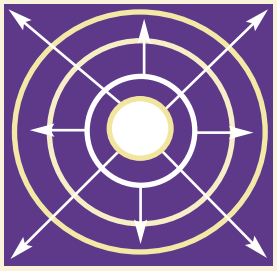

TRANSPORTATION & REGIONAL GROWTH

a study of the relationship between transportation and regional growth

A collaboration among:

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Road Finance Alternatives:
An Analysis of Metro-Area Road Taxes

Report #9 in the Series:
Transportation and Regional Growth Study

Barry Ryan and Thomas F. Stinson
Department of Applied Economics

CTS 01-04

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The average Twin Cities household paid about $500 in state and local taxes for roads in 1996. The total tax burden for the region was nearly $1 billion, with two-thirds coming from revenues that are fixed or hidden from the traveler's perspective. Tax alternatives that favor use-related charges can send travelers a clear price signal, ultimately encouraging more efficient travel behavior. Tax policy might have an effect on housing location decisions at the rural-urban fringe, where farmland development premiums are still small. Road tax policy will need to change in order to keep pace with higher construction costs.

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Preface

The Transportation and Regional Growth Study is a research and educational effort designed to aid the Twin Cities region in understanding the relationship of transportation and land use. Many regions of the country are experiencing rapid commercial and residential development, often accompanied by population growth and growth in the total area of land developed. This has caused a range of concerns, including the direct costs of the infrastructure needed to support development and the social and environmental side effects of development patterns.

This study is an effort to better understand the linkages between land use, community development, and transportation in the Twin Cities metropolitan area. It is designed to investigate how transportation-related alternatives might be used in the Twin Cities region to accommodate growth and the demand for travel while holding down the costs of transportation and maximizing the benefits. The costs of transportation are construed broadly and include the costs of public sector infrastructure, environmental costs, and those costs paid directly by individuals and firms. Benefits are also broadly construed. They include the gains consumers accrue from travel, the contribution of transportation and development to the economic vitality of the state, and the amenities associated with stable neighborhoods and communities.

The University of Minnesota's Center for Transportation Studies is coordinating the Transportation and Regional Growth Study at the request of the Minnesota Department of Transportation and the Metropolitan Council. The project has two components. The first is a research component designed to identify transportation system management and investment alternatives consistent with the region's growth plans. It has six parts:

- Twin Cities Regional Dynamics
- Passenger and Freight Travel Demand Patterns
- Full Transportation Costs and Cost Incidence
- Transportation Financing Alternatives
- Transportation and Urban Design
- Institutional and Leadership Alternatives

The first three research areas are designed to gather facts about the transportation system and its relationship to land use in the Twin Cities metropolitan area. The other three research areas will use these facts to investigate alternatives in financing, design, and decision making that could have an impact on this relationship. Results of this research is and will be available in a series of reports published for the Transportation and Regional Growth Study.

The study's second component is a coordinated education and public involvement effort designed to promote opportunities to discuss the relationship between transportation and growth based on the research results. It is believed that this dialogue will help increase knowledge and raise the level of awareness about these issues among the study's many audiences including decision makers who make policy, agency professionals who implement policy, stakeholder groups who try to influence policy, and members of the general public who experience the consequences of those policies.

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Executive Summary

Minnesota policymakers have a variety of tax options available to fund state and local roads. The current tax system uses both fixed fee mechanisms, like the vehicle registration tax, and taxes that vary with system use, like the motor fuels tax. Property taxes are an important source of road revenues, but they are hidden from the traveler's perspective, as are income and sales taxes, which find their way into road funding through general fund transfers.

Variable tax mechanisms send road users a clearer price signal about the true cost of travel. Alternative road taxes, like a vehicle mileage tax or congestion fee, bring about better travel decisions by factoring weight, distance, or time into the tax price. Concerns for improving system efficiency, however, must be balanced with tax fairness and administrative ease.

Nearly $1 billion of road-related taxes were collected in the seven-county Twin Cities metropolitan area during 1996. These taxes were levied and collected by federal, state, city, and county governments, and then redistributed in a series of intergovernmental transfers. Setting aside federal highway aid and local special assessments, four revenue sources define current road taix policy in the region. The state motor fuels tax raised $240 million, and vehicle registration taxes generated another $245 million. Local property taxes and state general-purpose aids provided $242 million and $105 million respectively. Of these revenues, 71 percent are from fixed or hidden taxes and are unrelated to travel behavior.

The way we pay for roads affects household budgets and creates location incentives. This study models the budget impact for a set of representative households, identifying the tax cost from an increasing work commute by moving the households further and further from the central cities. Road taxes in 1996 ranged from $800 to $1200 for a median income, two-car, two-parent household

living in a high-value home. A single retiree in a low-value home with an economy car and no commute paid road taxes between $200 and $300. A single-parent, one-car household, living in an average home and driving an economy car, paid between $300 and $500. The same household driving a more expensive vehicle with poor fuel economy paid between $450 and $725. Although the absolute amount paid was smallest for the single retiree, it was the largest percentage of household income. This results in part from a revenue policy overly reliant on fixed and hidden road taxes.

Two alternative road tax policies are explored in this report. In both, state general-purpose aid transfers are eliminated and registration taxes and road-related property taxes are cut in half, thus lowering the fixed tax portion of road funding from 71 percent to 30 percent. The difference is made up in one case by raising the motor fuels tax from 20 cents to 50 cents. In the second alternative, 70 percent of funding comes from a 3-cent vehicle mileage tax. The higher fuel tax alternative increases the road tax bill by nearly $200 for the single parent household driving the fuel-inefficient vehicle. But the two-parent household saves money, while the single-parent household driving an economy car and the single retiree are left unchanged. In the 3-cent vehicle mileage tax scenario, both pay more. The single-parent household with the fuel-efficient car fares the worst, paying more than $300 over the current law baseline.

While many factors influence housing location decisions, road tax policy can affect development at the urban/rural fringe. Land values there are typically based on agricultural use, but as the region grows land prices increase above the value for farming. For much of the region's farmland, this development premium is less than the discounted present value of the road tax increases described above. This implies that under the proper conditions increased reliance on variable pricing tax policy can slow conversion of the region's farmland to non-farm use.

Charging the full social cost of transportation means including external costs along with private travel costs and government transportation expenditures.

Transportation-related externalities in the greater Twin Cities region are estimated in another CTS study at $1.89 billion for 1998. Charging households for these externalities would take the equivalent of a 67-cent-per-gallon increase in the motor fuels tax. This would translate into as much as $910 more a year in fuel taxes for our representative two-parent household.

Over the next 25 years, road tax policy will be challenged by trends in vehicle and fuel use, as well as inflationary increases in public construction costs. Revenue growth for three road taxes is estimated using 2000 tax law and a Data Resources Inc. (DRI) forecast of 2025 economic conditions. Vehicle registration tax receipts will grow 44 percent between 2000 and 2025, more slowly than the projected increase in the state's vehicle fleet. Motor vehicle sales tax revenues are projected to climb 311 percent from growth in new vehicle purchases and higher light vehicle prices. Motor fuels excise tax revenues will increase 35 percent, as an increase in vehicle miles outweighs better fuel economy. DRI projects the cost of providing the same service level as today will rise 88 percent. With no changes in current tax law, road funding will need to become increasingly reliant on local property taxes and the state's general fund if current service levels are to be maintained.

Section 1. **Study Objectives**

Transportation and Regional Growth

This report is one of a series generated by the Center for Transportation Studies' Transportation and Regional Growth (TRG) Study. The TRG Study is a six-part analysis of the role transportation plays in the Twin Cities' development.[1] The study's first three projects chronicle the role of travel and housing in regional development and estimate the full social cost of transportation. These projects provide a history and perspective for the second three studies. Each of these develops a set of alternative choices for shifting land use, institutional relationships, or tax policies. This report addresses alternative tax policy by providing a review of how the current tax system works and an analysis of its impact on Minnesota household budgets. Also considered is the potential for alternative policies to influence housing location and future trends affecting three key road-related taxes.

Transportation financing is a broad topic, and by necessity this report focuses on a narrow set of factors. The analysis is limited to the seven-county Twin Cities metropolitan area, not the entire state of Minnesota. It only considers roads, ignoring transit and other alternative modes. Roads are treated as a network, without a differentiation of state or local responsibility. High-traffic roads are treated the same as roads with low traffic, and road expenditures for capital and current spending are lumped together. Finally, the analysis proceeds assuming revenue neutrality, not allowing any increase for backlogs or unmet needs. Even with this set of restrictions, the analysis tries to address six policy questions and, in the process, raises several more.

Six Policy Questions

What are the tax choices for generating road revenues?

- Section 2 examines a set of taxes and fees that can be used to pay for state and local roads, and considers each mechanism's efficiency and equity characteristics.

Where does current state and local road funding come from?

- Section 3 follows the flow of road funding from federal, state, and local sources. It shows road taxes from a governmental perspective.

How are different Twin Cities households affected by current road tax policy?

- Section 4 takes the household perspective. Budget and income impacts are estimated for a set of representative households using current tax law.

If road tax policy changes, who wins and who loses?

- Section 5 provides two simple policy alternatives that increase the travel-related portion of road funding and estimates how this would impact household budgets compared to the current law baseline of Section 4.

What influence can road tax policy have on housing location decisions?

- Section 6 compares two factors in the housing and travel equation to assess how influential tax policy can be on location decisions.

Will current road taxes keep pace with future trends?

- Section 7 considers the future trend for three revenue sources related to vehicles and motor fuel. A failure to adjust tax policy could lead to less efficient and less equitable road services.

Section 2. **Paying for Roads**

Policymakers have a variety of revenue-raising options for supporting state and local roads.[2] This section examines ten road-related taxes and fees; five are currently used in Minnesota, and five others are possibilities widely discussed but seldom implemented. Each tax instrument is tested against a set of desirable tax characteristics. Does the tax add to economic efficiency? Is it fair? Is the tax simple and balanced? Economist-philosopher Adam Smith first posed these tax principles in 1776, and they remain valid today. Before changing our road tax policy, we need to understand the features and characteristics of our road financing choices.

Whether transportation is involved or not, the desirability and effectiveness of a tax can be measured from three perspectives. The first is efficient resource allocation. To be efficient, the tax must send a clear price signal about the true cost (and marginal cost) of public service.[3] A second criterion is equity. Taxes should be fair, both within and between taxpayer classes. In the third area are general management objectives, like simplicity, balance, and stability. Each individual tax should be easily understood, provide adequate revenues, and fit within a larger balance of taxes.

Tax Policy Goals

Efficiency. Is there a strong and accurate price signal? To economists, efficiency means more than producing a product at the lowest costs. It also means ensuring that the right mix of products—food, autos, television sets, and roads—is produced. For tax policy to encourage this kind of economic efficiency, the price charged for a public service must equal the opportunity cost of producing it. The more closely costs are related to use, and the more responsive they are to change, the more efficiently public infrastructure will be constructed

and used. From an economic efficiency point of view, the best pricing scheme would create exactly the services consumers demand and provide the maximum social return from the facilities at hand. For drivers to respond appropriately, they must receive clear and accurate information about the cost of their travel behavior. Weak or false price signals can lead to economic distortions inside and outside of the transportation economy.

An efficient tax mechanism gives taxpayers feedback about the true cost of a public service through the prices they pay. Appropriate resource allocations occur, and social welfare is maximized. Society as a whole realizes the full benefits of a service. But for this to happen, it can mean rationing use to the highest bidder or result in the degradation of one service in favor of another more highly valued alternative. In this way, efficient taxation resembles the private goods market. The principle that those who benefit should be the ones to pay also implies a requirement that the full price for transportation be charged. Full social cost accounting includes externalities, like air pollution and congestion, along with private and governmental costs.

Of course, public goods differ from privately produced commodities in important ways. Changing tax policy can mean changing the prices users pay, potentially redistributing income and economic activity. The neutrality of a tax indicates how influential it is at changing private economic decisions or behavior. Generally it is preferable not to alter the economy with tax policy, but not always. Taxes can be used to create disincentives for undesirable activities or incentives for desirable behavior.

Equity. Is the tax fair? Tax equity is a societal decision about fairness, rooted in the politics of governing and the election process. Policymakers must view equity from many perspectives. Is the tax fair to households and businesses? Where do we invest—and with transportation, in what modes? Tax fairness debates often focus on pocketbook issues, making income equity a central concern. Income equity measures the tax impact on different income classes. One principle is vertical equity, in which the tax is distributed fairly

across people with differing abilities to pay. When those with a greater capacity to pay contribute a larger share of their income to the tax, it is said to be progressive. A regressive tax system, in which lower income individuals pay a greater percentage of their income in taxes than do higher income individuals, is generally considered to conflict with our social norms and values. But that does not mean that each individual tax must be proportional or progressive, only that the entire tax bill not be distributed in a regressive manner.

Another principle is horizontal equity, or the view that those with equal economic capabilities pay equal taxes. Here, ability to pay is less important than individual consumer choices, like where to live or what vehicle to drive. The expectation is that neighboring homes of equal value generate the same property tax, or cars of the same model and year generate the same registration tax, regardless of the owner's income.

Geographic equity considers the spatial distribution of a tax. Does the tax favor or disadvantage any region? Often this debate is characterized by rural versus urban, or suburb versus core city. Historically, high-density urban areas have subsidized low-density rural areas in transportation. Such redistribution occurs between states as well as within them. Over the last 50 years, Minnesota has received, on average, $1.25 in highway aid for every dollar sent to the federal highway trust fund.[4]

Modal equity is about the tax treatment of roads versus transit, cars versus trucks, or trucks versus rail and barge. Historically, road taxes have subsidized transit investment. Cars subsidize trucks on the nation's highways according to federal cost allocation studies.[5] If government undercharges or over-invests in any one mode, the transportation system can become less efficient and fair.

Two other equity issues are less about tax instruments than overall tax and investment strategies. **Environmental equity** issues range from individual concerns to global implications. Social injustice is cited in the placement of roads, the impacts of auto pollution, the division of neighborhoods, and more.[6]

Intergenerational equity is important because roads are long-term investments. A road project paid for with current funds, at the expense of the current taxpayer, may be valuable to travelers for decades to come. Alternatively, failing to invest in transportation disadvantages the next generation of users and taxpayers. One solution is to spread financing over the project's lifetime through bonding or a sinking fund.

Simple and balanced. Is the tax transparent and responsive to change? A desirable tax instrument has other characteristics besides fairness and improved efficiency. Public understanding, acceptance, and support are important features of any tax. A transparent tax allows taxpayers to see the relationship between taxes and services. Implementing the tax should also be direct and cost-effective. There are numerous other managerial features, of which just a few are noted here. **Accountability** means a tax system is explicit. The tax should be broadly applied across payer classes (individuals and business) and have limited exemptions, exclusions, or deductions. Implicit in the tax is political accountability, and therefore political feasibility becomes important as well. **Adequacy** measures how well the tax will generate revenues to fund current and future needs. It also implies stability or certainty of revenues. Individual taxes, and the tax system as a whole, need to keep pace with long-term economic growth. **Competitiveness** in a tax system helps maintain the region's ability to attract households and firms. A poorly designed tax can drive up compliance and enforcement costs, while overreliance on any single tax source can create a regional disadvantage.

Road Tax Mechanisms

Road taxes can be divided into three groups. One set of tax mechanisms is fixed, invariant to the amount traveled. Sometimes they are even hidden from the road user altogether. As will be shown in Section 3, these taxes play an important role in Minnesota's current state and local road financing. A second group varies with vehicle travel and the weight, distance, and time factors that can reflect the true

social cost. The most widely used mechanism from this group is the motor fuels excise tax. A third set of taxes focuses on specific travel behavior, like congestion pricing or emission fees, to change undesirable outcomes.

Ten road taxes are described below, along with details of how the tax works, whether it adds to system efficiency, and where equity conflicts might occur. Five of these mechanisms are currently used in Minnesota, and financial information about their characteristics is taken from the 1999 Tax Incidence Study. [7]

Motor vehicle registration taxes (MVRT) give vehicle owners the right to operate on public roads. In Minnesota, registration taxes are based on the vehicle's use or weight classification and the assessed value. Passenger vehicles are the dominant class, followed by commercial trucks. Trucks pay both state and federal registration taxes, while passenger vehicles pay just a state tax. Statewide, the MVRT generated $532 million in 1998, or about 3.3 percent of all state and local tax receipts. Individuals paid 81 percent of the tax and business, 19 percent.

From an efficiency standpoint, the MVRT does nothing to improve road or travel pricing. Charging an annual fixed tax may influence the decision to own a vehicle, but there is no connection to how much, where, or when the vehicle is driven. Of course, the MVRT should not be zero either; vehicle owners should pay some costs, like those of maintaining vehicle records or for road-related public safety.

Equity within vehicle classes would dictate that similar vehicles pay the same taxes, since all passenger vehicles cause about the same roadway damage. In Minnesota though, registration taxes vary considerably. Horizontal equity among vehicle owners could be improved by flattening the registration fee further. Twenty-nine states have a flat registration fee for automobiles.[8]

When owner income is the equity measure, vertical equity is improved when higher value cars pay more, since lower income households tend to have lower value cars. Ten states incorporate vehicle age or value into the fee

calculation. A few states differentiate passenger vehicles by weight. In Missouri automobiles are classified according to the horsepower of the vehicle's engine. To fully evaluate fairness, each tax has to be viewed as part of a larger system. For instance, the personal property portion of vehicle registration taxes is deductible from state and federal income taxes. The MVRT is easy to implement and administer and difficult to avoid. Tax collections are broad-based, and the new maximum fees passed in the 2000 legislative session make the tax more understandable.

Motor vehicle sales taxes (MVST) are simply the sales taxes paid at the time of title transfer of any new or used vehicle. Although it has a separate section in the Minnesota statutes, the MVST tax is levied at the same 6.5 percent rate that is charged on general sales. Statewide the MVST generated $466 million in 1998, or 2.9 percent of state and local tax receipts. Individuals paid 66 percent of the tax, while business paid 34 percent. The tax is easy to administer and difficult to avoid. New vehicle purchases provide a clear price record, but transactions between individuals leaves more room for understating value. MVST revenues could be a more volatile funding source than the registration tax, responding more quickly to inflation and business cycles. The registration tax is based on the entire statewide fleet, while the MVST relies on new and used vehicle sales that fluctuate year-to-year within the larger economy.

Taxing motor vehicle sales sends a very weak price signal about the true cost of travel. As with the registration tax, the MVST has no direct relationship to roadway use, and given it is only encountered with a vehicle purchase, drivers get no incentive to travel any more efficiently. Nevertheless, legislatures have tried to dedicate MVST revenues to highway purposes since 1981.[9] These efforts have been largely unsuccessful, but starting in fiscal 2002, 32 percent of MVST receipts will be statutorily dedicated to the highway user tax distribution fund.[10]

Motor vehicle sales taxes are probably regressive, like the general sales tax, although this is not shown definitively in the Tax Incidence Study. Vertical equity can also exist, since wealthier individuals buy more expensive cars, and

more of them, more often. Higher income households are likely to pay a larger share of the tax than lower income households are.

Property taxes are just one, albeit important, local government revenue source, and roads are just one of many local public services. Minnesota's property tax is based on the property's use classification—e.g., farm, homestead, or commercial—and its assessed value. The tax is calculated for each parcel by city or town, county, school, and special district. But property owners do not receive a breakdown of the cost of each service provided. Consequently, their semi-annual property tax bill is a poor indication of travel costs. There is, of course, a natural relationship between roads and real estate that merits some property tax support. Owners certainly benefit from road access, and whether they own and operate a vehicle or not, they need access for the fire truck, school bus, and commercial delivery van.

When the amount of property tax paid is compared with the property owner's income, Minnesota's property tax is regressive. It also possesses vertical and horizontal inequities. Consider two equivalent homes in the same jurisdiction, with one owner retired and living on a fixed income, and the other, a well-paid worker. Each pays the same property tax, but the retiree pays a larger share of income. Alternatively, consider two homes of the same value in the same tax jurisdiction that pay a different price for road services because one is owner-occupied and the other is rental. Income equity calculations are further complicated by the deductibility of property taxes from state and federal income taxes. A significant managerial shortcoming of the property tax is that taxpayers find it difficult to understand. From a governing standpoint the tax is a stable revenue source that is hard to evade.

Income and sales taxes are not immediately associated with road services, but receipts from these taxes are part of the road revenue stream. These taxes support local general-purpose aid programs, like Local Government Aid and the Homestead and Agricultural Credit Aids. Such aid provides local

governments with revenue they can use in the same way as property taxes for roadwork or other local services.

This intergovernmental fiscal relationship is hidden from travelers, if not taxpayers generally. For the road user, these aid transfers weaken the price signal and offer no efficiency contribution to road finance. Equity considerations, however, are more central to the transfer's purpose, for both the taxpayer and community. State general-purpose aid is an attempt to equalize the wealth disparities among Minnesota communities. Some taxpayers get a reduction in property tax, or better local services. Others pay more in income or sales taxes. How any individual taxpayer fares depends on a variety of factors, but not their use of the road system.

Other general fund transfers financed by the income and sales tax are used for roads as well. Most recently the reductions in vehicle registration taxes left a funding shortfall in the highway user tax distribution fund that was filled by using general fund revenues. The state income tax, a progressive tax, supplied one-third of the total state and local tax receipts in 1998. The sales tax, which is regressive, provided nearly a quarter of the total tax revenue.

Motor fuels excise taxes (MFET) are paid on a per gallon basis when vehicle operators purchase fuel.[11] Indeed, drivers pay two taxes, one to the federal government and one to the state government. The federal tax on gasoline is 18.4 cents per gallon. It is 24.4 cents per gallon on diesel fuel. These taxes come back to Minnesota, in an imperfect way, through federal highway planning and construction grants. Minnesota levies a state tax of 20 cents per gallon on both types of fuel, at about the national average. Minnesota's MFET raised $563 million in 1998, 3.5 percent of state and local tax receipts. Business paid 40 percent of the tax, while 44 percent was paid by individual Minnesotans and the rest (16%) was paid by non-residents.[12] MFET revenues were split, with 85 percent from gasoline and 15 percent from diesel fuel. These distributions show the potential to export a tax to individuals from outside the state, and remind us that businesses purchase gasoline as well as diesel fuel.

Unlike the fixed taxes discussed previously, the MFET can lead to more efficient use of the roadway. The amount of tax paid varies with vehicle use; the more you drive, the more fuel you use, and the more tax you pay. Here, the traveler receives a price signal about the incremental cost of driving. The tax acts as a proxy for distance, and to some extent vehicle weight and fuel efficiency. Raising this tax can lead to more fuel-efficient vehicles, less pollution, and less travel.

The motor fuels tax is a familiar and stable revenue source that is easy to implement and difficult to evade. Cross-border tax avoidance, however, becomes more attractive as the price differential widens. Wisconsin's gas tax, for example, is 7.3 cents higher than Minnesota's. [13]

The MFET is regressive, meaning lower income households that own motor vehicles spend more of their income on fuel taxes than do those with higher incomes. At the same time, higher income households on average drive further and potentially pay a larger share of the tax. Modal equity between cars and trucks with respect to fuel taxes is less of an issue in Minnesota than in some other states, since Minnesota's tax rates on gasoline and diesel fuels are the same. Connecticut has the largest spread, with gasoline taxed at 32 cents, and diesel fuel taxed at 18 cents. In eight other states the gas tax is higher than the diesel tax, while in twelve states the diesel tax is higher.

Vehicle mileage taxes in their simplest form are per mile charges for vehicle travel, and as such only reflect the distance factor important to pricing travel. A more complex fee schedule would include vehicle size, weight, or the type and efficiency of fuel use. Each of these factors could bring economic efficiency gains, assuming we understand how each relates to the true cost of travel. A more complex tax design might help preserve income, vehicle, and geographic equity as well. For instance, horizontal equity implies that similar vehicles pay a similar tax, but a simple VMT would discriminate against fuel-efficient vehicles. Again, if wealthy families drive more, vertical equity could be improved by raising VMT taxes incrementally as travel distance increases. Rural

drivers argue that they are spatially disadvantaged and would have to pay more under a vehicle mileage tax, raising geographic equity issues. A similar argument is also made against the motor fuels tax.

The trend in transportation has been one of a rising number of vehicle miles traveled. Between 1970 and 1990, vehicle miles traveled in the Twin Cities increased 144 percent, from 16.5 million miles to 40.2 million miles per day. In the United States, between 1979 and 1999 vehicle miles traveled increased by 72 percent.[14] While the annual average growth in vehicle miles is expected to slow from 2.5 percent annually to 1 percent annually over the next 50 years, vehicle mileage tax revenues would still increase. Technology is making the VMT approach more feasible every day, but some form of odometer audit will be needed for implementation, raising both privacy and administrative issues. Another management concern is that without broad interstate application, cross-border evasion could be significant.

Pavement damage fees are levied for wear and tear to the roadway caused by vehicle weight. The focus is generally on heavy trucks, since they cause most of the damage. But this principle can also be applied to passenger vehicles, and as noted, some states use a car's weight to calculate the registration fee. Roadway stress and decay, however, increase exponentially with gross vehicle weight and axle weight. Axle weight is the best predictor of roadway damage, and efficiency gains are possible if a pavement damage fee causes truck owners to reduce axle loads. One alternative is for truckers to make more trips with lighter loads; another is to add an axle to distribute weight. Either choice raises operator costs, but reduces societal road network costs.

In most states truck registration fees increase with vehicle weight. Minnesota fees range from $90 annually for a truck of 9,000 pounds to $1,760 for a vehicle at 81,000 pounds—the weight of the typical 5-axle, 18-wheel combination tractor-trailer. (Over 81,000 pounds, truck registration taxes increase at $50 per ton.) Until recently, Oregon imposed a mileage tax on trucks over 26,000 pounds, but after many years in use the tax was eliminated in favor of a

diesel fuel tax increase. Cost-allocation studies can show the differences in roadway cost and benefit by vehicle class. The most recent federal study contends that the heaviest trucks underpay their highway cost responsibility at the expense of lighter trucks and passenger vehicles.

Minnesota's gravel production tax is another form of pavement damage fee. The gravel tax gives counties the right to tax the production or importation of aggregate materials at 10 cents per yard or 7 cents per ton. Proceeds of the tax are distributed to counties and townships for road and bridge repairs. This production tax acknowledges the impacts trucks have on road life, and the importance of roads to the gravel industry. Yet other heavy industry road users, like agriculture and timber, are not subject to similar provisions. Indeed, they enjoy various seasonal exemptions on weight restrictions that allow them to exceed normal limits.

Congestion pricing incorporates time and place into the high-traffic conditions under which this pricing mechanism is applied. Some roads become overcrowded at various points in the day, and congestion pricing may help reduce congestion on those roadways by culling drivers who put less value on that particular route or trip. A pure congestion-pricing plan would charge travelers to use a road segment that had lost its throughput efficiency due to overcrowding. Pricing some users off the road would recapture the road's efficiency. Travelers would choose between paying for a free-flowing route or a more time-consuming or less convenient alternative. Congestion is a cost to travelers paid in lost personal time and wasted fuel.

Congestion pricing could have the effect of forcing low-income travelers off the road during peak travel periods. But this inequity might be remedied by using the revenues to provide incentives for alternative travel modes or by offering free travel to high-occupancy vehicles. There are also geographic concerns with congestion pricing. Pricing only at certain spots of a network or on particular corridors would put these areas at an economic disadvantage. Neighborhoods might also be adversely affected by the diversion of traffic from

the newly priced road to alternative free routes. This argues for a pricing plan that is regional and network-wide.[15] The same technological advancements that make a VMT tax feasible would also benefit congestion pricing, but the same controversies would be shared as well.

Parking taxes capture the end result of road use, vehicle parking. The tax is most often associated with ramps and surface lots in and around central business districts, although it could be applied to any parcel of property. A parking tax could reduce overcrowding and congestion by making auto travel more expensive, and alternative transportation more attractive. It could also discourage single-occupancy trips. If not carefully crafted, however, a parking tax could cost the taxing district jobs and retail sales and services. The parking tax is one element of a parking management plan, which should include options like transit and incentives like preferential parking for high-occupancy vehicles.

Imposing a parking tax can improve economic efficiency by providing users with feedback about their true cost to the system. In districts where the problem is work-related traffic congestion, simply charging a premium for peak-time arrivals could shift some drivers' behavior. The equity impact of a parking tax concerns not only businesses disadvantaged by the higher parking costs, but also low-income travelers forced into an alternative mode of travel or into finding alternative places to work and shop. Geographic equity is of particular interest with parking taxes, since the effects can be quite localized.

Emission fees focus on the environmental consequences of vehicle travel. Two commonly discussed types of emission are air pollution from internal combustion engines and noise pollution from vehicle traffic. Vehicle owners could be charged an emission fee for the amount of carbon dioxide and other pollutants their vehicles emit. It could be levied annually on average use statistics or with actual emission readings. More traditionally, emissions have been controlled with air quality regulations and vehicle inspections. Over time, emissions tax revenue would likely decline from more stringent regulation, and environmental conditions would improve. Indeed, tailpipe exhaust from automobiles has already dropped

substantially over the last decade. Carbon monoxide emissions are down 26 percent, hydrocarbons are down 22 percent, and nitrogen oxide is down 17 percent.[16]

Creating a user charge for air pollution would force drivers to recognize the environmental costs of vehicle travel. But since so much of the health costs do not have a market price, vehicle exhaust emissions are difficult to value. The efficiency gains from emission fees come from discouraging air and noise pollution, not by more efficient use of the roadway. Making these costs explicit in a fee would help bring about quieter or less polluting vehicles. For passenger vehicles, lower income drivers would likely pay more, since they tend to have older vehicle with higher emissions. The tax is also likely to be higher in urban areas where poor air quality is more acute.

Summary

Road tax policy should bring about better travel decisions as well as pay for the construction and maintenance of the roads. This section reviewed some alternative ways government can pay for state and local roads. Each tax has efficiency, equity, and managerial characteristics. If road users are to value travel appropriately, road taxes need to indicate the true cost of travel. A market-based approach can reduce vehicle miles, congestion, energy consumption, and exhaust emissions. The only mechanism currently used in Minnesota that varies with system use is the motor fuels tax. Other approaches that capture the important travel factors are not being used.

Equity considerations include the tax impact within and between classes of users. The primary issue is often the effect on household incomes, although regional or geographic impacts and travel mode fairness should also be considered. Generally, equity outcomes with most road tax mechanisms are mixed. Low-income households pay a larger share of their income in these taxes, but higher income households sometimes pay a relatively larger share of the total tax. Finally, road taxes need a simple and balanced structure that provides

adequate and stable revenues. Good tax policy helps maintain regional growth from a broad base of revenue sources.

Summary of policy characteristics

Motor vehicle registration taxes

- Fixed annual tax has weak price signal for traveler.
- Regressive. Flatter schedule improves horizontal equity, not vertical equity
- Appropriate for supporting vehicle record-keeping and some public safety.

Motor vehicle sales tax

- Fixed charge at vehicle purchase. Unrelated to vehicle travel.
- Likely regressive, same as general sales tax. Some vertical equity potential.
- Responsive to inflation and business cycle.

Property taxes

- Fixed semi-annual tax. Unrelated to travel.
- Regressive tax with vertical and horizontal inequities.
- Complicated system provides no detail on road costs.

Income and sales taxes

- Tax unrelated to roads. Hidden fiscal transfer. No feedback on travel.
- State aid helps equalize tax burden and community services.
- Income tax is progressive. Sales tax is regressive.

Motor fuels excise tax

- Amount paid varies with fuel use. Influences travel and fuel economy.
- Regressive with some vertical equity features.
- Impacts business and modal equity. Some of tax is exported.

Vehicle mileage tax

- Tax varies with distance traveled. Revenues increase with travel.
- Likely regressive with vertical equity potential.
- Privacy issues may be significant barrier to implementation.

Pavement damage fee

- Variable fee related to vehicle weight (most commonly trucks).
- Vehicle equity improves with accurate damage assessment.
- Provides incentive to reduce axle weight.

Congestion fees

- Fee varies with peak-period travel. Revenues increase with congestion.
- Rationing of overcrowded road may not seem fair to all users.
- Technical and privacy issues could be barrier to implementation.

Parking fees

- Varies with parking event. Need not apply only to downtowns.
- May have negative income equity and geographic equity impacts.
- Reduces trips to, and congestion in, parking tax district.

Emission fees

- Varies with pollution emitted from vehicle travel.
- May hurt income equity. Vehicle equity and geographic equity improved.
- Encourages lower emission vehicles, not fewer trips or less congestion.

Section 3. **Twin Cities Road Revenues**

State and local transportation financing involves a series of taxes and intergovernmental transfers. This section traces the revenues generated from federal, state, and local sources used to fund Twin Cities Metropolitan Area (TCMA) roads in 1996. Since no single database exists, information is combined from the four sources described below. Combining multiple sources requires simplifications about the temporal, spatial, and definitional nature of the data. One complication is that the data sets cross fiscal years. Local governments are on a calendar year, the state starts its fiscal year July 1, and the federal fiscal year begins October 1. A second problem is that summary values for the state are easier to compile than are those for sub-state or cross-border regions. Finally, the definition of a variable in one data set may differ from a seemingly comparable variable in another data set. Despite these limitations, a useful accounting snapshot can be developed.

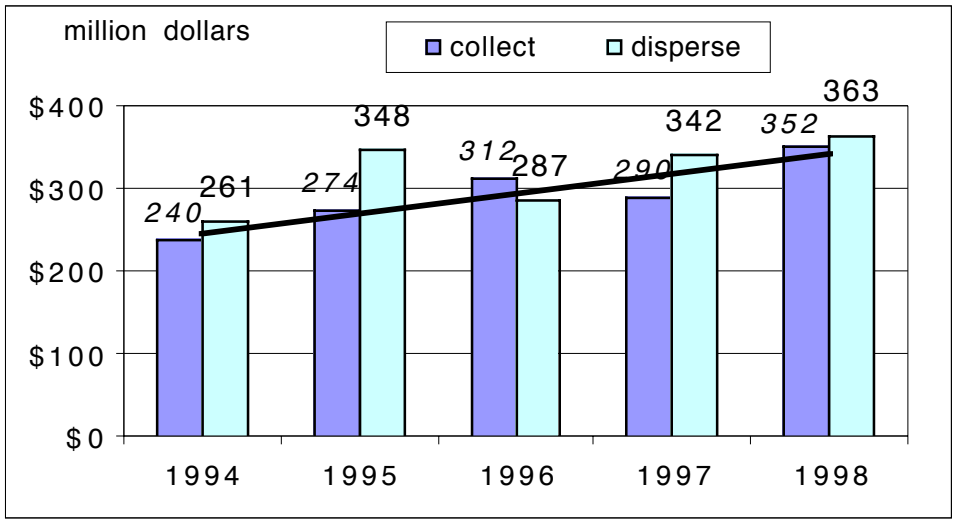
The **Federal Highway Administration** reports a variety of highway statistics, including revenue sources, for each state annually.[17] While this is an excellent resource for statewide or interstate analysis, there are no sub-state values. The **Consolidated Federal Funds Report** from the U.S. Department of Commerce provides a detailed accounting of federal government program payments to states. This data series provides funding values at the county-area level according to the place of payment.[18] State road revenues and expenditures data are available from the **Minnesota Department of Transportation** (Mn/DOT), which administers road-funding programs.[19] Local government data is also available from one source, but in four pieces: counties, large cities, small cities, and towns. The **Office of the State Auditor** gathers local government

revenue and expenditure data annually, with each local government reporting in a standardized financial statement.[20]

Federal Highway Aid: *Significant, but outside the control of state policymakers*
The federal government collects taxes and fees on highway users, including motor fuels taxes, truck registration fees, and various other charges, which are eventually returned to states for road and transit purposes. But individual states do not necessarily get back what they paid in. Between 1956 and 1998, Minnesota got back, on average, $1.25 for every $1 paid into the highway account of the Federal Highway Trust Fund. In that time, Minnesota paid $6.25 billion into the highway account, and got back $7.82 billion.[21] This amounts to a subsidy of $1.6 billion for Minnesota roads by the rest of the nation. Yet, in any given year, the ratio of payments to receipts can be greater than or less than one. In 1996, for example, Minnesota got back just $0.92 of every highway fund tax dollar collected in the state.

Figure 3.1 shows the statewide collection and disbursement of federal highway funds for the five-year period 1994–98. In 1996, federal tax and fee collections equaled $312 million (left column), while disbursements (right column) totaled $287 million. Federal Highway Administration data shows that federal highway funds to Minnesota have been trending higher, although somewhat erratically. Estimates of future disbursements show a marked increase in the highway user account. Federal highway program apportionments for Minnesota are forecast to increase to $418 million by FFY 2003.[22]

Figure 3.1 – Minnesota federal highway funding is trending higher



Source: Federal Highway Administration, Office of Highway Information

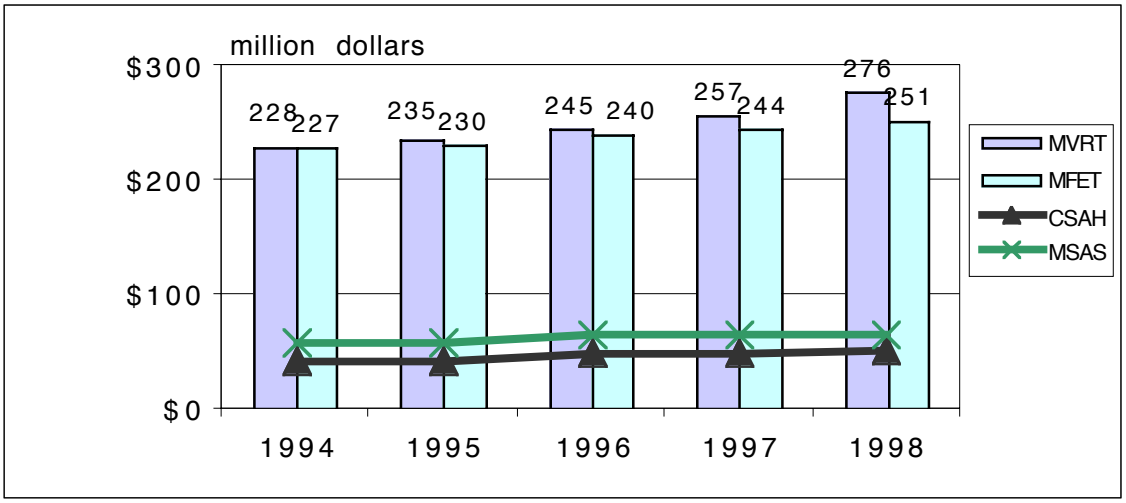
Another measure of federal highway funding in Minnesota is found in the Consolidated Federal Funds Report (CFFR). It shows that the U.S. Department of Transportation reported $550 million in federal expenditures statewide in 1995, but this includes $213 million in non-highway expenditures.[23] Highway planning and construction grants were reported at $337 million statewide, a value consistent with the FHWA estimate of $348 million for 1995 shown in Figure 3.1. Unlike the FHWA data, however, CFFR data is reported at the county-area level. Federal highway planning and construction grants for the seven-county metro-area totaled $128 million of the statewide dollars, or 38 percent.[24]

A third measure of federal funding for Minnesota roads comes from the local government financial reports to the Office of the State Auditor (OSA). This is a subset of the total of federal grants that finds its way to the local government balance sheet. In 1996, counties reported income from federal highway aid totaling $55.8 million statewide. In the seven-county metropolitan area, counties reported $21.1 million in federal road aid. Again, 38 percent of the statewide aid was reported by the seven TCMA counties, confirming the distribution seen in the

CFFR. These three perspectives give a snapshot of federal highway funding of state and local roads in the TCMA. In summary, applying the 38 percent share to the FHWA $287 million statewide value puts the total TCMA federal funding at $105 million. Using the OSA value of $22.1 million in federal highway aid to TCMA local governments, $82.9 million would remain for state roads in the 7-county metro.

State Revenues: *Motor fuels tax and registration tax are dedicated to roadwork*
In 1956, Minnesota established the Highway User Tax Distribution Fund (HUTDF) to facilitate building and maintaining roads and bridges. Money flows into the HUTDF account from motor fuels tax receipts and motor vehicle registration taxes. In 1996, the year examined in this analysis, these two sources totaled $976 million statewide. The motor fuels tax generated $520 million, while vehicle registration taxes contributed $456 million. In the Twin Cities revenues from these two sources totaled $485 million. The motor fuels tax raised $240 million, and the motor vehicle registration tax generated $245 million (Figure 3.2).

Figure 3.2 – Twin Cities HUTDF tax collections and aid transfers



Source: Minnesota Department of Transportation, unpublished data

Funds flow out of the HUTDF account to pay for state and local roadwork according to a formula in the state constitution. Ninety-five percent of the available funding is split three ways. Within this set of funds, trunk highways (or state roads) get 62 percent, counties receive 29 percent, and 9 percent goes to eligible cities. The remaining 5 percent of the HUTDF distribution goes to various other local road programs, including turn-back accounts and township bridge and road infrastructure. The local government distributions from the HUTDF are made according to two aid programs (also shown in Figure 3.2). The County State Aid Highway (CSAH) program provides funding to all county governments to maintain county state-aid highways. The Municipal State Aid System (MSAS) program provides support for designated state-aid roads in cities with 5,000 or more residents. Mn/DOT reports a total statewide transfer under the CSAH and MSAS programs of $369 million in 1996. Counties and cities in the TCMA received 30.6 percent, or $112.8 million.

For the County State Aid Highway program, the apportionment between counties is based on a four-factor formula.[25] Half the apportionment is according to the "money need," based on the 25-year cost of constructing the state-aid highway system in the county. Thirty percent of the apportionment is shared on the basis of lane-miles designated as county state-aid roads. Ten percent is apportioned by the number of registered vehicles in the county. The last ten percent is shared equally among all 87 counties. According to Mn/DOT estimates, the statewide CSAH distribution in 1996 totaled $278.4 million. TCMA counties got 17 percent of the total, or $47.9 million.

The Municipal State Aid System program formula is different from the county formula. Half the aid to each city is based on population. The other half is based on the city's "money need," which for this program is the estimated cost of construction and maintenance of the city's state-aid streets over 25 years. Cities share the total aid apportionment, even as new cities meet the 5,000-person threshold. According to Mn/DOT, the MSAS program in 1996 transferred $90.7

million to eligible cities statewide; TCMA cities got $64.9 million, or 71.5 percent of the statewide total.

In this analysis local governments are divided into three groups: counties, large cities, and small cities and towns. Minnesota has 87 counties, with seven making up the Twin Cities Metropolitan Area (TCMA). Unlike the state auditor reports, which divide cities between those with under and over 2,500 persons, this report recombines the city data to differentiate between cities under and over 5,000 persons—in keeping with the breakpoint for MSAS program eligibility. Cities with populations less than 5,000 are combined with towns.

Statewide there are 855 city government units, but only 125 have a population of 5,000 or more. Seventy-two of these "large cities" are in the TCMA. "Small cities"—those with less than 5,000 persons—are found predominately outside of the seven-county area. In the metro area there are just 67 cities with fewer than 5,000 persons, compared to 663 small cities outside the metro area. Township governments are even more rare in the TCMA; of the 2,467 towns in Minnesota, only 48 are in the seven-county metro. Minnesota has 4.7 million persons, of whom 2.5 million live in the metropolitan area.

Local Road Effort: *General revenue and special assessments pay local effort*

Three local government entities are of interest in any transportation finance discussion: counties, cities, and towns. As noted earlier, this analysis relies on the *Revenue, Expenditures, and Debt* reporting by local governments in 1996 to the Office of the State Auditor. Road expenditures are well documented at the local government level. Capital spending is reported separately from current spending, with the latter including sub-accounts for engineering, maintenance, street lighting, and snow plowing. Revenues and their association to roads at the local level, however, are less well defined. Only in towns are property owners charged a levy specifically for roads. City governments can charge special assessments for some roadwork, but these are not reported separately. Most local governments get categorical road aid from the state, and some even get federal aid. Paying the net cost of local roads then falls to the local general fund, supported primarily by property taxes and state general-purpose aids. These two

revenue sources are said to be fungible—i.e., they can be used equally well to pay for roads as for some other service.

Local effort equals total road spending minus categorical road aid. TCMA local governments spent $576 million on roads in 1996, with large cities accounting for nearly three-quarters of total spending (Table 3.1). Overall, $173 million (30 percent) of local road spending was funded by state and federal categorical aid. Categorical aid to large cities provided $92 million, or 22 percent, of their road spending. Aid to counties paid for more than half of county road expenditures, or $76 million of the $145 million in spending. The total local effort for all local governments was $403 million, or 70 percent of local road spending. Funds for the local effort came from property taxes, state general-purpose aid, and in some cases, special assessments. TCMA large cities raised $318 million of the total local effort.

Table 3.1 – TCMA local road spending is dominated by large cities

TCMA 1996	**County**	**Large Cities** >5,000 persons	**Small Cities** & **Towns**	**All Local Government**
ROADS:	----- *Dollars Million* -----			
Total spending local roads	$ 145	$ 410	$ 21.0	$ 576
Categorical Aid – state & federal	$ 76	$ 92	$ 4.7	$ 173
Local property taxes and general aid	$ 69	$ 318	$ 17.0	$ 403

Source: Office of the State Auditor, Revenues, Expenditures, and Debt reports

One dollar in three of all local government revenue is from property taxes. The significance of roads as a local government service can be put into perspective by considering total local government revenues relative to local spending on roads. Local governments in the TCMA raised over $3.6 billion in total revenues during 1996 to pay for all services (Table 3.2.). This revenue came

from a variety of sources, not just property taxes, state general-purpose aids (SGPA), and special assessments. These three revenue sources accounted for 49 percent of total revenues for local governments in the TCMA.[26]

Table 3.2 – Property taxes are an important source of local revenues

TCMA 1996	**County**	**Large Cities** >5,000 persons	**Small Cities** & **Towns**	**All Local Government**
Local Government:	----- *Dollars Million* -----			
Total revenues	$ 1,635	$ 1,856	$ 103	$ 3,595
Exhibit:				
Property taxes	$ 710	$ 468	$ 36	$ 1,215
State aid: LGA/HACA	$ 86	$ 265	$ 8	$ 359
Special Assessments	$ 0	$ 144	$ 23	$ 168

Source: Office of the State Auditor, Revenues, Expenditures, and Debt reports

Property taxes are the single most important funding source for local governments, totaling $1.2 billion, or one-third of all revenues. State general-purpose aid (SGPA), which includes LGA and HACA payments, accounts for 10 percent of all revenue, or $359 million. (Local Government Aid payments in the TCMA were reported at $155 million in 1996. Homestead and Agricultural Credit Aid was reported at $204 million.) Special assessments revenues totaled $168 million for all utility improvements, not just roads.

Again, while expenditures are reported in detail, the associated funds to pay for them are not reported separately. This analysis uses a simple proportionate allocation of the local effort between special assessments, property taxes, and SGPA. Special assessments are calculated using the share of capital spending going to roads. For example, if 30 percent of capital spending is on roads, it is assumed that 30 percent of special assessments are for roadwork. At the individual community level this approach may not work reliably, but it is adequate for the region as a whole. Subtracting special assessments from the

local effort leaves the portion paid with property taxes and state general-purpose aid. This remaining local effort is divided between these two sources, again proportionately. For instance, counties got $710 million in property taxes and $86 million in HACA payments—a ratio of $8.25 of property tax for each $1.00 of state general-purpose aid

Large cities are more reliant on state general aid and special assessments. The revenue structure of cities and counties shows that large cities are much more dependent on SGPA for road support (Table 3.3.). Overall, state general-purpose aid paid one in four dollars of the local road effort. For large cities, 37 percent of all SGPA is needed to cover the local road effort. By contrast, only 8 percent of the county SGPA is needed to pay the local road effort.

Table 3.3 – The local road effort is allocated proportionately

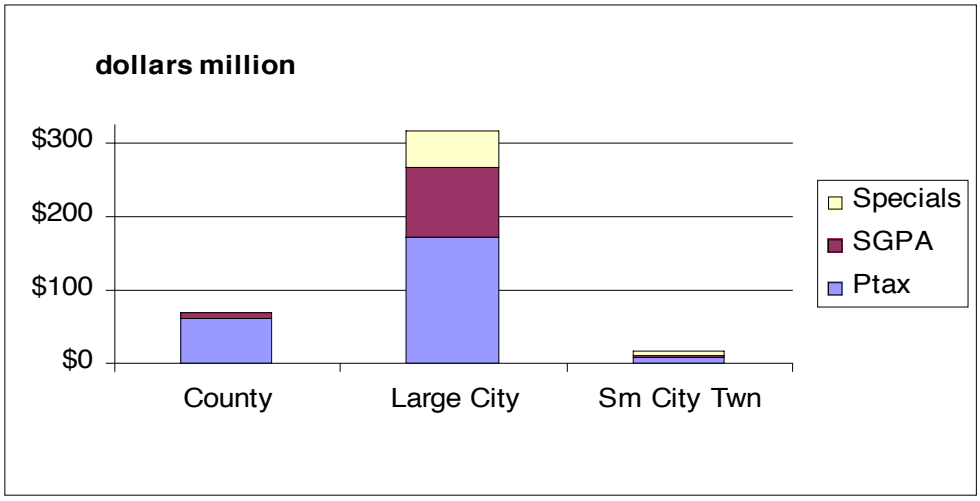
TCMA 1996	**County**	**Large Cities** >5,000 persons	**Small Cities** & **Towns**	**All Local Government**
	----- *Dollars Million* -----			
Local road effort	$ 69	$ 318	$ 17	$ 403
Property taxes	$ 61.4	$ 172.0	$ 9.2	$ 242
State general-purpose aid:	$ 7.6	$ 95.4	$ 2.0	$ 105
Special Assessments	$ 0	$ 50.6	$ 5.8	$ 56

Source: Office of the State Auditor, Revenues, Expenditures, and Debt reports

The total local effort of $403 million can be assigned as $242 million to property taxes, $105 million to state general-purpose aids, and $56 million in road-related special assessments. In percentage terms, this translates into 60 percent property tax, 26 percent state general-purpose aids, and 14 percent special assessments. The significance of large metro-area cities in the provision

of road services is shown graphically in Figure 3.3. The local effort at the county level is smaller, but more reliant on property taxes.

Figure 3.3. – Twin Cities local road effort (1996)



Source: Office of the State Auditor, Revenues, Expenditures, and Debt reports

An inconsistency between the categorical aid reported by the Minnesota Department of Transportation (Mn/DOT) and local government data should be noted. Local governments report state highway grants totaling $446 million statewide, $77 million more than the $369 million suggested by Mn/DOT data. According to the OSA data, counties statewide received $328 million, with TCMA counties reporting $58.4 million. City data shows $118 million in state highway grants, including $92 million in the TCMA. A number of factors might explain the differences, including reporting of public safety programs, other general fund transfers, or simply fiscal year differences. To maintain a consistent treatment of the data, the analysis will rely on the local government data as reported to the OSA.

Budget Summary

Revenues associated with state and local roads in the seven-county metropolitan area in 1996 are estimated at $990 million (Table 3.4). Federal highway aid and state motor fuels taxes totaled $345 million. These can both be categorized as

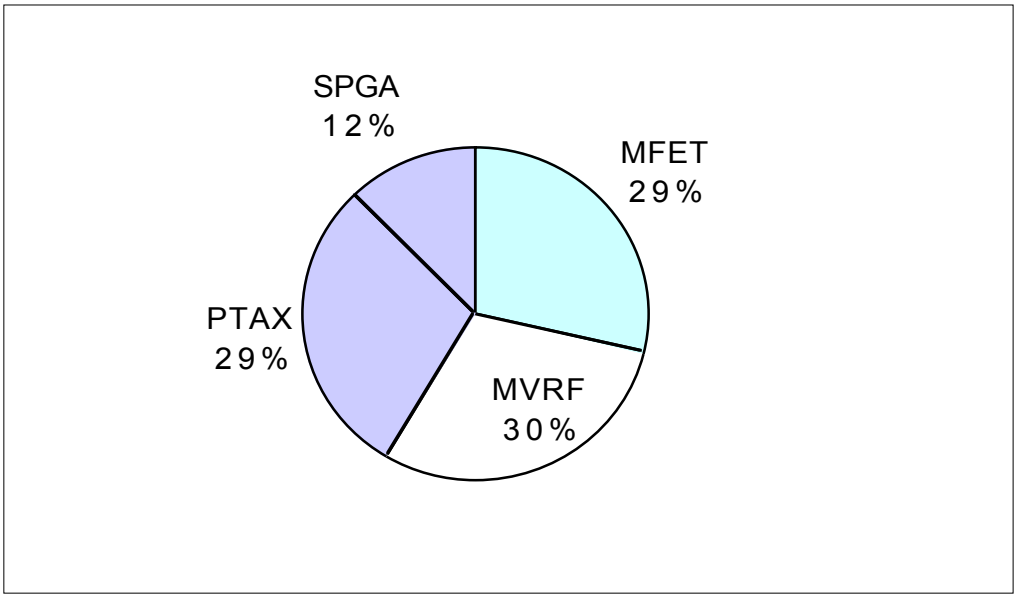
variable revenue sources, since they are each derived from fuel taxes on vehicle operation. Motor vehicle owners paid $245 million through vehicle registration fees. This tax is a fixed annual charge, levied without regard to how much, or how often, vehicles use the road. Local road revenues totaled $403 million, including property taxes, state general-purpose aid, and special assessments. These revenues are hidden from the traveler's perspective.

Table 3.4 – Total road revenues and tax price transparency

TCMA 1996	*Strong --- use related --- Weak*			
	Variable	*Fixed*	*Hidden*	*Total*
State and local	*---- Dollars Million -----*			
ROADS	**$ 345**	**$ 245**	**$ 403**	**$ 993**
Federal Highway Grants	*$ 105*			*Federal*
Motor Fuels Excise Tax	$ 240			*State*
Vehicle Registration Tax		$ 245		
Property Taxes			$ 242	*Local*
State Genl-Purpose Aid			$ 105	
Special Assessments			*$ 56*	

The study's next section examines household budget impacts from current road tax policy. But it limits the analysis to four taxes from the six sources in Table 3.4. Federal highway aid, while it is derived from federal fuel taxes, is not included, since Minnesota policymakers have no control over how much federal highway aid is distributed. Special assessments are left out of the continuing analysis because they are arguably more about property improvements than road use. The remaining four taxes generated $842 million in revenues in 1996 (Figure 3.4). Property taxes and general-purpose aid account for 29 percent and 12 percent respectively. State motor fuels tax revenues are 29 percent, with motor vehicle registration fees contributing the last 30 percent.

Figure 3.4 – Four road taxes provide $842 million in revenues



The reference year of 1996 was chosen because of the availability of data. As always, there are time lags between policy changes and the reporting of financial or research information. Since 1996 additional policy changes have occurred. In the 2000 legislative session the motor vehicle registration tax was capped for most vehicles at $99. State general funds made up the shortfall, but in 2002 part of the motor vehicle sales tax will be transferred to the highway fund. Property tax reform changed homestead classification rates, and income tax reductions were also passed. Additional tax reforms occurred in the 2001 legislative session. These policy changes will further alter the funding mix and tax values, but should not change the fundamental outcomes of this analysis or the long-term problems the system faces.

Section 4. Baseline Household Impacts

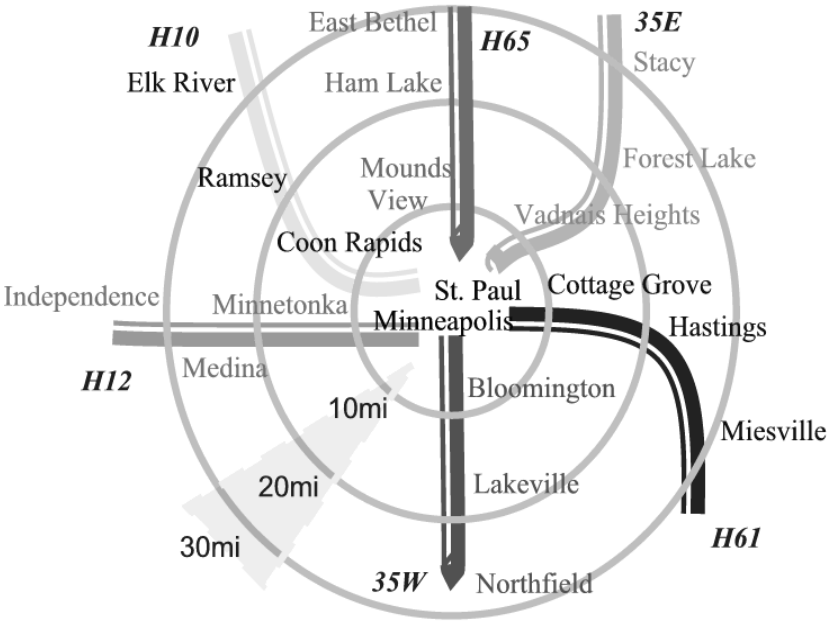
This section describes the framework used to estimate household budget impacts from 1996 road tax policy. The analysis centers on a set of representative households and a simple accounting model to estimate budget and income effects. Each household has income, a home, and at least one vehicle. They travel a minimum of 7,500 miles per year, and some travel as much as 22,500 miles. Travel differences result from an increase in work commutes, simulated by "relocating" households out a series of highway transects to increasingly more suburban communities. Where you live, what you earn, the car you drive, and how far you drive are elements of your total road tax levy. This section describes the households, communities, homes, and vehicles used to estimate a road tax baseline. The next section compares the baseline costs with those of two alternative financing policies.

Communities

Households live in communities, where city and county governments provide local roads. The location also defines a spatial relationship with reference to the TCMA's central business districts. The first element of this analysis is a set of communities radiating outward from the central cities of Minneapolis and Saint Paul (Figure 4.1). These communities are located along six highway transects at 10-mile intervals. They represent potential commuter routes to jobs in the downtown, but could also be used to interpret commutes between any pair of communities. For example, the section of I-35W south from Minneapolis to Bloomington is about 10 miles. It is another 10 miles from Bloomington to Lakeville, and another 10 miles to Northfield. If a worker commuted to a job in downtown Minneapolis from Northfield 250 days per year, he or she would drive

15,000 miles. From Lakeville the annual commute would be 10,000 miles, and from Bloomington it would total 5,000 miles.

Figure 4.1 – Communities at 10-mile increments from central cities



The set of communities was chosen for their relative distance from the central cities. While most are within the seven-county metropolitan area (Table 4.1), several are just over the border, including Northfield, Stacy, and Elk River. Much of the Twin Cities region is contained within about a 30-mile radius of Minneapolis or Saint Paul.

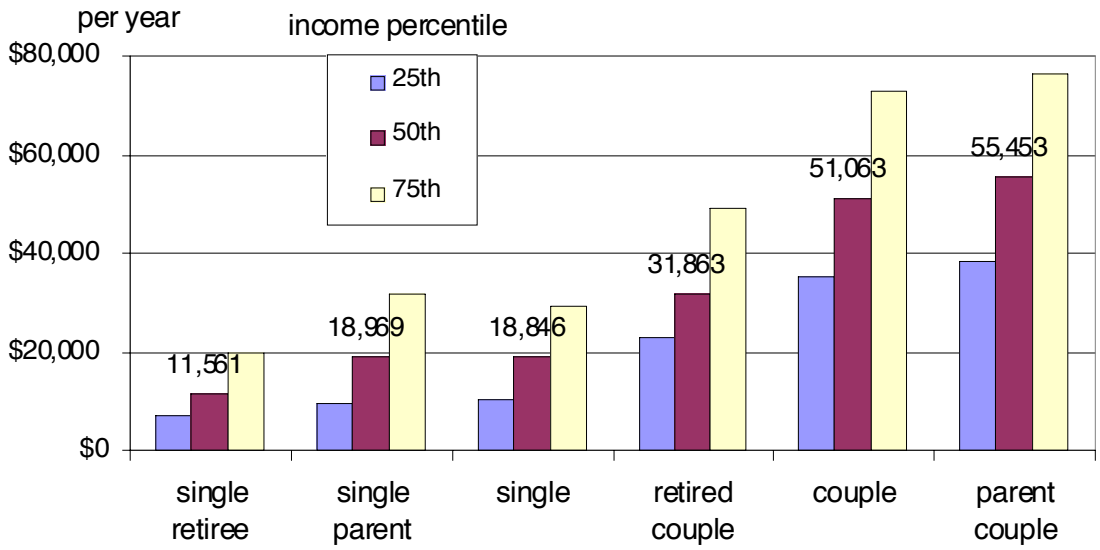
Table 4.1 – Transect communities are along major commuting routes

		First ring	*Second ring*	*Third ring*
Highway	**Central Cities**	**10 mi radius**	**20 mi radius**	**30 mi radius**
Hwy 65	Minneapolis *(Hennepin)*	Mounds View *(Ramsey)*	Ham Lake *(Anoka)*	East Bethel *(Anoka)*
Hwy 35E	St. Paul *(Ramsey)*	Vadnais Heights *(Ramsey)*	Forest Lake *(Washington)*	Stacy *(Chisago)*
Hwy 61	St. Paul *(Ramsey)*	Cottage Grove *(Dakota)*	Hastings *(Dakota)*	Miesville *(Dakota)*
Hwy 35W	Minneapolis *(Hennepin)*	Bloomington *(Hennepin)*	Lakeville *(Hennepin)*	Northfield *(Rice)*
Hwy 12	Minneapolis *(Hennepin)*	Minnetonka *(Hennepin)*	Medina *(Hennepin)*	Independence *(Hennepin)*
Hwy 10	Minneapolis *(Hennepin)*	Coon Rapids *(Anoka)*	Ramsey *(Anoka)*	Elk River *(Sherburne)*

People

The households used in this analysis are based in part on the 1999 *Tax Incidence Study*, which reports the estimated taxes paid by businesses and individuals in Minnesota statewide for tax year 1996.[27] It describes six household types, two retired and four working. Retirees are singles or couples, but without minor children. Workers are singles or couples, and either type can be a parent. Each household type is differentiated by income level, based on the 25th, 50th, and 75th percentile of income in their class. The median income for a single retiree is $11,561, while the median two-parent household earned $55,453 (Figure 4.2). Two-person households had income levels more than twice the incomes of single person households. The poorest (25th percentile) single retirees had incomes of $7,281. The wealthiest (75th percentile) two-person households had incomes of $76,488.

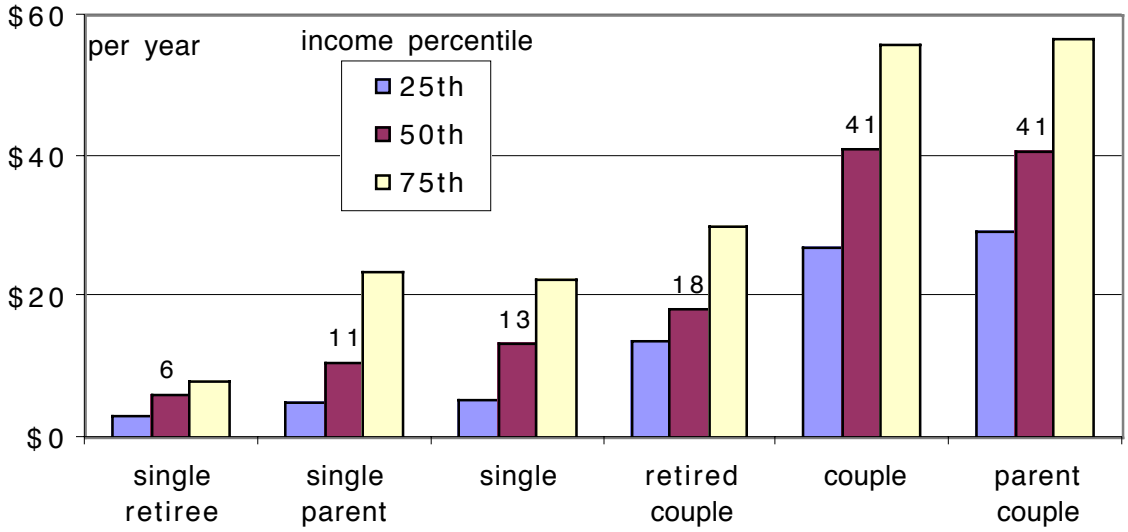
Figure 4.2 – Minnesota income distributions by household type (tax year 1996)



Source: Tax Incidence Study, Minnesota Department of Revenue 1999

Income and sales taxes used for roads. The first road tax to consider is the income and sales tax contributions to the state general fund. These taxes find their way to supporting local roads through general-purpose aid transfers to local governments. As was shown in Section 3, local governments in the Twin Cities used an estimated $105 million in general-purpose aid to pay for road services. Since Minnesota's general fund budget in 1996 totaled $12.5 billion, $105 million represents 0.008 percent. Households statewide therefore paid 0.008 percent, or 8 cents for every $100, in income and sales taxes to support this general-purpose transfer to local metro-area roads. Individual contributions ranged from $41 per year for median income parent couple, to $6 per year for median income single retiree (Figure 4.3).

Figure 4.3 – Income and sales taxes help pay for local roads



Homes

A second tax that helps pay for roads is the property tax. This analysis focuses solely on residential properties, using the four homestead valuations described in the final pay 97 (Minn.) House research analysis of property tax burdens. The average home in the seven-county metropolitan area in 1996 was valued at $111,900, and had a total property tax of $1,962.[28] House research describes three other residential homestead property valuations as low value, high value, and extra-high value. The low value home in the seven-county region was priced at $74,600, while the high value and extra-high value homes were assessed at $149,200 and $223,800 respectively.

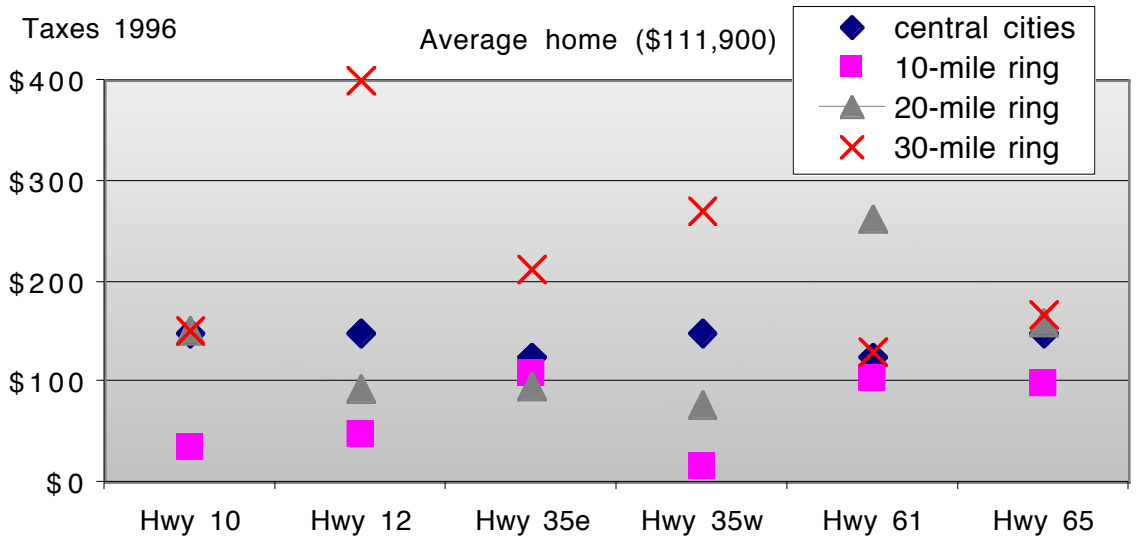
The portion of the property tax going to pay for roads and road-related activities is estimated for homesteads using House research and the state auditor data described in Section 3. For the average-value metro home in 1996, $220 of the property tax went to fund roads. Low-value homes paid just $1,006 in total property taxes, of which $113 was for roads. High-value homes paid $2,918 in total taxes, and had an estimated $329 in road-related property taxes. Extra-high value homes had total tax bills of $4,830, and road tax bills estimated at

$543. These are region-wide averages. To analyze household impacts, estimates are needed at the individual community level.

Road taxes in transect communities. Road-related property taxes for the average-priced metro home are estimated for the 18 transect communities (Figure 4.4). In this small subset of communities, local road property taxes varied considerably from the $220 regional average. First-ring communities (see Table 4.1) had lower than average road tax bills, while the communities furthest away had the highest. This may be explained in part by the categorical road-aid formulas, which benefit the older, more established, more populated communities.

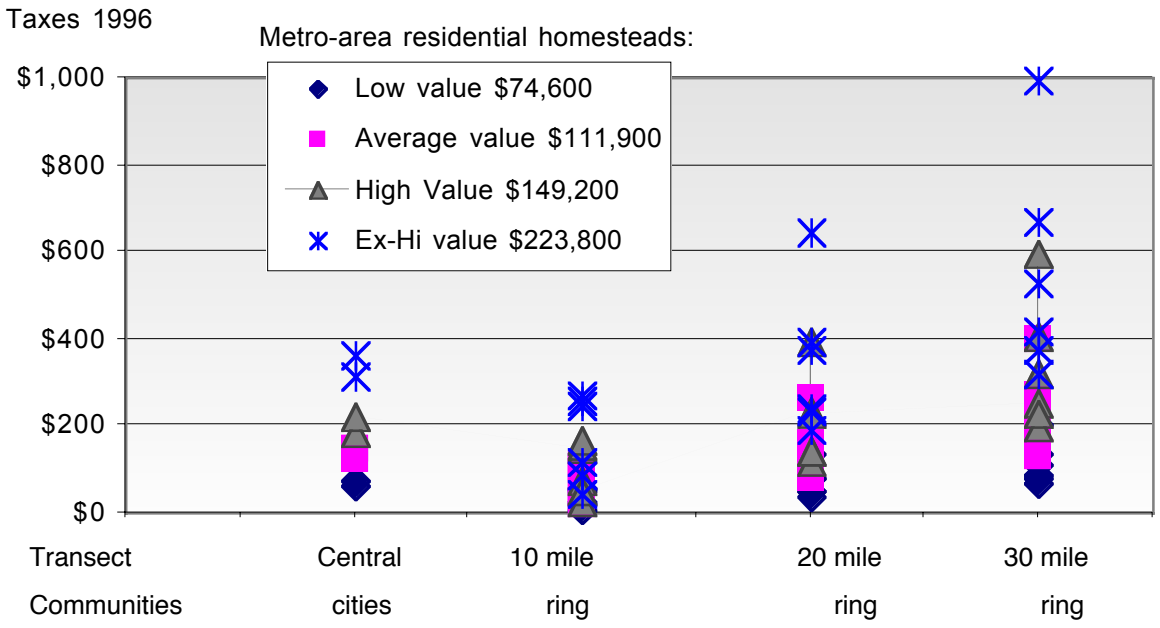
The community of Independence had the highest estimated road tax; there the metro average-value home would have had a road tax bill about twice the regional average. Independence has high property wealth and a small population, providing it with virtually no road aid to offset relatively high spending on roads. At the other end of the scale is Bloomington, a community that does particularly well under the municipal state aid road formula, subsequently requiring a very low local effort. Both communities are in Hennepin County.

Figure 4.4 – Road-related property taxes for metro average home (1996)



Another view of the road-related property tax uses the four metro home values described earlier. Instead of organizing by highway transect, communities are grouped by distance from the central cities (Figure 4.5). A similar pattern is evident, with the close-in suburbs having lower average road property taxes, and the communities furthest out having the highest. Once more, Independence is the outlier with the extra-high value home having a road tax bill of nearly $1,000.

Figure 4.5 – Road-related property taxes by transect ring (1996)



Vehicles

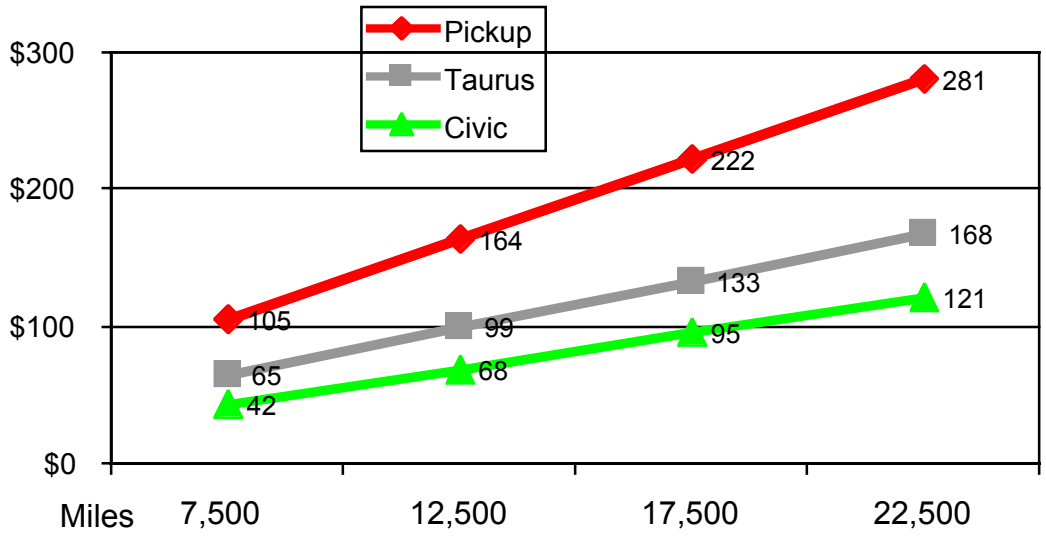
Three passenger vehicles, chosen from among the most popular selling cars and light trucks in America, are used in this analysis. For consistency they are all 1992 model year vehicles, putting them in their fifth vehicle registration cycle. The first is a Chevy pickup truck, which had a manufacturer's suggested retail price (MSRP) of $21,600. This vehicle is the least fuel efficient of the three, with an EPA rating of 13 miles per gallon (mpg) city and 18 mpg highway. The second vehicle is a Ford Taurus. It had a MSRP of $16,300 and gets an estimated 20

mpg city and 29 mpg highway. The third vehicle is a Honda Civic, costing $11,600 new and rated at 35 mpg city and 40 mpg highway. From this information two taxes associated with vehicle ownership can be calculated, the motor vehicle registration tax and the motor fuels excise tax.

The motor vehicle registration tax (MVRT) as described earlier is assessed annually at 1.25 percent of a vehicle's depreciated MSRP. The depreciation rate for a vehicle in the fifth model year is 75 percent. Consequently, the tax on the Civic was $119, the Taurus was $163, and the pickup was $213. Remember, this analysis is based on 1996 tax law, when there was no maximum registration tax.

The second tax to estimate is the motor fuels tax, paid as a result of operating a vehicle over some distance (Figure 4.6). This analysis assumes that vehicles are driven a base set of 7,500 miles split between city (40%) and highway (60%). These "weekend" miles come with each vehicle the household owns. As households move out the highway transects, travel increases in 5,000-mile increments, corresponding to a highway work commute. Driving the base set of miles would cost the owner of a Civic $42 in fuel taxes, the Taurus $65, and pickup $105. As mileage increases with the highway work commute, the fuel tax bill increases as well. The total state fuel tax for driving 22,500 miles would be $281 for the pickup, $168 for the Taurus, and $121 for the Civic.

Figure 4.6 – State motor fuels tax associated with vehicle operation



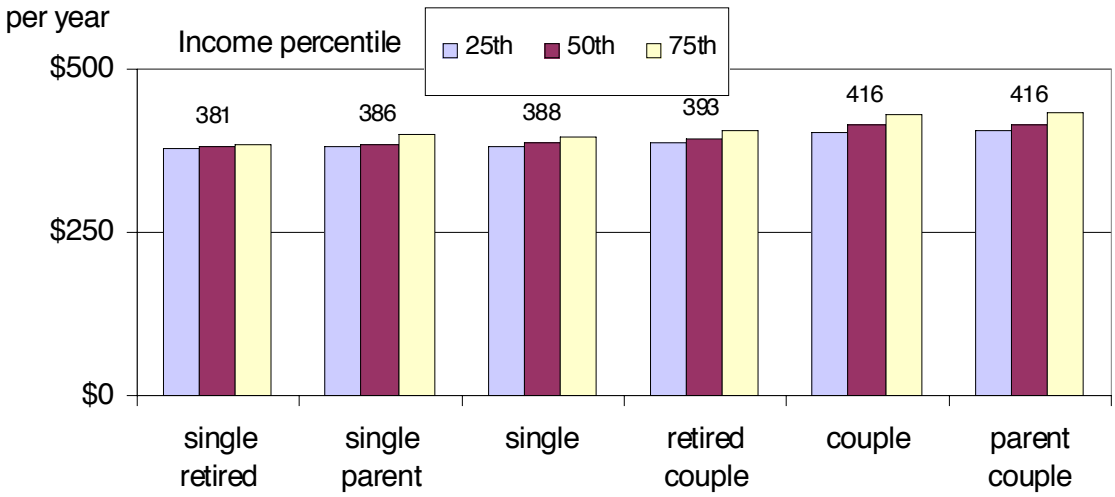
Fixed Road Tax Income Impacts

The set of road-related taxes described above can be combined to provide estimates of the amount that each household's budget or income goes to pay for roads and road-related activities. Using current (1996) road tax policy, budget impacts are described for a set of representative households. But, before considering the budget impacts, a simple point can be made about income impacts using the six household types from the *Tax Incidence Study*.

Fixed road taxes affect household incomes differently. For example, assume that all households lived in an average metro-area home. In 1996, that was an $111,900 homestead assessed an estimated $220 in road-related property taxes. Next, assume that each household owns a five-year-old, 1992 Ford Taurus. The registration fee on this vehicle was $163. Finally, assume each household paid its share of general-purpose aid for roads according to its income. For median-income retirees that would be about $6, while for median-income two-parent households it would cost $41. Without driving a single mile, each household would have a road tax bill of about $400 (Figure 4.7).

Figure 4.7 – Fixed road taxes by household type

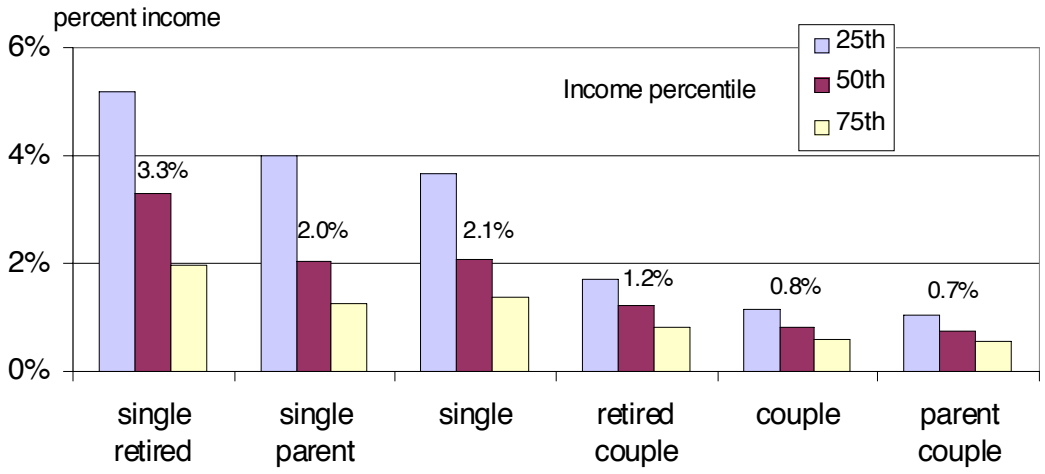
(average incomes, average-value home, average car, no travel)



Household income impacts are much less uniform than the budget impacts (Figure 4.8). A single retiree would pay from 2 percent to 5 percent of income on these fixed road taxes. On the other hand, couples—with or without children—would pay less than 1 percent of their income. The poorest single parents, living in an average-value home with a 1992 Taurus, would pay 4 percent of their income in fixed road taxes. Even a median income single parent would pay 2 percent of his or her income.

Figure 4.8 – Fixed road taxes as a share of household income

(average incomes, average-value home, average car, no travel)



Household Baseline

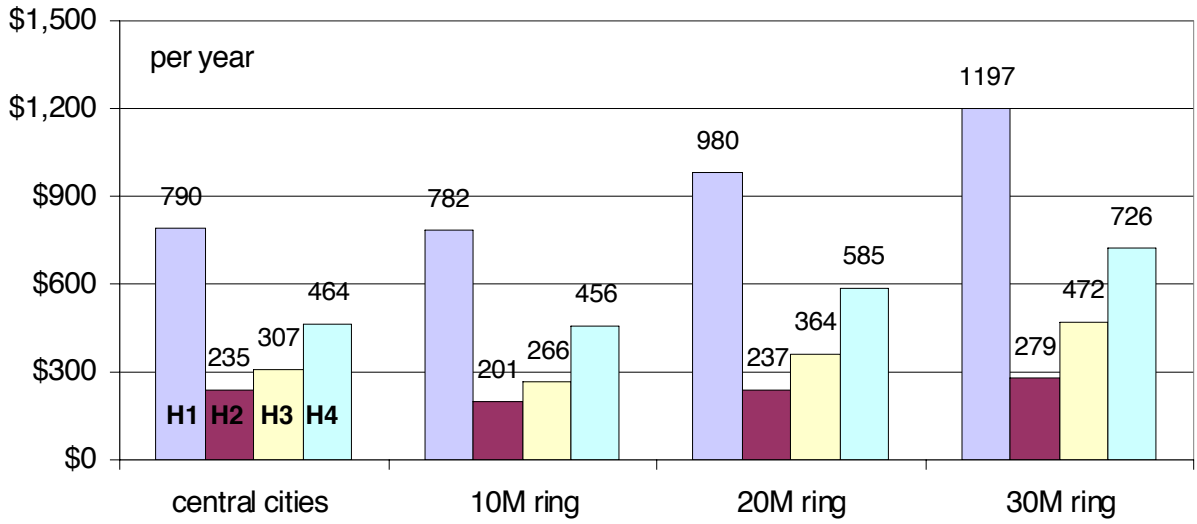
To highlight the differences household characteristics have on the amount paid for roads, the baseline household budget impact analysis is limited to four households with differing characteristics. One household is a two-parent family, another is a single retiree, and the other two are both single parents. All four are assumed to have the median income of their group. In this exercise, each household is assigned a home and car, plus 7,500 miles of travel, regardless of where they live. Then each household is relocated out the highway transects. One member of each working household commutes to work in the central cities, a distance that increases the further out he or she lives on the transect. To smooth out the community-level variability, property taxes are averaged together for the central cities, and then among the communities of each successive transect ring. For instance, in the third ring, road-related property taxes are estimated and averaged together for Elk River, East Bethel, Stacy, Miesville, Northfield, and Independence.

The first household is a two-parent family, living in a high-value home with two vehicles, a Taurus and a pickup truck. The Taurus is used for the work commute, while the pickup is driven the 7,500 base miles. The second household

is a single retiree living in a low-value home and driving a Civic the 7,500 base miles. The third household is a single parent living in an average home and driving a Civic as well. Finally, the fourth household is also a single parent in an average home and driving a pickup.

Total road taxes for each household are shown in Figure 4.9. The two-parent family (H1) in the central city pays $790 in road-related taxes, compared to $235 for the retiree (H2). The two single-parent families pay $307 and $464 respectively. The difference in amounts for the latter two is caused by differences in registration tax and motor fuel taxes. As all four households move away from the central cities, their road tax bill decreases at the 10-mile ring of communities, and then increases into the 20-mile and 30-mile rings. For the working households, the increased motor fuels taxes paid on 5,000 miles of additional driving at the 10-mile ring is offset by lower road property taxes. After initially being flat or down in the first ring, total road taxes rise as households move outward. For example, total road taxes for the two-parent household (H1) are $407 more at the 30-mile ring than in the central cities.

Figure 4.9 – Baseline road taxes for four representative households



Household H1 with its high-value home and two vehicles paid the most in this example. Its total road taxes, however, would be 2 percent or less of its income. For the retiree (H2), the only variable that changes is the property tax. But even in a low-value home and driving a modest, fuel-efficient car, the retiree can spend 2 percent of his or her $11,561 income on road taxes. The road tax differences between households H3 and H4 reflect the fuel-efficiency of their vehicles. Household H3 with the Civic gets considerably better highway fuel economy than the pickup and pays a slightly lower registration fee.

Section 5. **Two Alternative Policies**

The baseline household impacts detailed in the last section show the relative size of road taxes and the change in taxes when households locate further from the central city. In this section household budget impacts of two simple alternative tax strategies are examined. Constructing an alternative policy starts by choosing the share of fixed and variable road revenues, then choosing tax mechanisms to fill each division. The alternative proposals presented here are illustrative and demonstrate the potential to change the price signals road users receive.

Testing Two Tax Scenarios

Economists believe that road services should be priced at their marginal cost, and that tax policy needs to center on travel behavior.[29] But Minnesota's current financing program seems to be heavily biased in favor of fixed pricing mechanisms, not taxes that respond to system use. Less than one-third of metro-area state and local road revenues are from the one variable pricing mechanism, the motor fuels tax. Finding the right mix of variable and fixed revenues is central to creating efficient long run tax policy and investment outcomes. Determining the proper fixed and variable shares, however, is more complex than first appears; that is the focus of this project's next research phase. In this analysis we have arbitrarily chosen to reverse the weight given to fixed and variable revenues; the 71 percent fixed share is reduced to 30 percent, and the 29 percent variable portion is increased to 70 percent. This puts the tax burden much more heavily on system users, and should provide relief to low-travel households.

After establishing the fixed and variable shares of the overall revenue budget, the next issue is determining which tax mechanisms to use within each division, and at what rates. In the two scenarios described here, the three fixed

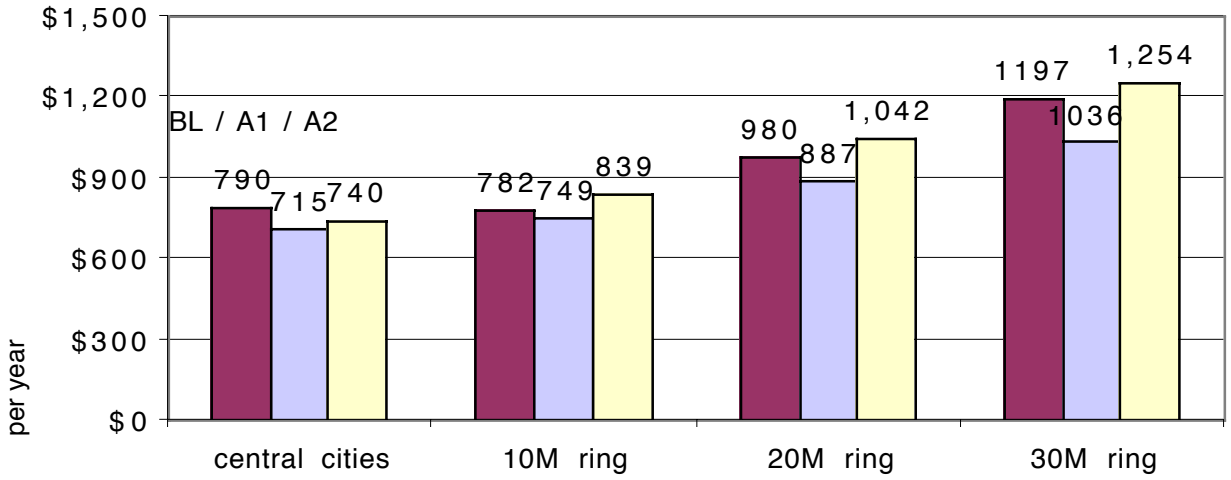
revenue sources are reduced or eliminated to bring the fixed portion down to 30 percent. First, the income and sales tax contribution to local aid programs (LGA and HACA) is eliminated. Second, property taxes for roads are cut in half. If the average household was paying $220 in road-related property taxes, it would now pay $110. Third, the motor vehicle registration fee is cut in half as well. These changes to the fixed share apply to both alternative policies described below.

The two alternatives differ, however, in the variable tax mechanism chosen. In the first alternative, the motor fuels tax is increased from the current 20 cents per gallon to 50 cents per gallon. This brings the variable revenue portion up to a 70 percent share from the current 29 percent. The second alternative replaces the motor fuels tax with a 3-cent vehicle mileage tax. While a more flexible or responsive VMT tax could be considered, a flat rate of 3 cents illustrates the point. These two alternatives are compared to current policy for the four representative households described in the baseline analysis.

Household Budget Impacts

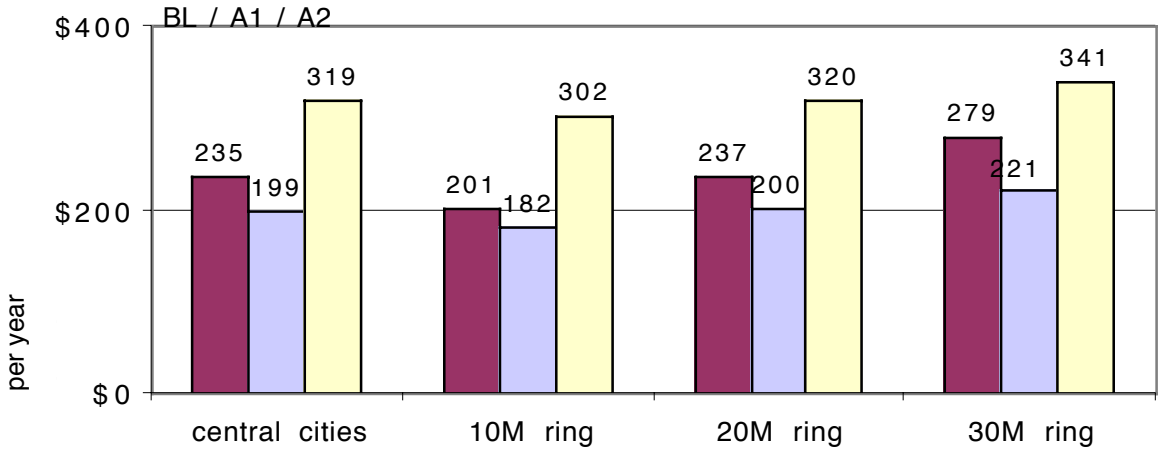
The tax policy changes have different budget impacts on each of the four representative households as they move out the commuter transects. The first household is the parent couple in a high-value home with two cars (Figure 5.1). They commute in a Taurus, and drive 7,500 base miles in a pickup truck. Under all three policies, total road taxes increase as the household moves away from the central cities. The first alternative policy—raising the gas tax—has the greatest budget impact, raising road taxes paid to $1,036, a decrease of $161 for those commuting from the furthest ring of communities. The second policy alternative—a 3-cent VMT tax—would increase the two-parent family's road tax bill by $57 in the 30-mile ring. Road tax bills range from around $700 to $1,200, depending on policy and location.

Figure 5.1 – Alternative tax impact HH1: Parent couple/high-value home/2 cars



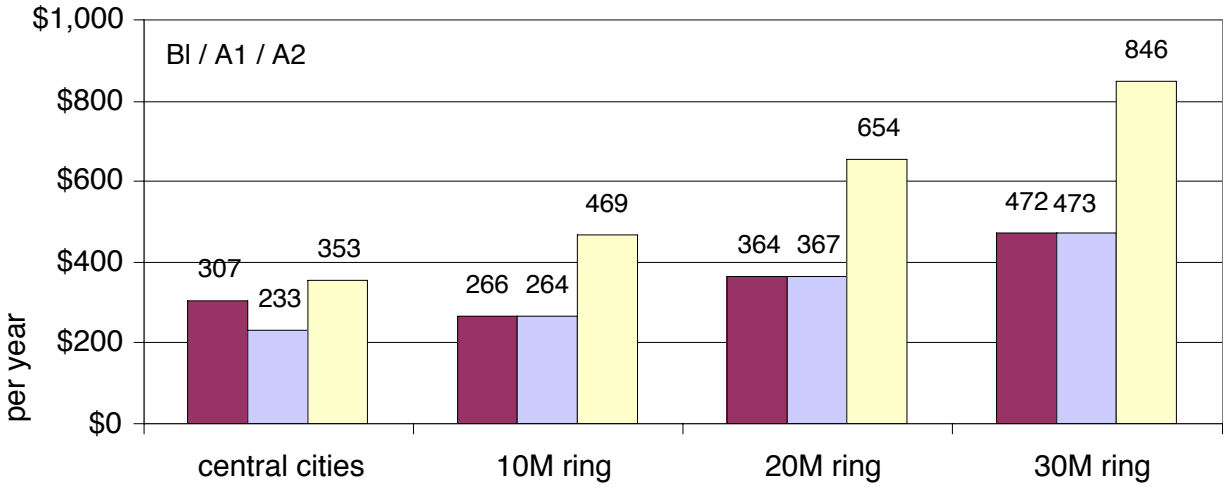
For household 2, the single retiree living in a low-value home and driving the 7,500 base miles in a Civic (Figure 5.2), the results are quite different. In the baseline results the difference in road taxes between communities reflects differences in property taxes, since the same base vehicle miles are driven regardless of home location. But when the policy changes to a higher gas tax in exchange for tax savings on sales taxes, registration fees, and property taxes, the retiree saves money regardless of location. By contrast, the 3-cent VMT policy costs the retiree more in every location. Despite the saving from tax cuts, the elimination of the gas tax in favor of a 3-cent VMT hurts the retirees' budget. Compared to the two-parent household, the retiree pays only about one-third as much in road taxes. Yet because retirees are assumed to have lower incomes, road taxes comprise a larger share of income. Among the three tax policies, the retiree's road tax bill ranges from $200 to nearly $350.

Figure 5.2 – Alternative tax impact HH2: single retiree/low-value home/econ. car



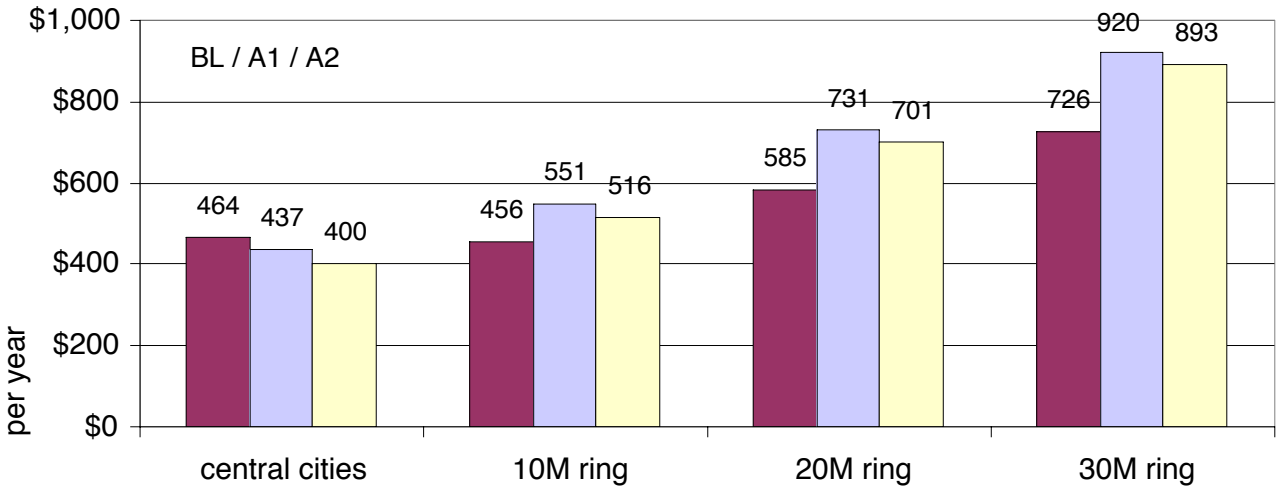
The third and fourth households differ only in their choice of vehicle. Both are single-parent households living in average-value homes. Household 3 drives a Civic (Figure 5.3), while household 4 drives a pickup (Figure 5.4). This comparison isolates the importance of vehicle fuel economy on the road tax bill. Household 3, with its high fuel efficiency vehicle, is indifferent to the current tax policy and to the fuel tax increase of policy alternative 1. In the central city location the household actually saves money under the first alternative. As the household moves out the transect rings, higher fuel tax costs are offset by lower income and sales taxes, property taxes, and vehicle registration fees. The second policy alternative provides a dramatic increase in road taxes for household 3 compared to both the baseline and first policy alternative. While road taxes are comparable in the central city location, when road taxes are based on miles traveled instead of gallons of fuel used, they nearly double as the household moves further out the highway transects. For this household, total road taxes range from as little as $233 to more than $800, again depending on the policy and location.

Figure 5.3 – Alternative tax impact HH3: single parent/average home/econ. car



Finally, household 4 sees an increase in road taxes under either policy alternative as the household moves away from the central cities (Figure 5.4). In the central city location alternative policy would save the household money. This household might be close to indifference between policy alternatives, since its tax difference in any particular transect ring is typically less than $50. The total road tax ranges from $400 to just over $900 under the various tax schemes and locations.

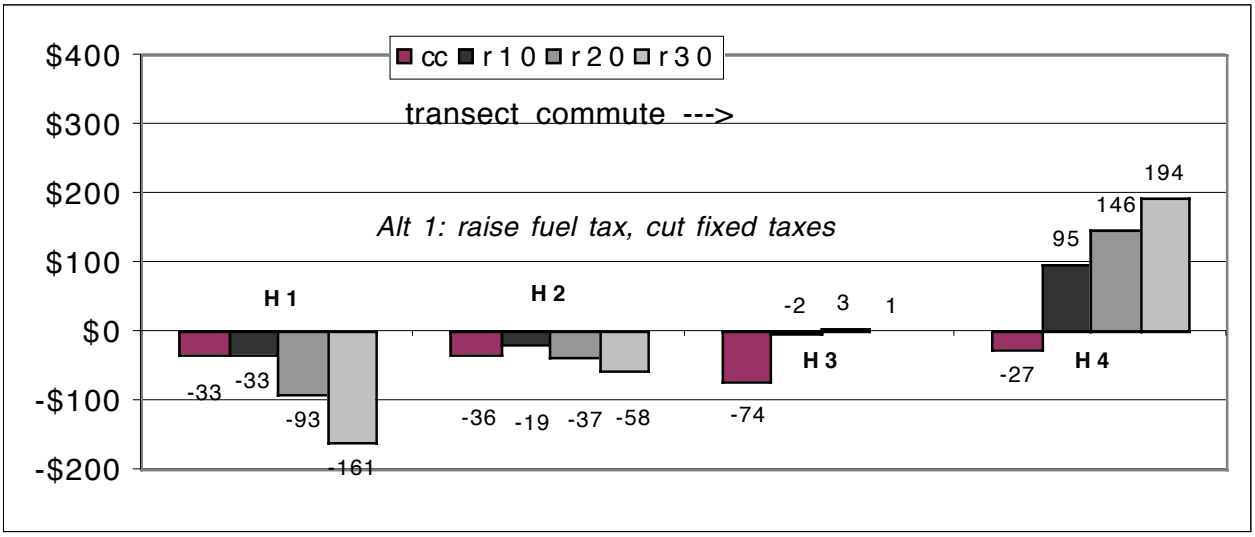
Figure 5.4 – Alternative tax impact HH4: single parent/avg home/ low mpg pickup



Baseline vs. Alternatives

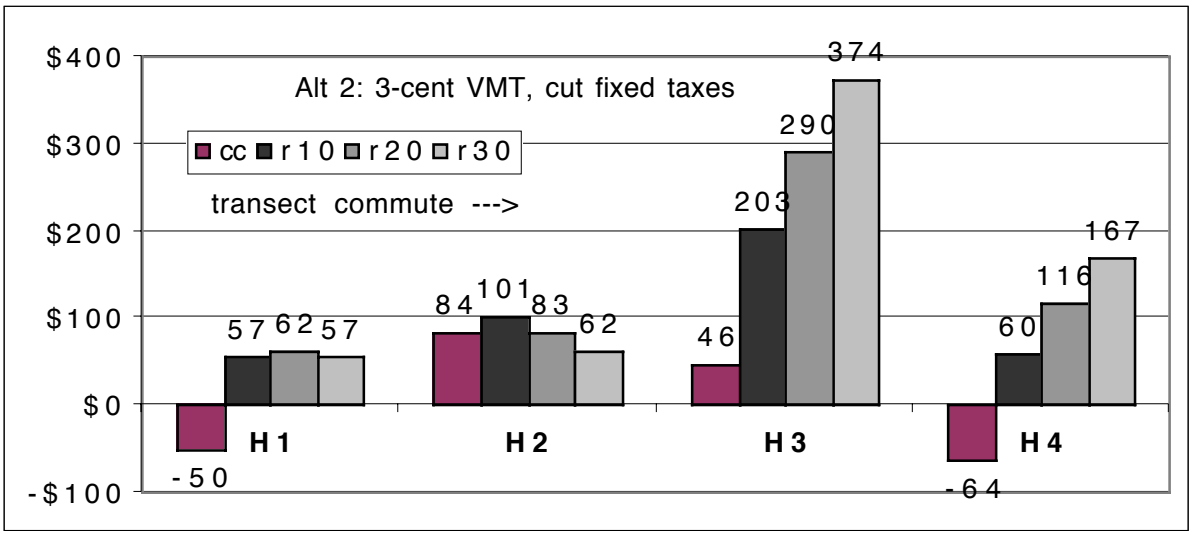
Budget impacts for these four representative households under the two policy alternatives are summarized in the two figures below. The first policy alternative (Figure 5.5) would raise the motor fuels tax in exchange for cuts in the three fixed taxes. *(See also Table 5.1.)* Compared to the baseline policy, this change has the largest positive budget impact on the two-parent household (H1). The savings in fixed taxes offsets higher fuel costs (Table 5.2). The single retiree (H2) benefits regardless of where he or she lives, since only the base miles are driven. The road tax bill for the single parent with a Civic (H3) is unchanged by the first policy alternative. The single parent with the pickup (H4) is the only household to pay more. If commuting from the 30-mile ring, costs would increase by nearly $200.

Figure 5.5 – Household budget impacts: baseline vs. alternative 1



Results are quite different when the baseline is compared to the 3-cent vehicle mileage tax (Figure 5.6). The two-parent family (H1) is only marginally worse off. Here the same tax cuts are not enough to compensate for the higher variable tax increase associated with travel. The single retiree (H2) is much worse off, especially when relative income is considered. The cost of driving a fuel-efficient vehicle the base 7,500 miles under this alternative increases significantly over the baseline, overwhelming the tax savings from cuts in property taxes and registration taxes. The most dramatic, although not surprising, result is the increased road tax burden on the Civic-driving single parent. High fuel economy vehicles, like the Civic, pay a very low rate per mile in fuel taxes. Their drivers can more easily absorb a significant fuel tax increase than the fixed 3-cent-per-mile VMT. By contrast, the owner of the poor fuel efficiency pickup fares slightly better with a VMT tax. Either alternative costs household 4 as much as $200–$400 more per year.

Figure 5.6 – Household budget impacts: baseline vs. alternative 2



Household budget impacts were little changed by the two policy alternatives, despite cuts on the fixed side of road revenues—in property taxes, income and sales taxes, and vehicle registration fees—and higher variable pricing. For most households the tax price of moving away from the central cities is higher. And there are significant differences in the total road tax paid by households under the two scenarios. One obvious, quick lesson is that it pays to have a fuel-efficient vehicle when commuting long distances. Another is that lowering the fixed share of taxes and raising the variable portion will send travelers a stronger price signal. Raising the gas tax encourages greater fuel-efficiency and increases the cost of commuting. A vehicle mileage tax can penalize long commute households, particularly those with fuel-efficient vehicles. Moving from the central city to a far ring community under the baseline policy only increases the household road tax by at most a few hundred dollars. But this same household would experience higher road taxes if it chooses to move to the far ring under the VMT scenario as well. Alternative road tax policies can affect household budgets, and reduce (or increase) the amounts available for spending on all other items, yet as this analysis has shown, the changes will be modest.

With tax increases of a few hundred dollars per year or less, some might argue that they are too small to affect housing location decisions.

Table 5.1 – Household impacts by tax category for baseline and alternatives

	BASELINE				*ALTERNATIVE 1*				*ALTERNATIVE 2*			
Household 1	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile
Income/Sales	$ 41	$ 41	$ 41	$ 41	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Tax	$ 203	$ 102	$ 208	$ 331	$ 102	$ 51	$ 104	$ 166	$ 102	$ 51	$ 104	$ 166
Reg. Tax Pickup	$ 213	$ 213	$ 213	$ 213	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107
Fuel Tax Veh 1	$ 105	$ 164	$ 222	$ 281	$ 263	$ 263	$ 263	$ 263	$ 225	$ 225	$ 225	$ 225
Reg. Tax Taurus	$ 163	$ 163	$ 163	$ 163	$ 82	$ 82	$ 82	$ 82	$ 82	$ 82	$ 82	$ 82
Fuel Tax Veh 2	$ 65	$ 99	$ 133	$ 168	$ 163	$ 248	$ 333	$ 420	$ 225	$ 375	$ 525	$ 675
Total Road Tax	**$ 790**	**$ 782**	**$ 980**	**$ 1,197**	**$ 715**	**$ 749**	**$ 887**	**$ 1,036**	**$ 740**	**$ 839**	**$ 1,042**	**$ 1,254**
Household 2	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile
Income/Sales	$ 5	$ 5	$ 5	$ 5	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Tax	$ 69	$ 35	$ 71	$ 113	$ 35	$ 17	$ 36	$ 56	$ 35	$ 17	$ 36	$ 56
Reg. Tax Civic	$ 119	$ 119	$ 119	$ 119	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Fuel Tax Veh 1	$ 42	$ 42	$ 42	$ 42	$ 105	$ 105	$ 105	$ 105	$ 225	$ 225	$ 225	$ 225
Total Road Tax	**$ 235**	**$ 201**	**$ 237**	**$ 279**	**$ 199**	**$ 182**	**$ 200**	**$ 221**	**$ 319**	**$ 302**	**$ 320**	**$ 341**
Household 3	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile
Income/Sales	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Tax	$ 136	$ 69	$ 140	$ 222	$ 68	$ 34	$ 70	$ 111	$ 68	$ 34	$ 70	$ 111
Reg. Tax Civic	$ 119	$ 119	$ 119	$ 119	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60
Fuel Tax Veh 1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -				
Total Road Tax	**$ 307**	**$ 266**	**$ 364**	**$ 472**	**$ 233**	**$ 264**	**$ 367**	**$ 473**	**$ 353**	**$ 469**	**$ 654**	**$ 846**
Household 4	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile	Ctl Cities	10 mile	20 mile	30 mile
Income/Sales	$ 10	$ 10	$ 10	$ 10	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Property Tax	$ 136	$ 69	$ 140	$ 222	$ 68	$ 34	$ 70	$ 111	$ 68	$ 34	$ 70	$ 111
Reg. Tax Pickup	$ 213	$ 213	$ 213	$ 213	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107	$ 107
Fuel Tax Veh 1	$ 105	$ 164	$ 222	$ 281	$ 263	$ 410	$ 555	$ 703	$ 225	$ 375	$ 525	$ 675
Total Road Tax	**$ 464**	**$ 456**	**$ 585**	**$ 726**	**$ 437**	**$ 551**	**$ 731**	**$ 920**	**$ 400**	**$ 516**	**$ 701**	**$ 893**

But when examining the impact on location decisions one cannot focus on the annual cost increases alone. A more appropriate framework for analyzing the tax change impacts is to examine the long-term cost, or the discounted present

value of the tax change over a long period of time. This concept assumes that households see the annual increase as a continuous stream of taxes, which extends years into the future. The tax increase does not just cost, say $200 this year, but $200 every year. And since a dollar next year is worth slightly less than a dollar today, the household discounts out-year dollars by some interest rate.

Table 5.2 – Net present value of tax increase at two discount rates

Annual tax increase	$ 100	$ 200	$ 400
	(infinite life)		
Discount rate	Long-term value of tax increase		
10%	$ 1,000	$ 2,000	$ 4,000
5%	$ 2,000	$ 4,000	$ 8,000

The net present value of a tax policy change shows the lump sum cost of the tax difference over the long run.[30] Discount rates vary with the returns that a household might expect from alternative investments. Generally accepted discount rates are in the 5 percent to 10 percent range. Table 5.2 shows the present values for three tax increases using these two rates. A tax increase of $200, for example, has an impact on the household budget of $2,000 at a 10 percent discount rate, or $4,000 at the 5 percent rate. The household, when calculating the amount it is willing to pay for housing further away from the central cities, should use this longer-term view of the tax impact.

Section 6. **Road Taxes and Urban Fringe Development**

One broad policy question of current interest is whether transportation financing can be an effective tool for regional growth management. Some argue that if only those using the roads paid the full cost of their action, including negative externalities, development would be more concentrated and the scattered, low-density development that produces the inefficiencies attributed to sprawl would be avoided. Others, while recognizing the problems associated with sprawl, believe that changes in the way roads are paid for would not provide a sufficiently large lever to change location decisions.

It is clear that in the abstract, higher road taxes can change housing location decisions. If taxes were set high enough, say $20 per gallon of fuel, the demand for suburban locations would drop dramatically, and the use of transit alternatives would boom. But, raising the cost to society would create other inefficiencies elsewhere, which could well be more disruptive to economic growth and quality of life than those associated with the current under-pricing of roads.

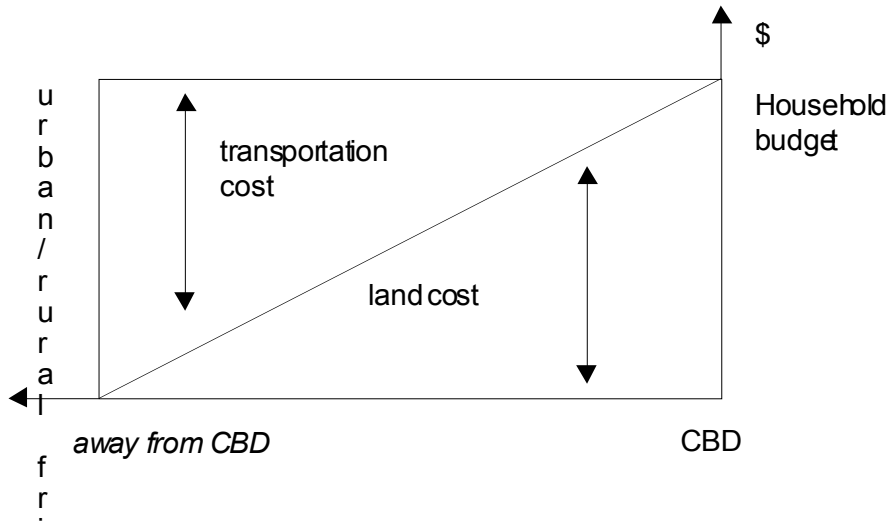
In this section we present one way of identifying the likely impact of higher transportation costs on development patterns on the rural-urban fringe. Then, using the price differentials developed in section 5, we discuss the likely impact that higher, variable-cost-based financing of roads would have on development. Finally, we drop the revenue neutral assumption used in the analysis thus far and examine a scenario in which tax policy reflects the full cost of transportation.

Land Rent Gradient

Ultimately, transportation costs affect development through their effect on land prices. The land rent gradient shows how land values change with the distance to an economic center.[31] Those changes in land value capture the trade-off households (and businesses) make between travel expenses and housing costs

(Figure 6.1). Transportation costs include the time costs of travel as well as out-of-pocket expenses. Housing costs can be reduced simply to land costs by assuming that a comparable dwelling can be built anywhere in the region at the same price. Households make these travel and housing choices within the constraints of a family budget. For simplicity we assume households spend a fixed share of their full income (including the value of their time) on some combination of transportation and land.

Figure 6.1 – Households make tradeoffs between travel and land costs



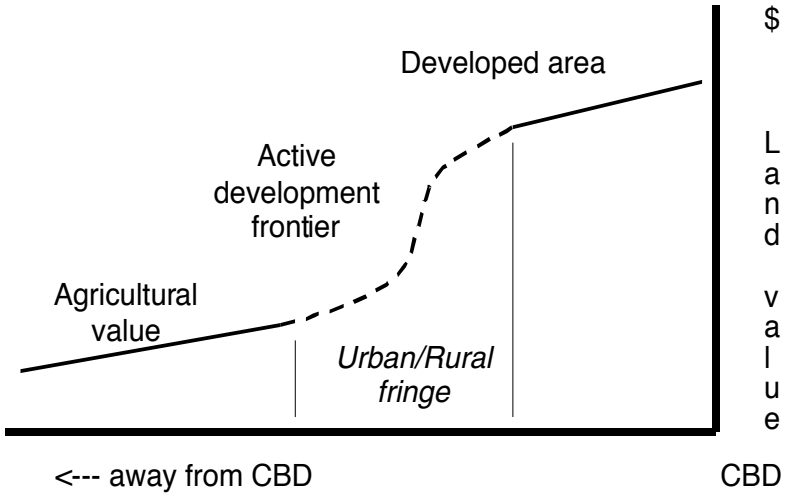
Like all good theoretical constructs, the simple land rent gradient relies on a number of assumptions: the population is homogenous with respect to income, family size, and housing demand; building costs do not vary with location, and density is the same everywhere; and the landscape is a featureless plain. As the distance from the central business district (CBD) increases, transportation costs increase, and that cost increase reduces the amount households are willing to pay for land.

The logic of this concept was best expressed recently by Jeff Schoenwetter, president of the Builders Association of the Twin Cities, in an interview about the high cost of building lots in the region.[32] He said "…the buyer

can decide to commute a few minutes farther for a cheaper lot….It's a geographic question, are you willing to pay an extra $50,000 to drive 10 minutes less each day?" With building lot prices in the metropolitan area increasing dramatically, it is worth noting that not long ago today's growth areas were considered rural in nature.

At the far edge of the region is the urban/rural fringe, where farming is typically the land's best commercial use. But as the region develops and its population grows, some farmland is converted to non-farm use. This starts an irreversible process that over the years will claim the most desirable, easily developed land for more highly valued non-farm uses. Locations where sale prices begin to exceed the agricultural value are on the active development frontier, and it is there that changing road tax policy might affect regional growth patterns (Figure 6.2).

Figure 6.2 – Land values rise steeply at the active development frontier



Land rent gradient theory maintains that households will trade travel expense for land value within a budget constraint. Lower the cost of travel with a road-related tax cut or road improvement, and households will tend, over time, to push out the borders of the urban/rural fringe, bidding more land away from

agricultural use. Raise travel costs with higher road taxes or more congestion, and households will find land on the fringe less desirable. The price households will be willing to pay for land at that particular location will fall, and less land will be developed.

The effectiveness of a change in tax policy in shaping—or changing—development patterns depends on the differential between the market value and the underlying agricultural value of any particular parcel, and on the change in the net present value of travel costs from that location. If the development premium is high, say $30,000 an acre, then raising road taxes by a net present value of $5,000 is unlikely to have much impact on development in the area. Some prospective households will be discouraged from moving to the area, but since land was selling for more than $30,000 per acre, a substantial development premium will remain under the alternative tax regime. Within reasonable limits, higher road taxes appear unlikely to affect the pace of development on the active development frontier where development values substantially exceed agricultural values.

But as we move beyond the area where development is actively underway, development premiums fall quickly. For those properties an increase in the net present value of transportation costs of $5,000 could well make it (temporarily at least) impossible to find a developer willing to bid more for the land than its agricultural value. Thus, the result of higher variable pricing for roads may well cause development to proceed in a more measured, concentrated manner. Whether or not there will be any impact on development will depend on the change in the net present value of transportation costs and the development premium the market formally assigns to the property.

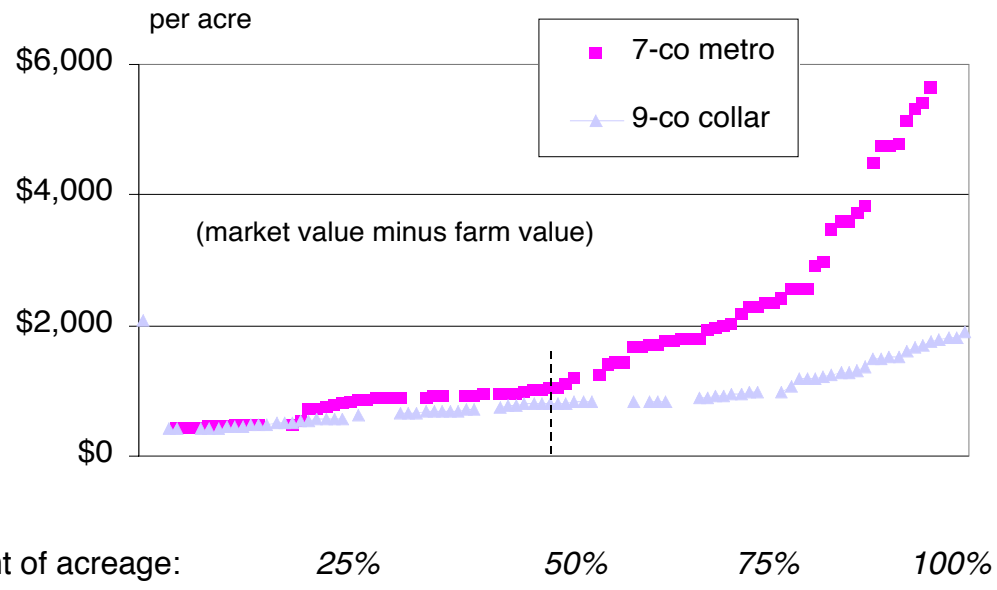
Green Acres Land Values

One resource that provides data comparing farm and development values for particular parcels is assessments on Green Acres farm property. The Green Acres program is designed to protect agricultural landowners from high property

taxes where land values are rising due to urban development pressures.[33] Under the program's rules, land used for agriculture retains a farm classification and is assessed agricultural value for property tax purposes. But, to limit abuse of this tax benefit by land speculators, the land is also assessed at its true market value for development. Should the property be converted from agricultural use, the landowner must pay the last three years of property taxes at the market classification rate and value. Any special assessments deferred through the Green Acres farm years must also be paid in full.

Since the local assessor must determine both a farm value and a market value for Green Acres property, these dual assessments provide a measure of the potential to influence the transition of land out of agricultural use. Farm values are based on factors such as soil productivity and comparable land sale. Market value assessments are also based on comparable non-farm land sales.[34]

Figure 6.3 – Green Acre development premiums in metro region



Source: Minnesota Land Economics (pay 2000 assessments)

In the seven-county metro there are nearly 400,000 acres of agricultural land enrolled in the Green Acres program. Surrounding the Twin Cities are nine

collar counties, where the program enrollment totals about 800,000 farm acres.[35] For Green Acres land in these two sets of counties, Figure 6.3 shows the distribution of development premiums, which is the difference between the market valuation and the agricultural use value assigned by the local assessors.

For much of the land enrolled in Green Acres, differences between the agricultural value and the market value are small. Market value exceeds farm value by $1,200 for the median Green Acres land in the seven-county metropolitan area. In the nine collar counties, the median Green Acres land had a development premium of just $800 per acre. The assessed market value exceeds the farm use value by more than $6,000 an acre for only 5 percent of Green Acres land in the seven-county metro. Less than one percent of land in the collar counties had a development premium exceeding $2,000 per acre.

Farmland in east central Minnesota used in a corn-soybean rotation might be valued at $1,500 an acre. In the metropolitan area agricultural land can be more highly valued for activities like farming vegetables or stabling horses. The largest development premium recorded is for a 57-acre parcel in Bloomington that has a farm value of $21,000 per acre and a market value of $221,000 an acre. At the other extreme are 58 acres in Scott County that have a farm value of $2,264 an acre and a market value of $2,381 per acre—just a $117 difference.

These values overall may seem unrealistically low to some, given anecdotal evidence of a tight land market and rising building lot prices in the region. The suggestion that one-acre building lots should only cost about twice the farm value price seems hard to believe. But that interpretation also ignores some factors that could explain the contradiction. Part of the problem may be in equating farmland with a ready building site. To build one home or many, land must be purchased, platted, and cleared, planning and zoning ordinances complied with, and access to utilities like roads, sewer, and water established. Each step in the site development process adds time, expertise, and expense to the final price of a building lot.

Small farmland development premiums may also result from the sheer size of the land market. Between the seven-county metro and the nine-county collar there are 1.2 million acres of Green Acres land. The top five percent of land in the seven-county area that has development premiums over $6,000 an acre only represents about 20,000 acres. In the end, there is a significant amount of farmland in the Twin Cities region where the development premium is small.

The Impact of Alternative Road Tax Policies

Annual differences between the household baseline and the two alternative scenarios outlined in Section 5 were generally small. For the two-parent household with two cars the difference was about $60 when a 3-cent vehicle mileage tax was imposed. Using a 10 percent discount rate the net present value of the cost increase for the two-parent household was less than $600. Increases in the discounted present value of future transportation costs of this magnitude suggest that changes in the way roads are paid for are unlikely to affect the pace at which land is converted from farmland on the active development frontier. There, for that 5 percent or less of land where development premiums are high, a change in the tax system will lower the development premium, or reduce the gap between a parcel of land's agricultural value and its value for housing, but it will not completely eliminate it. Consequently, development will continue at the same pace, although those owning undeveloped land in that area will gain less than under the current system.

Further out, on the rural-urban fringe where development premiums are small, however, a change in the road tax system may have some impact on the conversion of farmland. If, for example, the development premium for a particular parcel were $1,200, a change in the tax system that increases the discounted present value of transportation costs by $2,000 would more than eliminate the value for non-agricultural use. The result could be a substantial reduction in the spread of low-density housing in the short run, and more infilling and complete development along the active development frontier than under the current

system. Finally, only a small portion of the region's land is on the active development frontier. Prices for farmland in those areas, where development is proceeding rapidly, are likely to have a substantial premium over the agricultural use value of the land.

Exhibit: Green Acres Characteristics of Transect Communities

Green Acres land in the transect communities (p.36) is described in Table 6.1. As distance from the central cities increases, land values and development premiums fall. Most farmland in the metropolitan area is likely to be enrolled in either the Green Acres program or the more restrictive Agricultural Preserve program. Participating in the latter program commits land to farm use for 8-year periods. In exchange, landowners pay no back taxes or special assessments when program participation ends.

Table 6.1 – Green Acres land in transect communities

(year 2000)

dollars per acre:

program acreage	Share of all farmland	(ring)	Community*	Market value	Farm value	Development premium
11	55%	1	St. Paul	$ 27,255	$ 8,318	$ 18,937
57	100%	2	Bloomington	$ 221,418	$ 21,051	$ 200,367
24	100%	2	Minnetonka	$ 36,125	$ 9,917	$ 26,208
5247	20%	2	Cottage Grove	$ 4,726	$ 1,024	$ 3,702
223	39%	2	Coon Rapids	$ 5,263	$ 2,104	$ 3,159
59	48%	3	Vadnais Heights	$ 20,051	$ 2,151	$ 17,900
2737	90%	3	Medina	$ 14,730	$ 5,480	$ 9,250
5190	30%	3	Lakeville	$ 6,760	$ 1,633	$ 5,127
2752	35%	3	Ramsey	$ 4,656	$ 1,061	$ 3,595
574	20%	3	Hastings	$ 3,994	$ 1,440	$ 2,554
87	13%	3	Forest Lake	$ 3,422	$ 871	$ 2,551
6343	35%	3	Ham Lake	$ 3,029	$ 1,601	$ 1,428
6036	58%	4	Independence	$ 7,523	$ 3,918	$ 3,605
4490	28%	4	East Bethel	$ 2,966	$ 1,219	$ 1,747
11400	34%	4	Elk River	$ 2,609	$ 929	$ 1,680
20	19%	4	Stacy	$ 3,230	$ 1,710	$ 1,520
992	34%	4	Miesville	$ 2,544	$ 1,500	$ 1,044

Source: Minnesota Land Economics

**no acreage reported for Minneapolis, Mounds View, or Northfield*

Full Cost Pricing

To be truly efficient, in an economic sense, household travel decisions must reflect not only the private costs, but also the costs imposed on others, or the externalities of road travel. Anderson and McCullough, as part of the broader CTS TRG Study, have examined that issue in detail.[36] Their study covers a larger geographic area (19 counties) and more broadly defines government

expenses than does this study. It also uses a different reference year: 1998. Each cost category is given a high, medium, and low value; here we report the midline case. They estimate the full cost of transportation in the Twin Cities region at $27.4 billion. Internal or private costs paid by travelers are 84 percent of costs ($22.9 billion). Government costs, which are ultimately private costs but are reported separately, account for 9 percent ($2.56 billion). The remaining 7 percent ($1.89 billion) are externalities.

Externalities are sometimes referred to as third-party effects, because someone other than the party causing the problem pays the cost. Households pay the price in lost time, wasted fuel, poor health, and other contrary outcomes. The largest externality cost is air pollution, with an estimated regional cost of $900 million in 1998. Global warming is a closely related problem, causing another $100 million in damages. Petroleum consumption creates $295 million in externality costs as well. These three cost categories make up 77 percent of the estimated $1.89 billion total external costs. Travel-related externalities include congestion, estimated at $330 million, and vehicle crashes, another $220 million. Noise pollution and other costs account for the final $40 million.

Congestion pricing and emission fees are mentioned in Section 2 as tax mechanisms that address traffic congestion and air pollution problems directly. In principle it would be best to give travelers feedback about the price of particular actions, say driving in rush-hour traffic. But for purposes of illustration, consider a policy that adds the externality costs to the motor fuels tax. The motor fuels tax generated $558 million in 1998 based on a 20-cent-per-gallon tax.[37] Total externalities in 1998 were estimated at $1.89 billion, or three and one-third times the fuel tax revenues. To charge travelers for the region's travel externalities, the motor fuels tax would have to increase by 67 cents, to 87 cents per gallon.

For the individual household, of course, how much more you pay depends on your vehicle and travel behavior. For the two-parent household, described in Sections 4 and 5, with two vehicles and one worker commuting, road-related taxes would increase by $910 a year ($9,100 on a net present value basis). For

the retiree driving just 7,500 miles a year in an economy car, the additional tax would be $140 annually, or a net present value of $1,400.

One important question raised by the idea of taxing transportation externalities is what to do with the revenues collected. The temptation might be to use the funds for road-related spending, and in some cases that might be appropriate. Congestion fees could fund transit alternatives or reduce highway bottlenecks. But more generally, externality tax revenues should be used to relieve the harmful affects or compensate the injured third parties.

Section 7. **Future Revenue Growth**

Much of this report has focused on the impact of road taxes on the household. This section returns to the government perspective. The study, which has so far relied on historic data, now pushes the timeline out to 2025 with forecast data. The reference year, which has been 1996, is moved forward to 2000. And finally, the geographic area of concern is broadened from the seven-county metropolitan area to a statewide perspective.

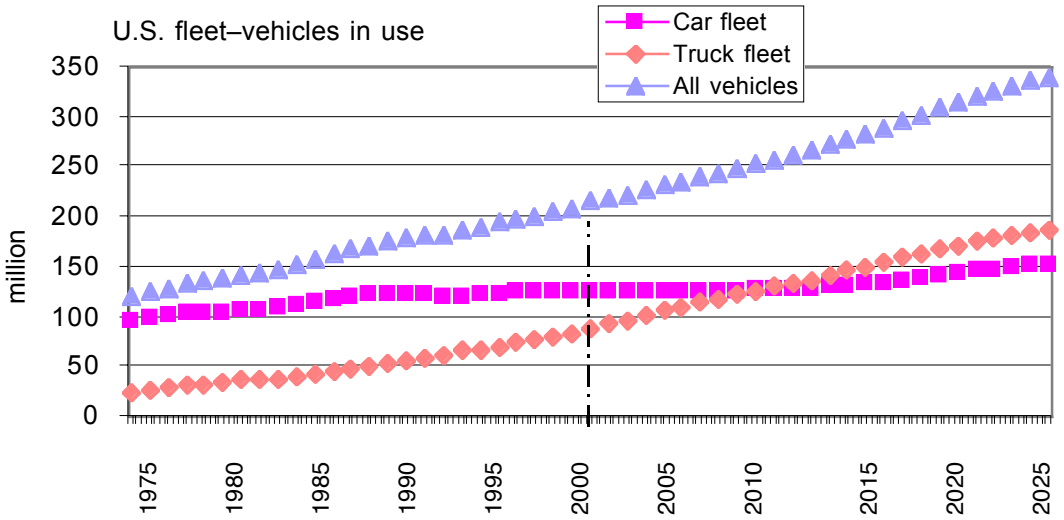
The purpose of this section is to consider how trends in vehicles and fuel use will affect the size and mix of future road tax revenues. Three taxes are of particular interest: vehicle registration taxes, vehicle sales taxes, and motor fuels excise taxes. These taxes are benchmarked against a price index for state and local government services to see whether revenues for transportation will keep pace with the costs of providing services at today's levels over the next 25 years. This assessment relies importantly on Standard and Poor's Data Resources Inc. (DRI) forecast of the U.S. economy in 2025.[38] DRI offers four economic performance scenarios; this exercise uses the trend forecast. The trend scenario is neither the most optimistic nor the most pessimistic of the four. It assumes 25 years of smooth growth with no "major mishaps" or even short-term cyclical fluctuations.

Motor Vehicle Registration Taxes in 2025

In 1975 the U.S. fleet of vehicles in active use totaled 121 million. By 2000 the fleet had grown by 78 percent, to 215 million vehicles. DRI estimates the 2025 fleet will increase 58 percent, to 341 million vehicles. The vehicle fleet can be parsed between cars and trucks (see Figure 7.1), where trucks include light, medium, and heavy vehicles. Or the fleet can be divided between light vehicles

and heavy vehicles. Light vehicles—cars and light trucks—drive the growth in Minnesota motor vehicle registration tax revenues.

Figure 7.1 – U.S. vehicle fleet: cars and trucks (1975–2025)



Source: DRI trend scenario, U.S. Economy: 25-year focus, Winter 2001

Minnesota's fleet currently includes 3.53 million light vehicles.[39] If it grows by 58 percent, the same as the national fleet, there will be 5.58 million light vehicles statewide in 2025. The average 2025 light vehicle registration tax is calculated in Table 7.1 using current law. Recall that vehicle registration taxes are based on the age and initial value of the vehicle. As the vehicle ages, the taxable value is depreciated according to a fixed schedule. The tax rate is 1.25 percent of the taxable value. In the vehicle's first model year, the owner pays the full tax. In the second year, the tax cannot exceed $189. In the third through ninth registration cycles, the maximum tax is $99. Once the vehicle is ten model years old, the fee is $35, which is also the minimum tax on any light vehicle regardless of age.

Table 7.1 – Registration taxes for 2025 average-value fleet (light vehicles only)

Avg. price new vehicle*	Model year & deprecation rate	1.25 % tax rate	Maximum tab fee
$48,600	Y1 2025 100%	$608	No max
$45,600	Y2 2024 100%	$570	$189
$42,900	Y3 2023 90%	$483	$99
$40,600	Y4 2022 90%	$457	$99
$38,500	Y5 2021 75%	$361	$99
$36,500	Y6 2020 75%	$342	$99
$34,800	Y7 2019 60%	$261	$99
$33,200	Y8 2018 40%	$166	$99
$31,800	Y9 2017 30%	$119	$99
$30,500	Y10 2016 10%	$38	$35

*Source: DRI trend scenario, U.S. Economy: 25-year focus, Winter 2001

The average new light vehicle in 2025 will sell for $48,600 and have a registration fee of $608. Under current law, the tax on an average two-year-old car—which is projected to sell for $45,600 new—would be $570. But the owner would pay only the $189 maximum. Even owners of nine-year-old vehicles, whose taxable value has depreciated to 30 percent of its initial price, would pay the $99 cap instead of the $119 tax. The disparity between new car fees and vehicles older than one year will grow wider over time if no maximum tax limit is placed on new vehicle registrations.

Statewide vehicle registration revenues, using 2000 tax law and 2025 economic conditions, are shown in Table 7.2. The current age distribution of Minnesota's light vehicle fleet includes 8 percent new vehicles and 39 percent of vehicles 10 years of age or older.[40] If the 5.58 million light vehicles projected for 2025 were distributed using this allocation, and the average registration fee was applied from Table 7.1, light vehicle revenues would total $675.5 million in 2025.

Table 7.2 – Estimated 2025 fleet registration tax revenues (light vehicle only)

Model Year	2000 age distribution	2025 light vehicle fleet	MVRF 2025 @1.25% rate	2025 tab fee rev.
All	**100%**	**5,580,000**		**$675.5 m**
1	8%	446,400	$608	$271.4 m
2	7%	390,600	$189	$73.8 m
3	7%	390,600	$99	$38.7 m
4	7%	390,600	$99	$38.7 m
5	7%	390,600	$99	$38.7 m
6	7%	390,600	$99	$38.7 m
7	6%	334,800	$99	$33.1 m
8	6%	334,800	$99	$33.1 m
9	6%	334,800	$99	$33.1 m
10	39%	2,176,200	$35	$76.2 m

Actual vehicle registration taxes totaled $597 million statewide in 2000.[41] Light vehicles accounted for 85 percent, or $508 million, while the remaining 15 percent came from medium and heavy vehicles, utility trailers, motorcycles, etc. Registration taxes on light vehicles are estimated to increase 33 percent, from $508 million to $675 million, over the 25 years—but how much will revenues from non-light vehicles change?

Estimating registration fee revenues from the non-light vehicle fleet can be handled in several ways. Registration taxes for each class of vehicle can be calculated using current law and growth estimates about each class. Or, the non-light vehicle fleet registration taxes could be assumed to grow at the same rate as light vehicles. This would create an estimation bias, however, since the rules for taxing light vehicles are quite different than for non-light vehicles. A third approach, which focuses attention on the light vehicle component of the fleet, is to assume that the remaining fleet registration taxes increase at the same rate as inflation in state and local government construction. Following this method, non-light fleet registration tax revenues increase from $89 million in 2000 to $182

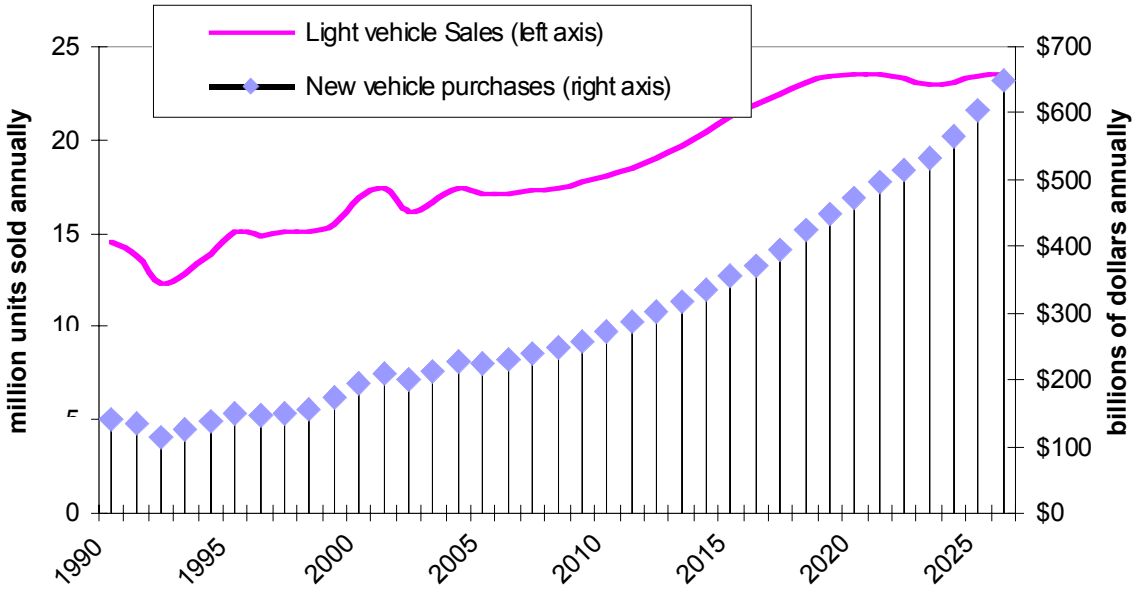
million in 2025. Total vehicle registration taxes will therefore increase *44 percent* over the next 25 years, from $597 million to *$858 million*.

By 2025, the majority of the light vehicle fleet (92 percent) will be at a fixed tax for vehicle registrations. One might conclude that this would add to revenue stability, but a closer look at Table 7.2 dispels that notion. Using current law, new vehicles will pay 40 percent of the light vehicle fleet registrations in 2025. New and two-year-old vehicles combined will make up just 15 percent of the light vehicle fleet, but will be paying 51 percent of the fees. Under these conditions revenues will become more volatile, since registration tax revenue will depend much more on annual vehicle sales.

Motor Vehicle Sales Tax in 2025

Light vehicle sales in the United States were at historically high levels in 2000, with 17.4 million units sold (Figure 7.2). Sales are expected to climb to 23.5 million vehicles by 2025. The value of these vehicle purchases, currently at about $208 billion, is forecast by DRI to increase to $648 billion in the next 25 years. This equals a 311 percent increase in the value of new light vehicle purchases nationally.

Figure 7.2 – U.S new vehicle purchases and unit auto sales



Source: DRI trend scenario, U.S. Economy: 25-year focus, Winter 2001

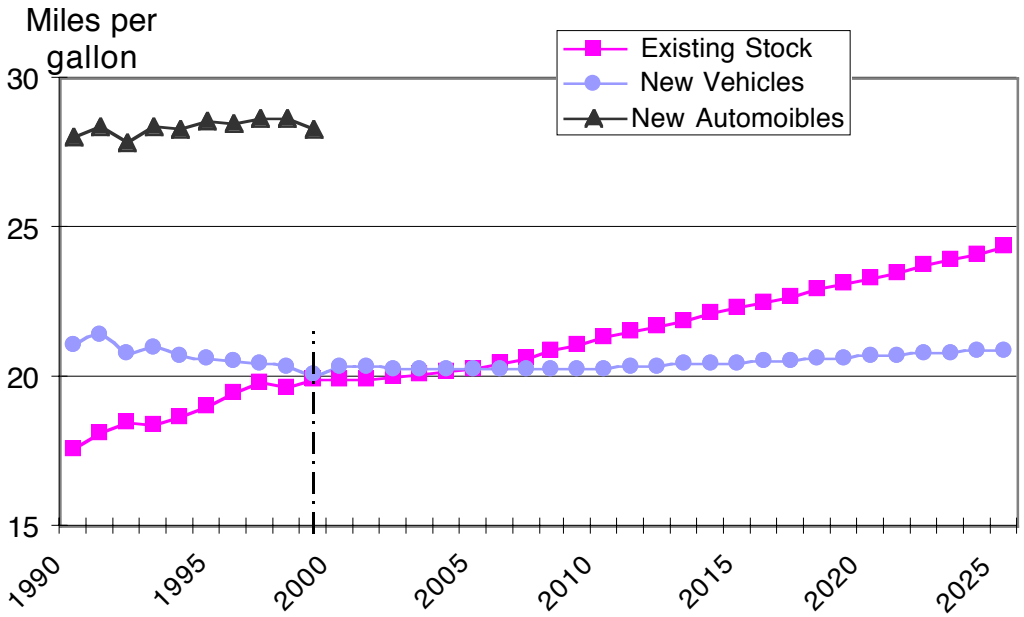
Minnesota is expected to follow the national trend. New non-light vehicles are assumed to increase in market value at the same rate as new light vehicles. Used vehicles are assumed to rise in value along with new vehicles. Minnesota's motor vehicle sales tax generated $539 million in 2000. Based on the 6.5 percent tax rate, this is equivalent to $8.3 billion in total vehicle purchases. By 2025, vehicle sales tax revenues will grow to *$1.68 billion* on $25.8 billion in purchases.[42] The rate of increase in tax revenues mirrors the increase in purchases at *311 percent*.

Motor Fuels Excise Tax in 2025

Motor fuels excise taxes depend on fuel consumption, which itself is a function of vehicle fuel efficiency and miles traveled. According to DRI, fuel efficiency for the existing stock of U.S. vehicles climbed in the 1990s from 17.6 mpg to 19.9 mpg (Figure 7.3). Meanwhile, new vehicle fuel efficiency actually fell. Data for the same period from the U.S. Department of Energy shows fuel economy for the

average new automobile increased from 28.0 mpg to 28.3 mpg.[43] Looking forward, DRI forecasts that the entire U.S. fleet will improve fuel efficiency to an average of 24.3 miles per gallon by 2025.

Figure 7.3 – Average U.S. vehicle fuel economy rating (1990–2025)



Sources: DRI and U.S. Department of Energy

The second factor in fuel consumption is vehicle miles traveled. Vehicle travel in the United States has increased 2.5 percent per year since 1980, according to U.S. Department of Energy estimates.[44] The average household vehicle in 2000 traveled 11,800 miles. Another U.S. Energy Department study predicts that vehicle miles traveled will slow over the next 50 years to a one percent annual rate of increase.[45]

Minnesota's motor fuels excise tax generated $611 million in 2000. At 20 cents per gallon, this corresponds to 3.06 billion gallons of motor fuel. DRI estimates the U.S. fleet fuel efficiency in 2000 was 19.9 miles per gallon. Assuming this is true for the Minnesota fleet, 3.06 billion gallons of fuel would represent 60.9 billion miles traveled. If we further assume that the rate of vehicle

miles traveled will increase at a 2 percent rate per year over the next 25 years, then the number of miles traveled will increase to 100 billion statewide by 2025. Using the 24.3 mpg fleet fuel rating for 2025, 4.11 billion gallons of fuel will be needed for this amount of travel. If the fuel tax remains unchanged at 20 cents per gallon, total fuel tax revenues will grow to *$823 million*. Between 2000 and 2025, therefore, state motor fuel tax revenues will increase *35 percent*.

Keeping Pace with Construction Cost Increases

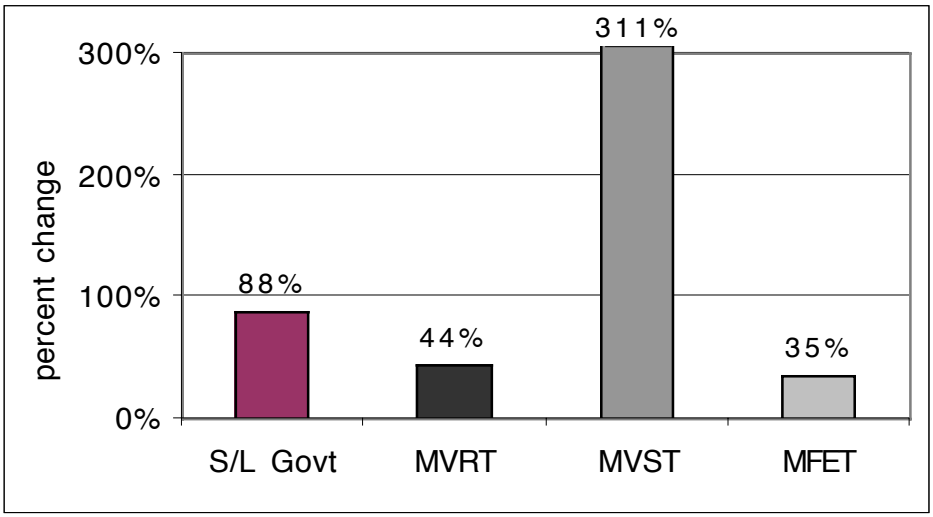
Each of the three road taxes examined here is expected to grow over the next 25 years, albeit at different rates. But it is not enough to have positive growth; the question is whether these revenues will keep pace with the cost of providing roads in Minnesota. While projecting future road needs in Minnesota is beyond the scope of this paper, it is possible to see whether future revenues will pay for the same amount of construction and repair as we are undertaking today. This can be done by comparing the expected percentage increase in road revenues to projected increases in the cost of government construction spending.

Inflation is a measure of how the price of goods and services change over time. DRI expects the often quoted consumer price index (CPI) to increase 129 percent in the next 25 years, with the index's energy component rising just 73 percent. There is also a price deflator for state and local government services, which DRI predicts will increase 105 percent by 2025. Within the state and local services index, the construction spending component is forecast to rise *88 percent*. This last index measures the change in price for an equivalent level of state and local construction in 2025 as was carried out in 2000. For example, if road work costs $1 million in 2000, the same level of roadwork in 2025 is forecast to cost $1.88 million.[46]

If no adjustments are made to current law, vehicle and fuel use trends suggest divergent rates of revenue growth for three important road taxes (Figure 7.4). Revenues from motor vehicle registration taxes (MVRT) are expected to grow at half the rate of state and local government construction costs (S/L Govt).

Motor fuels excise taxes (MFET) increase even more slowly. In contrast, motor vehicle sales taxes (MVST) will increase 3.5 times faster than state and local government construction prices.

Figure 7.4 – Construction cost and road tax growth, 2000–2025



But will the combination of these changes still be enough to fund roads at the same level as today, or will property taxes and state general fund transfers have to make up the difference? The two constitutionally dedicated tax resources, the vehicle registration tax and the motor fuels tax, generated $597 million and $611 million respectively in 2000. The $1.21 billion in spending this represents will cost $2.27 billion in 2025. But the vehicle registration tax is only expected to grow to $858 million by 2025, and the motor fuels tax will only grow to $823 million. This leaves a $589 million shortfall in 2025 buying power from those two taxes.

Beginning in 2002, 32 percent of the motor vehicle sales tax is statutorily dedicated to the highway user trust fund. In 2000, that 32 percent would have amounted to $173 million, and if we add that to the 2000 road construction base, the sum of the three taxes would be $1.38 billion. This level of spending would

grow, with 88 percent construction cost inflation, to $2.60 billion in 2025, still leaving a $378 million funding deficit.

Without changes to current tax policy it will be impossible to devote the same real resources to road maintenance and construction in the future. There will be a road-funding deficit well before 2025. Policymakers can respond by reducing road services, but most agree that additional investments are needed *above* today's spending levels, so funding cuts do not seem like a viable option. Alternatives include raising property taxes or transferring income and sales tax dollars from the state general fund. Both choices move tax policy towards more fixed and hidden revenues, not towards greater variability in road pricing. In addition, property taxes, income taxes, and general sales taxes are experiencing trends and policy changes of their own that may leave them unavailable for road purposes.

Section 8. **Study Conclusions**

Minnesota road revenues rely heavily on fixed charges that are unrelated to road use and on taxes that are hidden from travelers altogether. Property taxes, income and sales taxes, vehicle registration taxes, and vehicle sales taxes all qualify as fixed or hidden road charges. To improve the construction and use of state and local roads, economists believe road users need more feedback about incremental travel costs. The motor fuels excise tax is one common solution, but other mechanisms can better target specific problems like traffic congestion or air pollution.

Road taxes need to be more transparent if road users are going to value road services appropriately. Each tax has efficiency, equity, and management characteristics, yet efforts to balance these concerns can sometimes complicate public understanding of road costs. Capping the motor vehicle registration tax, for instance, made the tax easier for the average vehicle owner to comprehend, but also may have made the tax more regressive. Property taxes, which are notoriously complex, might be better accepted if road cost information were provided with the tax bill. While this could invite some unfavorable comparisons among property owners, it would also bring about better public decision making. The same argument can be made for more transparency in state aid transfers, both general-purpose aid and road-specific aids.

Alternative tax policies should shift revenue collection from the current focus on household economic status to measures of household travel behavior. About two-thirds of state and local road funding in the Twin Cities is dependent on fixed or hidden tax revenues. This tends to penalize households that travel less and households with lower incomes. Alternative tax policies, more reliant on variable pricing mechanisms, could actually save some households

money, while encouraging better fuel economy, less pollution, and alternative modes of travel.

Development of the rural/urban fringe is likely to slow if the discounted net present value of road tax increases are greater than the development premium on farmland. The difference between road taxes under the current law and the alternative policies demonstrated in this study are modest. However, the long-term budget impact for households could be substantial. For example, the present value of a $200 tax increase grows to $2,000 using a 10 percent discount rate. This measure of the tax increase exceeds the development premium on most farmland in the region. Under such conditions, tax policy has the potential to slow growth on the urban/rural fringe.

Tax policy should reflect full cost accounting and include the damaging effects transportation has on households not responsible for causing the problem. Estimates of these externalities show them to be smaller than total government transportation costs, but paying these added "third party" costs would raise transportation taxes significantly. A good proxy for pricing much of the external costs might be the motor fuels excise tax. Charging for externalities with the fuels tax would require a 67-cent-per-gallon increase.

Policy reforms are needed if road tax revenues are to keep pace over the next 25 years with the rising cost of building and maintaining roads. Policymakers need to get ahead of the vehicle and fuel use trends that will change the size and mix of future road tax revenues. Between now and 2025, without changing current law, vehicle registration taxes and motor fuel taxes will grow more slowly than the costs of road construction. Motor vehicle sales taxes, on the other hand, will grow much more quickly. A revenue short fall in these three taxes would put additional pressure to pay for roads with property taxes and the state general fund.

A broad public discussion of tax policy choices and their potential economic and social consequences would improve understanding and support for tax reform. Research projects, such as this study, help facilitate such discussions. Continued support of research and outreach efforts is essential to expanding the knowledge of policymakers and taxpayers about road funding options. The return on this investment will include better government services and more rational travel behavior and settlement patterns by taxpayers.

References and Endnotes

1. Find more information on the Transportation and Regional Growth Study on the Center for Transportation Studies' web site: www.cts.umn.edu/trg/index.html.

2. Two useful examples are *Alternatives to Motor Fuel Taxes for Financing Surface Transportation Improvements,* Transportation Research Board, Report 377, Washington D.C.,1995, and Litman, Komanoff, and Howell, *Road Relief: Tax and Pricing Shifts for a Fairer, Cleaner, and Less Congested Transportation System in Washington State*, Olympia, WA, Energy Outreach Center, 1998.

3. Kenneth D. Boyer, *Principles of Transportation Economics*, Addison Wesley, 1998.

4. U.S. Department of Transportation, Federal Highway Administration, donor/donee ratio table FE-221, www.fhwa.dot.gov/ohim/donor.pdf.

5. U.S. Department of Transportation, Federal Highway Administration, *1997 Federal Highway Cost Allocation Study*, August 1997, www.fhwa.dot.gov/policy/hcas/final/index.htm.

6. "The New Metropolitan Agenda," *Brookings Review*, Vol. 16, No. 4. (Fall 1998).

7. *1999 Minnesota Tax Incidence Study: Who Pays Minnesota's Household and Business Taxes?* Minnesota Department of Revenue, Tax Research Division, March 1999, www.taxes.state.mn.us/reports/fiscal/incid99.html.

8. U.S. Department of Transportation, Federal Highway Administration, *1996 Highway Statistics*, www.fhwa.dot.gov/ohim/ohimstat.htm.

9. John Williams, *The Motor Vehicle Sales Tax Transfer: A Chronology*, Minnesota House of Representatives Research Department, July 2000, www.house.leg.state.mn.us/hrd/pubs/mvettrns.pdf.

10. This allocation is for money collected and received after June 30, 2002 (www.revisor.leg.state.mn.us/stats/297B/09.html).

11. Motor fuel taxes are in fact collected at the distributor level, which makes allocating collections geographically difficult. In addition, a two-cent per gallon tax is collected for the environmental cleanup of underground storage tanks.

12. Table 1-2, 1998 state and local tax collection by type of tax and taxpayer category, *1999 Tax Incidence Study*, Minnesota Department of Revenue.

13. The Wisconsin motor fuels tax is adjusted on April 1 based on the U.S. CPI. The most recent change was April 1, 2001, when the per gallon rate increased to 27.3 cents from 26.4 cents (www.dor.state.wi.us/faqs/mofuel.html). Another source for fuel tax comparisons is *Nationwide and State-by-State Motor Fuel Taxes*, American Petroleum Institute, April 2000, www.api.org/newsroom.cgi?id=l002079&cat=Research+Papers.

14. National data is from U.S. Department of Energy, Office of Transportation Technologies, "Fact of the Week #163: Highway Indicators, 1979–1999," April 30, 2001, www.ott.doe.gov/facts/archives.html. Data for the Twin Cities is from a conversation with Gary Barnes, Humphrey Institute of Public Affairs, University of Minnesota.

15. Minnesota Department of Transportation and the Metropolitan Council, *Road Pricing Study*, March 1997.

16. U.S. Environmental Protection Agency, automobile emission standards, www.epa.gov/autoemissions/.

17. U.S. Department of Transportation, Federal Highway Administration, *1996 Highway Statistics*, www.fhwa.dot.gov/ohim/ohimstat.htm.

18. U.S. Census Bureau, *1995 Consolidated Federal Funds Report*, www.census.gov/govs/cffr/95cffmn.txt.

19. Minnesota Department of Transportation unpublished data.

20. Office of the State Auditor, 1996 Revenues, Expenditures, and Debt reports compiled individually for counties, cities, and townships, www.osa.state.mn.us/.

21. Table FE-221 showing apportionments and allocations between the Highway Trust Fund and the Highway Account, U.S. Department of Transportation, Federal Highway Administration, www.fhwa.dot.gov/ohim/hs98/tables/fe221.pdf.

22. U.S. Department of Transportation, Federal Highway Administration, funding tables, www.fhwa.dot.gov/tea21/funding.htm.

23. Notably, $71 million for the FAA and $65 million in DOT salaries, with the rest in procurement, NTSB, and Coast Guard programs. U.S. Census Bureau *1996 Consolidated Federal Funds Report,* www.census.gov/govs/www/cffr.html.

24. Updating the analysis with data from the FY 2000 *Consolidated Federal Funds Report* shows Minnesota received $375.3 million in highway planning and construction grants. The seven-county metropolitan area received 46 percent of the total (www.census.gov/govs/cffr/00cffmn.htm).

25. Minnesota Statue Chapter 162.07 details the apportionment of monies to counties, while Chapter 162.13 covers the municipal state-aid street system (www.revisor.leg.state.mn.us/stats/162/).

26. Local government revenues come from a variety of sources. For large cities, see www.osa.state.mn.us/reports/gid/1999/lcRED/overview.pdf. For counties, see www.osa.state.mn.us/reports/gid/2000/coBudget/overview.pdf.

27. *1999 Tax Incidence Study: Who Pays Minnesota's Household and Business Taxes*? Minnesota Department of Revenue, Tax Research Division, March 1999, www.taxes.state.mn.us/reports/fiscal/incid99.html.

28. House Research Simulation Report: Property Taxes, final pay 1997 estimates, www.house.leg.state.mn.us/hrd/issinfo/csim98v1.pdf.

29. One example of this view is Litman, Komanoff, and Howell, *Road Relief: Tax and Pricing Shifts for a Fairer, Cleaner, and Less Congested Transportation System in Washington State*, Olympia, WA, Energy Outreach Center, 1998.

30. A common time frame for analysis is 30 years, but in this case the tax is calculated for an infinite life. This makes for simpler math, without changing the results significantly. For example, a $100 tax at a 10 percent discount rate and a 30-year life has a present value of $942, compared to $1,000 using an infinite lifetime.

31. Roger E. Alcaly, "Transportation and Urban Land Values: A Review of the Theoretical Literature," *Land Economics* 52:1 (February 1976).

32. Neal Gendler, "Fewer Metro Homes Being Built; Prices Rising," *Minneapolis Star Tribune*, June 8, 2001, Homezone section.

33. Two publications were useful: Thomas D. Wegner, *Farmland Protection Options for Landowners in the Twin Cities Metropolitan Area*, Minnesota Extension Service, University of Minnesota, November 1994; and *Evaluation*

of Minnesota Agricultural Land Preservation Programs, Minnesota Department of Agriculture, June 1999.

34. See the Minnesota Land Economics web site at apecon.agri.umn.edu/faculty/sjtaff/landdata/index.html.

35. The nine collar counties to the Twin Cities are Goodhue, Rice, Lesueur, Sibley, McLeod, Wright, Sherburne, Isanti, and Chisago.

36. Midline case Table 3 in David Anderson and Gerard McCullough, *The Full Cost of Transportation in the Twin Cities Region*, Center for Transportation Studies, University of Minnesota, August 2000, www.cts.umn.edu/trg/pdf/TRGrpt5.pdf.

37. *Comprehensive Annual Financial Report*, year ending June 30, 1998, Minnesota Department of Finance, www.finance.state.mn.us/cafr/pdf98/71.pdf.

38. *The U.S. Economy, The 25-Year Focus*, Winter Issue 2001, Standard and Poor's Data Resources Inc.

39. In 1999, Minnesota's heavy vehicles numbered about 130,000. Minnesota Department of Public Safety, www.dps.state.mn.us/dvs/dvsmap/CountySum.htm.

40. Distribution of the light vehicle fleet found in *Money Matters*, a summary of the fiscal actions of the 2000 legislative session, May 25, 2000, Table 16, www.house.leg.state.mn.us/fiscal/files/00legact.pdf.

41. Revenues for the vehicle registration tax, vehicle sales tax, and motor fuels tax are for state fiscal year 2000, from the statistical section of the *Comprehensive Annual Financial Report*, year ending June 30, 2000, Minnesota Department of Finance, www.finance.state.mn.us/cafr/cafr2000.pdf.

42. Included in this assessment is one tax nuance that slightly reduces 2025 revenues, having to do with sales tax collections on leased vehicles. State sales taxes are paid on leased vehicles, but are remitted over the life of the lease, typically four or five years. This would materially affect revenues only when the leased fleet is growing faster than the non-leased fleet. According to DRI, new car leases accounted for $38 billion, or 18 percent, of all new light vehicle purchases in 2000. By 2025, leased vehicles will explain 32 percent of purchases.

43. DOE reference. Current CAFÉ standards require a 27.5 mile per gallon average for cars and a 20.7 mile per gallon average for the light truck fleet.

44. U.S. Department of Energy, Office of Transportation Technologies, “Fact of the Week #163: Highway Indicators, 1979–1999,” April 30, 2001, www.ott.doe.gov/facts/archives.html.

45. *Future U.S. Highway Energy Use: A Fifty-Year Perspective*, Office of Transportation Technologies, Energy Efficiency, and Renewable Resources, U.S. Department of Energy, draft report, May 3, 2001, www.ott.doe.gov/future_highway.shtml.

46. The assumption that costs will grow at the state and local service index for construction costs may understate the impacts of inflation, since only part of road spending will involve construction. Other costs will increase at a rate closer to the Consumer Price Index, which rises 37 percent higher than the construction cost index over the 25-year period.