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About the California Policy Research Center

The California Policy Research Center (CPRC), which funded this study, is a University of California program that applies the extensive research expertise of the UC system to the analysis, development, and implementation of state policy. CPRC provides technical assistance to policymakers, commissions policy-relevant research on statewide issues, and disseminates research findings and recommendations through publications and special briefings.

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Contents

Introduction

Since 1935, the Vehicle License Fee (VLF) has been assessed on all privately owned registered vehicles in California. It is a property tax currently set at 2% of a vehicle's value, based upon its most recent purchase price and a fixed depreciation schedule. The Legislative Analyst's Office has estimated that the VLF, if unchanged, would have raised approximately $3.9 billion in the 1998-99 fiscal year.

In light of the current fiscal surplus, the Legislature recently reduced the VLF by 25%, with possible additional reductions in future years. Because little information is available on who will benefit from this change, 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 this analysis of the incidence of the VLF. In this report, we examine the relative payments of households having different income levels, races, and locations; payments from businesses; and the relationship between the VLF and "Blue Book" vehicle values.

The Department of Motor Vehicles does not collect all of the data necessary for this analysis, such as household income. Therefore, the analysis of VLF payments by California households is based on data from the 1995 Nationwide Personal Transportation Survey, conducted by the Federal Highway Administration. This survey included detailed data on over 2,000 California households with over 4,000 vehicles. For each vehicle, an estimated purchase price was obtained from the *Kelley Blue Book* and the VLF calculated. The analysis of VLF payments by California businesses is based on a California Energy Commission database that identifies commercial and governmental fleets from the vehicles registered with the Department of Motor Vehicles. The methodology is described in detail later in this report.

The VLF is only one of several different taxes and fees that vehicle owners pay to the state government. These other assessments, including registration fees, sales taxes, gasoline taxes, and special interest or personalized license plate fees, are beyond the scope of this study.

Key Findings

- The average California household pays $247 in vehicle license fees each year, an expense which consumes approximately 0.61% of household income.
- VLF payments vary widely from household to household, but a clear relationship exists between family income and VLF payments. Average annual VLF payments vary from $55 for the lowest-income households to $599 for the highest-income households.
- Some 5.7% of households pay no VLF at all because they do not own vehicles. Most of these households (84%) have incomes below $20,000.
- Some of California's poorest households pay more than 1% of their annual income in VLFs. In this respect, the VLF is regressive – higher-income households pay a far smaller portion of their income in VLF than lower-income households.

- Though higher-income households pay a smaller portion of their income in VLFs, they pay the largest share of the total VLF collected. Households with incomes of $80,000 and above pay 22% of the total VLF collected from households, though they constitute only 10% of all California households. These households will therefore reap the largest share of savings from reductions in the VLF. Households with incomes less than $20,000 pay under 8% of the total VLF collected, while they constitute over 20% of the households.
- There are over three million light-duty vehicles registered to businesses in California, collectively paying more than $440 million in VLFs. These figures do not include medium- or heavy-duty trucks, which are likely to contribute a significant share of the total VLF payments by businesses.
- Most of the VLF paid for light-duty vehicles by businesses falls upon companies with small fleets (fewer than 10 vehicles) and vehicle rental businesses with very large fleets (more than 1,000 vehicles).
- The depreciation schedule used to determine the VLF may overestimate values for new vehicles and underestimate values for older vehicles.

California Households

How do VLF payments vary with income?

In 1996, the average California household paid $247 in VLFs. VLFs increase with income, because wealthier households tend to own more vehicles, and the vehicles that they own tend to be newer and more expensive (Figure 1). Total household VLF ranges from $55 for households with annual incomes under $10,000 to $599 for households with incomes over $100,000.[1] Therefore, a 25% reduction in the VLF will save the lowest-income households an average of $13.75. The average household will save $61.75, and the highest-income households will save nearly $150 on their VLF bills.

In addition, 5.7% of California households do not own or lease vehicles, and therefore do not pay any VLF. These households will not benefit from the VLF reduction, unless they purchase or lease a vehicle in the future. However, the amount of the reduction is unlikely to influence a household's decision whether or not to purchase or lease a vehicle. Thirty-five percent of the households with incomes under $10,000 do not own or lease vehicles. This explains, in part, the low average household VLF payment for that income group. The average total VLF payment among households that have incomes below $10,000 and own vehicles is $88.

The average number of vehicles per household starts to level off at about 2.25 for the highest income households, but the value of each vehicle continues to increase. This contributes to the

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

increasing VLF for households with incomes $80,000 and above. Figure 2 shows the average VLF per vehicle by income category. The VLF per vehicle increases most sharply for the lowest- and highest-income groups. For households with incomes between $30,000 and $79,999, the VLF per vehicle rises only from $123 to $138. In contrast, households with incomes of $80,000 – 99,999 pay an average of $200 per vehicle and households with incomes over $100,000 pay $237 per vehicle.

Figure 1: Total VLF and Number of Vehicles per Household, by Income

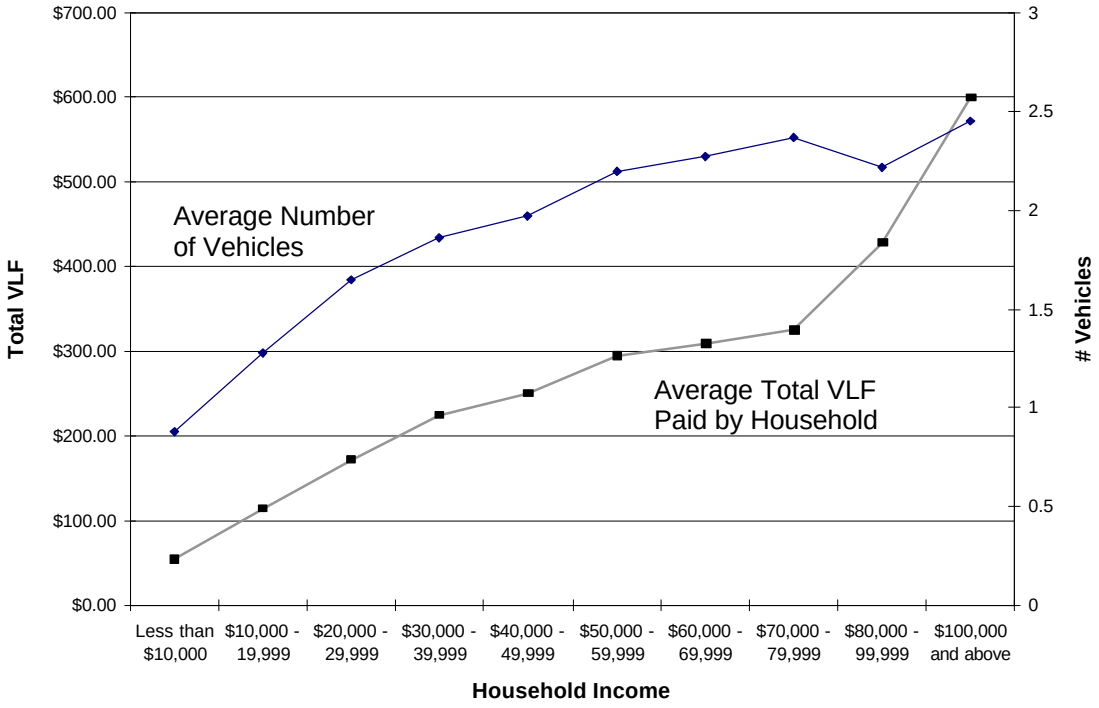


Figure 2: Average VLF per Vehicle, by Income

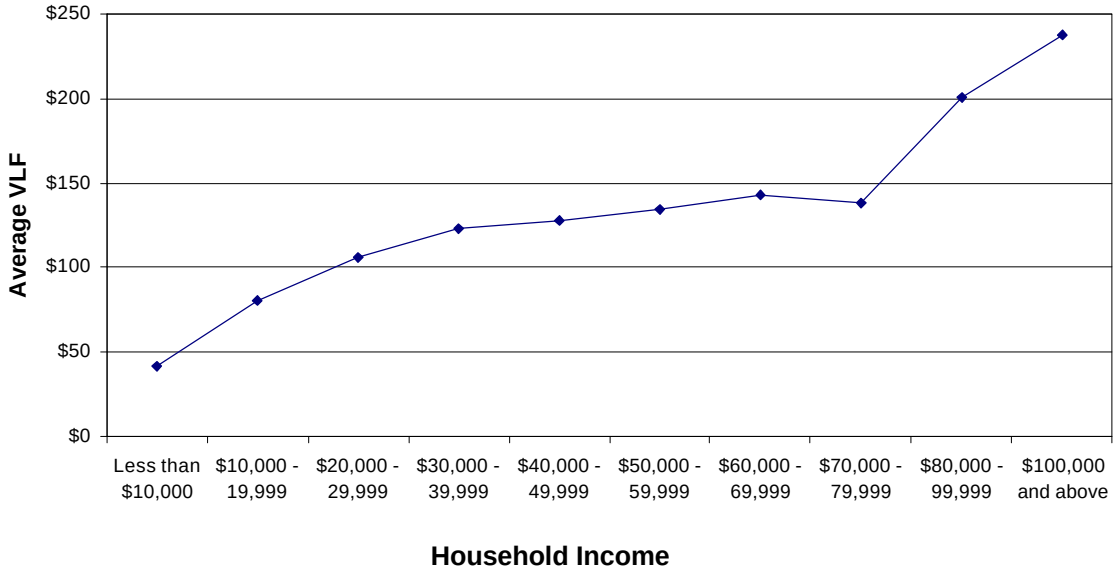
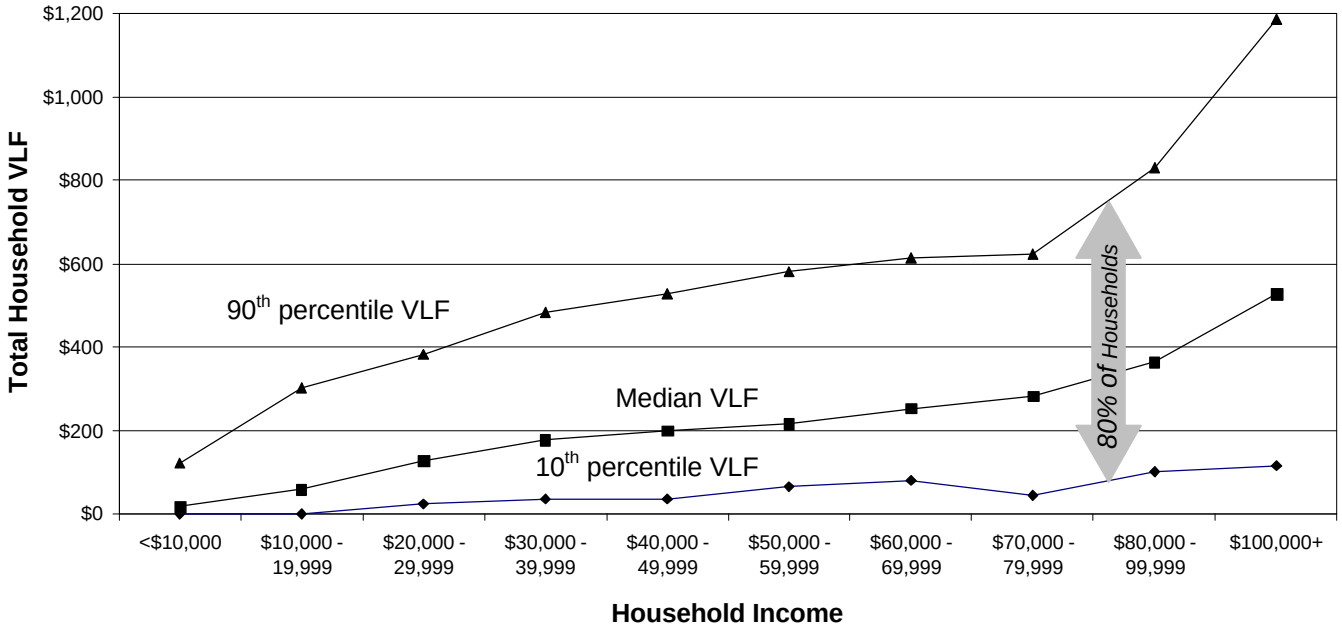


Figure 3 shows the range of total VLF paid for the different income groups. The median is the 50th percentile – half of the households pay more than that amount and half pay less. The 90th percentile line represents the total VLF below which 90% of the households in an income category pay; 10% of the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

The figure shows that the absolute range of the VLF paid is largest at the highest-income categories. For example, 80% of the households with incomes between $20,000 and $29,999 pay $24 to $381 in VLFs, a range of $357. Eighty percent of the households with incomes over $100,000 pay between $115 and $1,185 in VLFs, a range of $1,070.

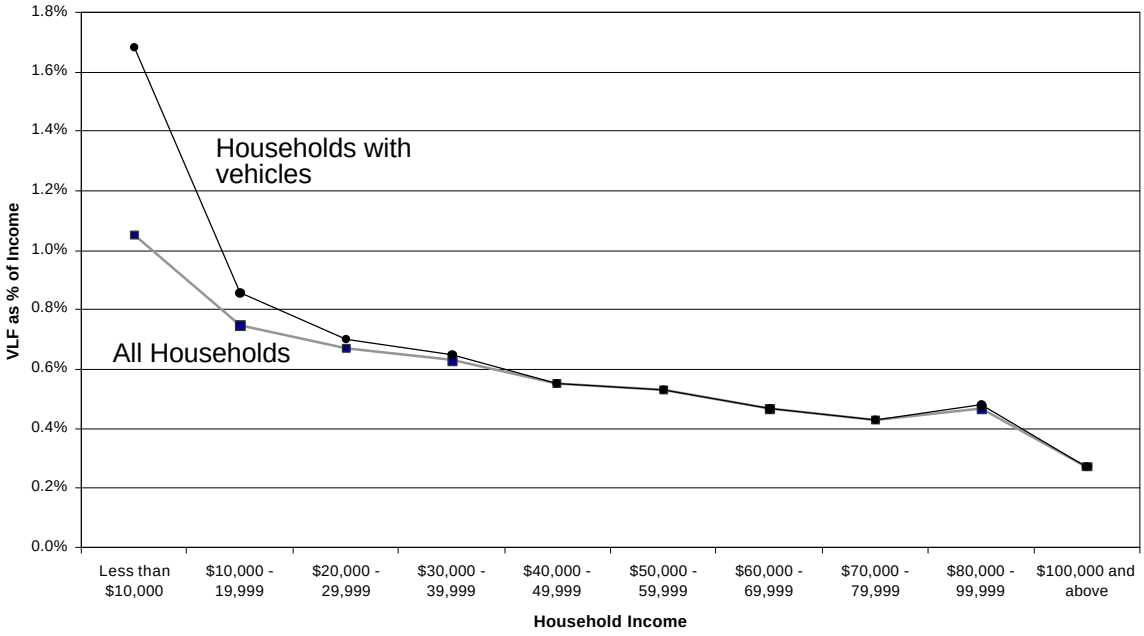
Figure 3: Total VLF by Income: Median, 10th and 90th Percentiles



Is the VLF equitable?

The total VLF paid is a small portion of annual household income, averaging 0.61%. However, households with incomes under $10,000 pay an average of 1.05% of their income in VLFs. Figure 4 shows that the total VLF as a percent of household income declines as income rises. As with the total VLF paid, the large portion of households without vehicles in the lowest income categories influences the average total VLF as a percent of income. For example, households with incomes under $10,000 that have vehicles actually pay an average of 1.68% of their income in VLFs. A 25% reduction in the VLF represents 0.42% of their annual income.

Figure 4: Total VLF as a Percent of Household Income, by Income



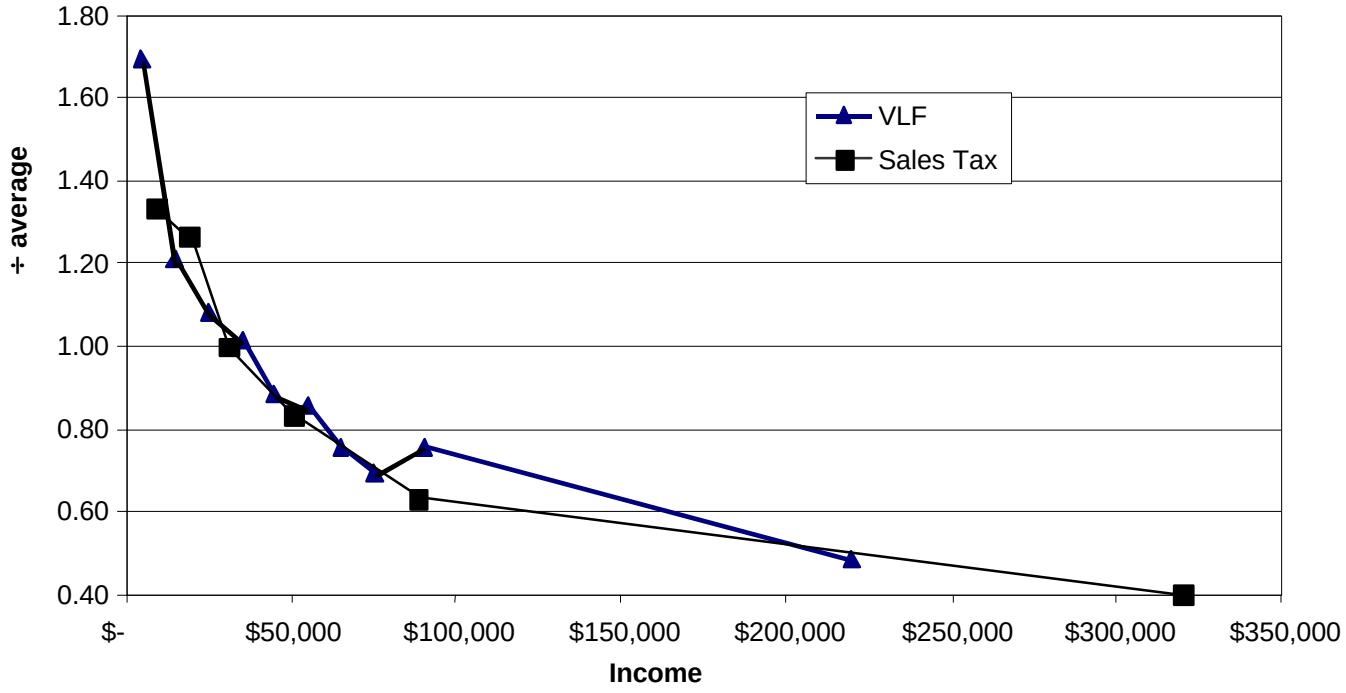
Taxes are often analyzed in terms of regressivity. A regressive tax is usually defined as one for which poorer households pay a higher percentage of their income, compared to higher-income households. Using this definition, the VLF is regressive.

The sales tax is often cited as an especially regressive tax. Therefore, it may be useful to compare the relative regressivity of the VLF and the general sales tax. The poorest Californians pay an average of 4.0% of their income toward sales tax, while the highest-income groups pay 1.2%.[2] Because the range of values (4.0% to 1.2%) differs from the VLF paid as a percent of income (1.05% to 0.30%), it is useful to evaluate payments relative to the average. For example, for VLF, the poorest households pay 1.7 times the average (1.05% vs. 0.61% of income) and the richest pay about half of the average. This is shown in Figure 5. The patterns are nearly identical when the VLF is compared to the sales tax.

The VLF is compared to other California taxes in Table 1. Households in the lowest income quintile pay nearly three times as much of their incomes toward VLFs than do households in the

[2] Citizens for Tax Justice/Institute on Taxation & Public Policy, as cited in Senate Office of Research, "Sales Tax Facts," June 29, 1998.

Figure 5: VLF vs. General Sales Tax
(% of income relative to average)



highest quintile. This is much more regressive than the state's overall system of taxes, but less regressive than the gasoline tax. This suggests that the VLF may be a more equitable alternative to the gas tax for financing transportation infrastructure.

Another measure of equity is to compare the percent of the total fee paid by a certain group with percent 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 from households, while they represent over 7% of the households in California. At the other extreme, households with incomes of $100,000 and above pay 13.5% of the total household VLF, yet they represent only 5.4% of the California households. In general, for households with annual incomes of $40,000 and above, the proportion of the total VLF collected from these households is larger than the proportion of all households that are of those income levels. Households with incomes $40,000 and above pay 55.7% of the VLF collected from households and represent 39.0% of the population. Therefore, without factoring in income tax deductibility, any proportional reduction of the fee (e.g., a 25%

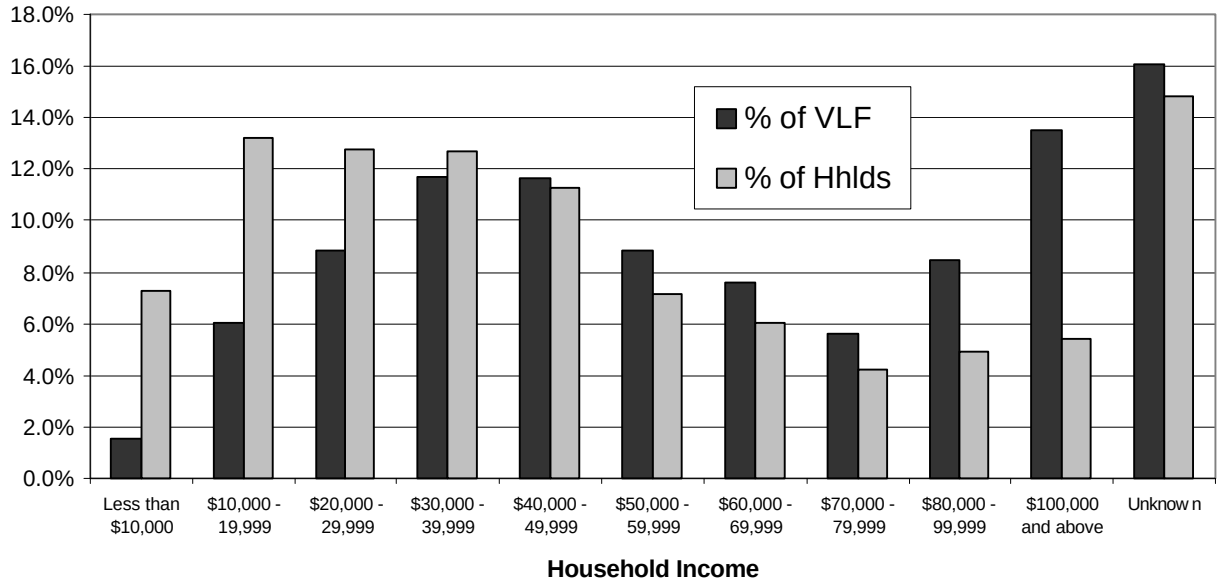
Table 1: California Taxes as a Percentage of Household Income

	Income Quintiles					Ratio of
Tax Type	Lowest 20%	Second 20%	Middle 20%	Fourth 20%	Highest 20%	Bottom / Top
Total State Tax Burden[a]	12.0%	9.2%	8.9%	9.1%	9.6%	1.2
Tax Burden after deductions[a,c]	12.0%	9.0%	8.5%	8.1%	7.7%	1.6
Sales Tax[a]	4.2%	3.4%	2.7%	2.3%	1.6%	2.7
Vehicle License Fee[b]	1.18%	0.70%	0.61%	0.52%	0.41%	2.9
Gasoline Tax[c]	0.75%	0.54%	0.40%	0.31%	0.19%	4.0

[a] Non-elderly married couples. Source: Citizens for Tax Justice and The Institute on Taxation and Economic Policy (1996).
[b] Households with 2 or more adults and a mean age of 65 or lower. From the present study.
[c] Total state tax burden minus federal tax deductions.

reduction) will have a greater absolute benefit for higher income households. Over 20% of the benefit will go to the 10% of households with incomes $80,000 and higher, since they pay 22% of the household VLF.

Figure 6: Total VLF paid by Households, by Income

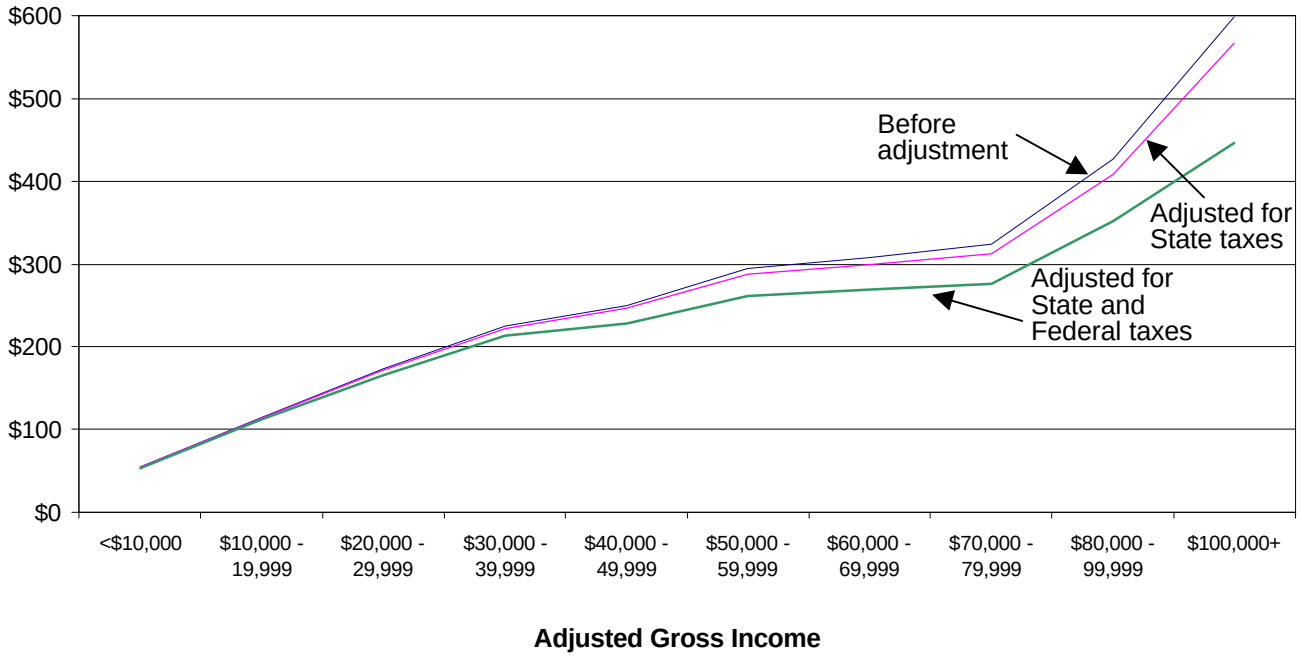


How do income tax deductions affect the incidence of the VLF?

So far, this analysis has looked at the VLF without considering income tax deductibility. Households that itemize deductions on their personal income taxes can deduct the VLF paid from their taxable income. This can reduce the income tax they must pay. Figure 7 shows the estimated total VLF paid by households once state and federal tax deductibility is factored in.

There is very little difference between the unadjusted VLF and adjusted VLF for the lowest-income households. The difference grows as income increases. 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 saves 25% of their VLF bill when they pay their income taxes. The average household at the lowest income levels saves only 2% of its VLF payments via tax deductions. Factoring in tax deductions results in a slight increase in the regressivity of the tax, since higher-income households are more likely to benefit from the tax deduction.

Figure 7: Estimated VLF Paid, Adjusted for Tax Deductions, by Income



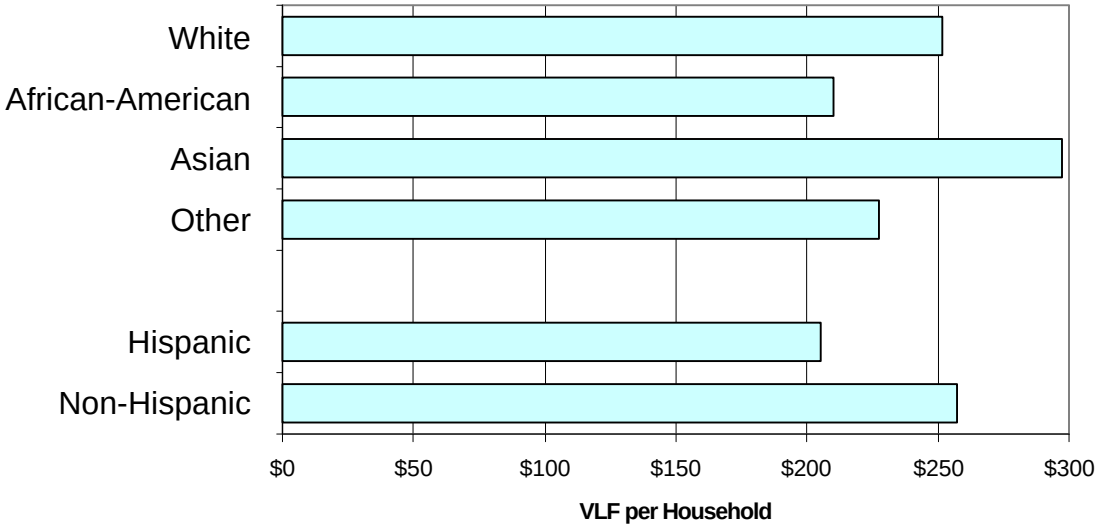
How do VLF payments vary with household demographics?

The average household VLF was compared across several demographic variables, including race, Hispanic ethnicity, family lifecycle category, and age. Although the VLF does vary significantly for across each of these variables, these effects disappear once household income and number of drivers are taken into account. Both income and number of drivers are strong predictors of household VLF, and together explain approximately 29% of the variation in the sample.[3]

Race and Ethnicity

Figure 8 shows the total household VLF (unadjusted for tax deductions) for households of different races.[4] The state's Asian households pay the highest average VLF, while African-American and Hispanic households pay a lower average VLF.

Figure 8: VLF per Household, by Race



The amount of VLF a household pays is directly related to the number of vehicles in the household and the VLF paid for each of those vehicles. The VLF per vehicle is a factor of the initial value of the vehicle and the number of years it is registered. The higher the vehicle value and the shorter the length of registration, the higher the VLF. The data on these factors are summarized in Table 2 for the different races. In all cases the differences are statistically significant.[5] However, these differences may be explained largely by income. After controlling for income and the number of drivers in each household, the effects of race and Hispanic ethnicity upon household VLF are both insignificant.

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[3] Results from multivariate regression on total household VLF: $t_{\text{hh income}} = 18.7$; $t_{\text{\# of drivers}} = 14.6$; $r^2 = 0.293$.

[4] Household race is based upon the race of the "reference person" for the survey. The reference person is the person or one of the persons who own or rent the home.

[5] One-way ANOVA, $p = 0.08$ or lower. That is, for each of the variables in Table 2, there is an 8% or lower chance that the variation across racial and ethnic groups is real and not due to random chance.

Table 2: Differences by Household Race

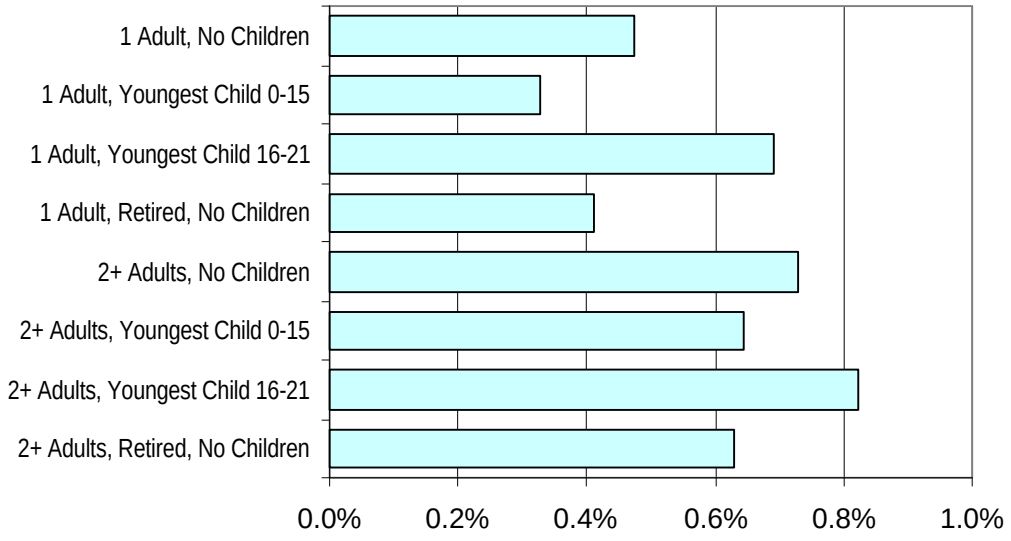
	Total VLF per Hhld	*Vehicles per Hhld*	*Initial Value of Vehicle*	*Years Vehicle Registered*
Asian	$297	2.02	$13,500	6.1
White	$252	1.85	$12,110	7.0
African-American	$210	1.46	$11,970	6.8
Other	$227	1.82	$10,290	6.4
Non-Hispanic	$257	1.85	$12,410	6.9
Hispanic	$205	1.72	$9,780	6.4

Household Lifecycle and Age

Households were classified into lifecycle categories to determine whether the VLF has a differential impact on various types of families. Distinctions were drawn between households containing only one adult and those containing two or more adults; and among households with no children, a youngest child aged 0-15 and a youngest child aged 16-21. Households with no children were further classified according to whether the adults were working or retired.[6]

Figure 9 displays the results of an analysis of how the VLF as a percentage of household income varies by family lifecycle category. There are three noteworthy patterns in these results: (1) households with two or more adults pay greater VLF in comparison to their incomes; (2) non-retired 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

Figure 9: VLF as a Percent of Household Income, by Lifecycle Category



[6] The NPTS makes a further distinction between households with the youngest child aged 0-5, and those with the youngest child aged 6-15. This distinction is important for studying household travel behavior, but it is less important when studying household vehicle ownership. However, since "children" aged 16-21 do influence family vehicle ownership patterns, distinct categories for their families were retained.

because their ownership of an extra car is not fully compensated by the wages 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. Because senior citizens appear in both the "no children" and "retired" lifecycle categories in the above analysis, another comparison was done between "senior" and "non-senior" households. A "senior" household was defined as one in which the average of the ages of all residents is 70 years or more. "Senior" households pay a lower percentage of their income toward the VLF (0.44%) than all other households (0.63%). Several factors appear to be holding down their taxes. Retirees are able to own fewer cars because their schedules are more flexible, and many cease driving after a certain age. Furthermore, the vehicles that are owned by seniors are on average 38% older than those owned by the non-senior population.

After controlling for the income and the number of drivers in each household, the effects of family lifecycle and average age on total household VLF are both insignificant.

How do VLF payments vary by region?

Households in the San Francisco metropolitan statistical area (MSA)[7] pay the lowest average VLF of the state's MSAs ($173), while Orange County MSA residents pay the highest ($285), as shown in Figure 10. However, the variations across regions are statistically weak relative to the variations within them.[8] There are more significant differences among the MSAs in the number of vehicles per household and the average VLF per vehicle.[9]

After controlling for household income and number of drivers, residency in the San Francisco or Oakland MSAs continued to have a significant effect on VLF payments. Households in the San Francisco region (Marin, San Francisco, and San Mateo counties) pay an average of $65 less than households in the rest of the state, and those in the Oakland region (Alameda and Contra Costa counties) pay an average of $62 less than the rest of the state.[10] One possible explanation of this may be that the relatively greater opportunities to use public transit in these regions has led to lower vehicle ownership. In the San Francisco region, the average VLF per vehicle is lower as well.

Households in urbanized[11] areas pay an average of $239, compared to $299 for non-urbanized areas.[12] This appears to be primarily due to variations in vehicle ownership rates. Households in urbanized areas own an average of 1.8 vehicles, compared to 2.1 vehicles for households in non-urbanized areas. This effect remains significant even after controlling for household income and number of drivers – households in rural areas still pay an average of $66 more. [13]

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[7] A metropolitan statistical area is a county or group of contiguous counties that includes a city of at least 50,000 population (or "twin cities" with a combined population of 50,000) within a total area population of at least 100,000.

[8] One-way ANOVA, p=0.11 (11% chance this is due to random error).

[9] One-way ANOVA, p=0.02 for vehicles per household and p=0.00 for VLF per vehicle.

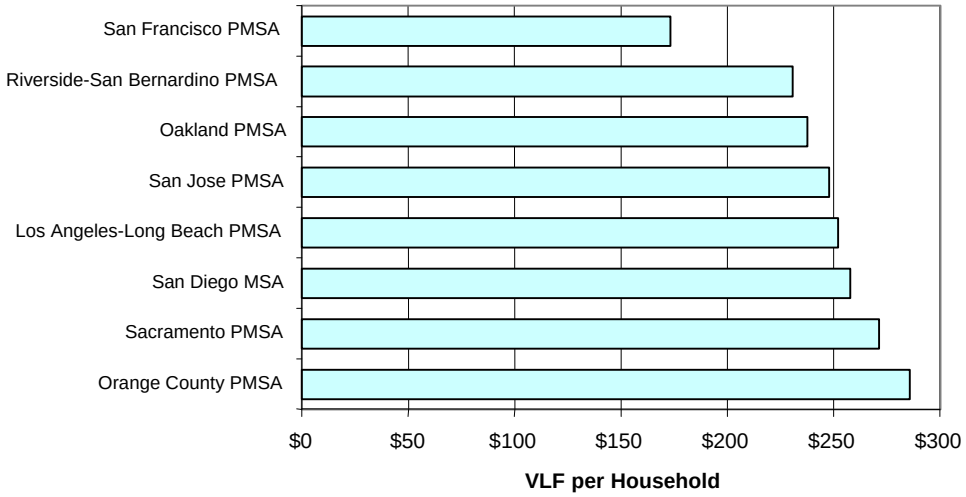
[10] Regression results: $t_{\text{hh income}} = 19.1$; $t_{\text{\# of drivers}} = 14.3$; $t_{\text{Oakland MSA}} = -3.3$; $t_{\text{SF MSA}} = -3.0$; $r^2 = 0.301$.

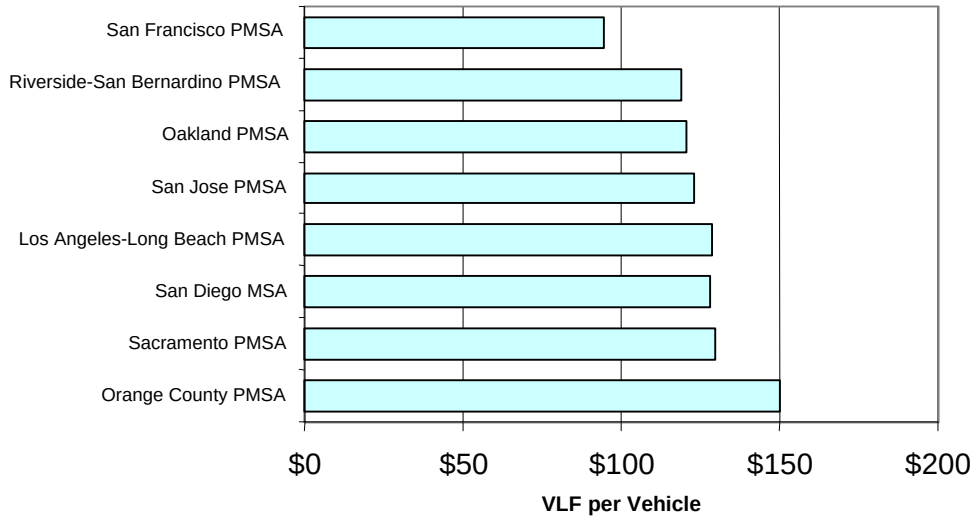
[11] "Urbanized" is defined as a block group with at least 1,000 persons per square mile.

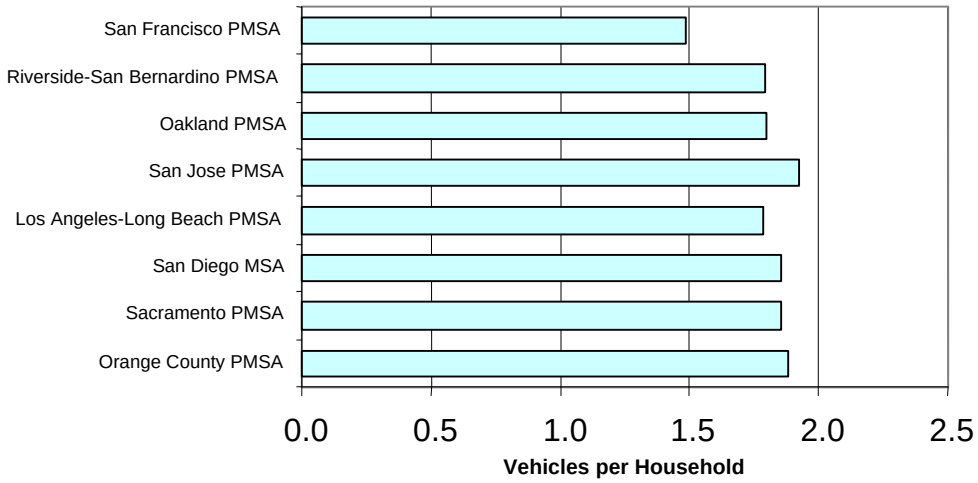
[12] One-way ANOVA, p=0.00

[13] Regression results:: $t_{\text{hh income}} = 18.5$; $t_{\text{\# of drivers}} = 14.4$; $t_{\text{Rural}} = -2.6$; $r^2 = 0.295$.

Figure 10: VLF and Vehicles per Household, by Region







California Businesses

Until now, no estimates have been available of Vehicle License Fee payments by businesses. The results reported elsewhere rely on Department of Motor Vehicles (DMV) data that classify vehicles according to their *body types*, with most types of trucks automatically designated as "commercial" vehicles. However, since many automobiles are owned by businesses, and growing numbers of light trucks are owned by households, this approach provides a limited picture of the incidence of the VLF on businesses. Using data developed by the California Energy Commission, this section provides a rough estimate of the VLF paid for light-duty vehicles owned by businesses in California.

Findings

Table 3 displays the results of a preliminary estimate of the VLF paid by commercial owners of light-duty vehicles in 1995.[14] In that year, there were approximately three million light-duty vehicles registered by businesses in the state of California. License fees for these vehicles totaled roughly $444 million, or an average of $146 per vehicle.

Table 3: VLF for Light-Duty Commercial Vehicles, 1995

Vehicle Fleet Type	# of Vehicles (1000's)	Estimated VLF ($ Millions)	VLF/vehicle ($)
Daily Rental	269	$94	$349
Other Commercial	2,766	$350	$126
Total	3,035	$444	$146

This result is not directly comparable to estimates published elsewhere, which use a weight-based definition of commercial vehicles.[15] The Legislative Analyst's Office report cites DMV data showing a total of 4.5 million commercial vehicles, paying an average of $151 each in VLFs. This total includes all medium and heavy trucks, as well as light trucks owned by households. It excludes cars and other vehicles owned by businesses.

VLFs are generally not fully absorbed by the businesses that pay them. In most cases, they are tax-deductible as business expenses. In addition, vehicle rental companies pass on the costs to their customers, often as a specific line item on their bills.

Average VLFs are higher for commercial vehicles than for personal vehicles because commercial vehicles tend to be worth more.

- Vehicles owned by daily rental companies are similar to those owned by California families: cars dominate both groups (cars are 89% of rental vehicles and 72% of personal vehicles). However, rental fleets incur much higher VLFs because their vehicles tend to be significantly newer (median age <1 year for rental vehicles, compared with a median age of nearly 8 years for personal vehicles).

[14] For the purposes of this section, light-duty vehicles include vehicles of all body types with less than 10,000 lbs. gross vehicle weight (GVW). Motorcycles are not included.

[15] The "Commercial/Trucks" vehicle classification used by the DMV and in the Legislative Analyst's Office report is defined as all trucks with GVW of 2,000 lb. or higher. This has several exceptions, e.g., pickups with camper shells are classified as personal vehicles. Trailers, motor homes, and certain other vehicle types are not included.

- Vehicles owned by other commercial enterprises tend to be dominated by trucks and vans (60% of commercial fleets vs. 22% of personal vehicles[16]), which are worth more. The median age of non-rental commercial vehicles is roughly similar to that for personal vehicles (7 vs. 8 years).

A further analysis of VLFs paid by fleet size appears in Table 4. These results suggest that most of the VLF paid by businesses falls upon companies with small fleets (less than 10 vehicles) and vehicle rental businesses with very large fleets (more than 1,000 vehicles).

Table 4: Percent of VLF Paid for Light-Duty Vehicles, by Fleet Size, 1995

	Fleet Size (# of vehicles registered to same owner)				
Fleet Type	**1-9**	**10-99**	**100-999**	**1000+**	**All**
Daily Rental	0%	0%	1%	19%	21%
Other Commercial	64%	8%	3%	4%	79%
Total	64%	8%	4%	23%	100%

Future Work

Because much of the necessary data were unavailable, this analysis excludes medium and heavy trucks, which likely constitute a significant share of the commercial vehicle fleet's value. It also excludes motorcycles and other vehicle types more likely to be found in the personal vehicle fleet, but which may also be owned by businesses.

A more thorough assessment of VLF payments by the commercial sector may be possible after the California Energy Commission (CEC) completes its next round of data analysis in late 1999 (which may include a broader range of vehicle classes). In its next iteration the CEC is hoping to carry through its analysis to include medium and heavy trucks, if sufficient funds can be identified.

With additional resources, the CEC may also be able to provide additional variables that would facilitate far more precise estimates of VLF payments. The raw data provided to the CEC by the Department of Motor Vehicles contain the reported vehicle purchase prices that serve as the basis for the VLF assessments. The CEC does not "clean" these data or carry them through to the final database, because these variables are not useful for their purposes. Additional resources for cleaning these data and carrying them through the creation of the CEC's database may make it possible to calculate VLF payments without relying on many of the assumptions and estimates used in the present analysis (see "Methodology").[17]

[16] In 1995, sport utility vehicles constituted 6% of the personal vehicle fleet.

[17] The CEC's ultimate ability to carry out this analysis will also depend on whether the DMV can improve its reporting of vehicle transfer-of-ownership dates, and whether the CEC's computers have enough capacity to handle these extra data.

Methodology

Estimate of VLF Payments by California Households

Data

Several pieces of information are necessary to evaluate the incidence of the VLF on California households, namely, the characteristics of households (income, race, employment, etc.) and how much they pay in VLF. While the Department of Motor Vehicles collects the VLF, they do not have data on household income and other characteristics. Moreover, raw DMV data were not available for this study. Therefore, we relied upon an alternative source – the Nationwide Personal Transportation Survey – that required a number of assumptions.

The U.S. Department of Transportation sponsors the Nationwide Personal Transportation Survey (NPTS), which it has conducted in 1995, 1990, 1983, 1977, and 1969. The NPTS surveys civilian residents regarding their travel, as well as household, driver, and vehicle attributes and is used extensively by public agencies and researchers throughout the country.

The most recent NPTS was conducted from May 1995 through July 1996. The final dataset from this survey includes 42,033 households; of these, the 2,262 households from California were used for this VLF analysis. The nationwide sample is stratified to assure adequate sampling of transit trips and certain targeted areas, and is weighted to reflect the demographic and economic characteristics of each region.

The survey includes all vehicles that the household owned or had available for regular use. This includes vehicles leased or company-owned, even if used only for business purposes, as long as the vehicle was used by household members on a regular basis, was driven home, and could be used for the home-to-work trip. Therefore, vehicles owned by home-based businesses are also included. The survey did not ask whether the vehicle was owned or leased. For each vehicle in a household, respondents provided information on the vehicle make (e.g., Ford), model (e.g., Taurus), model year, and whether the vehicle was acquired new or used.

Two pieces of information on each vehicle are needed to calculate the amount of VLF paid by a household: (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. Purchase price was not collected in the NPTS survey, and the date of acquisition was collected only for vehicles acquired in the most recent 12 months. Therefore, both pieces of information had to be estimated.

Estimate of Vehicle Purchase Year

For vehicles purchased during the previous 12 months, the exact month and year of purchase were recorded. Where this information was not recorded, the following assumptions were used to estimate the vehicle purchase year:

- *Vehicles acquired new* were assumed to be acquired in the vehicle's model year. While a portion of these vehicles were purchased when new models were introduced the previous summer or fall (e.g., a 1997 car bought in late 1996) and some new models are purchased the following year (e.g., a new 1996 car bought in 1997), this simplifying assumption was deemed adequate for this level of analysis.

- *Vehicles acquired used.* The year of acquisition was estimated as the midpoint between the model year and the survey year. That is, a respondent owning a 1975 vehicle (purchased used) in the 1995 survey year was assumed to have purchased it in 1985.

Estimate of Vehicle Purchase Price

The initial purchase price or value of the vehicle was estimated using the *Kelley Blue Book* for automobiles, vans, pick-up trucks, and sport utility vehicles, and the *N.A.D.A. Motorcycle Appraisal Guide* for motorcycles.

The following assumptions were used in this analysis:

- *Vehicles acquired new*. The vehicle was assumed to have been purchased at list price.

- *Vehicles acquired used*. The wholesale and retail prices were obtained from the January issue of the appropriate *Blue Book* or *N.A.D.A. Guide* for the estimated year of acquisition. Wholesale prices are what dealerships would pay to purchase vehicles; retail prices are what consumers would pay to purchase vehicles from a dealership. Vehicles sold between two private parties are typically sold at halfway between the wholesale and retail prices. Assuming that half of all used vehicles are sold by dealerships, and half are sold directly by their owners, the purchase price of used vehicles was estimated to be ½(retail price + ½(retail price + wholesale price)).

- *"Average" models*. The vehicle models reported by the NPTS tended to be somewhat more broadly defined than those found in the *Blue Book*. Where this occurred, prices were calculated as the average of the high and low values for all of the versions of a particular model. For example, the NPTS survey identifies a vehicle only as a Ford Taurus, whereas the *Blue Book* provides prices for the Taurus GL Sedan and Wagon, SE Sedan, LX Sedan and Wagon, and SHO Sedan. The high and low values from all of these versions were recorded and the average calculated.

- *"Typical" options*. The *Blue Book* prices are based on standard packages of options, determined by the vehicle's class and model year. All vehicles in this analysis were assumed to have this typical package of options.

Using this methodology, we obtained initial vehicle values for over 90% of the vehicles from the NPTS California sample. Missing values were most often due to a lack of information –whether the vehicle was acquired new or used, the model year, or the make of vehicle. In addition, recreational vehicles, medium-duty, and heavy-duty trucks accounted for less than 30 vehicles in the California sample. A price guide was unavailable for these vehicles. Finally, for model years 1918 through 1964, NPTS labeled the vehicle as model year 1955. There were less than 50 such vehicles in the California sample. Given the lack of precision for the vehicle model year, values were not obtained for these vehicles.

The estimated purchase prices were compared to data presented by the Legislative Analyst (*A Primer on the Vehicle License Fee*, June 17, 1998). This comparison is shown in Table 5. Overall, the data from the NPTS-based estimation are consistent with the Legislative Analyst's report. The estimation based upon the NPTS data has slightly fewer vehicles valued at less than $5,000 and more vehicles valued between $10,000 and $19,999.

Table 5: Comparison of Initial Purchase Price – NPTS and Legislative Analyst Estimation

Purchase Price	*NPTS (1996)*	*Leg. Analyst (1998)*
Less than $5,000	23%	27%
$5,000 - 9,999	23%	23%
$10,000 - 14,999	23%	19%
$15,000 - 19,999	18%	15%
$20,000 - 24,999	8%	8%
$25,000 - 29,999	2%	4%
$30,000 - 34,999	1%	2%
$35,000 and above	2%	2%

With the estimated acquisition year and vehicle value, the 1996 VLF for each vehicle was estimated using the DMV depreciation schedule (Table 6) and the following formula:

Estimated VLF = 0.02 * Vehicle Value (rounded to nearest $100) * Depreciation factor

The average VLF per automobile (including cars, pick-up trucks, vans, and sport utility vehicles) estimated from the NPTS data was $137 in 1996. The average for motorcycles was $55. The Legislative Analyst estimated the average automobile VLF in 1997 as $171 and the average motorcycle VLF as $57. The difference in the average automobile VLF may be due 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 fleets and other fleets. These vehicles are likely to be newer, i.e., registered for fewer years, and would pay a higher VLF.

Table 6: 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 or more	15

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 Franchise Tax Board was used for this part of the analysis. Based upon the FTB's weighted sample of 100,000 California tax returns, average marginal tax rates and percent 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 Franchise Tax Board is a sample of taxpayers, not households. This creates several 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. non-family households or married couples filing separately) may be over-represented in the sample. In addition, businesses filing tax returns are included in the sample. 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 (although some file returns if they are owed a refund on taxes paid).

- *Filing status.* Average marginal tax rates vary with filing status (single, married filing jointly, etc.) of the taxpayer. Because the NPTS does not provide information on tax filing status, household lifecycle categories were used as a proxy. All households with two or more adults were assumed to file taxes as "married couples filing jointly"; all households with one adult and no children were assumed to file as "single" taxpayers; and all households with one adult and one or more children were assumed to file as "head of household" taxpayers. There will, of course, be many exceptions to each of these assumptions, but we believe that this will be a second-order effect that will not change the results significantly.

- *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 from their federal income taxes included the VLF in the amount that they deducted. About 16% of California taxpayers deduct personal property taxes from their income taxes.

Based upon these assumptions, the Franchise Tax Board estimates for average marginal tax rates and percent of households deducting personal property taxes were applied to each household on the basis of household income and family lifecycle. Estimated VLF paid by the household was adjusted as follows:

$VLF_{adjusted}$ = VLF * (1 – (% deducting VLF)*(average marginal tax rate)).

Although data are available from the Franchise Tax Board on the actual amounts of personal property taxes claimed on tax forms, these data were not used because many taxpayers include the Registration Fee and other fees in their itemization.

Potential Sources of Error

The source of data, along with all of the assumptions, contributes to potential errors in the analysis. The overall impact of the error is unknown.

- *Vehicle purchase dates*. The assumption that used vehicles were purchased halfway between their model year and the survey year may systematically underestimate VLF charges. This is particularly true for older vehicles: unless their purchase dates are known, cars built in the early 1970's are all assumed purchased more than 10 years prior to the survey date. That puts them all in the lowest VLF fee categories (15-20%)—whereas in reality, some portion of these vehicles were purchased more recently, resulting in higher VLF rates.

- *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 for two reasons. First, many used vehicles are not in the "excellent" condition that corresponds to the *Blue Book* prices. Second, some purchasers of used vehicles may underreport vehicle sales 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 some price variation due to vehicles having more or fewer "options" than the typical vehicle of a particular model.

- *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, the total VLF paid may be over-estimated, particularly for higher-income households that are more likely to have company-owned or -leased vehicles.

The aggregate effects of these errors are unknown. The most important net effect is expected to be the combination of assumptions about vehicle condition, specific model price, and options packages. Each of these should lead to underestimates of the value of vehicles owned by wealthier families, and overestimates of the value of vehicles owned by poorer families, leading to more level (and therefore more regressive) estimates of the relationship between income and VLF than in reality exist. The magnitude of this error should be small, but is unknown.

Estimate of VLF Payments by California Businesses

The source for the data used in this section is the California Energy Commission, which has developed a sophisticated technique for identifying personal, commercial, and governmental fleets, and applied it to the DMV's entire 1995 database of 21 million operational light-duty vehicles.[18] To estimate payments by rental and other commercial fleets, the CEC's cross-tabulations of vehicle counts by vehicle class and vintage were multiplied by VLF factors derived from our earlier analysis of the NPTS data.

Thirteen vehicle classes were used: cars (mini, subcompact, compact, midsize, large, and sport); pickups (compact and standard); vans (compact and standard); and sport utility vehicles (mini, compact, and standard). Twenty-three vehicle vintages were used: each year from 1975 to 1996, plus a category for all vintages 1974 and earlier. For each of these class/vintage categories, the average VLF paid per vehicle was calculated from our earlier analysis of data from the NPTS.

The CEC also provided aggregate vehicle counts by fleet size and type. The average VLF paid per vehicle ($329 for daily rental fleets and $126 for other commercial vehicles) was applied to these counts to produce the results that appear in Table 4.

This approach relies on several assumptions:

- *For each vehicle class and vintage, the NPTS sample of personal vehicles is roughly representative of the fleet as a whole*. This is somewhat problematic, because most cells in the

[18] We are especially grateful to Robert Cenzer and Gary Occhiuzzo of the CEC for compiling the vehicle counts used in this section. Their method for identifying and classifying fleets relies on analysis of a vehicle body type and license type, owner's name and address, and fleet size and content.

class/vintage matrix contain too few observations to constitute a reliable sample. However, assuming that the errors are nonetheless randomly distributed, the matrix should provide an aggregate picture that approximates the VLF payments of the real-world personal vehicle fleet.

- *For each vehicle class and vintage, commercial vehicles have the same average values as do personal vehicles*. In other words, we have assumed that controlling for vehicle age and size, that personal and commercial vehicles tend to be similar in terms of degree of luxury, condition, and duration of ownership.

- *On average, vehicle values are independent of fleet size*. The very coarse assumption that large fleets resemble small fleets was used to produce Table 4.

Appendix A: Summary of Findings for California Households

		Percent of Households *(weighted)**	Mean Household VLF *(weighted)*	VLF as % of Household Income *(weighted)*
	Number of Cases		2175	1877
	Entire Population	100%	$247	0.61%
Household Income	Under $10,000	7%	$55	1.05%
	$10,000 - $19,999	13%	$114	0.75%
	$20,000 - $29,999	13%	$172	0.67%
	$30,000 - $39,999	13%	$225	0.63%
	$40,000 - $49,999	12%	$251	0.55%
	$50,000 - $59,999	7%	$295	0.53%
	$60,000 - $69,999	6%	$309	0.47%
	$70,000 - $79,999	4%	$324	0.43%
	$80,000 - $99,999	5%	$427	0.47%
	$100,000 and above	6%	$599	0.30%
Race	White	72%	$252	0.57%
	Black	7%	$210	0.61%
	Asian	5%	$297	0.83%
	Other	13%	$227	0.77%
Ethnic Group	Hispanic	19%	$205	0.67%
	Other	81%	$257	0.60%
Lifecycle Category	Single Adult, No Children	18%	$133	0.47%
	Single Adult, Youngest Child 0-15	3%	$113	0.33%
	Single Adult, Youngest Child 16-21	1%	$209	0.69%
	Single Adult, Retired	6%	$89	0.41%
	2+ Adults, No Children	25%	$306	0.73%
	2+ Adults, Youngest Child 0-15	30%	$297	0.64%
	2+ Adults, Youngest Child 16-21	4%	$441	0.82%
	2+ Adults, Retired	11%	$230	0.62%
Age	Average Age <70	89%	$263	0.63%
	Average Age 70+	9%	$118	0.44%
Region (MSA)	Los Angeles-Long Beach	30%	$252	0.61%
	Oakland	5%	$238	0.44%
	Orange County	11%	$285	0.73%
	Riverside-San Bernardino	12%	$230	0.59%
	Sacramento	4%	$271	0.68%
	San Diego	11%	$258	0.68%
	San Francisco	4%	$173	0.52%
	San Jose	4%	$247	0.65%
	Rest of State	19%	$237	0.57%
Area Type	Non-Urbanized	15%	$299	0.63%
	Urbanized	84%	$239	0.61%

*Does not always total to 100% due to data gaps.

Appendix B:
How Well Do VLF Assessments Reflect "Blue Book" Depreciation?

An interesting question is how accurately the legislated depreciation schedule used to calculate the VLF reflects the depreciation in market values of vehicles in the real world.

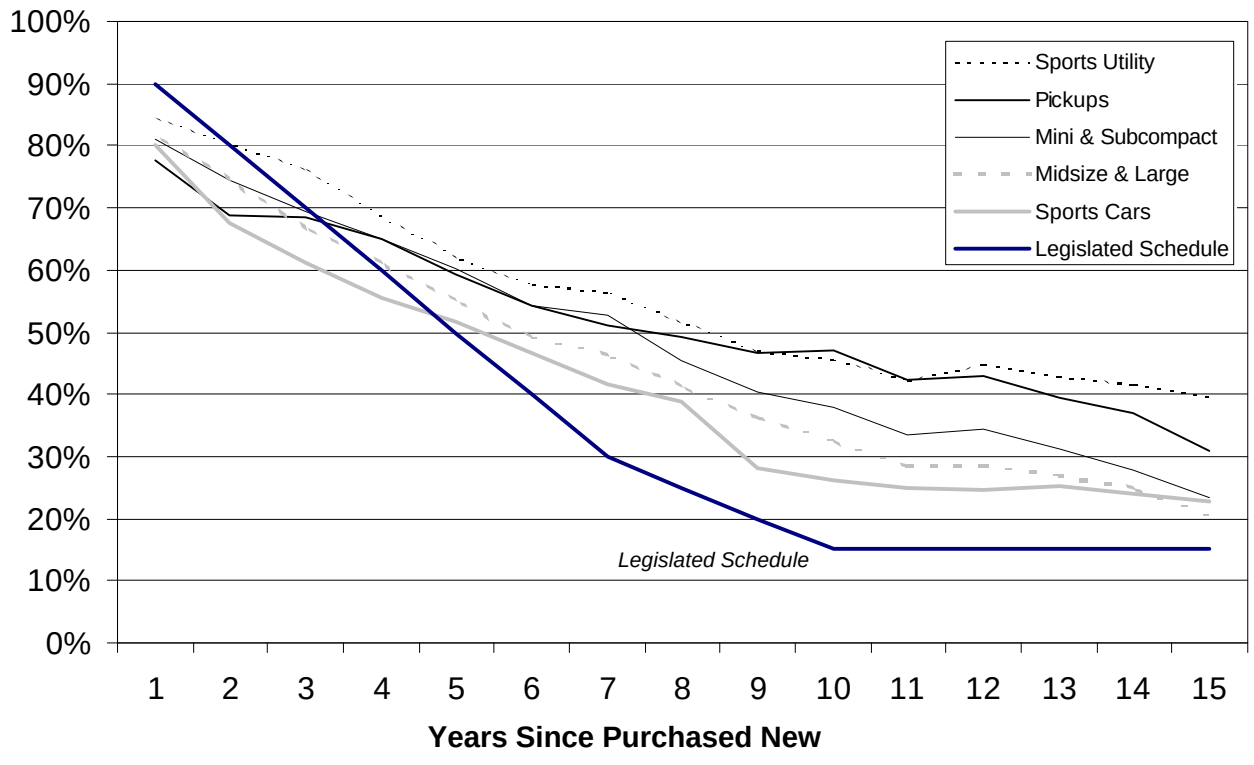
As discussed earlier, the VLF is based upon the reported purchase price of a vehicle at the time it is first registered by its present owner. Each year, the VLF is assessed at 2% of a vehicle's present value, based upon a fixed depreciation schedule (see Table 6 on p. 17). While this method of determining the VLF may be administratively convenient, it raises a number of issues worth examining. First, it can be susceptible to fraud in the reporting of vehicle purchase prices, particularly for used vehicles. It also may not reflect true vehicle depreciation rates, resulting in over- or undertaxation at different stages of a car's ownership cycle. Finally, it may not reflect differences in depreciation rates for different vehicle makes and models.

This section includes an exploratory analysis of some of these issues.

Findings

Vehicle depreciation rates vary significantly across vehicle makes and models, making any generalization about depreciation rates difficult. A rough picture of how these depreciation rates vary can be developed by comparing the legislative VLF depreciation schedule with actual market

Figure 11: Legislated vs. Blue Book Depreciation, for Popular Vehicle Models



values as reported in the *Kelley Blue Book*. Results of this preliminary analysis for 20 popular vehicle models (grouped into five vehicle classes) appear in Figure 11.

Preliminary findings include:

- The legislated depreciation schedule tends to overestimate values for relatively new vehicles, leading to higher than anticipated license fees for new car owners. At the same time, it tends to underestimate values for older vehicles, leading to lower than anticipated license fees for owners of older vehicles.

- Different vehicle types hold their value to varying degrees, leading to systematic differences in how well the depreciation schedule fits book values. Sports cars, midsize, and large cars tend to depreciate faster than pickups and sport utility vehicles, so their VLF payments are high relative to their book values.

This second finding raises the question of whether the VLF schedule should be adjusted to reflect the slower depreciation rates of trucks, since they appear to be undertaxed under the current system. It is not possible to generalize about the equity implications of a blanket shift in the depreciation schedule for trucks, since the characteristics of truck owners vary by truck type. For example, the average income of pickup truck owners is $6,800 lower than for owners of other types of vehicles, whereas the average income of sports utility vehicle owners is $12,600 higher than for owners of other types of vehicles.

These results are provided to stimulate discussion about the present method of calculating the VLF, not to provide authoritative findings about it. The reader should take note of the following caveats:

- Strong conclusions should not be drawn from this analysis about the relative depreciation rates of different vehicle classes. This methodology used an extremely small sample size (n=4) for each class, and the averages used in the chart hide considerable variation within each group. For example, although midsize and large cars are shown to depreciate faster than pickup trucks, the Ford Taurus Wagon actually holds its value significantly better than the Chevy S10 Pickup.

- The makes and models selected for this analysis are atypical in that they represent the most popular models in each class; it is therefore not surprising that they tend to hold their value over time. Certain less popular models (such as the Jaguar XJ-6 or the Lincoln Towncar) depreciate much faster.

- Many vehicles on the road do not meet the *Kelley Blue Book*'s strict definition of "good" condition, and therefore have lower values than those reported in the book.

Methodology

For each vehicle class, four "representative" makes and models were selected from among the most popular vehicles owned by California residents (according to the NPTS).[19] For each of 15 model

[19] Mini & Subcompact makes and models used for this analysis included: Honda Civic DX Hatchback; Nissan Sentra XE Sedan; Toyota Tercel 2D Sedan; and Geo Prizm Sedan. These model families accounted for approximately 32% of the mini and subcompact vehicles in the NPTS sample. Midsize & Large: Ford Taurus GL Wagon; Cadillac De Ville Sedan; Toyota Camry LE Sedan; Oldsmobile Cutlass Supreme Coupe (32%). Sport Cars: Ford Mustang GT Hatchback; Toyota Celica GT Liftback; Chevy Camaro Coupe; Nissan 300ZX 2+2 Coupe (53%). Pickups: Nissan

years (vintages), the vehicles' original list prices were compared with their 1998 values as reported in the *Kelley Blue Book* ("retail good") to find their depreciation to date. The annual depreciation values for the four "representative" vehicle models were then averaged to estimate the depreciation rate for the class as a whole, shown in Figure 11.

Every attempt was made to ensure continuity in the series of vehicles used for this analysis. In some cases, vehicles makes and models were consistent throughout the 15-year period. In other cases, makes and models changed. This analysis only included models whose evolution could easily be traced over time (e.g., the Ford Bronco II into the Ford Explorer).

Short Bed; Toyota Tacoma Xtra Cab; Ford F150 ½ Long Bed; Chevy S10 Extra Cab Short Bed (34%). Sport Utility: Toyota 4Runner SR5; Chevy S10 Blazer; Ford Explorer V6; Jeep Wrangler (50%).

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