Vehicle Ownership, Vehicle Acquisitions and the Growth of Auto Leasing:

Evidence from Consumer Surveys

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Abstract

This paper documents the basic features of data on motor vehicles from the Federal Reserve Board's Survey of Consumer Finances and the Bureau of Labor Statistics' Consumer Expenditure Survey. Despite some methodological differences between the two surveys, we find that they yield strikingly similar pictures of households' vehicle holdings. The survey data are also quite consistent with population estimates of vehicle stocks obtained from other sources. Finally, we document the growth of auto leasing by consumers, and find little evidence for the commonly-held view that liquidity constraints are an important motivation for leasing.

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Motor vehicles play a central role in the modern American lifestyle. The vast majority of workers travel to work by private vehicle. Motor vehicles are one of the most widely-owned assets, with over 85 percent of U.S. households owning one or more vehicles in 1992. Costs related to vehicles--vehicle purchases, operating expenses and repairs, insurance--account for a sizable part of the typical household's budget. Loans related to vehicle purchases are one of the most common forms of household borrowing, and monthly payments are important in expenditure patterns. For all these reasons, developments related to motor vehicles are important for understanding households' living standards.

The past decade has seen several trends of interest related to motor vehicles. New car prices have increased significantly faster than earnings, encouraging households to keep vehicles for longer periods. Auto leasing has grown substantially, with leases now estimated to represent as much as one in three new car acquisitions by consumers. There have also been significant changes in vehicle financing, including the growth of specialized auto lenders and greater competition for customers based on loan terms.

While there are several sources of information on motor vehicles, few provide much detail on vehicles owned by households. The Federal Reserve Board's Survey of Consumer Finances (SCF) and the Bureau of Labor Statistics' Consumer Expenditure Survey (CE) collect detailed information on motor vehicles held by households, as well as the timing and financial terms of households' acquisitions and disposals of vehicles. This article documents the basic features of the data on motor vehicles in the SCF and CE. The first section compares the SCF and CE data for 1992, the latest year for which final data are available for both surveys. We find that, despite some methodological differences between the two surveys, they yield strikingly similar pictures of households' vehicle holdings. The second section compares the survey data with figures on vehicle stocks obtained from other sources, primarily data on registrations. Although the comparisons are not straightforward, the survey data are quite consistent with population estimates of vehicle stocks. This confirms the value of using the survey data to analyze consumers' vehicle holdings. Finally, we present evidence on the growth of auto leasing in recent years--to our knowledge, the first analysis of this phenomenon using representative survey data. We conclude that the survey data do not support the commonly held notion that liquidity constraints are an important motivation for leasing.

Vehicle Ownership, Age and Means of Acquisition

While the SCF and CE are both based on representative samples, there are some notable differences in the surveys' designs. The Board's Survey of Consumer Finances is conducted every three years, interviewing about 4,000 households. Roughly three-quarters of the households come from an area-probability sample, while the remainder come from a high-wealth oversample. The Consumer Expenditure Survey, run by the Bureau of Labor Statistics, is conducted quarterly and interviews roughly 5,000 households. The sample is a rotating panel, in which a cohort of households is interviewed for five quarters and then replaced with a new cohort. The differences in design give the two surveys different strengths for the analysis of vehicle holdings. On one hand, the SCF oversample makes it well suited for analysis of narrowly-held assets, which turns out to be important for auto leasing (see Section 3). On the other hand, the quarterly frequency of the CE permits analysis of changes in vehicle stocks over the business cycle.

To compare the vehicle data from the two surveys, we use the 1992 SCF data, mostly collected during the third quarter of 1992, and the CE data from the same period. "Vehicles" are defined as cars, jeeps, vans, minivans, pickups, trucks, and sport utility vehicles, currently in running condition.[1] The data are weighted using the population weights provided in each survey.

As shown in table 1, the SCF and the CE provide very similar pictures of vehicle ownership by households. According to the SCF, 86.2 percent of households owned vehicles, compared to 85.0 percent in the CE. Ownership tends to rise with households' income and financial assets. Ownership increases with age until a peak in the 45-54 age bracket and declines thereafter.

In both surveys, the average number of vehicles per household was around 1.8 in 1992. The average number of vehicles owned rises steadily with the household's income and financial assets, and first rises then falls with the age of the household's head. The average age of vehicles owned by households was around 8.0 years in both the SCF and the CE.[2] Average ages of vehicles tend to be higher among households with relatively low incomes and also among those with relatively low financial assets.

Both surveys ask whether each vehicle was new or used when it was first acquired. As shown in table 2, the SCF shows that 43.6 percent of all vehicles owned by households were new when first acquired. The figure from the CE is very similar, at 42.6 percent. Of vehicles bought used, the average age at acquisition was 6.5 years in the SCF, and 6.6 years in the CE. In both surveys, roughly one-third of all households had only vehicles that were new when first acquired; 44 to 45 percent had only vehicles that were used when first acquired; and the remainder had a mixture of the two. Not surprisingly, the share buying only new vehicles rises with income and financial assets; it also rises with age. However, even among households in the highest income and asset brackets, used vehicles are not uncommon. For example, 45 to 50 percent of households with incomes of $100,000 or more had at least one vehicle that was used when first acquired.[3]

Comparison with Data on Vehicle Registrations

To assess the reliability of the survey data, it is useful to compare figures on vehicle stocks from the survey data with figures from other sources. The two most widely used series on vehicle stocks are essentially population counts obtained from registrations data. The Federal Highway Administration (FHA) publishes data on the total number of cars and trucks registered over the course of the year. R.L. Polk & Co. publishes data on the number of cars and trucks in operation as of July 1. Neither series is directly comparable to the survey data, because the registration-based counts include both household and business vehicles. In contrast, the Bureau of Economic Analysis (BEA) constructs an estimate of the stock of cars held by households for personal use, based on the Polk data and other sources. However, the BEA figure does not include trucks, leased vehicles, or cars used by households for both personal and business purposes, and as such captures only part of the vehicle stock held by households.

Table 3 shows the estimates of the total stock of vehicles from the registrations-based data, along with the estimates of the stock of vehicles held by households from the SCF and CE. The FHA, Polk and BEA data are taken from periods as similar as possible to the survey periods of the SCF and CE. According to the FHA data, 187.0 million private vehicles were registered over 1992. The Polk data show 181.5 vehicles in operation as of the middle of that year. As discussed in Greenspan and Cohen's (1994) detailed analysis of data on vehicle stocks, the Polk figure overstates the vehicle stock due to scrappage over the course of the year.[4] Accounting for this problem results in an estimate of 172.8 million for the total vehicle stock in 1991.

According to the CE, households held 156.4 million vehicles not exclusively used for business in the third quarter of 1992. The SCF shows households holding 153.5 million such vehicles, in roughly the same period. The CE and SCF estimates are close to those of other periodic surveys that can be used to estimate households' vehicle holdings. Notably, the estimate from the American Housing Survey (AHS) of the U.S. Bureau of the Census is 160.8 million for 1991, while the estimate from the U.S. Energy Information Administration's Household Vehicles Energy Consumption for the same year is 151.2 million.[5]

Thus, the SCF and CE estimates are quite similar to each other and to estimates from other consumer surveys, although they are 17 to 20 million vehicles below the careful population estimates of Greenspan and Cohen (1994). While we expect the SCF and CE figures to be lower because they cover household vehicles only, it is difficult to verify that business vehicles fully account for the difference. Neither the FHA nor Polk distinguish between household and business vehicles in estimating vehicle stocks.[6] However, the BEA series on cars owned by households provides some basis for comparison with the survey data.[7] For 1992, the BEA estimates that households owned 111.8 million cars not used for business purposes. The comparable figure from the 1992 SCF is very close, at 106.3 million (not shown in the table). The figure for the CE is somewhat higher at 122.2 million, probably due to the inclusion of vehicles with some business use. Thus, to the extent that we can make valid comparisons across data sources, the estimates from the consumer surveys appear to be quite consistent with other information on households' vehicle holdings.

The Growth of Auto Leasing

While the growth of auto leasing in recent years is well known, there has been little systematic investigation of the prevalence of leasing by consumers. A private consulting firm, CNW Marketing/Research, estimates the total number of vehicles leased by consumers, based on a sample of insurance records.[8] Because CNW does not release the details of its methodology, the representativeness of its sample is not clear. Moreover, the CNW data contain only limited information on the characteristics of households, and so do not provide much insight into the reasons that households lease. This makes it difficult to assess the implications of the growth of leasing for new car production and sales.

In contrast, the SCF and CE have well-documented representative samples, and both surveys contain detailed information on household characteristics. However, there are two problems with the survey data on leasing. First, leasing is still a relatively rare phenomenon (as shown below), so the survey samples contain a relatively small number of households who are leasing a vehicle.[9] Second, the 1992 SCF asked respondents to report vehicles leased for personal use, excluding leased vehicles used for business purposes. The exclusion of business-related leasing may lead to some underestimation of the prevalence of leasing by households in the SCF, especially if leasing is favored by self-employed individuals. In contrast, the CE asks about leased vehicles that have any personal use, including vehicles used for both personal and business purposes.

The survey data confirm that leased vehicles were a sizeable percentage of new vehicles acquired by households in the early 1990s. According to the SCF, leased vehicles accounted for 21.5 percent of vehicles less than two years old in 1992.[10] CNW estimates that, in recent years, one-fifth to one-third of new vehicles acquired by consumers were leased, rather than bought. There are two reasons why the SCF figures lie in the lower end of the range provided by the CNW data. First, the SCF and CNW employ different definitions of a 'consumer lease.' Whereas the 1992 SCF includes vehicles leased for personal use only, CNW also includes business vehicles that might sometimes be used for personal reasons.[11] Second, the sample of insurance records used by CNW may be unrepresentative in some way that overstates the prevalence of leasing. For example, leasing rates may be relatively high among vehicles insured through large insurance companies in major cities. Without additional information on CNW's methodology, it is difficult to determine the potential for bias of this type.

According to the SCF data, 3.0 percent of households held a leased vehicle in 1992 (table 4). While one might expect this figure to be higher in the CE, given its inclusion of business-related leases, the CE shows a smaller share of households leasing vehicles, at 1.9 percent. The discrepancy is likely due to the sample designs of the two surveys. Relatively wealthy households tend to be underrepresented among respondents to surveys like the CE, which use standard samples to represent the population as a whole; consequently, ownership of assets held disproportionately by wealthy households tends to be underestimated.[12]

According to both surveys, leased vehicles are most common among households with relatively high levels of income (table 4). In the 1992 SCF, almost 10 percent of households with incomes over $100,000 leased a vehicle; the comparable figure in the CE was 12.0 percent. The SCF probably estimates the prevalence of leasing more accurately, because it is less likely to underrepresent the relatively well-off.

The survey data on auto leasing provide some insight into the types of households that are most likely to lease. As mentioned, both surveys show the highest leasing rates among households with annual incomes exceeding $100,000. Leasing was also more common among households headed by persons in the 35-54 age brackets. According to the SCF, leasing was more common among households with relatively high levels of financial assets, though there were not appreciable differences related to asset holdings in the CE.[13]

The CE data can also be used to document the growth of leasing since 1992 (table 5). The share of households leasing a vehicle rose from 2.0 percent in 1992 to 2.6 percent in 1994.[14] Leasing grew most rapidly among households with incomes exceeding $100,000, with the share of such households leasing a vehicle rising from 11.4 percent in 1992 to 19.2 percent in 1992. The leasing rate also increased among households in the 35-54 age brackets, and among those with relatively high levels of financial assets.

According to the CE data shown in table 6, the terms of financing for purchased vehicles are substantially different from those for leased vehicles. Fewer leasing transactions involve a down payment, and among transactions where a down payment was made, down payments for leased vehicles are lower than those for purchased vehicles. Similarly, fewer leasing transactions involve a trade-in: For example, in the first half of 1994, 44 percent of leasing transactions involved a trade-in, compared with 50 percent of vehicle purchases. Also, for transactions involving a trade-in, the value of the trade-in is lower for transactions involving leasing.

Because the initial payment for a leased vehicle tends to be lower than that for a purchased vehicle, it is sometimes suggested that liquidity constraints dominate the decision to lease. While the decision to lease certainly warrants further study, the survey data do not appear to support the idea that liquidity contraints are the dominant factor. Most households who lease have relatively high levels of income and assets, and while some may lack the cash required to buy a relatively expensive vehicle, many would seem to be able to purchase a reasonable car at traditional lending terms.[15] Further analysis of the survey data may provide additional insights into this question.

Summary and conclusions

To summarize, surveys show strikingly similar patterns in vehicle ownership, including a high average age of vehicles held by households, and a strong relationship between income and the likelihood of having used cars. The survey data also match well with aggregate data, confirming their value for the analysis of the determinants of motor vehicle demand. Finally, we provide some evidence on the growth of auto leasing, and show that it has tended to be concentrated among households with relatively high incomes.

Table 1. Vehicle Ownership by Households, SCF and CE, 1992

	Percent of households owning a vehicle		Average number of vehicles		Average age of vehicles (years)	
	SCF	CE	SCF	CE	SCF	CE
All Households	86.2	85.0	1.8	1.7	7.9	8.0
By HH Income ('92 $)						
Below $10K	55.8	67.3	1.3	1.5	11.4	8.8
$10-25K	88.0	85.4	1.5	1.5	9.1	9.1
$25-50K	93.6	95.9	1.8	1.8	7.5	7.9
$50-100K	96.7	96.6	2.1	2.1	6.7	6.4
$100K or more	96.6	93.1	2.1	2.1	5.9	7.0
By Age of HH head (yrs)						
Under 35	84.8	82.5	1.7	1.6	7.8	7.9
35-44	88.7	88.2	1.8	1.9	7.8	7.8
45-54	92.5	91.2	2.0	2.0	7.5	7.5
55-64	86.9	87.5	1.9	1.9	7.7	8.2
65-74	86.2	87.1	1.6	1.6	8.1	8.6
75 and over	72.4	69.8	1.3	1.4	9.9	9.3
By Fin. Assets ('92 $)						
Below $500	71.8	72.1	1.6	1.6	9.9	9.9
$500 - 2,500	91.2	90.8	1.7	1.7	8.0	8.1
$2,500 -10,000	92.6	94.0	1.9	1.9	7.4	7.1
$10,000 or more	93.5	92.8	1.9	1.9	6.5	7.5

Table 2. New vs. Used Vehicles, SCF and CE, 1992

	Vehicles bought new as % of all vehicles owned by group		Avg age of groups' used vehicles at time of acquisition		Percent of households: Buying only new vehicles		Percent of households: Buying only used vehicles		Percent of households: Buying new and used vehicles	
	SCF	CE	SCF	CE	SCF	CE	SCF	CE	SCF	CE
All Households	43.6	42.6	6.5	6.6	34.8	32.6	44.0	45.1	21.2	22.3
By HH Income ('92 $)										
Below $10K	25.7	38.8	7.8	6.8	23.5	30.4	70.9	53.6	5.6	16.1
$10-25K	28.6	32.4	6.9	7.2	27.7	27.1	61.7	58.7	10.6	14.2
$25-50K	45.6	42.1	6.3	6.6	38.3	34.7	37.0	41.8	24.7	23.5
$50-100K	52.9	53.6	5.7	5.2	38.0	37.3	25.9	24.3	36.1	38.4
$100K or mor	66.0	64.1	5.1	7.7	54.1	49.7	18.1	17.9	27.8	32.4
By Age of HH head (yrs)										
Under 35	37.9	33.7	7.3	7.7	29.8	26.4	50.7	57.0	19.6	16.5
35-44	42.7	40.5	7.0	6.6	31.7	27.9	43.2	44.2	25.1	27.9
45-54	41.9	42.6	6.0	5.8	29.3	28.1	43.9	42.1	26.8	29.8
55-64	46.7	46.0	6.1	6.1	38.3	34.7	40.8	40.2	21.0	25.1
65-74	50.9	52.1	5.6	6.3	45.1	45.1	38.1	36.7	16.8	18.2
75 and over	54.3	60.6	4.6	5.0	50.3	54.5	39.1	33.9	10.3	11.6
By Fin. Assets ('92 $)										
Below $500	22.7	20.1	7.9	8.0	19.0	14.6	70.6	72.5	10.4	13.0
$500-2500	41.9	37.3	6.3	6.4	35.0	27.6	44.4	49.1	20.6	23.3
$2500-10000	47.0	47.5	5.7	5.6	36.7	37.8	35.8	34.2	27.6	27.9
$10000 or more	60.7	60.4	5.2	6.4	49.8	48.0	23.0	24.4	27.2	27.5

Table 3. Comparison of Industry-Level and Survey Data on Aggregate Vehicle Holdings, 1992

Data source	Coverage	Time period	Millions of vehicles
Federal Highway Administration	Registrations of privately-owned vehicles (household and commercial)	Year ending Dec. 1992	187.0
Polk	Vehicles in operation	July 1992	181.5
Greenspan and Cohen	Vehicles in operation	1991	172.8
Consumer Expenditure Survey	Vehicles held by households not exclusively used for business purposes	1992-Q3	156.4
Survey of Consumer Finances	Vehicles held by households not used for business purposes	1992, mostly Q3	153.5
American Housing Survey (in Greenspan and Cohen)	Vehicles in operation held by households	1991	160.8
Household Vehicles Energy Consumption	Vehicles held by households	1991	151.2
Bureau of Economic Analysis	Car stocks held by households for personal use	1992	111.8

Sources: American Automobile Manufacturers' Association, Motor Vehicle Facts and Figures, 1994; A. Greenspan and D. Cohen, "Motor Vehicle Stocks, Scrappage, and Sales," 1994; authors' calculations from the CE and SCF; U.S. Department of Commerce, *Statistical Abstract of the United States*, 1994; and Bureau of Economic Analysis.

Table 4. Vehicle leasing for personal use, SCF and CE, 1992

	Percent of HHs leasing a vehicle		Among HHs with a leased vehicle: Avg number of leased vehicles		Among HHs with a leased vehicle: Average age of leased vehicles (yrs)	
	SCF	CE	SCF	CE	SCF	CE
All Households	3.0	1.9	1.1	1.1	1.6	1.5
By HH Income ('92 $)						
Below $10K	*	0.8	*	1.1	*	1.2
$10-25K	0.9	0.8	1.2	1.2	2.3	0.8
$25-50K	3.8	1.5	1.1	1.0	1.7	2.2
$50-100K	4.3	3.9	1.1	1.1	1.4	1.4
$100K or more	9.8	12.0	1.2	1.2	1.3	1.8
By Age of HH head (yrs)						
Under 35	3.2	1.5	1.0	1.1	1.8	1.8
35-44	4.2	2.9	1.1	1.0	1.4	1.3
45-54	3.8	2.6	1.3	1.2	2.0	2.1
55-64	3.1	2.4	1.1	1.1	1.0	1.0
65-74	1.0	*	1.0	*	*	*
75 and over	0.1	*	1.0	*	1.4	*
By Fin. Assets ('92 $)						
Below $500	1.0	*	1.0	*	2.6	*
$500-2500	2.8	2.6	1.2	1.1	1.9	1.7
$2500-10000	3.7	2.7	1.0	1.1	1.4	1.6
$10000 or more	5.1	2.7	1.1	1.1	1.3	2.0

* = fewer than 5 observations.

Table 5. Vehicle leasing for personal use, CE, 1992-1994

	Percent of HHs leasing a vehicle			Avg number of leased vehicles			Average age of leased vehicles (yrs)		
	92	93	94(p)	92	93	94(p)	92	93	94(p)
All Households	2.0	2.1	2.6	1.1	1.2	1.3	1.6	1.6	1.8
By HH Income ('92 $)									
Below $10K	1.0	1.1	1.7	1.1	1.2	1.2	1.4	1.4	1.6
$10-25K	1.0	0.8	0.7	1.1	1.2	1.4	1.2	1.6	2.1
$25-50K	1.6	1.8	1.5	1.0	1.2	1.2	1.8	1.7	2.1
$50-100K	4.1	4.5	6.2	1.1	1.2	1.3	1.7	1.8	1.8
$100K or more	11.4	13.4	19.2	1.2	1.3	1.3	2.0	1.4	1.5
By Age of HH head (yrs)									
Under 35	1.7	1.4	1.7	1.0	1.1	1.2	1.6	1.6	1.9
35-44	2.9	3.3	4.0	1.1	1.2	1.2	1.4	1.6	1.5
45-54	2.6	3.3	4.6	1.2	1.3	1.3	2.1	2.0	2.0
55-64	2.4	2.4	2.3	1.1	1.2	1.5	1.5	1.0	1.6
65-74	0.7	0.8	1.4	1.3	1.1	1.3	1.1	0.8	2.1
75 and over	0.5	*	*	1.1	*	*	2.0	*	*
By Fin. Assets ('92 $)									
Below $500	0.4	0.7	0.8	1.0	1.1	1.1	1.4	1.5	1.7
$500-2500	2.8	1.6	2.8	1.0	1.2	1.6	1.8	1.8	1.6
$2500-10000	3.2	4.8	5.2	1.1	1.2	1.3	1.7	1.9	2.4
$10000 or more	2.5	2.4	4.9	1.1	1.1	1.1	1.3	1.4	1.6

* = fewer than 5 observations.
(p) = preliminary

Table 6. Financing Terms in Leasing vs. Purchase Transactions

	Collection Period				
	92:1	92:2	93:1	93:2	94:1
1. Transactions involving a down payment (pct)					
Purchase	70.1	67.9	72.7	65.6	69.1
Lease	27.1	32.6	60.1	57.1	51.0
2. Average Down Payment (92$)					
Purchase	2903	2616	2702	3371	3064
Lease	1820	1659	2595	2235	1492
3. Transactions involving a trade-in (pct)					
Purchase	52.2	59.8	58.8	58.4	50.4
Lease	37.9	25.0	33.8	38.8	44.0
4. Average trade-in amount (92$)					
Purchase	4020	5174	6273	4667	5493
Lease	3919	4612	2264	3016	4685

Footnotes

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1. While the surveys also collect data on other types of vehicles (such as recreational vehicles, motorcycles, and boats), our analysis is confined to standard passenger vehicles.

2. According to data from R.L. Polk & Co., the average age of passenger cars in use was 8.1 years in 1992. See American Automobile Manufacturers Association, *Motor Vehicle Facts and Figures*, 1994, p. 36.

3. Conceivably, some antique and other collectors' cars may be included in reported vehicle holdings if they are in active use. However, such cars are relatively uncommon.

4. See Alan Greenspan and Darrel Cohen, "Motor Vehicle Stocks, Scrappage and Sales," mimeo, Federal Reserve Board of Governors, August 1994.

5. Greenspan and Cohen, ibid., discuss in detail the periodic surveys covering vehicle stocks. See also U.S. Department of Commerce, *Statistical Abstract of the United States* (Washington, D.C.: U.S. Government Printing Office,1994), pp. 637-638. The differences in estimates across consumer surveys likely reflect small differences in the types of motor vehicles recorded and sampling and nonsampling error.

6. Figures on sales of new vehicles are regularly decomposed into purchases by consumers and businesses.

7. The BEA does not estimate the stock of trucks held by households.

8. *Automotive News* publishes aggregate figures on new leases from R.L. Polk & Co. However, these figures cover leasing by both businesses and consumers.

9. For example, among sample households in the 1992 SCF, there were 172 households leasing a vehicle, versus 101 households in the CE sample for 1992-Q3.

10. In contrast, leased vehicles represented only 2.2 percent of the total *stock* of vehicles held by households in the 1992 SCF.

11. Data from the 1995 SCF will shed light on the importance of this difference, since the 1995 survey included a question on leasing for business purposes.

12. See Richard Curtin, F. Thomas Juster, and James Morgan, "Survey Estimates of Wealth: An Assessment of Quality," in Robert Lipsey and Helen Stone Tice, eds., *The Measurement of Saving, Investment and Wealth* (Chicago: University of Chicago Press for the NBER, 1989).

13. "Financial assets" include checking, savings, money market and call accounts. The CE asks only a few questions on asset holdings, so its data on wealth are not of the same quality as the data on expenditures.

14. The figures in table 5 for 1992-93 are based on CE data for the year; thus, the 1992 figures differ somewhat from table 4, which uses data from the third quarter only. Figures for 1994 are based on CE data collected in the first half of 1994--the most recent data available--and are therefore preliminary.

15. Relatively expensive models tend to be overrepresented among leased vehicles. For example, in the 1992 SCF, the median blue book value of a leased vehicle less than two years old was $14,900, compared to $11,500 for a purchased vehicle of similar age.