

**Review of
Geographic Cost Adjustment Component in the
Essential Programs and Services Model**

**David L. Silvernail
Director**

**James E. Sloan
Research Associate**

**Maine Education Policy Research Institute
University of Southern Maine Office**

January 2007

Review of Geographic Cost Adjustment Component in the Essential Programs and Services Model

D.L. Silvernail

J.E. Sloan

Maine's Essential Programs and Services (EPS) school funding model includes many components, and all are subject to review, and if appropriate, revisions, on a three year cycle as described in Maine statute. One of the components which has been reviewed in 2006-07 is the geographic cost adjustment index.

The price of resources used in educating pupils, especially the price of labor, varies from place to place, not only between countries and between states, but also within states. Therefore, a geographic cost adjustment is a key component of any adequacy-based school funding model such as Maine's EPS model. In Maine's model, regional price differences are represented by an index derived from teacher salaries in the state's Labor Market Areas (LMAs). This Brief presents the findings from a review of this salary based index. In addition, the Joint Standing Committee for Education and Cultural Services of the Maine Legislature requested an additional analysis of an alternative regional adjustment index, one based on housing costs. This analysis is also included in this Brief.

The EPS Regional Adjustment Based on Actual Teacher Salaries

The current EPS regional adjustment is based on actual teacher salaries throughout Maine. Because salaries may vary across the state based on differing years of experience and education level, to calculate the regional adjustment, the average teacher salary for each LMA is first adjusted for the level of education and experience of the teachers, and then divided by the state average teacher salary. The regional adjustment is used when calculating a cost allocation for each School Administrative Unit (SAU). Specifically, the calculated EPS salaries and benefits of each SAU are multiplied by the regional salary index associated with the LMA in which the SAU is located.

The Maine Department of Labor defined 35 Labor Market Areas (LMAs) on the basis of commuting patterns evident in the 1990 U.S. Census data. The definition of the LMAs was changed by the federal government in 2005, resulting in 31 Maine LMAs. The new definition combined metropolitan areas (such as Greater Portland and Greater Bangor) into single LMAs, which resulted in several large LMAs with very large variation in teacher salaries within these LMAs. In addition, three of the 31 were only partially in Maine and were also partially in New Hampshire. For these reasons the 35 former LMAs were used in updating the EPS regional adjustment.¹ A listing of the SAUs in each of the 35 LMAs appears in Appendix A.

The most complex task in the process of calculating the LMA regional adjustments is revising the LMA average teacher salaries so that LMAs with less experienced or less highly educated teachers are treated equally to those with more experienced or more highly educated teachers. This revision is made because salary differences due to differences in education or experience of the teachers are not due to the region. These differences should be factored out. The method used to revise the LMA average teacher salaries for the level of education and experience of the teachers in the LMA uses a commonly-used statistical procedure called regression analysis. First, using a regression analysis for each LMA, teacher salaries are estimated as a mathematical function of education and experience. Then, using the resulting mathematical function, the average teacher salary in the LMA is calculated as if average teacher education and experience levels in the LMA was the same as in the state as a whole. (Note that the EPS model *does* include an adjustment to each individual SAUs allocation based on the education and experience levels of the teachers within that SAU. That adjustment is called the EPS Education & Experience Salary Matrix and is separate from the EPS Regional Adjustment.)

¹ Because of the small number of SAUs in some of the LMAs, the SAUs in the following groups were combined, resulting in the calculation of a single regional adjustment for each group: Sebago Lake & Norway-Paris LMAs; Patten-Island Falls, Millinocket-East Millinocket, & Houlton LMAs; Greenville and Dover-Foxcroft LMAs; and Van Buren, Fort Kent, and Madawaska LMAs.

In Table 1, a comparison is displayed between the current EPS regional adjustment, calculated from 2004-05 staff data, and an update of the regional adjustment based on 2006-07 staff data. As is shown in the table, the adjustment remained the same in twelve LMAs, increased in fourteen, and decreased in nine. Accordingly, in accordance with the Maine statute, this review of the geographic regional cost adjustment has resulted in a new adjustment, which reflects current differences in teacher salaries across the State. Consequently, it is recommended that the new adjustment be considered as an appropriate revision of the current EPS regional adjustment, and that it be used in calculating EPS allocations.

An Alternative Regional Adjustment Based on Home Prices

An alternative to the salary-based EPS method for calculating a regional adjustment would be to calculate a regional adjustment based on sales prices of homes. The underlying premise of such an adjustment is that housing costs vary by geographic region of the State, which require differences in staff salaries, which in turn result in differences in the cost of education across regions in the State. To examine this alternative, such a regional adjustment was calculated.

The median home sale price within each LMA the years 1996 through 2005 was provided by the Maine State Housing Authority. Ten single-year indexes were created by dividing the median home sale price within each LMA was by a statewide weighted average of the LMA median home prices. The resulting single-year indexes were then averaged to form a ten-year average home price index.² A ten-year average was used on the presumption that only a few employees have bought homes within the past year but that many may have bought homes within the past ten years. Using a multi-year index also

² For some LMAs, less than ten years of sufficient data on home sales was available. In these cases, the index is an average of the available years. The Fort Kent LMA had insufficient data in all ten years.

Table 1. Regional Adjustment Update – Salary Index 2004-05 & 2006-07 Data

LMA Code	LMA Name	Regional Adjustment Multiplier			
		Salary Index (2004-05)	Salary Index (2006-07)	Difference in Index	Estimated Dollar Difference
1	Kittery-York Market	1.06	1.07	+.01	\$329,614
2	Sanford Market	1.03	1.04	+.01	\$257,285
3	Biddeford Market	1.09	1.09	~	\$0
4	Portland Market	1.08	1.08	~	\$0
5	Bath-Brunswick Market	1.02	1.04	+.02	\$908,276
6	Boothbay Harbor Market	1.03	1.02	-.01	(\$85,153)
7	Sebago Lakes Region Market	0.94	0.94	~	\$0
8	Lewiston-Auburn Market	0.98	0.97	-.01	(\$544,669)
9	Rockland Market	1.00	1.01	+.01	\$282,031
10	Norway-Paris Market	0.94	0.94	~	\$0
11	Stonington Market	0.95	0.98	+.03	\$187,295
12	Augusta Market	0.95	0.96	+.01	\$486,859
13	Waterville Market	0.97	0.97	~	\$0
14	Belfast Market	1.01	1.01	~	\$0
15	Bucksport Market	0.94	0.92	-.02	(\$129,459)
16	Jonesport-Milbridge Market	0.84	0.84	~	\$0
17	Bangor Market	1.02	0.99	-.03	(\$1,549,718)
18	Machias-Eastport Market	0.84	0.81	-.03	(\$257,297)
19	Dexter-Pittsfield Market	0.94	0.96	+.02	\$255,129
20	Ellsworth-Bar Harbor Market	0.93	0.93	~	\$0
21	Outer Bangor Market	0.89	0.89	~	\$0
22	Rumford Market	0.93	0.92	-.01	(\$136,164)
23	Lincoln-Howland Market	0.86	0.85	-.01	(\$88,109)
24	Farmington Market	0.96	0.95	-.01	(\$224,939)
25	Calais Market	0.96	0.97	+.01	\$86,298
26	Patten-Island Falls Market	0.88	0.90	+.02	\$42,922
27	Millinocket-East Millinocket Market	0.88	0.90	+.02	\$114,639
28	Houlton Market	0.88	0.90	+.02	\$176,041
29	Skowhegan Market	1.03	1.02	-.01	(\$212,078)
30	Greenville Market	0.95	0.95	~	\$0
31	Dover-Foxcroft Market	0.95	0.95	~	\$0
32	Presque Isle-Caribou Market	0.90	0.90	~	\$0
33	Van Buren Market	0.99	1.00	+.01	\$18,048
34	Fort Kent Market	0.99	1.00	+.01	\$49,678
35	Madawaska Market	0.99	1.00	+.01	\$42,923
State		1.00	1.00	~	\$0

has the effect of reducing year-to-year fluctuation. The resulting raw home price index varied widely, from a high of 1.66 in the Kittery-York LMA to a low of 0.36 in the Patten-Island Falls LMA, which means that over the past ten years, median-priced homes in the Kittery-York LMA have cost around 66% more than the state average and median-priced homes in the Patten-Island Falls LMA have cost only about 36% of the state average. Because housing prices vary more than the prices in most other expenditures categories, a regional salary adjustment should not be calculated from a raw housing cost index directly. But a reasonable salary adjustment may be calculated by weighting the housing cost index by a factor representing the proportion of pay employees spend on housing.

Weighting factors for a housing index may be derived based on data from *Consumer Expenditures Survey*, which is conducted by the U.S. Bureau of Labor Statistics. For example, ACCRA (formerly, the American Chamber of Commerce Researchers Association)—which publishes a widely-used geographic index called The Cost of Living Index (COLI)—assigns a weight of 29.0% to its housing component index using data from the *Consumer Expenditures Survey*. This weighting factor was not used in the current analysis because the COLI is intended to be used in comparing the cost of living for “moderately affluent professional and managerial households” in around 300 specific *urban* areas in the United States, and because ACCRA considers only those households in the top 20% of income.

Although the ACCRA weighting factor would be unsuitable for use in the EPS regional adjustment, there are several weighting factors that might be used. Such factors may be derived by choosing a different type of households to consider and by choosing whether the weighting factor shall be the proportion of average consumer **expenditures** spent on housing or the proportion of average consumer **income** before taxes spent on housing. For instance, the proportion of average consumer *expenditures* spent on owned and rented dwellings by all consumer units is 17.3%. The proportion of average

consumer *income* spent on owned and rented dwellings by all consumer units is 13.8%. The 13.8% weighting factor was used in this analysis. Any differences in the raw housing index above or below 1.00 were multiplied by 0.138. The result was a narrower range of regional adjustment factors, from a high of 1.09 in the Kittery-York LMA down to a low of 0.91 in the Patten-Island Falls LMA. Using a 17.3% weighting factor would have resulted in a greater range. Specifically, the regional adjustments in Kittery-York LMA and Patten-Island Falls LMA would have been 1.11 and 0.89, respectively.

A comparison of the updated EPS regional adjustment to the index based on variation in home prices is displayed in Table 2. The estimated dollar difference between the EPS allocations under the two alternatives is again displayed in the final column. For the most part, this alternative would shift EPS cost allocation dollars from region to region, with perhaps some smaller impact on the total EPS allocation statewide. The difference between the Salary-Based EPS regional adjustment and the housing-based alternative index ranges from the alternative index being 0.13 higher in the Machias-Eastport LMA to being 0.08 lower in the Skowhegan LMA. On a dollar basis, the difference in the two adjustments ranges from a \$2.1 million estimated increase in EPS allocation in the Ellsworth-Bar Harbor LMA to a \$6.0 million estimated decrease in the Portland LMA. According to the estimate, as may be seen in the lower right cell of Table 2, the total EPS allocation statewide may decrease by around \$0.8 million. But again, this estimate was calculated on the basis of actual staffing levels, not EPS recommended staffing levels. Therefore, the actual dollar differences in total cost allocation may be higher or lower than these estimates.

Table 2. Regional Adjustment Alternatives – Salary Index & Home Price Index

LMA Code	LMA Name	Regional Adjustment Multiplier			
		Salary Method (2006-07)	Home Price Method (10-year)	Difference in Index	Estimated Dollar Difference
1	Kittery-York Market	1.07	1.09	+02	\$659,228
2	Sanford Market	1.04	1.00	-.04	(\$1,029,141)
3	Biddeford Market	1.09	1.06	-.03	(\$1,035,458)
4	Portland Market	1.08	1.04	-.04	(\$6,010,092)
5	Bath-Brunswick Market	1.04	1.03	-.01	(\$454,138)
6	Boothbay Harbor Market	1.02	1.07	+05	\$425,763
7	Sebago Lakes Region Market	0.94	1.00	+06	\$1,085,639
8	Lewiston-Auburn Market	0.97	0.98	+01	\$544,669
9	Rockland Market	1.01	1.02	+01	\$282,031
10	Norway-Paris Market	0.94	0.97	+03	\$509,831
11	Stonington Market	0.98	1.05	+07	\$437,022
12	Augusta Market	0.96	0.97	+01	\$486,859
13	Waterville Market	0.97	0.96	-.01	(\$421,637)
14	Belfast Market	1.01	1.00	-.01	(\$130,109)
15	Bucksport Market	0.92	0.97	+05	\$323,647
16	Jonesport-Milbridge Market	0.84	0.94	+10	\$545,527
17	Bangor Market	0.99	0.98	-.01	(\$516,573)
18	Machias-Eastport Market	0.81	0.94	+13	\$1,114,955
19	Dexter-Pittsfield Market	0.96	0.94	-.02	(\$255,129)
20	Ellsworth-Bar Harbor Market	0.93	1.02	+09	\$2,067,475
21	Outer Bangor Market	0.89	0.96	+07	\$516,297
22	Rumford Market	0.92	0.95	+03	\$408,493
23	Lincoln-Howland Market	0.85	0.94	+09	\$792,984
24	Farmington Market	0.95	0.95	~	\$0
25	Calais Market	0.97	0.94	-.03	(\$258,893)
26	Patten-Island Falls Market	0.90	0.91	+01	\$21,461
27	Millinocket-East Millinocket Market	0.90	0.93	+03	\$171,959
28	Houlton Market	0.90	0.92	+02	\$176,041
29	Skowhegan Market	1.02	0.94	-.08	(\$1,696,625)
30	Greenville Market	0.95	0.97	+02	\$27,751
31	Dover-Foxcroft Market	0.95	0.93	-.02	(\$173,203)
32	Presque Isle-Caribou Market	0.90	0.92	+02	\$508,646
33	Van Buren Market	1.00	0.95	-.05	(\$90,238)
34	Fort Kent Market	1.00	~	~	\$0
35	Madawaska Market	1.00	1.04	+04	\$171,692
	State	1.00	1.00	~	(\$793,266)

Pros and Cons of Each Approach

There are reasons for and against using each of the approaches. Below are lists of some of the pros and cons of each.

Salary-Based EPS Regional Adjustment (Status Quo)

Pros	Cons
<ol style="list-style-type: none"> 1. Simple. 2. The adjustment is mostly beyond the voluntary control of each SAU (but see con #1). 3. It is based directly on salary costs, which are the largest part of education spending. 	<ol style="list-style-type: none"> 1. The adjustment may be influenced somewhat by voluntary salary decisions of an SAU. 2. Possible regional differences in teacher quality, other than teacher experience and education, are not controlled for. 3. Some LMAs may not in fact be efficient, competitive labor markets.

Home Price-Based Regional Adjustment (Alternative to Status Quo)

Pros	Cons
<ol style="list-style-type: none"> 1. Simple. 2. The adjustment is entirely beyond the voluntary control of each SAU. 3. Housing costs are the largest part of school employees' household spending and perhaps the one that varies most from place to place. 	<ol style="list-style-type: none"> 1. Salaries are not precisely in step with home prices, even using a ten-year average. 2. Possible regional differences in salaries due to factors other than home prices are ignored. 3. Teachers may live and work in different LMAs.

Summary

This Brief has described the results from an analysis of two geographic regional cost adjustments. The first analysis was the result of updating the currently approved index, one based on regional differences in teacher salaries. The second analysis was for an alternative adjustment, one based on regional differences in housing costs. Both provide useable and defensible measures of regional differences in cost across the State. But the salary-based index reflects differences in the cost of education, while the housing index reflects differences in cost of living. Because Maine's essential programs and services model is based on the cost of providing education, it is recommended that the updated salary-based index be used in calculating EPS allocations.