

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

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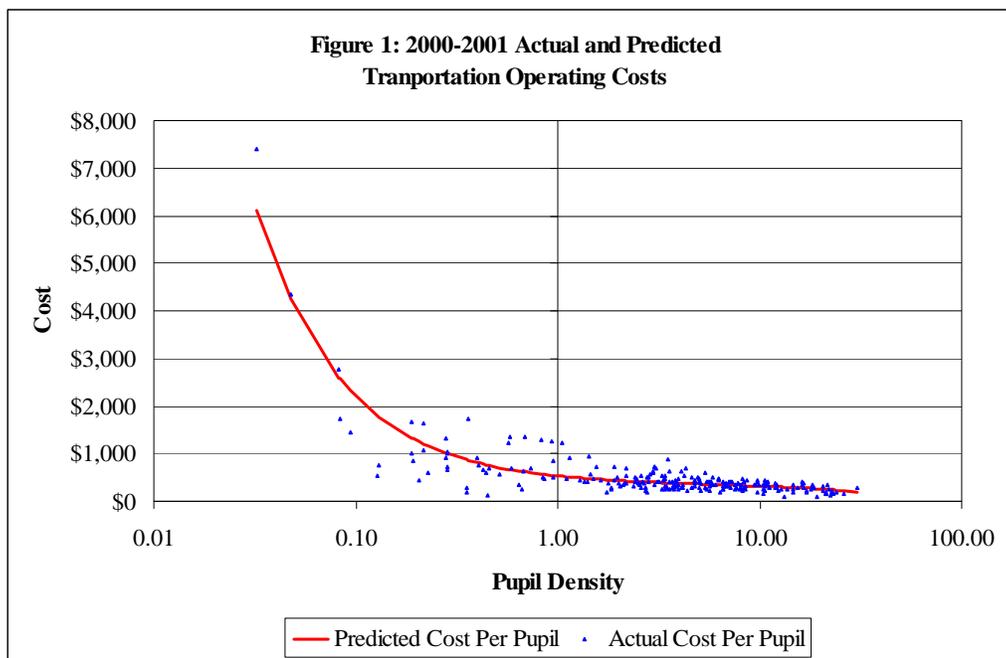
### ***Background***

Beginning 2005-06, Maine implemented a new school funding formula entitled the Essential Programs and Services (EPS). The Essential Programs and Services model is based on two fundamental premises. First, there must be adequate resources in each of Maine's school administrative units and schools to achieve desired outcomes. Second, there must be equity in the distribution of these adequate resources among Maine's school administrative units. Equity means similar school administrative units should be treated similarly in the school funding formula, and dissimilar school administrative units should be treated dissimilarly.

In the case of pupil transportation, and prior to 2005-06, Maine used an expenditure-reimbursement model for funding transportation costs. School administrative units annually submitted their transportation expenditure to the State, and the school administrative units were reimbursed for a portion of these expenditures based on an ability-to-pay formula.

An analysis of historical data revealed wide variations in reported transportation expenditures, even among Maine school administrative units with apparently similar cost-relevant characteristics (e.g., similar numbers of pupils, similar numbers of miles of road, similar numbers of miles traveled by school buses, etc). It was hypothesized that the differences in reported expenditures may be due to a combination of *controllable* (discretionary) and *uncontrollable* (non-discretionary) *cost drivers*; that is, cost factors *within the control of school administrative units* and cost factors *beyond school administrative unit control*. Controllable factors and the expenditures associated with them reflect local decisions, and consequently, in theory, the cost of these factors may be considered the responsibility of the local school administrative unit. However, uncontrollable factors should be the joint responsibility of the State and school administrative units, and thus accounted

for in the EPS funding formula. Accordingly, an analysis was undertaken of the relationship between key uncontrollable cost drivers and transportation expenditures. A variety of potential uncontrollable cost drivers were examined initially, but only two consistently surfaced from this analysis. The two key drivers were: (1) the number of resident pupils; and (2) the number of miles of road (class 1 – 5 roads). Using a statistical analysis procedure called multiple regression, the two uncontrollable cost drivers were found to be highly correlated with 2000-2001 and 2001-02 expenditures, and consequently highly predictive of transportation costs. The correlation between the two variables, the number of resident pupils and miles of road, and transportation expenditures was 0.91 (a perfect relationship is 1.00). Thus, Pupil Density (i.e., the number of pupils per mile of road) is very predictive of transportation costs. This makes sense intuitively, because students in sparsely populated rural SAUs generally live farther from school—and hence cost much more per pupil to transport—than pupils in densely populated urban SAUs. Figure 1 displays visually the relationship between actual and predicted costs.



Based on this analysis, a pupil density model, along with some adjustments was incorporated into the EPS funding formula. Thus, beginning

in 2005-06, SAU transportation cost allocations in the EPS formula were determined based on these factors:

- A pupil density index (i.e., number of resident pupils and number of class 1-5 road miles within SAU).
- Per-pupil transportation cost allocation based on lower of reported transportation expenditures +10% or predicted per pupil costs +10%.
- Per-pupil transportation cost allocation no lower than 75% of established costs of most recent fiscal year.
- Adjustments for:
  1. Out-of-district special education transportation
  2. Vocation education transportation
  3. Transportation of homeless pupils
  4. Ferry costs
  5. Island SAU costs

In approving the transportation component of EPS, the Joint Committee on Education and Cultural Affairs of the Maine State Legislature formally requested a review of a particular aspect of the approved cost component. Specifically, the committee requested the following:

*Review of the costs defined in Title 20-A, section 15681-A, subsection 3 as the costs pertain to school administrative districts or community school districts that have more than 1,250 resident pupils, in conjunction with other adjustments and funding increases provided by law to determine an appropriate level of funding for fiscal year 2006-07 in order for those districts to maintain their current level of transportation services. (PL05, c. 12 (LD468), Sec. UU-11)*

In addition, the committee informally requested that the Maine Education Policy Research Institute (MEPRI) review other features of the approved costs component. Based on these requests, MEPRI implemented a four phase review process. These four phases were:

1. The collection of additional transportation related information from SAUs.
2. An analysis of additional cost calculation models.

3. A review of the 10% adjustment to predicted and actual per pupil expenditures.
4. The identification of recommendations for any needed legislation.

## **Review**

The first phase in the review was to develop a process for collecting additional information from SAUs regarding their school transportation systems and costs. An ad hoc advisory group was used in this development process. More specifically, several steps were taken in this process. These included the following:

- A meeting was held with a group of superintendents, transportation directors, and business managers.
- A second meeting was held with a sample of transportation contractors.
- Based on input from these meetings, a SAU transportation survey form was designed, revised and finalized.
- The transportation survey was distributed to all SAUs with a deadline of February 10, 2006.

The intent was to analyze the survey responses once a majority of the surveys have been returned by SAUs. However, the initial survey response rate was only 54%. Accordingly, completion of phase one of the review had to be delayed until a larger representative sample of returns became available. This will be discussed in more detail later in this report.

A second phase of the review entailed conducting analyses of alternative transportation cost calculation models to the basic Pupil Density model. One series of analyses involved examining the flat rate models; models used in some other states. The analysis of these additional models revealed that none of the flat rate models corresponded well with the actual variance in SAU transportation costs. Consequently, it was concluded that none of the flat rate models were appropriate in Maine.

A second series of analyses were undertaken to calculate the empirical relationship between various other models and SAU transportation expenditures. These relationships are reported in Table 1. Recalling that a correlation of 1.00 would in this case represent a complete correspondence between the model and expenditures, and as may be seen from the table, the pupil density model remained the strongest model ( $r=.928$ ). The Odometer Miles Model also was strong ( $r=.903$ ), so a third model combining the two strongest models was calculated. This combined model (models 1 and 3 above) also yields a strong correspondence ( $r=.905$ ) between the model and SAU expenditures.

**Table 1**

<b>Model</b>	<b>Description</b>	<b>Correlation</b>
1. Odometer Miles Model	The gross cost per pupil conveyed for each SAU is predicted by the odometer miles traveled per pupil conveyed by each SAU.	.903
2. Cost Per Mile Traveled	The gross cost per odometer mile traveled for each SAU is predicted by the odometer miles traveled per pupil conveyed by the SAU.	.704
3. Pupil Density Model	The net cost per resident pupil for each SAU is predicted by the pupil density per mile of class 1 through class 5 road in the SAU.	.928
4. Combined Pupil Density and Odometer Miles Models	The average of the Pupil Density Model and the Odometer Miles Model.	.905

Based on these analyses, a revised method for calculating the EPS transportation component was recommended and adopted by the Legislature for 2006-07. This method of calculation was as follows:

1. Apply Density Model (3) or Combined Density and Odometer Model (4) to each SAU depending on whichever model is more beneficial to the SAU relative to most recent transportation expenditures.
2. Limit transportation cost allocation to no less than 90% of transportation expenditures for most recent year.
3. Incorporate modified vocational education adjustment into regulation.

The Legislature also requested that the SAU survey information (phase one of review) be analyzed, once more surveys were completed and returned, and any additional revisions, if needed, be recommended to the 123<sup>rd</sup> Legislature for implementation in 2007-08.

In accordance with this Legislative request, the commissioner of education requested a second time that superintendents complete and submit the transportation survey. By the new deadline of July 31, 2006, an additional 23 surveys had been returned, bringing the total returns to 165, which represented a total of 179 SAUs.

Based on the discussions with the ad hoc advisory group mentioned earlier, the analysis focused on the components of school transportation systems the group hypothesized may need to be revised because of their unique or uncontrollable features. These were: (1) mileage traveled returning from dead-end roads, the edge of districts, and other towns; (2) midday, late, and summer school buses; (3) driver compensation; and (4) fuel costs. If, as hypothesized, these features may be related to the variance between transportation expenditures and EPS cost allocations, then statistically significant moderate to high correlations should be found between the features and the expenditure-allocation variance. Table 2, on the next page, reports the correlations found in the analyses. As may be seen from the table, only one feature (bus driver compensation) correlated with transportation expenditure-allocation variance. All other correlations were not statistically significant, nor of any significant size.

In the case of driver pay, the correlation was statistically significant, but low ( $r=.221^*$ ). The correlation was positive indicating a direct relationship (i.e., as driver pay increases, variance between transportation expenditures and EPS cost allocation also increases). This makes intuitive sense. However, an examination of the raw data supplied on the survey from SAUs suggests the data is flawed. (e.g., benefits reported equal to 115% of driver pay; hourly pay ranges from \$8.75 - \$20.50). Accordingly, accurate data from SAUs are needed to determine if this feature is, in fact, related to transportation expenditures in

a way that is not accurately represented within the density and odometer models.

**Table 2: Correlations Between Transportation Expenditures and Transportation System Features**

<b>Transportation System Feature</b>	<b>Correlation to Expenditure-Allocation Variance</b>
1. Percent of miles retraveled returning down dead-end roads.	-.026
2. Percent of miles retraveled returning from edge of district.	-.114
3. Percent of miles retraveled going to another town.	-.064
4. Percent of regular run miles on midday buses.	.049
5. Percent of regular run miles on late buses.	0.11
6. Percent of regular run miles on summer school buses.	-.072
7. Total hourly bus driver compensation.	.221*
8. Gas price per gallon.	-.050
9. Diesel price per gallon.	.038

\* statistically significant <.05

In summary, the additional review of specific features that were hypothesized as being related to transportation expenditures, yield no empirical data supporting these hypotheses. Thus, no additional modifications to the calculation component of the 2006-07 EPS transportation formula are recommended at this time.