

period over which auto loans are made, thus minimizing short-term strains on income and cash flow. Indeed, paralleling an aging auto stock is a lengthening of the maturity of average new-car loans from roughly 36 months in 1974 to 46 months in 1982 (see table 1). An aggregate increase in borrowing maturities for new-car loans gives households partial relief from rising interest rates and new-car prices, although total user costs on average will increase over the life of the car.

Although not actually considered user costs, the operating costs of automobiles, particularly gasoline prices, have been discussed at length in the auto-demand literature over the past few years. For the most part, the evidence supports what economic theory would predict. Increases in gasoline prices tend to reduce the overall demand for cars, especially the demand for larger, less fuel-efficient models. Consequently, energy price increases have contributed to the number of smaller, foreign autos currently mushrooming in the United States. The evidence also suggests that the sensitivity of new-car demand to changes in gasoline costs is greater than the impact of user costs on new-car demand. And, as does weakness in disposable income, higher gasoline prices increase the demand for used cars relative to new cars.⁵ In sum, Americans have adjusted to recessionary income loss and gasoline price increases with similar strategies: we have decreased our total demand for new cars, while increasing our purchases of imports and the age of the existing auto stock.

Auto Sales in 1983

There are many ingredients necessary to an auto sales recovery in 1983. The long-term growth in new-car sales from new ownership is probably already on the wane. The increase in the number of Americans aged 20 years to 40 years is slowing, will peak around 1991, and will decline thereafter.⁶ The rapid growth of

individual households that occurred in the 1970s also should slow in the 1980s. These factors can limit the growth of additions to the U.S. auto stock in the coming years and consequently reduce the trend of new-owner auto sales. For these reasons, the U.S. auto market for new cars might never fully recover to the sales levels it once enjoyed. The trend component of the replacement demand for new autos has been on the decline for several years, and a sudden reversal in this aging behavior does not appear likely. However, the cyclical willingness of consumers to retain older cars should stabilize and eventually generate a faster auto scrappage rate, as car stocks reach an age where replacement can no longer be deferred. According to one analysis, the demand for new autos to replace aging autos is already building; over the next few years such replacement could add as many as 1 million additional units annually to new-car sales.⁷

A prerequisite for recovery in auto sales is persistent real income growth throughout the year. As labor markets firm, the prospects for such income strengthening are improving. Moreover, strength in the 1983 new-car market requires moderation in the pace of gasoline price advances. Although political events in the Middle East and the decisions of OPEC are uncertain, the current state of the oil markets suggests that energy supplies would be abundant in 1983. In January 1983, the average retail price per gallon of gasoline fell to \$1.16, nearly \$0.14 below that of July 1982 and its lowest level in three years. Many oil-market analysts anticipate continuing gasoline price retreats until summer.

In addition to the necessary conditions of income strength and gasoline price restraints, another decline in relative prices of new cars would contribute to a sustained auto recovery. For the 1983 model year, General Motors announced an average price increase of only 1.9 percent over similar 1982 models, while the prices

Table 2 Auto-Sales Forecasts: 1983
In millions of units; as of March 1983

Chase Econometrics	9.3 ^a
Conference Board	9.3
Data Resources, Inc.	9.0
Econoviews International Inc.	10.5
Eggert Economic Enterprises	10.0
Evans Economics	8.8
Goldman, Sachs Co.	9.2
UCLA Business Forecast	9.1
Univ. of Michigan M.Q.E.M.	9.0
Wharton Econometric Forecast	9.6
43 forecast composite	9.3

a. February data.
SOURCES: *Blue Chip Economic Indicators* and *Automotive News*. Data reprinted by permission of Eggert Economic Enterprises, Inc., Sedona, Arizona 86336.

of Ford Motor Company products increased less than 1 percent over the last model year. More importantly, given the recognition of user-cost importance to new-auto demand, the path of interest rates enters into the prognosis for new-car sales in 1983. Consumer lending rates have been falling since autumn 1982, and a con-

tinuation of this trend certainly improves prospects for auto sales in 1983. In conclusion, the variables for an auto recovery in 1983 are in place, and most market analysts apparently agree (see table 2). The least optimistic forecast calls for total 1983 auto sales of 8.8 million units, an increase of 10 percent from the 1982 sales performance of 8.0 million autos, but well below pre-1980 sales. On the more optimistic side, some auto-sales forecasts for 1983 are above the 10-million unit level, which would represent one of the stronger auto-sales comebacks in many years. An average of 43 market forecasts yields an expected 9.3-million unit sales pace for the 1983 calendar year, about a 16 percent improvement over the unit-sales performance for 1982 and a decided gain from the dismal auto markets of the past three years. Predicting the future is a hazardous business, particularly in today's auto market. The strength of such forecasts resides precariously in the ability of labor markets to improve real consumer incomes during the year. Throwing this caution aside, it would appear that auto dealers should enjoy the 1983 sales year, with even stronger sales to follow.

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Issues in the 1983 Auto-Sales Outlook

by Michael F. Bryan

Since the late 1970s, the U.S. auto market has suffered a severe decline. Total auto sales (domestic and foreign) have fallen from the highs of over 11 million units in 1977 and 1978 to an anemic average of 8.5 million units since 1980. The sales performance of U.S. autos has become one of the business horror stories of the 1980s, as imports consistently have captured a greater share of the shrinking new-car market. Accompanying the sales dive of U.S. autos is a corresponding dip in the capacity utilization rate of U.S. motor vehicle industries; this measure fell from 99 percent in 1977 to approximately 60 percent in 1982. Total employment in these industries declined nearly 27 percent over the same period. With an industry so decimated, it has been difficult for market analysts to predict the level of auto sales in 1983. After examining the sources of new-car demand, we still question whether the recent weakness in the auto industry is temporary or whether it represents a long-run downward adjustment that could continue indefinitely.

Until recent years, auto sales were influenced primarily by changes in the population, the existing stock of autos, real disposable income, and time. Since the late 1970s, however, auto sales forecasts that relied on such traditionally accurate indicators have been off the mark. Inflation, the frequency of recessions, historically high interest rates, gasoline shortages and their accompanying price increases, and changing household demographics have collectively muddled a market model that in previous years was reasonably predictable. In 1982, for example, total auto sales were 2.5 million units less than estimated by many industry analysts.

An Aging Auto Stock

Changes in the pattern of consumer auto buying have drastically altered the profile of the U.S. auto market (see table 1). The small-car market share of total domestic sales rose from 49.2 percent in 1974 to 63.5 percent in 1982. Foreign competitors seem to hold an advantage in the production and marketing of these smaller models, consequently increasing their importance as a source of new automobiles. In 1974, imports commanded 15.9 percent of the U.S. new-car market, a share that has since risen to almost 28 percent.

The demand for new cars results from two general sources: (1) additions to the stock of autos (new ownership) and (2) replacement of the existing auto stock. Additions to the auto stock result from changes in taste, in real personal income, and especially in demographic characteristics. An increase in the population of driving age, such as the aging of the baby-boom cohort, expands the rate of additions to the auto stock as more people require transportation. Similarly, since 1970 single-person households have become more prominent, further increasing the demand for cars. Moreover, the number of wage earners per household has risen, because large numbers of women have entered the labor force as both primary and secondary wage earners. Such demographic changes have greatly accelerated the rate of additions to the auto stock.

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The views stated herein are the author's and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

5. Tishler, "The Demand for Cars . . .," p. 188.
6. William A. Cox, "Changing Consumption Patterns," *American Demographics*, vol. 3, no. 5 (May 1981), p. 18.

7. Susan Weller Burch, *The Aging of the U.S. Auto Stock: Implications for Demand*, Working Paper 26 (Board of Governors of the Federal Reserve System, January 1983).

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Table 1 The U.S. Auto Market: 1974-82

Year	New-car sales, millions	Import car share, percent	Age of stock, years	Average price, dollars	CPI average price, dollars	Average finance rate, percent	Loan maturity, months
1974	8.9	15.9	5.7	4,390	4,390	12.6	35.7
1975	8.6	18.3	6.0	4,750	4,768	13.1	37.6
1976	10.1	14.8	6.2	5,470	5,068	13.2	38.8
1977	11.2	18.6	6.2	6,120	5,336	13.2	40.7
1978	11.3	17.7	6.3	6,470	5,742	13.2	43.0
1979	10.6	21.9	6.4	6,950	6,196	13.5	44.3
1980	9.0	26.7	6.6	7,340	6,691	14.8	44.7
1981	8.5	27.3	6.9	8,850	7,100	15.9	45.2
1982	8.0	27.9	7.2	9,750	7,369	15.8	46.0

While demographic occurrences have been gradual and hence predictable in terms of impact on new-car sales, the replacement demand for autos has behaved more erratically in recent years. The number of existing cars affects the frequency of auto replacement in that a larger stock of existing cars generates a larger replacement demand. Yet, consumers can vary the timing of auto replacement, within broad limits, by exercising their option to retain their current autos. Replacement demand for new cars, sensitive to both trend and cyclical variations in economic activity, is consequently more difficult to predict.

Perhaps the most dramatic feature of the changing U.S. auto market is the speed at which the auto stock has aged—a consequence of weakening auto replacement demand. Between 1974 and 1982, the average age of the U.S. auto stock rose from 5.7 years to 7.2 years. Some market analysts speculate that this aging stems from improvements in automobile quality and changes in driving laws (such as lowered speed limits), which have increased new-car durability. Analysts also argue that cyclical influences have played an important role in the auto-stock aging process. The cyclical component of replacement demand for new cars is often termed unfulfilled, or **pent-up**, auto demand. U.S. consumers seem to respond to what they perceive as a tem-

porary phenomenon in the economy by postponing new-car purchases beyond trend levels. Proponents of pent-up demand scenarios expect that an economic recovery that revives consumer confidence potentially could flood new-car markets with replacement auto demand as buyers revert to a long-run sales path. In the forefront of these cyclical determinants of replacement new-car sales are real personal incomes.

Income and Demand

Auto analysts long have regarded income as the most influential variable in the determination of auto sales. In the language of economics, auto sales are **income elastic**, i.e., a 1 percent decline in income causes more than a 1 percent decline in new-car sales. The link between income and new-car sales has never been precisely established. In the past, demand models for new cars assumed that the variable considered by consumers in the purchase of a new car was the current level of real disposable personal income. Early estimates of income elasticities based on current levels of per capita income fall within the wide range of 1.5 to 4.6; in other words, a 1 percent increase (decrease) in the current level of real disposable income has been associated with a 1.5 percent to 4.6 percent increase (decrease) in the total

volume of new-car sales.¹ A sizable range of income elasticities arises from differences in estimation sampling intervals, methodology, and variable specification in estimated models.

More recently, economists have argued that decisions to buy autos are based on a lifetime earnings stream, or a consumer's **permanent income**. Permanent income usually is measured as a distributive combination of current and past income values. Inasmuch as this measure distributes the impact of income over current and past earnings, these models react more slowly to cyclical fluctuations. Income elasticities of new-car sales derived from permanent income models have yielded estimates between 1.0 and 3.6.² There is no evidence that auto-demand models have been significantly improved in terms of forecast accuracy by the shift from current income levels to a permanent income approach, nor do the income-elasticity estimates appear to be unusually different. Regardless of the income approach used, estimates of income elasticities suggest eroding demand for new cars in the United States over the last three years can be explained in part as a cyclical response to slow income growth during the recessions of 1980 and 1981-82.

There seems to be a definite correlation between income growth and the size of an automobile purchased.³ Simply, consumers in the aggregate have adjusted their new-car purchase decisions for income weakness and job insecurity by buying smaller, more fuel-efficient cars. More importantly, this evidence also suggests that slow income growth not only reduces the total demand for cars by consumers, but it also weakens new-car

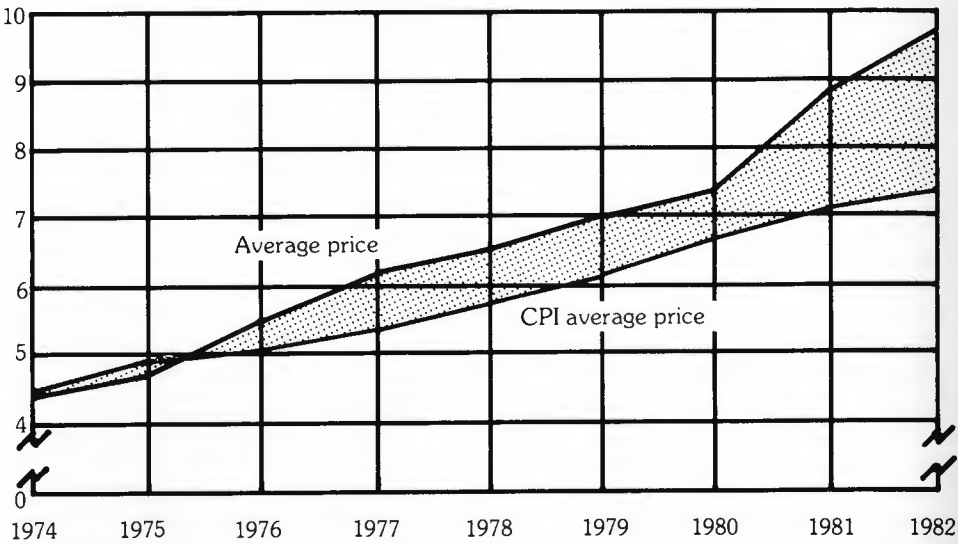
markets relative to used-car markets—an indication that the substitutability of new cars and used cars varies over the business cycle. A shift from new-car markets to used-car markets tends to increase the age of the U.S. auto stock during periods of recession and puts upward pressure on the prices of used cars.

Costs and Demand

Sticker shock has become a popular term to describe consumer reaction to the prices of new cars. While the high prices of new cars certainly have contributed to the decline in new-car demand in recent years, the impact of new-car prices probably has been overstated. The relative price of new cars probably has been falling over a long period of time and particularly since 1978. In fact, the prices of new domestic cars have risen less than the rate of inflation as measured by the consumer price index (CPI) during 14 of the past 15 years. From a price perspective, it is necessary to hold the mix and quality of the new-car market constant to isolate the influence of price change. Although this procedure (reflected in CPI-measured new-car prices) gives a more precise measure of price change, it does not accurately reflect the transactions, or purchase, price of new cars. The transactions price of cars paid by consumers may be much larger than CPI data indicate if significant changes in new-car quality and style occur over a measurement period. Chart 1 shows the average price of new cars paid by U.S. consumers and the average price represented by changes in the CPI for new cars. The differences between these two price measures are an indication of the new-car cost increases associated with changes in style and improvements in new-car quality, such as fuel-efficiency and pollution-control equipment. The average price of a new car in 1982 was \$9,750, or \$2,381 greater than a CPI-based new-car price. The 1982 price suggests that as much as 40 percent of the increase in new-car prices since 1974 resulted from improvements to car quality and changes in style.

Compared with nondurable goods, for which consuming and buying are fundamentally the same, a car is a store of

Chart 1 New-Car Price Comparisons^a
Thousands of dollars



a. New-car prices include domestic and foreign models. The CPI average new-car price represents the consumer new-car price index (1974 = 100), multiplied by the average price of new cars in 1974.

transportation services. Viewed this way, the cost of using these rendered services is more important to potential consumers than the car's purchase price. Economists have called such costs **user costs**, where new-car prices are treated as an expense over the expected life of a car rather than an expense absorbed entirely at the time of purchase. Because a car is essentially a transportation asset, user-cost methods adjust for resale value when the asset eventually is sold in a secondary market as a used car. Therefore, an increase in car prices does not translate entirely into user costs, especially if a large share of the price increase is quality-induced and either increases the car's value in the resale market or allows consumers to hold their cars for a greater length of time. An increase in car prices might slow the pace of new-car sales, but only to the extent that the increase raises user costs in terms of the depreciation level or additional interest costs.

The user-cost approach includes measures of the market rate of interest to represent the earnings opportunities foregone when a person makes a cash outlay for a car. Currently, about 75 percent of new-car purchases are financed,

which closely links the interest component of user costs to consumer lending rates. New-car loan rates have risen to average quarterly peaks of 14.8 percent in 1980, 15.9 percent in 1981, and 15.8 percent in 1982. A high real rate of interest raises the user cost to consumers and hence reduces new-car demand. As interest rates increase, however, the user cost of all durable goods rises. Other durable goods compete for a share of household wealth, and some studies have argued that a shift from other durable-goods expenditures into new-car markets occurs as interest rates rise.⁴ The net result of rising user costs on new-car demand from both price and interest-rate sources is negative but small relative to the sensitivity of income to new-car demand.

A related issue to the cost considerations of buying a new car is **affordability**. While a car might be desired at a given income-stream and over-the-life cost, the periodic monthly payments might be too prohibitive for certain household budgets to absorb. One way consumers can reduce the affordability constraint is to lengthen the borrowing

4. Hess, "A Comparison . . .," p. 698.

1. Daniel B. Suits, "The Demand for New Automobiles in the United States 1929-1956," *Review of Economics and Statistics*, vol. 40 (August 1958), pp. 273-80.
2. Alan C. Hess, "A Comparison of Automobile Demand Equations," *Econometrica*, vol. 45, no. 3 (April 1977), pp. 683-701; and Asher Tishler, "The Demand for Cars and the Price of Gasoline: The User Cost Approach," *Review of Economics and Statistics*, vol. 64, no. 2 (May 1982), pp. 184-90.
3. Tishler, "The Demand for Cars . . .," p. 188.