Errors in Self-reported Mileage for California Vehicles

Don McNeill

Policy Research Division

California Department of Insurance

September 21, 2006

Abstract

This study determined the level of accuracy in customer self-reporting of their annual mileage. This was achieved by comparing individual vehicle self-reported estimates from the customer versus the corresponding actual annual average mileage computed from two California Bureau of Automotive Repair smog check odometer readings for the same vehicle.

Self-reported annual vehicle mileage often understates actual annual mileage, but almost half of the vehicles did not understate vehicle mileage. Most (65 percent) vehicles estimate actual mileage within 5,000 miles. While 44 percent of the vehicles had no understatement of actual mileage, 30 percent had a low understatement (error of 5,000 or less), an additional 15 percent had a high understatement (error between 6,000 and 10,000) and still another 11 percent had a very high understatement (error over 10,000 miles).

Vehicles with particularly low self-reported mileage often understated actual mileage, and by a lot. Both self-reported and actual mileage distributions varied significantly by company, suggesting different marketing and mileage validation processes. Some zipcodes regardless of company have particularly high percentages of large (greater than 5,000 miles) understatement of actual mileage. These facts suggest that perhaps low self-reported mileage vehicles and some zipcodes require special attention. These facts indicated that self-reported mileage can be made a more useful rating factor by improved validation techniques, such as required odometer readings and closer review of small mileage estimates.

Some correlation (0.248, $p<0.001$) was found between understated mileage and pure premium (loss) at the zip code level. Correlation between understated mileage and premiums was negligible (0.009, $p<0.001$) for individual vehicles.

Acknowledgements

The author wishes to thank Jose Lopez, Scharlene Oxendine, Teresa Smothers, Jose Lopez-Alvarez, Ray Jones and Jim Allen at the California Bureau of Automotive Repair (BAR) for their assistance in obtaining and using SMOG Check file data. The author recognizes the work that Lyn Hunstad at the California Department of Insurance (CDI) provided in procuring the BAR SMOG files. Errors are the sole responsibility of the author. The views expressed in this report are those of the author and do not necessarily represent the position or policy of CDI.

Introduction

Proposition 103 made mileage one of three mandatory rating factors in setting premiums. Some insurance companies have taken to requiring odometer readings at time of renewal as a way to get better mileage data.

This study tests the hypothesis that there is a significant difference (with a bias of underreporting actual mileage) between consumer self-reported mileage and actual mileage calculated from odometer readings. The difference is hypothesized to occur due to faulty consumer memory or fraud. This study also investigates whether the degree of understating mileage is greater in some specific zipcodes or for some insurance companies. Such variance might point to possible fraud or weak underwriting practices.

Obtaining accurate annual mileage figures will also help solidify the relationship between mileage and risk of loss. This is important to those advocating insurance paid by mileage. It will also speak to the mileage concerns of Proposition 103, and the degree to which mileage is important in determining risk of loss to the insurance companies. It can help address the concerns of the National Organization of Women who claim women, the poor and the elderly drive less (lower mileage) and should be charged lower premiums accordingly.

If significant underreporting, or inconsistent reporting, in self-reported mileage is occurring, it may indicate that some regulatory action is required to obtain more accurate mileage estimates. While insurers can already require customer odometer readings, another approach might be to obtain SMOG odometer readings as in this study. If underreporting is occurring only in certain geographic pockets, this may call for targeted policy initiatives.

Literature Review

Finnegan (1997) reported that underwriting audits for different auto carriers revealed annual mileage underreporting error rates between 25 to 60 percent. One carrier achieved over an 80% decline in mileage reporting errors when sales agents were audited for rating accuracy. The author suggested using odometer readings from periodic smog readings in some states. He further stated that requiring odometer readings when applications are submitted, when a policy is renewed and when a claim is processed should make the misreporting of annual mileage impossible.

Later, Finnegan (2002) estimated rating error using a sample of over a million vehicles for multiple carriers, and compared multiple odometer readings with interview data concerning annual mileage. The percentage of vehicles in the less than 8,000 mile category dropped from 50 percent when rated (that is, as reported to the company) to 35 percent when based on odometer readings. Conversely, the percentage of vehicles in the greater than 16,000 mile category increased from roughly 15 percent when rated to 30 percent when based on odometer readings. The net effect was estimated to result in a 1.6 percent rating error in premiums.

The National Underwriter (1989) reported that Pennsylvania's Commonwealth Court dismissed a suit brought by the National Organization of Women (NOW). The suit alleged that women

drivers were overcharged even though they drive less than men. The court essentially agreed with Pennsylvania's insurance department that although women drive fewer miles than men, accident severity and accident risk were not proven proportional to miles driven.

Best Newswire (2002) described a pilot program approved by the Texas Legislature and Insurance Commissioner. In this optional program, insurers may audit the odometers of covered automobiles at any time. Justification for the program is based on lowering premiums for those who drive less, such as senior citizens, car poolers, multiple car families, and users of public transportation. The program could reduce the number of uninsured motorists (estimated at 20 to 25 percent of Texas drivers) and make coverage more affordable for low income drivers. The state's economy and environment should benefit from reduced traffic, based on studies in British Columbia where a 10 percent drop in traffic was attributed to a similar program.

Murray and Durning (2001) reported that Progressive Insurance has been testing a system to measure mileage. Vehicles carry mini-processors that use GPS (global positioning satellite) technology to record time and distance driven. Consumer response has been positive and Progressive is preparing a nationwide rollout of the policy.

Koslowski and Mathewson (2001) from the Oregon Environmental Council argued that equity required reducing cross subsidies of high mileage drivers by lower mileage drivers. For example, women drive half as much as men on average and therefore pay on average about twice as much as men for the same protection. The authors reported that, on average, all drivers who use Progressive's mileage option save an average of 25 percent. Koslowski and Mathewson also maintained that dangerous drivers would have the greatest incentive to reduce driving because they have the highest per mile insurance rates. In other words, proper application of accurate mileage data could facilitate beneficial policy objectives by targeting the group or groups (the dangerous drivers) that we want to get off the road. Lessening miles driven will also result in less air pollution and less contaminated runoff from the roads. Koslowski and Mathewson maintained that from an actuarial perspective, pricing by mileage is desirable "because within each risk class insurance compensation is well correlated to vehicle use." Furthermore, for participating insurance companies, "long-run profits are not expected to decrease."

Data Sources

Annual mileage estimates in this study for vehicles came directly from the 1998 Automobile Historical Loss Analysis (AHLA) data call for seven major auto insurance companies. These companies represented over 55% of the California auto insurance market in 1998. These mileage estimates in turn were self reported by consumers and were prospective for the coming year.

Actual annual mileage was calculated from the 1997 and 1999 smog check odometer readings obtained from the California Bureau of Automotive Repair (BAR) for the same vehicle. The difference in odometer readings was divided by the decimal number of years, based on the test dates, between smog checks. Sources at the BAR expressed concern about the accuracy of the odometer readings because no quality controls are in place, and the testers had no incentives to fill this data in correctly. Of course, the testers had no incentive to incorrectly record odometer readings, and the standard industry practice is to record odometer readings for automotive

repairs. After omitting some vehicles with negative or large outlier differences (of a hundred thousand miles) between the 1997 and 1999 odometer readings, the remaining vehicles exhibited what closely approximated a normal distribution of mileage figures. This was corroborated with three separate statistical tests of normality which yielded a p-value of .01 or less.

Use of smog data presented some other limitations. In 1999, new cars less than five years old were exempt from smog testing, as were vehicles with model years prior to 1973. In 1997, model years prior to 1966 were exempt. Not all drivers were diligent about having their vehicles smog tested. Some vehicles were not tested in both 1997 and 1999, presumably because of migration into or out of California. Also, because smog testing is required every other year, vehicles tested in even years, such as 1998, were omitted from this study.

The study made the assumption that omitting vehicles that were either not smog tested in California both years, or not insured with one of the major insurance companies, did not bias the results significantly. In other words, any underestimating of mileage did not differ between reporting to large insurance companies versus smaller insurance companies. Not withstanding, companies with their own odometer checks may have more accurate reporting than those companies that do not.

Vehicles not smog tested both years are typically new vehicles and vehicles changing states. It was assumed that owners of these vehicles are not necessarily more or less predisposed to underreport mileage.

It was further assumed that driving patterns from year to year have not varied significantly since the 1997 to 1999 study period and consequently still apply. For example, although declines in post September 11 tourist travel or recent gas price increases may have resulted in significant overall mileage decreases, these are assumed to be temporary fluctuations.

The AHLA data was matched with the BAR Smog data using the vehicle identification number (VIN). The resulting file contained 7,763,408 records with vehicles matched on both files. With the exception of correlation analysis between underreported mileage and pure premiums (losses), the findings are based solely on these matched records.

The pure premium data by zipcode comes from the Department's Statistical Analysis Division. Pursuant to Insurance Code Section 11628 (a) this Division collects summary data on the exposures, losses and number of claims by zipcode for every private passenger auto insurer operating in California. As part of a study titled "Auto Insurance in California: Differentials in Industrywide Pure Premiums and Company Territory Relativities between Adjacent Zipcodes" the zipcode data was credibility adjusted to account for zipcodes with relatively few claims.

Findings

Self-reported Annual Mileage

Table 1 shows that for the combined seven auto insurance companies, six percent of the customers self-reported annual vehicle mileage estimates fell below 3,000 miles, while 12 percent self-reported mileage between 3,001 and 5,000. The largest category of customers (27 percent) estimated driving between 5,001 and 8,000 miles annually. One large company drove this result since exactly 50 percent (appears in bold in Table 1) of its customers fell within this mileage range. As expected the 8,001 to 10,000 and the 10,001 to 12,000 ranges were popular, representing 23 and 16 percent of customers, respectively. The 12,001 to 15,000 range contained 10 percent of the customers. The 15,001 to 20,000 range, the 20,001 to 25,000 range and the over 25,000 range were rarely reported by customers, accounting for only three percent, one percent, and one percent, respectively.

Table 1

Percentage of Vehicles in Self-reported Annual Mileage Categories by Company 1998

Self-reported Mileage	#1	#2	#3	#4	#5	#6	#7	All
0-3000	5	9	11	1	8	14	1	**6**
3001-5000	11	14	23	6	14	20	2	**12**
5001-8000	20	18	24	**50**	17	20	8	**27**
8001-10000	29	15	24	22	22	23	42	**23**
10001-12000	17	11	9	9	31	11	31	**16**
12001-15000	11	16	6	10	5	8	13	**10**
15001-20000	4	11	2	2	1	3	3	**3**
20001-25000	2	**4**	0	0	0	1	0	**1**
over 25000	1	**2**	0	0	0	1	0	**1**
	100%	100%	100%	100%	100%	100%	100%	100%

The mileage categories were selected to match categories in use with ongoing research currently being conducted as part of the Auto Rating Factor (ARF) workshops, File No. RH03029826, California Department of Insurance. Similarly, this study used the same three consolidated mileage categories (low, medium and high mileage) used in the ARF analysis.

As already indicated, self-reported mileage distributions varied greatly by company, perhaps because of underwriting and pricing choices, or attention to validation techniques, such as required odometer readings. Table 1 and Chart 1 clearly illustrate the variance by company. In the smallest mileage category (0-3,000), companies ranged from one to fourteen percent of their customers represented. In the next mileage category (3,001-5,000) the percent of customers ranged from 2 percent to 23 percent depending on the company. In the next largest mileage category (5,001-8,000), customer usage varied from 8 percent to the previously mentioned 50 percent. In the popular 8,001-10,000 category, companies reported from 15 to 42 percent of their customers. In the 10,001-12,000 category companies only varied from 9 percent to 31 percent of their customers. Beyond that category, the consistently smaller number of drivers resulted in tighter and smaller ranges. In the 12,001-15,000 category, the company percentages were from 5 to 16 and in the 15,001 to 20,000 category, 1 to 11 percent. In the 20,000-25,000 category, and

the over 25,000 category, only two companies reported over one percent of their customers in those ranges. One of the two companies (see the bold numbers) actually reported four percent and two percent for those two categories, suggesting attention to mileage validation.

Actual Annual Mileage

Actual annual mileage, as calculated from BAR smog odometer readings, varied significantly as a whole from self-reported annual mileage. This is reflected in Exhibit 1. A paired T-test confirmed that the differences were statistically significant (at the .0001 level, with a t-value of 61.82).

Exhibit 1

Percentage of Vehicles in Nine Mileage Categories Using Self-reported Mileage Versus Actual Mileage

Mileage Category	1998 Self-reported Mileage %	1997/1999 Actual Mileage %
0-3000	6%	7%
3001-5000	12%	8%
5001-8000	27%	17%
8001-10000	23%	13%
10001-12000	16%	13%
12001-15000	10%	16%
15001-20000	3%	15%
20001-25000	1%	6%
over 25000	1%	5%
All	100%	100%

As expected, the distribution of vehicles shifted to the right to higher mileage categories when self-reported mileage was replaced with actual mileage. Put another way, the proportion of vehicles in under 12,000 mileage categories dropped and the proportion vehicles in the over 12,000 mileage categories increased when comparing self-reported mileage to actual mileage. The findings are consistent with the study by Finnegan (2002). One exception is the lowest mileage category of 0-3,000 where the percent of vehicles actually increased to seven percent, from the aforementioned six percent using self-reported mileage in the same mileage category. In the next highest mileage category (3,001-5,000) the number dropped to eight percent, versus twelve percent using self-reported mileage. In the still low category of 5,001-8000 only 17 percent using actual mileage were represented versus 27 percent using self-reported mileage.

In the mid-range categories of 8,001-10,000 and 10,001-12,000, the percentage of vehicles dropped when using self-reported mileage versus actual mileage, falling from 23 to 13 percent and from 16 to 13 percent, respectively for the two mileage categories. These shifts resulted in the percentage of vehicles represented in the higher mileage categories increasing when actual

mileage was used instead of self-reported mileage. Hence, the 12,001-15,000 mileage category increased from 10 percent to 16 percent. Similarly, the 15,001-20,000 category increased from 3 percent to 15 percent and the 20,000-25,000 category increased from one percent to six percent. Replacing self-reported with actual mileage resulted in an increase from one percent to five percent for the highest mileage category of over 25,000 miles. Clearly, some understatement of actual mileage occurred relative to self-reported mileage.

Table 2 and Chart 2 show that for actual annual mileage, little variation occurred between companies. This was expected as there was no reason to expect that one company has a disproportionate share of high mileage drivers, or low mileage drivers when measured with actual mileage. For example, in the 8001-10000 mile category only one company did not match the overall average of 13% book of business and that sole exception was a value of 14%. Rarely in any mileage category did a company vary by more than two percent from the overall average for all seven companies.

Table 2

Percentage of Vehicles in Actual Annual Mileage Categories by Company 1997/1999

Actual Mileage	#1	#2	#3	#4	#5	#6	#7	All
0-3000	5	11	6	7	10	6	5	**7**
3001-5000	6	10	9	8	10	8	7	**8**
5001-8000	15	18	18	17	18	17	17	**17**
8001-10000	13	13	14	13	13	13	13	**13**
10001-12000	13	12	13	13	12	13	12	**13**
12001-15000	18	14	16	16	14	16	16	**16**
15001-20000	18	13	14	15	13	15	15	**15**
20001-25000	7	5	5	6	5	5	6	**6**
over 25000	6	4	4	6	5	6	8	**5**
	100%	100%	100%	100%	100%	100%	100%	100%

Mileage Errors (Actual minus Self-reported Mileage) by Individual Vehicle

Matching self-reported to actual annual mileage for individual vehicles allowed for a more exact analysis of mileage differences and understatements. First, not all vehicles understated actual mileage (a positive error, that is, actual exceeds self-reported). In fact, as shown in Table 3 and Chart 3 after adding the appropriate categories, only 56 percent (that is, 14+16+15+11) of the vehicles had understated actual mileage. Furthermore, 35 percent (after rounding) of the vehicles had self-reported mileage within 2,000 miles (an error of plus or minus 2,000) of actual mileage, and similarly, 65 percent of the vehicles had self-reported mileage within 5,000 miles (an error of plus or minus 5,000) of actual mileage. Using rating factor relativities for the individual companies at five thousand mile increments allows a way of measuring the importance of a five thousand mile discrepancy. The five thousand, ten thousand and fifteen thousand mile levels yield premium discounts of only 11 percent on average at the lower mileage level and premium

surcharges of 7 percent at the higher level. However, for individual companies, the amounts vary greatly and the discount might be as much as 27 percent, or the surcharge as much as 17 percent. Only 12 percent of the vehicles failed to estimate mileage within the much larger range of plus or minus 10,000 miles of actual. Albeit all but one percent outside that range was from understating actual mileage (a positive error).

Table 3

Percentage of Vehicles by Mileage Error and Self-reported Mileage Categories

Mileage Error	1998 Self-reported Mileage Categories			
(thousands)	0-8,000	8,001-15,000	over 15,000	All
beyond -10	0	1	16	**1**
-6 to -10	2	11	21	**7**
-3 to -5	10	16	18	**13**
-1 to -2	14	14	12	**14**
0	9	7	6	**8**
1 to 2	15	13	8	**14**
3 to 5	18	15	8	**16**
6 to 10	19	13	6	**15**
over 10	14	9	5	**11**
	100%	100%	100%	100%

Note: Mileage error is defined as actual mileage less self-reported mileage, thus, a positive figure represents an understatement of actual mileage.

The pie chart in Exhibit 2 displays this data from another perspective. It shows that while 44 percent of the vehicles had no understatement of actual mileage, 30 percent had a low understatement (5,000 or less), an additional 15 percent had a high understatement (between 6,000 and 10,000) and still another 11 percent had a very high understatement (over 10,000 miles).

This raises the question, which vehicles (and customers) were understating actual mileage (a positive error) and which were overestimating actual mileage (a negative error)? Were the high mileage drivers having a hard time estimating and were those with very low estimated mileage clearly underestimating actual mileage? The data show that a high percent of low mileage vehicles (0-8,000 self reported miles) understated actual mileage, while a high percent of high mileage vehicles (over 15,000 self-reported miles) overestimated actual mileage.

The pattern was less clear for medium mileage vehicles. From Table 4 and Chart 4 it appears to be a mixture of both, depending on which side of the medium mileage spectrum the vehicle fell. In other words, vehicles just barely above 8,000 self-reported miles tended to understate actual mileage and those just barely under 15,000 self-reported miles tended to overstate actual mileage. This is clearer in Table 5 and Chart 5 where only the three mid-range self-reported mileage categories are displayed.

Exhibit 2
Percentage of California Vehicles with Understated Actual Mileage, 1998

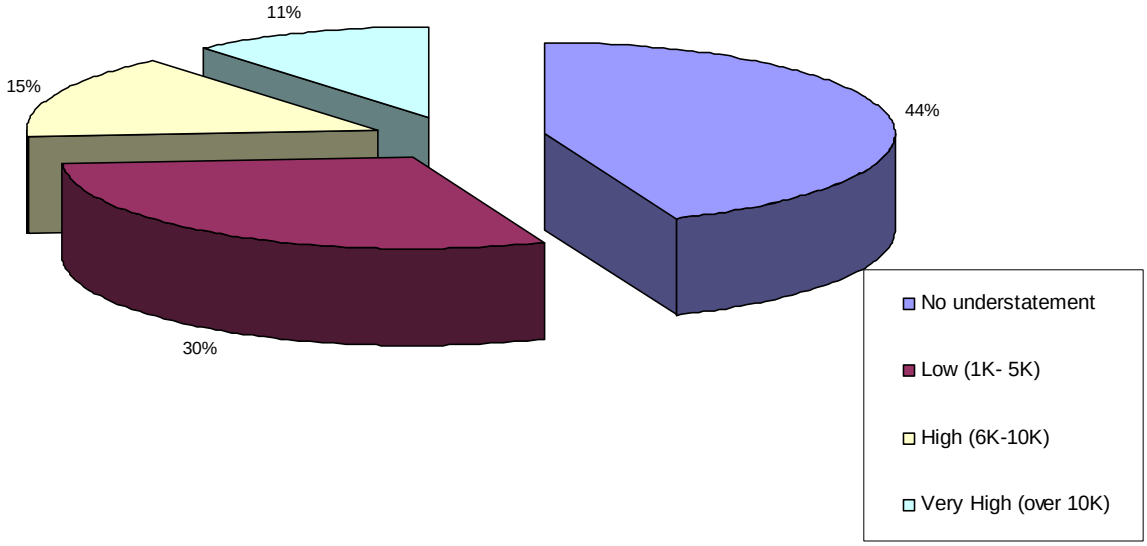

Table 4

Percentage of Vehicles by Mileage Error Categories and Self-reported Mileage

Mileage Error	1998 Self-reported Mileage Categories									
(thousands)	0-3000	3001-5000	5001-8000	8001-10000	10001-12000	12001-15000	15001-20000	20001-25000	over 25000	All
beyond -10	0	0	0	0	1	4	9	22	48	**1**
-6 to -10	0	0	3	7	12	17	21	23	18	**7**
-3 to -5	1	9	12	14	17	19	19	17	11	**13**
-1 to -2	14	14	13	14	14	14	14	11	7	**14**
0	13	8	8	8	7	7	6	5	3	**8**
1 to 2	16	15	15	14	13	11	10	7	4	**14**
3 to 5	18	19	18	17	14	11	9	6	4	**16**
6 to 10	20	20	18	15	12	9	6	5	2	**15**
over 10	18	15	13	10	9	7	6	5	4	**11**
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note: Mileage error is defined as actual mileage less self-reported mileage, thus a positive figure represents an understatement of actual mileage.

Table 5

Percentage of Vehicles by Mileage Error for Mid-range Self-reported Mileage

Mileage Error	1998 Self-reported Mileage Categories		
(thousands)	8001-10000	10001-12000	12001-15000
beyond -10	0	1	4
-6 to -10	7	12	17
-3 to -5	14	17	19
-1 to -2	14	14	14
0	8	7	7
1 to 2	14	13	11
3 to 5	17	14	11
6 to 10	15	12	9
over 10	10	9	7
	100%	100%	100%

Note: Mileage error is defined as actual mileage less self-reported mileage, thus a positive figure represents an understatement of actual mileage.

Part of the reason that low mileage self-reported estimates tend to underestimate rather than overestimate actual mileage is that any overestimate (negative error) is bounded by the size of the self-reported mileage. For instance, someone estimating 5,000 annual mileage cannot

overestimate actual mileage by more than 5,000 miles. Not only do the data show that low self reported mileage estimates understate mileage, they typically understate it by a lot. For this group, large or moderate understatements are more frequent than small understatements.

If low self-reported mileage (0-8000) vehicles tend to understate actual mileage, does this vary much by company? Table 6 shows that for six of the seven companies, actual mileage was consistently understated for between 63 and 76 percent of the low self-reported mileage vehicles. This rather stable rate existed even though the proportion of company book of business for low estimate mileage vehicles varied considerably (from 11 percent to 58 percent).

Table 6
Percent of Low Self-reported Mileage Vehicles that Understate Actual Mileage by Company, 1998

	For Vehicles with Low (0-8000) Self-reported Mileage	
Company	**Percent Understating Actual Mileage**	**Percent of Company Book**
#6	76	54
#3	73	58
#1	71	36
#7	70	11
#4	66	57
#5	63	39
#2	48	41

High self-reported mileage estimates leave a lot of room for both overestimating and underestimating. Nonetheless, the high mileage category generated a relatively low percentage of understatements of actual mileage. Moreover, the proportion of all vehicles in the high self-reported mileage estimate category, for the most part, consistently declined from the high overestimated actual mileage categories to the large underestimated actual mileage categories. This is evident in the yellow bars (high mileage) in Chart 3 and the supporting values in Table 3.

Variations in Mileage Error by ZIP Code

Are there differences in self-reported and actual mileage by geographic region? To test this hypothesis, the data from five urban zipcodes were analyzed. Rural areas were not analyzed because there were too few vehicles for meaningful analysis. The five urban zipcodes were selected because they all had matched records for at least 23,000 vehicles. One of the companies was omitted in this analysis because its small size would yield identity revealing percentages in individual zipcodes. As a consequence, the numbering of the companies is different from the prior section of this study.

The percentage of vehicles with accurate self-reported mileage (error of plus or minus 2,000 miles) did not vary by urban zipcode for five of the six companies. As shown in Table 7 and Chart 7, this percentage stayed tightly within the 30 to 40 % range. This implies that at least for large urban zipcodes, and possibly all zipcodes, a consistent core percentage of honest or diligent consumers report accurate mileage estimates.

Table 7

Percentage of Vehicles With at Most 2000 Mile Difference Between Self-reported and Actual Mileage, by Company and Five Selected Urban Zipcodes, 1998

	Zipcode				
	90650	**92677**	**92683**	**92708**	**95035**
Company	(n=30,792)	(n=25,073)	(n=32,364)	(n=24,353)	(n=23,449)
1	36	31	37	38	40
2	**49**	**48**	**55**	**55**	**36**
3	35	30	35	33	34
4	34	32	33	37	37
5	33	30	36	36	34
6	34	32	22	35	29

Because most of the understatement of actual mileage occurred with low self-reported mileage (less than 8,000 miles) vehicles, Table 8 and Chart 8 pertain only to these vehicles. They show that the percentage of vehicles with low self-reported mileage remains fairly constant (demonstrated by the flat lines) by urban zipcode within a specific company. Furthermore, for five of the six companies, the low self-reported mileage vehicles accounted for typically between 35 and 60 percent of the company's book.

Table 8

Percentage of Vehicles With Low Self-reported Mileage (0-8000) by Company for Five Selected Urban Zipcodes, 1998

	Zipcode				
	90650	**92677**	**92683**	**92708**	**95035**
Company	(n=30,792)	(n=25,073)	(n=32,364)	(n=24,353)	(n=23,449)
1	39	37	39	42	36
2	46	33	43	40	64
3	58	58	61	62	51
4	39	36	39	43	37
5	51	54	56	54	53
6	**9**	**4**	**1**	**0**	**3**

On the other hand, the percentage of vehicles with large (errors greater than 5,000) understatements of actual mileage, varied widely by urban zipcode within each company. This is shown in Table 9 and Chart 9. For example, in company #2 the percentage of these offending vehicles ranged from 9 to 29 percent depending on the zipcode. For company #5, the range went from 28 to 39 percent depending on the zipcode. The 92677 zipcode was particularly problematic with particularly high percentages for four of the six companies. This suggests that it may prove worthwhile to analyze geographic areas for patterns of poor self-reported mileage figures that require better mileage validation methods.

Table 9

Percentage of Vehicles With Actual Mileage Exceeding Self-reported Mileage by Greater Than 5000 Miles, by Company for Five Selected Urban Zipcodes, 1998

	Zipcode				
Company	**90650** (n=30,792)	**92677** (n=25,073)	**92683** (n=32,364)	**92708** (n=24,353)	**95035** (n=23,449)
1	26	**33**	25	25	20
2	14	15	9	10	29
3	27	**35**	22	27	23
4	24	**32**	21	23	19
5	33	**39**	28	28	30
6	17	16	28	15	13

Underreported Mileage Correlations

Correlations between understated mileage and premium were tested for individual vehicle but only a negligible relationship existed (0.009, $p<0.001$). Some correlation (0.248, $p<0.001$) was found between understated mileage and pure premium (loss) at the zip code level. Similar results were obtained when the data was analyzed at the company level. The lack of a relationship between understated mileage and premium suggests that customers understate mileage due to carelessness rather than for economic (e.g., fraud) reasons. The relationship between understated mileage and pure premium suggests that those customers not careful about their mileage estimates are either not careful about their driving or simply more likely to make claims. Put another way, zipcode level data tended to suggest that larger understated mileage corresponded with greater losses.

Conclusions

- Self-reported annual vehicle mileage often understated actual annual mileage, but almost half of the vehicles did not understate vehicle mileage. Most (65 percent) vehicles estimated actual mileage within 5,000 miles.
- While 44 percent of the vehicles had no understatement of actual mileage, 30 percent had a low understatement (5,000 or less), an additional 15 percent had a high understatement (between 6,000 and 10,000) and still another 11 percent had a very high understatement (over 10,000 miles).
- Vehicles with particularly low self–reported mileage estimates often understated actual mileage and by a lot.
- Both self-reported and actual mileage distributions varied significantly by company suggesting different marketing strategies and mileage validation processes.
- Apparently, regardless of company some zipcodes have particularly high percentages of large (greater than 5,000 miles) underreporting of actual mileage.
- Vehicles with understated mileage tend to generate more losses on average.

These facts indicate that self-reported mileage can be made a more useful rating factor by improved validation techniques, such as required odometer readings and closer review of low self-reported mileage vehicles and problematic geographic areas.

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Appendix

Chart 1
Percentage of Vehicles in Self-reported Annual Mileage Categories by Company, 1998

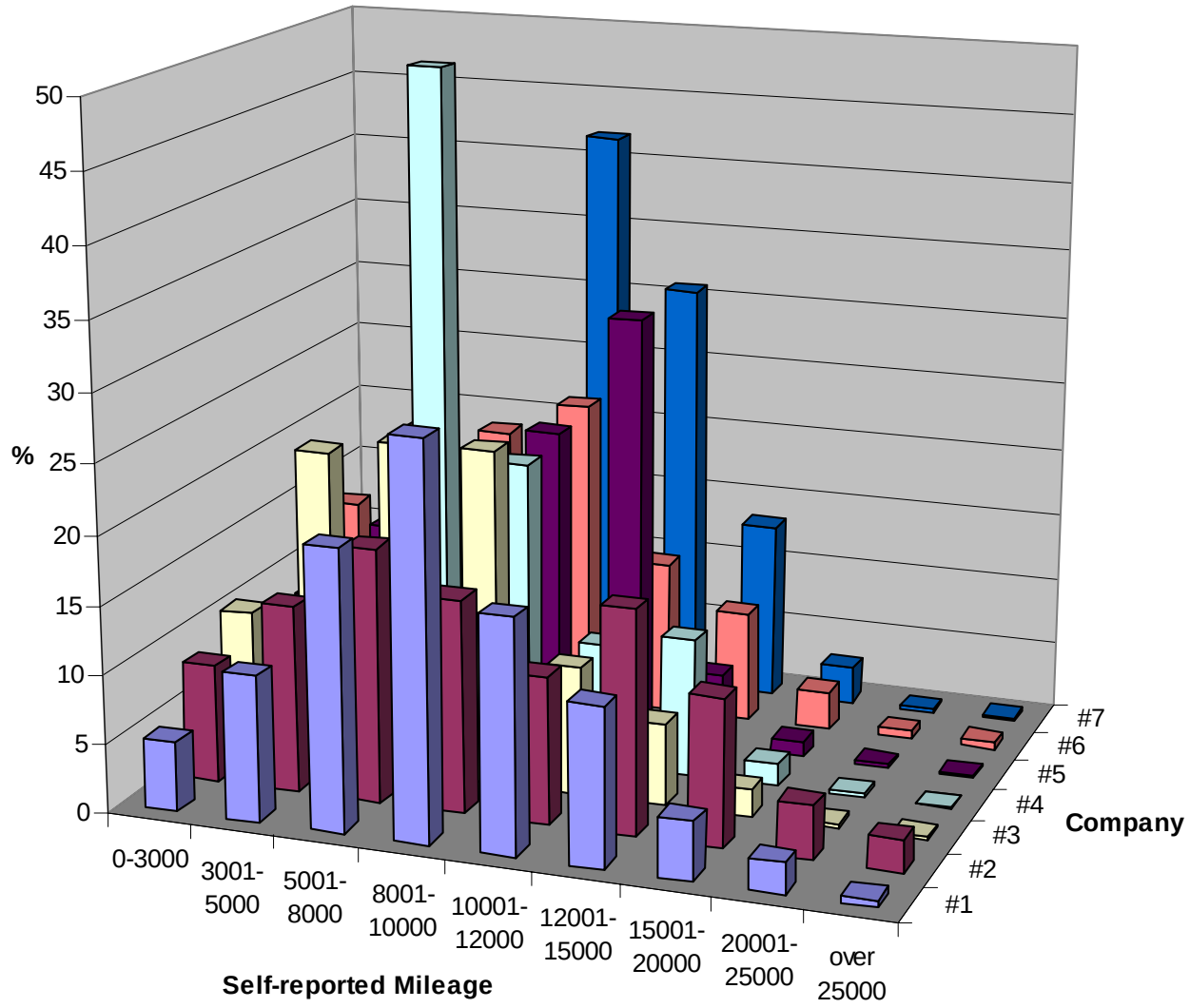

Chart 2

Percentage of Vehicles in Actual Annual Mileage Categories by Company,1997/1999

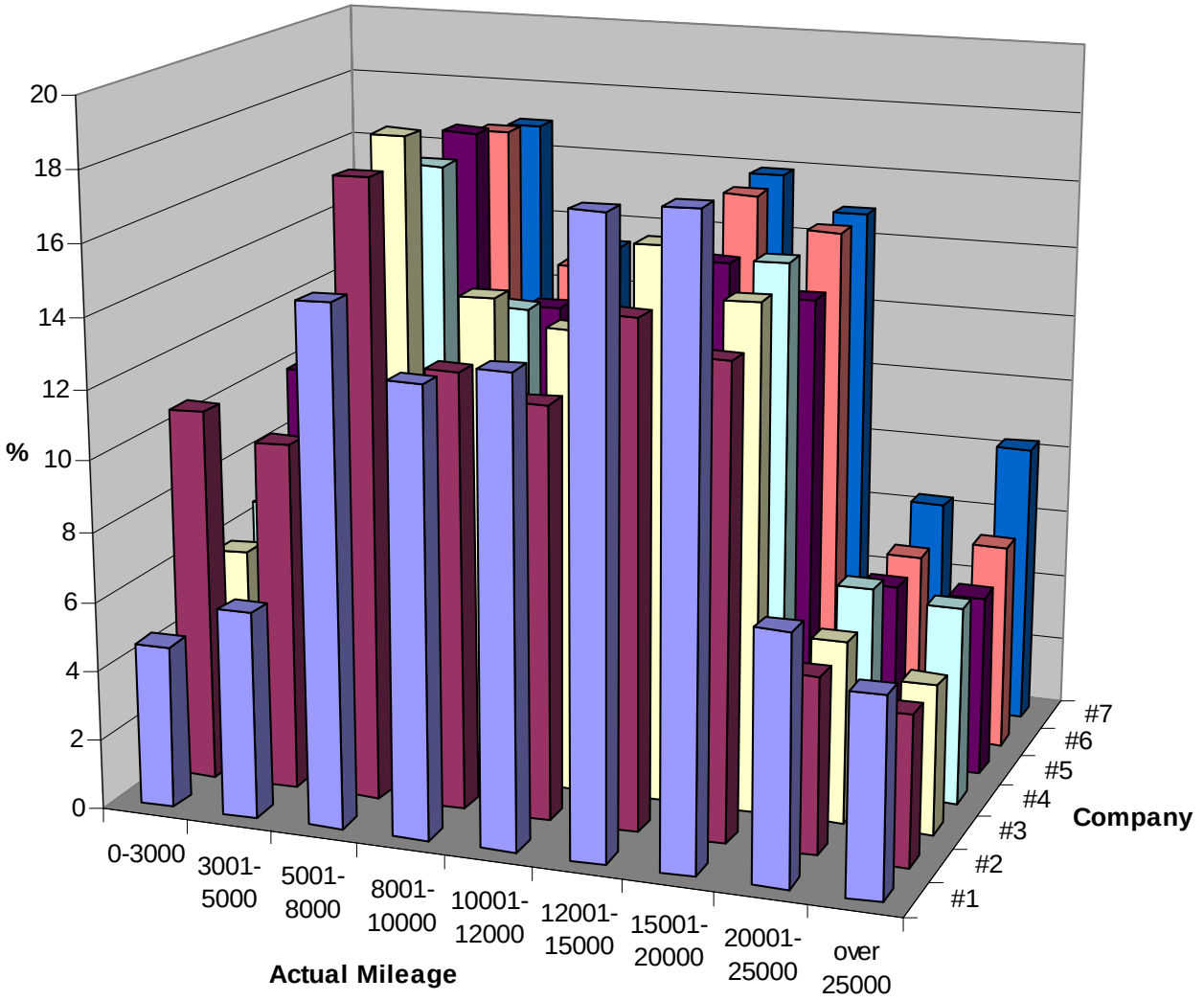

Chart 3
Percentage of Vehicles by Mileage Error and Self-reported Mileage Categories

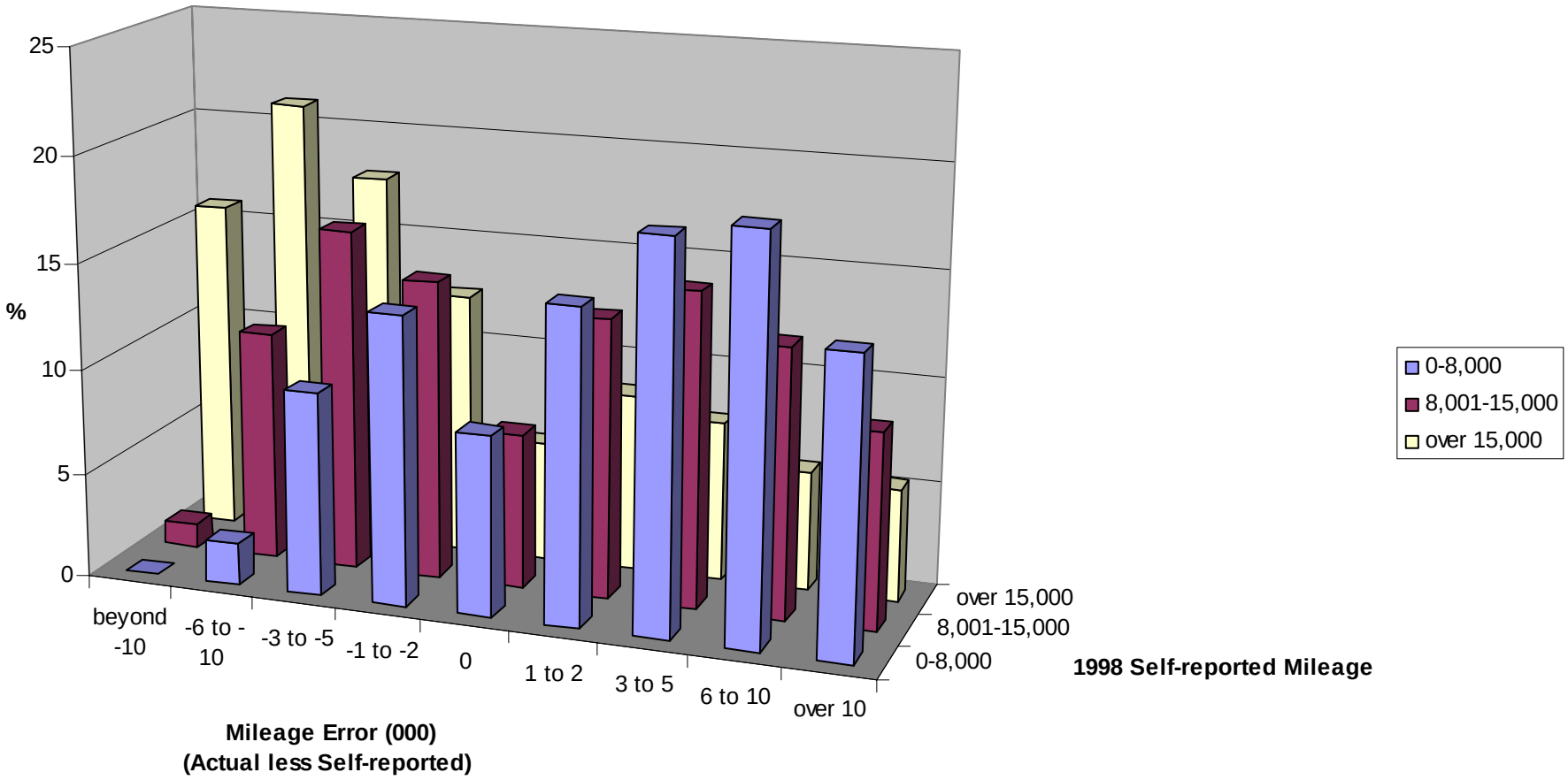

Chart 4
Percentage of Vehicles by Mileage Error and Self-reported Mileage Categories,

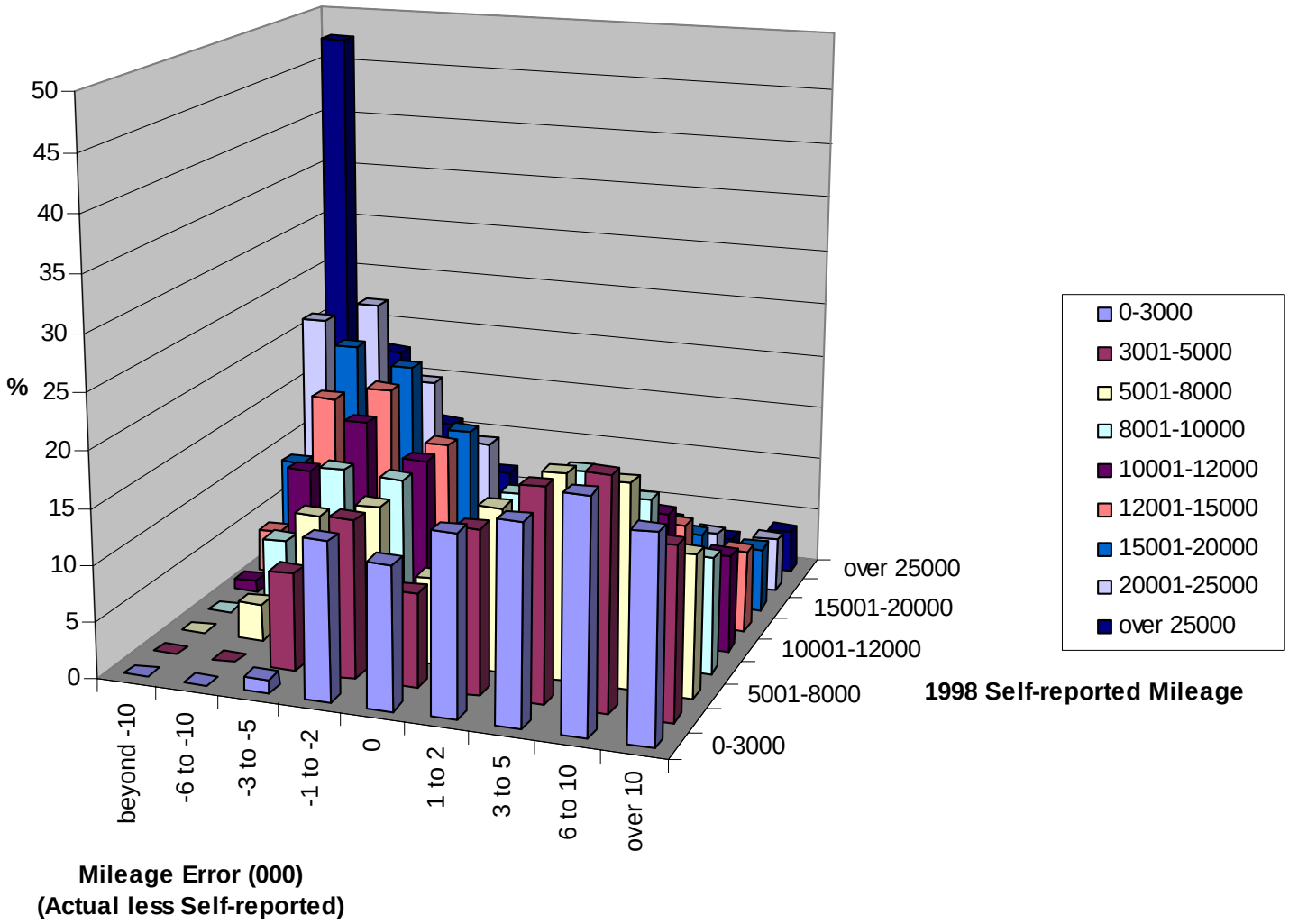

Chart 5
Percentage of Vehicles by Mileage Error for Mid-Range Self-reported Mileage Categories

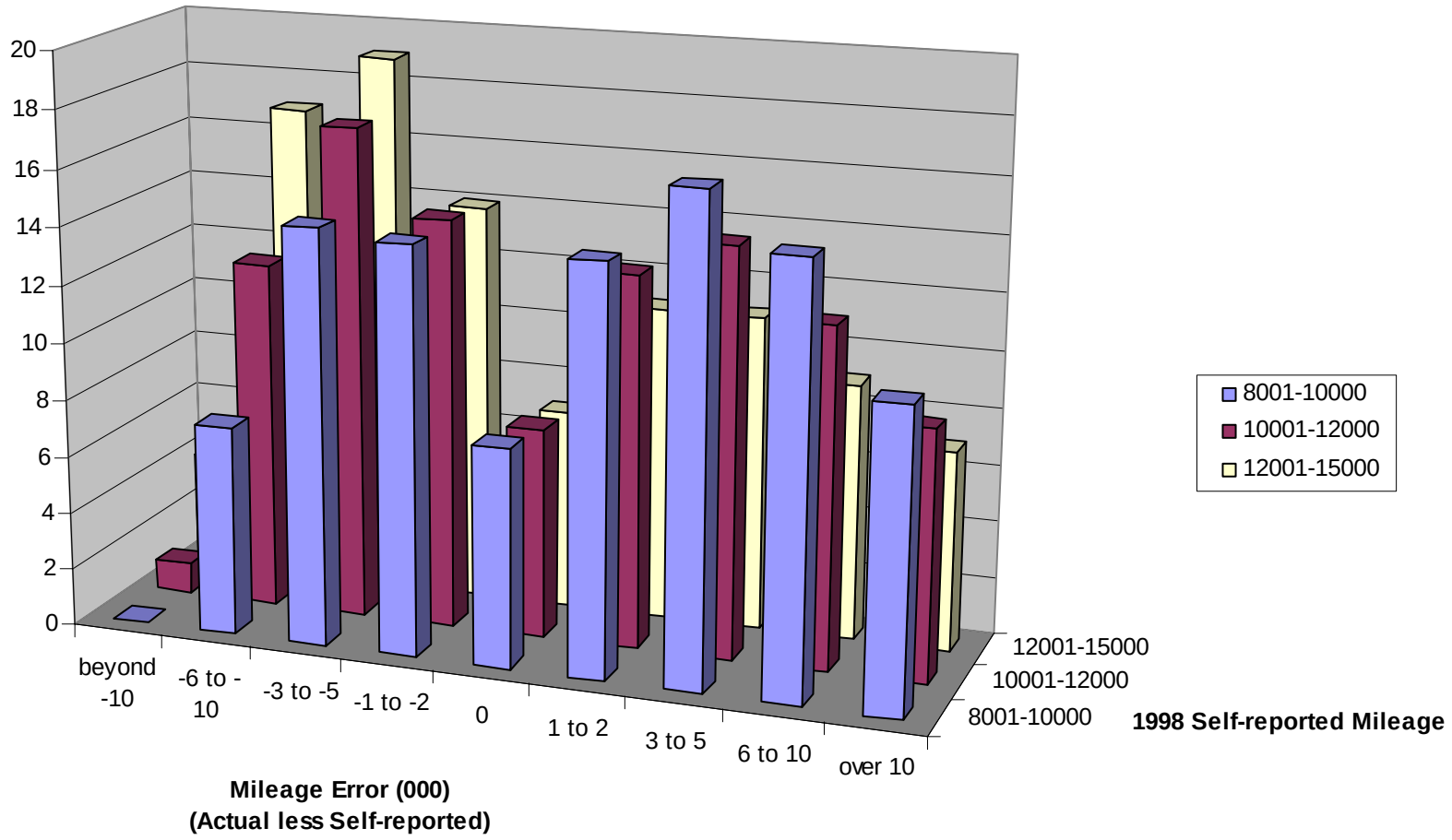

Chart 6. For Vehicles With Low 1998 Self-reported Mileage (0-8000), Percent Understating Actual Mileage and Percent of Company Book by Company

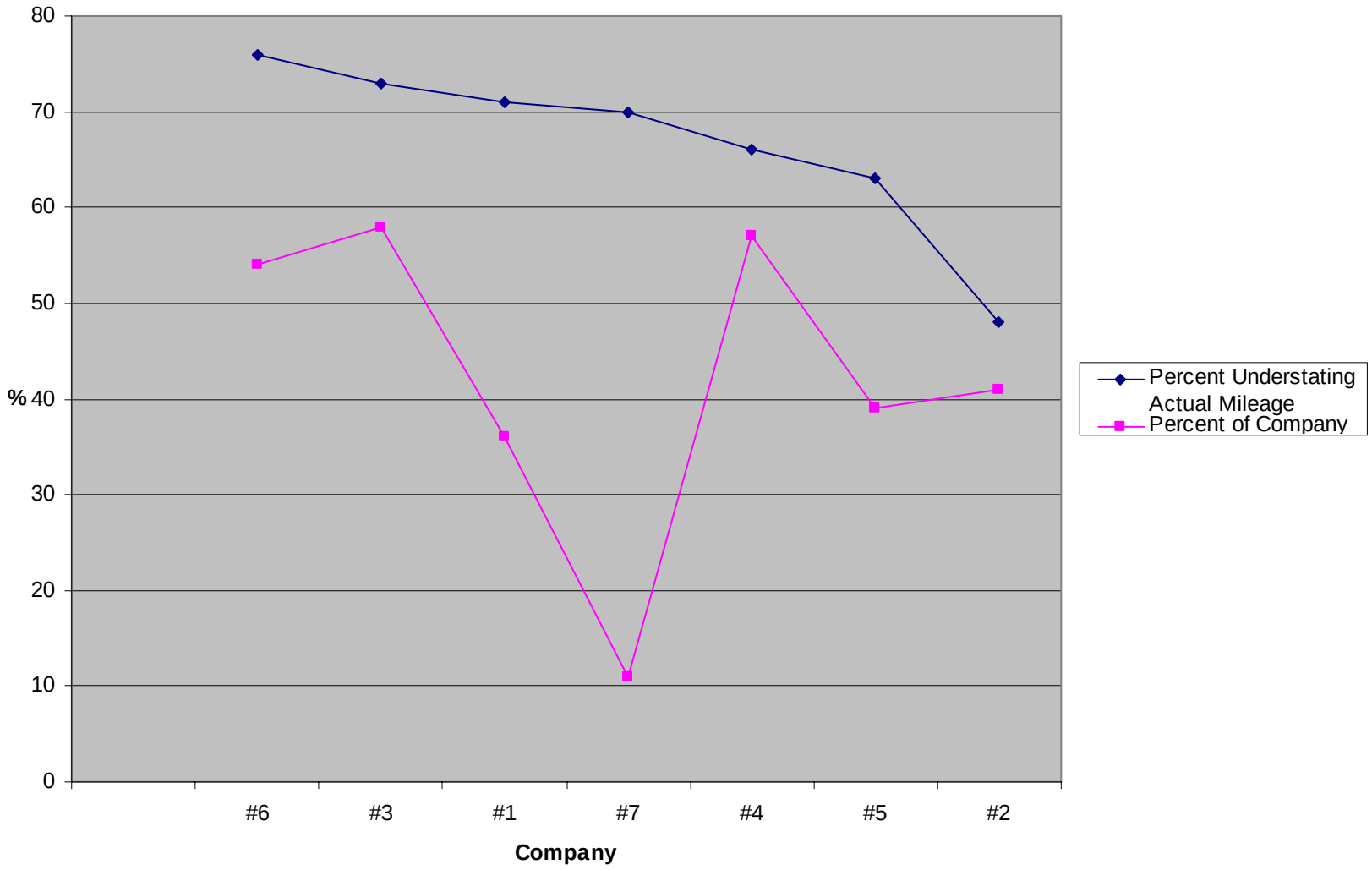

Chart 7
Percentage of Vehicles With Small Difference Between Self-reported and Actual Mileage by Company and Selected Urban Zipcodes, 1998

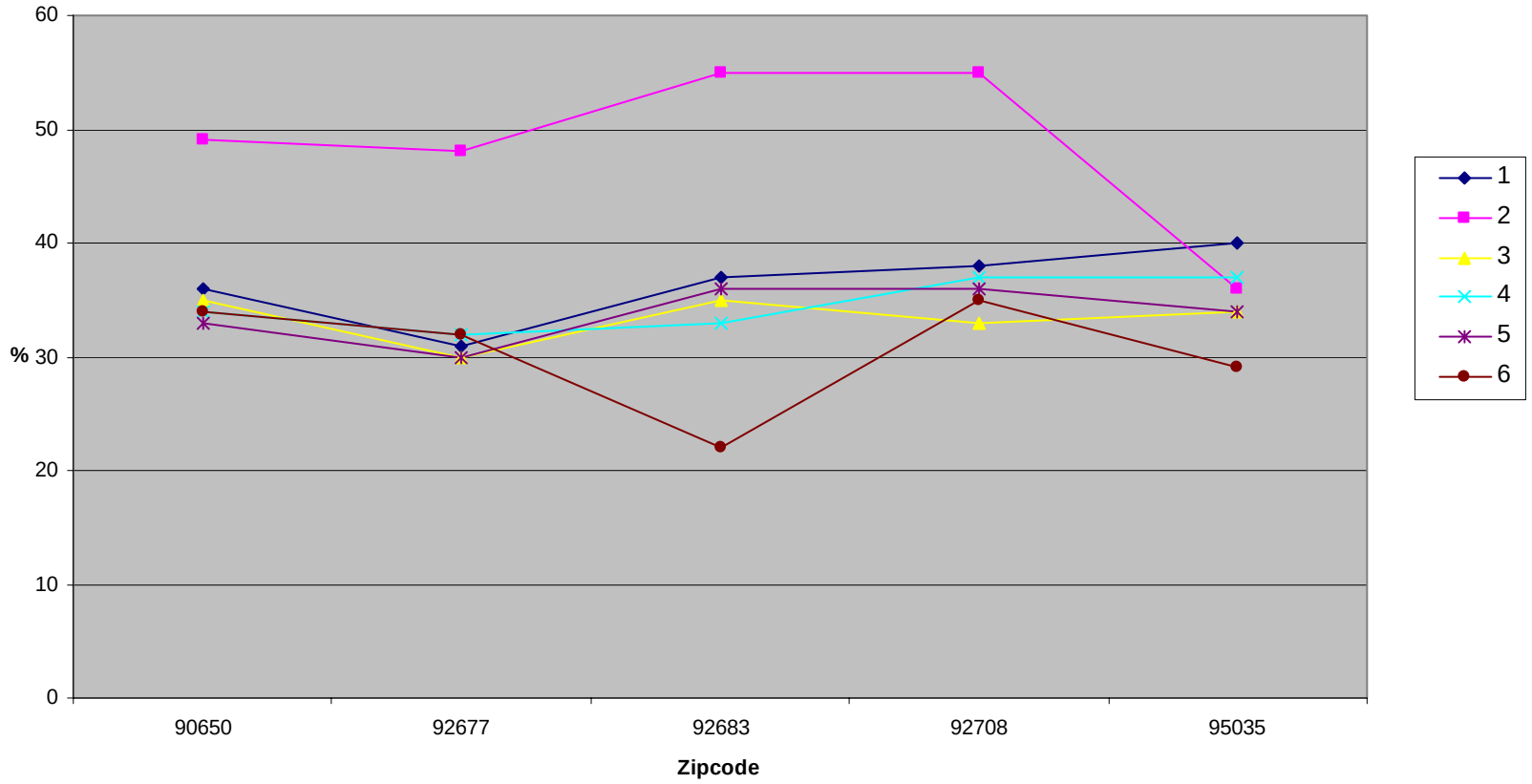

Chart 8
Percentage of Vehicles With Low Self-reported Mileage (0-8000)
By Company For Five Selected Urban Zipcodes, 1998

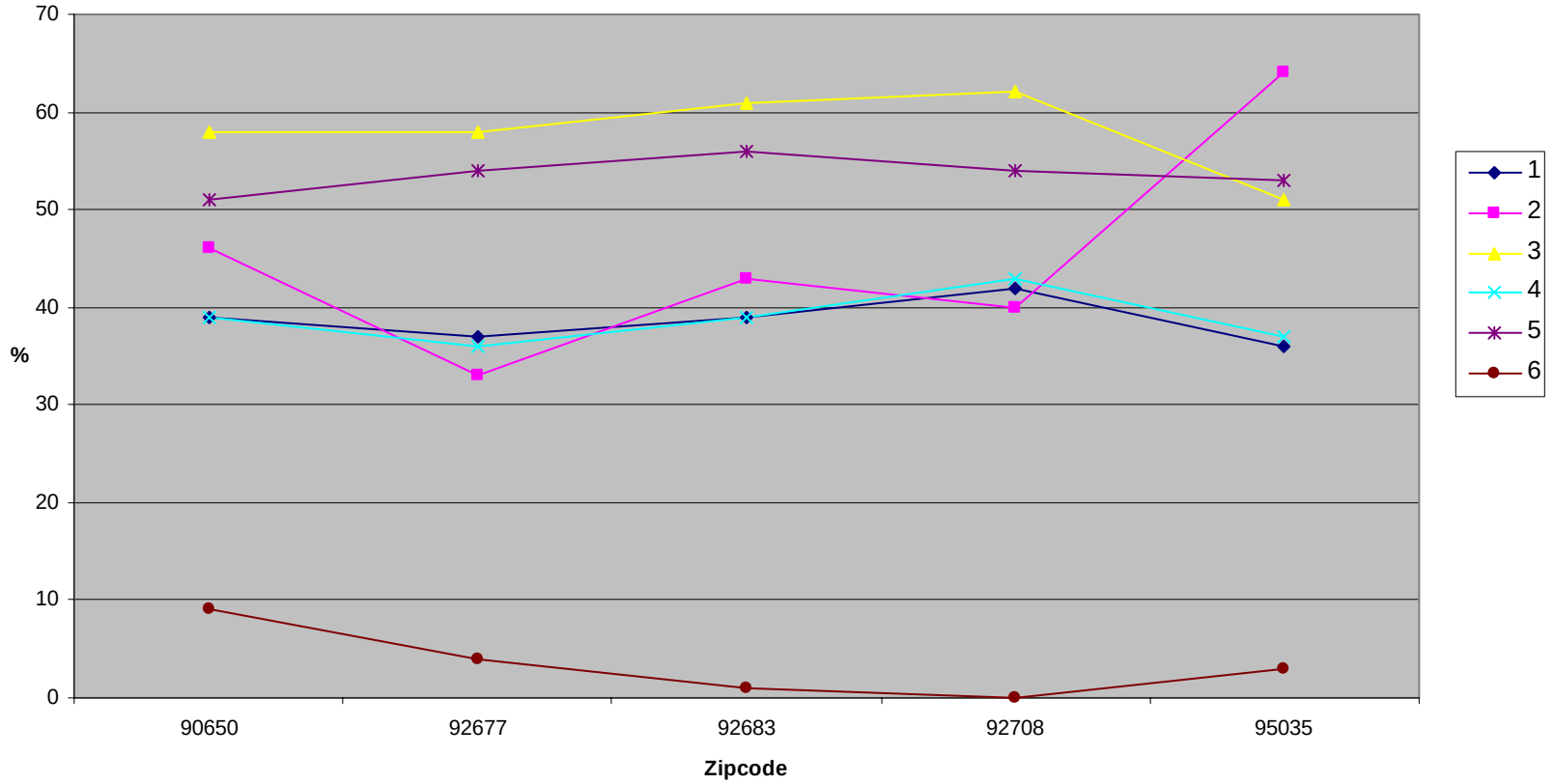

Chart 9
Percentage of Vehicles With Large (over 5000) Differences Between Self-reported and Actual Mileage by Company and Selected Urban Zipcodes, 1998