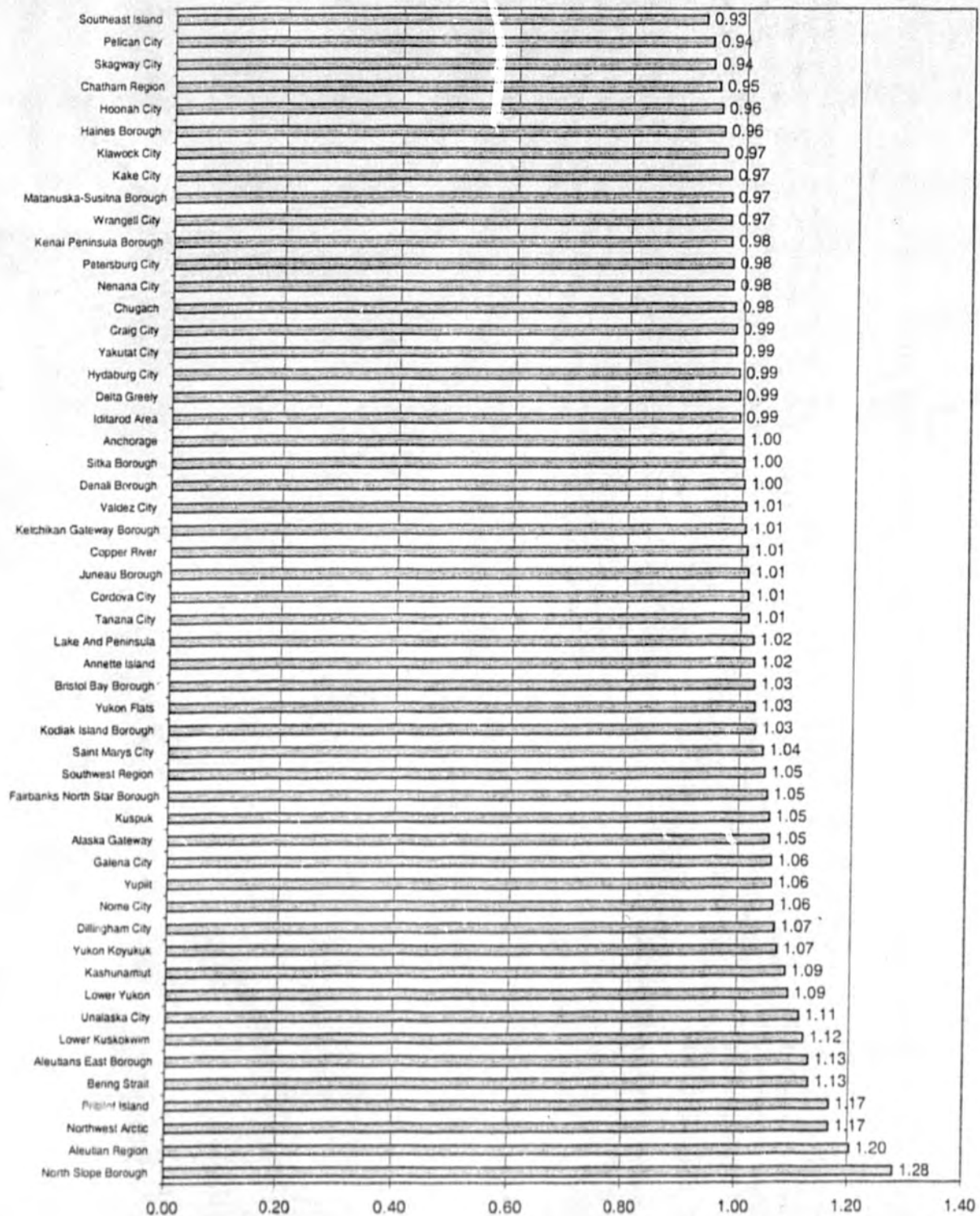


Exhibit III-2 displays the descriptive statistics associated with the personnel cost differences for various regions of the state. School districts located in the Southwest and Far North regions of the state exhibited the highest average costs while the districts located in the Southeast were among the lowest-cost districts in the state. In terms of distance from the nearest center of commerce, personnel costs generally were higher for the districts furthest (500 miles or more) from a major center of commerce, with an average index of 1.16 (16 percent above Anchorage).

Exhibit III-2. Descriptive Statistics for Personnel Cost Indices By Region⁸

District Characteristics	N	Mean	Standard Deviation	Minimum	Maximum
Region of the state					
Statewide	53	1.03	0.07	0.93	1.28
Far North	10	1.08	0.09	0.98	1.28
Interior	3	1.02	0.03	0.99	1.05
South Central	9	1.01	0.03	0.97	1.05
Southeast	17	0.98	0.03	0.93	1.02
Southwest	14	1.09	0.05	1.02	1.20
Distance from the nearest center of commerce*					
Statewide	53	1.03	0.07	0.93	1.28
Less than 10 miles	6	1.00	0.04	0.93	1.05
At least 10 miles	4	0.99	0.03	0.96	1.02
At least 50 miles	12	0.97	0.02	0.94	1.00
At least 100 miles	23	1.04	0.04	0.98	1.12
At least 500 miles	8	1.16	0.07	1.06	1.28

*The centers of commerce used for this analysis include Anchorage, Fairbanks, Juneau, Ketchikan, and Kodiak

IV. Costs of Energy Services

The Methodology

There are several factors that influence each district's energy costs. Alaska's significant climate variation across districts affects the consumption of fuels and energy required to provide heat to classrooms and school buildings. In addition, the degree of remoteness of each district

⁸ Data sources: Teacher data from regression analysis for teacher salaries and benefits. Administrator data from tobit model for administrators. Classified personnel data from regression analysis for classified personnel salaries.

affects the prices of these fuel and energy sources. Also, some districts may operate older school buildings that require more fuel or energy to maintain similar comfort levels within classrooms.

The study's approach to calculating energy costs relies on an engineering computer simulation model. This model requires the development of prototype buildings to permit estimation of the energy requirements to provide heating, cooling, and power for all aspects of school and district operations. The AIR research team (including SBW Consulting engineers) consulted with officials in the Alaska Department of Early Education and Development (ADEED), the TWG, and the Anchorage School District to develop a series of prototype school buildings. Each prototype building encompasses a set of structural and operational characteristics of school buildings including square footage; the allocation of square footage among end uses (classroom and office space); the levels of insulation in the walls and ceilings; the heating, ventilation, and air conditioning systems; the lighting and equipment power densities; and the hours of operation. In addition, each prototype is associated with a specific climate parameter expressed in terms of heating degree-days.

The parameters that define each prototype are entered into an engineering simulation model to estimate the energy consumption levels required in the different climatic regions of the state. Part of this model also simulates the different efficiency levels of alternative sources of energy such as natural gas, electricity, fuel oil, wood, and liquid propane. The results of these prototype simulations serve as points from which equations are calculated to capture each school's individualized projected energy consumption, given its specific heating degree-days and fuel type used for each end use.

Finally, the estimated energy consumption levels necessary for the prototype buildings in different climatic zones are combined with information on the unit energy prices at each school site throughout Alaska to estimate the cost of energy services. With the assistance of the TWG, the AIR research team collected data on these price levels for each school site from the school district offices. Energy costs were calculated at the school building level and aggregated to the district level using the square footage of school buildings at each site as weights.

The Results

The results of this analysis (Exhibit IV-1) show a range of index values for the cost of energy services per square foot from 0.74 in the Juneau School District to 9.31 in the North Slope School District. Typically, the school districts with the highest index values are located within the very cold climate zone, largely represented by the Far North region. High costs in less cold districts can be attributed to the relative costs of energy sources faced by these districts. For example, energy prices per BTU (*British Thermal Unit*) within the Bristol Bay School District

were second only to the North Slope Borough School District.⁹ This resulted in a relatively high index value for Bristol Bay that was not caused by climate. For the North Slope Borough School District, it is clear that the combination of an extremely cold climate and the highest energy costs give this district the highest index value. It is likely that a significant component of these differences in energy prices can be attributed to variations in the cost of transporting fuels to the different school sites.

Located near the Bristol Bay School District is the Dillingham City School District. Unlike its neighbor, Dillingham has a low energy cost index value. While Dillingham is still in a high-cost area for energy prices, schools in the Dillingham School District generate their own electricity and use the waste heat to heat their schools, thereby saving a substantial amount of money. This is also reflected in their assigned budget weight for energy, which is among the lowest in the state at 6 percent of the total operating fund.

⁹ A recent report entitled "Bristol Bay, Alaska, Comprehensive Economic Development Strategy" highlights the high cost of energy in the region and can be found on the Department of Commerce and Economic Development website at: http://www.dced.state.ak.us/cbd/oedp/pubs/BBNA_CEDS2002.pdf

Exhibit IV-1. Energy Cost Index

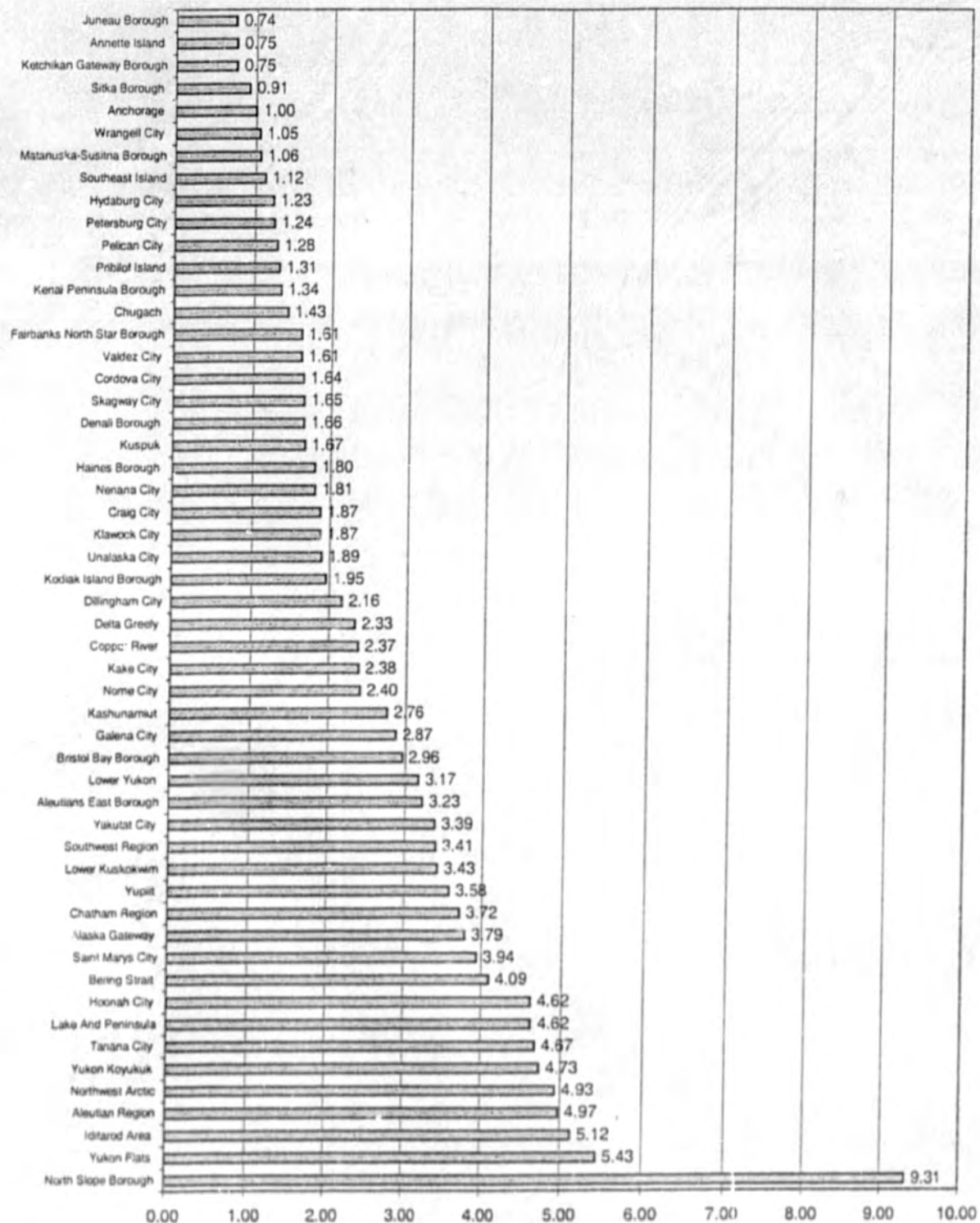


Exhibit IV-2 reveals that geographic location plays a significant role in the energy index values. Those districts located in the Far North region typically face a climate harsher than the rest of the state, and the cost of transporting fuel supplies here can also be much higher. Outside

of the Far North region, the highest-cost districts tend to be in the Southwest region, where they may also face high costs for transportation of fuel. Schools located in the Far North region tend to have more efficiently insulated school buildings than school districts in other regions, but the fact remains that they face higher costs to heat their buildings.

Exhibit IV-2. Comparison of Energy Index Values by Region

Region	N	Mean	Standard Deviation	Minimum	Maximum
Statewide	53	2.65	1.64	0.74	9.31
Far North	10	4.54	2.09	1.81	9.31
Interior	3	1.87	0.40	1.61	2.33
South Central	9	1.80	0.86	1.00	3.79
Southeast	17	1.79	1.13	0.74	4.62
Southwest	14	3.08	1.06	1.31	4.97

V. Costs of Supplies, Materials and Small Capital Items

The Methodology

Shipping cost is the major factor underlying cost differences in supplies, materials, and capital equipment across local schools and districts in Alaska. The base prices of supplies purchased by districts in different parts of the state may vary to some extent because of volume purchasing, but this difference is small compared to the difference associated with the cost of transporting these items from the major centers of commerce to the remote areas of the state. After extensive deliberations between the TWG and the AIR research team, a limited set of items was selected to represent the purchases of school districts. This set of items reflects the impact of transportation costs on the final prices paid.

The index developed for this portion of the GCEI is based on variations in the prices paid across the state for one case (10 reams) of white copier paper (8.5" by 11") and one 4' by 5' windowpane. AIR obtained this price information with a district questionnaire that requested information for each of the schools within the district. The total cost of the items reflects not only the cost of the item itself, but also the shipping and storage costs incurred for delivery of the item to the specific school site. The ream of copier paper was chosen as a proxy for instructional supplies, such as textbooks, and also for office supplies consumed by administrators. The windowpane represents the cost of bulky items that would commonly be purchased out of capital outlay expenditures. For districts located in the Far North region, this was usually a triple-paned

window, while schools in less harsh climates more often purchased single- or double-paned windows.

The district questionnaire took into account the fact that using only one method of transportation is not feasible for some districts. For example, districts located above the Bering Strait will not always be able to ship goods by barge. The questionnaire asked for the percentage of time an alternative shipping method was utilized for each school site. All calculations were made at the school level and then aggregated to the district level by pupil enrollment weights.

The Results

Exhibit V-1 displays the aggregate cost index for supplies, materials, and small equipment items. The districts are sorted in order from lowest to highest cost. The costs range from a low of 1.00 in Anchorage School District to a high of 6.81 in Pelican City School District.

Exhibit V-2 shows the relationship between the cost of goods and district size (measured by enrollment). In general, larger districts tend to exhibit lower costs of goods. Larger districts are able to purchase items in bulk more easily than smaller districts. Another factor contributing to the lower index values for districts with greater enrollments is their proximity to the suppliers of these goods. These districts operate in or near Alaska's major centers of commerce. Transportation costs are lower, and competition among suppliers in these centers of commerce drives down prices.

These trends do not hold true for all districts. Chugach and Chatham School Districts are relatively close to Anchorage and Juneau, respectively. However, they have index values above the average value in this input category. Both districts reported high transportation costs, as did Pelican City School District. All reported prices of goods were verified for accuracy with the respondent by the data collectors at AIR and by representatives from ALASBO. Any corrections necessary were made, and the remaining data have been deemed accurate.

Exhibit V-1: Index for the Cost of Supplies, Materials, and Small Capital Equipment

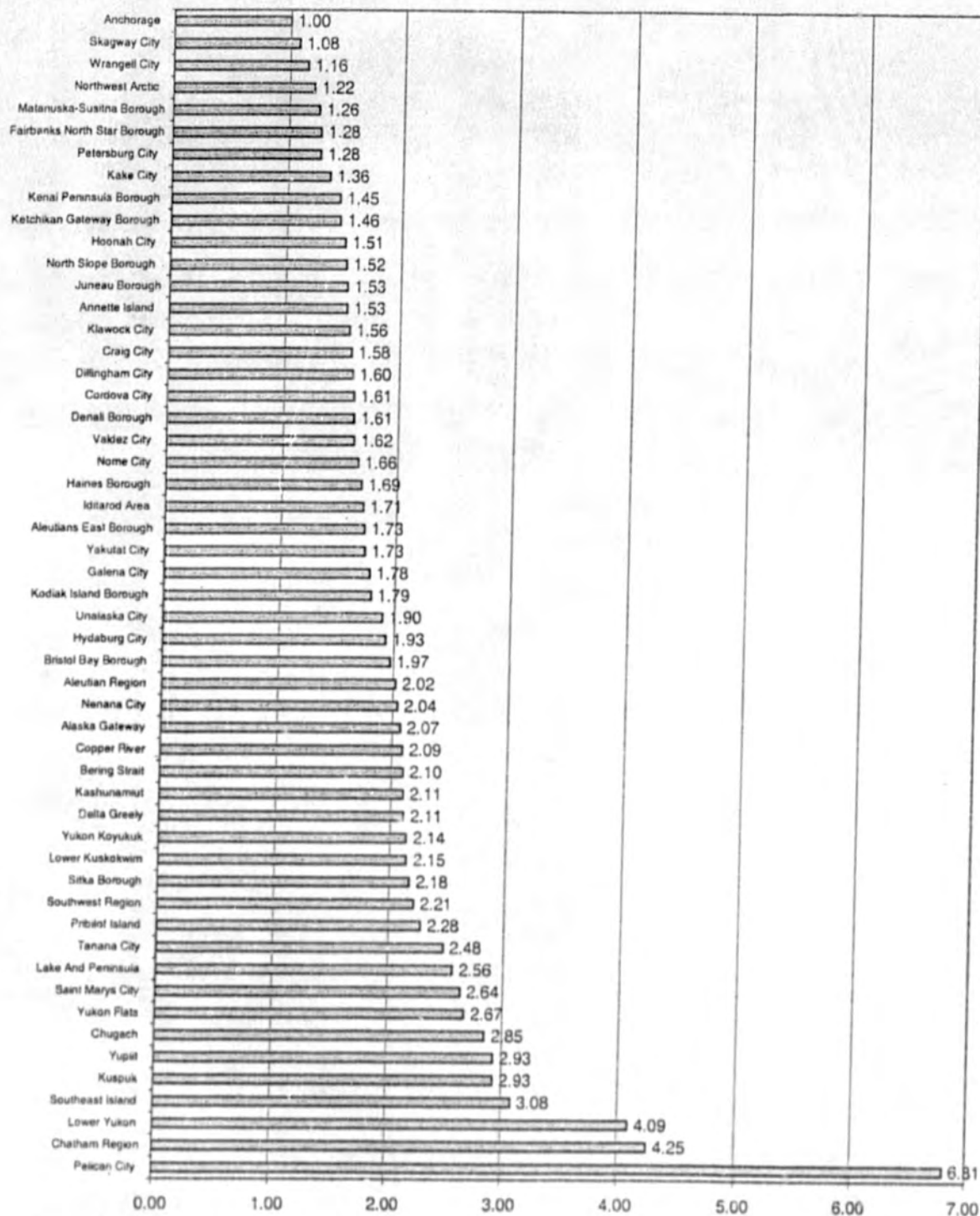


Exhibit V-2. Comparison of Total Goods Index Values by District Enrollment

Region	N	Mean	Standard Deviation	Minimum	Maximum
Statewide	53	2.05	0.94	1.00	6.81
0 to <250	13	2.50	1.53	1.08	6.81
250-999	25	1.98	0.52	1.16	3.08
1000-2499	6	2.19	1.00	1.22	4.09
2500-9999	6	1.69	0.27	1.46	2.15
10,000+	3	1.18	0.16	1.00	1.28

VI. Costs of Travel

The Methodology

Because of the remote locations of some schools and communities in Alaska, travel costs can have a significant impact on the expenditures necessary to operate schools in the state. Travel cost affect the cost of maintenance services, itinerant instructional services, professional development activities, administrative oversight of school activities, and statewide meetings for professional staff. The distances of the district offices from the centers of trade impact access to skilled maintenance personnel and technicians.

With the advice of the TWG, the AIR research team estimated the cost of a specified service call by a skilled technician. The cost included the amount of time for the call (16 hours), the cost of the time required to travel to the school site, and the cost of transportation, lodging (where necessary), and meals. The rate for the service technician was based on the Anchorage rate adjusted to the nearest center of trade. For schools located in a center of trade, there was generally no cost associated with travel time. The cost of transportation was based on the mode of transportation most commonly used between the school site and the corresponding center of trade (i.e., airfare for air travel, or mileage reimbursement for automotive travel). Lodging and meals were set at \$150 per day.

Travel costs associated with itinerant services and other services necessitating trips between the district office and the school site were estimated based on the appropriate mode of transportation and whether or not such travel was commonly associated with an overnight stay (common in some remote locations because of limited schedules of carriers). The data on the modes of transportation and the common airfares paid for travel were gathered through the questionnaires administered during the data collection process. Similarly, travel for statewide

meetings was based on the cost of transportation, lodging, and meals for a trip to Anchorage from each of the school sites.

All travel costs and the costs of the maintenance services were assigned to the school site and aggregated to the district level based on the relative enrollment of the school. The three subcomponents of travel were aggregated into a single index for travel using the appropriate budget share weights described earlier.

The Results

The majority of the low-cost districts in this index are city school districts and districts located near Anchorage or in another relatively accessible area of the state. These districts tend to have very low costs associated with travel between the district office and the school(s) in the district. For those districts located near Anchorage, travel costs to Anchorage for statewide training tends to be a relatively low-cost item.

Districts located close to a center of commerce enjoy low costs for maintenance service travel, resulting in lower cost index values in this travel input index. This is evidenced in Exhibit VII-2, as there is a general trend of higher index values associated with travel in the more remote districts of the state.

Exhibit VII-3 reveals that districts in the middle ranges of enrollment (i.e., between 1,000 to 2,499 students) have the highest costs of travel relative to smaller or larger districts. This can be confirmed intuitively: districts with the highest enrollment numbers are located in areas where they have easier access to travel and readily available maintenance services, combined with a concentration of schools near the district office. Districts comprising the lowest enrollment category tend to be city school districts, making travel cost between schools and the district office almost negligible. However, the average travel index value for these schools is higher than for the largest district enrollment category. Since some small districts are in remote areas of the state, they will have higher travel index values associated with them. Districts with mid-range enrollments usually span a large area and can be in very remote areas of the state, thus generating higher index values for the districts in these categories.

Exhibit VI-1. Index for the Cost of Travel

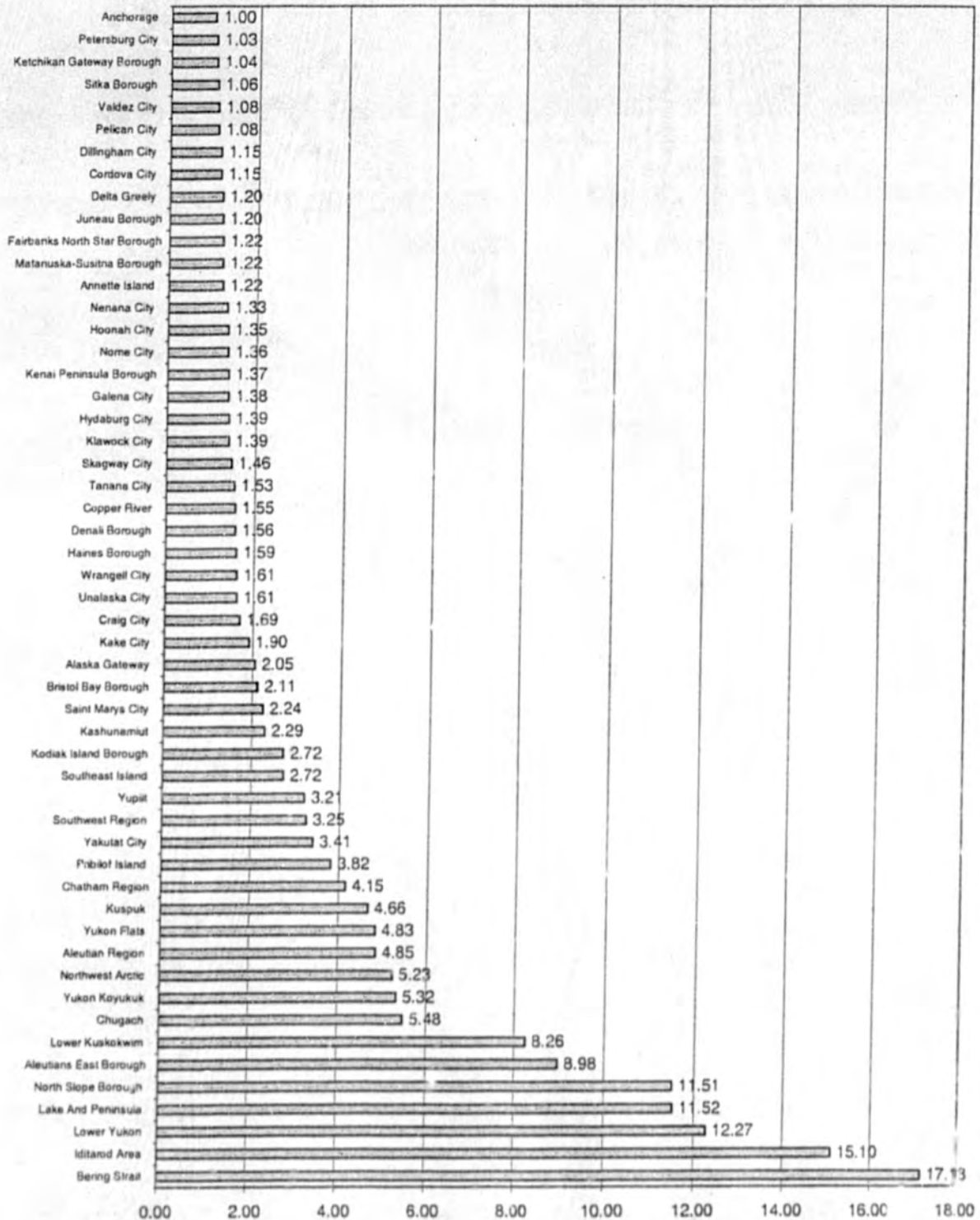


Exhibit VI-2. Comparison of Total Travel Index Values by Distance

Region	N	Mean	Standard Deviation	Minimum	Maximum
Statewide	53	3.51	3.78	1.00	17.18
Less than 10 miles	6	1.42	0.65	1.00	2.72
At least 10 miles	4	1.29	0.09	1.22	1.39
At least 50 miles	12	2.01	1.36	1.06	5.48
At least 100 miles	23	4.06	3.96	1.03	15.10
At least 500 miles	8	6.82	5.43	1.36	17.18

Exhibit VI-3. Comparison of Total Travel Index Values by District Enrollment

Region	N	Mean	Standard Deviation	Minimum	Maximum
Statewide	53	3.51	3.78	1.00	17.18
0 to <250	13	2.62	1.52	1.08	5.48
250-999	25	3.35	3.54	1.03	15.10
1000-2499	6	8.10	6.56	1.06	17.18
2500-9999	6	2.66	2.81	1.04	8.26
10,000+	3	1.14	0.13	1.00	1.22

VII. Overall Geographic Cost of Education Index

This project has undertaken a comprehensive analysis to address the various factors that affect the ability of districts in Alaska to access comparable school resources in the different regions of the state. The end product is a geographic cost-of-education index (GCEI), which addresses the following question:

How much more or less does it cost to recruit and employ comparable school personnel (i.e., teachers, administrators, and classified personnel); and to pay for comparable energy services (i.e., heating, lighting and power); comparable supplies, materials, and small capital equipment; and travel costs as they affect maintenance and operations, itinerant services, professional development, administrative oversight, and statewide professional meetings in different geographic locations around the state?

The GCEI is a cost adjustment index that permits translation of nominal dollar values into *real* dollars of purchasing power for school resources and services. It can be used to provide equal purchasing power by adjusting funding levels for individual school districts.

Determination of Budget Shares and Application of the Index Values

To calculate the GCEI, the AIR research team first needed to estimate the budget shares allocated by each district for each of the inputs. AIR utilized audited budget data provided by the ADEED. The budget shares were calculated based on the "operating budget" reported in the audited budget files. The operating budget data are organized into a matrix by function and object of expenditure. The assignment of each function and object cell in the budget matrix is presented in the *Technical Report* for this project. Once the budget cells were assigned to a component cost index, AIR calculated the index values for the four categories of inputs: personnel, energy, goods, and travel. A final overall GCEI was then calculated using the aggregate budget shares for each of these four categories of inputs. Exhibit VII-1 shows how each of the index values for the four major categories of inputs contributes to the overall GCEI. This exhibit reflects the overall contribution of each of the four input categories based on two elements: (a) the *relative costs* (i.e., reflected by the component geographic cost index) and (b) the *relative budget weights* (i.e., each district's budget share averaged with that of Anchorage for each input category). To arrive at the overall GCEI, one needs simply to multiply the four input category values in the exhibit together.

EXHIBIT VII-1(a). GCEI Values and the Relative Impact of the Four Component Indices

District Name	GCEI	Personnel Contribution	Energy Contribution	Travel Contribution	Goods Contribution
Alaska Gateway	1.28	1.04	1.15	1.03	1.04
Aleutian Region	1.46	1.16	1.08	1.11	1.06
Aleutians East Borough	1.49	1.10	1.08	1.23	1.03
Anchorage	1.00	1.00	1.00	1.00	1.00
Annette Island	1.03	1.02	0.98	1.01	1.02
Bering Strait	1.55	1.10	1.12	1.22	1.04
Bristol Bay Borough	1.19	1.02	1.08	1.05	1.02
Chatham Region	1.20	0.96	1.10	1.07	1.06
Chugach	1.29	0.99	1.03	1.16	1.10
Copper River	1.15	1.01	1.05	1.02	1.06
Cordova City	1.07	1.01	1.03	1.01	1.02
Craig City	1.09	0.99	1.03	1.05	1.02
Delta Greely	1.09	0.99	1.05	1.01	1.03
Denali Borough	1.09	1.00	1.04	1.02	1.03
Dillingham City	1.13	1.05	1.04	1.01	1.02
Fairbanks North Star Borough	1.08	1.04	1.02	1.01	1.01
Galena City	1.26	1.04	1.08	1.02	1.11
Haines Borough	1.03	0.97	1.03	1.01	1.02
Hoonah City	1.12	0.96	1.12	1.02	1.02
Hydaburg City	1.10	0.99	1.01	1.02	1.07
Iditarod Area	1.40	0.99	1.19	1.14	1.03
Juneau Borough	1.02	1.01	0.99	1.01	1.02
Kake City	1.09	0.98	1.06	1.04	1.01
Kashunamiut	1.25	1.07	1.06	1.04	1.06
Kenai Peninsula Borough	1.03	0.98	1.01	1.02	1.02
Ketchikan Gateway Borough	1.01	1.01	0.98	1.00	1.02
Klawock City	1.04	0.97	1.04	1.01	1.02
Kodiak Island Borough	1.12	1.02	1.04	1.03	1.03
Kuspuk	1.21	1.05	1.04	1.06	1.05
Lake And Peninsula	1.46	1.02	1.17	1.16	1.06
Lower Kuskokwim	1.39	1.10	1.09	1.12	1.04
Lower Yukon	1.40	1.08	1.09	1.12	1.06
Matanuska-Susitna Borough	0.99	0.98	1.00	1.01	1.01
Nenana City	1.17	0.99	1.03	1.01	1.14
Nome City	1.16	1.05	1.06	1.01	1.02
North Slope Borough	1.58	1.23	1.15	1.09	1.02
Northwest Arctic	1.48	1.13	1.16	1.12	1.01
Pelican City	1.14	0.95	1.01	1.00	1.18
Petersburg City	1.01	0.98	1.02	1.00	1.01
Pribilof Island	1.29	1.13	1.02	1.07	1.05
Saint Marys City	1.28	1.03	1.10	1.04	1.08
Sitka Borough	1.03	1.00	1.00	1.00	1.03
Skagway City	1.00	0.95	1.03	1.01	1.01
Southeast Island	1.07	0.94	1.01	1.07	1.06
Southwest Region	1.26	1.04	1.08	1.06	1.06
Tanana City	1.29	1.01	1.20	1.01	1.04
Unalaska City	1.19	1.09	1.04	1.02	1.03
Valdez C y	1.05	1.01	1.03	1.00	1.02
Wrangell City	1.00	0.98	1.00	1.02	1.01
Yakutat City	1.17	0.99	1.09	1.06	1.03
Yukon Flats	1.46	1.02	1.26	1.08	1.06
Yukon Koyukuk	1.44	1.06	1.18	1.11	1.04
Yupit	1.31	1.05	1.07	1.08	1.08

EXHIBIT VII-1(b). GCEI Values and the Budget Weights of the Four Component Indices

District Name	GCEI	Personnel Budget Weight	Energy Budget Weight	Travel Budget Weight	Goods Budget Weight
Alaska Gateway	1.28	0.81	0.04	0.11	0.05
Aleutian Region	1.46	0.79	0.06	0.05	0.08
Aleutians East Borough	1.49	0.79	0.08	0.07	0.05
Anchorage	1.00	0.87	0.04	0.04	0.05
Annette Island	1.03	0.85	0.05	0.06	0.04
Bering Strait	1.55	0.80	0.06	0.08	0.05
Bristol Bay Borough	1.19	0.82	0.06	0.07	0.04
Chatham Region	1.20	0.83	0.04	0.08	0.04
Chugach	1.29	0.77	0.08	0.07	0.09
Copper River	1.15	0.81	0.05	0.06	0.08
Cordova City	1.07	0.84	0.05	0.06	0.05
Craig City	1.09	0.82	0.07	0.04	0.05
Delta Greely	1.09	0.84	0.05	0.06	0.05
Denali Borough	1.09	0.82	0.04	0.08	0.06
Dillingham City	1.13	0.84	0.05	0.05	0.05
Fairbanks North Star Borough	1.08	0.88	0.04	0.04	0.04
Galena City	1.26	0.66	0.06	0.07	0.20
Haines Borough	1.03	0.87	0.03	0.06	0.03
Hoonah City	1.12	0.81	0.07	0.07	0.05
Hydaburg City	1.10	0.75	0.05	0.06	0.12
Iditarod Area	1.40	0.78	0.05	0.11	0.06
Juneau Borough	1.02	0.89	0.04	0.04	0.04
Kake City	1.09	0.82	0.06	0.07	0.04
Kashunamiut	1.25	0.81	0.04	0.06	0.08
Kenai Peninsula Borough	1.03	0.84	0.07	0.05	0.04
Ketchikan Gateway Borough	1.01	0.86	0.03	0.06	0.05
Klawock City	1.04	0.84	0.04	0.07	0.04
Kodiak Island Borough	1.12	0.86	0.03	0.06	0.05
Kuspuk	1.21	0.83	0.04	0.08	0.04
Lake And Peninsula	1.46	0.77	0.06	0.10	0.06
Lower Kuskokwim	1.39	0.84	0.05	0.07	0.05
Lower Yukon	1.40	0.83	0.04	0.08	0.04
Matanuska-Susitna Borough	0.99	0.88	0.03	0.05	0.04
Nenana City	1.17	0.70	0.04	0.06	0.19
Nome City	1.16	0.85	0.04	0.07	0.04
North Slope Borough	1.58	0.84	0.04	0.06	0.06
Northwest Arctic	1.48	0.79	0.06	0.09	0.05
Pelican City	1.14	0.79	0.04	0.06	0.09
Petersburg City	1.01	0.85	0.03	0.07	0.04
Pribilof Island	1.29	0.81	0.05	0.07	0.06
Saint Marys City	1.28	0.79	0.05	0.07	0.07
Sitka Borough	1.03	0.87	0.04	0.04	0.04
Skagway City	1.00	0.82	0.04	0.06	0.07
Southeast Island	1.07	0.83	0.06	0.06	0.05
Southwest Region	1.26	0.81	0.05	0.07	0.07
Tanana City	1.29	0.78	0.03	0.12	0.05
Unalaska City	1.19	0.83	0.04	0.07	0.05
Valdez City	1.05	0.87	0.03	0.05	0.04
Wrangell City	1.00	0.85	0.04	0.05	0.05
Yakutat City	1.17	0.83	0.05	0.07	0.05
Yukon Flats	1.46	0.75	0.05	0.14	0.06
Yukon Koyukuk	1.44	0.78	0.06	0.10	0.05
Yupik	1.31	0.80	0.06	0.05	0.07

VIII. Recommendations and Implementation

This section presents six recommendations to the Alaska State Legislature (ASL) based on this report. In each case, the recommendation is followed by a discussion of some of the details associated with implementation.

RECOMMENDATION 1: Adopt a New Cost Adjustment. *The ASL should replace the current Alaska cost index for education with the new AIR GCEI.*

The purpose of this report has been to produce a GCEI that can be used to adjust nominal distributions of state aid to reflect real purchasing power for the individual school districts in Alaska. The GCEI produced in this report is intended to replace the previous cost adjustment developed by the McDowell Group more than five years ago. A major difference between the AIR and McDowell studies is that, while both rely to some degree on existing information about educational spending patterns in Alaska School Districts, the AIR GCEI applies a methodology that goes beyond simply reflecting current spending behavior by school districts. The AIR GCEI includes only those factors that are *beyond the control of local school district decision makers*.

RECOMMENDATION 2: Improve Personnel Databases. *The ASL should direct the ADEED to improve and maintain the quality of the school personnel data systems in order to permit utilization of the hedonic wage model for updating the personnel components of the GCEI in the future. Specifically, this recommendation includes the following components:*

- (a) Improve the quality of the current Certified Staff Assignment Reporting (CSAR) system by running routine auditing checks on the files to ensure that information reported on individual personnel are accurate.*
- (b) Convert the current data collected on certification for school personnel into an electronic form that is capable of being merged with the CSAR files.*
- (c) Develop a data system similar in structure to the CSAR for classified staff (e.g., paraprofessionals, clerical support staff, custodial and skilled maintenance staff, and technical or managerial staff) so that these data may also be utilized for analysis of patterns of compensation using the hedonic wage method.*

Two categories of variables are necessary for the analysis of personnel compensation: the *personal qualifications and job assignment characteristics* and the *cost factors*. The first group of variables includes those that we want to control for (hold constant) in the simulations necessary to calculate the personnel cost indices. However, it is important to have as many control variables as possible that might impact the patterns of employment of different categories of school personnel. While the current Certified Staff Accounting Report (CSAR) was sufficient for the analysis in this project, AIR believes that there are some improvements that ADEED

could make in its data collection procedures that would improve the quality of the database and analysis of personnel compensation.

First, AIR suggests that ADEED be charged with responsibility for maintaining and auditing the personnel files for accuracy. Data-checking routines should be put in place to examine changes over time and to search for inconsistencies in the information reported to ADEED. During the course of the analysis, AIR discovered some inconsistencies in the way data were reported for the same school district employees over time. For example, experience levels of the same employees over time sometimes decreased, and the birth dates for the same employees differed over time. If these data are to be used as the basis for future analysis of personnel compensation, it is important that they accurately reflect employee qualifications. It should be noted that if districts are informed that these personnel data will be used in the future to determine school funding distributions, they will be more likely to spend the time to ensure the accuracy of the records.

Second, AIR recommends that the ADEED consider using the certification applications of teachers to create electronic records of teacher examination test scores and colleges attended, both of which are on the applications. The test scores and the data on the colleges could be used by analysts to determine the average selectivity or quality of the colleges attended as a proxy for quality of the individuals who are employed by public schools. ADEED should also consider reorganizing the CSAR to permit analysts to ascertain the percentage of teacher assignments for which each teacher is appropriately or fully certified. ADEED should also attach a unique identifier to each certified employee, so that they may be more easily tracked throughout the years. These changes would provide a stronger and more comprehensive set of personal qualifications that would help in the analysis of variations in personnel compensation.

Third, given the differences in the labor markets for classified and certified personnel, AIR recommends that ADEED consider implementing a data collection for classified personnel similar to the one for certified personnel, adapted to the needs of that population of employees. Such a data collection should gather some of the following data elements, permitting future analyses to control more accurately for qualifications of classified staff:

- Identification codes to permit tracking of personnel over time
- Compensation in the form of hourly wage rates
- Job title (e.g., school secretary, custodian, skilled maintenance, teacher aide)
- Total hours of work per week and per year
- Educational preparation (e.g., high school diploma, vocational training in a relevant field)
- Years of experience in this type of work
- Years working for the present district
- Date of birth