Highway Cost Allocation Study, 2007

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Prepared for the
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Study Scope

This report summarizes the results of the 2007 Highway Cost Allocation (HCA) study sponsored by the Idaho Transportation Department (ITD) and conducted by consultants Ken Casavant and Eric Jessup. This study follows two earlier, and more comprehensive, statewide HCA studies for the state of Idaho completed in 1994 and 2002 by consultants SYDEC, Inc., Cambridge Systematics, Inc. and R.D. Mingo and Associates. The earlier two studies, especially the 1994 HCA, were more comprehensive in the sense that much of the input data that drives the highway cost allocation analysis and the distributional assumptions related to vehicle miles traveled, revenue sources and highway expenditure information were more thoroughly developed and compiled from the Idaho Transportation Department sources. Due to the limited timeframe and constraints regarding data availability (primarily due to significant reporting systems changes at the ITD), many of these assumptions utilized in the earlier studies were also applied in this study.

The work tasks for this study included:

- Compile necessary data and information concerning Idaho revenue generation (from various user fee mechanisms) and cost expenditure data related to construction/maintenance of the state highways, roads and streets.

- Run/Implement the highway cost allocation program software, initially developed by Battelle Memorial Institute for the Federal Highway Administration.

- Report findings to the Idaho Transportation Department, Economics and Research Department.

- Provide instructional training for ITD Personnel within the Economics and Research Office to utilize the HCA software.

This report first begins with a general description of the HCA software and how the model operates. Then an explanation of the various data inputs utilized in this HCA study, for both revenue and expenditure information (provided by ITD) and the various assumptions regarding model parameters, is provided. The study results are then presented and discussed, followed by recommendations for future HCA studies and data generation from the state transportation department system reporting to help facilitate this process in future analyses.

State Highway Cost Allocation Software Description:

The HCA software utilized in this study was made available by the Idaho Transportation Department via compact disc titled, "State Highway Cost Allocation Study Tools – Final Version – August 2002." The HCA software consists of three Excel spreadsheets titled, CostAlloc_v02.xls, Rev&Tables_v02.xls and Def_Data_v02.xls. These spreadsheets are linked in various ways through several visual basic macros, with each spreadsheet containing multiple tabs where data is stored and calculations are performed.

As the spreadsheet titles suggest, the CostAlloc_v02 file is where the highway expenditure/cost information is store along with detailed information related to vehicle miles traveled by vehicle type and highway classification, pavement data, bridge data, registered gross weight distributions by vehicle class and highway type, axle weight distributions, etc. The Rev&Tables_v02 file is where the revenue information is stored, broken down by state, federal and local sources, by tax or registration fee type and by vehicle classification. This file is also where many of the output tables are defined and exported as various stages of the program are executed. The Def_Data_v02 file is where national default data is stored to be utilized by the program when individual state specific data is not available.

The itemized components for each file and a brief description of the information contained within each tab on the spreadsheets are provided in Tables 1, 2 and 3 below. The specific program macros required to execute the model are provide in Table 4. For a more complete description of this software and the components included, refer to the *"Guidelines for Conducting a State Highway Cost Allocation*

Table 1: Different Tabs Included in the CostAlloc_V02.xls File

Tab Names	Information
Table of Contents	Lists the components of the file.
BasicQuestions	Provides general information regarding different Cost Allocation Procedures.
1A Expenditures	Expenditure arrays by expenditure type, highway functional class, and level of government.
1H VMTControlData	VMT by vehicle configuration and highway functional class and VMT percentage breakdowns by RGW for each vehicle configuration.
2H AllocationFactors	Performs the allocation of highway expenditures to vehicle configurations and develops the registered gross weight to operating gross weight distributions.
3D CostResults	Basic cost responsibility results from output of Assign Costs program.
3E DetailedCostResults	Detailed costs results output of Assign Costs program used in Special Vehicle Analysis Spreadsheet.
4A PavementData	Pavement input data by functional class, pavement type, and type of distress.
4B BridgeData	Bridge input data by functional class, bridge type, and span length.
4C OGWDist	Operating Gross Weight distributions by highway functional class.
4D AxleWeightDist	Axle Weight Distributions by vehicle configuration and operating weight group.
4E RGWOGW	Seed value RGW percentile distributions and RGW-OGW distributions by vehicle configuration.
4F MiscCostData	Miscellaneous cost input data: includes fuel consumption rates and vehicle registration data.
4G MomentDist	Bridge increment distributions by vehicle configuration and operating weight.
4H LeftParameters	Load equivalency factors by state, functional class, pavement type, and distress type.
4J DistressShares	Distress shares by state, functional class, pavement type, and distress type.

Study Using the State HCA Tool", and the *"Documentation for Using the State HCAS Tool"* by the FHWA, Office of Transportation Policy Studies, 2000.

It is also useful to note that this software contains several program coding errors that have been identified from earlier attempts to conduct highway cost allocation studies at the state level. The most thorough and detailed listing of these program problems was provided by Bart Selle at the Vermont Agency of Transportation. These issues are provided in Appendix A of this report.

Table 2: Different Tabs Included in the Rev&Tables_V02.xls File

Tab Names	Information
Table of Contents	Lists the components of the file.
BasicQuestions	Provides general information regarding the different steps involved in a HCAS.
1B StateRevControls	Control totals for each state highway user revenue.
1C FedRevControls	Control totals for each Federal highway user revenue.
1D LocalRevControls	Control totals for each local highway user revenue.
1E RevenueData	User's selection of default data or user-supplied data for attribution of revenue to vehicle classes.
1F UserRevenueData	All data that the user prefers to use rather than the default data for revenue attribution.
1G DataCheck	Composite of user supplied data and default data for input to the revenue attribution program.
2A VehicleClassDef	User's selection of for different vehicle classes.
2B StateTaxRates	State tax rates to be analyzed.
2C FedTaxRates	Federal tax rates to be analyzed.
2D LocalTaxRates	Local tax rates to be analyzed.
2E DepreciationSched.	Default or user-specified depreciation schedule to use for ad valorem tax.
2F SubsidyAllocation	User's definition of tax subsidies and selection of method for allocation of tax subsidies.
2G TableSpec.	User's selection of formats for tables to be produced for results.
3A Tables	Summary of results in user-specified table formats.
3B RevenueResults	Detailed results of revenue attribution to vehicle classes.
3C SelectedCostResults	Results of cost allocation to vehicle classes and registered weights used in creating summary tables.

Table 3: Different Tabs Included in the Def_Data_V02.xls File

Tab Names	Information
DefaultRevenueData	National average default data for utilization if state specific data is unavailable.
StateData	Some limited average state data for various components (Average Miles by RGW, Out-of-state miles by RGW, Average Miles per gallon by RGW, etc.)

Table 4: Program Macros to Run for HCAS

Macro Name	Location (Tab)	Information
CalcRGOG	2H AllocationFactors	Calculates the registered gross weight to operating weight distributions.
AssignCosts	2H AllocationFactors	Executes the program to allocate highway expenditures to different vehicle configuration classes.
Create Data	1E RevenueData	Executes the program that generates data (from a combination of user supplied and default) to be utilized in the revenue attribution process.
Revenue Attribution	1B StateRevControls	Runs the revenue attribution process where revenue totals are distributed by vehicle class based on a variety of factors (tax rates, registration fees / weights/ depreciation, etc.)
Run Costs	3C SelectedCostResults	Final program that runs the cost allocation and produces the summary output tables as defined in 2G TableSpec.

Expenditure Data Inputs:

The data inputs required to run a "limited scale" highway cost allocation study, as in the case here, are still fairly large and includes information/analysis on a wide variety of factors and variables. A full scale highway cost allocation analysis, as indicated in the documentation of the software guidelines, may require several months to a year of preparatory data gathering and analysis before implementing the software.

One of the critical drivers of the HCA software is the information related to state expenditures and the process by which state program expenditure categories are mapped (converted) into the appropriate expenditure groups required by the HCA software. The HCA software requires that expenditures are separated by a variety of levels, including:

1. State, Local and Federal
   a. Construction and Maintenance
   b. Administration
   c. State/Federal-Aid for Construction and Maintenance
   d. State/Federal-Aid for Administration

2. Twelve Functional Highway Classifications
3. Twenty-seven Expenditure Types
   a. New flexible pavement, new rigid pavement, flexible pavement repair, rigid pavement repair, new bridge construction, bridge replacement, bridge repair, special bridge, grading and drainage, general construction, transit and rail, etc.

The mapping of state expenditures into the appropriate categories relied primarily on the program/construction category/functional highway classification mappings from the earlier two HCA studies conducted in 1994 and 2002. The proportion of expenditures that fall into each category and functional highway class is provided in Tables 5 and 6 below. However, some adjustments were made to program expenditure distributions to more appropriately reflect current conditions from ITD input. The total expenditures for 2006 were $735 million and are broken down by program category and level of government in Table 7. Forty-one percent of the total expenditures are attributed to the local level ($298 million), while the federal government accounts for 33% ($245 million), followed by the state government at 26% ($191 million).

Table 5: Construction Program Mapping, Adapted from Exhibit 23, HCA 1994

Construction Category	Percentage by Expenditure Category							
	New Pavment	Rehab. Pavment	New Bridge	Replacement Bridge	Bridge Repair	Grading	Other	Total
Interstate Maintenance	2%	54%	0%	11%	1%	3%	29%	100%
National Highway System	11%	31%	1%	4%	1%	26%	26%	100%
STP State	9%	36%	0%	11%	1%	26%	17%	100%
STP Local Rural	11%	35%	0%	13%	0%	35%	6%	100%
STP Local Urban	2%	17%	0%	6%	6%	14%	55%	100%
STP Safety	0%	14%	0%	0%	0%	5%	81%	100%
STP Enhancement	31%	0%	0%	0%	0%	9%	60%	100%
Congestion Mitigation and Air Quality	31%	0%	0%	0%	0%	9%	60%	100%
Bridge	6%	3%	0%	69%	1%	9%	12%	100%
Demonstration Projects	7%	66%	7%	0%	0%	12%	8%	100%
State Projects	5%	67%	0%	1%	6%	6%	15%	100%

Table 6: Expenditures Mapping Across Functional Highway Classes, Adapted from Exhibit 24, HCA 1994

Construction Category	Rural						Urban						
	I/S	OPA	Min. Art.	Maj. Coll.	Min. Coll.	Local	I/S	OPA	Min. Art.	Coll.	Local	Unknown	Total
Interstate Maintenance	48%	0%	0%	0%	0%	0%	42%	0%	0%	0%	0%	10%	100%
National Highway System	0%	65%	0%	0%	0%	0%	8%	20%	0%	0%	0%	7%	100%
STP State	0%	8%	34%	36%	0%	0%	0%	11%	11%	0%	0%	0%	100%
STP Local Rural	0%	0%	0%	48%	52%	0%	0%	0%	0%	0%	0%	0%	100%
STP Local Urban	0%	0%	0%	0%	0%	0%	0%	16%	64%	10%	0%	10%	100%
STP Safety	0%	2%	0%	15%	12%	0%	0%	18%	19%	15%	0%	19%	100%
STP Enhancement	49%	6%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	100%
Congestion Mitigation and Air Quality	49%	6%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	100%
Bridge	0%	45%	29%	18%	0%	0%	0%	0%	0%	0%	0%	8%	100%
Demonstration Projects	0%	0%	67%	0%	0%	0%	0%	0%	33%	0%	0%	0%	100%
State Projects	1%	39%	24%	21%	0%	0%	2%	12%	2%	0%	0%	0%	100%

Table 7: Expenditures by Level of Government and Construction Category, 2006.

Category	$ Thousands			
	State	Federal	Local	Total
Construction and Maintenance	$167,995	$245,794	$265,819	$679,608
Administration	$0	$0	$32,282	$32,282
State/Federal- Aid Construction and Maintenance	$23,197	$0	$0	$23,197
State/Federal-Aid Administration	$0	$0	$0	$0
Total	$191,193	$245,794	$298,102	$735,088

Revenue Data Inputs:

The information and data requirements related to state, federal and local revenues are concentrated in two primary categories for the HCA software. The first involves inputting tax *rate* information related to fuel taxes, registration fees (weight, weight-distance, ad valorem, etc.), vehicle sales tax, special permits, drivers license fees, etc. for each level of government (local, state and federal). For each government level, different rates may be applied to different classes of vehicles and truck weight categories and inputs are provided in the Rev&Tables_v03 spreadsheet on tabs 2B, 2C and 2D. The second category for inputting revenue information is for the control totals for each level of government (state, federal and local), within the tabs 1B, 1C and 1D on the same spreadsheet. The total dollar amounts are provided for each category, with the ability to differentiate between two vehicle classes (light and heavy vehicles), with the breakpoint between the two vehicle classes defined by the user (26,000 lbs. for this analysis).

No local tax rate information is included in this analysis, but state and federal taxes are applied at current levels for fuel taxes and vehicle sales. The controls totals for state, federal and local revenues were also provided by ITD and are presented in Table 8. The total highway user revenue for this analysis (year 2006) is $637.4 million, with 33% coming from state sources ($213.4 million), 47% from Federal sources ($297,200) and 20% from local sources ($126.8 million).

Table 8: Highway User Revenue, by Level of Government and Source, 2006.

Category	$ Thousands			
	State	Federal	Local	Total
Gasoline	$87,900			
Diesel and other	$39,200			
Registration Fees	$57,500			
Vehicle Sales/Title Fees	$24,500			
Other Permits	$3,000			
Drivers License Fees	$1,100			
Total	$213,400	$297,200	$126,800	$637,400

The vehicle miles traveled (VMT) for the state of Idaho by functional highway and vehicle classification were also provided by ITD. These values represent a weighted average over the past three years and are presented in Table 9 below, summarized by highway type.

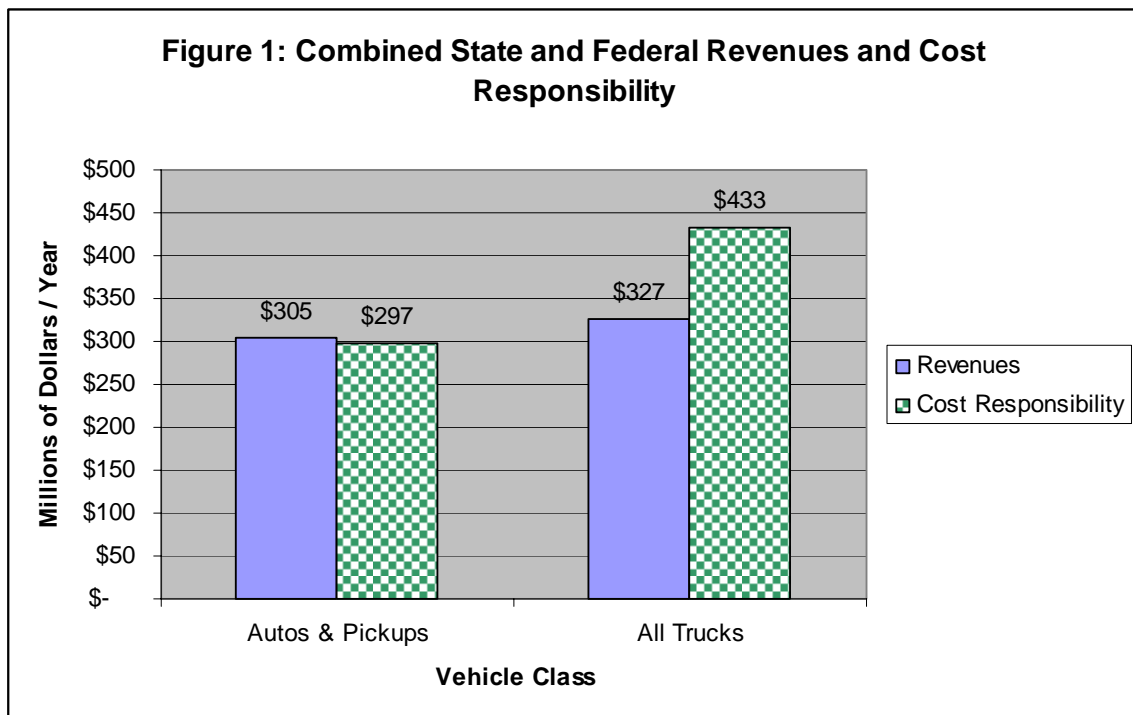**Table 9: Vehicle Miles Traveled, by Functional Highway Classification**

Functional Highway Classification	Vehicle Miles Traveled in Millions
Rural Interstate	2,159
Rural Princ. Art.	5,144
Rural Major Art.	1,074
Rural Major Coll.	1,212
Rural Minor Coll.	93
Rural Local	277
Urban Interstate	1,453
Urban OFE	17
Urban Princ. Art.	1,606
Urban Major Art.	1,640
Urban Coll.	588
Urban Local	14
Total	15,277

Highway Cost Allocation Results:

The results of the highway cost allocation study are presented below in Figures 1 and 2, and Tables 10 and 11. The earlier Idaho Highway Cost allocation Studies (both 1994 and 2002) did not include local revenues and expenditures or, if included, they were not reported separately. The results below include cost responsibility and revenue from local sources and are included in the state values reported below. The information is presented in this fashion, following the format of the earlier studies, to allow easier comparison/contrast to the earlier results.
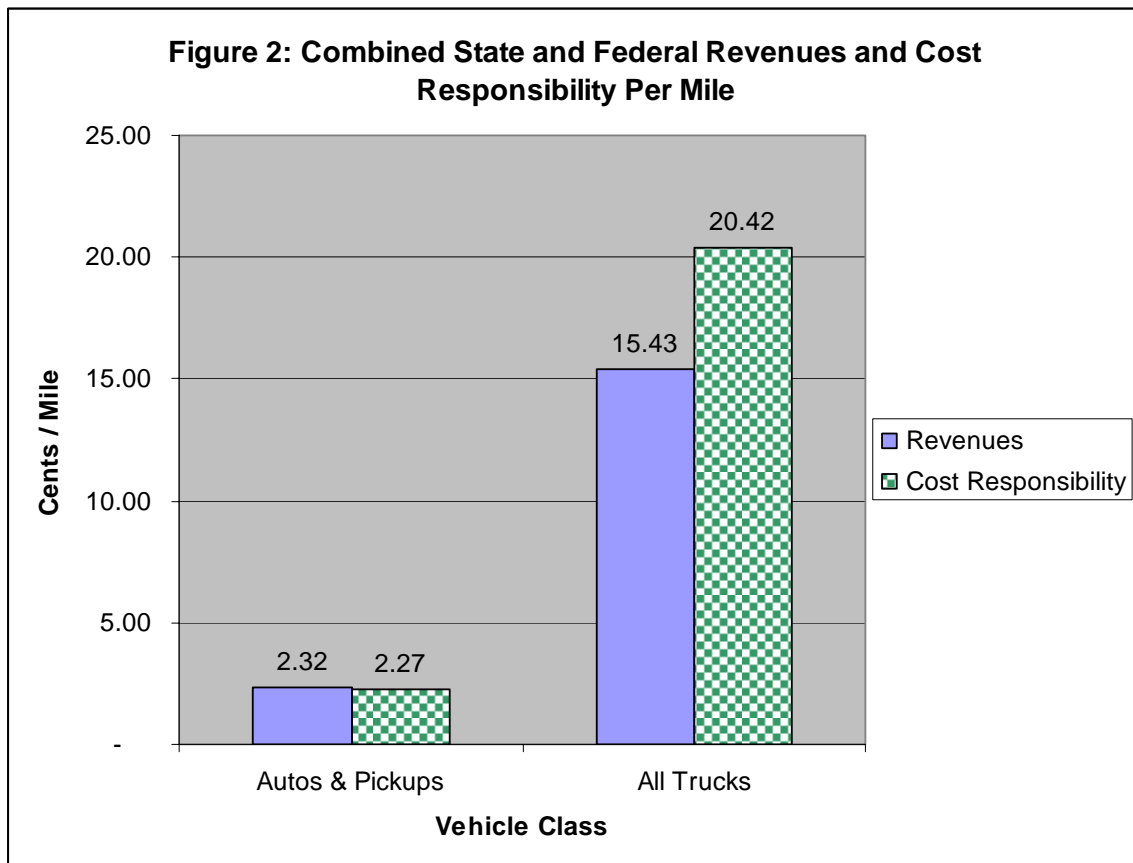
Separating the cost responsibility and revenues by vehicle class, autos and pickups pay slightly less than half the total revenues at $305 million. All trucks pay slightly more than half the total highway user revenue with $327 million, as illustrated in Figure 1. Combined, this represents $632 of the $637 million highway user revenue, with the difference being attributed to buses.

Figure 1: Combined State and Federal Revenues and Cost Responsibility

Highway cost responsibility for each of the different vehicle classes is also provided in Figure 1 and is only slightly below the revenue for autos and pickups at $297 million. However, cost responsibility for all trucks is significantly higher than user revenue for this vehicle class at $433 million. This represents a significant change since the 2002 highway cost allocation study where user revenue ($282 million) and cost responsibility ($333 million) for autos and pickups was more than half of that for all trucks user revenue ($223 million) and cost responsibility ($266 million).

If we consider the vehicle miles traveled for each of these vehicle classes and allocate the user revenue and cost responsibility based upon cents per mile, we see that the autos and pickups are fairly close to cost recovery. The cost responsibility for this category is 2.27 cents per mile while the user revenue generated for this class of vehicles is 2.32 cents per mile, as illustrated in Figure 2. This is fairly consistent with the 2002 highway cost allocation study, which produced values of 2.55 and 2.16 cents per mile for cost responsibility and revenue, respectively.

Figure 2: Combined State and Federal Revenues and Cost Responsibility Per Mile

All trucks are paying less than their cost responsibility, with user revenues from this vehicle class at 15.43 cents per mile compared with their cost responsibility of 20.42 cents per mile. This represents a difference of slightly less than 5 cents per mile or 20% of total cost responsibility. In the 2002 study the user revenue per mile was 8.44 cents per mile and the cost responsibility was 10.09 cents per mile for this class of vehicles. Thus, while collection of user revenue for all trucks has increased considerably (over 80%), cost responsibility for this class of vehicles has increased more (over 100%).

Evaluating the overall revenue and cost responsibility for all vehicles for state programs only, 70% of the cost responsibility is being covered, as provided in Table 10. When removing all federal revenues and expenditures, autos and pickups generate a revenue/cost ration of 0.64, whereas all trucks have a ratio of 0.72. Including all federal revenues and cost responsibility, autos and pickups produce an unadjusted ratio of 1.02 while all trucks have an unadjusted ratio of 0.76. The adjusted ratio for each of these classes is 1.12 for autos and pickups and 0.91 for all trucks. Stated slightly differently, autos and pickup users are overpaying about 10% while all trucks are underpaying about 10%.

Table 10: Revenue to Cost Responsibility Ratios for All State Programs and for State Plus Federal Programs Combined, 2006.

	Autos & Pickups	All Trucks	All Vehicles[1]
State Programs			
Revenue (millions)	127	210	340
Cost Responsibility (millions	197	289	489
Revenue / Cost Ratio	0.64	0.72	0.70
State Plus Federal Programs			
Revenue (millions)	305	327	637
Cost Responsibility (millions	297	433	735
Revenue / Cost Ratio	1.02	0.76	0.87
Adjusted Ratio	1.12	0.91	1.00
Revenue per mile (cents)	2.32	15.43	4.17
Cost Responsibility per mile (cents)	2.27	20.42	4.81

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[1] Includes buses.

Dividing the results into smaller vehicle class subsets reveals which users within each category pay more or less than their cost responsibility. The adjusted revenue to cost responsibility ratios are provided, segmented by autos, pickups, buses, single unit trucks and combination vehicles in Table 11, along with the outcomes from the 1994 and 2002 highway cost allocation studies. Users of autos and single unit trucks are paying more than their cost responsibility, with revenue to cost ratios of 1.21 and 1.31 respectively. Whereas owners of pickups are fairly close to cost recovery at 1.02. The ratio for buses seems somewhat large, but bus vehicle miles traveled represent less than 1% of the total for the state. The class of vehicles with the lowest revenue to cost responsibility ratio is combination trucks, paying about 80% of their cost responsibility.

The results of the 2006 HCA are fairly consistent with the earlier trends established from the 1994 and 2002 studies. The equity ratios for autos continued to increase, going from 0.84 in 1994 to 1.21 in 2006. The ratio for pickups has declined from 1.19 in 1994 to 1.02 in 2006. The equity ratio for combination vehicles has continued to decline, going from 0.99 in 1994, to 0.95 in 2002 and now at 0.81 in 2006.

Table 11: Revenue to Cost Responsibility Ratios for State Plus Federal Programs Combined, 1994, 2002, 2006.

	Adjusted Revenue-to-Cost Responsibility Ratios		
	1994	**2002**	**2006**
Vehicle Class			
Autos	0.84	0.94	1.21
Pickups	1.19	1.11	1.02
Buses	1.08	0.77	1.73
Single Unit Trucks	1.20	1.17	1.31
Combination Vehicles	0.99	0.95	0.81
All Vehicles	1.00	1.00	1.00

Suggestions for Future Analysis / HCA Studies:

The outcome of any highway cost allocation study is predicated on the quality, accuracy and validity of the inputs that feed into the HCA process. Given the shortened time constraint for this analysis, many of the assumptions and data required to implement the HCA software were carried forward from earlier studies. In many cases, these assumptions may no longer be valid or appropriate given changes in how highways are utilized or how state expenditures are allocated. In most cases, the difficulty in obtaining the information in the necessary format is related to how the Idaho Transportation Department is organized relative to the internal reporting systems related to highway construction expenditures and vehicle miles traveled. The Highway Cost Allocation software was first designed for the Federal Highway Administration and later modified to be implemented on a state level. The architecture of the model does not fit exactly with how Idaho reports information and data. For this analysis, information was collected from the Idaho Transportation Department and modified to fit the software requirements, often leading to initial difficulties in model outputs and results. The two areas that were most problematic involved truck vehicle classifications and functional highway classifications being different in the way they were tracked and reported in Idaho and what was required for the software. Since the software would not allow certain inputs and fields to be zero, re-distributions had to be performed for many inputs.

Given this conflict in how Idaho tracks and records information and what is required for the HCA software, there are two possible remedies. One remedy would be to alter the Idaho Transportation Department's reporting system to match that required by the HCA software. The other alternative is to alter the HCA software to match how Idaho reports revenues, expenditures, vehicle miles traveled and all other data inputs. The later is most likely the easier to address and wouldn't require much investment, with the appropriate technical staff and software programmers.

The primary areas where differences exist between ITD reporting and HCA Software:

- There are 12 functional highway classifications utilized by the software and Idaho tracks only 11.
- The software requires vehicle miles traveled broken into 20 vehicle classifications, Idaho's reporting is segmented into 11 or 12 (if you include buses). Since zeroes are not acceptable for successful software calculation, the 11 vehicle classifications must be reallocated into the 20 vehicle classes.
- Expenditures need to be tracked by functional highway classification (12) and construction type (new flexible pavement, new rigid pavement, flexible pavement repair, rigid pavement repair, new bridge construction, bridge replacement, bridge repair, special bridge, grading and drainage, general construction, transit and rail, etc) and by level of government (local, state, federal)
- Revenues also need to be tracked by source (fuel tax, registration fees, vehicle sales tax, weight-distance tax, permits, flat fees, license fees, mileage based permits, etc.) and level of government (local, state, federal).

Appendix A: Software Problems Identified by Bart Selle[2]

1. Directory location of the programs CostAlloc, Rev&Tables and DefaultData:

   The documentation recommends placing the HCAS software in the Excel default directory; however, users still might get an error if they open HCAS from the Excel most-recently-used-file list. One solution is to always <u>navigate</u> to the HCAS spreadsheet from Excel.

2. *Rev&Tables* file names in the *BasicQuestions* worksheet:

   Is there a reason why the user must change the file names in the *BasicQuestions* worksheet? Could the file names be synchronized with actual names on the FHWA CD? That would facilitate testing HCAS "out of the box".

3. *CostAlloc* state code in *2H AllocationFactorsState*:

   Six state-codes generate a Visual Basic "Run-time Error 13". Sydec fixed the problem for VT, but I believe the problem still exists for other states.

4. *Rev&Tables* Other Permits (Cell D22) in *1B StateRevControls* worksheet:

   The "light vehicle" Other Permits cell cannot be zero (Cell D22). A small value solves the problem.

5. *Rev&Tables* vehicle miles traveled information in *1F UserRevenueData* worksheet:

   Vermont collects VMT information on 12 vehicle classes. We do not allow large doubles or triples on Vermont highways; however, zeros for the DS7 vehicle type generates a visual basic error. The solution is to enter a small value such as 0.00001 for the DS7s.

6. *Rev&Tables* diesel tax rate in *2D LocalTaxRates* worksheet:

   The diesel tax rate value (cell C9) cannot be zero, or it will generate a visual basic error. A zero triggers an "N/A" entry in the tax evasion cells starting at C32. That alpha data causes a VB error in later calculations. The solution is to put in a very small number in cell C9.

7. *CostAlloc* traffic fatality information in the *4F MiscCostData* worksheet:

   HCAS does not seem to use the traffic fatality information. To test it, I entered large numbers in the thousands, but it had no effect on the result. If it is not needed, HCAS should not ask for it.

8. *Rev&Tables* state tax rates in *2B StateTaxRates* worksheet:

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[2] These software issues were provided by Bart Selle, with the Vermont Agency of Transportion.

It's not clear where the tax rate information is used. It seems to have no effect on the results. Revenue comes from the *1B StateRevControls* worksheet. It is not calculated from the tax rates.

9. *CostAlloc* operating gross weight in the *4C OGWDist* worksheet:

   We calculated operating-gross-weight-by-vehicle-type from Vermont WIM data, and replaced the default OGW table. If the weight ranges in the new table do not exactly match the default weight ranges, the user will get "Bad (vehicle type code)" warning messages when executing the *CalcRGOG* on the *2H AllocationFactors* worksheet. Although it is just a warning message, it would be helpful if it were documented.

10. "#REF" in *1F UserRevenueData* in *Rev&Tables*:

    The table starting at cell BR60 has "#REF" in all the cells. It doesn't seem to adversely affect anything, but it is a distraction.   You provided a fix for Vermont's version, but that fix should be put in the FHWA version, too.

11. *Rev&Tables* report options *in 2G TableSpec:*

    "Option 1" reports on 12 vehicle types, but it produces incorrect results on the cost side. The costs in Table 4 are shifted and have different values when compared to the correct costs in Table 3. Use "Option 2" for 20 vehicle types instead.

    "Option 5" and "Option 7" for operating-gross-weight reports do not allocate the correct expenditure amount. "Option 3" appears to work OK.

Other advice to a new HCAS user is:

- Run the system exactly as delivered by the FHWA to prove that it works in your environment.

- Run the system whenever anything changes. Frequently reconcile the revenue and costs reports to the source worksheets. Problems are much easier to track if you haven't changed much since the last successful execution.

- Be very careful when deleting or zeroing out cells. If you inadvertently hit a space key, subsequent programs might generate a visual basic error.   (A "space" and "delete" look the same.)

- Many options do not have a significant impact on the results. Determine how sensitive the results are before spending excessive time refining data.

- Run HCAS on the fastest processor available. It will consume 100% of the cycles when executing.