HIGHWAY COST ALLOCATION STUDY 2011-2013 BIENNIUM

Prepared for
Oregon Department of
Administrative Services,
Office of Economic Analysis

ECONorthwest
ECONOMICS • FINANCE • PLANNING

KOIN Center, Suite 1600
222 SW Columbia Street
Portland, Or 97201
503-222-6060
www.econw.com

with
R.D. Mingo & Associates,
Jack Faucett Associates,
HDR Engineering,
and Mark Ford

Highway Cost Allocation Study

2011-2013 Biennium

Summary of Major Findings

The 2011 Oregon Highway Cost Allocation Study finds that:

Light vehicles (those weighing 10,000 pounds or less) paying full fees should pay 65.5 percent of state highway user revenues, and heavy vehicles (those weighing more than 10,000 pounds) paying full fees should contribute 34.5 percent during the 2011-13 biennium.

For the 2011-13 biennium and under existing, current law tax rates, it is projected that full-fee-paying light vehicles will contribute 65.7 percent of state highway user revenues and full-fee-paying heavy vehicles, as a group, will contribute 34.3 percent.

The calculated equity ratios for full-fee-paying vehicles, defined as the ratio of projected payments to responsibilities for the vehicles in each class, are 0.9954 for light vehicles and 1.0089 for heavy vehicles as a group. This means that, under existing tax rates and fees, light vehicles are projected to underpay their responsibility by 0.5 percent. Heavy vehicles, as a group, are projected to overpay their responsibility by 0.9 percent during the next biennium.

The equity ratios for the individual heavy vehicle weight classes show some classes are projected to overpay and some to underpay their responsibility during the 2011-13 biennium. Chapter 7 of this report offers alternative fee schedules that would minimize this cross-subsidization of some heavy vehicle weight classes by others.

The reduced rates paid by certain types of vehicles, principally publicly owned and farm vehicles, mean these vehicles are paying lower per-mile charges than comparable vehicles subject to full fees. The difference between what these vehicles are projected to pay and what they would pay if subject to full fees represents a cost that is borne by all other highway users.

2011-13 Oregon Highway Cost Allocation Study

Study Team:

Carl Batten, ECONorthwest
Sarah Dammen, ECONorthwest
Randall Pozdena, ECONorthwest
Mark Ford, Mark Ford and Associates
Roger Mingo, RD Mingo & Associates
Brian Leshko, HDR
Mike Lawrence, Jack Faucett Associates
Jon Skolnik, Jack Faucett Associates

Study Review Team:

Doug Anderson, Metro
Doug Benzon, Idaho Transportation Department
Mazen Malik, Oregon Legislative Revenue Office
John Gallup, Portland State University
Tim Morgan, AAA Oregon
Don Negri, Willamette University
Jon Oshel, Association of Oregon Counties
Tom Potiowsky (Chair), Oregon Department of Administrative Services
Bob Russell, Oregon Trucking Associations
Jerri Bohard, Oregon Department of Transportation

Project Manager:

Brian Hedman, Cadmus Group

The study team received valuable assistance from John Merriss, Lani Pennington, Tessa Jantzi, Dan Porter, Dave Kavanaugh, Theresa Yih, Bert Hartman, Lea Ann Hart-Chambers, Stefan Hamlin, Richard Brock, Jennifer Campbell, John Coplantz, and Richard Munford at the Oregon Department of Transportation; Suzanne Schenk at the Oregon Department of Administrative Services; and Chris Monsere at Portland State University.

HCAS 2011 Report Contents

HCAS 2011 Report Exhibits

Chapter 3: General Methodology and Study Approach

Chapter 4: Study Data and Forecasts

Chapter 5: Expenditure Allocation and Revenue Attribution Results

Chapter 6: Comparison of Expenditures Allocated to Revenues Paid

Chapter 7: Recommendations for Changes in Tax Rates

Chapter 1

Introduction and Background

Cost responsibility is the principle that those who use the public roads should pay for them and, more specifically, that users should pay in proportion to the road costs for which they are responsible. Cost responsibility requires each category of highway users to contribute to highway revenues in proportion to the costs they impose on the highway system. Cost allocation is the process of apportioning the cost of highway work to the vehicles that impose those costs and is therefore necessary for the implementation of the cost responsibility policy of the State of Oregon.

For more than 70 years, Oregon has based the financing of its highways on the principle of cost responsibility. This tradition has served Oregon well by ensuring that the state's highway taxes and fees are levied in a fair and equitable manner. Periodic studies have been conducted to determine the "fair share" that each class of road users should pay for the maintenance, operation, and improvement of the state's highways, roads, and streets. Prior to the present study, 16 such studies had been completed; the first in 1937, the most recent in 2009.

Oregon voters ratified the principle of cost responsibility in the November 1999 special election by voting to add the following language to Article IX, Section 3a (3) of the Oregon Constitution:

"Revenues . . . that are generated by taxes or excises imposed by the state shall be generated in a manner that ensures that the share of revenues paid for the use of light vehicles, including cars, and the share of revenues paid for the use of heavy vehicles, including trucks, is fair and proportionate to the costs incurred for the highway system because of each class of vehicle. The Legislative Assembly shall provide for a biennial review and, if necessary, adjustment, of revenue sources to ensure fairness and proportionality."

Purpose of Study

The purpose of this 2011 Oregon Highway Cost Allocation Study (HCAS) is to

(1) determine the fair share that each class of road users should pay for the maintenance, operation, and improvement of Oregon's highways, roads, and streets; and

(2) recommend adjustments, if necessary, to existing tax rates and fees to bring about a closer match between payments and responsibilities for each vehicle class.

Past Oregon Highway Cost Allocation Studies

Oregon, more than any other state, has a long history of conducting highway cost allocation or responsibility studies and basing its system of road user taxation on the results of these studies. Studies were completed in 1937, 1947, 1963, 1974, 1980, 1984, 1986, 1990, 1992, 1994, 1999, 2001, 2003, 2005, 2007, and 2009. As noted above, the Oregon Constitution now requires that a study be conducted biennially and highway user tax rates adjusted, if necessary, to ensure fairness and proportionality between light and heavy vehicles.

Prior to 1999, Oregon used the term *cost responsibility studies*, whereas the federal government and most other states called their studies *cost allocation studies*. Oregon has now adopted the more conventional terminology, although the two terms are essentially equivalent and used interchangeably in this report.[1]

In this and all prior studies, highway users and other interested parties have been given the opportunity to offer their input in an open and objective process. During the 1986 Study, for example, three large public meetings were held to provide information on the study and solicit the input of all user groups.

As part of the 1994 Study process, a Policy Advisory Committee was formed to address several cost responsibility issues that arose during the 1993 legislative session. This committee consisted of 12 members, including a representative of AAA Oregon and five representatives of the trucking industry. The committee held six meetings devoted to understanding and recommending policies for the 1994 Study as well as future Oregon studies.

In 1996, the Oregon Department of Transportation (ODOT) formed the Cost Responsibility Blue Ribbon Committee to evaluate the principles and methods of the Oregon cost responsibility studies and, if warranted, recommend improvements to the existing methodology. This 11-member committee was chaired by the then Chairman of the Oregon Transportation Commission and included representatives of the trucking industry, AAA Oregon, local governments, academia, and Oregon business interests. The committee held a total of seven meetings and reached agreement on a number of recommendations for future studies. Because the trucking industry, in some cases, did not agree with the full committee recommendations, it was given the opportunity and elected to file a Minority Report that was included in the committee report.

All studies prior to 1999 were conducted by ODOT staff. In February 1998, the ODOT and Oregon Department of Administrative Services (DAS) Directors reached agreement to transfer responsibility for the study from ODOT to DAS. The 1999, 2001, 2005, 2007, and 2009 studies, as well as the current study, were conducted by consultants to the DAS Office of Economic Analysis. ODOT's role in these studies was to provide technical assistance and most of the data and other required information. In 2003, ODOT conducted the study using the model developed for the 2001 Study.

The Oregon studies prior to 1999 relied on an internal technical advisory committee to provide the expertise and some of the many data elements required for the studies. As noted, highway users and other interested parties were also provided the opportunity to offer their input as the studies were being conducted. For the 1999 and subsequent studies, DAS formed a Study Review Team (SRT) to provide overall direction for the studies. The SRT's role has been to provide policy guidance and advisory input on all study methods and issues.

The SRT for the 2001 Study consisted of ten members and the SRTs for the 2003 and 2005 studies had eight members. The SRT for the 2007, 2009 and the present study consisted of ten members. The composition of the SRTs has changed from study to study, but all have included motorist, trucking industry, and Oregon business representatives, academics, and state officials. All SRTs have been chaired by the State Economist. ODOT did not have a representative on the 1999 SRT but was represented in subsequent SRTs.

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[1] It should be noted that, to be precise, neither term is technically correct. Since all state studies, including Oregon's, have to this point allocated expenditures rather than actual costs imposed, they are really expenditure allocation studies.

Other Highway Cost Allocation Studies

Although Oregon has the longest history of conducting highway cost allocation studies, a number of other states have also conducted such studies, the majority of which have been completed over the past two decades. Since the first HCAS, 32 states have performed at least 87 cost allocation studies. Since the late 1970s, 30 states have conducted such studies.

The interest of other states in undertaking these studies has in many cases been sparked by the completion of similar studies by the federal government. Several states undertook studies following the release of the 1982 Federal HCAS. With the release of the 1997 Federal HCAS and the Federal Highway Administration's (FHWA) interest in helping states do their own studies, there has again been a renewed interest among the states. Upon completion of the 1997 Federal Study, FHWA formed a state representatives' Steering Committee to assist the states in adopting the research and methods employed in that study.

A 1996 Oregon Legislative Revenue Office report concluded that most of the differences in study results among states can be explained by differences in the types of expenditures that are allocated.[2] Oregon, for example, does not include state police expenditures in its studies because, since 1980, state police do not receive Highway Fund monies. California, on the other hand, includes large Highway Patrol expenditures in its studies. Since policing expenditures are typically viewed as a common responsibility of all highway users and are assigned to all vehicle classes on the basis of each class's relative travel, they are predominantly the responsibility of automobiles and other light vehicles. Therefore, it is not surprising that the California studies find a higher light and lower heavy vehicle responsibility share than the Oregon studies.

A review of state studies conducted in connection with the 1997 Federal Study found that those studies attempting to clearly allocate costs between light and heavy vehicle classes have commonly found heavy vehicles to be responsible for 30 to 40 percent of total highway expenditures. The past several Oregon studies have produced results in this range. Both the 1982 and 1997 Federal HCASs found trucks and other heavy vehicles to be responsible for 41 percent of federal highway expenditures.[3]

Oregon Road User Taxation

Oregon's constitutionally dedicated State Highway Fund derives most of its revenue from three major highway user taxes: vehicle registration fees, motor vehicle fuel taxes (primarily the gasoline tax), and motor carrier fees (primarily the weight-mile tax). The basis of each of these taxes is governed by the concept of cost responsibility. This three-tiered structure is used to collect a fair share of revenue from each highway user class.

Road user taxes were initially levied against motor vehicles to cover the cost of registration. A one-time fee of $3 was instituted in 1905. Because this proved to be a productive source of revenue, the state soon annualized the fee and began to increase the rates and use the proceeds to finance highways.

The registration fee is considered payment for the fixed or non-use related

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[2] "Oregon Cost Responsibility Studies Compared to Other States," Legislative Revenue Office Research Report #4-96, September 10, 1996.

[3] It should be noted, however, that the results of the federal studies are not directly comparable to those of state studies for two reasons: highway maintenance is largely a state-funded activity and thus is not included in the federal studies, and the heavy vehicle responsibility share is generally lower for most maintenance activities than for construction, particularly major rehabilitation projects. Therefore, the responsibility for federal expenditures will typically be more weighted toward heavy vehicles than is the case for state expenditures.

costs of providing a highway system. These costs include minimal maintenance of facilities and equipment along with certain administrative functions necessary to keep the system accessible. Since these costs account for a small portion of total highway costs, registration fees in Oregon have traditionally been low (for both cars and trucks) in comparison to the corresponding fees in most other states. From 1990 to 2003, the two-year registration fee for automobiles and other vehicles weighing 8,000 pounds or less was $30, and in 2004, it was increased to $54. It is currently $86 biennially.

The second tier in the Oregon system is the fuel tax. In 1919, Oregon became the first state in the nation to enact a fuel tax on gasoline. It was regarded as a "true" road user tax because those who used the roads more paid more. The fuel tax came to be viewed as the most appropriate means of collecting the travel-related share of costs for which cars and other light vehicles are responsible.

The state fuel tax was extended to diesel and other fuels in 1943. Since that time, the tax on diesel and other fuels, referred to as a "use fuel" tax, has been at the same rate per gallon as the tax on gasoline. On January 1, 2011, Oregon's fuel tax rate increased from $0.24 per gallon to $0.30 per gallon. The last time it was increased was in 1993.

The third tier in the Oregon highway finance system is the weight-mile tax. Oregon's first third-structure tax was put into effect in 1925 in the form of a ton-mile tax. It was used to cover the responsibility of the growing number of trucks and other heavy vehicles appearing on the public roadways at that time.

Oregon's first weight-mile tax was enacted in 1947 and implemented in 1948. The tax applies to all commercial motor vehicles with declared gross weights in excess of 26,000 pounds. It is based on the declared weight of the vehicle and the distance it travels in Oregon. The weight-mile tax is a use tax that takes the place of the fuel tax on heavy vehicles. Vehicles subject to the weight-mile tax are not subject to the state fuel tax.

The Oregon weight-mile tax system consists of a set of schedules and alternate flat fee rates. There are separate schedules for vehicles with declared weights of 26,001 to 80,000 pounds and those over 80,000 pounds. Additionally, log, sand and gravel, and wood chip haulers have the option to pay flat monthly fees in lieu of the mileage tax.

Since 1990, carriers hauling divisible-load commodities at gross weights between 80,001 and 105,500 pounds pay a weight-mile tax (statutory Table B) based on the vehicle's declared weight and number of axles. There are separate schedules for five, six, seven, eight, and nine or more axle vehicles, with each schedule graduated by declared weight. The rates are structured so that, at any declared weight, carriers can qualify for a lower per-mile rate by utilizing additional axles.

Also since 1990, carriers hauling non-divisible loads at gross weights in excess of 98,000 pounds under special, single-trip permits pay a per-mile road use assessment fee. Non-divisible (or "heavy haul") permits are issued for the transportation of very heavy loads that cannot be broken apart, such as construction equipment, bridge beams, and electrical transformers.

The road use assessment fees are expressed in terms of permit gross weight and number of axles and are currently based on a charge of 7.1 cents per equivalent single axle load (ESAL[4]) mile of travel. As with the Table B rates, carriers are assessed a lower per-mile charge the greater the number of axles used at any given gross weight. The road use assessment fee takes the place of the weight-mile tax for the loaded, front-haul portion of non-divisible load trips. With rare exceptions, empty back haul miles continue to be subject to the weight-mile

[4] An ESAL is equivalent to a single axle carrying 18,000 pounds (80kN).

tax and taxed at the vehicle's regular declared weight.

In the years since 1947, the weight-mile rates have been adjusted 15 times based on the results of updated cost responsibility studies or the passage of transportation funding packages. The most recent revision occurred on October 1, 2010, when weight-mile rates increased by an average of 24.5 percent as a result of the 2009 Jobs and Transportation Act (JTA). Prior to the 2009 JTA rate increase, the last increase occurred on January 1, 2004, when the 2003 Legislature increased weight-mile rates by approximately 9.9 percent when enacting OTIA-3. On September 1, 2000, rates were reduced across the board by approximately 12.3 percent to reflect the results of the 1999 Study. The rates were also reduced by 6.2 percent on January 1, 1996, based on the results of the 1994 Study. Before then, rates were increased on January 1, 1992, to maintain equivalency with the fuel tax increases enacted by the 1991 Legislature.

The 1999 Oregon Legislature repealed the weight-mile tax and replaced it with a 29 cent per gallon diesel fuel tax and substantially higher heavy truck registration fees. This measure, House Bill 2082, was subsequently referred to the voters and defeated in the May 2000 primary election.

After the May 2000 vote, the trucking industry challenged the Oregon tax in the courts. The primary focus of the legal action was the feature that allows haulers of logs, sand and gravel, and wood chips to pay alternate flat fees in lieu of the mileage tax. The industry argued that these fees are, from a practical standpoint, available only to Oregon intrastate motor carriers, and this provision of the Oregon system therefore unfairly discriminates against non-Oregon based interstate firms. In February 2002, the Third District Circuit Court ruled in favor of the State in the lawsuit. The ruling was reversed in the Court of Appeals in 2003. The Oregon Supreme Court affirmed the original Circuit Court decision in December 2005.

Organization of this Report

This volume of the 2011 Study provides an overview of the study issues, methodology, and results, as well as recommendations for future studies. There are a number of exhibits throughout this report to illustrate specific data. Please note that amounts shown are rounded and may not total exactly.

This chapter has provided an introductory discussion of the purpose, scope, and process of the 2011 Study as well as a brief background discussion of the history of Oregon highway cost allocation studies, studies by the federal government and other states, and the evolution of Oregon road user taxation.

Chapter 2 briefly summarizes the basic structure and parameters of the 2011 Study ,including the analysis periods, road (highway) systems, vehicle classes, revenues attributed, and expenditures allocated to the vehicle classes.

Chapter 3 presents the general methodology and approach used for the study. It includes a description of the special analyses conducted for the study and discussion of the major methodological and procedural changes from previous Oregon studies.

Chapter 4 summarizes the data and forecasts used in the study and compares them to the data and forecasts used in recent studies.

Chapter 5 presents the study expenditure allocation and revenue attribution procedures and results, and compares the methods and results to those of previous Oregon studies.

Chapter 6 brings together the expenditure allocation and revenue attribution results from the previous chapter to develop ratios of projected payments to cost responsibilities for light vehicles and the detailed heavy vehicle weight classes. It also compares these ratios with those from the two prior Oregon studies.

Chapter 7 contains recommendations for

changes in existing tax rates and fees to bring about a closer match between revenues contributed and cost responsibilities for each vehicle class.

The appendices to this report include:

A. Glossary of terms

B. Issue papers developed for this study

C. The agenda and minutes of each SRT meeting

D. User guide

E. Model documentation

F. 2011 data and assumptions

Chapter 2

Basic Structure and Parameters of Study

The underlying approach and methods used in this traditional highway cost allocation study are, with a few significant exceptions, similar to those used in the last four Oregon studies. The analytic framework and basic parameters of the 2011 Study are briefly summarized below.

Study Approach and General Methodology

This study uses the cost-occasioned approach, employing an incremental, design-based allocation methodology for bridges and the recently updated, 2010 version of the National Pavement Cost Model (NAPCOM) for pavement costs. This is the same general approach that was used in previous Oregon studies and virtually all studies conducted by the federal government and other states.

Analysis Periods

Base Year: Calendar Year 2009, the most recent full year for which data were available when the study was undertaken (2010).

Forecast Year: Calendar Year 2012, the middle 12 months of the 24-month study period.

Study Period: The 2011-13 State Fiscal Biennium, or July 1, 2011 to June 30, 2013.

The expenditures allocated are those projected for the 2011-13 biennium using ODOT's Cash Flow Forecast model. All traffic data used in the study were first developed from data for the 2009 base year, and then projected forward to the 2012 forecast year using weight-class-specific growth rates.

Road (Highway) Systems

This study uses the Federal Highway Administration's classification system for highway functional classes. Every public road in Oregon is assigned to one of 12 functional classes:

1. Rural Interstate
2. Rural Other Principal Arterial
3. Rural Minor Arterial
4. Rural Major Collector
5. Rural Minor Collector
6. Rural Local
7. Urban Interstate
8. Urban Other Freeway
9. Urban Other Principal Arterial
10. Urban Minor Arterial
11. Urban Collector
12. Urban Local

Each roadway segment is also assigned to one of four ownership categories: state, county, city, or federal. Note that U.S. Highways and Interstates are owned by the state; federal ownership consists mostly of Forest Service and Bureau of Land Management roads.

In addition to the 12 federal functional classes, we developed three other categories to facilitate the allocation of costs for projects on multiple functional classes or where the functional class was not known. The additional categories are: all roads, all state-owned roads, and all locally owned roads.

Vehicle Classes

Light, or basic, vehicles include all vehicles up to 10,000 pounds gross weight, consistent with Oregon law and registration fee schedules. In previous studies, light vehicles were defined as all vehicles up to 8,000 pounds.

Vehicles weighing more than 10,000 pounds are divided into 2,000-pound vehicle classes. All vehicles over 200,000 pounds are in the top weight class. Those over 80,000 pounds are further divided into subclasses based on the number of axles on the vehicle. The five subclasses are five, six, seven, eight, and nine or more axles.

Vehicles over 26,000 pounds are assigned to weight classes based on their declared weight, which may be different from their registered gross weight. For example, a given tractor may operate with different configurations (number and type of trailers) at different times, and may have different declared weights for different configurations.

For modeling purposes, each weight class under 80,000 pounds is assigned a distribution of numbers of axles, and each combination of weight class and number of axles is assigned a distribution of operating weights. For vehicles over 26,000 pounds, these distributions are obtained from Weigh-In-Motion data, data collected by ODOT and supplied by Portland State University, and Special Weighings data supplied by ODOT.[1]

For reporting purposes, the expenditure allocation and revenue attribution results reported in Chapters 5 and 6 are presented in terms of the following seven summary-level vehicle weight groups:

1 to 10,000 pounds
10,001 to 26,000 pounds
26,001 to 78,000 pounds
78,001 to 80,000 pounds
80,001 to 104,000 pounds
104,001 to 105,500 pounds
105,501 pounds and up

In this study, as in the 2007 and 2009 studies, weight classes between 26,001 and 78,000 pounds have been combined into a single group. The only other variation from the groupings used in the 2001, 2003, and 2005 Oregon studies is an increase in the upper weight limit for the lightest weight class from 8,000 to 10,000 pounds. One- to 8,000-pound vehicles accounted for 92.2 percent of vehicle miles traveled in Oregon in 2005; one- to 10,000-pound vehicles accounted for 92.5 percent.

The various weight classes were selected on the basis of the characteristics of the vehicles in each group, logical divisions in the tax structure, and the number of vehicles and miles in each group. Operators of vehicles in the 10,001 to 26,000 pound group, for example, pay the state fuel tax and higher registration fees rather than the weight-mile tax. Additionally, a large majority of these vehicles are two-axle, single-unit trucks or buses used in local commercial delivery operations or passenger transport. Thus, they have relatively similar characteristics with respect to their cost responsibility and tax payments, and it is therefore logical to combine them for reporting purposes.

Similarly, it makes sense to combine the individual weight classes above 105,500 pounds because these vehicles are (a) operated under special, single-trip, non-divisible load permits, (b) operated with multiple axles and legally allowed higher axle weights than regular commercial trucks, (c) subject to the road use assessment fee rather than the weight-mile tax for their loaded front haul miles, and (d) typically used for short-mileage hauls (e.g., transporting heavy equipment from one construction site to another) and so account for a very small proportion of total truck miles in the state.

[1] During a special weighing, every truck passing the weigh station is weighed and the weight recorded, even if the truck is empty.

The weight classes of 78,001 to 80,000 and 104,001 to 105,500 pounds are by far the largest two truck classes by miles of travel. These two classes alone account for a majority of the total commercial truck miles in Oregon. Because of the dominant role of these two classes in terms of miles of travel, cost responsibilities, and revenue contributions, it is logical they be kept as separate groups.

Expenditures Allocated

State Expenditures

All state expenditures of highway user fee revenues are allocated, as are all state expenditures of federal highway funds (e.g., matching funds). Federal funds are included because they are interchangeable with state user fee revenues. Any differences in the way they are spent are arbitrary and subject to change.

State expenditures of bond revenues are included because the bonds are repaid from state user fees. Such expenditures are, however, reduced to the amount that will be repaid in the study period before these expenditures are allocated. The remaining expenditures will be included in future studies using the allocation to vehicle classes applied in this study, consistent with the approach taken in the 2005, 2007, and 2009 studies. Thus, expenditures of bond revenues in the last study will be included in this and the next eight studies.

Local Government Expenditures

The study allocates all expenditures by local governments of state highway user fees and federal highway funds. Federal funds are included because, again, they are interchangeable with state user fee revenues.

Some local-government own-source revenues are allocated because they are interchangeable with state highway user fees. The study excludes local-government own-source revenues reported as coming from locally issued bonds, property taxes (including local improvement districts), systems development charges, and traffic impact fees. These revenue sources generally must be spent on certain projects or certain types of projects and are not considered interchangeable with state highway user fees.

In studies prior to 2003, only the expenditures of state highway user fee revenues were allocated. This approach failed to account for the interchangeability of funds from other sources and required local governments to estimate how state funds were spent because their accounting systems do not track expenditures by funding source.

In the 2003 Study, all expenditures by local governments were allocated. The 2005 Study refined the approach taken in the 2003 Study by excluding certain categories of own-source revenue that generally are not interchangeable. This approach was also used in the 2007 and 2009 studies.

Expenditure Categories

The four major expenditure categories are:

Modernization (new construction or reconstruction). Examples include adding lanes and straightening curves. Modernization generally adds to the capacity of a roadway either directly or by improving the throughput of a facility. A replacement bridge with more lanes than the bridge it replaces is considered modernization.

Preservation (rehabilitation). Most preservation projects involve repaving existing roads. Preservation projects extend the useful life of a facility but generally do not add to its capacity. A replacement bridge that does not add capacity is considered preservation.

Maintenance and Operations. Examples of maintenance include pothole patching, pavement striping, snow and ice removal, and bridge maintenance. Examples of operations include traffic signals and signage.

Administration, Collection, Planning, and Other Costs (everything else).

Within each of these major categories, expenditures are further broken down into a number of individual work types. Maintenance and Operations, for example, includes 16 individual work types. A separate allocation is performed for the expenditures in each individual work type. Chapter 3 contains a full listing of these work categories and the allocators used for each.

Revenues Attributed

The revenues attributed to vehicles are based on forecast collections for the 2011-13 biennium by major state revenue source under the existing tax structure and current-law tax rates (i.e., current registration and title fees, 30 cent per gallon fuel tax rate, current weight-mile tax, flat fee, and road use assessment fee rates).

Because non-state funding sources are included among the expenditures allocated, the dollar amount of revenues allocated is considerably smaller than the dollar amount of expenditures allocated. This difference in absolute size does not, however, affect the calculation of equity ratios, which are ratios of ratios (each vehicle class's share of attributed revenues divided by its share of allocated expenditures).

Chapter 3

General Methodology and Study Approach

This chapter presents the general methodology and approach used in the 2011 Oregon Highway Cost Allocation Study.

Cost-Occasioned Approach

All Oregon highway cost allocation studies, as well as the studies conducted by the federal government and most other states, use what is called the cost-occasioned approach. The basic premise of this approach is that each class of road user should pay for the system of roads in proportion to the costs associated with road use by that class. The equity of a road tax system may then be judged by how well shares of payments by different classes of road users match their shares of costs resulting from their use of the road system.

The principal alternative to the cost-occasioned approach is the benefits approach, in which an attempt is made to identify and measure the benefits received by both users and nonusers of the system. The benefits approach begins with the recognition that the purpose of a highway system is to provide benefits, both directly to highway users and indirectly to the rest of society. Basing user fees on the value of benefits received, rather than on the costs imposed, would promote both fairness (people pay in proportion to the value they receive) and efficiency (agencies would have less incentive to build facilities where the costs exceed the benefits). The benefits approach has two major drawbacks: benefits are not directly measurable, and the benefits associated with traveling a mile on a given road can vary greatly between identical-appearing vehicles or individuals and for the same vehicle or person at different times.

A long-running debate about the proper balance of cost responsibility and tax burden between highway users and nonusers continues at both the state and federal levels, fueled over the years by numerous studies. Arguments that support charging nonusers for highways are based on the societal benefits attributable to the highway system, including increased mobility, safety, and economic development. There are, however, some serious conceptual problems in quantifying benefits and deciding which accrue to users and which accrue to nonusers. In many cases, highway improvements benefit individuals or businesses simultaneously as both users and nonusers. Additionally, the more readily understood economic impacts of highway improvements often reflect a transfer of user benefits to nonusers—the clearest example being reduced shipping costs, which are passed to businesses and consumers in the form of lower product prices.

Because of these problems, and because of the inherent advantages of user fees in promoting an economically efficient allocation of scarce resources, the federal government and most states conducting cost allocation studies now rely on a cost-occasioned approach to determine responsibility for highways. The Oregon studies continue to use a cost-occasioned approach.

Incremental Method

Within the cost-occasioned approach, different methods may be used to allocate costs or expenditures to the various vehicle classes. Virtually every recent study, including Oregon's, has used some version of what is referred to as the incremental method. This method divides selected aspects of highway costs into increments, allocating the costs of successive increments to only those vehicles needing the higher cost increment. The design considered adequate for light vehicles only is viewed as a common responsibility of all highway users and is shared by all vehicle classes. Each group of successively larger and heavier vehicles also shares in the incremental costs they occasion.

In Oregon, the incremental method is used directly in the allocation of bridge costs. The first increment for a new bridge, for example, identifies the cost of building the bridge to support its own weight, withstand other non-load-related stresses (e.g., stream flow, high winds, and potential seismic forces), and carry light vehicle traffic only.[1] This cost is a common responsibility of all vehicles and is assigned to all classes on the basis of each class's share of total vehicle miles traveled (VMT). The second increment identifies the additional cost of building the bridge to accommodate trucks and other heavy vehicles weighing up to 50,000 pounds. This cost is assigned to all vehicles with gross weights exceeding 10,000 pounds on the basis of the relative VMT of each class over 10,000 pounds. Similarly, the additional cost of the third increment is assigned to all vehicles with gross weights over 50,000 pounds, and the cost of the fourth and final increment to vehicles having gross weights over 80,000 pounds.

National Pavement Cost Model (NAPCOM)

In the past, highway cost allocation studies typically used an incremental methodology to allocate pavement costs as well. Increased depth and strength of pavement surface and base is required to support increases in the number, and particularly weight, of the vehicles anticipated to use the pavement during its design life.

For the 1997 federal study, Roger Mingo adapted the National Pavement Cost Model (NAPCOM) for use in highway cost allocation. The model had two increments: non-load-related costs and load-related costs, with the load-related costs allocated using results from detailed engineering models of several different pavement degradation mechanisms that take into account the effects of climate, traffic levels, mix of vehicle types, and the interactions between different mechanisms. Mingo adapted the pavement model to use Oregon's special weighings data[2] and to use 2,000-pound increments of declared vehicle weight for data input and results reporting. The allocation of costs in the second increment used the detailed results of the Oregon-specific pavement cost model, which provides allocation factors by weight class and number of axles for each combination of functional class and

[1] The factors influencing the design requirements, and therefore costs, of bridges, are sometimes expressed by the terms *dead load*, *live load*, and *total load*. Bridges need to be designed to support their own weight and the other non-load-related forces such as stream flow, wind, and seismic forces (the dead load) plus the traffic loadings anticipated to be applied to the bridge (the live load). The total design load is the sum of the dead and live loads. Although the precise relationships differ by the type and location of the bridge under consideration, as a general rule, the longer the span length, the greater the relative importance of the non-load-related factors in determining the total cost of the bridge.

[2] Special weighings record the weight of every truck passing the scale, even if empty. Weights are reported for each axle grouping, along with the number of axles in the group. This data replaces the more generalized assumed distributions of operating weight and vehicle configurations used in the national model.

pavement type (flexible or rigid).

A new version of NAPCOM was completed in 2010. This version of the model is different from the earlier versions in several ways, though the fundamental idea of incremental allocation of non-load-related and load-related costs is the same. Among the main differences in the newest version of NAPCOM are the new pavement distress models and equations for load-related costs, which have been updated to reflect the current accepted pavement damage models and theories. Load-related costs are allocated using results from newer detailed, empirical engineering models that have been calibrated to pavement distress data.

The new 2010 NAPCOM model was used to develop the pavement factors for the 2011 Oregon Study. Similar to the development of pavement factors for past studies, pavement factors were developed by 2,000-pound increments of declared vehicle weight. In addition to the use of Oregon's special weighings data, weigh-in-motion (WIM) data were also used to construct a distribution of operating to declared weight. The 2011 Oregon Highway Cost Allocation Study is the first study to use the new version of NAPCOM to generate pavement factors for highway cost allocation.

The Choice of Appropriate Cost Allocators

Some quantifiable measure, or allocator, must be used to distribute each category of cost, or each increment within a category where the incremental approach is used, to the individual vehicle classes. For many costs, there are logical relationships that suggest a particular allocator as most appropriate.

Wear-related costs are the easiest to allocate. Wear-related costs are a direct, empirically established consequence of use by vehicles. The amount of wear a vehicle imposes per mile of travel generally relates closely to measurable attributes of the vehicle. Two approaches may be used for choosing allocators for wear-related costs.

Results from a detailed model that predicts costs imposed by individual vehicles may be used to develop allocation factors that produce the same attribution of costs as the model. That is how pavement costs are handled in this study.

If a detailed model for attributing wear-related costs does not exist, one may choose allocation factors that one expects to vary in proportion to the wear imposed per unit of use by the vehicles in each category. For example, striping costs are allocated according to axle-miles of travel because it is expected that stripes wear in proportion to the number of axles that pass over them.

Capital costs do not vary with the amount of actual use that occurs on a new facility once built. Conceptually, the decision to add capacity is an investment decision that the user benefits of the enhancement exceed its costs. This, in turn, is usually related to congestion levels on existing facilities, as relief of this congestion is the primary basis for additional user benefits. Hence, the share of efficient fees (which measure the contribution of a vehicle class to existing congestion), whether or not they are actually charged, is the appropriate allocator for capital costs expended to relieve that congestion; in this way, those vehicles responsible for the current congestion "problem" are appropriately charged for its "solution."

For structures and, to a lesser extent, roadways, the cost of constructing a facility with a given capacity will vary with the maximum weight and size of vehicle expected to use it. Part of the difference in construction cost, however, may be offset by increased useful life of a sturdier facility. If one attributes capital costs based on differences in the size or strength of the structure required to accommodate different types of vehicle, then the incremental approach may be used. The incremental approach, by itself, does not account for the capacity demand that drove the decision to build the facility. The incremental approach may be modified to take into account the expected effects of structure design on useful life, as was done in the allocation of bridge costs in recent Oregon studies.

All other approaches to capital-cost allocation are theoretically arbitrary and thus inherently second best. However, other approaches may be selected because of their convenience, despite the lack of a compelling underlying logic. One such second-best approach to allocating capacity-enhancing capital costs was used in the two most recent Oregon studies. The non-wear-related portion of capital costs were allocated in proportion to passenger-car-equivalent vehicle-miles traveled during the peak hour (peak PCE-VMT), which varies in proportion to each vehicle's contribution to congestion on existing facilities, but does not take into account the relationship between volume and capacity on existing facilities. The approach also assumes that the value of time is equal across all vehicle types, trip types, and vehicle occupancies.

If the benefits resulting from a given expenditure vary with vehicle use, the cost may be allocated in proportion to the level of benefit. For example, if the occupants of every vehicle passing a safety improvement benefit from reduced risk of death or injury, the cost could be attributed on the basis of occupant-miles traveled or, if occupancy is assumed to be the same across all vehicles, vehicle-miles traveled. Other costs may not vary at all with vehicle use but must still be allocated to vehicles. If one attributes costs that do not vary with use, any allocator that seems "fair" may be chosen. In these cases, there is no single right allocator to use.

In general, an allocator that varies more closely with costs imposed should be selected over one that varies less closely. The degree of correlation may be measurable given sufficient data, but the necessary data usually do not exist, so one must calculate the expected relationship based on engineering and economic theory. A strong statistical correlation does not necessarily indicate a good allocator, as there is no reason to believe that an accidental correlation will persist. An allocator must also vary with measurable (and measured) attributes of vehicles, such as miles traveled, weight, length, number of axles, or some combination of those.

Allocators Used in This Study

As noted above, there are a number of cost allocators available for use in a cost allocation study. Allocators may be applied on either a per-vehicle or per-vehicle-mile-traveled basis. Because it is generally vehicle use, rather than the existence of vehicles, that imposes costs on the highway system, all costs in the current Oregon study are allocated using some type of weighted vehicle-miles traveled (VMT). Exhibit 3-1 shows the allocators applied to each expenditure category for this study.

Unweighted VMT are the most general measure of system use and are considered a fair way to assign many types of common costs, that is, costs considered to be the joint responsibility of all highway users. VMT represent a reasonable and accepted measure to assign costs among the members of a subgroup (e.g., the individual vehicle classes within a cost increment), especially when members of the subgroup have similar characteristics or when an investment is made to provide a safer highway facility. Unweighted VMT are used for many traffic-oriented services, such as the provision of lighting, signs, and traffic signals, since these services are generally related to traffic volumes.

Weighting VMT with an appropriate vector of zeros and ones will produce an allocator that restricts the allocation to a corresponding subset of weight classes. Such allocators are used to implement the incremental approach for bridge costs and for other costs allocated on VMT for a subset of all vehicles. One example is the allocation of Motor Carrier Transportation Division administrative costs only to vehicles over 26,000 pounds.

Other VMT weighting factors may also be used to allocate certain costs more

Exhibit 3-1: Allocators Applied to Each Expenditure Category

Work Type	Work Type Description	Allocator 1	Share 1	Allocator 2	Share 2
1	Preliminary and Construction Engineering (and etc.)	Congested PCE	55.9%	Other Construction	44.1%
2	Right of Way (and Utilities)	Congested PCE	73.8%	Other Construction	26.2%
3	Grading and Drainage	Congested PCE	100.0%		0.0%
4	New Pavements-Rigid	Congested PCE	6.9%	Rigid Pave	93.1%
5	New Pavements-Flexible	Congested PCE	4.5%	Flex Pave	95.5%
6	New Shoulders-Rigid	Congested PCE	100.0%		0.0%
7	New Shoulders-Flexible	Congested PCE	100.0%		0.0%
8	Pavement and Shoulder Reconstruction-Rigid	Congested PCE	26.9%	Rigid Pave	73.1%
9	Pavement and Shoulder Reconstruction-Flexible	Congested PCE	24.5%	Flex Pave	75.5%
10	Pavement and Shoulder Rehab-Rigid	All VMT	26.9%	Rigid Pave	73.1%
11	Pavement and Shoulder Rehab-Flexible	All VMT	24.5%	Flex Pave	75.5%
12	Pavement and Shoulder Rehab-Other	All VMT	100.0%		0.0%
13	New Structures	None-Bridge Split	100.0%		0.0%
14	Replacement Structures	None-Bridge Split	100.0%		0.0%
15	Structures Rehabilitation	None-Bridge Split	100.0%		0.0%
16	Climbing Lanes	Uphill PCE	100.0%		0.0%
17	Truck Weight/Inspection Facilities	Over 26 VMT	100.0%		0.0%
18	Truck Escape Ramps	Over 26 VMT	100.0%		0.0%
19	Interchanges	None-Bridge Split	100.0%		0.0%
20	Roadside Improvements	All VMT	100.0%		0.0%
21	Safety Improvements	Congested PCE	100.0%		0.0%
22	Traffic Service Improvements	Congested PCE	100.0%		0.0%
23	Other Construction (modernization)	Other Construction	100.0%		0.0%
24	Other Construction (preservation)	All VMT	100.0%		0.0%
25	Surface and Shoulder Maintenance-Rigid	All VMT	26.9%	Rigid Pave	73.1%
26	Surface and Shoulder Maintenance-Flexible	All VMT	24.5%	Flex Pave	75.5%
27	Surface and Shoulder Maintenance-Other	All AMT	100.0%		0.0%
28	Drainage Facilities Maintenance	All VMT	100.0%		0.0%
29	Structures Maintenance	All VMT	100.0%		0.0%
30	Roadside Items Maintenance	All VMT	100.0%		0.0%
31	Safety Items Maintenance	All VMT	100.0%		0.0%
32	Traffic Service Items Maintenance	Congested PCE	100.0%		0.0%
33	Pavement Striping and Marking (maintenance)	All AMT	100.0%		0.0%
34	Sanding and Snow and Ice Removal (maintenance)	All VMT	100.0%		0.0%
35	Extraordinary Maintenance	All VMT	100.0%		0.0%
36	Truck Scale Maintenance-Flexible	Over 26 VMT	100.0%		0.0%
37	Truck Scale Maintenance-Rigid	Over 26 VMT	100.0%		0.0%
38	Truck Scale Maintenance-Buildings and Grounds	Over 26 VMT	100.0%		0.0%
39	Studded Tire Damage	Basic VMT	100.0%		0.0%
40	Miscellaneous Maintenance	All VMT	100.0%		0.0%
41	Bike/Pedestrian Projects	All VMT	100.0%		0.0%
42	Railroad Safety Projects	All VMT	100.0%		0.0%
43	Transit and Rail Support Projects	Congested PCE	100.0%		0.0%
44	Fish and Wildlife Enabling Projects	All VMT	100.0%		0.0%

Exhibit 3-1: Allocators Applied to Each Expenditure Category

Work Type	Work Type Description	Allocator 1	Share 1	Allocator 2	Share 2
45	Highway Planning	All VMT	100.0%		0.0%
46	Transportation Demand & Transportation System Management	Congested PCE	100.0%		0.0%
47	Multimodal	Congested PCE	100.0%		0.0%
48	Reserve Money, Fund Exchange, Immediate Opportunity Fund	All VMT	100.0%		0.0%
49	Seismic Retrofits on Structures	All VMT	100.0%		0.0%
50	Other Common Costs	All VMT	100.0%		0.0%
55	Other--Over 26,000 Only	Over 26 VMT	100.0%		0.0%
56	Other--Basic Only	Basic VMT	100.0%		0.0%
57	Other--Over 8,000 Only	Over 10 VMT	100.0%		0.0%
58	Other--Under 26,000 Only	Under 26 VMT	100.0%		0.0%
59	Other Administration	All VMT	100.0%		0.0%
60	Bridge --All Vehicles Share (no added capacity)	All VMT	100.0%		0.0%
61	Bridge --Over 8,000 Vehicles Share	Over 10 VMT	100.0%		0.0%
62	Bridge --Over 50,000 Vehicles Share	Over 50 VMT	100.0%		0.0%
63	Bridge --Over 80,000 Vehicles Share	Over 80 VMT	100.0%		0.0%
64	Bridge --Over 106,000 Vehicle Share	Over 106 VMT	100.0%		0.0%
65	Bridge --All Vehicles Share (added capacity)	Congested PCE	100.0%		0.0%
66	Other Bridge	Other Bridge	100.0%		0.0%
67	Interchange Modernization	None-Bridge Split	100.0%		0.0%
68	Bridge Replacement with Capacity	None-Bridge Split	100.0%		0.0%
101	Local Gov: Preliminary and Construction Engineering (and etc.)	Congested PCE	55.9%	Other Construction	44.1%
102	Local Gov: Right of Way (and Utilities)	Congested PCE	55.9%	Other Construction	44.1%
103	Local Gov: Grading and Drainage	Congested PCE	100.0%		0.0%
104	Local Gov: New Pavements-Rigid	Congested PCE	8.1%	Rigid Pave	91.9%
105	Local Gov: New Pavements-Flexible	Congested PCE	7.6%	Flex Pave	92.4%
106	Local Gov: New Shoulders-Rigid	Congested PCE	100.0%		0.0%
107	Local Gov: New Shoulders-Flexible	Congested PCE	100.0%		0.0%
108	Local Gov: Pavement and Shoulder Reconstruction-Rigid	Congested PCE	28.1%	Rigid Pave	71.9%
109	Local Gov: Pavement and Shoulder Reconstruction-Flexible	Congested PCE	27.6%	Flex Pave	72.4%
110	Local Gov: Pavement and Shoulder Rehab-Rigid	All VMT	28.1%	Rigid Pave	71.9%
111	Local Gov: Pavement and Shoulder Rehab-Flexible	All VMT	27.6%	Flex Pave	72.4%
112	Local Gov: Pavement and Shoulder Rehab-Other	All VMT	100.0%		0.0%
113	Local Gov: New Structures	None-Bridge Split	100.0%		0.0%
114	Local Gov: Replacement Structures	None-Bridge Split	100.0%		0.0%
115	Local Gov: Structures Rehabilitation	None-Bridge Split	100.0%		0.0%
116	Climbing Lanes	Uphill PCE	100.0%		0.0%
117	Truck Weight/Inspection Facilities	Over 26 VMT	100.0%		0.0%
118	Truck Escape Ramps	Over 26 VMT	100.0%		0.0%
119	Interchanges	None-Bridge Split	100.0%		0.0%
120	Roadside Improvements	All VMT	100.0%		0.0%
121	Local Gov: Safety Improvements	All VMT	100.0%		0.0%

Exhibit 3-1: Allocators Applied to Each Expenditure Category

Work Type	Work Type Description	Allocator 1	Share 1	Allocator 2	Share 2
122	Local Gov: Traffic Service Improvements	Congested PCE	100.0%		0.0%
123	Local Gov: Other Construction	Other Construction	100.0%		0.0%
124	Local Gov: Other Rehabilitation	All VMT	100.0%		0.0%
125	Local Gov: Surface and Shoulder-Rigid	All VMT	28.1%	Rigid Pave	71.9%
126	Local Gov: Surface and Shoulder-Flexible	All VMT	27.6%	Flex Pave	72.4%
127	Local Gov: Surface and Shoulder-Other	All AMT	100.0%		0.0%
128	Local Gov: Drainage Facilities	All VMT	100.0%		0.0%
129	Local Gov: Structures	All VMT	100.0%		0.0%
130	Local Gov: Roadside Items	All VMT	100.0%		0.0%
131	Local Gov: Safety Items	All VMT	100.0%		0.0%
132	Local Gov: Traffic Service Items	Congested PCE	100.0%		0.0%
133	Local Gov: Pavement Striping and Marking	All AMT	100.0%		0.0%
134	Local Gov: Sanding and Snow/Ice Removal	All VMT	100.0%		0.0%
135	Local Gov: Extraordinary Maintenance	All VMT	100.0%		0.0%
136	Truck Scale-Flexible	Over 26 VMT	100.0%		0.0%
137	Truck Scale-Rigid	Over 26 VMT	100.0%		0.0%
138	Truck Scale-Buildings and Grounds	Over 26 VMT	100.0%		0.0%
139	Local Gov: Studded Tire Damage	Basic VMT	100.0%		0.0%
140	Local Gov: Miscellaneous / Unspecified	All VMT	100.0%		0.0%
141	Bike/Pedestrian Projects	All VMT	100.0%		0.0%
142	Railroad Safety Projects	All VMT	100.0%		0.0%
143	Transit and Rail Support Projects	Congested PCE	100.0%		0.0%
144	Fish, Wildlife Enabling Projects	All VMT	100.0%		0.0%
145	Planning	All VMT	100.0%		0.0%
146	Transportation Demand & Transportation System Management	Congested PCE	100.0%		0.0%
147	Multimodal	Congested PCE	100.0%		0.0%
148	Reserve Money, Fund Exchange, Immediate Opportunity Fund	All VMT	100.0%		0.0%
149	Seismic Retrofits	All VMT	100.0%		0.0%
150	Local Gov: Other Admin	All VMT	100.0%		0.0%
160	Bridge --All Vehicles Share	All VMT	100.0%		0.0%
161	Bridge --Over 8,000 Vehicles Share	Over 10 VMT	100.0%		0.0%
162	Bridge --Over 50,000 Vehicles Share	Over 50 VMT	100.0%		0.0%
163	Bridge --Over 80,000 Vehicles Share	Over 80 VMT	100.0%		0.0%
164	Bridge --Over 106,000 Vehicle Share	Over 106 VMT	100.0%		0.0%
165	Bridge Modernization	None-Bridge Split	100.0%		0.0%
166	Other Bridge	Other Bridge	100.0%		0.0%
167	Interchange Modernization	None-Bridge Split	100.0%		0.0%
168	Bridge Replacement with Capacity	None-Bridge Split	100.0%		0.0%

appropriately. VMT can be weighted to account for the effective roadway space occupied by various types of vehicles relative to a standard passenger car. This is accomplished by using passenger-car equivalence (PCE) factors to weight VMT, producing PCE-VMT. Because trucks are larger and heavier than cars and require greater acceleration and braking distances, they occupy more effective roadway space and therefore have higher PCE factors. A variety of PCE factors were developed for the 1997 federal study, including different factors for different functional classes and different levels of traffic congestion, as well as uphill factors for steep grades. The uphill factors are used in this study to allocate the costs of climbing lanes.

Congested (or peak period) PCE-VMT is peak-period VMT weighted by the PCE factors for congested traffic conditions. It is used in this study for the common cost portion of projects undertaken to add capacity to the highway system.

VMT can also be weighted to reflect the amount of pavement wear imposed by vehicles of various weights and axle configurations. The factors used for this weighting are produced from the results of the pavement model described above.

Costs not accounted for as a part of specific construction projects but that are expected to vary with the overall level of construction are allocated with special factors developed during the allocation process. These factors allocate costs in proportion to the construction costs that were allocated from specific projects. Separate "other construction" factors are calculated and applied for work performed by the state and by local governments.

Prospective View

The costs or expenditures allocated in a cost allocation study can be those for a past period, those anticipated for a future period, or a combination of past and future costs. Some studies conducted by the federal government and other states have allocated both historical and planned expenditures.

The Oregon studies have traditionally used a prospective approach in which the expenditures allocated are those planned for a future period, specifically, the next fiscal biennium. Similarly, the traffic data used in the studies is that projected for a future year. This is done to allow for changes in expenditure level and traffic volumes, so that the study results will be applicable for the period in which legislation is enacted to implement the study recommendations.

There are some disadvantages associated with allocating only projected future expenditures. Specifically, it requires relying on forecasts, which are subject to greater error than historical data, and it does not address issues related to facilities with useful lives far in excess of the two-year study period.

The 1996 Cost Responsibility Blue Ribbon Committee recommended that the Oregon studies continue allocating only projected future expenditures. The current Oregon study again follows that recommendation, with the exception of incorporating study-period expenditures on the repayment of bonds issued in the prior study periods, allocated in the same proportions as in the prior studies.

Exclusion of External (Social) Costs

The Oregon studies, as well as the studies conducted by most other states, have chosen to allocate direct governmental expenditures and exclude external costs associated with highway use. The proponents of a cost-based approach argue that, to be consistent, a HCAS should include all costs that result from use of the highway system. They further argue that economically efficient pricing of highways requires the inclusion of all costs, and that failure to do so encourages an over-utilization of highways. Including external costs adds to the breadth and completeness of the analysis and helps determine appropriate user charges necessary to reflect these costs.

However, there are several disadvantages associated with including external costs. Although these costs represent real costs to society, they are decidedly more difficult to quantify and incorporate in the analysis than are direct highway costs. Inclusion of external costs therefore increases the data requirements and complexity of the studies, and could reduce their overall accuracy.

The 1996 Blue Ribbon Committee recommended that the Oregon studies continue to exclude social costs until the state implements explicit user charges to capture these costs. Both the 1982 and 1997 federal HCASs included some social costs in supplementary analyses. The 1999 Oregon Study recommended that future studies include "a separate assessment of the impacts of proposed changes in highway user taxes on the total costs of highway use including all major external costs." The 2001 and 2003 studies made this same recommendation.

In 2009, the State Legislature directed the Oregon Department of Administrative Services to prepare a second highway cost allocation based on the concept of the efficient pricing of highways, in addition to the traditional study. ORS 366.506 Section 30 in House Bill 2001 specifically required that an efficient fee study "consider the actual costs users impose on the highway system, including but not limited to highway replacement costs, traffic congestion costs and the cost of greenhouse gas emissions." Additionally, the efficient fee study report must "include recommendations for legislation to implement the efficient fee method of cost allocation." The results of the 2011 Oregon Efficient Fee Highway Cost Allocation Study are presented in a separate report.

Expenditure Allocation

The Oregon studies allocate expenditures rather than costs. Over the long run, expenditures must cover the full direct costs being imposed on the system or the system will deteriorate. Over any shorter period, however, expenditures will exceed or fall short of the costs imposed.

Some past Oregon studies, including a special analysis in the 2001 Study, attempted to estimate and allocate a full-cost budget in addition to a base-level (actual expenditure) budget. The intent was to approximate costs by estimating the level of expenditures required to preserve service levels and pavement conditions at existing levels. In these studies heavy vehicles were found to be responsible for a greater share of the preservation level budget than of the base-level budget. This was because the majority of unmet needs at that time involved pavement rehabilitation and maintenance, items for which heavy vehicles have the predominant responsibility.

There are strong arguments for moving toward a full cost-based approach in highway cost allocation studies. Recognizing the benefit of moving toward a financing system based on efficient fees, a full 2011 Efficient Fee Highway Cost Allocation Study was performed in addition to this traditional study. "True" costs are still more difficult to quantify and incorporate in the analysis than are direct highway expenditures. Some of these problems are theoretical in nature or are limited by our knowledge of such costs, and data limitations also plague the calculation of many of these costs. As a practical matter, therefore, highway cost allocation studies, including this study, continue to focus on the allocation of expenditures rather than costs.

Treatment of Debt-Financed Expenditures and Debt Service

Oregon has traditionally relied much less on debt financing of its highway program than have many other states. This has changed since the enactment of the Oregon Transportation Investment Act (OTIA) by the 2001 Legislature. The first OTIA authorized the issuance of $400 million in new debt for projects to be completed across Oregon. It provided $200 million for projects that add lane capacity or improve interchanges and $200 million for bridge and pavement rehabilitation projects. Automobile and truck title fees were increased to finance the repayment of construction bonds for OTIA projects.

Favorable bond-rate conditions allowed the 2002 Special Legislative Session to authorize an additional $100 million in debt without needing to further increase revenues. The original OTIA projects became known as OTIA I and the additional projects as OTIA II.

The 2003 Legislature authorized an additional $2.46 billion in new debt and increased title, registration, and other DMV fees to produce the additional revenue necessary to repay the bonds. The OTIA III money will be spent as follows:

- $1.3 billion to repair or replace 365 state bridges
- $300 million to repair or replace 141 locally owned bridges
- $361 million for local-government maintenance and preservation
- $500 million for modernization

The issue of how to treat OTIA project expenditures and the associated debt service was discussed at some length by the Study Review Teams for both the 2003 and 2005 studies. Debt finance introduces a disconnect between study-period revenues and expenditures because the time period in which the revenues are received differs from the period in which the funds are expended. Care needs to be taken to avoid double counting, which would occur if both the debt-financed project expenditures and full debt service expenditures (including interest and repayment of principal) were included.

While not all of the funds expended on OTIA projects come from bonds, the bonded amounts are easily identifiable, as are the associated debt service expenses. The dollar amount allocated in the model is the study-period debt service expenditure, given the bond rate and amortization period, in this case 20 years. The expenditures associated with each bond-financed project are scaled down by a bond factor to one study period's worth of debt service expenditure before allocation. This method retains the project detail necessary to assign expenditure shares by vehicle class. The dollar amounts allocated to each vehicle class for bonded projects are recorded and carried forward to each of the next nine studies.

This approach has two disadvantages: the choice of which projects get bond financing can affect the results of the study, as well as the next nine studies, and the allocation of those expenditures in future studies remains based on traffic conditions expected for the first two years of the 20-year repayment period. The Study Review Team considered a number of alternative approaches and decided that the advantages of simplicity and limited data requirements for the chosen approach outweighed its disadvantages. They also noted that the failure to update the allocation in future studies was consistent with the treatment of cash-financed projects, which are completely ignored in all future studies.

Treatment of Alternative-Fee-Paying Vehicles

Under Oregon's existing highway taxation structure, some types of vehicles are exempt from certain fees or qualify to pay according to alternative-fee schedules. These types of vehicles are collectively referred to in this report as "alternative-fee-paying" vehicles. The two main types of such vehicles are publicly owned vehicles and farm trucks. Publicly owned vehicles pay a nominal registration fee and are not subject to the weight-mile tax. Most types of publicly owned vehicles are now subject to the state fuel tax, but many diesel-powered publicly owned vehicles are not. Operators of farm trucks pay lower annual registration fees than operators of regular commercial trucks, and most pay fuel taxes, rather than weight-mile taxes when operated on public roads.

The reduced rates paid by certain types of vehicles mean they are paying less per-mile than comparable vehicles subject to full fees. The difference between what alternative-fee-paying vehicles are projected to pay and what they would pay if they were subject to full fees is the *alternative-fee difference*. The approach used in past Oregon studies is to calculate this difference for each weight class and sum these amounts. The total alternative-fee difference (subsidy amount) is then reassigned to all other, full-fee-paying vehicles on a per-VMT basis, that is, this amount is treated as a common cost to be shared proportionately by all full-fee-paying vehicles.

The rationale for this approach is that the granting of these reduced fees represents a public policy decision, and most vehicles paying reduced fees are providing some public service that arguably should be paid for by all taxpayers in relation to their use of the system. Because the heavy vehicle share of the total alternative-fee difference is greater than their share of total statewide travel, reassigning this amount on the basis of relative vehicle miles has the effect of increasing the light vehicle responsibility share and reducing the heavy vehicle share.

Treatment of Tax Avoidance and Evasion

When vehicles subject to Oregon's fuel tax purchase fuel in another state and then drive in Oregon, they avoid the Oregon fuel tax. The reverse is also true, so if the number of miles driven in Oregon on out-of-state fuel equaled the number of miles driven outside Oregon on in-state fuel, the net avoidance would be zero. Net avoidance in Oregon is significant because of the large number of people who live in Washington and work in Oregon. These people tend to buy a smaller proportion of their fuel in Oregon than the proportion of their total miles that are driven in Oregon. This net avoidance is specifically accounted for in the highway cost allocation study by assuming that 3.5 percent of VMT by fuel-tax paying vehicles do not result in fuel-tax collections for Oregon.

The International Fuel Tax Agreement sorts out the payments of state fuel taxes and the use of fuel in other states for interstate truckers. If truckers pay fuel tax in California, for example, and then use that fuel in Oregon while paying the weight-mile tax, IFTA provides a mechanism for California to reimburse them. If truckers then buy fuel in Oregon, paying no fuel tax, and drive in Washington, IFTA provides a mechanism for them to pay what they owe to Washington.

The avoidance of the weight-mile tax by vehicles that are not legally required to pay it is treated as described above, under alternative-fee paying vehicles, rather than as avoidance.

Virtually any tax is subject to some evasion. While it is generally agreed that evasion of the state gasoline tax and vehicle registration fees is quite low, there is more debate concerning evasion of the weight-mile and use fuel (primarily diesel) taxes. For the purpose of this study, it was assumed that evasion of the weight-mile tax is equal to 5 percent of what would be collected if all that is due were paid. This is the midpoint of the 3 to 7 percent evasion rate estimated by the Oregon Weight-Mile Tax Study conducted by consultants for the Legislative Revenue Office in 1996. This study also assumes that an additional 1.0 percent of the use-fuel tax on diesel (beyond the 3.5 percent avoidance) is successfully evaded.

Chapter 4

Study Data and Forecasts

Five major types of data are required to conduct a highway cost allocation study. These are:

Traffic data. The miles of travel by vehicle weight and type on each of the road systems used in the study.

Expenditure data. Projected expenditures on construction projects by work type category, road system, and funding source, and projected expenditures in other categories by funding source.

Revenue data. Projected revenues by revenue source or tax instrument.

Allocation factors. Factors used to allocate costs to individual vehicle classes, including passenger-car equivalence (PCE) factors, pavement factors, and bridge increment shares.

Conversion factors and distributions. Examples include distributions used to convert VMT by declared weight class to VMT by operating weight class or to VMT by registered weight class.

The allocation factors used in this study are described in Chapter 3 and the development and use of conversion factors is described in Appendix E, Technical Documentation.

The remainder of this chapter presents the traffic, expenditure, and revenue data used in the 2011 Study and compares them with the data used in the prior two Oregon studies.

Traffic Data and Forecasts

VMT by road system, by vehicle weight class and number of axles, and by vehicle tax class are important throughout the cost allocation and revenue attribution processes. VMT estimates and projections are used in both the allocation of expenditures and the attribution of revenues to detailed vehicle classes. Additionally, as explained in Chapter 3, VMT weighted by factors such as PCEs or pavement factors is used to assign several of the individual expenditure categories allocated in the study.

For this study, the required traffic data were first collected for the 2009 base year, the latest year for which complete historical data were available. These data were then projected forward to calendar year 2012, the middle 12 months of the 2011-13 fiscal biennium, which is the study period.

The base year traffic data were obtained from a number of sources. These include ODOT Motor Carrier Transportation Division (MCTD) weight-mile tax information, ODOT traffic counts and traffic classification statistics, Highway Performance Monitoring System (HPMS) submittals, MCTD and Driver & Motor Vehicle Services vehicle registrations data, and the Weigh-In-Motion data and Special Truck Weighings previously discussed. For each road system used in the study, travel estimates are developed for light vehicles and each 2,000-pound truck weight class.

Information from state economic

forecasts and from ODOT's revenue forecasting model is used to forecast projected study year traffic from the base year data. Data from Weigh-In-Motion and Special Truck Weighings are used to convert truck miles of travel by declared weight class to miles of travel by operating weight class and to obtain detailed information on vehicle configurations and axle counts for each weight class. HPMS data are used to spread VMT to functional classifications.

Exhibit 4-1 shows that total vehicle travel in Oregon is projected to increase from 36.0 billion miles in 2009 to 38.1 billion miles in 2012. This represents an average annual growth of about 1.9 percent. Light vehicle travel is projected to increase from 33.7 billion miles in 2009 to 35.4 billion miles in 2012, which represents an average annual growth of 1.7 percent. Total heavy vehicle travel is forecast to increase from 2.30 billion miles in 2009 to 2.67 billion miles in 2012, an average annual growth of about 5.1percent. These projections are based on, and consistent with, the projections from ODOT's revenue forecast model. The traffic growth projections for the current study are slightly higher than those for the 1999, 2001, 2003, 2005, and 2009 studies, and are roughly equal to the growth projections in the 2007 Study. The 1999 Study projected that total state VMT would grow at an average annual rate of 1.7 percent between 1997 and 2000. The 2001 Study projected 1.3 percent annual growth between 1999 and 2002. The 2003 Study projected 1.1 percent annual growth between 2001 and 2004. The 2005 Study growth projection of 1.6 percent reflected recovery from the economic downturn in Oregon and the nation that limited growth in the early part of the decade. The 2007 Study projected a 1.9 percent annual growth rate between 2005 and 2008, reflecting the upward trend in the economy during that period. The 2009 Study projected a growth rate of 1.1 percent from 2007 to 2010, reflecting the recession of 2008 through 2009, with a particularly high negative growth rate for heavy vehicles over the study VMT period. The current study projects a growth rate of 1.9 percent from 2009 to 2012, reflecting some of the expected recovery from the recent recession.

Exhibit 4-1: Current and Forecasted VMT by Weight Group (millions of miles)

Declared Weight in Pounds			2009 VMT (estimate)	2012 VMT (forecast)	Average Annual Growth Rate
1	to	10,000	33,672	35,417	1.7%
10,001	to	26,000	559	622	3.6%
26,001	to	78,000	345	373	2.6%
78,001	to	80,000	982	1,170	6.0%
80,001	to	104,000	196	232	5.8%
104,001	to	105,500	214	266	7.5%
105,501	and	up	3	3	5.0%
Total for All Vehicles			35,971	38,083	1.9%
Total for Vehicles Under 10,001 pounds			33,672	35,417	1.7%
% for Vehicles Under 10,001 pounds			93.6%	93.0%	
Total for Vehicles Over 10,000 pounds			2,299	2,667	5.1%
% for Vehicles Over 10,000 pounds			6.4%	7.0%	
Total for Vehicles Under 26,001 pounds			34,231	36,039	1.7%
% for Vehicles Under 26,001 pounds			95.2%	94.6%	
Total for Vehicles Over 26,000 pounds			1,740	2,045	5.5%
% for Vehicles Over 26,000 pounds			4.8%	5.4%	

While projected travel by heavy vehicles grew faster than projected travel by light vehicles in recent studies, and then declined in the 2009 Study, forecasted heavy vehicle travel is expected to increase between 2009 and 2012 and forecasted light vehicle travel is expected to experience more modest growth. Because of this, the share of travel accounted for by light vehicles is expected to decrease from 93.6 percent to 93.0 percent between 2009 and 2012. This is one reason for the slightly lower cost responsibility share for light vehicles reported in this study compared to the previous study.

Exhibit 4-1 also shows that the growth projected for heavy vehicle travel varies by weight group. The lowest growth among the heavy vehicle weight classes is expected to be in the 26,001 to 78,000 weight class group, which is still higher than the expected growth rate for the basic vehicle class.

Exhibit 4-2 shows the distribution of projected 2012 travel between light and heavy vehicles for different combinations of functional classification and ownership. Although light vehicles are projected to account for 93 percent and heavy vehicles 7 percent of total statewide VMT, the mix of traffic varies significantly among the different road systems. Heavy vehicles are projected to account for 17.7 percent of the travel on rural interstate highways but only 2.8 percent of the travel on city streets. Heavy vehicles are expected to account for 9.2 percent of the overall travel on state highways and 3.5 percent of the travel on local roads.

Exhibit 4-3 illustrates, in a slightly different manner, how the relative mix of traffic varies by road system. It presents the separate distributions of projected VMT by road system for light vehicles, heavy vehicles, and all vehicles. As shown, 61.6 percent of total travel in the state is expected to be on state highways and 38.2 percent on local roads and streets. These shares, however, differ significantly for light versus heavy vehicles. Rural interstate highways, for example, are projected to handle 12.7 percent of total travel in 2012 but 32.2 percent of the heavy vehicle travel. At the other extreme, 20.7 percent of light vehicle travel, but only 8.0 percent of heavy vehicle travel, is forecast to be on city streets. State highways are expected to handle about 60.1 percent of total travel by light vehicles and 80.5 percent of travel by heavy vehicles.

Exhibit 4-2: Projected 2012 VMT by Road System (millions of miles)

	Light Vehicles		Heavy Vehicles		
Road System	Miles of Travel	Percent of Total	Miles of Travel	Percent of Total	Total VMT
Interstate Urban	4,629	92.2%	394	7.8%	5,023
Interstate Rural	3,985	82.3%	859	17.7%	4,843
Other State Urban	5,534	96.3%	214	3.7%	5,748
Other State Rural	7,151	91.3%	679	8.7%	7,831
Subtotal-State Roads	21,299	90.8%	2,147	9.2%	23,446
County Roads	6,692	95.7%	302	4.3%	6,993
City Streets	7,343	97.2%	214	2.8%	7,557
Subtotal-Local Roads	14,035	96.5%	516	3.5%	14,551
Subtotal-State and Local Roads	35,334	93.0%	2,662	7.0%	37,996
Federal Roads	83	94.8%	5	5.2%	87
Total-All Roads	35,417	93.0%	2,667	7.0%	38,083

Exhibit 4-3: Distribution of Projected 2012 VMT by Road System

Road System	Percent of Light Vehicle Total	Percent of Heavy Vehicle Total	Percent of All Vehicle Total
Interstate Urban	13.1%	14.8%	13.2%
Interstate Rural	11.3%	32.2%	12.7%
Other State Urban	15.6%	8.0%	15.1%
Other State Rural	20.2%	25.5%	20.6%
Subtotal State Systems	60.1%	80.5%	61.6%
County Roads	18.9%	11.3%	18.4%
City Streets	20.7%	8.0%	19.8%
Subtotal Local Systems	39.6%	19.3%	38.2%
Federal Roads	0.2%	0.2%	0.2%
Total All Systems	100.0%	100.0%	100.0%

Exhibit 4-4 compares the VMT projections by road system used in the 1999, 2001, 2003, 2005, 2007, 2009, and 2011 studies. It shows that the VMT shares on the six road systems have not changed substantially from the comparable projections made in the 2001 Study. The systems projected to account for the largest shares of total statewide travel are Other State Rural highways, County Roads, and City Streets. The current study projects a higher share of travel on city streets than did prior studies.

Expenditure Data

Until the 2001 Study, Oregon highway cost allocation studies allocated only expenditures of Oregon highway user fees by state and local-government agencies. Because federal funds are in many cases interchangeable with state funds, and because the proportion of federal funds used for any particular project is arbitrary and subject to change between the time of the study and the time the money is spent, excluding federal funds can introduce arbitrary bias and inaccuracy into the

Exhibit 4-4: Comparison of Forecast VMT Used in OR HCASs: 1999, 2001, 2003, 2005, 2007, 2009, and 2011 (billions of miles)

Road System	1999 Study		2001 Study		2003 Study		2005 Study		2007 Study		2009 Study		2011 Study	
	2000 VMT	% of Total	2002 VMT	% of Total	2004 VMT	% of Total	2006 VMT	% of Total	2008 VMT	% of Total	2010 VMT	% of Total	2012 VMT	% of Total
Interstate Urban	4.0	11.8%	3.9	11.4%	3.9	11.2%	4.1	11.3%	5.0	12.9%	5.1	13.2%	5.0	13.2%
Interstate Rural	4.4	12.9%	4.4	12.7%	4.4	12.6%	4.7	13.0%	4.8	12.4%	4.8	12.6%	4.8	12.7%
Other State Urban	4.5	13.2%	5.5	15.7%	5.2	15.1%	5.3	14.7%	6.1	15.7%	6.1	15.9%	5.7	15.1%
Other State Rural	7.5	22.1%	7.8	22.5%	7.5	21.6%	8.0	22.1%	7.7	19.8%	7.7	19.9%	7.8	20.6%
Subtotal State Systems	20.4	60.0%	21.7	62.3%	21	60.5%	22.1	61.1%	23.6	60.8%	23.7	61.6%	23.4	61.7%
County Roads	8.6	25.3%	8	22.9%	8.9	25.6%	7.9	22.0%	8.3	21.3%	7.4	19.3%	7.0	18.4%
City Streets	5.0	14.7%	5.1	14.8%	4.8	13.9%	6.1	17.0%	6.9	17.9%	7.3	19.0%	7.6	19.9%
Subtotal Local Systems	13.6	40.0%	13.1	37.7%	13.7	39.5%	14.1	38.9%	15.2	39.2%	14.7	38.4%	14.6	38.3%
Total	34.0	100.0%	34.8	100.0%	34.7	100.0%	36.2	100.0%	38.8	100.0%	38.4	100.0%	38.0	100.0%

study results. The 2001 Study included the expenditure of federal funds by the state and reported their allocation both separately and in combination with state funds.

The 2003 Study, for the first time ever, included all expenditures on roads and streets in the state. In addition to state-funded expenditures, expenditures (both state and local) funded from federal highway revenues and locally generated revenues were also included. This change substantially increased the level and breadth of expenditures allocated in the 2003 Study as compared to previous studies.

Following the 2005 Study, the 2007 Study and the current study include expenditures of state, federal, and local revenues but exclude certain categories of local revenues determined to not be interchangeable with state user fees. Those sources are locally issued bonds, property taxes (including local improvement districts), systems development charges, and traffic impact fees.

The expenditure data for this study were obtained from a number of sources. Data from ODOT's monthly Budget and Cash Flow Forecast were used to develop projected construction expenditures by project for the 2011-13 biennium. Projected expenditures on maintenance and other programs were obtained from ODOT Financial Services and based on ODOT's Agency Request Budget.

Identifying those expenditures projected to be federally funded was relatively straightforward, and based on detailed information from the ODOT Cash Flow Forecast model and Project Control System. Local expenditures were projected from data obtained from the 2009 Local Roads and Streets Survey combined with information from ODOT's Agency Request Budget.

Care was taken to accurately identify the bonded (OTIA) projects and treat them as a separate, independent funding source. It was assumed that any bridge projects that still remained in "option packages" and had not been assigned real project numbers by September of 2010 would not start construction until after the end of the 2011-13 biennium. Those projects were not included in the analysis.

Exhibit 4-5 presents the average annual expenditures projected for the 2011-13 biennium by major category (modernization, preservation, maintenance, bridge, and other) and funding source (state, federal, bond, and local). As shown, projected expenditures total $1.5 billion. This compares to annual expenditures allocated in the 1999, 2001, 2003, 2005, 2007, and 2009 studies of $691 million, $649 million, $1.5 billion, $1.5 billion, $1.7 billion, and $1.8 billion, respectively.

Of the $1.5 billion total annual expenditures, $880 million (58.5 percent) are projected to be state funded, $486 million (32.3 percent) federally funded, and $119 million (7.9 percent) locally funded. The remaining $20 million (1.4 percent) of allocated expenditures are the allocated

Exhibit 4-5: Average Annual Expenditures by Category and Funding Source (thousands of dollars)

Major Expenditure Category	State Funds	Percent of All Sources	Federal Funds	Percent of All Sources	Local Funds	Percent of All Sources	Bond Funds	Percent of All Sources	All Funding Sources
Modernization	193,486	55.1%	135,918	38.7%	19,014	5.4%	2,535	0.7%	350,954
Preservation	40,526	33.0%	69,490	56.7%	12,463	10.2%	157	0.1%	122,636
Maintenance	324,521	70.6%	80,064	17.4%	55,281	12.0%	119	0.0%	459,986
Bridge	25,137	17.3%	109,180	75.3%	1,088	0.7%	9,671	6.7%	145,075
Other	296,306	69.4%	91,399	21.4%	31,250	7.3%	7,878	1.8%	426,833
All Expenditures	879,975	58.5%	486,051	32.3%	119,096	7.9%	20,361	1.4%	1,505,483

portion of the $173 million per year of expended bond revenue. An additional $153 million per year of pre-allocated bond expenditures from the prior study is included in the allocated costs in this study.

The local funds column of Exhibit 4-5 includes only local expenditures from the own-source revenues that were included in this study. Local expenditures from state and federal revenues are included in the state funds and federal funds columns, respectively.

Bridge and interchange expenditures are shown separately from other modernization, preservation, and maintenance expenditures.

The "other" category in the exhibit encompasses expenditures for a large number of different activities. In addition to general administrative and tax collection costs for the state, counties, and cities, it includes expenditures for:

- Preliminary engineering
- Right of way acquisition and property management
- Safety-related projects, safety inspections, and rehabilitation and maintenance of existing safety improvements
- Pedestrian/bike projects
- Railroad safety projects
- Fish- and wildlife-enabling projects (e.g., salmon culverts)
- Transportation demand management and transportation system management projects (e.g., Traffic Operations Centers)
- Multi-modal projects
- Transportation project development and delivery
- Transportation planning, research, and analysis

The exhibit shows significant differences in the funding of different expenditure categories. Preservation and bridge expenditures, in particular, have a large federal funds component. About 57 percent of preservation expenditures and 75 percent of bridge expenditures will be federally funded. Maintenance expenditures, on the other hand, are largely state-, and to a lesser extent, locally funded, with a very small federal funds component. About 48 percent of the OTIA and JTA bond expenditures in the study period will be on state- and locally owned bridges. Modernization expenditures make up an additional 16 percent of OTIA and JTA bond expenditures. An additional 39 percent of bond expenditures fall into the "other" category. Most of those are for administration, engineering, and right-of-way expenditures associated with state- and locally owned bridges.

Revenue Data and Forecasts

The revenues projected for this study include receipts from taxes and fees collected by the state from highway users, that is, revenues flowing into Oregon's dedicated State Highway Fund. Revenues from federal taxes and user fees are not estimated. Similarly, revenues generated by local governments from their own funding sources (e.g., property taxes, street assessments, system development charges, local fuel taxes) are not included. Because the expenditure of federal and local revenues are included among the expenditures to be allocated, and because a portion of the expenditure of bond revenue in the prior biennium is included, average annual allocated expenditures exceed average annual attributed revenues by $532.1 million.

The revenue data required for the study are obtained directly from ODOT's revenue forecasting model. The revenue forecast used for the present study was the December 2009 forecast; the latest available at the time the study was being conducted. The forecasts include the approximately 40 percent of State Highway Fund revenues transferred to local governments for use on local roads and streets, and all state funds used for highways, including matching requirements for federal-aid highway projects.

Average annual state revenues for the 2011-13 biennium are expected to total $1.13 billion. As shown in Exhibit 4-6, fuel taxes and the weight-mile tax are the two largest sources of state user-fee revenue. Revenue from the state fuel tax is projected to average $536 million per year (47.6 percent of total revenues) and weight-mile tax revenue is forecast to average $277 million (24.6 percent of total revenues). These two sources account for 72.2 percent of highway user revenues, illustrating that Oregon's system of highway finance is based heavily on taxes and fees directly related to use of the system.

Revenue from registration and title fees is anticipated to average $305 million annually (27.1 percent of total revenues), relatively consistent with the 2005, 2007, and 2009 studies, but up sharply from prior studies as a result of the registration fee increases enacted as part of the Jobs and Transportation Act. Other revenue sources bring in smaller amounts of revenue.

Exhibit 4-6: Revenue Forecasts by Tax/Fee Type (thousands of dollars), Average Annual Amounts for 2011-13 Biennium

Tax/Fee	Forecast Revenue	Percent of Total
Fuel Tax	535,888	47.6%
Weight-Mile Tax	277,276	24.6%
Registration Fees	229,758	20.4%
Title Fees	75,497	6.7%
Other Motor Carrier Revenue	5,437	0.5%
Road Use Assessment Fees	2,377	0.2%
Total	1,126,232	100.0%

Exhibit 4-7 compares the forecasts of average annual total revenues used in the 1999, 2001, 2003, 2005, 2007, 2009, and 2011 studies. The total revenues of forecast for the current study are $1.13 billion, or 29.4 percent higher than in the prior study, reflecting the increases in the fuel tax, weight-mile tax, and registration fee.

Caution should be used in comparing these forecasts, however, because they were made at different times for different biennia, and they used somewhat different assumptions regarding the treatment of ODOT beginning and ending balances. Additionally, title fees were not identified as a revenue source in studies prior to 2003 because they did not produce net revenue.

Exhibit 4-7: Comparison of Forecast Revenue (millions of dollars) Used in OR HCASs: 1999, 2001, 2003, 2005, 2007, 2009, and 2011

Year of Study	Average Annual Forecast Revenue
1999	691.1
2001	690.0
2003	712.8
2005	825.5
2007	878.8
2009	869.7
2011	1,126.2

Expenditure Allocation and Revenue Attribution Results

This chapter presents the expenditure allocation and revenue attribution results of the 2011 Study and compares them to the results of previous Oregon studies. The following chapter reports equity ratios for each vehicle group and weight class based on the expenditure allocation and revenue attribution results.

Expenditure Allocation Results

The 2003 Study was the first to base expenditure allocation results on all highway expenditures, or those financed by federal, local, and state revenues; the 2005 Study did the same, but excluded some expenditure of local own-source revenues. This approach was considered necessary to address the impacts of the federal advance construction program on expenditures. This change in approach means the expenditure allocation results for the 2003 Study are not directly comparable to those of the earlier Oregon studies.

For the 2005, 2007, and 2009 studies, the approach used in the 2003 Study was modified to exclude the expenditure of certain local-government own-source revenues that were not considered to be interchangeable with State Highway Fund monies. The excluded categories were property taxes (including local improvement districts), bond revenues, systems development charges, and traffic impact fees. The 2011 Study uses the same methodology as the 2005, 2007, and 2009 studies. As a result, the expenditure allocations in this study are comparable to the 2005, 2007, and 2009 studies, but not directly comparable to those in the 2003 Study or any prior study.

The results presented in this chapter are for all—full-fee and alternative-fee—vehicles, but do not include the allocated expenditure of bond revenues that are carried forward from the 2003 through 2009 studies. For this reason, most of the results presented in this chapter will show slightly lower allocated expenditures than are shown in the exhibits in Chapter 6.

Exhibit 5-1 presents the expenditure allocation results by major expenditure category and vehicle weight group. Light (up to 10,000 pound) and heavy (over 10,000 pound) vehicles are projected to be responsible for 64.6 percent and 35.4 percent (respectively) of average annual total expenditures for the 2011-13 biennium.

As shown in the exhibit, the responsibility shares vary significantly among the major expenditure categories. Heavy vehicles, as a group, are projected to be responsible for the majority of preservation and bridge expenditures (55.3 percent and 55.1 percent, respectively). The group is responsible for significantly smaller shares of maintenance, modernization, and other expenditures (38.1 percent, 42.2 percent, and 17.3 percent, respectively); this illustrates the point made previously that the mix of expenditures allocated can have a significant impact on the overall results.

Both the state and local governments spend funds from state user fees and from

Exhibit 5-1: Average Annual Cost Responsibility by Expenditure Category and Weight Class (thousands of dollars)

Declared Weight in Pounds			All Funding Sources						
			Modern-ization	Preser-vation	Mainte-nance	Bridge	Other	Prior Bonds	Total
1	to	10,000	125,221	54,873	284,884	65,070	463,808	76,939	1,070,796
10,001	to	26,000	8,778	6,965	23,006	9,669	9,514	7,563	65,494
26,001	to	78,000	8,041	6,752	21,852	6,766	14,979	7,413	65,803
78,001	to	80,000	44,944	31,046	72,646	22,656	48,843	29,406	249,541
80,001	to	104,000	12,059	8,890	21,475	18,376	10,732	15,125	86,656
104,001	to	105,500	16,421	12,737	32,098	22,252	12,928	16,115	112,551
105,501	and	up	1,256	1,373	4,025	286	262	341	7,544
Total			216,720	122,636	459,986	145,075	561,066	152,902	1,658,385
Total for Vehicles Under 10,001 Pounds			125,221	54,873	284,884	65,070	463,808	76,939	1,070,796
% for Vehicles Under 10,001 Pounds			57.8%	44.7%	61.9%	44.9%	82.7%	50.3%	64.6%
Total for Vehicles Over 10,000 Pounds			91,499	67,763	175,101	80,004	97,258	75,963	587,589
% for Vehicles Over 10,000 Pounds			42.2%	55.3%	38.1%	55.1%	17.3%	49.7%	35.4%
Total for Vehicles Under 26,001 Pounds			133,999	61,839	307,891	74,739	473,321	84,501	1,136,290
% for Vehicles Under 26,001 Pounds			61.8%	50.4%	66.9%	51.5%	84.4%	55.3%	68.5%
Total for Vehicles Over 26,000 Pounds			82,721	60,797	152,095	70,336	87,745	68,400	522,095
% for Vehicles Over 26,000 Pounds			38.2%	49.6%	33.1%	48.5%	15.6%	44.7%	31.5%

the federal government. Exhibit 5-2 shows the funds received from each revenue source and by whom they are expended. The difference between the funds received and the expenditures allocated is due to the allocation of bond expenditures. The upper part of the table shows the full expenditure of bond revenues and the lower part shows the portions of current and prior expenditures of bond revenues that are allocated to vehicles in this study. In the exhibits that follow, where allocated expenditures are broken down into state, federal, local, and bond, the categories correspond to rows in the lower part of Exhibit 5-2.

The responsibility amounts for state, federal, local, and bond expenditures are broken out separately in Exhibit 5-3. In this exhibit, the expenditure of state and federal monies by local governments are counted under the state and federal categories. The local category contains only the expenditure by local governments of their own revenues.

Exhibit 5-2: Sources and Expenditures of Funds (thousands of annual dollars)

	Source of Funds				
Expenditures of Funds	State Revenues	Bond Revenues	Federal Revenues	Local Revenues	All Sources
State Government	643,458	0	408,133	0	1,051,591
Local Governments	236,517	0	77,918	119,096	433,532
Expenditure of Bond Revenue	0	126,869	0	0	126,869
All Expenditures	879,975	126,869	486,051	119,096	1,611,991
Allocated State Expenditures	643,458	0	408,133	0	1,051,591
Allocated Local Expenditures	236,517	0	77,918	119,096	433,532
Allocated Current Bond	0	20,361	0	0	20,361
Allocated Prior Bond	0	152,902	0	0	152,902
Allocated Expenditures	879,975	173,262	486,051	119,096	1,658,385

Exhibit 5-3: Expenditure Allocation Results for Weight Groups by Funding Source (thousands of dollars)

Funding Source	Average Annual Total Expenditures Allocated	Allocation to Vehicles: Under 10,001 Pounds	Over 10,000 Pounds	Under 26,001 Pounds	Over 26,000 Pounds
State (Highway Fund)	643,458	469,473	173,984	485,181	158,277
		73.0%	27.0%	75.4%	24.6%
Federal	408,133	228,518	179,615	246,368	161,765
		56.0%	44.0%	60.4%	39.6%
Local	433,532	283,404	150,128	306,988	126,544
		65.4%	34.6%	70.8%	29.2%
Bond	20,361	12,462	7,899	13,252	7,109
		61.2%	38.8%	65.1%	34.9%
Current	1,505,483	993,857	511,626	1,051,789	453,694
		66.0%	34.0%	69.9%	30.1%
Prior Bond	152,902	76,939	75,963	84,501	68,400
		50.3%	49.7%	55.3%	44.7%
Total	1,658,385	1,070,796	587,589	1,136,290	522,095
		64.6%	35.4%	68.5%	31.5%

Light vehicles are projected to be responsible for 73.0 percent of state, 56.0 percent of federal, 65.4 percent of local, and 61.2 percent of bond expenditures. Heavy vehicles are projected to be responsible for 27.0 percent of state, 44.0 percent of federal, 34.6 percent of local, and 38.8 percent of bond expenditures. Overall, state-funded expenditures are expected to average $643.5 million annually over the 2011-13 biennium. Comparable annual amounts for federal, local, and bond-funded expenditures are $408.1 million, $433.5 million, and $20.4 million, respectively.

The allocation results for state, federal, local, and bond expenditures are further broken out by major category in Exhibits 5-4 through 5-7. For most funding sources, heavy vehicles are projected to be responsible for the majority of modernization and preservation expenditures, while light vehicles are projected to bear larger shares of maintenance and other expenditures.

Because of restrictions on the types of expenditures for which federal-aid highway funds can be used, federal funds tend to be concentrated on construction (i.e., modernization, preservation, and bridge) projects and other types of work for which heavy vehicles have the predominant responsibility. Additionally, federal funds are focused on projects on interstate and other higher order highways where the heavy vehicle share of travel is highest. Hence, the inclusion of federally funded expenditures in a state HCAS will almost always have the effect of reducing the light vehicle responsibility share and increasing the heavy vehicle share.

Conversely, state funds are generally more concentrated on maintenance, operations, administration, and other activities for which light vehicles have the largest responsibility share. This is particularly the case at the present time with ODOT's use of the federal advance construction programming technique and aggressive strategy to "federalize" a large portion of the construction program.

The inclusion of local expenditures in a state HCAS will, by itself, typically increase the relative responsibility of light vehicles and reduce that of heavy vehicles. This is because many types of expenditures are allocated on a relative travel basis and heavy vehicles account for a comparatively small share of the total travel on local roads and streets. This factor, however, is more than offset by the fact that local governments spend more of their road and street funds on activities having a comparatively high heavy vehicle responsibility component; specifically rehabilitation, repair, and maintenance of pavements and bridges.

Exhibit 5-4: Average Annual Cost Responsibility, State Highway Fund Detail (thousands of dollars)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	20,016	13,918	154,376	11,255	269,908	469,473
10,001	to	26,000	2,768	141	6,354	1,501	4,943	15,708
26,001	to	78,000	2,497	125	4,954	992	10,335	18,903
78,001	to	80,000	17,894	792	31,282	3,846	34,445	88,258
80,001	to	104,000	4,820	210	7,592	2,456	7,150	22,228
104,001	to	105,500	6,391	283	9,814	2,891	8,319	27,697
105,501	and	up	423	23	584	35	126	1,191
Total			54,809	15,491	214,955	22,977	335,226	643,458
Total for Vehicles Under 10,001 Pounds			20,016	13,918	154,376	11,255	269,908	469,473
% for Vehicles Under 10,001 Pounds			36.5%	89.8%	71.8%	49.0%	80.5%	73.0%
Total for Vehicles Over 10,000 Pounds			34,793	1,573	60,578	11,722	65,318	173,984
% for Vehicles Over 10,000 Pounds			63.5%	10.2%	28.2%	51.0%	19.5%	27.0%
Total for Vehicles Under 26,001 Pounds			22,783	14,060	160,730	12,756	274,852	485,181
% for Vehicles Under 26,001 Pounds			41.6%	90.8%	74.8%	55.5%	82.0%	75.4%
Total for Vehicles Over 26,000 Pounds			32,025	1,432	54,225	10,220	60,375	158,277
% for Vehicles Over 26,000 Pounds			58.4%	9.2%	25.2%	44.5%	18.0%	24.6%

Exhibit 5-5: Average Annual Cost Responsibility, Federal Detail (thousands of dollars)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	45,486	20,425	35,624	47,826	79,158	228,518
10,001	to	26,000	3,897	3,127	1,002	7,186	2,639	17,850
26,001	to	78,000	3,610	2,799	764	5,107	3,175	15,455
78,001	to	80,000	22,877	21,412	4,258	16,648	12,375	77,570
80,001	to	104,000	5,882	5,601	970	14,148	3,033	29,635
104,001	to	105,500	7,875	7,433	1,233	17,326	3,801	37,668
105,501	and	up	533	539	47	227	91	1,436
Total			90,160	61,336	43,897	108,468	104,272	408,133
Total for Vehicles Under 10,001 Pounds			45,486	20,425	35,624	47,826	79,158	228,518
% for Vehicles Under 10,001 Pounds			50.4%	33.3%	81.2%	44.1%	75.9%	56.0%
Total for Vehicles Over 10,000 Pounds			44,675	40,911	8,273	60,642	25,114	179,615
% for Vehicles Over 10,000 Pounds			49.6%	66.7%	18.8%	55.9%	24.1%	44.0%
Total for Vehicles Under 26,001 Pounds			49,382	23,551	36,625	55,012	81,797	246,368
% for Vehicles Under 26,001 Pounds			54.8%	38.4%	83.4%	50.7%	78.4%	60.4%
Total for Vehicles Over 26,000 Pounds			40,778	37,784	7,271	53,456	22,475	161,765
% for Vehicles Over 26,000 Pounds			45.2%	61.6%	16.6%	49.3%	21.6%	39.6%

Exhibit 5-6: Average Annual Cost Responsibility, Local Government Detail (thousands of dollars)

Declared Weight in Pounds			Modernization	Preservation	Maintenance	Bridge	Other	Total
1	to	10,000	58,223	20,392	94,850	2,329	107,610	283,404
10,001	to	26,000	2,022	3,694	15,644	436	1,788	23,584
26,001	to	78,000	1,853	3,826	16,128	308	1,375	23,490
78,001	to	80,000	3,641	8,832	37,063	371	1,686	51,593
80,001	to	104,000	1,220	3,077	12,902	205	471	17,876
104,001	to	105,500	1,968	5,019	21,036	304	716	29,042
105,501	and	up	289	811	3,393	6	44	4,543
Total			69,216	45,651	201,015	3,959	113,690	433,532
Total for Vehicles Under 10,001 Pounds			58,223	20,392	94,850	2,329	107,610	283,404
% for Vehicles Under 10,001 Pounds			84.1%	44.7%	47.2%	58.8%	94.7%	65.4%
Total for Vehicles Over 10,000 Pounds			10,992	25,259	106,166	1,630	6,080	150,128
% for Vehicles Over 10,000 Pounds			15.9%	55.3%	52.8%	41.2%	5.3%	34.6%
Total for Vehicles Under 26,001 Pounds			60,245	24,086	110,494	2,765	109,398	306,988
% for Vehicles Under 26,001 Pounds			87.0%	52.8%	55.0%	69.8%	96.2%	70.8%
Total for Vehicles Over 26,000 Pounds			8,682	21,565	90,522	1,194	4,292	126,255
% for Vehicles Over 26,000 Pounds			12.5%	47.2%	45.0%	30.2%	3.8%	29.1%

Exhibit 5-7: Average Annual Cost Responsibility, Bond Detail (thousands of dollars)

Declared Weight in Pounds			Modern-ization	Preser-vation	Mainte-nance	Bridge	Other	Current	Prior	Total
1	to	10,000	1,496	138	35	3,661	7,132	12,462	76,939	89,401
10,001	to	26,000	92	3	6	545	143	790	7,563	8,353
26,001	to	78,000	81	2	6	360	93	542	7,413	7,955
78,001	to	80,000	533	10	44	1,790	338	2,714	29,406	32,120
80,001	to	104,000	137	2	12	1,565	77	1,793	15,125	16,918
104,001	to	105,500	186	2	15	1,731	93	2,028	16,115	18,143
105,501	and	up	11	0	1	18	2	33	341	373
Total			2,535	157	119	9,671	7,878	20,361	152,902	173,262
Total for Vehicles Under 10,001 Pounds			1,496	138	35	3,661	7,132	12,462	76,939	89,401
% for Vehicles Under 10,001 Pounds			59.0%	87.6%	29.6%	37.9%	90.5%	61.2%	50.3%	51.6%
Total for Vehicles Over 10,000 Pounds			1,039	19	84	6,010	746	7,899	75,963	83,862
% for Vehicles Over 10,000 Pounds			41.0%	12.4%	70.4%	62.1%	9.5%	38.8%	49.7%	48.4%
Total for Vehicles Under 26,001 Pounds			1,588	141	42	4,206	7,275	13,252	84,501	97,753
% for Vehicles Under 26,001 Pounds			62.7%	89.7%	34.9%	43.5%	92.3%	65.1%	55.3%	56.4%
Total for Vehicles Over 26,000 Pounds			947	16	78	5,465	603	7,109	68,400	75,509
% for Vehicles Over 26,000 Pounds			37.3%	10.3%	65.1%	56.5%	7.7%	34.9%	44.7%	43.6%

Because pavements and bridges represent two of the largest and most important expenditure areas in a highway cost allocation study, the responsibility results for these expenditures are broken out separately in Exhibits 5-8 and 5-9.

Exhibit 5-8 shows that pavement expenditures allocated in the 2011 Study total $473.5 million, 81 percent of the pavement expenditure allocated in the 2009 Study.

The responsibility shares for particular types of pavement work are roughly the same between the two studies. Both studies found heavy vehicles responsible for relatively larger shares of new pavement,

Exhibit 5-8: Comparison of Pavement Responsibility Results from 2009 and 2011 OR HCASs (thousands of annual dollars)

	2009 Study			2011 Study		
Expenditure Work Type	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility
New Pavements	76,099	15,674	60,425	67,251	10,483	56,768
	4.1%	20.6%	79.4%	4.5%	15.6%	84.4%
Pavement and Shoulder Reconstruction	40,358	13,395	26,963	26,959	7,115	19,844
	2.2%	33.2%	66.8%	1.8%	26.4%	73.6%
Pavement and Shoulder Rehabilitation	222,813	77,790	145,023	103,693	36,581	67,112
	12.1%	34.9%	65.1%	6.9%	35.3%	64.7%
Pavement Maintenance	228,214	87,946	140,269	250,115	98,727	151,388
	12.4%	38.5%	61.5%	16.6%	39.5%	60.5%
Other Pavement Expenditures	18,920	17,414	1,506	25,452	22,865	2,586
	1.0%	92.0%	8.0%	1.7%	89.8%	10.2%
Total Pavement Expenditures	586,403	212,218	374,186	473,470	175,771	297,699
	31.9%	36.2%	63.8%	31.4%	37.1%	62.9%

pavement reconstruction, and pavement rehabilitation expenditures and slightly smaller shares of maintenance expenditures. For this exhibit, other pavement expenditures include those for climbing lanes, pavement striping and marking, maintenance of truck scale pavements, and studded tire damage repair.

Given the substantial changes to the distress equations in the 2010 NAPCOM model (which is used to generate pavement factors for pavement expenditure allocation), the pavement expenditure allocation based on the 2011 pavement factors was compared to the pavement expenditure allocation when using the 2009 Study pavement factors with the 2011 model. First, the pavement factors developed for the 2011 Study for light vehicles are slightly lower than those from the 2009 Study. Pavement factors are also lower for certain heavy vehicle weight classes but are offset by increases in the pavement factors for other heavy vehicle classes. Sensitivity analyses performed using new pavement factors demonstrated that pavement expenditure allocations are highly sensitive to the basic vehicle pavement factors. Overall, basic vehicle pavement expenditure responsibility in the 2011 Study is about 3 percentage points lower when using the 2011 pavement factors than when using the 2009 pavement factors.

Exhibit 5-9 compares the bridge plus interchange expenditure amounts and responsibility results in the 2009 and present studies. Bridge-related expenditures were slightly higher as a share of total expenditures in the current study (11.4 percent) than in the 2009 Study (10.1 percent) and lower than in the 2007 Study (15.0 percent).

The heavy vehicle responsibility share for total bridge plus interchange expenditures in the present study is 48.1 percent, compared to 51.3 percent in the 2009 Study. This reflects differences in the mix of bridge types as well as a different treatment of bridge projects that are funded but for which bridges have not yet been selected. Following the approach introduced in the 2007 Study, “other bridge” type expenditures were allocated in proportion to the allocation results for work on known bridges.

Exhibit 5-10 shows the amounts of allocated expenditures of bond revenues, including the amount that carried forward from the prior HCAS studies. These represent amounts that were spent in prior biennia and that will be repaid during the 2011-13 biennium. The 2013 Study will

Exhibit 5-9: Comparison of Bridge and Interchange Responsibility Results from 2009 and 2011 OR HCASs (thousands of dollars)

	2009 Study			2011 Study		
Expenditure Work Type	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility	Expenditures Allocated	Light Vehicle Responsibility	Heavy Vehicle Responsibility
Bridge and Interchange	172,972	78,842	94,130	144,292	64,362	79,930
	9.4%	45.6%	54.4%	9.6%	44.6%	55.4%
Bridge Maintenance	13,045	11,829	1,216	27,091	24,672	2,420
	0.7%	90.7%	9.3%	1.8%	91.1%	8.9%
Total Bridge and Interchange Expenditures	186,017	90,671	95,346	171,384	89,034	82,350
	10.1%	48.7%	51.3%	11.4%	51.9%	48.1%

Exhibit 5-10: Average Annual Cost Responsibility by Weight Group with Prior Allocated Expenditures (thousands of dollars)

Declared Weight in Pounds			Total Without Prior Allocated Expenditures	Prior Allocated Expenditures	Total With Prior Allocated Expenditures
1	to	10,000	993,857	76,939	1,070,796
10,001	to	26,000	57,932	7,563	65,494
26,001	to	78,000	58,390	7,413	65,803
78,001	to	80,000	220,135	29,406	249,541
80,001	to	104,000	71,531	15,125	86,656
104,001	to	105,500	96,435	16,115	112,551
105,501	and	up	7,203	341	7,544
Total			1,505,483	152,902	1,658,385

include the same allocated expenditures from the 2003, 2005, 2007, and 2009 studies as well as allocated bond expenditures from the current study.

For illustrative purposes, Exhibit 5-11 compares the expenditure allocation results (with prior allocated costs) for the present study with those of the previous study. As shown, the shares are nearly identical: the all-vehicle responsibility shares in the 2009 Study shares are 64.5 percent for light vehicles and 35.5 percent for heavy vehicles; the 2011 Study shares are 64.6 percent for light vehicles and 35.4 percent for heavy vehicles.

Exhibit 5-11: Cost Responsibility Distributions by Weight Group-Comparison Between 2009 and 2011 OR HCASs

Declared Weight in Pounds			2009 Study	2011 Study	Change in Percentage
1	to	10,000	64.5%	64.6%	0.0%
10,001	to	26,000	4.1%	3.9%	-0.2%
26,001	to	78,000	4.5%	4.0%	-0.6%
78,001	to	80,000	16.7%	15.0%	-1.6%
80,001	to	104,000	5.0%	5.2%	0.2%
104,001	to	105,500	4.7%	6.8%	2.1%
105,501	and	up	0.4%	0.5%	0.1%
Total			9.2%	100.0%	

Revenue Attribution Results

The attribution of revenues to the various vehicle types and weight classes is an important element of a highway cost allocation study. Once accomplished, the shares of projected payments are compared to the shares of cost responsibility for each class to determine whether each class is paying more or less than its fair share under the existing tax structure and rates. Where significant imbalances are detected, recommendations for changes in tax rates are made to bring payments back into balance with cost responsibilities.

As noted in Chapter 4, most of the required revenue data for the study, including control totals for forecasted revenues by tax instrument (e.g, fuel, registration, weight-mile), are obtained from ODOT's revenue forecasting model. Every effort is made to ensure that the data used in the HCAS are consistent with the most recent revenue forecast available at the time the study is being conducted. Some information required for the HCAS, however, is not available from the revenue forecasting model and so must be estimated from other sources. The revenue model, for example, does not project fuel tax payments by detailed, 2,000-pound weight class. Therefore, estimated fuel efficiencies by vehicle type and weight group must be used together with control totals from the revenue model to attribute projected fuel tax payments to the detailed vehicle classes.

The revenue attribution results are summarized in Exhibit 5-12. For the next biennium, under existing tax rates, it is forecasted that light vehicles will contribute 65.9 percent of State Highway Fund revenues and heavy vehicles will contribute 33.9 percent. The 33.9 percent projected payment share for heavy vehicles is less than the overall responsibility share of 35.4 percent for these vehicles reported earlier in this chapter. However, these results need to be adjusted to reflect the impacts of tax exemptions and reduced rates granted to certain types of vehicles. As explained in the following chapter, these adjustments have a significant effect on the relative shares of attributed revenues and allocated expenditures for the various vehicle classes.

Exhibit 5-12: Average Annual User-Fee Revenue by Tax Instrument and Weight Class (thousands of dollars)

Declared Weight in Pounds			Fuel Tax	Registration and Title Fees	Weight-Mile Tax	Other Motor Carrier	Flat Fee	RUAF	Total
1	to	10,000	515,451	226,959	0	0	0	0	742,410
10,001	to	26,000	17,208	28,437	0	0	0	0	45,644
26,001	to	78,000	2,706	5,601	18,232	700	59	0	27,297
78,001	to	80,000	246	31,434	176,147	3,378	3,967	0	215,171
80,001	to	104,000	87	5,187	31,705	589	4,198	33	41,799
104,001	to	105,500	191	7,492	41,983	761	985	34	51,446
105,501	and	up	0	146	0	10	0	2,310	2,466
Total			535,888	305,255	268,067	5,437	9,209	2,377	1,126,232
Total for Vehicles Under 10,001 Pounds			515,451	226,959	0	0	0	0	742,410
% for Vehicles Under 10,0001 Pounds			96.2%	74.4%	0.0%	0.0%	0.0%	0.0%	65.9%
Total for Vehicles Over 10,000 Pounds			20,437	78,296	268,067	5,437	9,209	2,377	381,446
% for Vehicles Over 10,000 Pounds			3.8%	25.6%	100.0%	100.0%	100.0%	100.0%	33.9%
Total for Vehicles Under 26,001 Pounds			532,658	255,396	0	0	0	0	788,054
% for Vehicles Under 26,001 Pounds			99.4%	83.7%	0.0%	0.0%	0.0%	0.0%	70.0%
Total for Vehicles Over 26,000 Pounds			3,229	49,859	268,067	5,437	9,209	2,377	335,802
% for Vehicles Over 26,000 Pounds			0.6%	16.3%	100.0%	100.0%	100.0%	100.0%	29.8%

Exhibit 5-12 also illustrates how the relative payments of different vehicle weight groups vary by tax instrument. Light vehicles are projected to contribute approximately 96.2 percent of fuel tax revenues and 74.4 percent of registration and title fee revenues. Heavy vehicles, on the other hand, contribute 100 percent of weight-mile tax, flat fee, and road use assessment fee revenues. Heavy vehicles also contribute 100 percent of the other motor carrier revenue identified in the exhibit. This category includes revenues from truck overweight/overlength permit fees, late payment penalties and interest, etc.

Exhibit 5-13 compares the revenue attribution results of the present study with those of the 2009 Study. The projected share of revenues contributed by light vehicles has increased slightly from 65.3 percent in the 2009 Study to 65.9 percent in the present study. Conversely, the overall heavy vehicle share of projected payments has decreased from 34.7 percent in the previous study to 34.1 percent in the present study.

Exhibit 5-13: Revenue Attribution Distributions by Weight Group-Comparison Between 2009 and 2011 OR HCASs

Declared Weight in Pounds			2009 Study	2011 Study	Change in Percentage
1	to	10,000	65.3%	65.9%	0.6%
10,001	to	26,000	4.2%	4.1%	-0.2%
26,001	to	78,000	2.9%	2.4%	-0.5%
78,001	to	80,000	18.9%	19.1%	0.2%
80,001	to	104,000	4.1%	3.7%	-0.4%
104,001	to	105,500	4.3%	4.6%	0.3%
105,501	and	up	0.2%	0.2%	0.0%
Total			100.0%	100.0%	

Chapter 6

Comparison of Expenditures Allocated to Revenues Paid

This chapter brings together the expenditure allocation and revenue attribution results reported in Chapter 5 to compare projected responsibilities and tax payments for each vehicle class and for broader group of vehicles (e.g., all heavy vehicles combined). This comparison is facilitated by the calculation of equity ratios, or the ratio of the share of revenues contributed by the vehicles in a class to the share of cost responsibility for vehicles in that class. An equity ratio greater than 1 indicates that the vehicles in that class are projected to pay more than their cost-responsible share of user fees. Conversely, an equity ratio less than 1 indicates that the vehicles in that class are projected to pay less than their cost-responsible share.

The comparison of revenue shares to cost responsibility shares in the Oregon studies is traditionally done for full-fee-paying vehicles only. This study takes the same approach, which requires some further adjustments to the numbers presented in Chapter 5. The model separately estimates the revenue contributions from full-fee-paying and alternative-fee-paying vehicles for each tax instrument. For alternative-fee-paying vehicles, the model also estimates the fees they would pay if they were full-fee-paying vehicles. The expenditures allocated to each vehicle class are apportioned among full-fee-paying and alternative-fee-paying vehicles on the basis of the relative miles of travel of each in that class.[1]

Presentation of Equity Ratios

Exhibit 6-1 includes calculated equity ratios for the summary-level weight groups shown in earlier exhibits. Exhibit 6-3, at the end of this chapter, shows the equity ratios for each 2,000-pound weight class. It needs to be emphasized that these results are for full-fee-paying vehicles only, and exclude vehicles that pay on an alternative-fee basis.

As shown in the first table within Exhibit 6-1, projected 2012 vehicle miles traveled (VMT) for full-fee-paying vehicles are 37.2 billion, 93.5 percent of these miles being traveled by light vehicles and 6.5 percent by heavy vehicles. This compares to projected 2012 miles of travel by all vehicles of 38.1 billion, 93.0 percent by light vehicles and 7.0 percent by heavy vehicles. As explained in the previous chapter, alternative-fee-paying vehicles are disproportionately concentrated in the heavy vehicle classes, so excluding them will reduce the heavy vehicle share of VMT. The heavy vehicle percentage share of VMT, in other words, will always be

[1] If, for example, 80 percent of the VMT in a weight class are by full-fee-paying vehicles and 20 percent are by alternative-fee-paying vehicles, then 80 percent of the total responsibility of that class is assigned to full-fee-paying vehicles and 20 percent to alternative-fee-paying vehicles. This division is based on the reasonable assumption that two vehicles that are identical, except one is subject to full fees and the other alternative fees, have exactly the same per-mile cost responsibility.

lower if only full-fee-paying vehicles are considered than if all vehicles are considered.

The projected total cost responsibility of full-fee-paying vehicles is $1.60 billion, with responsibility shares of 65.5 percent for light vehicles and 34.5 percent for heavy vehicles. This compares to the projected total responsibility for all vehicles of $1.66 billion. The difference between these two amounts is the projected responsibility of alternative-fee-paying vehicles.

Forecasted average annual user fees paid by full-fee-paying vehicles total $1.12 billion, 65.7 percent from light vehicles and 34.3 percent from heavy vehicles. The difference between this total and the $1.13 billion total for all vehicles represents projected revenues from alternative-fee-paying vehicles.

The total of the Allocated Alternative-Fee Difference column represents the average annual difference between what alternative-fee-paying vehicles are projected to pay and what they would pay if subject to full fees. This total is $28.8 million annually for the next biennium under existing tax rates.[2] Following the approach of previous studies, this amount is reassigned to the full-fee-paying vehicle classes based on the relative VMT of each class.

Because the current study includes expenditures of funds from federal and local revenue sources, the allocated expenditures for full-fee-paying vehicles are more than twice the attributed state revenues for these vehicles. This does not present a problem in calculating the equity ratios themselves but it does raise an issue as to how and at what stage the alternative-fee difference adjustment should be made.[3] In this study, the allocated alternative-fee difference is added to allocated costs for full-fee-paying vehicles before calculating the share of costs in the denominator of the equity ratio.

The equity ratios are calculated four different ways to illustrate the effects of considering only full-fee-paying vehicle costs and revenues and of adding the allocated alternative-fee difference. The last table in Exhibit 6-1 presents the unadjusted and alternative-fee difference-adjusted equity ratios for full-fee-paying vehicles. The adjusted ratios in the final column are more important, however, because it is these results that form the basis for the determination of whether rates should be adjusted.

This study finds overall equity ratios of 0.9954 for light vehicles and 1.0089 for heavy vehicles as a group. This means that, for the 2011-13 biennium, under the existing tax structure and rates, light and heavy vehicles are each expected to pay very close to their fair shares.

Exhibit 6-1 also shows the overall equity ratios for vehicles under and over 26,000 pounds, as well as for the summary-level weight groups shown in earlier exhibits. Vehicles with weights between 10,001 pounds and 26,000 pounds are projected to overpay their responsibility by 24.4 percent. This is almost entirely a result of the adjustments for full-fee-paying vehicles

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[2] These amounts represent the underpayment by alternative-fee-paying vehicles relative to what they would pay on a full-fee basis – the difference, for example, between revenues from publicly owned vehicles under the existing tax structure versus revenues from these vehicles if they were all subject to the state fuel tax or weight-mile tax and full registration fees. The amounts, however, do not necessarily represent an underpayment relative to the cost responsibility of these vehicles. Some flat-fee vehicles, for instance, pay more under the alternative fee structure than they would under the weight-mile tax, while others pay less.

[3] The calculation of equity ratios in the model is accomplished by comparing ratios of revenues attributed to ratios of expenditures allocated. For each vehicle class, the ratio of the revenues attributed to this class to the total revenue attributed to all classes is first calculated. This ratio is then divided by the ratio of the expenditures allocated to this class to the total expenditures allocated to all classes. Thus, the calculation of the equity ratios does not require scaling of either the attributed revenues or allocated expenditures when the two are not equal.

in the equity-ratio calculation, as all vehicles in this group pay close to their fair share.

Vehicles with declared weights between 26,001 and 78,000 pounds as a group underpay their fair share by 17.0 percent and those between 78,001 and 80,000 pounds overpay by 26.3 percent. Vehicles in the 78,001-80,000 pound class alone account for 48.0 percent of the VMT by full-fee-paying heavy vehicles and 60.1 percent of the VMT by over 26,000-pound vehicles. These vehicles also account for 45.0 percent of the cost responsibility (after allocation of the alternative-fee difference) and 56.3 percent of the user fees paid by full-fee-paying heavy vehicles. The reason for the large difference in the equity ratio between this group and the groups above and below it is that most truckers who are capable of operating at 80,000 pounds and do not know in advance how much their loads will weigh, declare at 80,000 pounds. As a result, the average operating weights of vehicles declared at 80,000 pounds are a substantially lower fraction of their declared weight than for other declared weight classes, and the wear-related costs they impose per mile are correspondingly lower.

As a group, vehicles between 80,001 and 105,500 pounds (Schedule B vehicles) pay 30.6 percent less than their fair share. Those in the 104,001 to 105,500 range pay 31.9 percent less than their fair share.

Vehicles over 105,500 pounds all pay the road use assessment fee, as do some vehicles between 98,001 and 105,500 pounds. Those over 105,500 pounds underpay their fair share by 52.2 percent, an increase of about 10 percent from the 2009 Study. This study and the 2005, 2007, and 2009 studies report smaller underpayments for these vehicles than did the 2001 and 2003 studies primarily because the model was changed for the 2005 Study to attribute portions of vehicle registration fees to these vehicles. Since no vehicle can register above 105,500 pounds, no registration fees were attributed to these vehicles in earlier studies.

Comparison With the 1999, 2001, 2003, 2005, 2007, and 2009 Oregon Studies

The overall light and heavy vehicle equity ratios found by this study are slightly different from those determined by the prior five Oregon studies. The alternative-fee-difference-adjusted equity ratios found by the 1999 Study were 0.97 for light vehicles and 1.05 for heavy vehicles as a group, indicating a projected underpayment of 3 percent by light vehicles and overpayment of 5 percent by heavy vehicles. The analysis period for the 1999 Study was the 1999-01 biennium. On the basis of these results, the 1999 Legislature enacted an across-the-board 12.3 percent reduction in the weight-mile tax rates.[4] This reduction became effective September 1, 2000.

The 2001 Study found adjusted equity ratios of 1.003 for light vehicles and 0.995 for heavy vehicles as a group. This indicated a situation of near-perfect equity for the 2001-03 biennium analysis period, that is, a 0.3 percent projected overpayment by full-fee-paying light vehicles and a 0.5 percent projected underpayment by heavy vehicles. As a consequence, no adjustment in tax rates was deemed necessary by the legislature to satisfy the constitutional requirement of “fairness and proportionality” between light and heavy vehicles.

The 2003 Study found adjusted equity ratios of 0.9921 for light vehicles and 1.0158 for heavy vehicles. The 2003 Legislature did not change rates as a direct result of the 2003 Study but did increase registration and other fees to meet the

[4] The overall results of the 1999 Study were implemented by a proportionate reduction in all the weight-mile tax rates. The legislature, however, did not implement the detailed recommendations of the 1999 or 2001 studies.

Exhibit 6-1: Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

Declared Weight			Annual VMT All	Annual VMT Full-Fee	Annual VMT Alternative Fee	Percent of Annual VMT All	Percent of Annual VMT Full-Fee	Percent of Annual VMT Alternative Fee
1	to	10,000	35,416,749,479	34,756,643,957	660,105,523	93.0%	93.5%	73.2%
10,001	to	26,000	622,014,193	488,807,967	133,206,226	1.6%	1.3%	14.8%
26,001	to	78,000	373,366,522	275,369,501	97,997,022	1.0%	0.7%	10.9%
78,001	to	80,000	1,169,779,027	1,164,919,723	4,859,304	3.1%	3.1%	0.5%
80,001	to	104,000	232,111,779	230,498,180	1,613,599	0.6%	0.6%	0.2%
104,001	to	105,500	266,176,184	262,743,054	3,433,130	0.7%	0.7%	0.4%
105,501	and	up	3,234,030	3,234,030	0	0.0%	0.0%	0.0%
	Total		38,083,431,215	37,182,216,412	901,214,803	100.0%	100.0%	100.0%
10,001	and	up	2,666,681,736	2,425,572,455	241,109,281	7.0%	6.5%	26.8%
26,001	to	80,000	1,543,145,549	1,440,289,224	102,856,326	4.1%	3.9%	11.4%
80,001	to	105,500	498,287,963	493,241,234	5,046,729	1.3%	1.3%	0.6%
26,001	to	105,500	2,041,433,513	1,933,530,458	107,903,055	5.4%	5.2%	12.0%
26,001	and	up	2,044,667,543	1,936,764,488	107,903,055	5.4%	5.2%	12.0%

Declared Weight			Annual Cost Responsibility State	Federal	Local	Total	Full-Fee	Percent of Cost Responsibility State	Federal	Local	Total	Full-Fee
1	to	10,000	558,874,196	228,517,708	283,403,850	1,070,795,755	1,050,838,017	68.4%	56.0%	65.4%	64.6%	65.5%
10,001	to	26,000	24,060,248	17,850,314	23,583,720	65,494,282	49,365,286	2.9%	4.4%	5.4%	3.9%	3.1%
26,001	to	78,000	26,857,404	15,455,291	23,490,371	65,803,067	50,139,813	3.3%	3.8%	5.4%	4.0%	3.1%
78,001	to	80,000	120,377,520	77,570,214	51,592,914	249,540,648	248,504,047	14.7%	19.0%	11.9%	15.0%	15.5%
80,001	to	104,000	39,145,584	29,634,837	17,875,788	86,656,209	86,037,571	4.8%	7.3%	4.1%	5.2%	5.4%
104,001	to	105,500	45,840,269	37,668,104	29,042,405	112,550,778	111,032,142	5.6%	9.2%	6.7%	6.8%	6.9%
105,501	and	up	1,564,832	1,436,491	4,542,529	7,543,852	7,541,801	0.2%	0.4%	1.0%	0.5%	0.5%
Total			816,720,053	408,132,959	433,531,577	1,658,384,590	1,603,458,677	100.0%	100.0%	100.0%	100.0%	100.0%
10,001	and	up	257,845,857	179,615,251	150,127,727	587,588,835	552,620,660	31.6%	44.0%	34.6%	35.4%	34.5%
26,001	to	80,000	147,234,924	93,025,506	75,083,285	315,343,714	298,643,860	18.0%	22.8%	17.3%	19.0%	18.6%
80,001	to	105,500	84,985,853	67,302,941	46,918,193	199,206,988	197,069,713	10.4%	16.5%	10.8%	12.0%	12.3%
26,001	to	105,500	232,220,777	160,328,447	122,001,478	514,550,702	495,713,573	28.4%	39.3%	28.1%	31.0%	30.9%
26,001	and	up	233,785,609	161,764,938	126,544,007	522,094,554	503,255,374	28.6%	39.6%	29.2%	31.5%	31.4%

Exhibit 6-1 (continued)

Declared Weight			Annual User Fees: All	Full-Fee	Alternative-Fee Difference	Allocated Alternative-Fee Difference	Percent of User Fees: All	Full-Fee	Alternative-Fee Difference	Allocated Alternative-Fee Difference
1	to	10,000	742,409,718	734,078,259	5,610,310	26,879,031	65.9%	65.7%	19.5%	93.5%
10,001	to	26,000	45,644,216	42,339,113	9,257,294	378,019	4.1%	3.8%	32.2%	1.3%
26,001	to	78,000	27,297,061	28,601,158	11,067,345	212,957	2.4%	2.6%	38.5%	0.7%
78,001	to	80,000	215,170,591	215,543,485	1,272,004	900,890	19.1%	19.3%	4.4%	3.1%
80,001	to	104,000	41,798,995	41,971,100	466,894	178,256	3.7%	3.8%	1.6%	0.6%
104,001	to	105,500	51,446,130	51,860,017	1,080,998	203,192	4.6%	4.6%	3.8%	0.7%
105,501	and	up	2,465,528	2,465,528	0	2,501	0.2%	0.2%	0.0%	0.0%
	Total		1,126,232,238	1,116,858,658	28,754,846	28,754,846	100.0%	100.0%	100.0%	100.0%
10,001	and	up	383,822,520	382,780,399	23,144,535	1,875,815	34.1%	34.3%	80.5%	6.5%
26,001	to	80,000	242,467,652	244,144,642	12,339,350	1,113,847	21.5%	21.9%	42.9%	3.9%
80,001	to	105,500	93,245,125	93,831,117	1,547,892	381,448	8.3%	8.4%	5.4%	1.3%
26,001	to	105,500	335,712,777	337,975,759	13,887,241	1,495,295	29.8%	30.3%	48.3%	5.2%
26,001	and	up	338,178,304	340,441,287	13,887,241	1,497,796	30.0%	30.5%	48.3%	5.2%

Declared Weight			Share of Full-Fee Revenues	Share of Full-Fee Costs	Share of Full-Fee Costs + Allocated Difference	Full-Fee Equity Ratio	Difference-Adjusted Full-Fee Equity Ratio
1	to	10,000	65.7%	65.5%	66.0%	1.0029	0.9954
10,001	to	26,000	3.8%	3.1%	3.0%	1.2313	1.2439
26,001	to	78,000	2.6%	3.1%	3.1%	0.8190	0.8301
78,001	to	80,000	19.3%	15.5%	15.3%	1.2453	1.2630
80,001	to	104,000	3.8%	5.4%	5.3%	0.7004	0.7114
104,001	to	105,500	4.6%	6.9%	6.8%	0.6706	0.6813
105,501	and	up	0.2%	0.5%	0.5%	0.4693	0.4776
Total			100.0%	100.0%	100.0%	1.0000	1.0000
10,001	and	up	34.3%	34.5%	34.0%	0.9944	1.0089
26,001	to	80,000	21.9%	18.6%	18.4%	1.1737	1.1903
80,001	to	105,500	8.4%	12.3%	12.1%	0.6836	0.6945
26,001	to	105,500	30.3%	30.9%	30.5%	0.9788	0.9934
26,001	and	up	30.5%	31.4%	30.9%	0.9712	0.9857

debt-service requirements of the OTIA III bond program. Those fee increases were designed to preserve light/heavy equity given the nature of the projects they would fund, and the results of this study indicate that they succeeded.

The 2005 Study found adjusted equity ratios of 1.0032 for light vehicles and

0.9936 for heavy vehicles. This indicated near-perfect equity for the 2005-07 biennium analysis period: a 0.32 percent projected overpayment by full-fee paying light vehicles and a 0.64 percent underpayment by full-fee paying heavy vehicles.

The 2007 Study found adjusted equity ratios of 0.9933 for light vehicles and 1.0129 for heavy vehicles. As in the 2005 Study, these equity ratios indicated near-perfect equity for the 2007-09 biennium analysis period.

The 2009 Study found adjusted equity ratios of 0.9915 for light vehicles and 1.0173 for heavy vehicles. As in recent studies, these equity ratios indicated near-perfect equity for the 2009-11 biennium analysis period.

All of the recent prior studies, as well as this current study, have projected an overpayment by vehicles in the 78,001-80,000 pound class and an underpayment by vehicles weighing more than 80,000 pounds.

Comparison of 2011 Results Using New NAPCOM Pavement Factors and Pavement Factors from the 2009 Study

The 2011 Study results, described above, were prepared using pavement factors from the newly revised 2010 NAPCOM model. Results were also produced using the pavement factors from the 2009 Study in the 2011 model to analyze the impact of changes in pavement factors from the new NAPCOM model. As indicated in Chapter 5, when using the new 2011 pavement factors, basic vehicle pavement expenditure cost responsibility is lower by about 3 to 5 percent, depending on the type of pavement expenditure,.

The small shift in the allocation of pavement expenditures from basic vehicles to heavy vehicles implies that basic vehicle share of cost responsibility overall is slightly lower when using the new pavement factors. Hence, when using the 2009 pavement factors in the 2011 model, the adjusted equity ratios are 0.9761 for basic vehicles and 1.0486 for heavy vehicles, compared to 0.9954 and 1.0089,

Exhibit 6-2: Comparison of Equity Ratios from the 1999, 2001, 2003, 2005, 2007, 2009, and 2011 Oregon Highway Cost Allocation Studies

			Alternative-Fee Difference Adjusted Equity Ratios for Full-Fee-Paying Vehicles						
Declared Weight			1999	2001	2003	2005	2007	2009	2011
1	to	10,000	0.9700	1.0027	0.9921	1.0032	0.9933	0.9915	0.9954
10,001	to	26,000	1.0000	0.9440	1.3803	1.1846	1.2557	1.1576	1.2439
26,001	to	78,000		0.9596	1.0091	0.7401	0.7485	0.7881	0.8301
78,001	to	80,000		1.0603	1.0931	1.0610	1.1274	1.1234	1.2630
80,001	to	104,000		0.9479	0.7430	0.9034	0.8427	0.8278	0.7114
104,001	to	105,500		0.8712	0.7576	0.8759	0.8299	0.9210	0.6813
105,501	and	up	1.3500	0.4727	0.2678	0.6395	0.6127	0.5932	0.4776
Total			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10,001	and	up	1.0500	0.9952	1.0158	0.9936	1.0129	1.0173	1.0089
26,001	to	80,000				1.0189	1.0742	1.0655	1.1903
80,001	to	105,500				0.8880	0.8357	0.8763	0.6945
26,001	to	105,500				0.9812	1.0007	1.0068	0.9934
26,001	and	up		0.9996	0.9870	0.9789	0.9984	1.0013	0.9857

the adjusted equity ratios when using the new pavement factors. Using the 2009 pavement factors, basic vehicles underpay by 2.39 percent and heavy vehicles overpay by 4.86 percent. The largest difference for the vehicle summary weight groups is seen for vehicles with declared weights of 104,001 to 105,000 pounds. Vehicles in this weight class have an adjusted equity ratio of 0.8367 using the 2009 pavement factors and an adjusted equity ratio of 0.6813 using the 2011 pavement factors. Some of this difference reflects the use of new declared-to-operating weight distributions in the creation of the 2011 pavement factors.

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
1	0	35,416,749,479	34,756,643,957	$1,070,795,755	$1,050,838,017	$742,409,718	$734,078,259	$5,610,310	$26,879,031	1.0209	0.9954
10,001	0	105,791,369	92,698,785	6,575,164	5,761,432	6,544,679	6,163,372	489,195	71,689	1.4657	1.5442
12,001	0	61,512,520	47,625,517	4,536,219	3,512,127	3,780,334	3,436,434	658,120	36,831	1.2271	1.4151
14,001	0	143,541,188	112,957,769	11,160,088	8,782,279	9,459,446	8,509,272	1,353,719	87,356	1.2481	1.4021
16,001	0	69,079,040	63,045,917	6,182,294	5,642,354	5,599,521	5,437,235	358,025	48,757	1.3337	1.3962
18,001	0	65,949,567	57,320,058	6,739,034	5,857,230	5,667,743	5,483,555	641,359	44,328	1.2384	1.3579
20,001	0	12,868,249	6,531,622	1,768,696	897,749	825,862	738,997	630,070	5,051	0.6876	1.1963
22,001	0	35,853,175	25,867,253	5,274,476	3,805,415	3,073,338	2,993,964	1,076,431	20,004	0.8580	1.1438
24,001	0	127,419,085	82,761,045	23,258,311	15,106,702	10,693,292	9,576,284	4,050,375	64,003	0.6770	0.9225
26,001	0	19,425,324	9,462,190	2,969,401	1,446,413	666,731	751,119	875,272	7,318	0.3306	0.7551
28,001	0	24,337,606	13,476,463	3,962,230	2,194,005	945,960	1,088,208	1,019,272	10,422	0.3516	0.7214
30,001	0	47,228,209	34,172,106	9,443,107	6,832,588	1,926,361	2,504,684	1,535,285	26,427	0.3004	0.5337
32,001	0	34,832,856	28,819,206	5,622,108	4,651,490	2,187,809	2,260,814	544,765	22,287	0.5730	0.7069
34,001	0	11,017,039	3,942,941	1,843,672	659,841	381,760	395,848	724,284	3,049	0.3049	0.8727
36,001	0	6,819,120	3,160,941	1,393,499	645,944	273,956	289,955	351,565	2,445	0.2895	0.6535
38,001	0	39,394,132	5,071,473	5,137,547	661,391	499,319	615,384	4,280,854	3,922	0.1431	1.3518
40,001	0	5,895,361	3,626,736	940,067	578,315	330,221	378,257	284,647	2,805	0.5173	0.9513
42,001	0	5,877,997	3,643,061	1,130,411	700,605	384,525	412,504	281,042	2,817	0.5009	0.8570
44,001	0	29,198,121	27,357,377	4,498,489	4,214,890	2,832,176	2,856,597	216,627	21,157	0.9271	0.9855
46,001	0	12,672,567	11,293,218	2,544,373	2,267,430	1,213,233	1,228,425	165,231	8,734	0.7021	0.7887
48,001	0	18,210,105	16,962,346	3,572,671	3,327,871	1,790,234	1,813,801	156,991	13,118	0.7379	0.7934
50,001	0	15,607,451	14,935,159	2,767,482	2,648,273	1,561,822	1,580,380	89,697	11,550	0.8310	0.8683
52,001	0	22,263,774	21,372,332	4,303,310	4,131,005	2,309,758	2,335,482	123,137	16,528	0.7904	0.8229
54,001	0	24,584,001	23,686,138	4,806,049	4,630,521	2,680,508	2,685,650	106,945	18,318	0.8213	0.8443
56,001	0	8,618,519	8,414,198	1,710,340	1,669,793	948,898	955,436	29,739	6,507	0.8169	0.8330
58,001	0	7,873,924	7,573,749	1,533,631	1,475,164	895,926	908,372	48,448	5,857	0.8602	0.8964

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
60,001	0	1,083,796	1,065,489	287,957	283,093	127,637	128,635	3,208	824	0.6527	0.6621
62,001	0	1,874,896	1,818,895	364,848	353,951	229,137	231,432	9,420	1,407	0.9248	0.9518
64,001	0	13,677,848	13,225,093	2,604,787	2,518,565	1,706,074	1,737,647	91,061	10,228	0.9645	1.0042
66,001	0	3,002,621	2,750,686	667,065	611,095	376,032	394,565	54,671	2,127	0.8301	0.9403
68,001	0	9,482,286	9,386,533	1,724,912	1,707,494	1,351,165	1,356,427	19,100	7,259	1.1534	1.1560
70,001	0	2,463,351	2,445,498	517,582	513,831	371,160	372,491	4,050	1,891	1.0559	1.0555
72,001	0	1,498,883	1,459,553	232,468	226,368	236,440	239,310	9,318	1,129	1.4977	1.5373
74,001	0	5,349,939	5,286,428	1,007,858	995,893	888,238	891,903	14,380	4,088	1.2977	1.3035
76,001	0	1,076,799	961,692	217,200	193,982	181,978	187,831	28,335	744	1.2337	1.4097
78,001	0	1,169,779,027	1,164,919,723	249,540,648	248,504,047	215,170,591	215,543,485	1,272,004	900,890	1.2697	1.2630
80,001	5	17,234,840	17,130,327	5,345,459	5,313,044	2,984,148	2,994,625	28,747	13,248	0.8220	0.8217
80,001	6	364,338	361,559	125,645	124,686	63,278	63,515	724	280	0.7416	0.7428
80,001	7	688,779	683,527	169,505	168,212	113,071	113,514	1,316	529	0.9823	0.9831
80,001	8	111,737	110,885	36,052	35,777	17,573	17,645	207	86	0.7178	0.7190
80,001	9	18,896	18,752	6,561	6,511	2,833	2,845	34	15	0.6358	0.6371
82,001	5	10,317,407	10,275,601	3,548,290	3,533,912	1,965,515	1,969,409	11,906	7,947	0.8157	0.8126
82,001	6	1,592,541	1,586,303	436,386	434,677	274,335	274,922	1,667	1,227	0.9257	0.9217
82,001	7	69,784	69,495	25,894	25,787	11,552	11,578	74	54	0.6569	0.6548
82,001	8	39,357	39,195	15,113	15,051	6,225	6,239	41	30	0.6065	0.6046
82,001	9	13,374	13,319	4,599	4,580	2,015	2,020	13	10	0.6453	0.6432
84,001	5	9,665,751	9,508,437	4,314,703	4,244,479	1,838,570	1,852,507	44,587	7,353	0.6275	0.6367
84,001	6	4,930,226	4,850,224	1,787,339	1,758,336	852,635	859,610	21,155	3,751	0.7024	0.7129
84,001	7	359,081	352,716	119,037	116,927	59,645	60,170	1,610	273	0.7378	0.7503
84,001	8	100,922	99,083	35,806	35,154	16,222	16,368	450	77	0.6671	0.6790
84,001	9	26,122	25,627	10,101	9,909	4,032	4,070	117	20	0.5878	0.5991
86,001	5	3,177,230	3,157,110	1,271,624	1,263,571	614,390	616,538	6,078	2,442	0.7114	0.7117

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
86,001	6	21,790,758	21,666,965	7,358,967	7,317,160	3,550,906	3,565,245	34,708	16,756	0.7105	0.7104
86,001	7	665,772	660,902	233,475	231,767	106,832	107,346	1,305	511	0.6738	0.6754
86,001	8	200,068	198,457	98,225	97,434	32,918	33,067	418	153	0.4935	0.4952
86,001	9	28,409	28,159	14,895	14,764	4,511	4,533	63	22	0.4459	0.4481
88,001	5	2,217,893	2,205,283	830,847	826,123	393,679	395,346	3,928	1,705	0.6977	0.6979
88,001	6	34,276,917	34,040,814	11,967,819	11,885,383	5,940,179	5,966,528	67,732	26,325	0.7309	0.7320
88,001	7	624,558	620,417	298,452	296,473	96,937	97,415	1,129	480	0.4783	0.4794
88,001	8	63,724	63,271	41,378	41,084	10,063	10,111	120	49	0.3581	0.3592
88,001	9	9,590	9,507	3,844	3,810	1,529	1,537	21	7	0.5857	0.5882
90,001	5	232,260	228,844	115,528	113,829	50,654	50,999	1,106	177	0.6456	0.6537
90,001	6	3,570,407	3,522,876	1,758,550	1,735,139	665,608	670,607	14,047	2,724	0.5573	0.5639
90,001	7	1,469,974	1,453,456	564,800	558,454	242,476	244,302	4,602	1,124	0.6322	0.6380
90,001	8	21,412	21,097	10,973	10,812	3,599	3,630	85	16	0.4830	0.4900
90,001	9	8,123	8,003	3,583	3,530	1,302	1,313	31	6	0.5349	0.5427
92,001	5	82,079	81,012	42,624	42,070	18,765	18,873	358	63	0.6482	0.6547
92,001	6	2,289,992	2,264,586	941,426	930,981	420,236	423,174	7,686	1,751	0.6573	0.6630
92,001	7	660,548	651,108	312,031	307,572	118,806	119,744	2,674	504	0.5607	0.5680
92,001	8	25,207	24,847	10,899	10,743	4,317	4,353	99	19	0.5832	0.5911
92,001	9	11,065	10,907	4,991	4,920	1,804	1,819	42	8	0.5321	0.5395
94,001	5	1,099,409	1,085,312	359,813	355,200	260,644	262,150	4,911	839	1.0667	1.0760
94,001	6	5,348,981	5,305,277	1,635,095	1,621,736	951,982	957,717	13,625	4,103	0.8573	0.8609
94,001	7	23,613,068	23,312,967	9,578,710	9,456,973	4,354,985	4,385,605	87,075	18,029	0.6695	0.6764
94,001	8	897,217	887,050	353,800	349,791	150,918	152,034	2,858	686	0.6281	0.6340
94,001	9	29,746	29,358	14,171	13,986	4,953	4,993	106	23	0.5147	0.5209
96,001	5	2,092,164	2,087,161	725,238	723,504	495,775	496,390	1,805	1,614	1.0066	1.0004
96,001	6	3,321,412	3,314,663	1,077,982	1,075,791	654,628	655,457	2,163	2,563	0.8942	0.8883

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
96,001	7	24,852,935	24,791,645	10,308,555	10,283,133	4,563,118	4,569,958	18,139	19,173	0.6518	0.6483
96,001	8	845,070	842,881	358,703	357,774	144,530	144,779	626	652	0.5933	0.5903
96,001	9	74,721	74,558	30,353	30,286	2,660	2,700	45	58	0.1291	0.1300
98,001	5	-	-	2,249	-	-	-	-	-		
98,001	6	1,230,698	1,220,641	414,444	411,058	237,137	238,467	3,295	944	0.8425	0.8459
98,001	7	11,427,224	11,313,308	4,282,188	4,239,499	2,036,523	2,049,999	34,118	8,749	0.7003	0.7052
98,001	8	842,414	832,168	324,020	320,079	151,277	152,359	2,958	644	0.6875	0.6943
98,001	9	5,617	5,548	3,097	3,059	953	961	19	4	0.4533	0.4583
100,001	5	-	-	720	-	-	-	-	-		
100,001	6	-	-	3,704	-	-	-	-	-		
100,001	7	12,450,731	12,392,749	4,118,538	4,099,358	2,304,785	2,311,897	17,928	9,584	0.8240	0.8223
100,001	8	7,684,350	7,646,705	2,712,901	2,699,610	1,382,054	1,386,462	11,234	5,914	0.7502	0.7489
100,001	9	3,078	3,062	2,005	1,994	528	529	5	2	0.3875	0.3874
102,001	5	-	-	255	-	-	-	-	-		
102,001	6	-	-	1,932	-	-	-	-	-		
102,001	7	4,407,546	4,402,279	2,144,338	2,141,775	858,657	859,276	1,647	3,404	0.5896	0.5854
102,001	8	14,923,188	14,905,114	6,336,228	6,328,555	2,751,194	2,753,313	5,458	11,527	0.6394	0.6347
102,001	9	3,069	3,065	1,747	1,745	535	535	1	2	0.4506	0.4475
104,001	5	-	-	31,611	-	-	-	-	-		
104,001	6	-	-	35,851	-	-10,461	-	-	-		
104,001	7	98,149,121	96,894,458	38,260,126	37,771,038	19,488,537	19,638,951	404,714	74,933	0.7500	0.7584
104,001	8	164,725,424	162,588,217	72,311,796	71,373,597	31,419,090	31,666,794	663,961	125,738	0.6398	0.6473
104,001	9	3,301,639	3,260,379	1,911,393	1,887,507	548,964	554,273	12,323	2,521	0.4229	0.4286
106,001	5	-	-	181	-	-	-	-	-		
106,001	6	28,737	28,737	46,433	46,433	13,449	13,449	-	22	0.4265	0.4231
106,001	7	25,289	25,289	28,150	28,150	7,536	7,536	-	20	0.3942	0.3910

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
106,001	8	1,753	1,753	4,199	4,199	347	347	-	1	0.1217	0.1207
106,001	9	2,314	2,314	1,708	1,708	389	389	-	2	0.3352	0.3323
108,001	6	76,529	76,529	67,159	67,159	38,110	38,110	-	59	0.8356	0.8286
108,001	7	99,461	99,461	110,392	110,392	31,627	31,627	-	77	0.4219	0.4184
108,001	8	6,335	6,335	9,603	9,603	1,318	1,318	-	5	0.2020	0.2004
108,001	9	17,728	17,728	13,040	13,040	2,978	2,978	-	14	0.3363	0.3334
110,001	6	47,419	47,419	44,287	44,287	26,933	26,933	-	37	0.8955	0.8880
110,001	7	23,966	23,966	29,251	29,251	8,100	8,100	-	19	0.4078	0.4044
110,001	8	1,780	1,780	3,689	3,689	388	388	-	1	0.1549	0.1537
110,001	9	7,673	7,673	6,096	6,096	1,442	1,442	-	6	0.3484	0.3455
112,001	6	52,848	52,848	52,205	52,205	31,074	31,074	-	41	0.8765	0.8692
112,001	7	29,860	29,860	39,392	39,392	10,689	10,689	-	23	0.3996	0.3963
112,001	8	5,020	5,020	6,436	6,436	1,195	1,195	-	4	0.2733	0.2711
112,001	9	3,486	3,486	3,169	3,169	690	690	-	3	0.3207	0.3180
114,001	6	23,772	23,772	49,702	49,702	14,453	14,453	-	18	0.4282	0.4248
114,001	7	64,308	64,308	51,410	51,410	24,307	24,307	-	50	0.6962	0.6903
114,001	8	5,377	5,377	8,660	8,660	1,441	1,441	-	4	0.2450	0.2431
114,001	9	37,004	37,004	30,120	30,120	7,326	7,326	-	29	0.3582	0.3551
116,001	6	22,699	22,699	50,289	50,289	14,935	14,935	-	18	0.4373	0.4339
116,001	7	36,056	36,056	30,708	30,708	14,350	14,350	-	28	0.6881	0.6823
116,001	8	2,745	2,745	4,546	4,546	790	790	-	2	0.2560	0.2540
116,001	9	1,605	1,605	2,156	2,156	334	334	-	1	0.2281	0.2262
118,001	5	-	-	1,869	-	-	-	-	-		
118,001	6	37,092	37,092	43,947	43,947	26,260	26,260	-	29	0.8799	0.8727
118,001	7	108,290	108,290	187,419	187,419	45,263	45,263	-	84	0.3556	0.3528
118,001	8	10,187	10,187	9,892	9,892	3,138	3,138	-	8	0.4671	0.4632

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
118,001	9	4,947	4,947	6,777	6,777	1,078	1,078	-	4	0.2343	0.2324
120,001	6	11,282	11,282	28,310	28,310	8,439	8,439	-	9	0.4389	0.4355
120,001	7	40,484	40,484	39,576	39,576	17,732	17,732	-	31	0.6597	0.6543
120,001	8	4,015	4,015	6,587	6,587	1,277	1,277	-	3	0.2854	0.2831
120,001	9	1,108	1,108	2,142	2,142	264	264	-	1	0.1813	0.1798
122,001	6	12,344	12,344	32,858	32,858	9,850	9,850	-	10	0.4414	0.4380
122,001	7	43,029	43,029	45,431	45,431	19,707	19,707	-	33	0.6387	0.6335
122,001	8	5,155	5,155	7,967	7,967	1,794	1,794	-	4	0.3316	0.3289
122,001	9	448	448	1,415	1,415	120	120	-	0	0.1250	0.1240
124,001	6	2,986	2,986	8,423	8,423	2,592	2,592	-	2	0.4531	0.4495
124,001	7	95,879	95,879	106,249	106,249	46,787	46,787	-	74	0.6484	0.6431
124,001	8	17,026	17,026	25,738	25,738	6,095	6,095	-	13	0.3487	0.3459
124,001	9	14,018	14,018	16,406	16,406	4,037	4,037	-	11	0.3623	0.3594
126,001	6	2,779	2,779	8,321	8,321	2,523	2,523	-	2	0.4465	0.4431
126,001	7	67,422	67,422	78,549	78,549	34,924	34,924	-	52	0.6547	0.6493
126,001	8	6,497	6,497	11,030	11,030	2,391	2,391	-	5	0.3192	0.3166
126,001	9	968	968	2,911	2,911	288	288	-	1	0.1459	0.1447
128,001	6	1,342	1,342	4,259	4,259	1,340	1,340	-	1	0.4631	0.4595
128,001	7	103,517	103,517	261,560	261,560	57,761	57,761	-	80	0.3252	0.3226
128,001	8	24,436	24,436	41,119	41,119	9,969	9,969	-	19	0.3570	0.3542
128,001	9	10,354	10,354	15,035	15,035	3,189	3,189	-	8	0.3123	0.3098
130,001	7	42,679	42,679	55,894	55,894	25,522	25,522	-	33	0.6724	0.6669
130,001	8	9,046	9,046	15,802	15,802	3,962	3,962	-	7	0.3692	0.3663
130,001	9	3,141	3,141	4,916	4,916	999	999	-	2	0.2992	0.2968
132,001	7	80,001	80,001	212,468	212,468	51,039	51,039	-	62	0.3537	0.3510
132,001	8	22,763	22,763	21,819	21,819	10,198	10,198	-	18	0.6882	0.6825

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
132,001	9	3,282	3,282	5,761	5,761	1,044	1,044	-	3	0.2667	0.2646
134,001	6	30	30	998	998	36	36	-	0	0.0538	0.0534
134,001	7	69,631	69,631	197,330	197,330	47,209	47,209	-	54	0.3523	0.3495
134,001	8	28,250	28,250	27,618	27,618	13,221	13,221	-	22	0.7049	0.6990
134,001	9	19,620	19,620	26,778	26,778	6,827	6,827	-	15	0.3754	0.3724
136,001	6	24	24	97	97	33	33	-	0	0.5011	0.4972
136,001	7	31,830	31,830	93,850	93,850	22,853	22,853	-	25	0.3586	0.3558
136,001	8	14,530	14,530	28,806	28,806	7,236	7,236	-	11	0.3699	0.3669
136,001	9	5,671	5,671	8,738	8,738	2,030	2,030	-	4	0.3421	0.3394
138,001	6	2	2	9	9	3	3	-	0	0.5091	0.5052
138,001	7	46,238	46,238	150,199	150,199	35,048	35,048	-	36	0.3436	0.3409
138,001	8	43,834	43,834	44,805	44,805	22,705	22,705	-	34	0.7462	0.7400
138,001	9	13,987	13,987	22,914	22,914	5,147	5,147	-	11	0.3308	0.3281
140,001	7	18,839	18,839	31,030	31,030	15,221	15,221	-	15	0.7223	0.7166
140,001	8	6,689	6,689	13,926	13,926	3,799	3,799	-	5	0.4017	0.3986
140,001	9	4,977	4,977	8,609	8,609	1,931	1,931	-	4	0.3303	0.3277
142,001	7	13,157	13,157	44,149	44,149	11,420	11,420	-	10	0.3809	0.3779
142,001	8	15,535	15,535	32,907	32,907	9,445	9,445	-	12	0.4226	0.4193
142,001	9	7,882	7,882	12,840	12,840	3,294	3,294	-	6	0.3778	0.3748
144,001	7	22,686	22,686	80,987	80,987	20,599	20,599	-	18	0.3745	0.3716
144,001	8	26,384	26,384	30,740	30,740	16,833	16,833	-	20	0.8063	0.7997
144,001	9	12,705	12,705	13,897	13,897	5,564	5,564	-	10	0.5896	0.5848
146,001	7	9,577	9,577	36,049	36,049	9,367	9,367	-	7	0.3826	0.3796
146,001	8	28,426	28,426	68,694	68,694	18,420	18,420	-	22	0.3948	0.3917
146,001	9	8,891	8,891	10,184	10,184	3,983	3,983	-	7	0.5759	0.5712
148,001	7	4,426	4,426	17,547	17,547	4,550	4,550	-	3	0.3818	0.3789

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
148,001	8	34,170	34,170	91,502	91,502	24,192	24,192	-	26	0.3893	0.3863
148,001	9	27,330	27,330	50,458	50,458	12,517	12,517	-	21	0.3653	0.3624
150,001	7	195	195	822	822	210	210	-	0	0.3758	0.3729
150,001	8	7,522	7,522	11,131	11,131	5,551	5,551	-	6	0.7344	0.7285
150,001	9	7,277	7,277	8,680	8,680	3,551	3,551	-	6	0.6025	0.5975
152,001	7	39	39	175	175	45	45	-	0	0.3809	0.3780
152,001	8	13,430	13,430	41,484	41,484	10,314	10,314	-	10	0.3661	0.3633
152,001	9	6,385	6,385	13,301	13,301	3,180	3,180	-	5	0.3520	0.3492
154,001	7	116	116	539	539	139	139	-	0	0.3795	0.3766
154,001	8	29,326	29,326	48,280	48,280	23,402	23,402	-	23	0.7137	0.7080
154,001	9	31,931	31,931	65,575	65,575	16,540	16,540	-	25	0.3714	0.3685
156,001	7	20	20	98	98	25	25	-	0	0.3823	0.3793
156,001	8	14,767	14,767	51,802	51,802	12,670	12,670	-	11	0.3602	0.3574
156,001	9	16,475	16,475	34,556	34,556	9,687	9,687	-	13	0.4128	0.4095
158,001	7	30	30	156	156	40	40	-	0	0.3797	0.3768
158,001	8	33,895	33,895	126,356	126,356	29,760	29,760	-	26	0.3468	0.3441
158,001	9	44,538	44,538	55,315	55,315	27,079	27,079	-	34	0.7208	0.7150
160,001	8	12,065	12,065	23,876	23,876	11,076	11,076	-	9	0.6831	0.6777
160,001	9	12,828	12,828	15,515	15,515	8,184	8,184	-	10	0.7767	0.7704
162,001	8	17,598	17,598	38,204	38,204	17,562	17,562	-	14	0.6769	0.6716
162,001	9	10,104	10,104	25,487	25,487	6,648	6,648	-	8	0.3841	0.3811
164,001	7	18	18	107	107	27	27	-	0	0.3716	0.3688
164,001	8	12,518	12,518	57,532	57,532	12,868	12,868	-	10	0.3294	0.3268
164,001	9	45,329	45,329	115,249	115,249	32,092	32,092	-	35	0.4100	0.4068
166,001	8	1,349	1,349	6,662	6,662	1,440	1,440	-	1	0.3184	0.3159
166,001	9	14,388	14,388	38,577	38,577	10,762	10,762	-	11	0.4108	0.4076

Exhibit 6-3: Detailed Comparison of Average Annual Cost Responsibility and User Fees Paid by Full-Fee-Paying Vehicles by Declared Weight Class

		Annual VMT		Annual Cost Responsibility		Annual User Fees		Alternative-Fee Difference		Equity Ratio	
Weight Class	Axles	All	Full-Fee	All	Full-Fee Cost	All	Full-Fee	Alternative Fee Difference	Allocated Alternative-Fee Difference	Plain	Alternative-Fee Adjusted
168,001	8	5,043	5,043	26,608	26,608	5,688	5,688	-	4	0.3148	0.3124
168,001	9	44,123	44,123	122,616	122,616	34,327	34,327	-	34	0.4122	0.4090
170,001	8	624	624	3,526	3,526	729	729	-	0	0.3043	0.3020
170,001	9	15,873	15,873	47,328	47,328	12,826	12,826	-	12	0.3990	0.3959
172,001	9	26,833	26,833	79,112	79,112	23,290	23,290	-	21	0.4335	0.4301
174,001	8	28	28	180	180	36	36	-	0	0.2978	0.2956
174,001	9	47,172	47,172	74,764	74,764	42,360	42,360	-	36	0.8343	0.8276
176,001	9	33,997	33,997	106,162	106,162	31,549	31,549	-	26	0.4376	0.4342
178,001	8	22	22	160	160	31	31	-	0	0.2824	0.2802
178,001	9	53,269	53,269	89,032	89,032	53,162	53,162	-	41	0.8792	0.8722
180,001	9	14,618	14,618	49,945	49,945	15,027	15,027	-	11	0.4430	0.4396
182,001	9	34,202	34,202	61,203	61,203	36,527	36,527	-	26	0.8788	0.8718
184,001	9	61,174	61,174	227,605	227,605	69,003	69,003	-	47	0.4464	0.4430
186,001	9	22,252	22,252	84,568	84,568	25,768	25,768	-	17	0.4487	0.4452
188,001	9	39,614	39,614	77,213	77,213	47,853	47,853	-	31	0.9126	0.9054
190,001	9	19,830	19,830	81,567	81,567	25,144	25,144	-	15	0.4539	0.4504
192,001	9	17,110	17,110	73,169	73,169	22,550	22,550	-	13	0.4538	0.4503
194,001	8	125	125	1,511	1,511	249	249	-	0	0.2426	0.2408
194,001	9	51,518	51,518	108,378	108,378	69,961	69,961	-	40	0.9505	0.9430
196,001	9	44,133	44,133	195,777	195,777	62,580	62,580	-	34	0.4707	0.4671
198,001	9	77,650	77,650	355,976	355,976	113,212	113,212	-	60	0.4683	0.4647
200,001	9	367,072	367,072	1,748,883	1,748,883	553,538	553,538	-	284	0.4661	0.4625
Total		38,083,431,215	37,182,216,412	$1,658,384,590	$1,603,458,677	$1,126,232,238	$1,116,858,658	$28,754,846	$28,754,846		

Chapter 7

Recommendations for Changes in Tax Rates

Because light and heavy vehicles pay equitable shares of highway costs in Oregon, there is no constitutional requirement to change user-fee rates for the 2011-13 biennium. This report does not recommend any change that would affect the distribution of revenue burdens between light and heavy vehicles. Should rates be adjusted for other reasons, such as to fund additional highway projects, the proportional burdens on light and heavy vehicles should be maintained.

Within the various classes of heavy vehicles, there are inequities that the legislature could choose to address through changes to the rate structure. In this chapter, we offer alternative rate schedules that, if implemented, would bring about substantially greater equity within heavy vehicle classes without noticeably changing the total amount of revenue collected from heavy vehicles.

The inequities within heavy vehicle classes may be generalized as follows:

- vehicles weighing more than 80,000 pounds are paying less than their fair share
- vehicles with a declared weight of 78,000 to 80,000 pounds (which account for 57 percent of all vehicle miles by vehicles over 26,000 pounds and 44 percent of all heavy vehicle miles) are paying more than their fair share
- vehicles weighing more than 26,000 pounds, but less than 78,000 pounds, are paying less than their fair share
- vehicles between 10,000 and 26,000 pounds are paying more than their fair share

To achieve equity within heavy vehicle classes, several rate schedules would need to be changed. These include the Table A and Table B weight-mile tax rates; the optional flat fee rates for haulers of logs, sand and gravel, and wood chips; and the road use assessment fee applicable to vehicles operated under single-trip, non-divisible load permits at gross weights over 98,000 pounds.

Weight-Mile Tax Table A and Table B Rates

Commercial vehicles operated at declared weights of 26,001 to 105,500 pounds are subject to the weight-mile tax for their Oregon miles of travel. Operators of vehicles with declared weights of 26,001-80,000 pounds pay the statutory Table A rates. Vehicles operated under special annual permits at declared weights of 80,001-105,500 pounds are subject to the statutory Table B rates.[1]

Table A rates are specified for each 2,000-pound declared gross weight increment. The existing rates range from 4.98 cents per mile for vehicles declared at 26,001-28,000 pounds to 16.38 cents per

[1] Under the Oregon weight-mile tax system, a power unit (tractor) can have multiple declared weights, depending on the configuration in which it is being operated (i.e., the number of trailers/semi-trailers the truck or tractor is pulling). Hence, during any given reporting period, portions of a vehicle's miles may be reported under both Table A and Table B.

Exhibit 7-1: Weight-Mile Tax Table A

Declared Weight			Current WMT Rate	Alternative Rate	Difference	Percent Difference
26,001	to	28,000	$0.0498	$0.1026	$0.0528	106.04%
28,001	to	30,000	$0.0528	$0.1031	$0.0503	95.19%
30,001	to	32,000	$0.0552	$0.1035	$0.0483	87.52%
32,001	to	34,000	$0.0576	$0.1040	$0.0464	80.49%
34,001	to	36,000	$0.0599	$0.1044	$0.0445	74.32%
36,001	to	38,000	$0.0630	$0.1049	$0.0419	66.46%
38,001	to	40,000	$0.0654	$0.1053	$0.0399	61.04%
40,001	to	42,000	$0.0677	$0.1058	$0.0381	56.24%
42,001	to	44,000	$0.0702	$0.1062	$0.0360	51.32%
44,001	to	46,000	$0.0726	$0.1067	$0.0341	46.94%
46,001	to	48,000	$0.0749	$0.1071	$0.0322	43.03%
48,001	to	50,000	$0.0774	$0.1076	$0.0302	38.99%
50,001	to	52,000	$0.0803	$0.1080	$0.0277	34.54%
52,001	to	54,000	$0.0833	$0.1085	$0.0252	30.23%
54,001	to	56,000	$0.0864	$0.1089	$0.0225	26.08%
56,001	to	58,000	$0.0900	$0.1094	$0.0194	21.54%
58,001	to	60,000	$0.0941	$0.1098	$0.0157	16.73%
60,001	to	62,000	$0.0990	$0.1103	$0.0113	11.41%
62,001	to	64,000	$0.1045	$0.1107	$0.0062	5.98%
64,001	to	66,000	$0.1104	$0.1112	$0.0008	0.72%
66,001	to	68,000	$0.1183	$0.1116	-$0.0067	-5.62%
68,001	to	70,000	$0.1266	$0.1121	-$0.0145	-11.45%
70,001	to	72,000	$0.1350	$0.1126	-$0.0224	-16.63%
72,001	to	74,000	$0.1427	$0.1130	-$0.0297	-20.81%
74,001	to	76,000	$0.1500	$0.1135	-$0.0365	-24.36%
76,001	to	78,000	$0.1572	$0.1139	-$0.0433	-27.54%
78,001	to	80,000	$0.1638	$0.1191	-$0.0447	-27.29%

mile for vehicles declared at 78,001-80,000 pounds.

To achieve better equity within heavy vehicle classes, Table A rates could be changed to range from 10.26 cents per mile to 11.91 cents per mile, as shown in Exhibit 7-1. These rates are higher than existing rates for lower weights and lower than existing rates for the highest weights and would result in a 22 percent reduction in revenue collected from vehicles paying Table A rates.

Table B rates are specified for combinations of 2,000-pound increment and number of axles. The rates are structured so that, at any given declared weight, carriers can qualify for a lower rate by utilizing additional axles. At a declared weight of 98,000 pounds, for example, the per-mile rate for a five-axle vehicle is 23.04 cents and the rate for a six-axle vehicle is 19.02 cents. Thus, by adding an axle, a carrier can reduce his or her tax liability by more than three cents per mile. Current Table B rates range from 12.96 cents per mile for a nine-axle vehicle declared at 82,000 pounds to 23.04 cents per mile for a five-axle vehicle declared at 98,000 pounds. Vehicles declared at over 98,000 pounds must have six or more axles, and vehicles declared at over 100,000 pounds must have seven or more axles.

To achieve better equity within the heavy vehicle classes, Table B rates could be adjusted as shown in Exhibit 7-2.

Optional Flat Fee Rates

Under existing law, carriers hauling qualifying commodities —logs, sand and gravel, and wood chips—have the option of paying monthly flat fees in lieu of the weight-mile tax. There are separate flat fee rates applicable to each of the three different commodity groups. Each rate is set so that carriers paying it should, on average, pay the same amount as they would on a mileage basis. For this reason, flat fee vehicles are treated as full fee vehicles in this study. In past studies flat fee vehicles were classified as alternative fee vehicles.

The existing statutory flat fee rate for carriers transporting logs is $7.59 per 100 pounds of declared combined weight. The comparable rates for carriers transporting wood chips and sand and gravel are $30.65 and $7.53, respectively. These are annual rates that are typically paid in monthly installments. The monthly flat fee applicable to a log truck declared at 80,000 pounds, for example, is $506 (*i.e.*, $7.59 x 800 = $6,072/12 months = $506). This amount must be paid each month the vehicle remains on a flat fee basis, regardless of the number of miles traveled during the month.

The flat fee rates are required to be

reviewed biennially and appropriate adjustments presented to each regular legislative session. This review is accomplished through the biennial flat fee studies, the latest of which was completed in September 2010. That study compared flat fee revenues in 2009 to what those vehicles would have paid in weight-mile tax in 2009. Both the flat fee rates and weight-mile rates were increased as of October 1, 2010 as a result of the 2009 Jobs and Transportation Act. Previously, both flat fee rates and weight-mile rates were increased as a result of the OTIA III legislation on January 1, 2004. The 2010 flat fee study found that wood chip haulers and log haulers reporting on a flat fee basis paid more than they would have on a mileage basis in 2009, while flat fee sand and gravel haulers paid less than they would have on a mileage basis.

We applied new 2010 flat fee rates and weight-mile rates to the 2009 flat fee VMT data and found that current flat fee rates for wood chip and log haulers result in overpayment and current flat fee rates for sand and gravel haulers result in underpayment relative to the weight-mile taxes those haulers would otherwise pay.

When paying the weight-mile tax, log haulers are allowed to use a lower declared weight when their trailer is empty and stowed above the tractor unit. We assumed that 50 percent of log-truck miles are with an empty, decked trailer, with a declared weight of 44,000 pounds. We also tested the assumption that 55 percent of log-truck miles are with an empty, decked trailer. Weight-mile taxes apply only to miles on public roads in Oregon, but log trucks incur some of their miles on logging roads.

Exhibit 7-3 shows the flat fee

Exhibit 7-2: Weight-Mile Tax Table B

Declared Weight			Axles	Current Rate	Alternative Rate	Difference	Percent Difference
80,001	to	82,001	5	$0.1692	$0.1787	0.0095	5.62%
80,001	to	82,001	6	$0.1548	$0.1588	0.0040	2.61%
80,001	to	82,001	7	$0.1447	$0.1390	-0.0057	-3.95%
80,001	to	82,001	8	$0.1374	$0.1191	-0.0183	-13.29%
80,001	to	82,001	9	$0.1296	$0.0993	-0.0303	-23.40%
82,001	to	84,001	5	$0.1747	$0.1953	0.0206	11.79%
82,001	to	84,001	6	$0.1572	$0.1736	0.0164	10.43%
82,001	to	84,001	7	$0.1470	$0.1519	0.0049	3.33%
82,001	to	84,001	8	$0.1392	$0.1302	-0.0090	-6.47%
82,001	to	84,001	9	$0.1313	$0.1085	-0.0228	-17.37%
84,001	to	86,001	5	$0.1799	$0.2119	0.0320	17.78%
84,001	to	86,001	6	$0.1609	$0.1884	0.0275	17.06%
84,001	to	86,001	7	$0.1494	$0.1648	0.0154	10.31%
84,001	to	86,001	8	$0.1409	$0.1413	0.0004	0.26%
84,001	to	86,001	9	$0.1332	$0.1177	-0.0155	-11.62%
86,001	to	88,001	5	$0.1860	$0.2285	0.0425	22.84%
86,001	to	88,001	6	$0.1643	$0.2031	0.0388	23.62%
86,001	to	88,001	7	$0.1518	$0.1777	0.0259	17.07%
86,001	to	88,001	8	$0.1434	$0.1523	0.0089	6.23%
86,001	to	88,001	9	$0.1350	$0.1269	-0.0081	-5.97%
88,001	to	90,001	5	$0.1932	$0.2451	0.0519	26.86%
88,001	to	90,001	6	$0.1686	$0.2179	0.0493	29.21%
88,001	to	90,001	7	$0.1543	$0.1906	0.0363	23.54%
88,001	to	90,001	8	$0.1458	$0.1634	0.0176	12.07%
88,001	to	90,001	9	$0.1374	$0.1362	-0.0012	-0.90%
90,001	to	92,001	5	$0.2016	$0.2617	0.0601	29.80%
90,001	to	92,001	6	$0.1734	$0.2326	0.0592	34.14%
90,001	to	92,001	7	$0.1565	$0.2035	0.0470	30.05%
90,001	to	92,001	8	$0.1482	$0.1745	0.0263	17.72%
90,001	to	92,001	9	$0.1398	$0.1454	0.0056	3.99%
92,001	to	94,001	5	$0.2107	$0.2783	0.0676	32.07%
92,001	to	94,001	6	$0.1782	$0.2474	0.0692	38.81%
92,001	to	94,001	7	$0.1590	$0.2164	0.0574	36.13%
92,001	to	94,001	8	$0.1505	$0.1855	0.0350	23.27%
92,001	to	94,001	9	$0.1417	$0.1546	0.0129	9.10%
94,001	to	96,001	5	$0.2202	$0.2949	0.0747	33.91%
94,001	to	96,001	6	$0.1836	$0.2621	0.0785	42.76%
94,001	to	96,001	7	$0.1620	$0.2293	0.0673	41.57%
94,001	to	96,001	8	$0.1530	$0.1966	0.0436	28.49%
94,001	to	96,001	9	$0.1439	$0.1638	0.0199	13.84%
96,001	to	98,001	5	$0.2304	$0.3115	0.0811	35.19%
96,001	to	98,001	6	$0.1902	$0.2769	0.0867	45.56%
96,001	to	98,001	7	$0.1656	$0.2423	0.0767	46.29%

(continued on next page)

Exhibit 7-2, continued

96,001	to	98,001	8	$0.1555	$0.2076	0.0521	33.53%
96,001	to	98,001	9	$0.1464	$0.1730	0.0266	18.20%
98,001	to	100,001	6	$0.1973	$0.2916	0.0943	47.80%
98,001	to	100,001	7	$0.1692	$0.2552	0.0860	50.81%
98,001	to	100,001	8	$0.1584	$0.2187	0.0603	38.08%
98,001	to	100,001	9	$0.1488	$0.1823	0.0335	22.49%
100,001	to	102,001	7	$0.1728	$0.2681	0.0953	55.13%
100,001	to	102,001	8	$0.1620	$0.2298	0.0678	41.84%
100,001	to	102,001	9	$0.1513	$0.1915	0.0402	26.56%
102,001	to	104,001	7	$0.1764	$0.2810	0.1046	59.28%
102,001	to	104,001	8	$0.1656	$0.2408	0.0752	45.43%
102,001	to	104,001	9	$0.1543	$0.2007	0.0464	30.07%
104,001	to	106,001	7	$0.1811	$0.2939	0.1128	62.28%
104,001	to	106,001	8	$0.1692	$0.2519	0.0827	48.88%
104,001	to	106,001	9	$0.1572	$0.2099	0.0527	33.54%

rates necessary to achieve revenue neutrality with both existing weight-mile rates and with the weight-mile rates recommended in this chapter. These rates represent an increase in the statutory rate for sand and gravel trucks and a reduction in the statutory rates for log trucks. For wood chip trucks, the recommended rate to match the current weight-mile tax rates is lower than the current flat fee rate, but the rate to match our recommended weight-mile tax rates is higher. The flat fee rates presented here were recalculated to match the alternative weight-mile tax rates presented above, using 2009 flat fee mileage data.

Exhibit 7-3: Flat Fees

Rate per 100 lbs. per year	Logs	Sand & Gravel	Wood Chips
Current flat fee rate	$7.59	$7.53	$30.65
Rate to match current weight-mile tax	$7.37	$9.35	$23.05
Rate to match alternative weight-mile tax	$7.02	$13.22	$32.70

Road Use Assessment Fee Rates

Since 1990, carriers operating vehicles under single-trip, non-divisible load permits at gross weights above 98,000 pounds pay the road use assessment fee. The road use assessment fee takes the place of the weight-mile tax for the loaded portion of non-divisible load hauls. With rare exceptions, the empty back haul portion of these trips is subject to the weight-mile tax and taxed at the vehicle's regular declared weight.

The existing statutory road use assessment fee rate is 7.1 cents per equivalent single-axle load (ESAL) mile of travel. The fees carriers actually pay are contained in a table of per-mile rates expressed in terms of permit gross weight and number of axles. Because of its size, that table is not reproduced in this report. Per-mile rates for loads over 200,000 pounds are calculated from the actual weight on each axle. As with the Table B rates, carriers are charged a lower per-mile fee for the use of additional axles at any given gross weight. This reflects the fact that spreading any given total load over additional axles reduces the amount of pavement damage imposed by that load.

The equity ratio results presented in Chapter 6 suggest that the weight classes above 105,500 pounds are significantly underpaying their responsibility. To increase equity within heavy vehicles, the road use assessment fee rates could be increased to 14.8 cents per ESAL-mile. Doing so would roughly double revenues from the fee.