

APPENDIX

ESTIMATING THE AVERAGE PRICE OF USED VEHICLES IN CALIFORNIA

Collecting price data for a vehicle model for several model years from the Kelley Blue Book (KBB) website is time consuming.¹ It was not feasible to collect prices for all models for all model years because more than 350 different models of LDVs were sold in the U.S. during the relevant time period (late 1970s through 1997). Because we wanted to incorporate price information for as many California LDVs as possible—given the number of models for which price data were to be collected—we focused on LDV models with relatively high sales levels during any of the calendar years 1985, 1990, or 1995.²

The KBB database does not include prices for LDVs older than 20 years; we collected information for model years back to 1978. To extract a trade-in (or a retail) price quote from the website for a selected model and model year, one must supply several pieces of information in addition to model, model year, vehicle condition, and type of price—among these is the zip code of the location of the vehicle. We used a Los Angeles zip code. We had been told by KBB personnel that doing so would yield prices specific to California, but experimentation indicated that quoted prices did not differ across zip codes for the Rocky Mountain states and westward.

To extract a price, one also must specify accumulated mileage (odometer reading) and information about features of the vehicle, such as number of cylinders, number of doors, and the presence or absence of various types of optional equipment. For mileage, we specified the average accumulated mileage (rounded to the nearest 1,000 miles) for a California vehicle of the relevant age (given the model year) using data from CARB, which distinguishes cars and light-duty trucks.

¹After exploring potential sources of data on used-LDV values, we identified Kelley Blue Book as the most appropriate source because their price data are distinguished on a geographic basis and include information for western states. We attempted to obtain price data in machine readable form, but personnel at Kelley Blue Book reported to us that no datasets (flat files) suitable for our purposes exist and that the best way to collect the data was one price at a time from their website.

²Historical data on California LDV sales by model are not available, so we used national sales figures from the annual *Market Data Book* published by *Automotive News* to identify models with high sales levels. (Sales figures by model are not available for imports for the early 1980s.) All of the 82 models for which we collected trade-in price data had at least 0.5 percent of national sales in one of the three years. (There are 122 models that meet this criterion; the 82 are those for which the procedures described below enabled us to collect consistent data over several model years.)

We developed rules for specifying features for a vehicle model, and for each model we collected prices for as many model years of the model as possible while consistently specifying the same values for the following major features: engine size (one in the middle of the range);³ transmission (always automatic); number of drive wheels;⁴ number of doors (always four for cars and two for trucks); air conditioning (always yes); and truck bed size (one in the middle of the range).⁵ For other features of the vehicle, we used default values supplied by the website software.

This procedure yielded data on western U.S. trade-in prices for vehicles in good condition for 82 models for various sets of model years as far back as 1978.⁶ First we averaged prices of different models for the same model year over models using national⁷ (calendar year) sales of each model as weights.⁸ We then averaged the model-year average prices⁹ over model years using as weights the proportions of LDVs in the South Coast of different model years. The result was \$4,218, which represents the average *trade-in* price of vehicles in good condition for model years 1997 and older as of December 1998 to January 1999.

To gauge how much higher than \$4,218 the average price of used LDVs in California might be, we also collected KBB *retail* price quotes for 20 models selected from among the 82 models for which we collected trade-in prices. The 20 models were selected to include cars, trucks, vans, and sport-utility vehicles. We compared the retail price series to the corresponding trade-in price series for the 20 models, computing ratios of retail to trade-in prices for each model and model year. The average ratio is about 1.5 for the 1997 model year. It increases almost linearly with age

³For models with only two engine-size choices, we alternated using the larger size if a smaller size had been chosen for the previous model for which such a choice had to be made, and vice versa.

⁴When there was a choice between two- and four-wheel drive, we alternated; e.g., we chose four-wheel if we had chosen two-wheel for a model the last time such a choice was available.

⁵When there were only two choices we alternated in a fashion similar to that used for engine sizes and number of drive wheels.

⁶For 15 of the 20 model years we had between 30 and 50 prices to average (more than 40 in most cases); for four model years we had between 20 and 30 prices; and for model year 1978 we had data for only 10 models because data for the 1978 model year were not available after January 1, 1999.

⁷National sales figures are from the annual *Market Data Book* published by *Automotive News*.

⁸The model-year average trade-in prices fall almost exponentially with age. Regression of the logarithm of average trade-in price on a constant and age of vehicle has an R-square value of 0.97 and a coefficient of age of -0.19—i.e., average trade-in prices decrease with age by about 19 percent per year.

⁹The average for the 1978 model year was \$404, and the price-age curve was flattening by age 20, so we used \$400 to represent the average trade-in price for all model years before 1978 (i.e., for which we could not collect price data from KBB).

back to model year 1983 to approximately 3.5 and finally stabilizes at about 3.5. To project average retail prices for each model year, we then multiplied average trade-in prices for the model year by the calculated ratio of retail to trade-in price for each of the model years 1984 through 1997 and by 3.5 for all earlier model years. We then averaged these retail prices over model years using as weights the proportions of LDVs in the South Coast of different model years. The result is \$7,545, which represents the average retail price of vehicles in excellent condition for model years 1997 and older as of December 1998 to January 1999.