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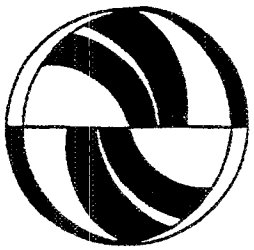

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Jennifer Dill
Todd Goldman
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California Vehicle License Fees: Incidence and Equity

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ABSTRACT

Most states tax the value of residents' motor vehicles In recent political debates over the future of these levies, the relative effects of these taxes on different socioeconomic groups have been a prominent question By linking data from the Nationwide Personal Transportation Survey with estimates of vehicle values from consumer vehicle pricing guides, the socioeconomic and demographic incidence of California's Vehicle License Fee is examined. After the effects of state and federal income tax deductions are taken into account, the fee is found to be as regressive as the state's sales tax.

INTRODUCTION

Value-based assessments on motor vehicles, including personal property taxes and vehicle license fees, have emerged as a key focus of state-level tax-cutting efforts nationwide. This paper examines the incidence of one such tax, California's Vehicle License Fee (VLF), which has been assessed on all privately owned, registered vehicles in the state since 1935. It is a uniform, statewide property tax that was set, until recently, at 2% of a vehicle's value, based on its most recent purchase price and

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a fixed depreciation schedule If the VLF had remained unchanged, it would have raised approximately $3.9 billion in the 1998–99 fiscal year (State of California 1998).

Around the nation, concerns about equity have been at the center of many of the debates surrounding these tax cuts. In California, where a budgetary surplus led legislators to reduce the VLF by 25% last year, little information was available on how the benefits of this action would be distributed across the population Because of this gap, the Senate Office of Research asked the California Policy Research Center and the Institute of Urban and Regional Development at the University of California, Berkeley, to prepare an analysis of the incidence of the fee. This paper grew from that research effort.

The VLF and its equivalents elsewhere pose interesting questions because they are distinct from other transportation-related taxes Unlike many other taxes, the VLF bears no relationship to costs or benefits from use of the transportation system Some transportation-related taxes seek to recapture some external benefits by taxing actual system use (crossing a bridge or tunnel, consuming gasoline) or by taxing the wealth derived from the system (real property, since local streets confer the property with value by providing access) Other taxes are assessed in some rough proportion to the impacts that a user places on the system, simply by participating (e.g., registering a vehicle) or by imposing specific externalities (e.g., causing road damage from excessive axle weight, driving during rush hour, etc.).

The VLF does not fit any of these categories; instead, it is loosely related to individuals' ability-to-pay But unlike other levies that rely on current expenditures to reveal ability-to-pay, such as the vehicle sales/transfer tax or the general sales tax, the VLF targets a portion of wealth that is derived from past expenditures.

Another unique characteristic is that the VLF is typically not earmarked for transportation-related expenditures Because of its origins as a local tax on personal property, it continues to be used as a source of local general revenue. As a result, it is not easy to determine how VLF revenues are spent For this reason, we focus more narrowly on the incidence of the tax burden imposed by the VLF.

Finally, because it is not based directly on expenditures in the marketplace or on easily observable characteristics of vehicles or travelers, the VLF is difficult to measure. As a result, the implications of this tax are not as well understood as those of other taxes, despite the tax's magnitude in many states

METHODOLOGY

The methodology and assumptions used in this research are outlined briefly here and described in detail in the appendix. Before the 1998 tax cut, the California Department of Motor Vehicles (DMV) charged the VLF annually for each vehicle, using the following formula (equation 1) and a depreciation schedule (table 1).

$$VLF = 0.02 \times \textit{initial vehicle value (rounded to nearest \$100)} \times \textit{depreciation factor} \quad (1)$$

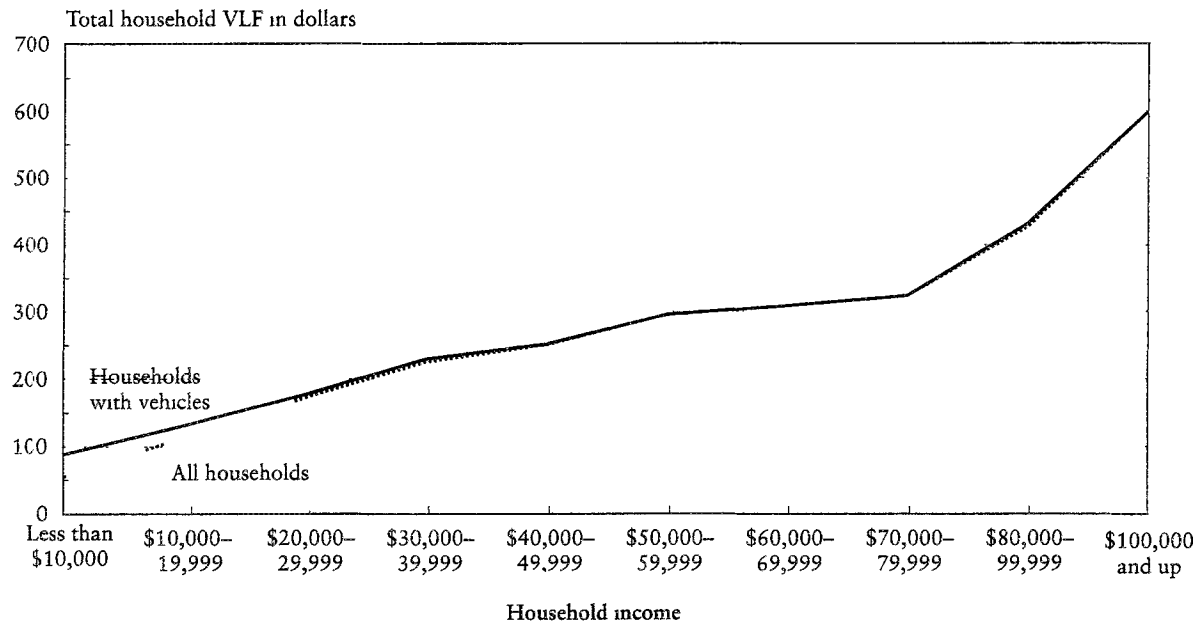
Therefore, two pieces of information on each household vehicle are needed to calculate the VLF: 1) purchase price (or reported value) of the vehicle when it was first registered by the current owner, and 2) initial year of vehicle registration by the current owner, which determines the depreciation factor. While the DMV collects the VLF, it does not gather data on household income or demographic characteristics needed for an incidence analysis. Moreover, raw DMV data on vehicle registrations were not available for this study

Instead, we relied on an alternative source, the 1995 Nationwide Personal Transportation Survey (NPTS). The NPTS sample includes 2,262 households in California, which collectively have over

TABLE 1 VLF Depreciation Schedule

Year of registration	Depreciation factor (autos)
1	100%
2	90%
3	80%
4	70%
5	60%
6	50%
7	40%
8	30%
9	25%
10	20%
11 and later	15%

FIGURE 1 Average Total Household Vehicle License Fees



4,200 vehicles available for regular use. Using the NPTS required a number of assumptions for initial value and year of acquisition. Where the acquisition year of vehicles was not known, we assumed that 1) new vehicles were acquired the same year as the model year and 2) used vehicles were acquired halfway between the model year and the year of the survey. Based on these estimated purchase dates, plus vehicle make and model information from the NPTS, we estimated vehicle purchase values using standard vehicle pricing guides.

FINDINGS

How Do VLF Payments Vary with Income?

In 1996, the average California household paid $247 in VLFs. Total household VLFs ranged from $55 for households with annual incomes under $10.000 to $599 for households with incomes over $100,000[1] (see figure 1). The 25% reduction in the VLF will save the households with the lowest incomes an average of $13.75 The average household will save $61.75, and households in the highest income group will save nearly $150

Approximately 5.7% of California households do not own or lease any vehicles and, therefore, do not pay the VLF. These households will not benefit from the tax cut, unless they purchase or lease a vehicle in the future More than one-third of households with incomes less than $10,000 do not own or lease vehicles, excluding these households, the average total VLF payment for this income group is $88 per year.

VLFs increase with income because wealthier households tend to own more vehicles, and the vehicles they own tend to be newer and more expensive (see figure 2) The average number of vehicles per household levels off at about 2.25 for the highest income households, but the value of each vehicle continues to increase

Figure 3 shows the range of total VLF paid by different income groups. The median is the 50th percentile. half of the households pay more than that amount, and half pay less. The 90th percentile line represents the total VLF below which 90% of the households in an income category pay; 10% of the households in that income category pay more than that amount. Similarly, the 10th percentile line represents the amount of VLF below which the

[1] In figure 1, the total VLF appears to rise sharply for households in the highest two income categories However, note that the highest two income categories ($80,000–99,999 and $100,000 and above) are broader than the other categories, which are in $10,000 increments This difference in increment is due to the data source and makes the increase in the VLF appear sharper than it should

FIGURE 2 Average Value and Vehicle Counts per Household

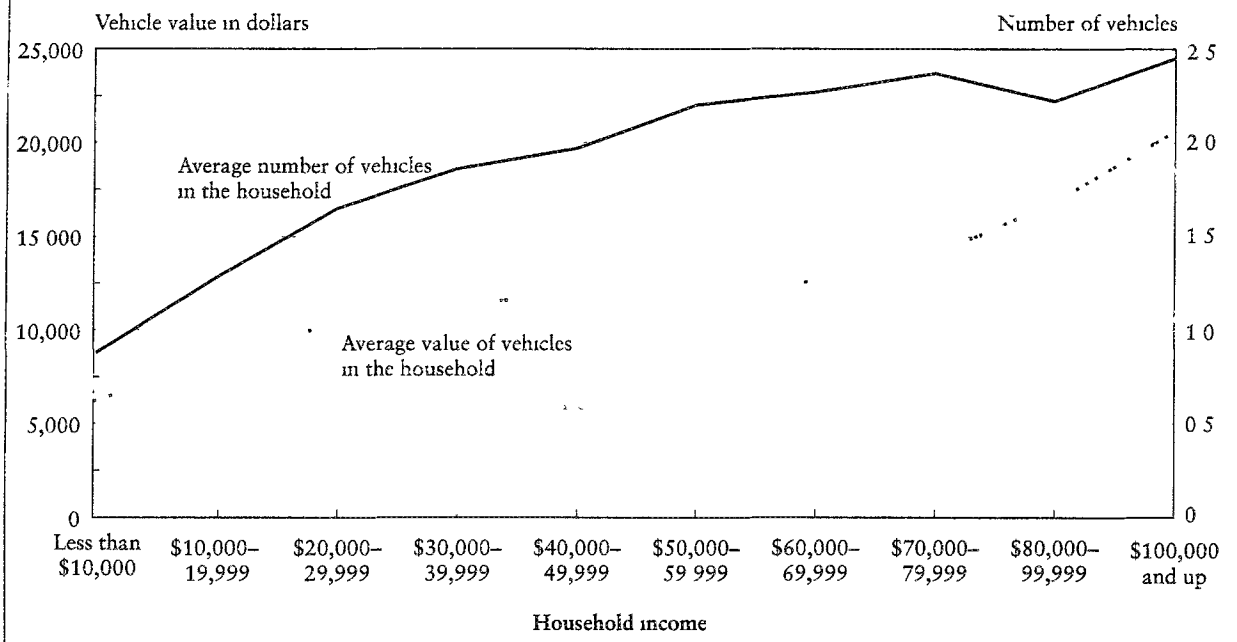
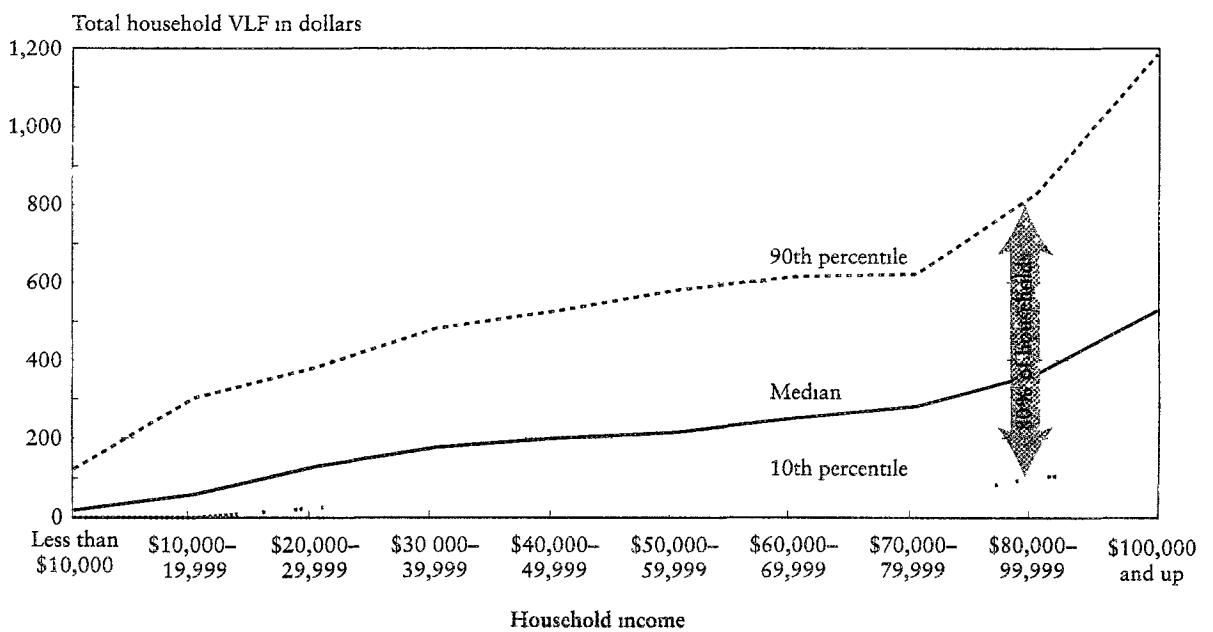


FIGURE 3 Total VLF by Income: 10th, 50th, and 90th Percentiles

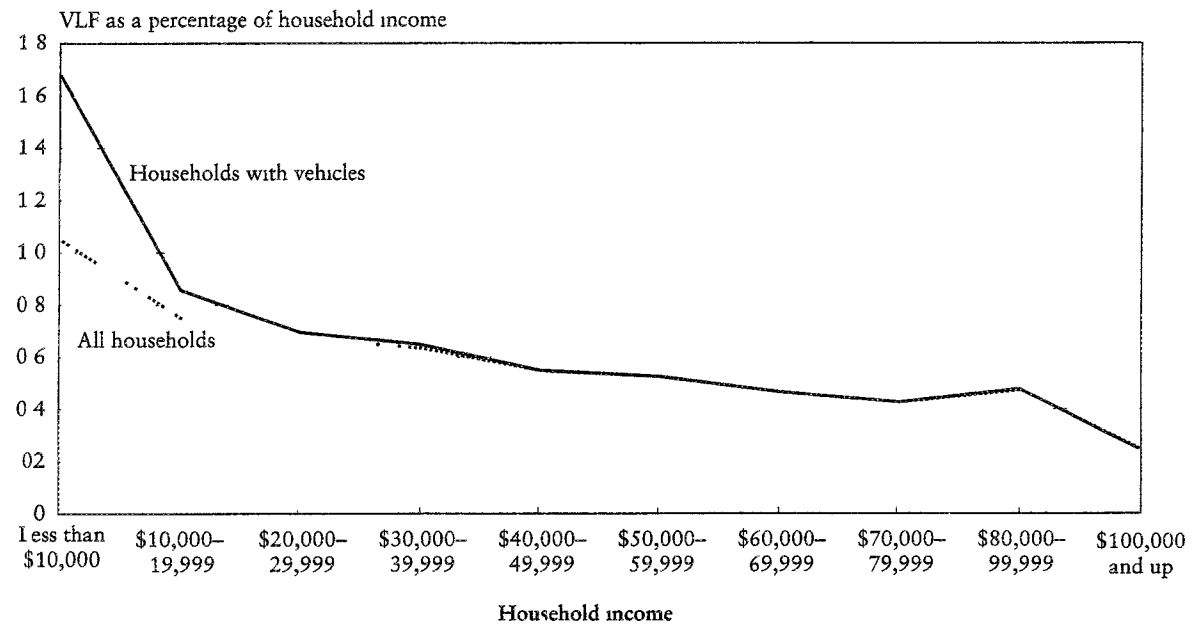


lowest 10% of households in that income group pay. Therefore, 80% of the households pay a total VLF within the range between the 10th and 90th percentile lines.

Is the VLF Equitable?

Discussions of equity in transportation finance usually focus on measures of horizontal equity (fairness across different user groups, demographic groups, or geographic areas) and/or vertical equity (fairness across different income groups). In both cases, the *net benefits* to each group are of primary importance. However, because the revenues from the VLF tend not to be targeted for transportation expenditures, it is not possible to compare the costs and benefits. We, therefore, focus exclusively on the cost side of the equation.

FIGURE 4 Total VLF as a Percentage of Household Income



On average, the California VLF consumes 0.61% of annual household income. The VLF's impact relative to household income declines as income rises (see figure 4), indicating that this is a regressive tax. Overall, the poorest households pay an average of 1.05% of their income in VLFs, this value rises to 1 68% for low-income households that own vehicles. For vehicle-owning households with incomes less than $10,000, the 25% cut in the VLF will be most noticeable. on average, it will save them nearly 0.5% of their annual incomes.

The regressivity of the VLF is heightened when interactions with other taxes are taken into account. Households can significantly reduce their net VLF payments by deducting personal property taxes (including the VLF) from their taxable income. The vast majority of the benefits of this tax rule accrue to upper income households (see figure 5). There are two reasons for this: higher income taxpayers tend to be more likely to itemize deductions, and they benefit more from doing so, since they have higher marginal tax rates. Most families (84%) do not claim a deduction for the VLF. However, including the majority who do not claim this deduction, the average household at the highest income levels wins back one-quarter of its VLF bill when it pays income taxes. The average household at the lowest income levels saves only 2% of its VLF payments through tax deductions

A different perspective on equity can be seen by comparing the percentage of the total fee paid by a certain group with the percentage of the total population that group represents. This analysis is shown in figure 6. Households with incomes below $10,000 pay under 2% of the total VLF collected, while they represent over 7% of the households in California. The transition appears to occur near $40,000: households above this level pay 55.7% of the VLF, while representing only 39.8% of the population. Any proportional reduction in the tax rate will have a greater absolute benefit for these higher income households.

How Does the VLF Compare with Other Taxes?

As discussed earlier, license fees based on vehicle values are only one of many different taxes and fees that vehicle owners pay. Other types of assessments include registration fees, vehicle sales and transfer taxes, gasoline taxes, wheel taxes, weight taxes, title fees, emissions charges, and special interest or personalized license plate fees.

Some predictions can be made concerning the relative regressivity of various tax options. In general, taxes that target discretionary expenditures will be less regressive than those that target essen-

FIGURE 5 Household VLF, Adjusted for Income Tax Deductions

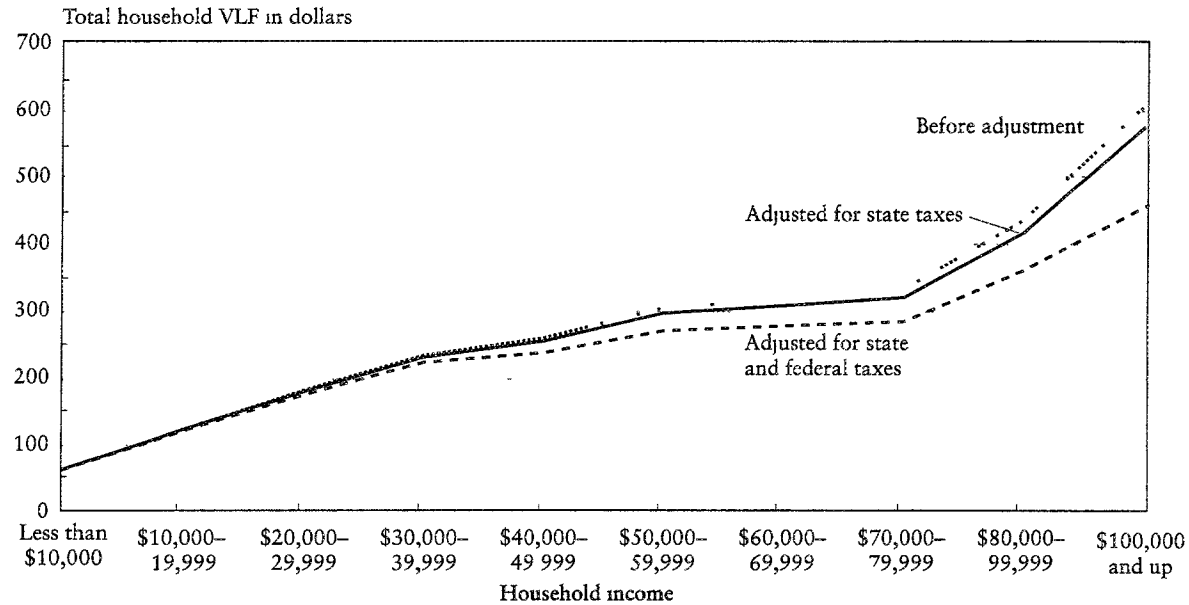
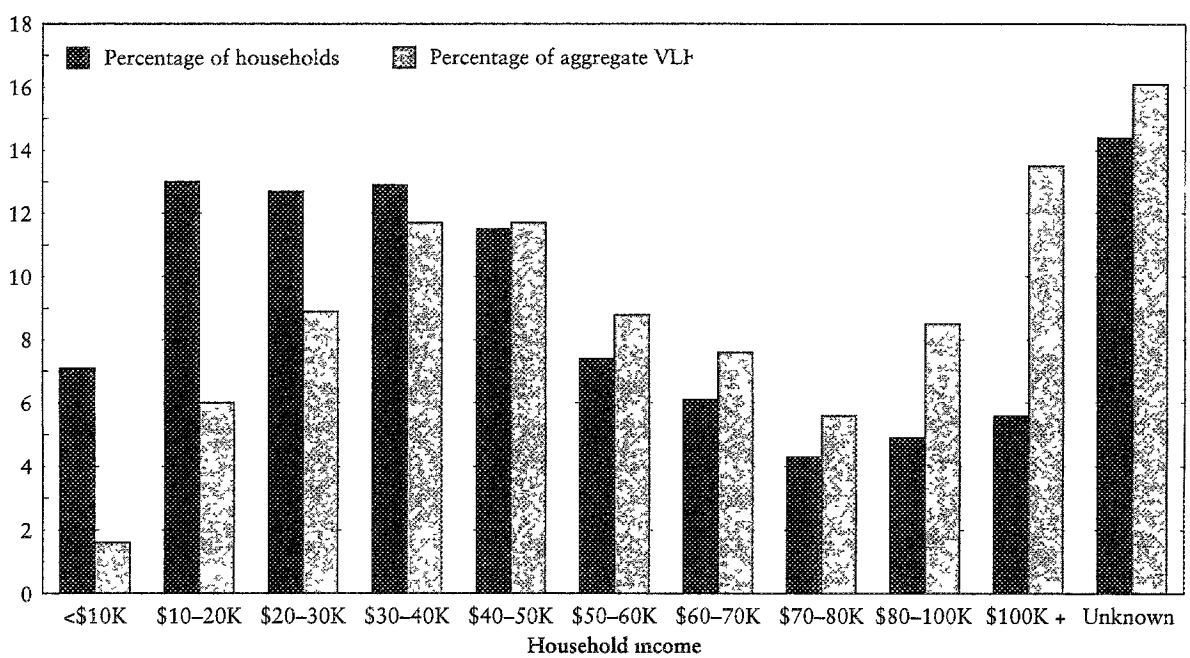


FIGURE 6 Percentage of Households and Aggregate VLF Paid



tial expenditures. In California, the regressivity of the sales tax is alleviated somewhat because the least discretionary expenditures—food, utilities, and some health-related products and services—are exempt from the tax. This is not the case for the gas tax, which remains highly regressive because a high proportion of the state's poor population is automobile dependent

The VLF is expected to be less regressive than these other taxes The choice of vehicle is highly discretionary· the age, value, and number of vehicles a family owns is strongly influenced by family income. However, unlike sales and gasoline taxes, the VLF is deductible from state and federal income taxes, a policy that disproportionately benefits higher income groups.

FIGURE 7 Tax Burden vs. Income in California: 1995

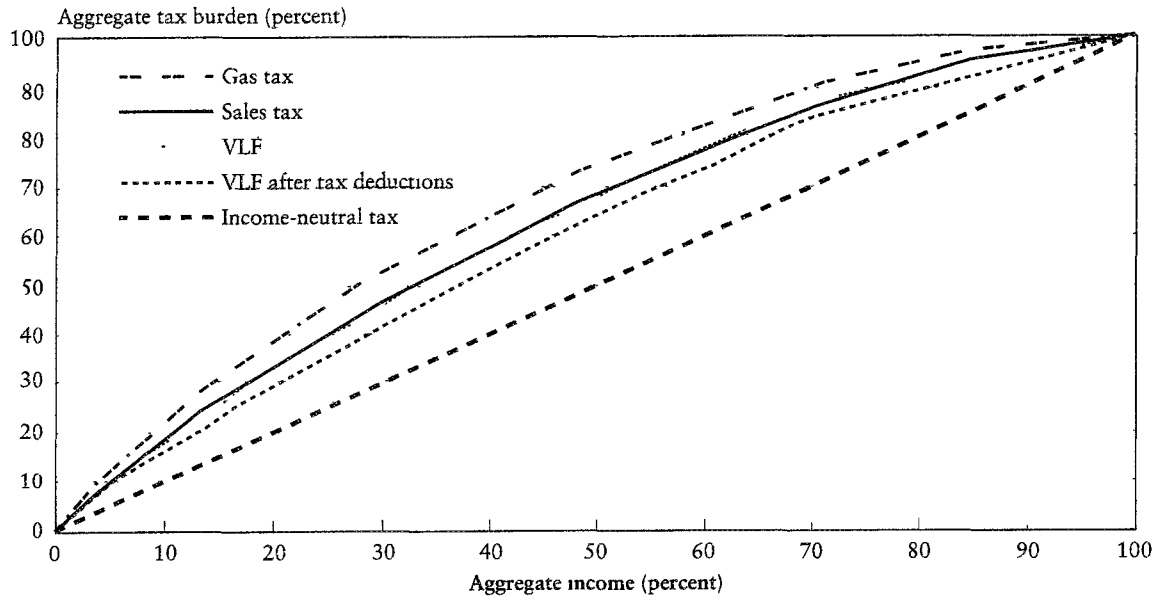
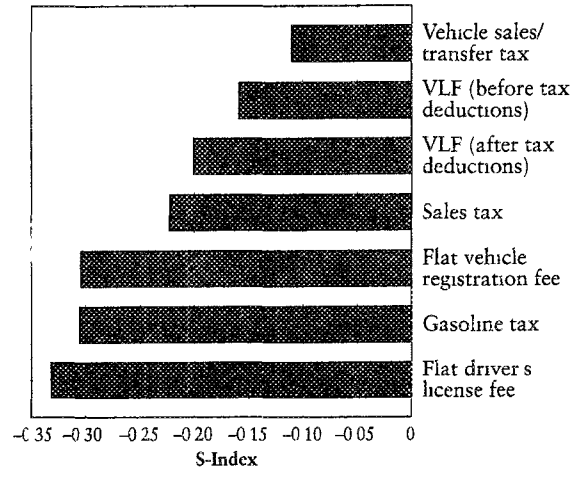


FIGURE 8 Relative Regressivity of Various Taxes and Fees



One way of comparing the relative incidence of different taxes is to plot the aggregate percentage of the tax burden against the aggregate percentage of total income. Figure 7 compares the VLF results with data on the incidence of gasoline and sales taxes (Citizens for Tax Justice 1996). The results confirm the expectations described above: the gas tax is the most regressive, followed by the sales tax, and ultimately by the VLF After the tax deductibility of the VLF is taken into account, the VLF is extremely similar to the sales tax.

These relationships can be quantified using the S-Index (Suits 1977), which relates the area under the tax incidence curve to the area under the line representing income neutrality. The S-Index ranges from +1 (extreme progressivity) to −1 (extreme regressivity), with a value of 0 indicating a tax burden equitably distributed across incomes. The index has been applied before to the analysis of transportation taxes, based on data from the Consumer Expenditures Survey (Rock 1982, 1990). It has also been used to evaluate the incidence of vehicle emissions taxes, based on data from the NPTS (Walls and Hanson 1996).

The relative regressivity of various transportation-related taxes and fees in California is shown in figure 8 [2] Values for VLFs, before and after tax deductions, are based on data produced in this study Values for the flat registration and driver's license fees were derived from the NPTS database by multiplying a flat fee by the number of vehicles and the number of drivers in each household, respectively. Values for the sales and gasoline taxes

[2] Household income quintiles were used to calculate the values in figure 8 Because the tax incidence curve is concave, the use of coarse income categories underestimates the area under the curve and thus understates the actual regressivity of the taxes Although richer detail is available for each of the taxes examined here, the income ranges are not compatible across data sources, and quintiles must be used to ensure comparability

were derived from a study that estimated the distribution of payments of these taxes in California in 1995, based on the Consumer Expenditures Survey (Citizens for Tax Justice 1996) Values for the vehicle sales/transfer tax were derived directly from 1994/95 Consumer Expenditures Survey data for the western United States (USDOL 1994–1995).

Of these tax options, the vehicle sales/transfer tax is the only one more progressive than the VLF This is consistent with the theoretical predictions outlined above since households have greater discretion in their decisions to *purchase* vehicles than they do in their decisions to *own* vehicles. Lower income households tend to make these purchases less frequently because they hold on to their cars for longer periods of time.

How Do VLF Payments Vary with Household Location and Demographics?

The average household VLF was compared across several demographic variables, including race and ethnicity, family life cycle category, age, and location. For example, figure 9 displays the results of an analysis of how the VLF as a percentage of household income varies by family life cycle category. There are three noteworthy patterns in these results: 1) households comprised of two or more adults pay greater VLF in comparison to their incomes, 2) nonretired households without children pay more (probably because they are able to devote more of their resources to automobile purchases), and 3) households with older teens pay more (probably because their ownership of an extra car is not fully compensated by the salary that a teenager can earn). A key question is whether the VLF places a disproportionate economic burden on retirees, given their relatively low fixed incomes Figure 9 suggests that retired families do not bear higher costs relative to their means

Table 2 shows the total household VLF for households of different races and Hispanic ethnicity, along with factors that directly influence VLF payments: the number of vehicles per household, the initial value of the vehicle, and the number of years household vehicles were registered.[3] Asian households pay the highest average VLF, while African-American and Hispanic households pay a lower average VLF. Households in the San

[3] Household race is based on the race of the "reference person" for the survey The reference person is the person or one of the persons who owns or rents the home

FIGURE 9 VLF as a Percentage of Household Income, by Life Cycle Category

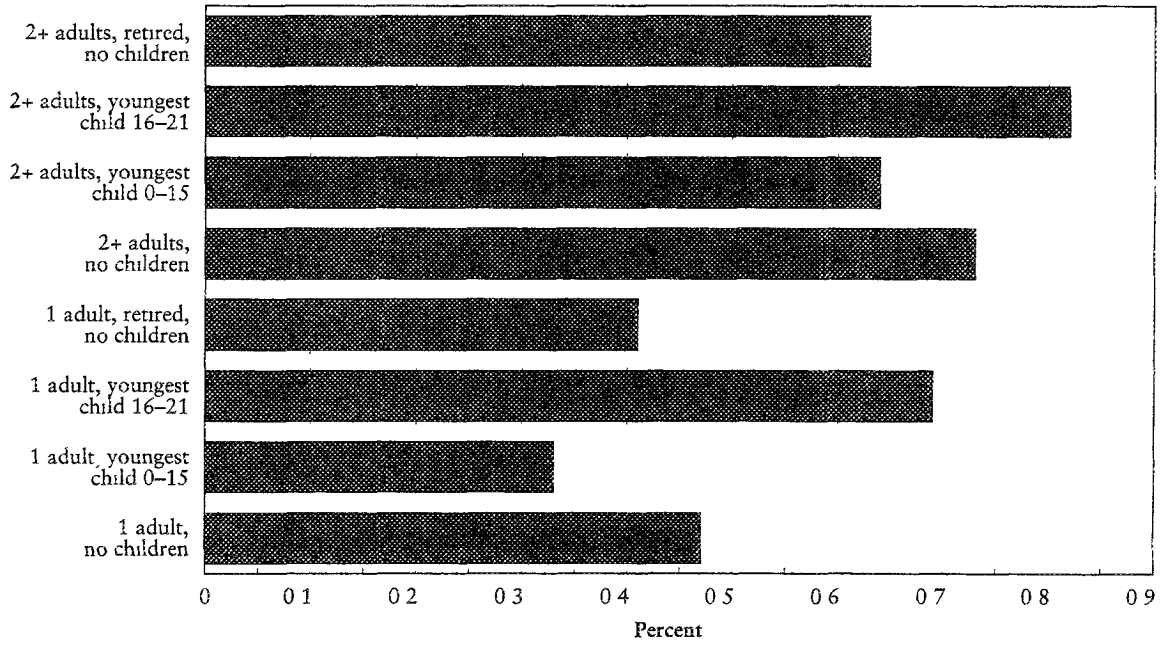


TABLE 2 VLF Payments by Race and Ethnicity

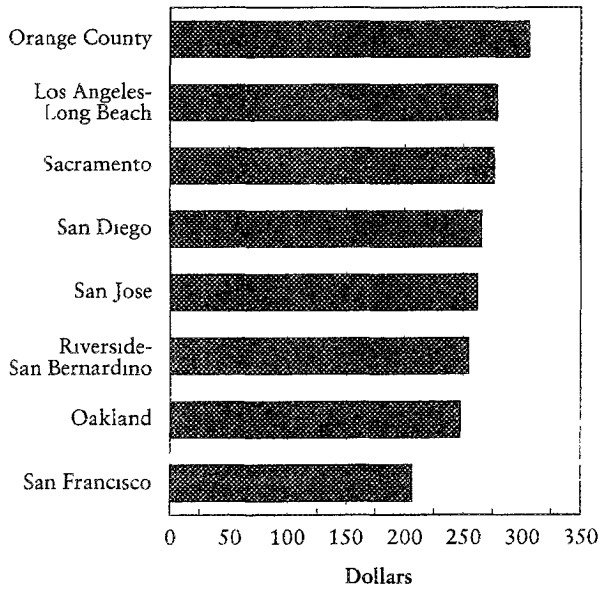
	Total VLF per household	Vehicles per household	Initial value of vehicle	Length of vehicle registration (years)
Asian	$297	2 02	$13,500	6 1
White	$252	1 85	$12,110	7 0
African-American	$210	1 46	$11,970	6 8
Other	$227	1 82	$10,290	6 4
Non-Hispanic	$257	1 85	$12,410	6.9
Hispanic	$205	1 72	$ 9,780	6 4

Francisco metropolitan statistical area (MSA) pay the lowest average VLF of the state's MSAs ($206), while Orange County MSA residents pay the highest ($306), as shown in figure 10.

The differences in VLF payments by life cycle, race, and region are of interest to political decisionmakers when evaluating tax-cut proposals. However, a regression analysis demonstrates that many of the differences in VLF payments between households disappear after controlling for income and the number of vehicles or drivers per household. Table 3 shows the results of a stepwise, least squares linear regression model with total household VLF payments as the dependent variable (model 1).

As expected, households with higher incomes and more vehicles pay greater VLFs. Additional significant variables include white households and the San Francisco and Oakland MSAs The significance of the latter two variables suggests that urban form or the existence of a regional rail system may enable some households to defer expenditures on vehicles. However, as noted at the bottom of the table, the adjusted r^2 for a model with only income and number of vehicles as independent variables is identical to the model with the additional variables.

FIGURE 10 Mean Total Household VLF by MSA



Models 2, 3, and 4 employ three different dependent variables: the number of household vehicles, the average initial value of the household vehicles, and the average length of vehicle registration in years, respectively As described earlier, total household VLF payments were calculated directly from the initial vehicle value and the length of registration for each household vehicle, applying equation 1. Therefore, any relationship between household characteristics and VLF payments enters through one or more of the three dependent variables shown in models 2–4.

Several factors are significant when estimating vehicle ownership (model 2). For example, senior households have fewer vehicles, as do African-American, Hispanic, and San Francisco households. However, these additional variables do little to explain vehicle ownership beyond income and the number of drivers. The adjusted r^2 for the complete model is 0.47, compared with 0 46 for a reduced model with only income and number of drivers as variables.

Model 3 shows that, even after accounting for income, some household characteristics may have an impact on the purchase price of vehicles. For example, having more children in a household correlates with lower value cars, indicating that households with children may divert income from vehicle purchases to other expenses Asian house-

TABLE 3 Ordinary Least Squares Regression Models

	Model 1	*Model 2*	*Model 3*	*Model 4*
Dependent variable	Total household VLF	Number of household vehicles	Average initial vehicle value	Average length of vehicle registration (years)
Relationship to VLF		*Positive*	*Positive*	*Negative*
Constant	−18 82 (−1.32)	0 32*** (6 42)	9,219 16*** (33 58)	6 69*** (23 16)
Household income ($1,000)	1 55*** (16 74)	0 002*** (6 22)	49 5*** (18 02)	−0 006*** (−3 86)
Number of vehicles	116 70*** (22 42)	n a		0 53*** (4 24)
Number of drivers		0 84*** (33 20)		−0 65*** (−3 71)
Number of children			−377 30* (−2 53)	
Teen in household (1 = yes)		−0 16** (−2 90)		−0 52[a] (−1 78)
Senior household (average age 70)		−0 18** (−3 04)		2 58*** (7 91)
White head of household	−30 66* (−2 50)			
Asian head of household			1,418 47* (2 16)	
African-American head of household		−0 25** (−3 42)		
Hispanic head of household		−0 15** (−2 63)	−1,702 05** (−3 21)	
Urbanized area (1 = yes)		0 15** (3 26)		
San Francisco MSA	−44 10* (−2 14)	−0 14* (−2 00)		1 04** (2 74)
Oakland MSA	−53 06** (−2 96)			0 73* (2 23)
Orange County MSA			1,834 79** (3 23)	
Los Angeles-Long Beach MSA			895 76* (2 26)	
Adjusted r^2 N	0 38 1,807	0 47 1,864	0 18 1,708	0 07 1,708
Adjusted r^2 for model with only income and number of vehicles as independent variables	0 38	0 09 (Income only)	0 17	0 01
Adjusted r^2 for model with only income and number of drivers as independent variables	0 29	0 46	0 17	0 02

Key *p < 0 05, **p < 0 01, ***p < 0 001, [a]p = 0 075

Note Variables excluded from all models—San Jose, Sacramento, San Diego, and Riverside-San Bernardino MSAs, and number of adults

holds and households in Los Angeles-Long Beach and Orange County spend more on vehicles, even after controlling for income. However, as with model 2, these additional variables add little to explain the model beyond the income variable. The adjusted r^2 for the full model is 0.18, compared with 0.17 for a reduced model with only income and the number of vehicles or drivers as variables.

The average length of time a vehicle has been registered determines the depreciation factor used to calculate the VLF. The estimated coefficients (model 4) confirm expectations: a negative relationship between income and length of registration and a positive relationship between the number of vehicles in the household and length of registration. In addition, senior households hold on to their vehicles longer, as do residents of the San Francisco and Oakland MSAs. These last two variables carry through to total household VLF payments (model 1), where San Francisco and Oakland households are seen to pay lower VLFs. Overall, however, the variables in model 4 explain less than 10% of the variation in the data (adjusted $r^2 = 0.07$). In contrast to models 1–3, the income and number of drivers or vehicles variables do not account for a large portion of the explanatory power of Model 4.

APPLICABILITY TO OTHER STATES

The taxation of the value of motor vehicles is not unique to California. At the beginning of 1998, 31 states had some form of value-based vehicle license fee (Mackey and Rafool 1998). These taxes have been receiving increased political attention in recent years. Indiana started the trend, cutting its vehicle taxes by up to 50% Soon afterwards, James Gilmore III was elected Governor of Virginia, after making elimination of the state's "car tax" a centerpiece of his campaign. His victory helped to catapult the issue into the national spotlight. By the end of 1998, at least seven other states (Arizona, California, Nebraska, Rhode Island, Utah, Virginia, and Washington) had reduced, restructured, or eliminated their VLFs, and voters in Kentucky had amended their state constitution to enable the repeal of their VLFs. In 1999, expanding state budget surpluses are continuing to fuel calls for VLF cuts.

The magnitude of these taxes varies significantly around the country: in 1998, rates ranged from 1% of vehicle value in Iowa to 7 68% of vehicle value in Rhode Island (Lopez 1998) Sixteen states set uniform rates, with taxes collected either by local governments or the state, in which case revenues are usually recycled back to local governments. Tax rates are set by local jurisdictions in 12 states, and 3 states have hybrid systems. Among the states with uniform rates, the median annual tax rate was 1.8% of assessed vehicle value (Mackey and Rafool 1998).

The method of determining the value of vehicles subject to taxation also varies significantly among the states. Four broad methods are used to establish these values (Mackey and Rafool 1998).

- *Most recent purchase price* (California and Indiana) In these states, a fixed schedule is used to determine the depreciated value of the vehicle in subsequent years.
- *Manufacturer's standard retail price* (Arizona, Colorado, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, Oklahoma, Washington, and Wyoming). This is also used with a fixed depreciation schedule.
- *Market value*, determined by a standard pricing guide, local assessor, or state commission (Alabama, Alaska, Arkansas, Connecticut, Georgia, Kansas, Kentucky, Mississippi, Missouri, North Carolina, Rhode Island, South Carolina, Texas, Utah, Virginia, and West Virginia). Depreciation occurs naturally according to market demand.
- *Vehicle vintage* (Alaska, Utah).[4] This is only a very rough proxy for vehicle value.

Although each state has a unique method for assessing its vehicle property taxes, the general approach outlined in this paper should be applicable elsewhere In most states, the tax basis is simply determined by the list price and purchase year, purchase year alone, or fair market value. These can be determined from consumer pricing guides, the method most often used by the state governments. However, since most transportation surveys

[4] Local jurisdictions in Alaska may choose between assessing a property tax and a vintage-based registration tax Utah shifted from a market value-based property tax to a vintage-based user fee in 1998

on the NPTS data has slightly fewer vehicles valued at less than $5,000 and more vehicles valued between $10,000 and $19,999. With the estimated acquisition year and vehicle value, the 1996 VLF for each vehicle was estimated using equation (1) and the depreciation schedule in table 1.

The average VLF per automobile (including cars, pickup trucks, vans, and sport utility vehicles) estimated from the NPTS data was $136 in 1996. The average for motorcycles was $55. The Legislative Analyst's report estimated the average automobile VLF in 1997 as $171 and the average motorcycle VLF as $57 (State of California 1998). The difference in the average automobile VLF may be due to the fact that the NPTS data include only household vehicles. The DMV data used for the Legislative Analyst's estimate include vehicles owned by businesses, including rental-car and other fleets. These vehicles are likely to be newer, i.e., registered for fewer years, and would incur a higher VLF. For example, we estimated that the average VLF for rental vehicles is $349 (Dill et al. 1999).

3. Estimate of Income Tax Deductions

Although the VLF is deductible from state and federal income taxes, relatively few taxpayers claim this deduction. Nonetheless, because the tendency to itemize tax deductions varies with income, it is appropriate to estimate how this affects the actual incidence of the tax.

Data supplied by the California Franchise Tax Board (FTB) were used for this part of the analysis. Based on the FTB's weighted sample of 100,000 California tax returns, average marginal tax rates and percentage of households itemizing deductions for personal property tax payments were estimated for each income group and filing status category. This involved the following assumptions:

- *Households vs. taxpayers.* The data from the FTB are a sample of taxpayers, not households. This creates potential problems if we wish to apply statistics from this sample to the households in our sample from the NPTS. First, some households with more than one adult (e.g., nonfamily households or married couples filing separately) may be overrepresented. In addition, businesses filing tax returns are included in the sample. Small businesses may comprise a large proportion of the returns at lower income levels, since low-income families are not required to file if they do not owe taxes.
- *Filing status.* Average marginal tax rates vary with the filing status (single, married filing jointly, etc.) of the taxpayer. Because the NPTS does not provide information on tax filing status, household life cycle categories were used as a proxy. Households with two or more adults were assumed to file taxes as "married couples filing jointly," households with one adult and no children were assumed to file as "single" taxpayers; and households with one adult and one or more children were assumed to file as "head of household" taxpayers.
- *Personal property tax deductions.* Taxpayers may deduct state "personal property taxes" on their federal tax forms. For California residents, the VLF is the most significant of these taxes. We have assumed that all California taxpayers itemizing deductions for personal property taxes (about 16% of all filers) from their federal income taxes included the VLF in the amount that they deducted.

Based on these assumptions, the estimates for average marginal tax rates and percentage of households deducting personal property taxes were applied to each household on the basis of income and family life cycle. The estimated VLF was adjusted as follows:

$$VLF_{adjusted} = VLF \times (1 - (\%\ deducting\ VLF) \times (average\ marginal\ tax\ rate)) \quad (3)$$

Potential Sources of Error

Systematic errors in our analysis may potentially originate with the data themselves or with the assumptions that we applied in using the data.

- *Vehicle purchase dates.* The assumption that used vehicles were purchased halfway between their model year and the survey year may systematically underestimate VLF charges for older vehicles. Since cars built in the early 1970s were all assumed to have been purchased more than 10 years prior to the survey date, they were all assigned to the lowest VLF fee categories (15% to 20%), whereas in reality, some of these vehicles would have been purchased more recently.
- *Used-vehicle values.* The assumption that used-vehicle values are a function of the *Kelley Blue*

Book retail and wholesale values may systematically overestimate actual reported vehicle values. This is because many used vehicles are not in the "excellent" condition that corresponds to the *Blue Book* prices and because some purchasers of used vehicles may underreport vehicle sale prices to evade the state sales tax and the VLF

- *New-vehicle values.* The assumption that new vehicles were purchased at list price may overestimate actual new vehicle values because some dealerships may sell below list price. It also masks price variations among vehicle submodels and options packages.
- *Tax deductions.* Some taxpayers running businesses may deduct the VLF as a business expense rather than as a personal property tax. These deductions are not counted in our analysis
- *Company vehicles* An unknown percentage of the vehicles in the sample are owned or leased by an entity other than the household, such as an employer In many of these cases, the household does not pay the VLF directly or indirectly. Therefore, VLF may be overestimated for higher income households that are more likely to use company-owned vehicles.

The most important net effect of these errors is expected to be the combination of assumptions about vehicle purchase dates and vehicle values. In each case, the use of "average" values is likely to mask significant underlying income effects, leading to more level (and therefore more regressive) estimates of the relationship between income and VLF than actually exist.

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REFERENCES

Citizens for Tax Justice and the Institute on Taxation and Economic Policy 1996 *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States* Washington, DC

Dill, J , T Goldman, and M Wachs 1999 *The Incidence of the California Vehicle License Fee* Berkeley, CA California Policy Research Center

Kelley Blue Book 1975–1995 *Kelley Blue Book Used Car Guide* Irvine, CA

Lopez, E 1998 *Vehicle License Fee A Comparison Among the Most Populous Cities of Each State*, CRB-98-0008 Sacramento, CA California Research Bureau, California State Library

Mackey, S and M Rafool 1998 *State and Local Value-Based Taxes on Motor Vehicles* Washington, DC National Conference of State Legislatures

National Automotive Dealers Association 1975–1995 *NADA Motorcycle Appraisal Guide* McLean, VA

Rock, S M 1982 Applying the S-Index to Transportation Financing Alternatives *Transportation Research Record* 858

____ 1990 Equity of Local Option Taxes *Transportation Quarterly* 44 3

State of California, Legislative Analyst's Office 1998 *A Primer on the Vehicle License Fee* Sacramento, CA

Suits, D B 1977 Measurement of Tax Progressivity *American Economic Review* 67 4

U S Department of Labor (USDOL), Bureau of Labor Statistics 1994–95 Consumer Expenditure Survey

U S Department of Transportation, Federal Highway Administration 1997a *1995 NPTS Data Files (CD-ROM)*, FHWA-PL-97-034 Washington, DC

____ 1997b *1995 NPTS User's Guide for the Public Use Data Files* Washington, DC

Walls, M and J Hanson 1996 *Distributional Impacts of an Environmental Tax Shift The Case of Motor Vehicle Emissions Taxes*, Discussion Paper 96-11 Washington, DC Resources for the Future