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AN ANALYSIS OF THE AUTOMOBILE MARKET: MODELING THE LONG-RUN DETERMINANTS OF THE DEMAND FOR AUTOMOBILES

Volume I - The Wharton EFA Automobile Demand Model

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16. Abstract

An econometric model is developed which provides long-run policy analysis and forecasting of annual trends, for U.S. auto stock, new sales, and their composition by auto size-class. The concept of "desired" (equilibrium) stock is introduced. "Desired stock" and its composition by size-class are related to numerous economic and demographic variables using cross-section data. Among them is a new "capitalized cost per mile" measure, which expresses all costs over time relative to miles driven, discounted back to the present. New registrations, total and by class, and scrappage are found to be strongly related to "desired" stock relative to actual stock, with other influences operating as "speed of adjustment" factors. Fuel efficiency is analyzed in detail, relating mpg by class to physical vehicle characteristics and technological developments. Purchase prices and options expenditures are analyzed and all cost measures distinguished by foreign vs domestic origin as well as by size-class. Volume I summarizes and describes the study, and contains a forecast through 2000. Volume II contains extensive simulation analysis, with public policy implications. Volume III contains data and methodology appendices.

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PREFACE

A research undertaking of this magnitude required the concerted efforts of many people, each of whose contributions were essential to its successful completion. The entire project was overseen by the project director, George R. Schink, who also conceived the overall structure of the model. James Savitt helped develop the approach employed, and assisted in the initial data gathering effort and equation estimation. Arthur Doud supervised the work of preparing data bases and computer systems, as well as having the main responsibilty for the international modeling effort. The exogenous projections for the model's forecasts were primarily developed by Sonia Klein. The final report was written and revised by Colin Loxley, who also was responsible for the forecast and simulation analysis. The prinicpal research assistant throughout was Brenda McCowan. Most of the typing for the final report was performed by Renee Scott. Finally, the authors wish to acknowledge the help of the TSC personnel Ron Mauri and Bob Mellman, whose critical reviews undoubtedly improved the final report. This report was originated under the Transportation Energy Efficiency Program (TEEP) at the Transportation Systems Center (TSC), under the sponsorship of the U.S. Department of Transportation, Office of the Secretary (DOT/OST). Work was completed under sponsorship of the U.S. Department of Transportation, National Highway Traffic Safety Administration (DOT/NHTSA).

METRIC CONVERSION FACTORS

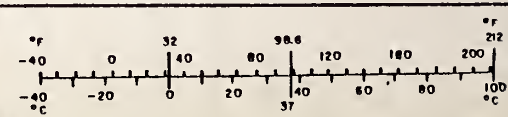
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



VOLUME I

THE WHARTON E.F.A. AUTOMOBILE DEMAND MODEL

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

1. EXECUTIVE SUMMARY

1.1 PROJECT OBJECTIVE

The primary objective of this research project was to construct a long-run econometric model of the U.S. auto market which can be used to forecast the long-run size and composition of U.S. auto demand and stock. Within the context of this project, the model will be used to generate long-run forecasts in order to study the impacts of altered assumptions concerning such factors as the efficiency and weight of new cars, gasoline prices, and automobile-related tax laws. The model will be made available to the TSC research staff for their use in ongoing forecasting and policy analysis work. To accomplish this latter objective, appropriate data files and computer simulation programs will be supplied on a computer system designated by the TSC staff.

1.2 SUMMARY OF APPROACH AND MODELING CONTRIBUTIONS

The observed cyclical fluctuations in auto market activity cannot provide an accurate guide to long-run trends. Meaningful analysis extending to the year 2000 therefore clearly requires consideration of the demographic, economic, technological, and behavioral determinants of the long-run equilibrium underlying the observed market behavior.

The critical, innovative, approach employed in the Wharton Automobile Demand Model is therefore the analysis of the "desired" auto stock and its "desired" composition by size-class. This approach was implemented using cross-sectional state data for 1972. This methodology permits the estimated equations to be interpreted as long-run, equilibrium relationships.

With the "desired" levels established the "realized"values - new registrations and scrappage - are determined by the "gap" between the desired and actual stocks. Similarly, the shares by size-class of new registrations are expressed as functions of the divergence between the desired and actual shares of stock. Hence, the mechanism linking the "desired" block to the "actual" block is a stock-adjustment process, the parameters of which were estimated from time-series data.

As is appropriate in a long-term model, the size and composition of the desired stock are strongly influenced by demographic factors. Noteable features here are our use of family-size variables in the size-class relationships, and the definition of the basic scale variable as the number of family units (rather than "households", which adds together people unlikely to jointly own a car).

A second major influence is, of course, income. However, in addition to a real income per family variable, we have refined the concept of saturation by introducing an income distribution measure, which acts to slow the demand response to increasing real incomes. Income distribution also plays a role in the size-class distribution. A further factor that we have introduced is a "trading-up" response. This is achieved by means of a variable expressing income relative to average automobile costs.

The third important element is the cost of purchasing and operating an automobile. Here we have originated a new, and we believe superior, overall measure of costs which is termed "capitalized cost per mile". This attempts to account for all costs and expenditures involved in automobile ownership, taking note of when they are incurred, and expresses the costs relative to the stream of services yielded by the auto - the miles traveled. Finally, both the time-stream of expenditures and services are discounted back to the present to reflect the lesser significance of more distant costs and benefits.

Another influence on desired stock comes from public transit usage. Although the measure used here is far from ideal, it nonetheless does represent the marginal substitution of public transportation facilities for the private automobile.

Passing from the "desired" relationships to actual or "realized" values, equations were estimated from annual time-series data relating new car sales and used car scrappage to the desired total stock, the existing stock, and current economic cyclical conditions and price movements. The age of the stock and the intensity of its use also affect scrappage. Both sales and scrappage are disaggregated by size-class and by foreign versus domestic origin.

While the user may supply his own price and fuel efficiency assumptions if desired, the model does incorporate a fully developed set of relationships for determining the components of total purchase prices, and for estimating miles per gallon by class as functions of vehicle characteristics.

Finally, subsidiary features of the model are an analysis of the used car market, concerned with total transactions and prices by vintage and by class, and a prediction of total vehicle miles traveled by the fleet of automobiles.

The primary outputs and capabilities of the Wharton Automobile Demand Model may be summarized as follows:

The model yields forecasts of -

The size and composition by size-class of the 'desired' (equilibrium) stock of autos.

New registrations, total, and by size-class.

The size, composition by size-class, and vintage distribution of scrappage.

The size, composition by class. and vintage distribution of the actual auto stock.

Vehicle miles traveled by the fleet.

Miles per gallon by size-class, and for the new and existing fleet, both EPA estimates and actual driving m.p.g. estimates.

New car base purchase prices, options expenditures, and transportation charges by size-class.

Used car prices, by size-class and by vintage, and total used car transactions.

The model can be used to analyze the impacts of -

Changes in the rate of family formation, the distribution of families by size, the age and geographic distribution of the population.

Varying rates of real income growth, employment, and inflation.

Possible tax and pricing policies affecting either purchase costs or operating expenses, such as the price of gasoline.

Changing curb weights and engine displacements, and increases in fuel consumption efficiency through technological advances or losses due to stricter emissions standards.

1.3 KEY ASPECTS OF THE WHARTON EFA AUTOMOBILE DEMAND MODEL

Each model relationship constitutes a simplified representation of behavior for a particular element of automobile demand. Just as each element does not stand alone in the "real world" neither do the model relationships. They interact extensively with each other, frequently simultaneously, such that the precise, overall impact of a given change in a causal factor cannot always be readily determined with reference to its impact on a particular element of the system.

Notwithstanding this fact, the simplest course for purposes of exposition - to catch the "flavor" of the relationships - is to take each element in turn, and describe the nature and role of the principal influences upon them. This is the purpose of this section with respect to the most important "core" elements of the model. We also discuss the general trends currently projected for each. Finally, the section concludes with an outline of how the elements interact with each other.

1.3.1 THE DETERMINANTS OF DESIRED STOCK PER FAMILY

Key behavioral aspects of the long-run stock of autos per family unit are:

--As real income per family increases, the desired stock of autos per family increases.

--The rate of increase in the stock slows substantially as the percentage of families earning in excess of $15,000 per year (in constant dollars) increases. This represents the "market saturation" factor with respect to income.

--As the number of licensed drivers per family increases, the desired number of autos per family increases. This could be termed a demographic market saturation factor.

--As the cost per vehicle mile driven increases, the desired stock of autos per family declines.

--Increased availability of mass transit leads to a reduction in the desired stock of autos.

Over the next 25 years, real income per family may well grow at a somewhat slower rate than in the past, while the percentage earning over $15,000 is expected to continue to rise. At the same almost 90% of the 16 to 74 age group now have licenses, which (given current demographic projections) suggests that the growth in licensed drivers, total and per family, will be markedly slower from 1980 onwards.

These three factors would, by themselves, tend to imply a declining rate of growth in autos per family. The outlook for real costs per mile and mass transit is more uncertain, but in the absence of dramatic technological changes a rise in the former may perhaps be considered probable, while the latter has recently reversed its historical decline in ridership. The anticipated trends in all five influences would therefore seem to imply a possible marked slowdown in the growth of the desired stock of autos.

The current outlook is for a modest increase in desired stock per family unit from 1.25 units per family in 1975 to 1.33 units by the year 2000. In fact, desired stock per family is anticipated to reach saturation by the late 1980's, remaining virtually unchanged thereafter.

Total desired stock is expected to show healthy growth through 1980 (2.7% per annum), primarily due to a recovery in real family income and a high rate of family formation. Then the rate of growth will slow to 1.8% per annum through 1985, reaching 117 million units in that year, and thereafter desired stock parallels the growth in family units, increasing at a rate of less than 1% per annum, reaching 134 million units by 2000.

1.3.2 THE DETERMINANTS OF NEW REGISTRATIONS

Variations in new car sales are largely seen as a response to fluctuations in desired stock - they are the main component in the process of adjustment to long-run equilibrum stock. Significant findings include:

- --A change in desired stock initially leads to much sharper changes in new sales.
- --Cyclical swings in income produce sharp swings in auto sales.
- --Sharp increases in new car prices tend to lead to postponement of new car purchases.
- --Increases in the rate of scrappage lead (indirectly) to increases in new car sales.

The key finding is the strength of the new car sales adjustment to changes in the desired stock. A substantial slowdown in the rate of growth of the desired auto stock will produce an even more marked slowdown in the growth of auto sales. The timing and magnitude of this change are only strongly affected by the direct impacts of income, prices, and scrappage in the short-run.

As a consequence of the forecast for desired stock, we therefore anticipate a favorable outlook for new registrations through 1981, followed by a long period of stagnation during the 1980's, and a modest revival from the late 1980's through the end of the period. From about 10 million units in 1976, sales should peak at over 12½ million units in 1981, and approach 14 million units by the year 2000.

1.3.3 THE DETERMINANTS OF SCRAPPAGE

Scrappage tends to be a cyclical phenomemon, rising in good times and falling in bad times. Key factors affecting scrappage are as follows:

- --If the desired stock falls relative to the actual stock, the rate of scrappage increases.
- --As the average age of the stock rises, the scrappage rate rises.
- --As miles driven per auto increases, the scrappage rate increases.
- --An increase in new car sales would lead (indirectly) to an increase in total scrappage.

--As the price of older cars declines relative to the price of steel scrap, the rate of scrappage increases.

Total scrappage undergoes wide fluctuations from year to year but over the longer term the many influences tend to be self-correcting. If scrappage falls, the stock's age tends to rise, pushing scrappage back up. Since scrappage is so strongly related to the desired stock, the actual stock, and new registrations, the relationship is highly simultaneous. "In equilibrium", scrappage and new sales tend to equality. The current scrappage outlook is for sharp increases from the depressed 1975 level and, in the longer run, scrappage then tends towards the level of new registrations.

1.3.4 THE DETERMINANTS OF DESIRED SHARES BY SIZE-CLASS

The dominant behavioral characteristics of the desired share relationships are:

--As the cost per mile for a given size increases relative to the average cost per mile for all other classes, that car's desired share in the stock declines.

--As the average size of a family declines, the demand for full-size cars falls relative to total demand.

--Rising incomes (relative to auto costs) implies trading-up to larger, more expensive, cars.

--As the average age of the population rises, the share of smaller cars in desired stock falls

--As the percentage of families earning in excess of $15,000 increases, the shares of luxury, and small cars (second and third cars), increase.

While the desired shares in the fleet are highly sensitive to relative purchase and operating costs, these (in the absence of special taxes designed to alter the desired composition of the fleet) may not change very radically over the next 15 years, with the notable exception of the impacts of changes in fuel efficiencies and higher gasoline prices. However, if the current slow population growth is maintained, the average size of families can be expected to decrease, tending to imply a smaller share for full-size cars than economic trends alone would indicate. At the same time, the population aged 20 to 29 years will fall, relatively, exerting a similar downward influence on the small-car shares.

1.3.5 THE DETERMINANTS OF SALES SHARES BY CLASS

The share of new car sales responds solely (in the context of the WEFA model) to changes in the desired fleet composition. A given shift in desired composition of the fleet initially produces much larger shifts in the composition of new car sales, in exactly the same type of response as that of total sales to changes in the total desired stock.

Given the assumptions that have been made about downsizing, our forecast suggests that the swing back to full-size cars that we have seen occurring in 1976 is not a temporary phenomemon, but may be expected to persist, and even gather momentum. In the absence of sharp cost increases or large fuel efficiency losses due to much more stringent pollution and safety standards, we anticipate that a smaller, more efficient, full-size car might account for a peak market share as high as 30% by the mid - 1980's with the subcompact-compact share falling below 40%, compared to 17% and 51%, respectively, for 1975.

1.3.6 MODEL INTERACTIONS

The above sections have sketched out the separate parts of the model. Let us turn now to how these fit together. The WEFA Auto Demand Model is a long-run equilibrium model. If all forces acting on the auto market were held constant, the model would tend towards an equilibrium state with actual stock constant and equal to desired stock, total registrations and scrappage constant and equal, and the class-shares of stock, new registrations, and scrappage, also constant and equal.

Now let the desired stock rise. This would (directly) occur due to a rise in income, a fall in auto operating or purchase costs, more licensed drivers per family, increasing urbanization or a decline in non-auto modes of commuting. New registrations would then increase sharply, and the scrappage rate would tend to fall. Thereafter, new registrations and total scrappage would oscillate more and more gradually about their new (higher) equilibrium levels.

Should a change occur which alters the composition of the desired stock, such as changes in auto costs, income and its distribution, family size, geographic shifts in population, or changes in age structure, then the new registrations and scrappage shares of the classes would shift. Again, the initial response would be proportionately greater than the initiating desired share changes.

Here the pattern is more complex because total desired stock also changes. Suppose a shift towards smaller (cheaper) cars occurs, then the average cost per mile of the desired stock is reduced, tending to increase desired stock, and initiating the pattern of aggregate responses already outlined.

1.4 OUTLOOK AND ANALYSIS

In this section the assumptions and results for our baseline projection are outlined, and the findings for some variations in these assumptions are presented in the form of an analysis of elasticities.

1.4.1 ASSUMPTIONS

The basic assumptions fall into three groups: demographic, economic, and auto characteristics:

The major demographic assumptions are:

<u>Slow population growth:</u> the growth-rate falls from 0.7% per annum for 1976-1985 to just over 0.3% per annum for 1995-2000.

<u>Family formation outpaces population:</u> the number of family units rises from 75.3 million in 1975 to 87.4 million in 1985 (a 1.5% per annum rate) to 100.7 million by 2000 (a 0.9% per annum rate).

<u>Families become smaller:</u> the proportion with five or more members falls sharply, while that for three or four remains constant.

<u>An ageing population:</u> the percentage between 20 and 29 years of age falls, especially after 1980.

The key economic assumptions are:1/

<u>Strong real income growth:</u> real GNP growth in excess of 5% per annum through 1978, slowing to 2% for 1979-80, stabilizing at around 3% per annum thereafter.

<u>Slowing inflation:</u> the overall G.N.P. deflator rises at around 5.5% per annum through 1980, slowing towards 4% by 1985, and reaching 3% per annum by 2000.

<u>Declining unemployment-rate:</u> unemployment falls towards a 5% rate by the mid-1980's, then slowly trends towards 3% by 2000.

<u>Slowly increasing 'real' automobile costs:</u> operating costs are expected to outpace the overall consumer price index, especially the price of gasoline - projected to increase over 20% in 1972 prices by 1985; however, 'real' purchase prices are expected to be quite stable.

The auto characteristics assumptions are:

<u>Sharply reduced weights and displacements:</u> a major domestic downsizing program, applied to each size-class in succession, reducing curb-weights about 30%, and engine displacements about 40%, by 1990.

<u>Efficiency improvements:</u> technological developments are projected to yield increases in fuel efficiency totalling 11% for 1976-80; thereafter these gains are held to 1% per annum on the assumption of more stringent pollution standards.

1.4.2 BASELINE FORECAST

The outstanding features of the forecast made on the basis of the above assumptions are:

1/ Based upon the Wharton Long-Term Econometric Model forecast, November, 1976.

Strong short-run sales demand: new registrations growth continues, especially in 1977 and 1981, the latter containing a record peak of over 12½ million units.

Slower long-term sales growth: during the 1980's new registrations show little, if any, growth, then a slow upward trend resumes, sales just reaching 14 million units in 2000.

Declining growth-rate for stock: the net result of the trends foreseen for desired stock, new registrations, and scrappage, is a total end-of-year stock of cars in operation of 132 million units by 2000. Most of the increase from the 1975 total of 97 million occurs in the first 10 years, with increments of 10 million units occurring in each of the periods 1975-1980 and 1980-1985. The remaining 15 million increase occurs after 1985, at a steadily decreasing rate.

Sustained 'large car' recovery: the shift towards mid and full-sized cars is sustained, their joint market share rising from 40% in 1975 to over 51%, while the small-car share declines from 51% to 38%, mostly at the expense of subcompacts.

1.4.3 SENSITIVITY ANALYSIS

The sensitivity of these results to changing assumptions can be analyzed by observing the percentage changes in the forecast levels that occur for a given percentage change in an exogenous assumption. This relative measure is termed an "elasticity" and provides a quantitative measure of a variable's significance.

(A) With respect to income, a 1% increase in total nominal income yields the following percentage changes:

Nominal Income Increased by 1%, 1977-2000

% Changes In:	'Short-Term' (1977)	'Long-Term' (1987)
Total New Registrations	+5.5	+0.1
Size-Class Shares:		
Subcompacts	-1.6	+0.2
Compacts	-0.5	+0.4
Mid-Size	-0.2	-0.1
Full-Size	+1.8	-0.7
Luxury	+0.4	+0.9

This simulation (discussed in detail in Chapter 5) reveals the powerful immediate impact of income on total sales, with an elasticity of 5.5. However, the adjustment is virtually instantaneous, with very slight long-run effects on total stock and sales. Initially, the income increase induces both trading-up to the more expensive cars and increased options expenditures for every class. Hence the average cost per mile increases slightly (by 0.1% in the first year). The initial 'trading-up' shifts are substantial - full-size gains by almost 2% (relative, not absolute), with subcompacts faring the worst. In the longer-run the income distribution shifts due to the higher income level. As the proportion in the $15,000 or over real income category rises, luxury gains ground, and a swing back to the smaller cars occurs, leaving the distribution of actual stock virtually unchanged, except for the slight luxury increases.

(B) The corresponding results for each 1% increase in gas prices are as follows:

Gas Price/Gallon Increases 1%, 1977-2000

% Changes In:	'Short-Term' (1977)	'Long-Term' (1987)
Total New Registrations	-0.2	-0.04
Size-Class Shares:		
Subcompacts	+0.8	+0.3
Compacts	-0.1	+0.1
Mid-Size	- -	- -
Full-Size	-0.7	-0.3
Luxury	- -	- -

Our capitalized cost per mile measures increase about 0.2% for a 1% price hike, with subcompacts at 0.18%, and full-size at 0.22. The redistribution among classes leaves compacts and mid-size with little net change, but the subcompact and full-size shares shift significantly. In the longer-run, however, it is clear that the impacts are substantially reduced. This can be seen by noting that if the long-run subcompact market share was 20%, the gasoline price increase needed to yield a 21% share (a 5% increase) would be 17% (5 ÷ 0.3). Because of the shift to cheaper cars, the average cost per mile increase is moderated to less than 0.2%, and thus the immediate effect on new registrations is not severe, while the long-run impact is very slight.

(C) In the case of an 'across the board' 1% point increase in the sales tax rate, we find the following responses:

Increase Sales Tax by 1% Point, 1977-2000

% Changes In:	'Short-Term' (1977)	'Long-Term' (1987)
Total New Registrations	-1.46	-0.10
Size-Class Shares:		
Subcompacts	+0.8	+0.6
Compacts	+0.4	+0.2
Mid-Size	+0.1	---
Full-Size	-1.0	-0.5
Luxury	-0.1	-0.1

In this example, capitalized costs per mile rise about twice as much as for the gas price increase - the elasticities vary around 0.4. Another difference is that (with the exception of luxury whose cost per mile rises over 0.5%), there is naturally less shifting in relative costs.

The main reason why the shares change so significantly is a "trading-down" response - auto costs have risen but income is unchanged. This is why the effects on the size-class distribution tend to be more enduring in the long-run. The implied behavior here is that a significant proportion of full-size buyers switch to the mid-size class which in turn loses an off-setting amount to the small-car classes, while some "marginal" compact buyers transfer to subcompacts. Nor surprisingly, the luxury share shows little response. Even with the switch to cheaper cars, we can see that new registrations are quite sensitive to purchase costs, falling about 1½% in the first year. Once again, the long-run effect is much less dramatic.

A common thread running throughout these exercises is the stabilizing nature of the model's reactions. Even substantial "exogenous" shocks are rapidly absorbed, and the long-run effects are relatively minor. In large part this stability arises from the sensitivity of the size-class shares to shifts in relative costs. This means that that any given cost increase will induce shifts towards the cheaper classes, moderating the change in average costs, and hence reducing the ultimate impacts on desired stock and new sales.

1.5 CONCLUDING REMARKS

This Executive Summary has sought to outline the structure of, and the results derived from, the Wharton Automobile Demand Model described in more comprehensive detail in the remainder of this final report.

This model was developed on behalf of the Transportation Systems Center of the Department of Transportation by Wharton Econometric Forecasting Associates, Inc. It is very large, and therefore quite complex, with some eighty stochastically estimated behavioral relationships plus some three hundred associated identities.

While size and complexity are not in themselves virtues, they permit the model to offer for analysis what we believe to be an unparalled array of detailed forecasts and policy and scenario instruments relating to the automobile market. With respect to the latter, not only do we distinguish eighteen economic variables that impact on the automobile market, but also fifteen separate demographic trends, while twelve categories of automobile taxes may be applied. Finally, the extensive analysis of fuel efficiency involves seven vehicle characteristics for each size-class.

In conclusion, therefore, the model provides both a detailed long-term market outlook and the ability to observe changes arising from the two pressing issues of great current concern: environmental policy and energy conservation policy.

2. INTRODUCTION

The main body of the report is divided into three chapters and three appendices. The key model features are discussed in Chapters 3 and 4 in Volume I, while Volume II contains the simulation analysis in Chapter 5. Details of data and estimation are in the appendices in Volume III.

The description of the model in Chapter 3 is of fundamental importance in understnading *how* the model works and *how* it was constructed, *why* we adopted this approach, *what* goes into the model in terms of assumptions and *what* comes out of the model in terms of projections.

Despite the technical nature of this report, the general reader should find the material in Chapter 3 comprehensible. Econometricians and model-builders will find a more detailed discussion and complete presentation of model equations contained in Appendix A2, Volume III.

The construction of a large and complex model inevitably requires a large volume of data. In the present instance the automobile data, in particular, required extensive organization and estimation. Two key concepts, the size classification and capitalized cost per mile, are defined and discussed in Chapter 3. Apart from this preliminary treatment, however, all the details of the data base underpinning the model are presented in Appendix A1, Volume III.

It is our belief that the scope and magnitude of this data base is such that its potential usefulness rivals that of the model itself. For instance, we compiled *57* items of information for *2,234* domestic cars (1947 to 1974) and *20* items for *982* foreign (1948 to 1975). In addition to this model-specific data we compiled aggregate data on new registrations and cars in operation, by *state* for 1969 through 1972 and for the U.S. for 1948 to 1974. Additional estimates were made for auto stocks and costs (by class) by *age* of vehicle. Selected examples of this material are presented in Appendix A1.

Chapters 4 and 5 concern themselves with *results*. Baseline forecasts through the year 2000 are presented in Chapter 4, along with observed elasticities (multipliers) for various exogenous variables (taken with repsect to this baseline). The general outlook underlying the exogenous assumptions is discussed, with the specific values involved being given in Appendix A3, Volume III.

Finally, Chapter 5 (Volume II) addresses the important issue of *"what if..."* Here we examine the implications of certain 'controlled' changes in critical factors affecting the automobile market. These simulations of alternative events--*'scenarios'*--are extremely important. For a long-term model of this type they may be considered of greater significance than any single projection.

Any particular forecast involves specific assumptions about the world 'outside' the market for autos. No matter how good the model is, the results will only be as accurate as these assumptions. The simulation analysis, on the other hand, indicates the *relative* impact of certain events and *policies* compared to what otherwise would have occurred. This allows us to deduce policy implications whose accuracy does depend upon the degree to which the model realistically reflects the behavior of the automobile market.

3. DESCRIPTION OF THE WEFA AUTO DEMAND MODEL

3.1 OBJECTIVES

The design activity of any model should include consideration of the potential research applications of the model and the requirements of the expected model user set concerning the desired outputs. Therefore, the first step in model design required a definition of the desired forecast horizon and an identification of the various relevant policy assumption variables. In structuring the model, attention was given to the various expected model users and the circumstances under which they would exercise the model. Based on these general design rules, the model of the U.S. long-run demand for autos has been structured to meet the following key criteria and characteristics:

Provide an easily useable tool for forecasting the long-run demand for autos (the auto stock), under a wide range of alternative assumptions, through the year 2000.

The long-run forecast output includes total stocks; vehicle miles driven; the composition of the stock by size class; the yearly demand for new cars and the yearly scrappage of cars, both disaggregated by size class; new car prices disaggregated by size class; and used car prices disaggregated by size class and vintage.

The equations predicting the long-run demand for autos include explanatory variables measuring income and economic activity, demographic factors, transportation system characteristics, and the real cost of owning and operating automobiles.

All model inputs are obtainable from a long-run macroeconomic forecasting model (in this case the Wharton Annual and Industry Forecasting Model); are projected by a respected independent source, such as the demographic projections made by the U.S. Census; or fall into the realm of policy variables (such as the gasoline tax), to be manipulated by the model user.

A wide range of policy variables are incorporated, including both purchase and ownership taxes, overall and by size-class; gasoline prices and taxes; changes in travel to work induced by government funded expansion of mass transit facilities; and changes in production and running costs due to environmental and safety legislation.

The model is responsive to changes in new auto characteristics insofar as they effect ownership and operating cost, such as changes in weight, engine displacement and engine type; and an analysis is made of the determinants of fuel efficiency.

3.2. MODEL OVERVIEW

3.2.1 INTRODUCTION

The Wharton E.F.A. Auto Demand Model is a <u>long-run</u> model. That is, we are concerned with the existance of, and movement towards, long-run <u>equilibrium</u> levels of auto demand. The methodology of the model at the most basic level may be characterized as a <u>stock-adjustment process</u>

towards the equilibrium state.

3.2.2. CROSS-SECTIONAL ANALYSIS - THE DESIRED STOCK

A critical concept in the model is therefore the desired stock of autos. The desired stock is measured in units of stock, and may be defined as the long-run "steady-state" level that would exist if prices, income, population, etc. were held constant. Given this concept of an equilibrium or desired stock we then estimate the flows that affect the stock of cars in operation - new registrations and scrappage - as functions of the "gap" between the desired and actual level of stock, as well as other, cyclical, variables that affect the stock's speed of adjustment in a particular year - such as income, prices, unemployment, etc.

Classical economic theory indicates that the estimation of the determinants of long-run equilibra cannot be made using time-series data. Rather, the appropriate methodology is cross-sectional analysis, at one point in time. If we wish to analyze the characteristics of the consumer's decision making, then we must hold tastes, the choice available, and technology constant.[1/] In addition, the cross-sectional approach offers much greater variation (across states) in such critical factors as demographic characteristics and the relative costs of auto

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1/ For an early study of this kind relating to autos see F.M.Fisher, Z. Griliches and C. Kaysen, "The Costs of Automobile Model Changes Since 1949", Journal of Political Economy, Vol. LXX (October, 1962) No. 5, pp. 433-451.

operation and ownership than does time-series analysis.[1] This greater within-sample variation of the cross-sectional data offers a much wider potential range of applicability for forecasting and simulation.

3.2.3. DECISION MAKERS - THE FAMILY UNIT

Throughout the model our decision-maker is taken as the family unit. Clearly per capita variables are not appropriate - auto demand would then be principally determined by the age and sex distribution of the population. However the substitution of number of family units for number of households as the basic scale variable deserves special attention. Households are defined by the U.S. Census Bureau as "all persons who occupy a housing unit" ...A household includes the related family members and all the unrelated persons, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone or a group of unrelated persons sharing the same unit as partners is also counted as a household.[2] Since households include as a single unit individuals who most likely would not jointly own cars, households was rejected as the "scale variable". Instead, the number of family units (FM) was chosen as the "scale variable". We have

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1/ As observed by Charlotte Chamberlain in her study, A Preliminary Model of Auto Choice by Class of Car: Aggregate State Data, #DP-SP-26 TSC, Department of Transportation, Cambridge, Mass., (March 1974, unpublished)

2/ Statistical Abstract of The United States, 1975, U.S. Department of Commerce, Bureau of The Census, p. 3.

defined family units as the number of families plus the number of unrelated individuals. These two series are defined by the U.S. Census Bureau as follows: 1/

> Family - The term "family" refers to a group of two or more persons related by blood, marriage, or adoption who reside together in a household.
>
> Unrelated Individuals - "Unrelated Individuals" refers to persons (other than inmates of institutions)who are not living with any relatives.

We believe that family units, defined as the sum of the number of families and the number of unrelated individuals, is a better measure of the number of decision units involved in the auto market than would be the number of households.

3.2.4. STOCK - SHARE APPROACH

Our methodology distinguishes a two-stage, sequential decision process. In the first, the level of desired stock per family unit is determined--the chosen number of (undifferentiated) units. In the second stage, given a purchasing decision, we analyze the choice between classes of autos, this being a question of substitution and the comparison of relative characteristics. The correct approach in a case of this kind is a "shares" formulation, herein developed as a logit-style model, i.e. the estimated

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1/ Statistical Abstract of The United States, 1975, U.S. Department of Commerce, Bureau of The Census, p. 3.

variable is the class "odds" (share X divided by one minus X).[1/]

Concerning the correct analysis of class shares, while we agree with Chamberlain that equations estimated across states yield predictions of "desired" or "long-run" adjustments to changes in the explanatory variables, we disagree with her choice of single year new car sales shares as a dependent variable.[2/] Ideally what should be explained by the equation is desired composition of the stock. Observed sales compostion in the state for any given year may not reflect desired composition of the stock. However, we know why Chamberlain chose to explain sales share rather than stock share, namely, R.L. Polk and Co. did not produce a useful breakdown of stock by state by year.[3/]

We feel that the desired stock composition may be approximated

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1/ Numerous examples exist of this standard logit approach based on discrete choice models having explicit microeconomic foundations. Some selected references are: D. McFadden, "Conditional Logit Analysis of Qualitative Choice Behaviour", in Frontiers in Econometrics, ed. P. Zarembka, Academic Press, New York, 1975, pp. 105-142; M. Baughman and P. Joskow "The Effects of Fuel Prices on Residential Appliance Choice in The United States," Land Economics, Vol. 50, No. 1, pp. 41-49, February 1974; and an early application to autos: M.J. Farrell, "The Demand for Motor-Cars in The United States", Journal of The Royal Statistical Society, Vol. 117, pp. 171-193, 1954. Studies of this type employ cross-sectional data, interpreting the results as long-run equilibrium stock levels, with inter-class substitution, and, as in our approach, we have a clear analogy to a long-run investment model.

2/ A Preliminary Model of Auto Choice (op. cit.)

3/ R.L. Polk and Co. is the sole source of regional detailed information on autos and has recently started producing a breakdown of the auto stock by size class but 1975 is the first year for which these data will be available by state.

by averaging sales shares over a number of years.[1] We have chosen to estimate desired (or long run equilibrium) auto stock and auto stock composition from aggregate state data for 1972. The year 1972 was chosen as it was the most recent year prior to the "oil crisis". Earlier years were ruled out due to the recent emergence of compacts (early 1960's) and subcompacts (late 1960's) which are destined to account for an increasing share of the stock in the face of expected further increases in fuel costs.

Given that the year 1972 followed several years of quite stable income and economic activity (excepting the minor recession in early 1970) and that no dramatic relative price changes had occurred, one can assert that total stock of autos by state (K_S) was close to its equilibrium value (K_S^*). To approximate the desired shares (SHR^*_{sc}) of the stock in 1972, the share of new car sales by class over the period 1971 to 1972 is computed as follows:[2]

$$SHR^*_{s,c} = \frac{\sum_{t=1971}^{1972} AN_{s,c,t}}{\sum_{t=1971}^{1972} \left(\sum_{c} AN_{s,c,t}\right)}$$

where $AN_{s,c,t}$ is new car sales within state s of class c in year t.

The "desired" stock by state and class (in 1972) is thus defined as:

1/ Initially we had planned to use sales shares from 1969 to 1972. However, upon close examination of the data by state 1969 to 1972 and for the U.S. 1969 to 1972, we decided that including the two earlier years would bias the desired share of subcompacts downward (vis-a-vis compacts) even though the combined subcompact-compact share was quite stable.

2/ The empirical measure is therefore close to that used by Chamberlain; desired shares are approximated using 1971 and 1972 sales.

$$K^{*}_{s,c} = (SHR^{*}_{s,c}) * (K^{*}_{s})$$

3.2.5. SIZE CLASS DEFINITIONS

The "shares of stock" procedure is intuitively straightforward. In addition, of course, we must have shares of actual stock and new registrations (and scrappage) for the time-series analysis of the stock adjustment process. We therefore require a straightforward and unambiguous way to divide up these stocks and flows. The definition of the size classes is therefore crucial to the analysis. The allocation scheme must be such that the criteria for a particular class are constant throughout the study. Whatever kind of scheme is considered, these criteria must be different from other possible explanatory variables in the share equation. For example, if wheelbase were the only classification criterion, then wheelbase should not appear on the right-hand side of the regression equation, since that would result in an identification problem.

The criteria for selection are in fact multi-dimensional, which would seem to allow a limited set of criterion variables to appear on the right-hand side. An appropriate disaggregation appeared to be to divide automobiles into five classes: subcompacts, compacts, mid-size, full-size, and luxury cars. The criterion for allocation is primarily, but not entirely, wheelbase.[1/] Price, overall dimensions, and estimated seating

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[1/] We had originally planned to use a measure of seating capacity, but found intractible the construction of such a series over the period 1948 to 1974 for domestic and foreign cars. Price is clearly what distinguishes the luxury class.

capacity also play a role. However, wheelbase plus any one of the other characteristics will very likely yield the correct classification. The classification is one that we feel is reasonably intuitive. Further, it minimizes the number of potential misclassifications. It should be stressed, however, that the wheelbase criteria is essentially a proxy measure of seating capacity and internal dimensions 1/ (excepting luxury). It may be noted that the classification scheme is in approximate conformity with that of Chamberlain 2/ who used a price classification.

The classification scheme has its primary justification in an empirical as well as a theoretical sense. Essentially, cars within a particular class compete more closely than cars in distinct classes, i.e. the interclass elasticity of substitution is lower than the intra-class elasticity. This fact should make sense in so far as the classification was set up to distinguish among different types of vehicles.

While numerous borderline decisions were made in classifying specific cars, 3/ we shall concentrate here on the general rules followed. The general rules for defining the size class shares are as follows:

<u>Subcompacts:</u> All cars with a wheelbase of 100 inches or less (excluding luxury cars).

<u>Compacts:</u> All cars with a wheelbase greater than 100 inches and less than or equal to 111 inches (excluding luxury cars).

1/ Hence the new 1977 General Motors full-size models retain the full-size classification despite the wheelbase reductions.

2/ <u>A Preliminary Model of Auto Choice</u> (op. cit.)

3/ For a detailed discussion see Appendix A1, page A1-4.

Domestic Mid-Size Cars: All cars with a wheelbase greater than 111 inches and less than or equal to 118 inches (excluding luxury cars) - only domestic cars are given this classification.[1/]

Domestic Full-Size Cars: All cars with a wheelbase greater than 118 inches (excluding luxury cars) - only domestic cars are given this class designation.[1/]

Luxury Cars: Since the basis for this is price, the cut-off is somewhat arbitrary. However, the lowest price cars in this class are generally (for domestics) the Buick Electra 225, the Oldsmobile 98, and the Chrysler New Yorker. Foreign cars with a price greater than or equal to the lower priced member of the cars mentioned above are included in this class.[1/]

3.2.6. STRUCTURAL RELATIONSHIPS

For the year 1972, we employed state data to estimate cross-sectional relationships explaining the long-run influence of auto costs, income, demographic factors and transportation system characteristics on total stock and its share-composition by size class. One would, of course, expect auto costs and the availability of public transportation facilities to be negatively related to the desired total stock. Demographic factors would vary--some possibly having positive effects, others negative.

Income would be expected to be a positive influence - but not to a limitless extent. It seems to us reasonable to postulate a "saturation" effect: beyond a certain point further income increases would lead to

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[1/] There are therefore only three foreign car categories. The reader is again referred to page A1-4 for details.

little or no addition to desired stock. To capture this concept, the percentage of families earning $15,000 or more (measured in 1970$) was introduced - this figure having been suggested by a number of surveys.[1/]

It could be argued that desired stock should primarily be considered a function of some concept of desired total vehicle miles (VMT). Initially we had planned to test this hypothesis by estimating a function for desired VMT, but the only data available on a state by state basis are VMT for all vehicles (including trucks, buses, etc.) and these proved totally unsatisfactory. The total stock equation may then be viewed as a reduced form, if you will, the determinants of desired VMT affecting the stock directly.

The size-class shares were estimated as functions of the same types of variables as the total stock, with one difference being that relative costs were employed: the cost for class *X* relative to the average cost for all other classes except *X*. A second distinction deals with the "income effect" phenomenon. If auto costs rise one's real income with respect to auto costs is reduced: thus, if costs for each class rose by equal proportions one would expect some "trading down" (e.g. from a full size to a mid-size) might well take place. To capture this effect the ratio of dollar income to average cost was introduced.

1/ See Marketing and Mobility, Report of a panel of the Inter Agency Task Force on Motor Vehicle Goals beyond 1980, March 1976, pp. 2-19 to 2-32 for a review of these surveys.

It is worth re-stating that the major "decision-making" process takes place in these cross-sectional components of the model. Once satisfactorily estimated, these then had to be "translated" into the time-domain. This involves an important "heroic assumption": that we have correctly identified a sufficiently large and detailed set of characteristics affecting auto demand that the behaviour of the U.S. over time will match that of the states - i.e. that the two are equivalent in estimated behaviour.

In principle this translation is straightforward, involving the substitution of the appropriate time-series variable for the cross-sectional measure initially employed. In practice the desired share equations had to be adjusted to reflect the drastically different supply situation - the consumer choice set - over the historical period (recall that the behaviour was estimated with the consumer facing 1972 alternatives). The details are given in Section 3.3, but, as one would expect, primarily involved the lack of subcompact and compact offerings in earlier years.

The remainder of the model is estimated on the basis of an annual time-series sample. Total new registrations shares of new registrations by class and used car scrappage are all estimated primarily as functions of the relationship between desired and actual stocks. One would expect the relationships between these flows and any divergence in stocks to be a powerful one because they are small relative to the total stock.[1/]

1/ For an illustration, see next section.

Other, essentially cyclical, variables enter these equations, these being interpreted as primarily "speed of adjustment" factors.

Completing the model structure we have an equation estimating vehicle miles traveled; an analysis of the used car market; and the estimation of all components of auto prices and costs necessary for the derivation of the cost concept employed in this study.

3.2.7 THE COST PER MILE CONCEPT

The concept of auto costs developed for this study appears quite original, and is of critical importance for the model. It is, therefore, deserving of special notice. It appeared to us that previously used measures were faulty in one respect or another insofar as their conceptual foundations were concerned. We consider there to be three primary elements to a conceptually correct approach.

Firstly, an automobile, as a consumer durable item and an important capital investment, should be analyzed analogously to any other piece of capital "equipment" that incurs costs and yields benefits over time, i.e., a "present value" method is appropriate. This technique involves "discounting"--i.e., giving less weight to--both costs and benefits that occur in the future. The further ahead they are incurred, the less significance is attached to them. Costs incurred today are more significant because they involve the sacrifice of present consumption--their opportunity cost is greater. Similarly, benefits accruing today are of greater value than those anticipated at some point in the future.

For the purpose of discounting we have assumed the economic vehicle life to be ten years. For each year we have computed the relevant costs.[1/] These cost streams are then discounted back to present value terms. At the same time we have assumed a lifetime mileage of 100,000 miles, with higher per year mileage being driven in the earlier years. This stream of services (miles traveled) is also discounted back (at the same rate) and divided into capitalized costs. The result is the measure that we term "capitalized cost per mile."

The second issue concerns the conceptual viewpoint from which one considers the costs (and benefits) of owning and operating a vehicle. In our view all costs incurred over the economic vehicle life must be accounted for in the analysis, and not only those faced by any one owner, such as the new car buyer. Since the resulting measure will not correspond to that faced by any specific

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[1/] The capitalized cost per mile calculation is quite complex. For all details concerning the computational procedures and assumptions employed the reader is referred to Appendix A1, Section A1.4.3., page A1-15.

individual, this equilibrium concept of capitalized cost per mile might be somewhat more loosely characterized as an index of "social" or "society" cost.

The third issue is the somewhat more pragmatic one of precisely how the costs of purchase and operation should be evaluated in each year. This clearly is an important issue, however, since we do wish to consider all costs and, most importantly, to "weight" each of them appropriately relative to their economic significance. The procedure we have adopted places the purchase cost completely in the initial year, with computed costs of financing, gasoline consumption, insurance, etc., for each year.[1/]

The components of auto costs are, in the main, predicted endogenous variables. There are equations (for all eight classes) explaining base sticker prices, options expenditures, and transportation charges. Taxes are computed by identity, given the exogenous/policy variable level of the overall purchase tax rate. These are the components of total purchase cost. For operating cost, we exogenously project cost indexes for every component <u>except</u> gasoline consumption.

[1/] The precise methodology was arrived at after extensive discussions with TSC staff, see Appendix A1, page A1-23.

Gasoline consumption is subject to detailed analysis. Estimates of miles per gallon (MPG) were constructed for each class,[1/] and relationships estimated expressing fuel efficiency as a function of weight, engine displacement, and other characteristics. These physical characteristics are exogenously projected, yielding forecasts of MPG by class,[2/] which then feed into the cost per mile calculations.

3.3 MODEL STRUCTURE

3.3.1 OUTLINE

At its most basic level the 'skeleton' of the model can be characterized by the following elements:

--Desired Stock

--Desired Stock by Size-Class

--New Registrations

--New Registrations by Size-Class

--Scrappage

[1/] See Section A1.4.2, page A1-8, and Appendix A2, page A2- 16 .

[2/] TSC staff actively participated in making these projections. We have also estimated linking equations yielding E.P.A. estimates, see 3.3.6, below.

All other components may be regarded as subordinate to the above, even though they may be very important in their own right.

The model operates as follows.[1/] We forecast or exogenously project every element of auto costs--including fuel efficiency. From these components,[2/] capitalized cost per mile by class is computed. Then desired stock size-class shares are determined on the basis of relative costs per mile, income relative to auto costs, income distribution, and such demographic factors as the size of families, and the population distribution by age and by geographic location. These desired shares were estimated cross-sectionally to derive equilibrium relationships.

Using these desired shares as weights an average cost per mile is computed, and this average, together with permanent income, income distribution, drivers per family, the population percentage in metropolitan areas, and the numbers of people using non-auto transportation to work, determines the total desired stock per family. This relationship was similarly estimated from cross-sectional data.

All other components of the model were estimated with time series. The addition to the stock of autos, total new registrations, is determined primarily by the relationship between desired and actual stock. When desired rises above the actual, new registrations increase (and vice-versa). The growth in real income and an index of purchase costs also have direct effects on total new registrations. New registrations shares by class are

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[1/] Schematic diagrams are presented in Section 3.5, below.

[2/] Estimated from time-series data.

entirely determined by the desired - actual stock relationship alone; with domestic and foreign shares of new registrations also specified by class.

In order to determine current actual stocks for the new registrations analysis we must also estimate scrappage. This is again strongly affected by the desired-actual stock ratio (if desired rises relative to actual, scrappage declines). Scrappage is also strongly affected by the average age of the current stock and by changes over time in average mileage per vehicle. The unemployment rate and old car prices relative to scrap metal prices are cyclical influences. Scrappage by class is computed by identity once the total is defined.

Total vehicle miles per family is estimated in terms of the deviation from its trend value (which is a function of the vintage composition of the stock). This is strongly influenced by fleet gasoline costs, permanent income, and income distribution. This estimate feeds into scrappage as mentioned above.

The used car market analyses both purchases and a variety of price measures, with past and present new registrations and new car prices being the primary influences. These used car prices then determine the old car average price that enters the scrappage equation.

3.3.2 DESIRED STOCK

With this outline of the logical structure and estimated relationships in place, we now proceed to consider these estimates in more detail.[1/] Turning first to the desired stock per family unit, this equation is presented in Table 3-1, page 3-37.

As expected, the primary determinant is real disposable family income, which has a strong positive relationship with desired stock.[2/] However, as discussed above, we hypothesized a "saturation effect," and this is supported by the negative impact of the percentage of families with real incomes of $15,000 or more.[3/]

The second key variable is real capitalized cost per mile(desired-share-weighted average) which has the expected strong negative impact on desired stock. Thirdly, licensed drivers per family unit, not surprisingly, has a strong significant, positive impact.[4/] Note that this variable is automatically 'bounded' by total family size and hence is more significant historically than in a forecast sense.

The availability of public transit is represented by the number of persons (per family) using non-auto transportation to work.[5/]

[1/] As this detail is presented the reader should refer back to the above introduction and to the methodology discussion of the preceding section.

[2/] This section presents a summary discussion. For a complete treatment of the equation estimates, evaluation of results and alternatives examined, the reader is referred to Appendix A.2.

[3/] The offsetting effect of PER15+ cannot readily be evaluated since it itself is a (positive) function of income.

[4/] Licensed drivers relative to the driving age population has been rising by a pure logarithmic time trend. No behavioral or economic influences had any effect. Thus licensed drivers is exogenous (projected by the above trend).

[5/] Public transit availability data are not produced consistently by state. We elected not to model non-auto travel to work due to the data problems.

This "commuting" measure has a relatively minor negative influence on stock; however, since it has sharply declined historically, it has a potential for significant future effect.

Finally, the metropolitan population has a slight positive impact, this percentage reflecting large suburban ring populations which tend to have above-average numbers of cars per family. Again, this variable's future influence is somewhat limited since it has already reached 75% for the U.S.

In the estimation of desired shares by class (Table 3-1, page 3-37) we modeled the small car share (subcompacts and compacts) jointly, the subcompacts share relative to combined small cars, and the mid-size, full-size, and luxury shares.[1/]

Relative cost per mile--own cost over other cost--is by far the most important factor in all the share equations except luxury, having a significant negative effect throughout. The second important factor is income relative to average costs per mile. This represents the "trading down" effect of general cost inflation hypothesized in Section 3.2 (and the converse: increasing affluence relative to auto costs implies "trading up"). Full size suffers the most from "trading down", with compacts gaining the most, and mid-size having a weak tendancy for a small net loss. Luxury cars are not affected, as might be expected.

[1/] The combination was made only after extensive experimentation. Conceivably this form was superior because subcompacts and compacts are closer competitors than the other classes. We experimented with combining mid-size and full-size with no success.

Next in general significance are various demographic factors. Increasing numbers of 3 and 4 member families increase the mid-size share, primarily at the expense of full-sized cars but the percent of families with 5 or more members has a positive effect on full-sized. People between the ages of 20 and 29 years have a strong preference for "sporty" small cars, and a slight preference for subcompacts within that group. The number of licensed drivers per family also tends to strongly increase the subcompact share (more second and third cars). The metropolitan population tends to buy somewhat more luxury cars.

Income distribution strongly affects some classes. Higher income families buy significantly more luxury cars, at the expense of full-size, and also buy more (second and third) small cars.[1/] Finally, as is obvious from inspection of Table 3-1, we had to include regional dummy variables (defined to coincide with the 9 census regions) in all the desired share equations except the full-size share equation. These regional dummies suggest the following:

> New England consumers demonstrate a stronger preference for smaller cars (subcompact, compact, and mid-size) and purchase a smaller share of luxury cars than would be expected given income, costs, and demographic factors.
>
> Mountain and Pacific Region consumers purchase a larger share of combined subcompacts and compacts and a larger share of subcompacts within the combined subcompact and compact share than would be expected given income, costs, and demographic factors. Consumers in the mountain region also purchase fewer mid-size cars than would be expected given the other variables.

1/ "Unscrambled" elasticities are also presented in Table 3-1, page 3-39.

West South Central Region consumers purchase fewer small cars (subcompacts, compacts, and mid-size) and more luxury cars than would be expected given income, costs, and demographic factors.

3.3.3 TRANSLATION TO TIME SERIES

The equations described above were estimated for the 1972 cross-section. They therefore had to be "translated" into the time domain. The logical way to do this procedure is to first translate the desired share equations, and then the desired stock equation since the causality between these groups of equations (so ordered) is strictly recursive.[1/] The first step in converting the desired share equations to the time domain involved substitution of percent of population living in a given census region for the 0 or 1 regional dummies used in estimating the equations. Then, historical time-series values were similarly substituted for the other variables.

Now, as noted in Section 3.2, the long-run relationships were estimated, conceptually, with the consumer facing the 1972 model offerings. Therefore, the desired share by size class equations were adjusted over the historical period to reflect the following factors:

1. Combined Subcompact and Compact Share

    a. Adjust equation downward in 1969 and 1968 backward to reflect lack of supply of U.S. subcompacts.

    b. Adjust equation downward in 1959 and 1958 back to reflect lack of supply of U.S. compacts.

[1/] The desired share equations are highly simultaneous among themselves, but are not directly influenced by the size of the desired stock which itself is influenced by the desired shares within the stock.

2. Subcompact Share of Combined Subcompact and Compact Share

   a. Adjust equation steadily downward between 1971 and 1967 (as you go backwards) to reflect the disappearance of U.S. subcompact supply and the disappearance of Toyota and Datsun as major suppliers in the market. Surprisingly the adjustment was no longer necessary by 1963 (again as one goes back) suggesting that economic, cost, and demographic factors were not favorable to subcompacts.

3. Shift to Ford, Chevrolet, and Plymouth from Full-Size to Mid-Size Between 1964 and 1959 (again going backwards)

   a. This required a gradual upward shift in the mid-size share which was held constant from 1958 back and an opposite downward shift in the full-size group which was also held constant from 1958 back.

4. The Luxury Share Equations exhibited a steady but small upward bias from 1968 backwards. As a result, this equation was adjusted downward by 0.0125 from this point backward.

The final projected desired shares by size class are shown in Table 3-2, page 3-42.[1/]

Given the estimated desired shares over time, extrapolating the desired stock backward over time required that the value for the variable PER15+ (percentage of families earning in excess of $15,000 in 1970 dollars) not be permitted to fall below 20% since as this variable declines to very low levels (5% in 1954), the desired stock of autos

[1/] All share equation estimates go through the process of reconciliation so that the adjusted summation equals one. This is done by summing all classes (except luxury)and dividing the unadjusted shares (except luxury) by their unadjusted sum divided by one minus luxury's share. Luxury is excluded because the share and its fluctuations are so small.

rises, failing to decline to a sensible level.

By imposing the constraint that the value of PER15+ entering the equation not be allowed to fall below 20%, the equation produced a very sensible time series for the desired stock. The intent in including the variable (PER15+) in the desired stock equation was to capture the income saturation effect; not to suggest that as this variable fell to its low historical levels that the desired stock would be held up at high levels. For the purposes of forecasting, in order to guarantee that increases in income can never lead to reductions in the desired stock (by increasing PER15+) we have imposed, in the model coding, the constraint that if the negative impact of PER15+ more than offsets the positive influence of permanent income the net effect is set to zero. The estimated 'historical' desired stock is given in Table 3-3, page 3-43.

3.3.4 NEW REGISTRATIONS AND SCRAPPAGE

On the basis of these desired shares and stock series, the total new registrations equation was estimated using time series (Table 3-4, page 3-44). Total new registrations respond strongly to changes in the desired stock, with a positive elasticity of 3.8.

The dynamics of this equation are of interest. If the actual and desired stock were in equilibrium at 100.0 million units the previous year, and new registrations and scrappage (last year) were 10.0 million units, a 10% increase in the desired stock implies a desired increase to 110.0 million units. New car sales would increase to 14 million units the first year which, if scrappage were to remain at 10 million units, would lead to an end of year stock of 104 million units. In the second year, new registrations would decline from 14 million but would remain well above 10 million. This process would continue until the actual and desired stock were in equilibrium. However, the new equilibrium stock would be 110 million units which, assuming an expected life of a car of 10 years, would ultimately lead to equilibrium new registration and scrappage of 11 million units. Somewhere in time between the initial increase in desired stock and the final equilibrium, new registrations could be expected to fall below 11 million units, and possibly below 10 million units, because the initial jump in new car sales would produce a younger than "average" stock and lower than "normal" scrappage thus requiring fewer new car sales to maintain the desired stock level.

Family income relative to past trends is an important positive factor, with a high elasticity of over 6 (however, the elasticity with respect to changes in this year's income is less than 4). The ratio of PUTOTNRL to PUTOTNR (-1) represents a "chain link" price index of new car prices.[1/] When this chain link index increases by 1%, representing pure price inflation, new registrations are reduced by 1.3%.

Total auto scrappage less "given" scrappage (21 year old cars which are, by assumption, removed from cars in operation), also strongly

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[1/] A ratio of current year car prices weighted by last year's sales weights relative to last year's car prices also weighted by last year's sales weights.

responds (in a negative fashion) to increases in the desired stock, as may be seen in Table 3-4, page 3-44, (a 1% increase in the desired stock leads to a 3.8% decrease in scrappage). Therefore, the initial scrappage response to changes in desired stock (ceteois paribus") is similar in magnitude to that for new registrations. The simultaneity between new registrations and scrappage should be emphasized. If scrappage increases, new registrations rise, and vice versa. Similarly, an increase in sales will tend to push scrappage upward, other things being equal. This feedback process rapidly converges to a consistent solution.

A very powerful effect on scrappage is exerted by trends in driving habits. The impact may be summarized by saying that if miles driven per vehicle increased at a steady 1% per annum then the scrappage rate would increase by just over 3% per annum.

Since scrappage rates by vintage vary directly with vehicle age, the strong relationship with the average age of the current stock is almost inevitable. The estimated elasticity is 2.9, but of course the average age is quite stable.

Finally, two variables having minor impacts are the unemployment rate and the price of old cars relative to scrap metal prices. Both tend to slightly reduce the scrappage rate and both are essentially cyclical influences.

For the new registrations shares by size-class the basic philosophy behind the specification of the equations is that the sales share responds to changes in the desired stock share, and that the strength of that response is dependent on how far away the existing stock shares (after scrappage) are from the desired shares. Basically, the closer the composition of the existing stock to the desired composition of the stock, the smaller the shifts expected in the new car sales shares and vice versa.

The equation estimates are presented in Table 3-5, page 3-46. The constrained forms of the equations assume an elasticity of one for the log of the desired odds variable, with the differences between the log of the stock share odds and the log of the desired share odds entering with the expected negative signs. (If the existing stock share is higher than the desired share, the sales share is less than the desired share and vice versa). The constrained forms were estimated because in equilibrium one expects the new registrations share to move directly proportionately with the desired stock share.

Scrappage shares by class are computed directly by identity, given the scrappage rates that were developed (see Appendix A1).

Finally, domestic and foreign shares of new registrations are specified. Although several different forms were estimated for these equations, both over time and cross-section, these relationships were judged unsatisfactory.[1/] We felt that the behaviour was unstable, and

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[1/] See Appendix A2.

that even though past trends could be 'explained' satisfactorily (in terms of statistical measures) the implied relationships were not theoretically valid. Domestic and foreign shares are therefore specified exogenously for the subcompact, compact and luxury classes, to be varied or modeled by the user.

3.3.5 VEHICLE MILES TRAVELED[1/]

To estimate vehicle miles traveled (VMT) per family we adopted a classical demand approach, viewing this as the utilization of the stock of autos per family. We therefore adjusted for the variation in VMT that is due to a changing vintage distribution of the stock--we are not attempting to explain changes in the stock but changes in the intensity of use, given the existing stock.

Real gas cost per mile has a strong negative influence on vehicle miles per family, with an elasticity of 0.24. Note that gasoline cost was computed using our estimate of average actual miles per gallon for the existing fleet.[2/]

We again found income distribution (PER15+) and real income per family to be interrelated. VMT was positively affected by PER15+ and negatively related to permanent income. When income rises, PER15+ will normally increase faster, yielding a net positive effect.

[1/] See Appendix A2 for the detailed equation discussions of this and following sections.

[2/] Since the gas price increase will increase the smaller cars' new registrations share, average fuel efficiency would (slowly) rise.

3.3.6 MILES PER GALLON

As detailed in Appendix A1 we have computed the historical values for MPG by class from individual model mpg estimated using pooled cross-sectional data. For forecasting we also had to estimate the corresponding class relationships over time.[1/] Therefore, the city and highway mpg by class was related to the average class curb weight, engine displacement, fraction with automatic transmission (and fraction with overdrive for highway mpg), and the fractions with 4 and 6 cylinder engines.

The results are very similar to those obtained from the cross-section (which was the hoped for result). Inertial weight (curb weight + 300 lbs.) has the strongest (negative) effect, with an elasticity of 0.47 for city and 0.33 for highway. Engine displacement is the second most significant (negative) factor with elasticities of 0.19 and 0.17, respectively. The most substantial positive effect comes from 4-cylinder engines (versus the 'normal' 8-cylinder), with elasticities of 0.115 and 0.124, respectively.

To provide additional useful model outputs we estimated linking relationships translating our estimates of actual driving mpg into their EPA equivalents. The greatest disparity was for city mileage, with the EPA being much higher (over 30% too high). We found foreign cars

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[1/] Since the class mpg's are sales-weighted harmonic means versus arithmetic averages for the other variables, the class relationships do not have an automatic correspondence to those for individual models.

received significantly lower EPA city ratings, by an average 2 mpg.[1/] A weak tendency for slightly lower full-size ratings was also indicated.

Highway mpg estimates coincide more closely, with slightly higher subcompact and compact ratings relative to other sizes being indicated. Interestingly, the elasticities were approximately one in both equations,[2/] i.e., the EPA measure and ours tend to change by the same proportions.

3.3.7 NEW CAR PRICES

For the domestic industry, base purchase prices are expressed as a function of production costs, in the form of a weighted index of auto industry inputs. A similar form was used for our options price series. These equations thus represent prices as a mark-up over costs.

The cost-elasticity for base prices was found to be virtually one, quite reasonably, with a further 'expectations' effect--an elasticity of 0.43 on the change in costs. For the options price series the cost-elasticity was lower (0.8) reflecting the tendency for options prices to fall relative to other costs.

Foreign base prices were estimated as a function of an average import-cost index whose components were the export prices of the six

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[1/] Consistent with motoring media remarks that domestics have been better at "playing the EPA game." See Consumer Reports, June 1976.

[2/] Evaluated at the mean.

major countries (Germany and Japan dominate). Not unreasonably, the elasticities were lowest for subcompacts (0.7), highest for luxury (1.1), with compacts intermediate (0.9).

Consumers' options expenditures are expressed as a function of "permanent" income per family and the 'real' maximum options price. The form in which the equations were estimated expressed actual expenditures relative to maximum options cost, in an "odds" formulation. This prevents expenditures from exceeding the estimated maximum. The cost coefficients range from 4.6 to 0.6, while for income they vary from 1.7 to 2.9. For subcompacts PER15+ was found to have a negative impact, offsetting the high income elasticity.

Finally, the last component of pre-tax new car purchase costs, transportation charges, were estimated as a straightforward function of the U.S. transportation price index. The elasticities ranged from 1.2 for subcompacts and luxury to the essentially equivalent levels of 1.8, 1.6, and 1.7 for compacts, mid-size, and full-size respectively.

3.3.8 USED CAR PRICES

Our approach here is to estimate the relative price of one year old cars with respect to new car prices. Given these we then generate successive price-relatives (for a car aged i versus age i-1).[1/]

1/ The complete exposition and data development is contained in Appendix A1.

An intermediate step was the generation of used car volume estimates as a function of the change in new car sales (positive) and past trends in sales (negative), i.e., a sustained increase reduces used car sales versus the positive effect of a one-year upswing.

The price-relatives for each class all rise when used car sales are high vis-a-vis new car sales, a reasonable finding. Changes in new car prices tend to increase the price-relatives for subcompacts and compacts, implying a substitution of used for new car purchases, but decrease them for mid-size, full-size and luxury. Thus large car buyers are less sensitive to new car price increases, fewer are deterred from buying new cars, hence the used car price does not rise proportionately to the new car price increase. Finally, for compacts and mid-size an increase in new car sales share tends to increase used car prices.

Two vintage-weighted average price series were computed. The first, for cars eight years old and over, enters into the scrappage equation; the second, for all cars, was related to the Automotive News average wholesale price. The close correspondence found between the two validates, to some extent, the methodology employed.

3.4 MODEL INPUTS AND OUTPUTS

While the model inputs and outputs have been discussed, both in general terms and with reference to specific equations, it is useful to present them in a collected form to give the more general reader a better grasp of what drives the model and what the model yields in terms of results.

A description of the model outputs is given in Table 3-6, page 3-48. Note that most of these outputs are distinguished by size-class. These classes are defined in Section 3.1, above. The variables can be grouped into two main categories:

(1) Desired long-run equilibrium variables,

(2) Yearly realization variables.

The former variables represent the long-run equilibrium values toward which the yearly realization variables adjust. The values of these long-run equilibrium (desired) variables change in response to changes in income and economic activity variables, demographic variables, public transportation system usage, new auto characteristics, and operation and ownership-related prices. Movements in the yearly realization variables are strongly related to movements in the corresponding long-run equilibrium variables (e.g., total new car sales is strongly related to changes in the desired stock) but also respond to changes in current economic conditions, costs of adjustment to the desired levels, and auto supply limitations.

Table 3-7, page 3-49, presents a description of the model inputs (exogenous policy assumptions). While all these variables can be manipulated by the model users as desired, potential sources for these exogenous projections are identified in the table. Variables of particular interest as policy-inputs include taxes on new cars by size class and gasoline taxes (item I.H), commuting transportation mode (group III), and the auto characteristics assumptions (group IV).

3.5. SUMMARY OF MODEL STRUCTURE

Chart 3-A below gives a very broad picture of the overall structure of the Wharton EFA Automobile Model within the context of policy variables and other exogenous inputs (page 3-51).

Government policies feed into the foreign block via possible import quotas, anti-dumping rules, and import tariffs. Other government policies feed directly into the U.S. auto industry via emission and safety control standards, mileage standards, excise taxes on new cars, and the like.

The auto industry itself interacts with the exogenous inputs, especially economic activity. These inputs include income and its distribution, family size, the demand for public transportation services, etc. The three exogenous blocks all feed into the price block, which includes the various measures of cost per mile, a variable crucial to the entire analysis of the automobile sector.

Chart 3-B shows the detail of the long run portion of the model. The outputs of the long-run sub-model feed into the year-to-year realizations of the shorter-run sub-model. The long-run outputs are delineated in boldface and include the size of the desired stock and the desired size class share of that desired stock (page 3-52).

The two long-run outputs are each determined or driven by all of the exogenous inputs. Strictly from the exogenous point of view transportation system characteristics, demographic variables, and the income and activity variables all drive the desired stock and shares. From a more classical point of view the cost per mile of new cars also feeds in.

These costs per mile have three main determinants: the characteristics of new cars (size, horsepower, mpg, etc.), prices and taxes associated with operation (i.e., the variable costs), and new car prices. These prices are determined by supply constraints as discussed in the paragraph above, new car production costs, and taxes and tariffs, the latter being part of the arsenal of policy instruments.

Chart 3-C represents the detail surrounding the short run realization of the desired stock and shares. From the point of view of the annual sub-model the major "exogenous" inputs are the long-run outputs described previously, and the new car supply constraints, and income and activity variables (page 3-53).

The annual sub-model outputs are total vehicle miles, new car sales and the size class share of new sales. As before, the ownership and operation costs play a crucial role in the determination of those outputs. However, other parts of the model also come into play. The end of year auto stock is determined along with its composition by class and vintage. Further, the stock also plays a role in its own utilization, i.e., vehicle miles.

Another important variable in the model is unit scrappage, which is influenced by the desired stock, trends in vehicle miles per auto, and the age of the stock. Scrappage and used car prices are related through the average price and volume of used car sales. Finally, used car prices themselves are influenced by new car sales and prices.

Thus, if new car prices are taken as exogenous to the model, the ownership and operation costs are essentially simultaneous with the rest of the model, driving the outputs, and in turn being driven by other variables which are influenced by the model outputs. The major feedback loop is through these prices, which serve as potential market equilibrators.

TABLE 3-1

DESIRED STOCK AND SHARE EQUATIONS

I. Desired Stock Per Family

$$ln\ (KEND/FM) = \underset{(2.40)}{-1.90959} + \underset{(3.13)}{0.563344}\ ln\ (RDIP4/FM) \underset{(1.92)}{-0.100994}\ ln\ (PER15+/(100-PER15+)) - \underset{(.84)}{0.199527}$$

$$ln\ (CPMTTCAP/PC) + \underset{(3.07)}{0.421187}\ ln\ (LD/FM) - \underset{(1.48)}{0.0536642}\ ln\ (MTWNA/FM) + \underset{(1.61)}{0.0990056}\ (NPMET/100)$$

$\bar{R}^2 = 0.461$ SEE = 0.0596

II. Combined Share of Subcompacts and Compacts

$$ln\ \left(\frac{SHRSC}{1-SHRSC}\right) = \underset{(1.62)}{2.63851} - \underset{(1.52)}{2.75703}\ ln\ (CPMSC/T-SC) - \underset{(2.91)}{1.16875}\ ln\ (YDI/FM/CT*Q) + \underset{(2.88)}{0.378345}\ ln\ (PER15+)$$

$$+ \underset{(1.79)}{0.540311}\ ln\ (NP20.29/FM) + \underset{(6.06)}{0.445103}\ (DUMNEW) - \underset{(2.07)}{0.228363}\ (DUMWSC) + \underset{(3.93)}{0.321488}$$

$$(DUMNTN) + \underset{(4.46)}{0.559391}\ (DUMPAC)$$

$\bar{R}^2 = 0.755$ SEE = 0.1591

Notes: All equations are estimated over 47 states excluding Oklahoma, Alaska, Hawaii, and the District of Columbia. Variable definitions are presented on page 3-40,41.

TABLE 3-1 (Cont.)

III. Share of Subcompacts in Combined Subcompacts and Compact Share

$$ln\left(\frac{SHRS/SC}{1-SHRS/SC}\right) = \underset{(.71)}{0.665464} - \underset{(5.55)}{11.9101}\ ln\ (CPMS/C) - \underset{(2.73)}{0.599591}\ ln\ (YDI/FM/SC*Q) + \underset{(0.86)}{0.225044}$$

$$ln\ (NP20/29/FM) + \underset{(2.67)}{0.702456}\ ln\ (LD/FM) + \underset{(5.68)}{0.321199}\ (DUMMTN) + \underset{(5.31)}{0.494263}\ (DUMPAC)$$

$\bar{R}^2 = 0.792$ SEE = 0.1315

IV. Mid-Size Share

$$ln\left(\frac{SHRM}{1-SHRM}\right) = \underset{(0.39)}{0.211089} - \underset{(4.57)}{1.98095}\ ln\ (CPMM/T\text{-}M) - \underset{(1.31)}{.161133}\ ln\ (YDI/FM/CT*Q) + \underset{(4.73)}{0.785861}$$

$$ln\ (FM3+4/FM) + \underset{(4.01)}{0.162809}\ (DUMNEW) - \underset{(3.65)}{0.125991}\ (DUMMTN)$$

$\bar{R}^2 = 0.683$ SEE = 0.0779

V. Full-Size Share

$$ln\left(\frac{SHRF}{1-SHRF}\right) = -\underset{(1.63)}{1.84714} - \underset{(12.81)}{8.84702}\ ln\ (CPMF/T\text{-}F) + \underset{(3.01)}{0.831944}\ ln\ (YDI/FM/CT*Q) - \underset{(6.11)}{0.506012}$$

$$ln\ (PER15+) - \underset{(3.52)}{0.771159}\ ln(FM3+4/FM) + \underset{(1.11)}{0.158820}\ ln\ (FM5+/FM)$$

$\bar{R}^2 = 0.865$ SEE = 0.1070

Notes: All equations are estimated over 47 states excluding Oklahoma, Alaska, Hawaii, and the District of Columbia. Variable definitions are presented on page 3-40,-41.

TABLE 3-1 (Cont.)

VI. Luxury Share

$$\ln\left(\frac{SHRL}{1-SHRL}\right) = \underset{(9.26)}{-\,2.88455} - \underset{(0.72)}{0.467677}\ \ln\,(CPML/T\text{-}L) + \underset{(2.12)}{0.209938}\ \ln\,(PER15+) + \underset{(1.52)}{0.00183016}\ (NPMET)$$

$$- \underset{(4.66)}{0.298623}\ (DUMNEW) + \underset{(2.20)}{0.203160}\ (DUMWSC)$$

$\bar{R}^2 = 0.519$ SEE = 0.1388

Elasticities for Desired Share Equations

E.G. A 1% increase in CPMSC/T-SC would reduce SHRSC by 1.74% (not % points).

	1	2	3	4	5	6	7	8
	CPMX/T-X	YDI/FM/CT*Q	PER15+	NP20.29/FM	LD/FM	FM3+4/FM	FM5+/FM	NPMET
SHRSC	-1.74	-0.74	+0.24	0.34	---	---	---	---
SHRS/SC	-5.27	-0.27	---	0.10	0.31	---	---	---
SHRM	-1.59	-0.13	---	---	---	0.63	---	---
SHRF	-5.91	0.56	-0.34	---	---	-0.51	0.11	---
SHRL	-0.43	---	0.19	---	---	---	---	0.01

Notes: All equations are estimated over 47 states excluding Oklahoma, Alaska, Hawaii, and the District of Columbia. Variable definitions are presented on page 3-40,-41.

TABLE 3-1 (Cont.)

Symbol	Definitions
CPMF/T-F	Cost Per Mile for Full-Size Cars Over Desired Share Weighted Cost Per Mile for All Other Classes
CPML/T-1	Cost Per Mile for Luxury Cars Over Desired Share Weighted Cost Per Mile for All Other Classes
CPMM/T-M	Cost Per Mile for Mid-Size Cars Over Desired Share Weighted Cost Per Mile for All Other Classes
CPMSC/T-SC	Cost Per Mile for Combined Subcompact and Compact Cars (Weighted by Desired Shares) Over Desired Share Weighted Cost Per Mile for All Other Classes
CPMS/C	Cost Per Mile for Subcompacts Over Cost Per Mile for Compacts
CPMTTCAP	Desired Share Weighted Cost Per Mile (Includes all Classes: Domestic and Foreign)
DUMNEW	Dummy for New England States (Equals 1.0 for Mountain; 0.0 otherwise)
DUMMTN	Dummy for Mountain States (Equals 1.0 for Mountain; 0.0 otherwise)
DUMPAC	Dummy for Pacific States (Equals 1.0 for Pacific; 0.0 otherwise)
DUMWSC	Dummy for West South Central States (Equals 1.0 for West South Central; 0.0 otherwise)
FM	Number of Family Units (Equals number of families plus number of unrelated individuals)
FM3+4/FM	Number of 3 and 4 Member Families Over Number of Family Units
FM5+/FM	Number of 5 or more Member Families Over Number of Family Units
KEND/FM	Number of Cars In Operation At Year End Over Number of Family Units
LD/FM	Number of Licensed Drivers Over Number of Family Units
MTWNA/FM	Number of Persons Not Using An Automobile To Travel To Work Over Number of Family Units

TABLE 3-1 (Cont.)

Symbol	Definitions
NPMET	Percentage of Population Living in SMSA's
NP20.29/FM	Number of Persons in Resident Population Between 20 and 29 Years Old Over Number of Family Units
PC	Consumer Price Index, All Items (Note: Is Divided by 125.3 to convert from 1967 = 100 base to 1972 = 1.0 base)
PER15+	Percentage of Families (Excluding Unrelated Individuals)Earning $15,000 or more in 1970 dollars
RDI/FM	Permanent Real Disposable Income: Weighted Average of Current and Lagged Disposable Income (4, 3, 2, 1 weights) Deflated by The Current Year Consumer Price Index
YDI/FM/CT*Q	$ Disposable Income Over Number of Family Units Over Fixed Weighted Cost Per Mile (Cost per mile for subcompacts and compacts, cost per mile for mid-size, cost per miles for full-size, and cost per mile for luxury where weights are desired share in U.S. Market for 1972)
YDI/FM/SC*Q	$ Disposable Income Over Number of Family Units Over Fixed Weighted Cost Per Mile for Subcompacts and Compacts (Weights are desired U.S. shares in 1972)
SHRF	Desired Share of Full-Size Cars
SHRL	Desired Share of Luxury Cars
SHRM	Desired Share of Mid-Size Cars
SHRSC	Desired Combined Share of Compact and Subcompact Cars
SHRS/SC	Desired Share of Subcompact Cars in Total Subcompact and Compact Cars

TABLE 3-2

ESTIMATED DESIRED SHARES BY CLASS OVER TIME (1954-1974)

	SHRSC*A	SHRS/SC*A	SHRS*A	SHRC*A	SHRM*A	SHRF*A	SHRL*A
1954	0,0176	0,4544	0,0000	0,0096	0,5648	0,3654	0,0522
1955	0,0180	0,4956	0,0089	0,0091	0,5464	0,3853	0,0503
1956	0,0231	0,5488	0,0127	0,0104	0,5676	0,3488	0,0605
1957	0,0352	0,6027	0,0212	0,0140	0,5763	0,3245	0,0640
1958	0,0721	0,6535	0,0471	0,0250	0,5647	0,2949	0,0684
1959	0,1220	0,5802	0,0708	0,0512	0,5202	0,2889	0,0689
1960	0,1813	0,4663	0,0845	0,0968	0,4532	0,2992	0,0663
1961	0,2047	0,4631	0,0948	0,1099	0,4243	0,3016	0,0695
1962	0,2094	0,4021	0,0842	0,1252	0,3977	0,3237	0,0692
1963	0,1904	0,4202	0,0800	0,1104	0,3762	0,3647	0,0687
1964	0,2024	0,3747	0,0758	0,1265	0,3397	0,3896	0,0680
1965	0,2037	0,3748	0,0763	0,1273	0,3034	0,4215	0,0715
1966	0,2120	0,3640	0,0773	0,1347	0,3003	0,4130	0,0747
1967	0,2359	0,3564	0,0841	0,1519	0,2726	0,4119	0,0796
1968	0,2398	0,3761	0,0902	0,1496	0,2750	0,4051	0,0801
1969	0,2595	0,3662	0,0950	0,1645	0,2516	0,4035	0,0855
1970	0,3061	0,3926	0,1202	0,1859	0,2423	0,3738	0,0778
1971	0,3229	0,4791	0,1547	0,1682	0,2229	0,3667	0,0875
1972	0,3289	0,4965	0,1633	0,1656	0,2254	0,3553	0,0904
1973	0,3598	0,5048	0,1816	0,1781	0,2257	0,3244	0,0902
1974	0,3840	0,5267	0,2022	0,1817	0,2463	0,2840	0,0857

KEY:

SHRSC*A = Desired Combined Subcompact and Compact Share.
SHRS/SC*A = Desired Share of Subcompacts in Combined Subcompact and Compact Share.
SHRS*A = Desired Share of Subcompacts.
SHRC*A = Desired Share of Compacts.
SHRM*A = Desired Share of Mid-Size Cars.
SHRF*A = Desired Share of Full-Size Cars.
SHRL*A = Desired Share of Luxury Cars.

TABLE 3-3

ESTIMATED DESIRED AUTO STOCK
OVER TIME (1958-1974)

	KEND*AY/FM	KEND*AY
1954	0.983	50.029
1955	1.002	51.943
1956	1.018	53.714
1957	1.026	54.583
1958	1.033	55.945
1959	1.051	57.971
1960	1.071	60.153
1961	1.090	61.789
1962	1.098	63.593
1963	1.129	65.826
1964	1.163	68.449
1965	1.188	71.471
1966	1.220	74.212
1967	1.238	76.345
1968	1.238	78.336
1969	1.245	80.505
1970	1.250	82.814
1971	1.260	85.401
1972	1.261	88.122
1973	1.273	90.986
1974	1.256	92.517

KEY:

KEND*AY/FM = Desired stock of autos per family unit (autos per family unit).

KEND*AY = Desired stock of autos (Millions of units).

TABLE 3-4

TOTAL NEW REGISTRATIONS AND SCRAPPAGE

I. New Registrations (OMVUANR)

$$ln\left(\frac{OMVUANR}{OPMVUAYEND(-1) - SCMVUA}\right) = +\underset{(9.90)}{3.79294}\,ln\left(\frac{KEND*AY}{OPMVUAYEND(-1) - SCMVUA}\right) - \underset{(2.49)}{0.255190}\,DUMAUTOS$$

$$+\underset{(8.30)}{6.03907}\,ln\left(\frac{RDI/FM}{RDIP4/FM}\right) - \underset{(3.45)}{1.26683}\,ln\left(\frac{PUTOTNRL}{PUTOTNR(-1)}\right) - \underset{(35.2)}{2.9151}$$

$\bar{R}^2 = 0.864$ SEE = 0.0473 D.W. = 2.28

Period of Fit: 1954-1974

II. Total Auto Scrappage (SCMVUA)

$$ln\left(\frac{SCMVUA - SCMVAGIV}{OPMVUAYEND(-1) + OMVUANR}\right) = -\underset{(7.99)}{6.98289} - \underset{(4.50)}{3.82763}\,ln\left(\frac{KEND*AY}{OPMVUAYEND(-1) + OMVUANR}\right)$$

$$+\underset{(5.32)}{2.91080}\,ln\,(AVAGE\ 0\text{-}20) - \underset{(2.20)}{.145089}\,ln\left(\frac{PUOLD}{PSCRAPAV}\right) - \underset{(4.33)}{.338149}\,ln\,(NRUT)$$

$$+\sum_{i=0}^{2} a_i\,ln\left(\frac{VMT/K}{VMT/K(-1)}\right)_{-i}$$

$$a_0 = \underset{(2.42)}{2.23399},\quad a_1 = \underset{(3.60)}{4.19538},\quad a_2 = \underset{(2.86)}{3.45071}$$

$\bar{R}^2 = .923$ S.E. = .0462 DW = 2.60

Period of Fit: 1958-1974

Note: For definitions see page 3-45.

TABLE 3-4 (Cont.)

Definitions:

AVAGEO-20 - Average Age of Stock, Vintages 0 through 20

DUMAUTOS - Strike Dummy Variable

KEND*AY - Desired Stock

NRUT - Unemployment Rate

OMVUANR - New Registrations

OPMVUAYEND - Year-End Stock of Cars in Operation

PSCRAPAV - Scrap-Metal Price

PUOLD - Average Price of Old Cars

PUTOTNR - New Car Price, Average, Weighted by Previous Year Sales

PUTOTNRL - Previous Year Average New Car Price, Sales Weighted

RDI/FM - Real Disposable Income Per Family

RDIP4/FM - Permanent Family Income

TABLE 3-5

SHARE OF NEW REGISTRATIONS EQUATIONS

I. Combined Subcompact and Compact New Registrations Share (SHRSCTNR)

$$\ln\left(\frac{\text{SHRSCTNR}}{1-\text{SHRSCTNR}}\right) = \ln\left(\frac{\text{SHRSC*A}}{1-\text{SHRSC*A}}\right) + \underset{(3.97)}{0.0598815}$$

$$- \underset{(16.61)}{0.400553}\left[\ln\left(\frac{(\text{TMSCTK-SC})}{1-(\text{TMSCTK-SC})}\right) - \ln\left(\frac{\text{SHRSC*A}}{1-\text{SHRSC*A}}\right)\right]$$

$\bar{R}^2 = 0.932$ SEE = 0.0483 D.W. = 0.83
Period Fit: 1954-1974

II. Subcompact Share in Combined Subcompact and Compact New Registrations (SHRS/SCTNR)

$$\ln\left(\frac{\text{SHRS/SCTNR}}{1-\text{SHRS/SCTNR}}\right) = \ln\left(\frac{\text{SHRS/SC*A}}{1-\text{SHRS/SC*A}}\right) + \underset{(0.27)}{0.00275211}$$

$$- \underset{(21.41)}{0.699549}\left[\ln\left(\frac{(\text{TMS/SCTK-SC})}{1-(\text{TMS/SCTK-SC})}\right) - \ln\left(\frac{\text{SHRS/SC*A}}{1-\text{SHRS/SC*A}}\right)\right]$$

$\bar{R}^2 = 0.958$ SEE = 0.0453 D.W. = 1.39
Period of Fit: 1954-1974

III. Mid-Size Car New Registration Share (SHRMDNR)

$$\ln\left(\frac{\text{SHRMDNR}}{1-\text{SHRMDNR}}\right) = \ln\left(\frac{\text{SHRM*A}}{1-\text{SHRM*A}}\right) - \underset{(0.66)}{0.00198516}$$

$$- \underset{(82.94)}{0.873077}\left[\ln\left(\frac{(\text{TMMDK-SC})}{1-(\text{TMMDK-SC})}\right) - \ln\left(\frac{\text{SHRM*A}}{1-\text{SHRM*A}}\right)\right]$$

$\bar{R}^2 = 0.997$ SEE = 0.0101 D.W. = 1.26
Period of Fit: 1954-1974

Note: For definitions, see page 3-47.

TABLE 3-5 (Cont.)

IV. Full-Size Car New Registrations Share (SHRFDNR): Constrained Form

$$ln\left(\frac{SHRFDNR}{1 - SHRFDNR}\right) = ln\left(\frac{SHRF*A}{1 - SHRF*A}\right) - \underset{(3.06)}{0.0115806}$$

$$- \underset{(47.12)}{0.826937}\left[ln\left(\frac{(TMFDK\text{-}SC)}{1 - (TMFDK\text{-}SC)}\right) - ln\left(\frac{SHRF*A}{1 - SHRF*A}\right)\right]$$

$\bar{R}^2 = 0.991$ SEE = 0.0168 D.W. = 1.05
Period of Fit: 1954-1974

V. Luxury Car New Registrations Share (SHRLTNR)

$$ln\left(\frac{SHRLTNR}{1 - SHRLTNR}\right) = ln\left(\frac{SHRL*A}{1 - SHRL*A}\right) + \underset{(0.37)}{0.000264892}$$

$$- \underset{(105.00)}{0.713064}\left[ln\left(\frac{(TMLTK\text{-}SC)}{1 - (TMLTK\text{-}SC)}\right) - ln\left(\frac{SHRL*A}{1 - SHRL*A}\right)\right]$$

$\bar{R}^2 = 0.998$ SEE = 0.0021 D.W. = 1.33
Period of Fit: 1954-1974

Definitions:

SHR*sc*NR = Share of New Registrations, Class *sc*, *sc* = S/SCT, SCT, MD, FD, LT.

SHR*sc**A = Desired Stock Share, Class *sc*.

TM*sc*K-SC = Share of Stock, Class *sc*, after scrappage, shares adjusted to sum to one. Thus:

$$TMscK\text{-}SC = SHRscK\text{-}SC / \sum_{sc} SHRscK\text{-}SC$$

where

SHR*sc*K-SC = (OPMVUA*sc*YEND(-1) - SCMVUA*sc*)/ (OPMVUAYEND(-1) - SCMVUA) = Previous class stock less this year's class scrappage relative to total previous stock less total current scrappage.

TABLE 3-6

DESCRIPTION OF WEFA LONG-RUN AUTO DEMAND MODEL OUTPUTS

I. Desired or Long-Run Equilibrium Variables:

A. Desired Total Stock of Autos
B. Desired Shares of Stock by Class
C. Cost Per Mile Traveled for the Desired Stock

II. Yearly Realization Variables

A. Total New Registrations of Autos
B. New Registrations by Class
C. Vehicle Miles Traveled
D. Total Scrappage of Autos
E. Scrappage by Class and Vintage
F. Total Auto Stock
G. Total Stock by Class and Vintage
H. Cost Per Mile Traveled by Class
I. Overall Fleet MPG
J. New Auto MPG by Class
K. New Auto Prices by Class
L. Used Auto Prices by Class and Vintage

TABLE 3-7

DESCRIPTION OF WEFA LONG-RUN AUTO DEMAND MODEL INPUTS

I. Economic Activity and Price Assumptions:[1/]

A. Personal Income
B. Income Tax Payments
C. Transfer Payments
D. Unemployment Rate
E. Employment
F. Consumer Price Indices (Including CPI's Related to Auto Operation and Maintenance)
G. Retail Gasoline Price (Including Tax)
H. Interest Rates
I. Auto Ownership and Operation Tax Rates by Size Class
J. Domestic Auto Production Cost Index
K. Foreign Auto Export Price
L. Transportation Price Index
M. Scrap Metal Price Index

II. Demographic Assumptions:[2/]

A. Number of Family Units
B. Family Size Distribution
C. Percent of Population Living in SMSA's
D. Population by Region
E. Population 20-29 Years Old
F. Number of Licensed Drivers

III. Transportation Mode Assumptions:

A. Growth in Urban Transit Passengers Relative to Employment
B. Growth in Urban Transit Passengers Relative to Transit Travelers to Work
C. Growth in Non-Auto, Non-Transit Travelers to Work Relative to Employment

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[1/] Forecasts of most of these variables are obtainable directly from the Wharton Long-Run Forecasts. Forecasts of the others can be provided via simple linking equations to the Wharton Model variables. The tax rates (item I) are policy variables.

[2/] Forecasts for most of these variables are available from the U.S. Census.

IV. Auto Characteristics Assumptions:1/

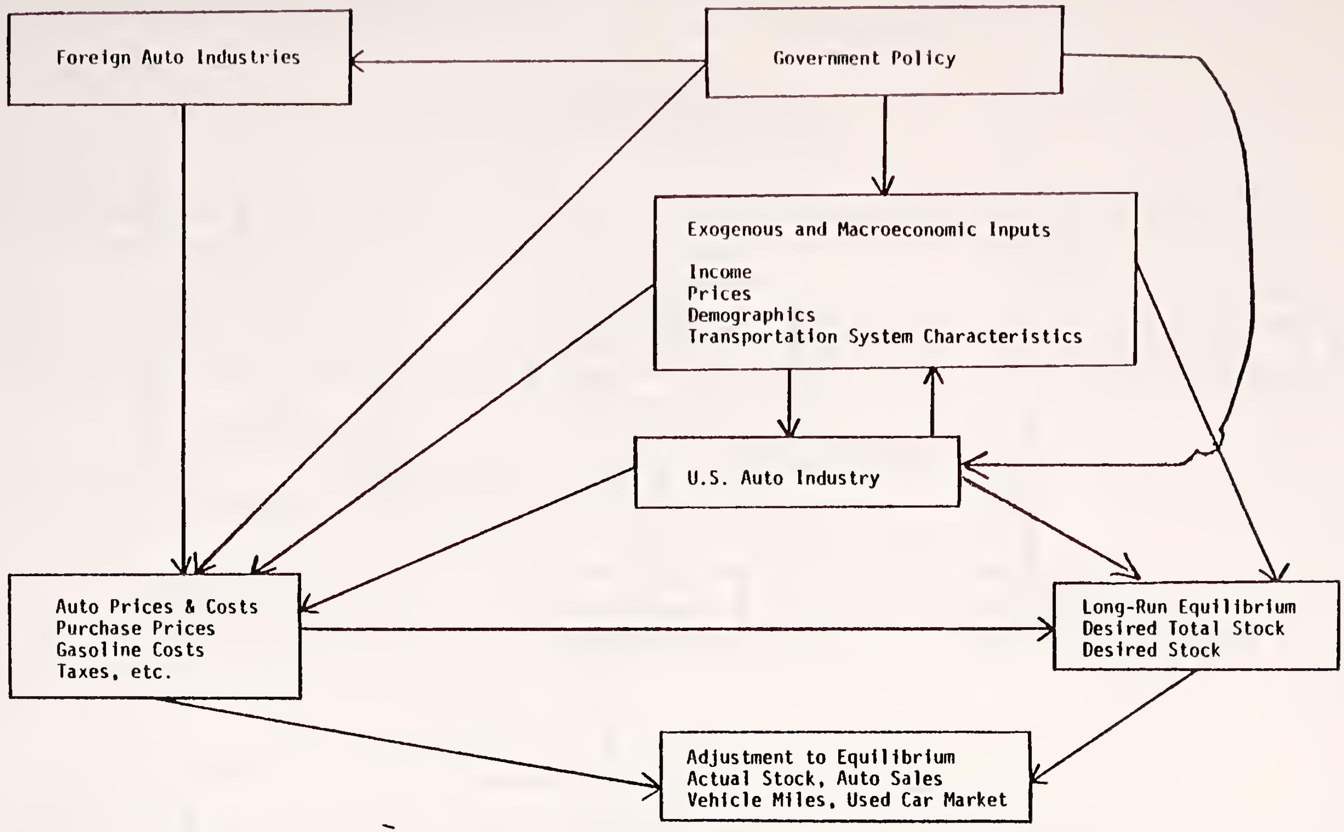
A. Curb Weights for New Cars by Class
B. Engine Displacements for New Cars by Class
C. Number of Cylinders for New Cars by Class
D. Transmission Types for New Cars by Class
E. MPG Efficiency Factors for New Cars by Class2/
F. Urban Fraction of Vehicle Miles Traveled
G. Used Cars Price Decay Parameters
H. Ratios Class Prices to Average, Domestics

1/ Numerous projections of expected new car weight and efficiency are available from the EPA, DOT, and the Auto Industry. These two variables also can be considered policy variables to the extent that feasible improvements in miles per gallon are mandated.

2/ Efficiency is defined as mile-pounds per gallon of gas. Miles per gallon is efficiency divided by weights.

CHART 3A

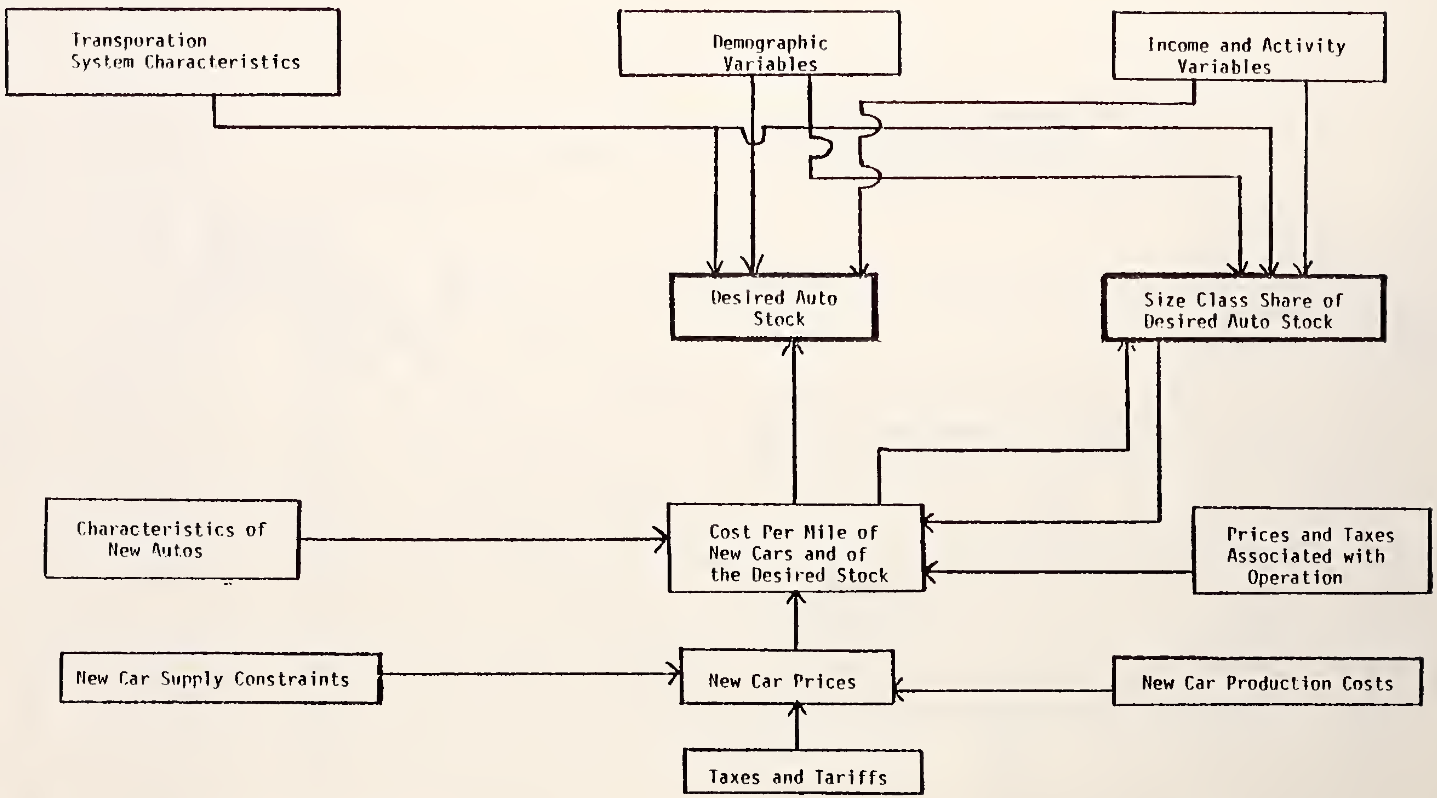
SIMPLIFIED SCHEMATIC OF THE WEFA AUTO MODEL



This chart shows the major blocks of the Wharton EFA Automobile model. For detail regarding the outputs of the long run equilibrium portion of the model see chart #2. For detail regarding the adjustments to long run equilibrium see chart #3.

CHART 3B

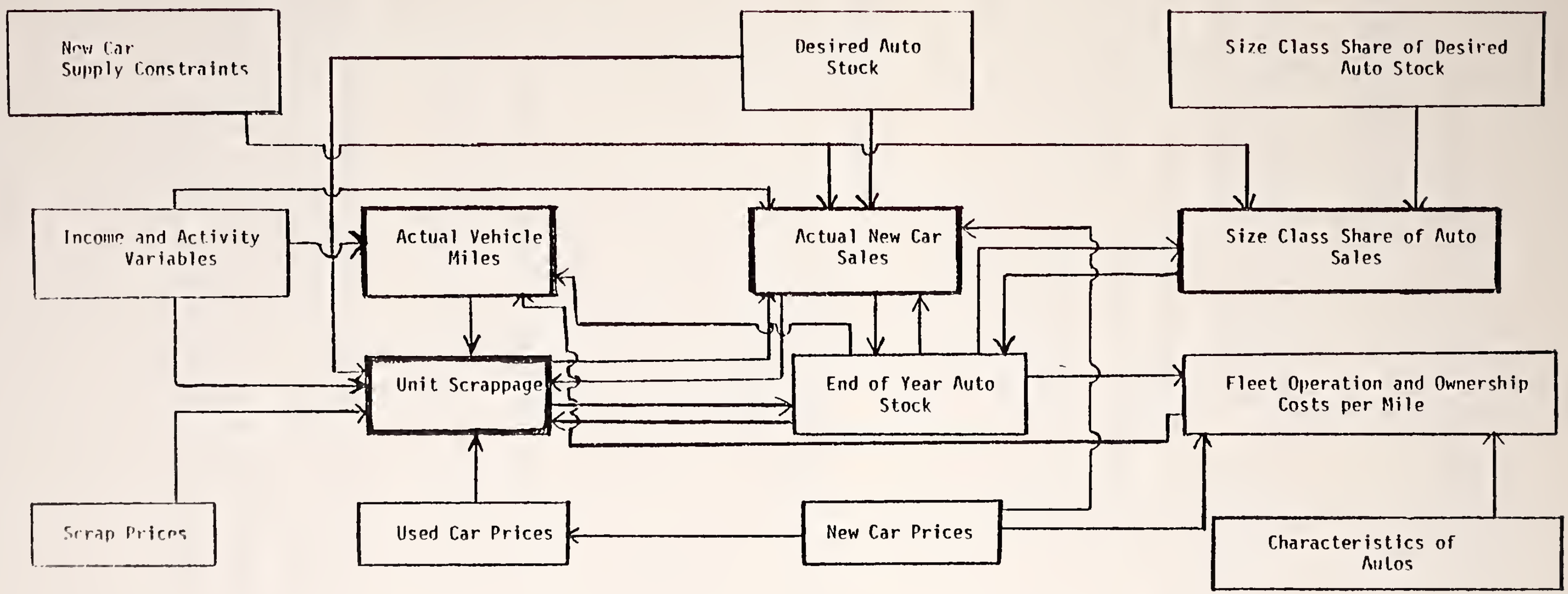
DETAIL OF THE LONG RUN AUTO MODEL



This chart shows the detail surrounding the long run equilibrium of the model. Those outputs are in bold face boxes. For detail regarding the impacts of these long run outputs see chart # 3.

CHART 3C

INPUT AND OUTPUT DETAIL OF THE LONG RUN AUTO MODEL: ADJUSTMENTS TO THE DESIRED VALUES OF THE ACTIVITIES OVER TIME



This chart shows the detail leading to the major outputs of the model. Those outputs are bold face blocks. For detail regarding the long run equilibrium portion of the model see chart # 2.

4. BASELINE FORECASTS AND ELASTICITIES

4.1 ASSUMPTIONS THROUGH 2000

The assumptions that must be made concerning the world outside the automobile market are obviously critical to the relevance of the baseline forecasts. Due to their different nature, these assumptions fall naturally into three major categories: demographic trends, the economic environment, and automobile characteristics. The projections are discussed in general terms, with details and data being presented in Appendix A3.

4.1.1. DEMOGRAPHIC TRENDS

The projections for the population components and other demographic variables are taken directly from, or inferred from, U.S. Bureau of the Census estimates published in various issues of <u>Current Population Reports</u>. The Census projections used were: total resident population (NPR); the 16 to 74 age group (NPR16.74); the 20 to 29 age group (NPR 20.29); number of families (NCF); number of unrelated individuals (NPRU); average family size (NCFMAVG); and population by region (NPRNEW, NPRWSC, NPRMTN, NPRPAC).

Throughout, we used the lowest Census projections, which are the most reasonable in the light of recent trends. For most of the period, total population grows at around 1½ million (less than 1%) per annum, slowing during the 1990's, and approaching ZPG by 2000. The number of unrelated individuals relative to total population has been slowly rising at a declining rate, and since the average family size is projected to slowly fall, the total number of family units (NCF plus NPRU) grows at almost twice the rate of NPR - from 75 million in 1975 to 100 million by 2000.

Given the trend in NCFMAVG, the proportion of families with 5 or more members (FM5+/FM) will fall continuously, being about half its 1974 value by 2000. The 3 or 4 member proportion (FM3+4/FM) fluctuates around a level trend through the mid-1980's, then slowly declines.

The number of licensed drivers (projected on the basis of NPR16.74) rises steadily, but relative to the number of family units (LD/FM) it slowly rises and then declines, showing no net change for the period as a whole. The labor force (NLC) is also projected on the basis of NPR16.74, with the participation rate initially rising. This produces a high labor-force growth rate of 2½% p.a. for 1977-78, thereafter the growth steadily declines to under 1½% (1.28% in 1985) until for 1990 onwards the labor-force growth follows that of NPR16.74 - roughly ½% p.a.

The population 20 to 29 years old, as a fraction of the total, will decline in 1977, and from 1981 onwards will fall more and more rapidly, stablizing only at the very end of the period. The metropolitan population is projected to hit 80% of the total by 1990, subsequently remaining unchanged. Similarly, for the regional population proportions, the changes are so gradual that the 1990 Census estimates were continued through 2000. Only for the Pacific Region is there any significant change projected: an increase from 13.2% in 1975 to 14.4% in 2000.

Economic prognosticators currently find themselves in a more than normally hazardous situation. Not only are they faced with a new president, but also less is "known" than usual about the precise nature and scale of future economic policies. Compounding this uncertainty is the critical question of the policy to be pursued by the OPEC nations concerning crude oil prices.

The baseline economic projections were made on the basis of the most recent Wharton Annual Long-Term Econometric Model forecast. This forecast assumes several stimulative policies on the part of the new administration, and a 10% OPEC price increase for 1977.

4.1.2. BASELINE ECONOMIC OUTLOOK

The economy is expected to continue a healthy recovery through 1978, with both real GNP growth and inflation proceeding at rates in the area of 5.5% and unemployment falling to 6.0%. In 1979-80 a downturn or 'pause' is expected, slowing real growth to 2%, and pushing inflation back up to the 6% range as productivity growth slows, promoting "cost-push" inflationary pressures. The unemployment rate, however, continues to fall due to the impact of an assumed jobs program.

The slowdown seems to be due to two factors. Fixed investment expenditures slow down sharply, and consumption expenditures show only slow growth, primarily because of the modest rates of increase in personal disposable income. For 1981-85, a return to real GNP growth at or above 3% and a slower inflation rate (falling below 4.5%) should be possible, as the stimulative policies described pull the economy out of this, hopefully, temporary slump.

Needless to say, the stimulative policies and the slowdown lead to substantial federal deficits being sustained through 1981. By 1982 the increase in tax receipts and the slower rate of expenditures growth should produce a balanced budget.

For the international economy we expect world trade to rebound strongly as other countries recover, with growth initially above 7%, falling to a 5% rate by 1985. World trade prices are projected to increase at about 5.5%. The OPEC block have been assumed to increase prices by 10% for 1977, and thereafter maintain their 'real' price by raising crude prices in line with the general world inflation rate - i.e. 5 to 6% per annum.

With respect to specific model inputs, total current personal income follows the aggregate growth described above, with rates in excess of 10% for 1976-78, falling to 8% in 1979-80, and growth continues to decline through 1985, hitting 7.4% p.a. The growth in tax receipts consistently outpaces income, while transfer payments grow at a slower pace still. Hence the relatively modest growth in total current disposable income referred to above.

Total employment is expected to expand vigorously while the assumed jobs program is at its peak, thereafter the growth rate declines - from 2.3% in 1979 to 1.2% in 1985. As previously noted, the unemployment rate falls steadily, hitting 4.9% in 1981, rising slightly in 1983-85 due to labor force growth.

The consumer installment credit rate for new autos is expected to decline slowly, in line with the discussion above, reaching 10% by 1985. The rate of increase in the consumer price index is expected to fluctuate between 5 and 6% initially, but then should fall towards 4% by 1985.

For the period 1985-2000, we have projected a trend for real growth of 3% p.a. with inflation running at 3.5 - 4% through 1990, falling to 3-3.5% thereafter. Therefore, personal income is projected to increase at 6.5% through 1990 and by 6% p.a. to 2000. The rates of increase of income taxes are set slightly above these values, with transfers initially growing at slightly lower rates than income, then (1990 on) rising to match the growth-rates of taxes (as a progressively larger proportion of the population becomes over 65 years old).

Since we anticipate that the increased participation rates projected through 1985 will stabilize by 1990, total employment is expected to continue to increase at rates above 1% p.a., with the unemployment rate falling to 4% by 1990. Thereafter, we feel that the unemployment rate will decline at much slower rates (by 0.1 percentage points p.a. through 2000) and since the projected labor force growth is approximately 0.5% p.a., total employment growth slackens, fluctuating between 0.5 to 0.7% p.a., 1990-2000.

Production costs for the domestic automobile industry continue to outpace the overall consumer price index, growing in excess of 6% p.a. through 1979. This rate should moderate sharply for 1981-85, to 3.5-4%. We project this rate to continue to 1990, falling to 3.5% through 1995, and slowing further to 3.2% p.a.

After their large increases in 1975-76 foreign auto export prices will grow by only 4% for 1977, and 7% p.a. for 1978-79. Thereafter, their rate of increase is expected to parallel the inflation rate for U.S. imports of manufactured goods. Therefore, they were projected to increase by 4.5% p.a. through 1990, and by 4.0 p.a. for 1990 onwards.

The average retail price of gasoline (including taxes) is expected to climb sharply in 1977-78, paralleling the crude oil price trend. After increases of 7% and 9%, respectively, we estimate rates of increase in the vicinity of 7% for 1979-85. Then, in line with the crude oil price assumptions, we anticipate a fall to 6% for 1986-90, with a further slackening in the rate of increase, to just under 5% p.a., for the remainder of the period. These trends cause the gas price to rise to $1.102 by 1985 and to $2.394 by 2000. These are increases of 100% and 330%, compared to 60% and 170% for overall consumer prices.

The other inputs to auto operating costs, the price indices for repairs, insurance, tires, motor oil, and parking and etc., mainly follow fluctuations in the overall rate of inflation. Auto insurance premiums show the most rapid rates of increase, averaging 10-11% p.a. through 1980, then consistently running 1-2 percentage points above the general inflation rate. Repair costs are a second source of increasing costs. After increasing at rates above 7% p.a. for 1976-1980, they then increase at a rate roughly 1 percentage point above the overall rate. Parking and etc. costs will increase roughly 0.5 percentage point faster than the total CPI, while the motor oil index should increase at about the same rate. The price of tires should follow a more moderate path, rising by an average 5% for 1976-79, then increasing at a rate of 3.5% p.a. through 1985 and by 3.0% p.a. thereafter.

The Wharton forecast up to 1985 assumes the following stimulative policies:

1. Easier monetary policy - this is a continuation of recent trends. By 1978 this is assumed to reduce short-term interest-rates by 80 basis points versus previous policies.

2. Increased federal spending - non-defense expenditures are raised $15 billion by 1979. This is accompanied by higher government employment, peaking at 250,000 in 1978.

3. Subsidized jobs program - the program is assumed to have two streams of 300,000 participants, each lasting three years, one beginning 1978 and the other in 1979.

4. Housing subsidies - a goal of 400,000 additional starts is assumed for 1979. This adds an estimated $5 billion to expenditures.

4.1.3. AUTOMOBILE CHARACTERISTICS

The most critical elements in this category are the projections by class for curb weight, engine displacement, automatic transmission fraction, overdrive fraction, four cylinder fraction, and six cylinder fraction.

We begin with domestics. For 1976 the model specifications are known, and we employed the eight months sales data currently available to compute the class averages. In fact, 1976 specifications tended to show relatively minor changes overall. The major impacts for 1976-77 come from the higher sales of Chevettes (for domestic subcompacts), and the sharp reductions in weight and displacement for many of the full-size and luxury cars occuring in the 1977 models.

For 1977-78 we have judgementally extended the trends we presently see occurring. The rest of the domestic industry is assumed to follow GM's lead. Thus there will be more "Chevette-sized" subcompacts, mid-size moves towards an "Aspen-Volare" type, and the full-size and luxury classes are downsized across the board.

The assumption we have followed is that the major effort to reduce weight and displacement will move 'down' the classes. Thus, next year GM intends to 'shrink' its mid-size models substantially (again, we feel the rest of the industry will follow suit in 1979-80). It would seem logical to assume that compacts and subcompacts will be the next candidates for major redesign programs.

Over the longer term we have been guided primarily by The Report by The Federal Task Force on Motor Vehicle Goals Beyond 1980, (Volume 2, Draft, Sept. 2, 1976). The curb weight projections (Section 5.2.5, page 5-11) distinguish "weight conscious" and "innovative" designs, 'high' and 'low' estimates, for 4.5, and 6 passenger vehicles.

The baseline curb weight for full-size is assumed to reach 3000 lbs. by 1990, roughly the average of the 'high' and 'low' Task Force estimates for the "innovative" 6-passenger design. Luxury are given the same trend, with about a 300 lb. (or 10%) differential maintained throughout. At the opposite end of the scale, subcompacts are reduced to the 4-passenger "innovative" weight by 1990 (1900 lbs). Compacts and mid-size are placed intermediate, with compacts reaching 2300 lbs. by 1990 (actually equal to the 'low', 5-passenger, "innovative" level), and mid-size being closer to the full-size, at 2800 lbs. These average weights represent reductions for each class of about one-third.

Average displacements for the domestics have been projected on the basis of the weight reductions and downward trends in displacement/weight ratios. Current domestics have much larger engines, even relative to weight, than foreign makes. Therefore, we have reduced the domestics' ratios to approach present, comparative foreign ratios. Engine displacements are therefore reduced by about 40%.

The transmission and engine-type variables have essentially been projected on the basis of the above trends, although we have not projected any changes beyond 1981. Given the American consumers' apparent preference for the performance and flexibility of more cylinders and the convenience of automatics, we have adopted a conservative attidue with respect to these factors.

As far as foreign cars are concerned, curb weights and displacements are already so much lower than their domestic counterparts that it was difficult to establish what rates of reduction were appropriate. Consequently we assumed that foreign subcompacts would fall to the same weight in 1990 as domestics, while both compacts and luxury would still be slightly lighter than their domestic counterparts. Displacements were reduced commensurately.

With respect to efficiency improvements, we assumed gains for domestics of 4% p.a. for 1975-76, 3.5% p.a. for 1977-78, and 2% for 1979-80. For this period, foreign cars were assumed to have rates of gain 1% lower than domestics. For 1981 onwards we have applied a conservative trend of additional gains of 1% p.a. throughout the period.

Clearly these assumptions are very judgemental. For 1976-80 the only test is one of inference based upon the predicted mpg values (see following discussion of baseline automobile forecast). For 1980 onwards, the uncertainty surrounding future environmental and safety regulations, and the doubt as to the widespread application of diesel technology, suggest to us that assuming lower rates of efficiency gain may be the most appropriate for a baseline case. Higher rates could then be assumed for scenario analysis.

4.2. BASELINE FORECAST RESULTS

To begin with, it may be noted that the model performs very well in matching 1975 and 1976 new registrations - both total and by class - with only minor adjustments needed to align the initial forecasts with the data currently available. Since 1975-76 are outside the data set used to estimate the model, and the changes in new registrations (both total and by class) were very substantial, this initial success is quite encouraging.

Nonetheless, the reader is reminded that the model is aimed at long-run analysis, rather than precise year-to-year tracking - although the one does not necessarily preclude the other.

The primary outstanding characteristic of the baseline forecast is clearly the excellent outlook for new car sales over the next 5 years. We expect new registrations to total 10.2 million units for 1976. Continued growth is anticipated for 1977 - to 11.3 million units - and, to a lesser extent, for 1978 (11.6 million units). With the, hopefully, mild 1979-80 recession, new sales dip slightly, recovering the lost ground in 1980, with 1981 then being another year of strong growth - to a record 12.7 million units.

The second key feature is the strong, sustained recovery in the larger car market share. Our analysis clearly indicates that the 1976 resurgence in the mid- and full-size classes is by no means a temporary phenomenon. Indeed, the full-size share is expected to continue to rise through 1979, reaching almost 29%, implying sales of 3.3 million units (compared to just 1.4 million in 1975). Mid-size sales should also hold up well, falling off somewhat from their high 1976 level, but nevertheless maintaining a respectable 23% share.

Commensurate with these trends, small cars continue to decline in market share, the major brunt being borne by subcompacts, while compacts maintain a somewhat more stable trend. Compacts should, in fact, recover somewhat in 1979-81, back to 20% of the market. Subcompacts, on the other hand, continue to lose ground markedly, falling to 20% by 1980.

The primary factor underlying these trends would appear to be income growth. Real disposable income per family is expected to show substantial, although not outstanding, growth following the drastic 1975 decline. This upward trend is halted, but not reversed, in 1979-80 and again in 1982-83. This income growth is a major causative factor in stimulating the desired stock of autos and, hence, new sales, and in increasing the full-size share, via trading up to the larger cars.

A second major influence is costs. The substantial fuel efficiency gains achieved for large cars, and those projected for the next several years, result in a relatively favorable trend in costs for larger cars vis-a-vis smaller. Our index of costs, capitalized cost per mile, shows an increase of 16% for full-size, 1975-78, compared to about 19% for subcompacts and compacts.

In addition to these relative changes, examining the forecast rate of growth for average real capitalized cost per mile shows automobile costs rising very slowly relative to overall inflation, except for a slight jump in 1978. Hence desired stock and new registrations are not held down by rising costs.

A third factor is that the proportion of families with real incomes of $15,000 or more does not recover to its 1974 level until 1980. This is significant because this group is clearly associated with both higher luxury sales (as a substitute for full-size), and with higher subcompact sales (as second cars).

Finally, demographic trends are also unfavorable to small cars, since the population 20 to 29 years old relative to the number of family units begins to decline during this period.

Scrappage is expected to rebound strongly from its low 1974-75 levels, rising substantially in 1976-77, and again in 1979. The postponed scrappage in 1974-75 led to relatively substantial increases in the average age of the stock, by about 4% p.a. Hence replacement demand, combined with the growth of desired stock, must be considered a not insignificant factor in spurring new sales.

As a result of these trends we expect the total end-of-year automobile stock to grow strongly from under 97 million units in 1975 to over 106 million by 1979, with growth slackening in 1979-80 as scrappage holds at its higher level and new sales cease to increase.

Despite the growth in stock, it is significant that our forecast for total vehicle miles shows very modest growth from 1975. Indeed, examining the prediction for vehicle miles per family reveals that even this slight increase is due solely to the upward trend in the number of family units.

We expect a substantial increase in fuel efficiency through 1980. We estimate that the sales-weighted average for new sales (measured by E.P.A. standards) will exceed 20 mpg by 1980, with the "mandated" average for new domestics (assuming a 55% urban driving ratio) just attaining the 20 m.p.g. figure. This slowly rises to 23 mpg by 1990. Our 1976-77 estimates appear to match current E.P.A. and industry estimates quite closely.

In terms of actual driving mpg, we expect to see the largest improvement for full-size, up 27% in 1980 over 1975 levels. Well over half this improvement occurs in 1976 and 1977. Since the other classes are also expected to improve substantially, the average m.p.g. for the total fleet (again, driving mpg, not E.P.A.) should show a significant increase, to 13.5 mpg, up over 6% from 1975-76. The combined result of our forecasts for overall fuel efficiency and vehicle miles traveled is that total gasoline consumption for automobile use is predicted to remain almost completely static, 1975 to 1980.

Over the longer term, the early and mid-1980's are years of retrenchment, with new registrations running between 12 and 12½ million units. Modest growth should resume in the latter half of the decade, sales reaching 13.2 million in 1990. Thereafter the trend is one of very slow growth, averaging under 1% p.a., new registrations just reaching 14 million units by 2000.

In terms of shares, trends should stabilize significantly from the early 1980's through the end of the period. Compacts are expected to hold at 20 to 21% of the market throughout. Mid-size shows a very slight increase from 1985 to 1990, rising from between 22 and 23% to 24%. Luxury shows signs of a slow, but sustained increase, from 9% initially to 11% by 2000. Subcompacts' share dips to 17% in 1984-85, recovering slightly to 18% in the early 1990's, and full-size slowly rises to its ultimate peak market share of 30% in 1985 then steadily declines, back down to 27% from 1990 onwards.

The slowing rate of growth of new sales can be traced to the modest growth in desired stock. Desired stock per family unit increases by less than ½% p.a. during the early 1980's, and becomes virtually constant from the late 1980's through the end of the period. Thus it would appear that saturation is attained during the latter part of the forecast period.

The moderate growth in real family income, the rising proportion of higher income families (who tend to have a more stable number of cars per family), and the slow but persistant increase in 'real' auto costs, all contribute to this finding. Therefore, the slow (and declining) rate of growth in total desired stock during the 1990's is entirely due to the upward trend in the number of family units.

This discussion of the forecast results has by necessity concentrated on the salient features of the most important series. The forecast tables presented at the end of this chapter contain predictions for 143 variables. For instance, those not covered in this discussion include all the components of new car prices and the used car market variables.

4.3. MODEL ELASTICITIES

The concept of an "elasticity" (or "multiplier") is fairly straightforward - given a certain initiating change in a given variable, changes in the predictions will occur. Expressing the 'output' change relative to the 'input' change yields a quantitative indication of how important the input variable is to the results.

In terms of individual equations, since most of the model is estimated in log-linear form, elasticities can be directly observed or readily computed: a 1% change in independent variable X yields an E% change in the dependent variable Y, and "E" is then the elasticity relationship between X and Y.

For a complex and highly simultaneous model, however, the single -

equation elasticities are rarely realized - they are offset or compounded by reactions with the rest of the system. Therefore, we present in this section a selected sample of model elasticity responses in tabular forms. The elasticities take the form of % changes relative to the existing baseline.

Since the most interesting examples are fully presented and discussed in Chapter 5, the treatment given here is as concise as possible.

1. <u>10% GASOLINE PRICE INCREASE</u>

% Change in:	1977	1978	1979	1980
Desired Stock	-.34	-.33	-.33	-.32
Actual Stock	.05	.24	.23	-.28
New Registrations	-2.13	-2.97	-2.89	-0.47
Scrappage	-3.47	-6.18	-3.14	+4.49
Vehicle Miles	-1.92	-1.97	-2.13	-2.49
New Fleet MPG	.75	.67	.59	.51
Desired Shares:				
Subcompacts	4.97	4.85	4.49	4.20
Compacts	0.0	-.09	.18	.41
Mid-Size	.10	.12	.13	.15
Full-Size	-3.49	-3.29	-3.28	-3.31
Luxury	.01	.02	.02	.01
New Reg. Shares:				
Subcompacts	7.85	7.30	6.36	5.36
Compacts	-.76	-.57	+.14	.61
Mid-Size	.44	.47	.43	.33
Full-Size	-6.71	-5.48	-5.08	-4.61
Luxury	.33	.34	.26	.14
Capital Costs/Mile:				
Subcompact	1.81	1.79	1.76	1.73
Compact	2.13	2.10	2.02	1.95
Mid-Size	2.23	2.18	2.11	2.06
Full-Size	2.16	2.10	2.06	2.02
Luxury	1.71	1.68	1.65	1.62
Average	1.74	1.71	1.68	1.64

Raising gas prices by 10% increases costs per mile by around 2% (an elasticity of 0.2). Gasoline costs are less important to luxury costs, hence the lower increase. The different relative importance also is the reason why mid-size costs increase fractionally more than full-size.

Average costs increase less, due to the shift to subcompacts. The size-class shifts in desired shares are substantial for subcompacts and full-size. The change in desired stock is modest, but persistent, producing very reasonable results for new registrations. As can be seen, the reduction in sales tapers off quite rapidly. Scrappage tends to oscillate very sharply in this initial period. Vehicle miles traveled falls off significantly, and this tends to build up. This upward trend in response does not continue, in fact, it ultimately begins to taper off due to the very slight improvements in average fuel efficiency.

The next table examines the impact of a 1% increase in income. Clearly income has varying effects on desired shares and new registrations by class. There is an initial "trading up" response which is very rapidly 'damped' and then compensated for by income distribution changes. The longer-run trend again indicates reductions in the smaller car shares, and an increase in the full-size share. Given that we have a 1% initiating income change these elasticities are quite strong - at their peak values they exceed 1.0, compared to elasticities of 0.5 to 0.8 for the gaseoline price.

2. 1% PERSONAL INCOME INCREASE

% Change in:	1977	1978	1979	1980
Desired Stock	.16	.22	.20	.14
Actual Stock	.53	.65	.51	.29
New Registrations	5.54	1.54	-.19	-.50
Scrappage	.92	.47	1.12	1.61
Vehicle Miles	.09	.73	.90	.80
New Fleet MPG	-.19	-.08	-.01	.07
Desired Shares:				
Subcompacts	-1.05	-.54	-.03	.36
Compacts	-.40	-.11	.14	.33
Mid-Size	-.06	-.05	-.04	-.04
Full-Size	.93	.30	-.27	-.73
Luxury	.29	.54	.77	.94
New Reg. Shares:				
Subcompacts	-1.62	-.77	+.05	.65
Compacts	-.49	-.11	+.25	.50
Mid-Size	-.18	-.14	-.06	-.02
Full-Size	1.79	.49	-.55	-1.30
Luxury	.41	.85	1.23	1.46
Capital Costs/Mile:				
Subcompacts	.02	.02	.01	0.0
Compacts	.03	.05	.07	.07
Mid-Size	.02	.04	.04	.04
Full-Size	.02	.03	.03	.03
Luxury	.01	.02	.02	.02
Average	.11	.09	.06	.03

As can be seen, new registrations quickly adjust after a substantial initial impact. The increase in scrappage dies away in the longer-run. The minute changes in costs per mile by class originate with higher options expenditures.

3. <u>5% PURCHASE TAX, FULL-SIZE</u>

% Change in:	1977	1978	1979	1980
Desired Stock	.04	.04	.04	.05
Actual Stock	-.09	-.04	-.02	-.01
New Registrations	-1.25	.43	.31	.29
Scrappage	-.59	.03	.09	.22
Vehicle Miles	-.02	-.09	.01	.09
New Fleet MPG	1.71	1.56	1.50	1.43
Desired Shares:				
Full-Size	-13.32	-13.04	-13.27	-13.51
New Reg. Shares:				
Full-Size	-25.16	-21.07	-19.66	-18.41
Capital Cost/Mile:				
Full-Size	2.07	2.07	2.05	2.04
Average	-.23	-.20	-.21	-.23

The converse situation occurs with a 5% tax on full-size autos. Total new registrations are relatively unaffected, but the distribution changes markedly. The 5% tax (i.e. a 5% purchase price increase) raises the full-size cost per mile by just over 2%. This reduces the full-size shares in desired stock by over 13%, causing the new registrations share to fall even more. Each of the other classes (except luxury) gain about equally in percentage-point terms.

The very sharp redistribtuion holds average cost virtually unchanged, and this is why total new registrations are relatively unaffected. The new share distribution increases average fleet mpg significantly.

As clearly seen in Table 4, the ownership tax has virtually negligable effects compared to the purchase tax. Even the redistribution effects are much less, with full-size's registrations share falling by a modest 5% (1.3% points) at worst. The reason, of course, is the smaller increase in

4. <u>10% OWNERSHIP TAX, FULL-SIZE</u>

% Change in:	1977	1978	1979	1980
Desired Stock	0.01	0.0	0.0	0.0
Actual Stock	0.0	0.0	0.0	0.0
New Registrations	0.01	0.01	0.03	0.03
Scrappage	-0.03	0.03	0.05	0.05
Vehicle Miles	0.0	0.01	0.02	0.03
New Fleet MPG	0.34	0.29	0.26	0.23
Desired Share:				
Full-Size	-2.62	-2.41	-2.33	-2.26
New Reg. Share:				
Full-Size	-5.07	-3.91	-3.41	-2.98
Capital Costs/Mile:				
Full-Size	0.41	0.38	0.36	0.34
Average	-0.03	-0.02	-0.02	-0.03

cost per mile - which increases by only 0.4%. The minute increase in new registrations soon disappears.

The next table is aimed at comparing the effects of purchase taxes levied on each class individually.

5. COMPARISON TABLE: 5% PURCHASE TAX

% Change in:		1977	1978	1979	1980
New Registrations:					
Tax on:	Subcompacts	-1.59	-0.13	-0.20	-0.27
	Compacts	-1.04	+0.29	0.17	0.12
	Mid-Size	-2.02	+0.23	0.07	-0.01
	Full-Size	-1.25	+0.43	0.31	0.29
	Luxury	-1.24	+0.12	0.02	-0.02
New Reg. Shares: (Effect on own share from own class tax)					
	Subcompacts	-22.05	-20.32	-19.07	-17.80
	Compacts	-20.63	-18.93	-16.88	-15.23
	Mid-Size	-6.05	-5.90	-5.68	-5.11
	Full-Size	-25.16	-21.07	-19.66	-18.41
	Luxury	-1.87	-1.73	-1.57	-1.42
Capital Costs;Mile: (Effect on own cost from own class tax)					
	Subcompacts	1.90	1.88	1.86	1.84
	Compacts	1.90	1.90	1.89	1.89
	Mid-Size	1.98	1.98	1.97	1.96
	Full-Size	2.07	2.07	2.05	2.04
	Luxury	2.60	2.59	2.58	2.56

Regarding capitalized costs per mile we observe a logical progression according to how important the purchase cost is. The results of these cost changes, however, vary widely depending on the different price elasticities.

Hence we can see that the greatest initial impact on new registrations occurs for mid-size and the lowest for compacts. In terms of shares, however, full-size clearly reacts the most, followed closely by the small-car classes, with luxury changing very little.

6. COMPARISON TABLE: 10% OWNERSHIP TAX

% Change in:		1977	1978	1979	1980
New Registrations:					
Tax on:	Subcompacts	-0.18	-0.12	-0.09	-0.09
	Compacts	-0.01	+0.01	0.01	0.01
	Mid-Size	-0.07	-0.04	-0.02	-0.02
	Full-Size	0.01	0.01	0.03	0.03
	Luxury	-0.03	-0.01	-0.01	-0.01
New Reg. Shares: (Effect on own share from own class tax)					
	Subcompacts	-7.01	-6.06	-5.35	-4.70
	Compacts	-5.59	-4.77	-3.95	-3.32
	Mid-Size	-1.40	-1.28	-1.15	-0.96
	Full-Size	-5.07	-3.91	-3.41	-2.98
	Luxury	-0.23	-0.20	-0.17	-0.14
Capital Costs/Mile: (Effect on own cost from own class tax)					
	Subcompacts	0.57	0.54	0.50	0.47
	Compacts	0.50	0.47	0.44	0.42
	Mid-Size	0.44	0.42	0.39	0.37
	Full-Size	0.41	0.38	0.36	0.34
	Luxury	0.31	0.30	0.28	0.26

In Table 6 a similar comparison for the ownership tax is presented. The major difference here, of course, is that now the small-car classes have the greater % cost increase. Thus subcompacts and compacts now experience the largest % changes in new registration shares. Again, we may note the very small changes in total new sales - even the largest elasticity (subcompacts in 1977) is less than 0.02 (0.18%/10%).

The last multiplier table addresses the question of increasing fuel efficiency. Compared to the baseline 1% per annum efficiency improvement from 1979 onwards, we now have an additional 2% p.a. increase each and every year. In this case the divergence from the baseline increases every year-there is a compounding effect.

7. <u>3% p.a. FUEL EFFICIENCY INCREASE</u>

% Change in:	1979	1980	1981	1982
Desired Stock	0.06	0.11	0.16	0.20
Actual Stock	0.03	0.07	0.09	0.11
New Registrations	0.18	0.30	0.48	0.65
Scrappage	-0.13	-0.02	+0.25	0.55
Vehicle Miles	0.02	0.11	0.24	0.43
New Fleet MPG	1.54	3.05	4.57	6.08
Desired Shares:				
Subcompacts	-0.71	-1.26	-1.76	-2.24
Compacts	-0.05	-0.18	-0.41	-0.55
Mid-Size	-0.02	-0.05	-0.10	-0.13
Full-Size	0.53	1.05	1.56	1.99
Luxury	0.0	-0.01	-0.01	-0.01
New Reg. Shares:				
Subcompacts	-1.13	-1.95	-2.63	-3.22
Compacts	-0.02	-0.21	-0.56	-0.75
Mid-Size	-0.10	-0.18	-0.28	-0.33
Full-Size	0.93	1.74	2.48	2.98
Luxury	-0.06	-0.10	-0.13	-0.15
Capital Cost/Mile:				
Subcompacts	-0.30	-0.58	-0.84	-1.10
Compact	-0.34	-0.64	-0.91	-1.18
Mid-Size	-0.36	-0.67	-0.97	-1.26
Full-Size	-0.35	-0.66	-0.97	-1.25
Luxury	-0.28	-0.53	-0.78	-1.01
Average	-0.29	-0.55	-0.80	-1.04

The extra 2% efficiency gain increases total new registrations by 0.18% initially, rising to 0.65% after four years. While registrations increase for all except the small cars, the changes in the shares indicate that they do so at very different rates.

The cost reductions are proportionately greater for the larger cars. Hence, across the board efficiency increases favor the larger, less fuel efficient cars. The effect is most noticeable for full-size, whose share rises 0.5% initially and 2% by 1982 i.e. full-size sales increase over 2 1/2%

by 1982.

Contrasting to this change, mid-size sales are raised 1/3%, while sub-compact sales fall by 2 1/2%. Clearly these redistribution effects somewhat offset the full increase in new fleet m.p.g. - with no changes it would have been 8% higher by 1982 rather than 6%.

TABLES OF FORECAST OUTPUT

BASELINE

TABLES OF FORECAST OUTPUT (Cont.)

TABLE 1,00 SUMMARY

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	DESIRED STOCK OF AUTOS	MILL AUTOS	93,841	97,155	100,261	103,261	105,273	107,157
2		%GROWTH	1,43	3,53	3,20	2,99	1,95	1,79
3								
4	ACTUAL YR-END STOCK OF AUTOS	MILL AUTOS	96,644	100,005	102,732	105,601	106,574	107,133
5		%GROWTH	2,90	3,48	2,73	2,79	0,92	0,52
6								
7	NEW REGISTRATIONS OF AUTOS	MILL AUTOS	8,261	10,231	11,253	11,586	11,476	11,653
8		%GROWTH	-11,04	23,85	9,99	2,96	-0,95	1,55
9								
10	FOREIGN NEW REGIS,	MILL AUTOS	1,502	1,478	1,538	1,536	1,502	1,510
11		%GROWTH	2,83	-1,62	4,09	-0,13	-2,19	0,50
12								
13	DOMESTIC NEW REGIS,	MILL AUTOS	6,759	8,754	9,715	10,051	9,974	10,144
14		%GROWTH	-13,63	29,51	10,98	3,45	-0,76	1,70
15								
16	VEHICLE MILES TRAVELED	BILL MILES	1029,7	1027,2	1040,7	1054,2	1081,4	1099,4
17		%GROWTH	3,43	-0,24	1,32	1,30	2,57	1,67
18								
19	SCRAPPAGE OF AUTOS	MILL AUTOS	5,541	6,870	8,527	8,717	10,503	11,095
20		%GROWTH	-15,63	23,97	24,12	2,23	20,49	5,64
21								
22	NEW AUTOS FLEET M,P,G, (EPA)		17,15	17,45	18,10	18,84	19,48	20,20
23		%GROWTH	6,33	1,71	3,75	4,10	3,37	3,69
24								
25	NEW DOMESTIC EPA TEST M,P,G,		16,14	16,65	17,38	18,16	18,87	19,65
26		%GROWTH	5,87	3,17	4,38	4,50	3,91	4,10
27								
28	NEW DOMESTIC AUTOS M,P,G,		16,12	16,60	17,30	18,05	18,72	19,46
29		%GROWTH	5,66	2,99	4,20	4,32	3,73	3,96
30								
31	NEW FOREIGN AUTOS M,P,G,		24,10	24,95	25,56	26,47	26,64	27,06
32		%GROWTH	3,53	3,53	2,46	3,57	0,63	1,58
33								
34								
35	SHARE OF NEW REGISTRATIONS:							
36								
37	SUBCOMPACT		0,291	0,230	0,217	0,210	0,205	0,200
38		%GROWTH	13,13	-20,97	-5,83	-3,06	-2,61	-1,99
39								
40	COMPACT		0,219	0,197	0,190	0,182	0,195	0,203
41		%GROWTH	16,95	-9,83	-3,39	-4,62	7,17	4,57
42								
43	MID-SIZE		0,228	0,284	0,251	0,234	0,225	0,225
44		%GROWTH	-12,22	24,51	-11,49	-6,97	-3,83	0,15
45								
46	FULL-SIZE		0,169	0,198	0,253	0,286	0,285	0,279
47		%GROWTH	-19,67	16,70	27,95	13,15	-0,35	-2,23
48								
49	LUXURY		0,093	0,091	0,089	0,088	0,091	0,092
50		%GROWTH	9,07	-1,70	-2,80	-0,38	2,72	1,34

TABLE 1.00 SUMMARY

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	DESIRED STOCK OF AUTOS	MILL AUTOS	109,421	111,487	113,319	115,205	116,997	118,812
2		%GROWTH	2,11	1,89	1,64	1,66	1,56	1,55
3								
4	ACTUAL YR-END STOCK OF AUTOS	MILL AUTOS	108,513	110,446	112,401	114,403	116,613	118,523
5		%GROWTH	1,29	1,78	1,77	1,78	1,93	1,64
6								
7	NEW REGISTRATIONS OF AUTOS	MILL AUTOS	12,730	12,461	12,211	12,335	12,359	12,189
8		%GROWTH	9,24	-2,11	-2,01	1,01	0,19	-1,37
9								
10	FOREIGN NEW REGIS,	MILL AUTOS	1,579	1,528	1,477	1,456	1,428	1,431
11		%GROWTH	4,60	-3,27	-3,34	-1,42	-1,90	0,25
12								
13	DOMESTIC NEW REGIS,	MILL AUTOS	11,151	10,934	10,735	10,879	10,931	10,758
14		%GROWTH	9,93	-1,95	-1,82	1,35	0,47	-1,59
15								
16	VEHICLE MILES TRAVELED	BILL MILES	1114,6	1143,2	1172,1	1194,4	1216,6	1235,1
17		%GROWTH	1,38	2,57	2,52	1,90	1,86	1,52
18								
19	SCRAPPAGE OF AUTOS	MILL AUTOS	11,349	10,529	10,256	10,334	10,148	10,279
20		%GROWTH	2,29	-7,23	-2,59	0,76	-1,79	1,29
21								
22	NEW AUTOS FLEET M,P,G, (EPA)		20,72	21,27	21,85	22,44	22,94	23,30
23		%GROWTH	2,57	2,68	2,69	2,72	2,21	1,56
24								
25	NEW DOMESTIC EPA TEST M,P,G,		20,26	20,86	21,49	22,16	22,72	23,08
26		%GROWTH	3,11	2,96	3,04	3,08	2,52	1,61
27								
28	NEW DOMESTIC AUTOS M,P,G,		20,04	20,60	21,20	21,83	22,35	22,68
29		%GROWTH	2,94	2,84	2,92	2,93	2,41	1,49
30								
31	NEW FOREIGN AUTOS M,P,G,		27,27	27,72	28,01	28,44	28,72	29,23
32		%GROWTH	0,78	1,65	1,04	1,52	0,99	1,79
33								
34								
35	SHARE OF NEW REGISTRATIONS:							
36								
37	SUBCOMPACT		0,189	0,186	0,183	0,177	0,172	0,176
38		%GROWTH	-5,97	-1,49	-1,73	-3,11	-2,70	2,08
39								
40	COMPACT		0,212	0,210	0,209	0,208	0,206	0,205
41		%GROWTH	4,06	-0,80	-0,58	-0,52	-0,78	-0,59
42								
43	MID-SIZE		0,227	0,226	0,226	0,227	0,226	0,229
44		%GROWTH	1,05	-0,41	-0,12	0,41	-0,68	1,63
45								
46	FULL-SIZE		0,279	0,284	0,288	0,293	0,299	0,292
47		%GROWTH	0,07	1,64	1,39	1,71	2,36	-2,36
48								
49	LUXURY		0,093	0,094	0,095	0,096	0,097	0,098
50		%GROWTH	1,23	1,09	0,83	0,95	1,09	1,03

TABLE 1.00 SUMMARY

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	DESIRED STOCK OF AUTOS	MILL AUTOS	120,482	121,946	123,271	124,549	125,918	127,092
2		%GROWTH	1,41	1,22	1,09	1,04	1,10	0,93
3								
4	ACTUAL YR-END STOCK OF AUTOS	MILL AUTOS	120,089	121,328	122,282	123,092	124,050	124,945
5		%GROWTH	1,32	1,03	0,79	0,66	0,78	0,72
6								
7	NEW REGISTRATIONS OF AUTOS	MILL AUTOS	12,295	12,525	12,834	13,194	13,261	13,324
8		%GROWTH	0,87	1,88	2,46	2,80	0,51	0,48
9								
10	FOREIGN NEW REGIS.	MILL AUTOS	1,449	1,489	1,528	1,586	1,602	1,613
11		%GROWTH	1,22	2,77	2,64	3,81	0,99	0,68
12								
13	DOMESTIC NEW REGIS.	MILL AUTOS	10,846	11,037	11,305	11,607	11,658	11,711
14		%GROWTH	0,82	1,76	2,44	2,67	0,44	0,45
15								
16	VEHICLE MILES TRAVELED	BILL MILES	1249,3	1261,0	1271,9	1283,2	1294,7	1307,9
17		%GROWTH	1,15	0,94	0,86	0,89	0,89	1,02
18								
19	SCRAPPAGE OF AUTOS	MILL AUTOS	10,728	11,287	11,880	12,383	12,303	12,429
20		%GROWTH	4,36	5,21	5,26	4,23	-0,65	1,03
21								
22	NEW AUTOS FLEET M.P.G. (EPA)		23,62	23,98	24,32	24,69	24,86	25,03
23		%GROWTH	1,40	1,53	1,42	1,53	0,68	0,67
24								
25	NEW DOMESTIC EPA TEST M.P.G.		23,44	23,81	24,18	24,58	24,77	24,96
26		%GROWTH	1,54	1,58	1,58	1,63	0,76	0,76
27								
28	NEW DOMESTIC AUTOS M.P.G.		23,01	23,35	23,69	24,05	24,21	24,37
29		%GROWTH	1,42	1,49	1,46	1,51	0,67	0,67
30								
31	NEW FOREIGN AUTOS M.P.G.		29,56	30,04	30,31	30,75	30,96	31,17
32		%GROWTH	1,11	1,62	0,92	1,44	0,69	0,67
33								
34								
35	SHARE OF NEW REGISTRATIONS:							
36								
37	SUBCOMPACT		0,176	0,178	0,178	0,180	0,181	0,181
38		%GROWTH	0,33	1,04	0,04	1,17	0,46	0,13
39								
40	COMPACT		0,205	0,204	0,204	0,204	0,204	0,204
41		%GROWTH	-0,12	-0,41	0,25	-0,29	0,18	-0,04
42								
43	MID-SIZE		0,231	0,233	0,234	0,236	0,235	0,237
44		%GROWTH	0,85	0,72	0,50	0,96	-0,49	0,85
45								
46	FULL-SIZE		0,289	0,285	0,282	0,278	0,277	0,273
47		%GROWTH	-1,14	-1,30	-0,99	-1,68	-0,39	-1,14
48								
49	LUXURY		0,099	0,100	0,101	0,102	0,103	0,104
50		%GROWTH	1,06	1,11	1,08	1,01	1,04	0,97

TABLE 1,00 SUMMARY

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	DESIRED STOCK OF AUTOS	MILL AUTOS	128,115	129,067	129,968	130,869	131,731	132,563
2		%GROWTH	0,81	0,74	0,70	0,69	0,66	0,63
3								
4	ACTUAL YR-END STOCK OF AUTOS	MILL AUTOS	125,836	126,716	127,601	128,537	129,506	130,385
5		%GROWTH	0,71	0,70	0,70	0,73	0,75	0,68
6								
7	NEW REGISTRATIONS OF AUTOS	MILL AUTOS	13,439	13,578	13,654	13,797	13,798	13,853
8		%GROWTH	0,87	1,03	0,56	1,04	0,01	0,40
9								
10	FOREIGN NEW REGIS,	MILL AUTOS	1,623	1,632	1,638	1,638	1,628	1,628
11		%GROWTH	0,61	0,59	0,37	-0,00	-0,65	0,00
12								
13	DOMESTIC NEW REGIS,	MILL AUTOS	11,817	11,945	12,016	12,158	12,171	12,226
14		%GROWTH	0,90	1,09	0,59	1,19	0,10	0,45
15								
16	VEHICLE MILES TRAVELED	BILL MILES	1321,5	1335,0	1348,5	1361,3	1373,9	1384,9
17		%GROWTH	1,05	1,02	1,01	0,95	0,92	0,80
18								
19	SCRAPPAGE OF AUTOS	MILL AUTOS	12,548	12,697	12,770	12,861	12,829	12,974
20		%GROWTH	0,96	1,19	0,57	0,71	-0,24	1,13
21								
22	NEW AUTOS FLEET M,P,G, (EPA)		25,18	25,33	25,48	25,62	25,76	25,92
23		%GROWTH	0,60	0,58	0,60	0,55	0,55	0,60
24								
25	NEW DOMESTIC EPA TEST M,P,G,		25,13	25,31	25,48	25,65	25,82	25,99
26		%GROWTH	0,71	0,69	0,70	0,64	0,66	0,68
27								
28	NEW DOMESTIC AUTOS M,P,G,		24,52	24,66	24,81	24,96	25,10	25,25
29		%GROWTH	0,61	0,59	0,60	0,58	0,57	0,61
30								
31	NEW FOREIGN AUTOS M,P,G,		31,37	31,56	31,76	31,96	32,15	32,35
32		%GROWTH	0,64	0,62	0,63	0,61	0,59	0,64
33								
34								
35	SHARE OF NEW REGISTRATIONS:							
36								
37	SUBCOMPACT		0,181	0,179	0,179	0,176	0,174	0,173
38		%GROWTH	-0,44	-0,68	-0,37	-1,48	-0,99	-0,66
39								
40	COMPACT		0,204	0,203	0,203	0,203	0,203	0,204
41		%GROWTH	-0,15	-0,07	-0,08	0,07	0,02	0,12
42								
43	MID-SIZE		0,238	0,238	0,238	0,238	0,238	0,238
44		%GROWTH	0,19	0,17	0,16	0,00	0,05	-0,06
45								
46	FULL-SIZE		0,273	0,273	0,272	0,274	0,274	0,274
47		%GROWTH	-0,14	-0,03	-0,22	0,54	0,21	0,02
48								
49	LUXURY		0,105	0,106	0,107	0,108	0,109	0,110
50		%GROWTH	0,98	1,00	0,98	0,98	0,94	0,91

TABLE 1.00 SUMMARY

LINE	ITEM		1999	2000
1	DESIRED STOCK OF AUTOS	MILL AUTOS	133,368	134,075
2		%GROWTH	0,61	0,53
3				
4	ACTUAL YR-END STOCK OF AUTOS	MILL AUTOS	131,195	131,903
5		%GROWTH	0,62	0,54
6				
7	NEW REGISTRATIONS OF AUTOS	MILL AUTOS	13,940	13,997
8		%GROWTH	0,63	0,41
9				
10	FOREIGN NEW REGIS.	MILL AUTOS	1,630	1,624
11		%GROWTH	0,10	-0,32
12				
13	DOMESTIC NEW REGIS.	MILL AUTOS	12,311	12,373
14		%GROWTH	0,70	0,51
15				
16	VEHICLE MILES TRAVELED	BILL MILES	1394,6	1402,1
17		%GROWTH	0,71	0,54
18				
19	SCRAPPAGE OF AUTOS	MILL AUTOS	13,130	13,289
20		%GROWTH	1,20	1,21
21				
22	NEW AUTOS FLEET M.P.G. (EPA)		26,06	26,21
23		%GROWTH	0,56	0,57
24				
25	NEW DOMESTIC EPA TEST M.P.G.		26,17	26,33
26		%GROWTH	0,67	0,65
27				
28	NEW DOMESTIC AUTOS M.P.G.		25,39	25,54
29		%GROWTH	0,57	0,58
30				
31	NEW FOREIGN AUTOS M.P.G.		32,54	32,74
32		%GROWTH	0,59	0,61
33				
34				
35	SHARE OF NEW REGISTRATIONS			
36				
37	SUBCOMPACT		0,172	0,170
38		%GROWTH	-0,83	-1,06
39				
40	COMPACT		0,204	0,204
41		%GROWTH	0,13	-0,13
42				
43	MID-SIZE		0,238	0,239
44		%GROWTH	-0,10	0,47
45				
46	FULL-SIZE		0,275	0,275
47		%GROWTH	0,16	0,00
48				
49	LUXURY		0,111	0,112
50		%GROWTH	0,87	0,84

TABLE 1.01 SHARES BY SIZE CLASS

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	SHARES OF DESIRED STOCK							
2								
3	SUBCOMPACTS		0,232	0,210	0,201	0,200	0,199	0,199
4		%GROWTH	14,91	-9,81	-4,00	-0,39	-0,89	-0,07
5								
6	COMPACTS		0,198	0,193	0,185	0,180	0,186	0,191
7		%GROWTH	8,96	-2,37	-4,41	-2,77	3,38	3,19
8								
9	MID-SIZE		0,235	0,232	0,230	0,230	0,232	0,232
10		%GROWTH	-4,76	-1,03	-0,74	-0,04	0,68	0,01
11								
12	FULL SIZE		0,245	0,275	0,294	0,299	0,293	0,286
13		%GROWTH	-13,72	12,25	6,75	1,94	-2,25	-2,31
14								
15	LUXURY		0,090	0,090	0,090	0,090	0,091	0,092
16		%GROWTH	5,17	-0,14	0,05	0,33	0,97	1,04
17								
18								
19	SHARES OF ACTUAL YR-END STOCKS							
20								
21	SUBCOMPACT		0,168	0,179	0,189	0,196	0,203	0,207
22		%GROWTH	9,75	6,40	5,38	4,04	3,33	2,22
23								
24	COMPACT		0,175	0,179	0,181	0,183	0,185	0,188
25		%GROWTH	2,96	1,95	1,45	0,69	1,31	1,62
26								
27	MID-SIZE		0,231	0,235	0,236	0,235	0,234	0,234
28		%GROWTH	-0,96	1,66	0,40	-0,21	-0,38	-0,20
29								
30	FULL SIZE		0,338	0,319	0,306	0,297	0,288	0,281
31		%GROWTH	-5,27	-5,61	-4,31	-2,86	-2,88	-2,63
32								
33	LUXURY		0,087	0,088	0,089	0,089	0,090	0,090
34		%GROWTH	1,23	1,09	0,68	0,41	0,59	0,61
35								
36								
37	DOMESTIC SHARE OF NEW REGISTRATIONS							
38								
39	DOMESTIC SHARE OF TOTAL		0,818	0,856	0,863	0,867	0,869	0,870
40		%GROWTH	-2,91	4,57	0,91	0,48	0,19	0,16
41								
42	DOMESTIC SHARE OF SUBCOMPACTS		0,4694	0,4800	0,4800	0,4800	0,4800	0,4800
43		%GROWTH	-2,68	2,26	0,0	0,0	0,0	0,0
44								
45	DOMESTIC SHARE OF COMPACTS		0,9264	0,9300	0,9300	0,9300	0,9300	0,9300
46		%GROWTH	0,15	0,39	0,0	0,0	0,0	0,0
47								
48	DOMESTIC SHARE OF LUXURY		0,8792	0,8800	0,8800	0,8800	0,8800	0,8800
49		%GROWTH	-0,33	0,09	0,0	0,0	0,0	0,0

TABLE 1.01 SHARES BY SIZE CLASS

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	SHARES OF DESIRED STOCK:							
2								
3	SUBCOMPACTS		0,192	0,190	0,187	0,182	0,178	0,178
4		%GROWTH	-3,04	-1,19	-1,58	-2,60	-2,54	0,26
5								
6	COMPACTS		0,197	0,198	0,198	0,198	0,198	0,198
7		%GROWTH	3,01	0,17	0,20	0,11	-0,16	-0,04
8								
9	MID-SIZE		0,233	0,233	0,233	0,233	0,232	0,233
10		%GROWTH	0,64	-0,14	-0,11	0,12	-0,51	0,52
11								
12	FULL SIZE		0,284	0,285	0,287	0,291	0,296	0,294
13		%GROWTH	-0,77	0,49	0,74	1,23	1,79	-0,81
14								
15	LUXURY		0,093	0,094	0,095	0,096	0,097	0,097
16		%GROWTH	1,07	0,96	0,79	0,90	0,98	0,83
17								
18								
19	SHARES OF ACTUAL YR-END STOCKS:							
20								
21	SUBCOMPACT		0,209	0,208	0,205	0,202	0,197	0,194
22		%GROWTH	0,54	-0,48	-1,13	-1,78	-2,15	-1,89
23								
24	COMPACT		0,192	0,195	0,197	0,199	0,201	0,202
25		%GROWTH	2,01	1,61	1,29	1,04	0,74	0,56
26								
27	MID-SIZE		0,234	0,234	0,233	0,232	0,231	0,230
28		%GROWTH	-0,00	-0,08	-0,22	-0,30	-0,45	-0,33
29								
30	FULL SIZE		0,275	0,273	0,273	0,274	0,278	0,280
31		%GROWTH	-1,94	-0,87	-0,05	0,63	1,19	0,96
32								
33	LUXURY		0,091	0,091	0,092	0,092	0,093	0,094
34		%GROWTH	0,61	0,55	0,56	0,64	0,71	0,77
35								
36								
37	DOMESTIC SHARE OF NEW REGISTRATIONS:							
38								
39	DOMESTIC SHARE OF TOTAL		0,876	0,877	0,879	0,882	0,884	0,883
40		%GROWTH	0,63	0,17	0,19	0,33	0,28	-0,21
41								
42	DOMESTIC SHARE OF SUBCOMPACTS		0,4800	0,4800	0,4800	0,4800	0,4800	0,4800
43		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
44								
45	DOMESTIC SHARE OF COMPACTS		0,9300	0,9300	0,9300	0,9300	0,9300	0,9300
46		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
47								
48	DOMESTIC SHARE OF LUXURY		0,8800	0,8800	0,8800	0,8800	0,8800	0,8800
49		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0

TABLE 1,01 SHARES BY SIZE CLASS

LINE	I T E M		1987	1988	1989	1990	1991	1992
1	SHARES OF DESIRED STOCK:							
2								
3	SUBCOMPACTS		0,177	0,177	0,176	0,176	0,176	0,176
4		%GROWTH	-0,60	-0,09	-0,54	0,23	-0,04	-0,13
5								
6	COMPACTS		0,198	0,198	0,199	0,199	0,199	0,199
7		%GROWTH	0,17	-0,03	0,30	-0,05	0,15	-0,01
8								
9	MID-SIZE		0,234	0,234	0,235	0,236	0,236	0,237
10		%GROWTH	0,24	0,26	0,23	0,54	-0,15	0,58
11								
12	FULL SIZE		0,293	0,291	0,290	0,288	0,287	0,285
13		%GROWTH	-0,25	-0,46	-0,40	-0,88	-0,30	-0,74
14								
15	LUXURY		0,098	0,099	0,100	0,101	0,102	0,103
16		%GROWTH	0,91	0,96	0,99	0,96	0,99	0,98
17								
18								
19	SHARES OF ACTUAL YR-END STOCKS:							
20								
21	SUBCOMPACT		0,190	0,187	0,185	0,183	0,182	0,181
22		%GROWTH	-1,74	-1,49	-1,31	-0,98	-0,69	-0,47
23								
24	COMPACT		0,203	0,204	0,204	0,205	0,205	0,205
25		%GROWTH	0,47	0,35	0,29	0,14	0,04	-0,02
26								
27	MID-SIZE		0,230	0,230	0,230	0,230	0,231	0,232
28		%GROWTH	-0,24	-0,08	0,06	0,25	0,24	0,37
29								
30	FULL SIZE		0,283	0,284	0,285	0,285	0,284	0,283
31		%GROWTH	0,78	0,51	0,27	-0,01	-0,13	-0,34
32								
33	LUXURY		0,094	0,095	0,096	0,097	0,098	0,099
34		%GROWTH	0,84	0,92	0,99	1,02	1,04	1,03
35								
36								
37	DOMESTIC SHARE OF NEW REGISTRATIONS:							
38								
39	DOMESTIC SHARE OF TOTAL		0,882	0,881	0,881	0,880	0,879	0,879
40		%GROWTH	-0,05	-0,12	-0,02	-0,13	-0,07	-0,03
41								
42	DOMESTIC SHARE OF SUBCOMPACTS		0,4800	0,4800	0,4800	0,4800	0,4800	0,4800
43		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
44								
45	DOMESTIC SHARE OF COMPACTS		0,9300	0,9300	0,9300	0,9300	0,9300	0,9300
46		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
47								
48	DOMESTIC SHARE OF LUXURY		0,8800	0,8800	0,8800	0,8800	0,8800	0,8800
49		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0

TABLE 1.01 SHARES BY SIZE CLASS

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	SHARES OF DESIRED STOCK:							
2								
3	SUBCOMPACTS		0,175	0,175	0,174	0,172	0,171	0,170
4		%GROWTH	-0,40	-0,50	-0,29	-0,97	-0,71	-0,54
5								
6	COMPACTS		0,199	0,198	0,198	0,198	0,198	0,198
7		%GROWTH	-0,12	-0,11	-0,10	-0,05	-0,05	0,04
8								
9	MID-SIZE		0,238	0,239	0,239	0,240	0,240	0,240
10		%GROWTH	0,29	0,29	0,27	0,20	0,18	0,09
11								
12	FULL SIZE		0,284	0,283	0,282	0,283	0,282	0,282
13		%GROWTH	-0,27	-0,23	-0,35	0,08	-0,06	-0,14
14								
15	LUXURY		0,104	0,105	0,106	0,107	0,108	0,109
16		%GROWTH	1,00	1,02	1,01	1,02	0,98	0,95
17								
18								
19	SHARES OF ACTUAL YR-END STOCKS:							
20								
21	SUBCOMPACT		0,180	0,180	0,180	0,179	0,179	0,178
22		%GROWTH	-0,32	-0,24	-0,16	-0,26	-0,31	-0,36
23								
24	COMPACT		0,204	0,204	0,204	0,204	0,204	0,204
25		%GROWTH	-0,07	-0,09	-0,10	-0,08	-0,06	-0,03
26								
27	MID-SIZE		0,233	0,234	0,235	0,235	0,236	0,237
28		%GROWTH	0,38	0,39	0,37	0,34	0,28	0,24
29								
30	FULL SIZE		0,282	0,281	0,279	0,278	0,277	0,276
31		%GROWTH	-0,42	-0,47	-0,50	-0,43	-0,37	-0,32
32								
33	LUXURY		0,100	0,101	0,102	0,103	0,104	0,105
34		%GROWTH	1,03	1,04	1,04	1,03	1,01	0,99
35								
36								
37	DOMESTIC SHARE OF NEW REGISTRATIONS:							
38								
39	DOMESTIC SHARE OF TOTAL		0,879	0,880	0,880	0,881	0,882	0,882
40		%GROWTH	0,03	0,06	0,03	0,14	0,09	0,05
41								
42	DOMESTIC SHARE OF SUBCOMPACTS		0,4800	0,4800	0,4800	0,4800	0,4800	0,4800
43		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
44								
45	DOMESTIC SHARE OF COMPACTS		0,9300	0,9300	0,9300	0,9300	0,9300	0,9300
46		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0
47								
48	DOMESTIC SHARE OF LUXURY		0,8800	0,8800	0,8800	0,8800	0,8800	0,8800
49		%GROWTH	0,0	0,0	0,0	0,0	0,0	0,0

TABLE 1,01 SHARES BY SIZE CLASS

LINE	ITEM		1999	2000
1	SHARES OF DESIRED STOCK:			
2				
3	SUBCOMPACTS		0,169	0,168
4		%GROWTH	-0,67	-0,85
5				
6	COMPACTS		0,198	0,198
7		%GROWTH	0,05	-0,10
8				
9	MID-SIZE		0,240	0,241
10		%GROWTH	0,05	0,34
11				
12	FULL SIZE		0,282	0,282
13		%GROWTH	-0,03	-0,06
14				
15	LUXURY		0,110	0,111
16		%GROWTH	0,92	0,91
17				
18				
19	SHARES OF ACTUAL YR-END STOCKS:			
20				
21	SUBCOMPACT		0,177	0,176
22		%GROWTH	-0,45	-0,56
23				
24	COMPACT		0,204	0,204
25		%GROWTH	-0,01	-0,02
26				
27	MID-SIZE		0,237	0,237
28		%GROWTH	0,18	0,20
29				
30	FULL SIZE		0,276	0,275
31		%GROWTH	-0,24	-0,17
32				
33	LUXURY		0,106	0,107
34		%GROWTH	0,97	0,95
35				
36				
37	DOMESTIC SHARE OF NEW REGISTRATIONS:			
38				
39	DOMESTIC SHARE OF TOTAL		0,883	0,884
40		%GROWTH	0,07	0,10
41				
42	DOMESTIC SHARE OF SUBCOMPACTS		0,4800	0,4800
43		%GROWTH	0,0	0,0
44				
45	DOMESTIC SHARE OF COMPACTS		0,9300	0,9300
46		%GROWTH	0,0	0,0
47				
48	DOMESTIC SHARE OF LUXURY		0,8800	0,8800
49		%GROWTH	0,0	0,0

TABLE 1.02 NEW REGISTRATIONS AND STOCKS BY SIZE CLASS

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	NEW REGISTRATIONS:							
2								
3	SUBCOMPACT	MILL AUTOS	2,405	2,354	2,438	2,434	2,348	2,336
4		%GROWTH	0,64	-2,12	3,58	-0,19	-3,54	-0,48
5								
6	COMPACT	MILL AUTOS	1,805	2,016	2,142	2,104	2,233	2,371
7		%GROWTH	4,04	11,68	6,26	-1,80	6,15	6,19
8								
9	MID-SIZE	MILL AUTOS	1,883	2,903	2,826	2,707	2,578	2,622
10		%GROWTH	-21,91	54,20	-2,65	-4,21	-4,75	1,69
11								
12	FULL SIZE	MILL AUTOS	1,400	2,023	2,847	3,317	3,274	3,250
13		%GROWTH	-28,54	44,53	40,73	16,50	-1,30	-0,72
14								
15	LUXURY	MILL AUTOS	0,768	0,935	0,999	1,025	1,043	1,073
16		%GROWTH	-2,97	21,75	6,91	2,57	1,75	2,91
17								
18	DESIRED STOCK:							
19								
20	SUBCOMPACT	MILL AUTOS	22,459	20,962	20,672	21,167	21,172	21,269
21		%GROWTH	18,23	-6,67	-1,38	2,40	0,02	0,46
22								
23	COMPACT	MILL AUTOS	19,120	19,315	18,968	18,957	19,778	20,516
24		%GROWTH	12,01	1,02	-1,80	-0,06	4,33	3,73
25								
26	MID-SIZE	MILL AUTOS	22,673	23,221	23,678	24,329	24,720	24,852
27		%GROWTH	-2,00	2,42	1,97	2,75	1,61	0,53
28								
29	FULL SIZE	MILL AUTOS	23,684	27,510	30,168	31,612	31,187	30,626
30		%GROWTH	-11,22	16,15	9,66	4,79	-1,34	-1,80
31								
32	LUXURY	MILL AUTOS	8,707	8,997	9,246	9,537	9,718	9,870
33		%GROWTH	8,22	3,33	2,77	3,14	1,90	1,57
34								
35	YEAR-END ACTUAL STOCKS:							
36								
37	SUBCOMPACT	MILL AUTOS	16,275	17,918	19,397	20,745	21,632	22,229
38		%GROWTH	12,93	10,10	8,25	6,95	4,28	2,76
39								
40	COMPACT	MILL AUTOS	16,947	17,878	18,633	19,285	19,719	20,143
41		%GROWTH	5,94	5,50	4,22	3,50	2,25	2,15
42								
43	MID-SIZE	MILL AUTOS	22,309	23,467	24,203	24,826	24,959	25,038
44		%GROWTH	1,90	5,19	3,14	2,57	0,54	0,32
45								
46	FULL SIZE	MILL AUTOS	32,695	31,936	31,391	31,345	30,721	30,071
47		%GROWTH	-2,52	-2,32	-1,70	-0,15	-1,99	-2,12
48								
49	LUXURY	MILL AUTOS	8,418	8,806	9,107	9,401	9,543	9,652
50		%GROWTH	4,16	4,61	3,42	3,22	1,52	1,13

TABLE 1.02 NEW REGISTRATIONS AND STOCKS BY SIZE CLASS

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	NEW REGISTRATIONS:							
2								
3	SUBCOMPACT	MILL AUTOS	2,400	2,314	2,229	2,181	2,127	2,141
4		%GROWTH	2,72	-3,57	-3,71	-2,13	-2,51	0,68
5								
6	COMPACT	MILL AUTOS	2,696	2,616	2,548	2,561	2,546	2,496
7		%GROWTH	13,68	-2,97	-2,58	0,49	-0,59	-1,95
8								
9	MID-SIZE	MILL AUTOS	2,894	2,822	2,761	2,801	2,787	2,794
10		%GROWTH	10,38	-2,52	-2,13	1,43	-0,49	0,24
11								
12	FULL SIZE	MILL AUTOS	3,553	3,535	3,512	3,608	3,701	3,564
13		%GROWTH	9,32	-0,50	-0,65	2,74	2,55	-3,70
14								
15	LUXURY	MILL AUTOS	1,187	1,175	1,161	1,184	1,199	1,194
16		%GROWTH	10,59	-1,04	-1,20	1,97	1,29	-0,35
17								
18	DESIRED STOCK:							
19								
20	SUBCOMPACT	MILL AUTOS	20,889	21,009	21,044	20,861	20,723	21,118
21		%GROWTH	-1,79	0,57	0,17	-0,87	-0,66	1,90
22								
23	COMPACT	MILL AUTOS	21,406	21,824	22,256	22,676	23,077	23,446
24		%GROWTH	4,34	1,95	1,98	1,89	1,77	1,60
25								
26	MID-SIZE	MILL AUTOS	25,333	25,747	26,174	26,671	27,047	27,634
27		%GROWTH	1,94	1,63	1,66	1,90	1,41	2,17
28								
29	FULL SIZE	MILL AUTOS	30,781	31,483	32,278	33,257	34,508	34,789
30		%GROWTH	0,50	2,28	2,52	3,03	3,76	0,81
31								
32	LUXURY	MILL AUTOS	10,105	10,383	10,650	10,937	11,258	11,536
33		%GROWTH	2,38	2,76	2,57	2,69	2,93	2,48
34								
35	YEAR-END ACTUAL STOCKS:							
36								
37	SUBCOMPACT	MILL AUTOS	22,637	22,930	23,071	23,065	23,004	22,939
38		%GROWTH	1,84	1,29	0,62	-0,03	-0,26	-0,28
39								
40	COMPACT	MILL AUTOS	20,813	21,525	22,187	22,817	23,430	23,947
41		%GROWTH	3,33	3,42	3,08	2,84	2,69	2,20
42								
43	MID-SIZE	MILL AUTOS	25,360	25,790	26,188	26,573	26,965	27,316
44		%GROWTH	1,29	1,70	1,54	1,47	1,47	1,30
45								
46	FULL SIZE	MILL AUTOS	29,868	30,135	30,653	31,396	32,382	33,226
47		%GROWTH	-0,68	0,90	1,72	2,42	3,14	2,61
48								
49	LUXURY	MILL AUTOS	9,836	10,066	10,301	10,551	10,832	11,094
50		%GROWTH	1,91	2,34	2,34	2,43	2,66	2,42

TABLE 1.02 NEW REGISTRATIONS AND STOCKS BY SIZE CLASS

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	NEW REGISTRATIONS:							
2								
3	SUBCOMPACT	MILL AUTOS	2.167	2.230	2.286	2.378	2.401	2.415
4		%GROWTH	1.20	2.94	2.50	4.01	0.97	0.61
5								
6	COMPACT	MILL AUTOS	2.515	2.551	2.621	2.686	2.705	2.716
7		%GROWTH	0.74	1.46	2.72	2.50	0.69	0.43
8								
9	MID-SIZE	MILL AUTOS	2.842	2.916	3.003	3.117	3.117	3.159
10		%GROWTH	1.73	2.61	2.97	3.79	0.01	1.33
11								
12	FULL SIZE	MILL AUTOS	3.554	3.573	3.625	3.664	3.668	3.644
13		%GROWTH	-0.28	0.55	1.45	1.08	0.12	-0.67
14								
15	LUXURY	MILL AUTOS	1.218	1.254	1.299	1.349	1.370	1.390
16		%GROWTH	1.94	3.00	3.56	3.84	1.55	1.45
17								
18	DESIRED STOCK:							
19								
20	SUBCOMPACT	MILL AUTOS	21.269	21.469	21.521	21.713	21.872	22.002
21		%GROWTH	0.71	0.94	0.24	0.89	0.74	0.59
22								
23	COMPACT	MILL AUTOS	23.796	24.034	24.297	24.447	24.673	24.847
24		%GROWTH	1.49	1.00	1.09	0.62	0.92	0.71
25								
26	MID-SIZE	MILL AUTOS	28.067	28.430	28.720	29.067	29.249	29.632
27		%GROWTH	1.57	1.29	1.02	1.21	0.62	1.31
28								
29	FULL SIZE	MILL AUTOS	35.162	35.363	35.498	35.420	35.589	35.580
30		%GROWTH	1.07	0.57	0.38	-0.22	0.48	-0.02
31								
32	LUXURY	MILL AUTOS	11.795	12.032	12.246	12.446	12.667	12.884
33		%GROWTH	2.24	2.00	1.78	1.63	1.78	1.71
34								
35	YEAR-END ACTUAL STOCKS:							
36								
37	SUBCOMPACT	MILL AUTOS	22.838	22.729	22.608	22.534	22.552	22.607
38		%GROWTH	-0.44	-0.48	-0.53	-0.33	0.08	0.25
39								
40	COMPACT	MILL AUTOS	24.377	24.715	24.983	25.183	25.389	25.567
41		%GROWTH	1.80	1.39	1.08	0.80	0.82	0.70
42								
43	MID-SIZE	MILL AUTOS	27.612	27.875	28.112	28.370	28.661	28.973
44		%GROWTH	1.08	0.95	0.85	0.92	1.02	1.09
45								
46	FULL SIZE	MILL AUTOS	33.927	34.451	34.816	35.043	35.269	35.403
47		%GROWTH	2.11	1.54	1.06	0.65	0.64	0.38
48								
49	LUXURY	MILL AUTOS	11.335	11.557	11.762	11.962	12.180	12.394
50		%GROWTH	2.17	1.96	1.78	1.69	1.83	1.76

TABLE 1,02 NEW REGISTRATIONS AND STOCKS BY SIZE CLASS

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	NEW REGISTRATIONS							
2								
3	SUBCOMPACT	MILL AUTOS	2,426	2,434	2,439	2,428	2,404	2,398
4		%GROWTH	0,43	0,34	0,19	-0,46	-0,98	-0,27
5								
6	COMPACT	MILL AUTOS	2,736	2,762	2,776	2,806	2,807	2,822
7		%GROWTH	0,72	0,95	0,49	1,11	0,03	0,52
8								
9	MID-SIZE	MILL AUTOS	3,192	3,230	3,254	3,288	3,290	3,301
10		%GROWTH	1,06	1,20	0,73	1,04	0,06	0,34
11								
12	FULL SIZE	MILL AUTOS	3,670	3,707	3,719	3,778	3,787	3,803
13		%GROWTH	0,72	1,00	0,34	1,59	0,22	0,42
14								
15	LUXURY	MILL AUTOS	1,415	1,444	1,467	1,496	1,511	1,531
16		%GROWTH	1,86	2,03	1,55	2,03	0,95	1,32
17								
18	DESIRED STOCK							
19								
20	SUBCOMPACT	MILL AUTOS	22,071	22,113	22,203	22,150	22,160	22,190
21		%GROWTH	0,31	0,19	0,41	-0,24	0,04	0,14
22								
23	COMPACT	MILL AUTOS	24,993	25,142	25,292	25,465	25,645	25,829
24		%GROWTH	0,59	0,59	0,60	0,68	0,71	0,72
25								
26	MID-SIZE	MILL AUTOS	29,929	30,226	30,518	30,803	31,090	31,330
27		%GROWTH	1,00	0,99	0,97	0,93	0,93	0,77
28								
29	FULL SIZE	MILL AUTOS	35,737	35,903	36,026	36,318	36,570	36,765
30		%GROWTH	0,44	0,47	0,34	0,81	0,69	0,53
31								
32	LUXURY	MILL AUTOS	13,106	13,333	13,561	13,800	14,041	14,271
33		%GROWTH	1,73	1,73	1,71	1,76	1,75	1,63
34								
35	YEAR-END ACTUAL STOCKS							
36								
37	SUBCOMPACT	MILL AUTOS	22,696	22,799	22,921	23,030	23,132	23,204
38		%GROWTH	0,39	0,46	0,53	0,48	0,44	0,31
39								
40	COMPACT	MILL AUTOS	25,733	25,889	26,045	26,214	26,396	26,566
41		%GROWTH	0,65	0,61	0,60	0,65	0,69	0,65
42								
43	MID-SIZE	MILL AUTOS	29,291	29,609	29,925	30,246	30,558	30,838
44		%GROWTH	1,10	1,09	1,07	1,07	1,03	0,92
45								
46	FULL SIZE	MILL AUTOS	35,505	35,587	35,655	35,761	35,899	36,028
47		%GROWTH	0,29	0,23	0,19	0,30	0,38	0,36
48								
49	LUXURY	MILL AUTOS	12,612	12,832	13,055	13,286	13,521	13,748
50		%GROWTH	1,75	1,75	1,74	1,77	1,77	1,68

TABLE 1.02 NEW REGISTRATIONS AND STOCKS BY SIZE CLASS

LINE	ITEM		1999	2000
1	NEW REGISTRATIONS:			
2				
3	SUBCOMPACT	MILL AUTOS	2.393	2.377
4		%GROWTH	-0.21	-0.65
5				
6	COMPACT	MILL AUTOS	2.843	2.851
7		%GROWTH	0.76	0.28
8				
9	MID-SIZE	MILL AUTOS	3.318	3.348
10		%GROWTH	0.53	0.89
11				
12	FULL SIZE	MILL AUTOS	3.833	3.849
13		%GROWTH	0.79	0.42
14				
15	LUXURY	MILL AUTOS	1.554	1.573
16		%GROWTH	1.50	1.26
17				
18	DESIRED STOCK:			
19				
20	SUBCOMPACT	MILL AUTOS	22.179	22.109
21		%GROWTH	-0.05	-0.32
22				
23	COMPACT	MILL AUTOS	26.003	26.116
24		%GROWTH	0.67	0.44
25				
26	MID-SIZE	MILL AUTOS	31.540	31.819
27		%GROWTH	0.67	0.88
28				
29	FULL SIZE	MILL AUTOS	36.981	37.157
30		%GROWTH	0.59	0.48
31				
32	LUXURY	MILL AUTOS	14.491	14.702
33		%GROWTH	1.54	1.45
34				
35	YEAR-END ACTUAL STOCKS:			
36				
37	SUBCOMPACT	MILL AUTOS	23.244	23.240
38		%GROWTH	0.17	-0.02
39				
40	COMPACT	MILL AUTOS	26.730	26.869
41		%GROWTH	0.61	0.52
42				
43	MID-SIZE	MILL AUTOS	31.087	31.316
44		%GROWTH	0.81	0.74
45				
46	FULL SIZE	MILL AUTOS	36.166	36.301
47		%GROWTH	0.38	0.37
48				
49	LUXURY	MILL AUTOS	13.968	14.177
50		%GROWTH	1.60	1.50

TABLE 1,03 CAPITALIZED COSTS PER MILE

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	AVG NOMINAL CAP, COST PER MILE	$/MILE	0,195	0,206	0,218	0,232	0,247	0,260
2		%GROWTH	8,49	5,67	5,88	6,40	6,24	5,60
3								
4	AVG REAL CAP, COST PER MILE	1972 $	0,152	0,152	0,152	0,154	0,154	0,154
5		%GROWTH	-0,598	0,545	-0,003	1,076	0,055	0,221
6								
7	CAPITALIZED COST PER MILE BY SIZE:							
8								
9	SUBCOMPACTS	$/MILE	0,152	0,161	0,170	0,181	0,193	0,204
10		%GROWTH	7,81	5,77	5,70	6,33	6,57	5,86
11								
12	COMPACTS	$/MILE	0,175	0,184	0,195	0,208	0,221	0,233
13		%GROWTH	8,93	5,09	5,83	6,60	6,16	5,55
14								
15	MID-SIZE	$/MILE	0,198	0,208	0,219	0,233	0,247	0,261
16		%GROWTH	10,06	4,74	5,57	6,14	6,18	5,60
17								
18	FULL SIZE	$/MILE	0,217	0,226	0,237	0,252	0,267	0,283
19		%GROWTH	9,99	4,16	5,11	6,13	6,32	5,72
20								
21	LUXURY	$/MILE	0,281	0,294	0,308	0,328	0,348	0,368
22		%GROWTH	11,40	4,49	4,95	6,29	6,26	5,68
23								
24								
25	CAP, COST PER MILE BY FOR/DOM:							
26								
27	TOTAL DOMESTIC	$/MILE	0,196	0,208	0,221	0,236	0,250	0,264
28		%GROWTH	8,96	5,92	6,19	6,78	6,21	5,55
29								
30	TOTAL FOREIGN	$/MILE	0,165	0,179	0,189	0,201	0,216	0,230
31		%GROWTH	6,48	8,26	5,57	6,39	7,40	6,47
32								
33	DOMESTIC SUBCOMPACT	$/MILE	0,153	0,162	0,171	0,183	0,194	0,205
34		%GROWTH	10,18	5,22	6,00	6,62	6,41	5,76
35								
36	FOREIGN SUBCOMPACT	$/MILE	0,151	0,160	0,169	0,179	0,191	0,203
37		%GROWTH	5,70	6,24	5,42	6,06	6,72	5,96
38								
39	DOMESTIC COMPACT	$/MILE	0,174	0,182	0,193	0,206	0,218	0,230
40		%GROWTH	8,96	5,01	5,90	6,62	6,09	5,50
41								
42	FOREIGN COMPACT	$/MILE	0,199	0,212	0,223	0,237	0,254	0,269
43		%GROWTH	8,94	6,79	5,11	6,39	6,93	6,17
44								
45	DOMESTIC LUXURY	$/MILE	0,276	0,287	0,301	0,320	0,340	0,358
46		%GROWTH	11,32	3,99	4,98	6,20	6,13	5,55
47								
48	FOREIGN LUXURY	$/MILE	0,318	0,343	0,359	0,384	0,411	0,437
49		%GROWTH	11,60	7,76	4,78	6,86	7,07	6,48

TABLE 1.03 CAPITALIZED COSTS PER MILE

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	AVG NOMINAL CAP. COST PER MILE	$/MILE	0.273	0.285	0.299	0.312	0.325	0.339
2		%GROWTH	4.74	4.57	4.75	4.35	4.37	4.28
3								
4	AVG REAL CAP. COST PER MILE	1972 $	0.155	0.155	0.155	0.156	0.156	0.157
5		%GROWTH	0.334	0.161	0.096	0.178	0.292	0.510
6								
7	CAPITALIZED COST PER MILE BY SIZE:							
8								
9	SUBCOMPACTS	$/MILE	0.214	0.224	0.235	0.246	0.257	0.268
10		%GROWTH	4.95	4.75	4.92	4.52	4.49	4.24
11								
12	COMPACTS	$/MILE	0.244	0.255	0.267	0.279	0.291	0.304
13		%GROWTH	4.49	4.66	4.81	4.35	4.36	4.35
14								
15	MID-SIZE	$/MILE	0.273	0.285	0.298	0.310	0.323	0.337
16		%GROWTH	4.56	4.48	4.64	4.17	4.19	4.30
17								
18	FULL SIZE	$/MILE	0.296	0.309	0.323	0.336	0.349	0.364
19		%GROWTH	4.70	4.34	4.52	4.03	4.04	4.27
20								
21	LUXURY	$/MILE	0.384	0.400	0.418	0.435	0.452	0.471
22		%GROWTH	4.50	4.17	4.39	3.97	3.97	4.22
23								
24								
25	CAP. COST PER MILE BY FOR/DOM:							
26								
27	TOTAL DOMESTIC	$/MILE	0.276	0.289	0.303	0.316	0.329	0.343
28		%GROWTH	4.65	4.57	4.73	4.29	4.31	4.24
29								
30	TOTAL FOREIGN	$/MILE	0.244	0.256	0.269	0.282	0.296	0.308
31		%GROWTH	5.96	5.04	5.16	4.95	4.94	4.07
32								
33	DOMESTIC SUBCOMPACT	$/MILE	0.215	0.225	0.236	0.247	0.258	0.269
34		%GROWTH	4.71	4.72	4.90	4.56	4.43	4.39
35								
36	FOREIGN SUBCOMPACT	$/MILE	0.213	0.223	0.234	0.245	0.256	0.266
37		%GROWTH	5.17	4.77	4.94	4.48	4.54	4.11
38								
39	DOMESTIC COMPACT	$/MILE	0.241	0.252	0.264	0.275	0.287	0.300
40		%GROWTH	4.43	4.65	4.81	4.33	4.35	4.36
41								
42	FOREIGN COMPACT	$/MILE	0.283	0.297	0.311	0.325	0.339	0.354
43		%GROWTH	5.06	4.81	4.81	4.53	4.46	4.23
44								
45	DOMESTIC LUXURY	$/MILE	0.374	0.389	0.406	0.422	0.438	0.456
46		%GROWTH	4.40	4.04	4.30	3.84	3.85	4.15
47								
48	FOREIGN LUXURY	$/MILE	0.459	0.482	0.506	0.530	0.554	0.580
49		%GROWTH	5.09	4.92	4.90	4.75	4.67	4.59

TABLE 1.03 CAPITALIZED COSTS PER MILE

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	AVG NOMINAL CAP. COST PER MILE	$/MILE	0.354	0.369	0.385	0.401	0.417	0.433
2		%GROWTH	4.31	4.25	4.29	4.24	3.95	3.87
3								
4	AVG REAL CAP. COST PER MILE	1972 $	0.158	0.159	0.159	0.160	0.161	0.162
5		%GROWTH	0.563	0.521	0.541	0.486	0.724	0.647
6								
7	CAPITALIZED COST PER MILE BY SIZE:							
8								
9	SUBCOMPACTS	$/MILE	0.279	0.291	0.303	0.316	0.328	0.341
10		%GROWTH	4.29	4.17	4.25	4.16	3.89	3.78
11								
12	COMPACTS	$/MILE	0.317	0.330	0.344	0.359	0.374	0.388
13		%GROWTH	4.31	4.27	4.29	4.30	3.98	3.90
14								
15	MID-SIZE	$/MILE	0.352	0.367	0.382	0.398	0.414	0.430
16		%GROWTH	4.27	4.23	4.25	4.24	3.93	3.85
17								
18	FULL SIZE	$/MILE	0.380	0.396	0.412	0.430	0.447	0.464
19		%GROWTH	4.24	4.20	4.22	4.22	3.91	3.83
20								
21	LUXURY	$/MILE	0.491	0.511	0.533	0.556	0.577	0.599
22		%GROWTH	4.24	4.21	4.22	4.23	3.87	3.84
23								
24								
25	CAP. COST PER MILE BY FOR/DOM:							
26								
27	TOTAL DOMESTIC	$/MILE	0.358	0.373	0.389	0.405	0.421	0.437
28		%GROWTH	4.26	4.21	4.24	4.21	3.94	3.85
29								
30	TOTAL FOREIGN	$/MILE	0.322	0.336	0.350	0.365	0.380	0.394
31		%GROWTH	4.38	4.21	4.45	4.24	3.95	3.86
32								
33	DOMESTIC SUBCOMPACT	$/MILE	0.281	0.293	0.305	0.318	0.331	0.344
34		%GROWTH	4.33	4.24	4.20	4.20	3.98	3.90
35								
36	FOREIGN SUBCOMPACT	$/MILE	0.278	0.289	0.301	0.314	0.326	0.338
37		%GROWTH	4.24	4.10	4.29	4.12	3.81	3.67
38								
39	DOMESTIC COMPACT	$/MILE	0.313	0.326	0.340	0.355	0.369	0.383
40		%GROWTH	4.31	4.28	4.29	4.29	3.99	3.90
41								
42	FOREIGN COMPACT	$/MILE	0.369	0.384	0.401	0.419	0.435	0.452
43		%GROWTH	4.26	4.24	4.25	4.44	3.92	3.82
44								
45	DOMESTIC LUXURY	$/MILE	0.475	0.495	0.515	0.536	0.557	0.578
46		%GROWTH	4.17	4.12	4.15	4.15	3.81	3.79
47								
48	FOREIGN LUXURY	$/MILE	0.607	0.635	0.665	0.696	0.725	0.755
49		%GROWTH	4.64	4.69	4.63	4.70	4.16	4.12

TABLE 1.03 CAPITALIZED COSTS PER MILE

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	AVG NOMINAL CAP. COST PER MILE	$/MILE	0.450	0.467	0.486	0.504	0.524	0.544
2		%GROWTH	3.90	3.89	3.90	3.82	3.86	3.86
3								
4	AVG REAL CAP. COST PER MILE	1972 $	0.163	0.165	0.166	0.167	0.168	0.169
5		%GROWTH	0.642	0.687	0.672	0.608	0.625	0.645
6								
7	CAPITALIZED COST PER MILE BY SIZE							
8								
9	SUBCOMPACTS	$/MILE	0.353	0.367	0.381	0.395	0.410	0.426
10		%GROWTH	3.79	3.79	3.79	3.75	3.79	3.80
11								
12	COMPACTS	$/MILE	0.403	0.419	0.435	0.452	0.469	0.487
13		%GROWTH	3.90	3.88	3.90	3.79	3.84	3.85
14								
15	MID-SIZE	$/MILE	0.447	0.464	0.482	0.500	0.519	0.538
16		%GROWTH	3.85	3.84	3.86	3.73	3.79	3.80
17								
18	FULL SIZE	$/MILE	0.482	0.500	0.519	0.539	0.559	0.580
19		%GROWTH	3.84	3.82	3.85	3.71	3.77	3.78
20								
21	LUXURY	$/MILE	0.622	0.646	0.671	0.696	0.722	0.750
22		%GROWTH	3.84	3.83	3.86	3.71	3.78	3.79
23								
24								
25	CAP. COST PER MILE BY FOR/DOM							
26								
27	TOTAL DOMESTIC	$/MILE	0.454	0.472	0.491	0.509	0.529	0.549
28		%GROWTH	3.89	3.89	3.90	3.80	3.85	3.84
29								
30	TOTAL FOREIGN	$/MILE	0.410	0.426	0.443	0.461	0.480	0.499
31		%GROWTH	3.94	3.98	3.94	4.10	4.05	4.02
32								
33	DOMESTIC SUBCOMPACT	$/MILE	0.357	0.371	0.385	0.400	0.415	0.432
34		%GROWTH	3.90	3.88	3.91	3.80	3.86	3.88
35								
36	FOREIGN SUBCOMPACT	$/MILE	0.350	0.363	0.377	0.391	0.405	0.420
37		%GROWTH	3.69	3.69	3.69	3.71	3.72	3.73
38								
39	DOMESTIC COMPACT	$/MILE	0.398	0.414	0.430	0.446	0.463	0.481
40		%GROWTH	3.90	3.89	3.91	3.79	3.84	3.85
41								
42	FOREIGN COMPACT	$/MILE	0.469	0.487	0.506	0.525	0.545	0.566
43		%GROWTH	3.84	3.84	3.83	3.83	3.83	3.84
44								
45	DOMESTIC LUXURY	$/MILE	0.600	0.623	0.646	0.670	0.695	0.721
46		%GROWTH	3.79	3.77	3.81	3.64	3.71	3.73
47								
48	FOREIGN LUXURY	$/MILE	0.786	0.819	0.853	0.888	0.925	0.963
49		%GROWTH	4.15	4.14	4.14	4.14	4.14	4.15

TABLE 1,03 CAPITALIZED COSTS PER MILE

LINE	ITEM		1999	2000
1	AVG NOMINAL CAP, COST PER MILE	$/MILE	0,565	0,587
2		%GROWTH	3,84	3,87
3				
4	AVG REAL CAP, COST PER MILE	1972 $	0,170	0,171
5		%GROWTH	0,611	0,662
6				
7	CAPITALIZED COST PER MILE BY SIZE:			
8				
9	SUBCOMPACTS	$/MILE	0,442	0,459
10		%GROWTH	3,79	3,82
11				
12	COMPACTS	$/MILE	0,506	0,525
13		%GROWTH	3,82	3,84
14				
15	MID-SIZE	$/MILE	0,559	0,580
16		%GROWTH	3,77	3,79
17				
18	FULL SIZE	$/MILE	0,602	0,624
19		%GROWTH	3,76	3,77
20				
21	LUXURY	$/MILE	0,778	0,807
22		%GROWTH	3,76	3,78
23				
24				
25	CAP, COST PER MILE BY FOR/DOM:			
26				
27	TOTAL DOMESTIC	$/MILE	0,570	0,592
28		%GROWTH	3,82	3,84
29				
30	TOTAL FOREIGN	$/MILE	0,519	0,540
31		%GROWTH	4,04	4,08
32				
33	DOMESTIC SUBCOMPACT	$/MILE	0,448	0,466
34		%GROWTH	3,85	3,89
35				
36	FOREIGN SUBCOMPACT	$/MILE	0,436	0,452
37		%GROWTH	3,73	3,76
38				
39	DOMESTIC COMPACT	$/MILE	0,500	0,519
40		%GROWTH	3,82	3,84
41				
42	FOREIGN COMPACT	$/MILE	0,588	0,610
43		%GROWTH	3,83	3,83
44				
45	DOMESTIC LUXURY	$/MILE	0,747	0,775
46		%GROWTH	3,69	3,71
47				
48	FOREIGN LUXURY	$/MILE	1,003	1,045
49		%GROWTH	4,14	4,15

TABLE 1.04 MISCELLANEOUS

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	DESIRED STOCK PER FAMILY	AUTOS	1,246	1,268	1,285	1,301	1,304	1,305
2		%GROWTH	-0,81	1,75	1,37	1,21	0,21	0,10
3								
4	YEAR-END STOCK PER FAMILY	AUTOS	1,283	1,305	1,317	1,330	1,320	1,305
5		%GROWTH	0,62	1,70	0,90	1,02	-0,80	-1,14
6								
7	VEHICLE MILES PER FAMILY	THOU MILES	13,674	13,406	13,342	13,282	13,391	13,389
8		%GROWTH	1,14	-1,96	-0,48	-0,45	0,82	-0,01
9								
10	VEHICLE MILES PER AUTO	THOU MILES	10,806	10,447	10,267	10,121	10,193	10,289
11		%GROWTH	0,47	-3,33	-1,72	-1,42	0,71	0,94
12								
13	RATIO-NEW REGIS, TO BEGIN, STOCK	RATIO	0,0880	0,1059	0,1125	0,1128	0,1087	0,1093
14		%GROWTH		20,37	6,29	0,23	-3,64	0,62
15								
16	RATIO-SCRAPPAGE TO BEGIN, STOCK	RATIO	0,0590	0,0711	0,0853	0,0849	0,0995	0,1041
17		%GROWTH		20,48	19,95	-0,49	17,22	4,67
18								
19	REAL DISP, INCOME PER FAMILY	THOU '72 $	9,349	9,561	9,762	10,032	10,039	10,063
20		%GROWTH	-3,75	2,27	2,11	2,76	0,06	0,24
21								
22	FAMILIES WITH INCOME OVER $15,000	%	21,93	20,98	20,44	20,65	21,64	22,83
23		%GROWTH	-1,20	-4,36	-2,57	1,03	4,83	5,49
24								
25	AVG AGE OF AUTO STOCK	YEARS	5,457	5,650	5,711	5,712	5,690	5,621
26		%GROWTH	4,32	3,53	1,09	0,02	-0,39	-1,21

AUTO MODEL FORECAST 1975 - 2000

TABLE 1,04 MISCELLANEOUS

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	DESIRED STOCK PER FAMILY	AUTOS	1,311	1,314	1,315	1,318	1,320	1,324
2		%GROWTH	0,44	0,26	0,09	0,19	0,17	0,26
3								
4	YEAR-END STOCK PER FAMILY	AUTOS	1,300	1,302	1,305	1,309	1,316	1,320
5		%GROWTH	-0,37	0,15	0,22	0,30	0,54	0,35
6								
7	VEHICLE MILES PER FAMILY	THOU MILES	13,352	13,475	13,604	13,662	13,726	13,759
8		%GROWTH	-0,28	0,93	0,96	0,42	0,47	0,24
9								
10	VEHICLE MILES PER AUTO	THOU MILES	10,338	10,442	10,519	10,532	10,532	10,505
11		%GROWTH	0,47	1,01	0,74	0,12	0,00	-0,26
12								
13	RATIO-NEW REGIS, TO BEGIN, STOCK	RATIO	0,1188	0,1148	0,1106	0,1097	0,1080	0,1045
14		%GROWTH	8,67	-3,36	-3,72	-0,74	-1,56	-3,24
15								
16	RATIO-SCRAPPAGE TO BEGIN, STOCK	RATIO	0,1059	0,0970	0,0929	0,0919	0,0887	0,0881
17		%GROWTH	1,76	-8,41	-4,30	-0,99	-3,51	-0,63
18								
19	REAL DISP, INCOME PER FAMILY	THOU 172 $	10,241	10,324	10,385	10,503	10,647	10,789
20		%GROWTH	1,77	0,82	0,59	1,13	1,37	1,33
21								
22	FAMILIES WITH INCOME OVER $15,000	%	23,94	24,87	25,64	26,57	27,65	28,78
23		%GROWTH	4,86	3,87	3,08	3,64	4,06	4,10
24								
25	AVG AGE OF AUTO STOCK	YEARS	5,511	5,416	5,380	5,374	5,389	5,429
26		%GROWTH	-1,96	-1,72	-0,66	-0,12	0,27	0,76

AUTO MODEL FORECAST 1975 - 2000

TABLE 1,04 MISCELLANEOUS

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	DESIRED STOCK PER FAMILY	AUTOS	1,326	1,326	1,325	1,324	1,326	1,327
2		%GROWTH	0,18	0,04	-0,08	-0,07	0,12	0,10
3								
4	YEAR-END STOCK PER FAMILY	AUTOS	1,322	1,320	1,315	1,309	1,306	1,305
5		%GROWTH	0,10	-0,14	-0,38	-0,44	-0,20	-0,11
6								
7	VEHICLE MILES PER FAMILY	THOU MILES	13,749	13,716	13,675	13,646	13,635	13,661
8		%GROWTH	-0,07	-0,24	-0,30	-0,21	-0,08	0,19
9								
10	VEHICLE MILES PER AUTO	THOU MILES	10,472	10,447	10,442	10,460	10,477	10,505
11		%GROWTH	-0,32	-0,24	-0,04	0,16	0,17	0,27
12								
13	RATIO-NEW REGIS, TO BEGIN, STOCK	RATIO	0,1037	0,1043	0,1058	0,1079	0,1077	0,1074
14		%GROWTH	-0,76	0,55	1,41	2,00	-0,15	-0,30
15								
16	RATIO-SCRAPPAGE TO BEGIN, STOCK	RATIO	0,0905	0,0940	0,0979	0,1013	0,0999	0,1002
17		%GROWTH	2,68	3,84	4,18	3,42	-1,30	0,25
18								
19	REAL DISP, INCOME PER FAMILY	THOU 172 $	10,942	11,106	11,270	11,443	11,634	11,846
20		%GROWTH	1,42	1,50	1,48	1,53	1,67	1,82
21								
22	FAMILIES WITH INCOME OVER $15,000	%	30,10	31,59	33,18	34,86	36,65	38,58
23		%GROWTH	4,97	4,96	5,04	5,05	5,13	5,26
24	.							
25	AVG AGE OF AUTO STOCK	YEARS	5,481	5,520	5,534	5,521	5,500	5,481
26		%GROWTH	0,94	0,71	0,25	-0,23	-0,38	-0,35

AUTO MODEL FORECAST 1975 - 2000

TABLE 1.04 MISCELLANEOUS

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	DESIRED STOCK PER FAMILY	AUTOS	1,328	1,327	1,327	1,327	1,328	1,328
2		%GROWTH	0,01	-0,02	-0,01	0,01	0,02	0,02
3								
4	YEAR-END STOCK PER FAMILY	AUTOS	1,304	1,303	1,303	1,304	1,305	1,306
5		%GROWTH	-0,08	-0,06	-0,01	0,05	0,12	0,07
6								
7	VEHICLE MILES PER FAMILY	THOU MILES	13,695	13,730	13,771	13,808	13,847	13,873
8		%GROWTH	0,25	0,26	0,30	0,27	0,28	0,19
9								
10	VEHICLE MILES PER AUTO	THOU MILES	10,539	10,572	10,605	10,630	10,648	10,657
11		%GROWTH	0,33	0,31	0,31	0,23	0,18	0,08
12								
13	RATIO-NEW REGIS, TO BEGIN, STOCK	RATIO	0,1076	0,1079	0,1078	0,1081	0,1073	0,1070
14		%GROWTH	0,15	0,31	-0,13	0,34	-0,72	-0,35
15								
16	RATIO-SCRAPPAGE TO BEGIN, STOCK	RATIO	0,1004	0,1009	0,1008	0,1008	0,0998	0,1002
17		%GROWTH	0,24	0,47	-0,13	0,01	-0,97	0,37
18								
19	REAL DISP, INCOME PER FAMILY	THOU '72 $	12,062	12,292	12,530	12,778	13,034	13,302
20		%GROWTH	1,83	1,91	1,93	1,98	2,00	2,05
21								
22	FAMILIES WITH INCOME OVER $15,000	%	40,64	42,84	45,16	47,56	50,03	52,54
23		%GROWTH	5,34	5,41	5,41	5,33	5,18	5,03
24								
25	AVG AGE OF AUTO STOCK	YEARS	5,461	5,439	5,420	5,405	5,394	5,391
26		%GROWTH	-0,37	-0,41	-0,34	-0,28	-0,20	-0,06

TABLE 1.04 MISCELLANEOUS

LINE	ITEM		1999	2000
1	DESIRED STOCK PER FAMILY	AUTOS	1.328	1.331
2		%GROWTH	0.02	0.24
3				
4	YEAR-END STOCK PER FAMILY	AUTOS	1.307	1.310
5		%GROWTH	0.03	0.25
6				
7	VEHICLE MILES PER FAMILY	THOU MILES	13.889	13.923
8		%GROWTH	0.12	0.24
9				
10	VEHICLE MILES PER AUTO	THOU MILES	10.663	10.659
11		%GROWTH	0.06	-0.04
12				
13	RATIO-NEW REGIS. TO BEGIN. STOCK	RATIO	0.1069	0.1067
14		%GROWTH	-0.05	-0.21
15				
16	RATIO-SCRAPPAGE TO BEGIN. STOCK	RATIO	0.1007	0.1013
17		%GROWTH	0.52	0.59
18				
19	REAL DISP. INCOME PER FAMILY	THOU '72 $	13.576	13.899
20		%GROWTH	2.06	2.38
21				
22	FAMILIES WITH INCOME OVER $15,000	%	55.09	57.72
23		%GROWTH	4.84	4.78
24				
25	AVG AGE OF AUTO STOCK	YEARS	5.389	5.388
26		%GROWTH	-0.03	-0.02

TABLE 1.05 MILES PER GALLON

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	OVERALL FLEET MILES PER GALLON - WEFA		12,69	12,71	12,78	12,95	13,19	13,50
2		%GROWTH	-0,70	0,12	0,61	1,28	1,87	2,34
3								
4	NEW AUTO MILES PER GALLON (WEFA):							
5								
6	TOTAL		13,29	13,52	14,07	14,68	15,19	15,77
7		%GROWTH	6,46	1,71	4,07	4,35	3,48	3,80
8								
9	SUBCOMPACT		18,74	19,56	20,30	21,16	21,66	22,32
10		%GROWTH	1,89	4,38	3,78	4,27	2,36	3,05
11								
12	COMPACT		13,94	14,48	15,07	15,65	16,43	17,29
13		%GROWTH	5,91	3,91	4,05	3,85	4,97	5,23
14								
15	MID-SIZE		11,70	12,20	12,79	13,49	14,05	14,64
16		%GROWTH	3,87	4,34	4,80	5,52	4,12	4,22
17								
18	FULL SIZE		10,80	11,51	12,25	12,92	13,31	13,74
19		%GROWTH	4,54	6,55	6,45	5,42	3,03	3,26
20								
21	LUXURY		10,51	11,19	11,88	12,44	12,79	13,16
22		%GROWTH	3,95	6,45	6,16	4,77	2,79	2,91
23								
24	NEW AUTO M.P.G. BY FOR/DOM (WEFA):							
25								
26	TOTAL DOMESTIC		12,38	12,78	13,37	13,99	14,52	15,12
27		%GROWTH	5,65	3,21	4,60	4,61	3,84	4,08
28								
29	TOTAL FOREIGN		19,82	20,53	21,02	21,75	21,87	22,21
30		%GROWTH	3,41	3,55	2,38	3,49	0,56	1,53
31								
32	DOMESTIC SUBCOMPACT		17,13	17,95	18,83	19,72	20,52	21,41
33		%GROWTH	0,15	4,78	4,95	4,72	4,04	4,33
34								
35	FOREIGN SUBCOMPACT		20,44	21,33	21,87	22,70	22,84	23,24
36		%GROWTH	3,34	4,35	2,52	3,80	0,63	1,76
37								
38	DOMESTIC COMPACT		13,67	14,23	14,82	15,39	16,20	17,08
39		%GROWTH	6,12	4,04	4,15	3,90	5,22	5,45
40								
41	FOREIGN COMPACT		18,41	19,06	19,48	20,05	20,21	20,56
42		%GROWTH	3,07	3,50	2,23	2,91	0,78	1,74
43								
44	DOMESTIC LUXURY		10,08	10,77	11,47	12,05	12,40	12,78
45		%GROWTH	3,88	6,81	6,53	5,02	2,88	3,10
46								
47	FOREIGN LUXURY		15,19	15,64	16,01	16,39	16,70	16,87
48		%GROWTH	3,47	2,95	2,40	2,36	1,88	1,01

TABLE 1.05 MILES PER GALLON

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	OVERALL FLEET MILES PER GALLON - WEFA		13.86	14.28	14.70	15.12	15.55	15.97
2		%GROWTH	2.68	2.99	2.97	2.86	2.86	2.71
3								
4	NEW AUTO MILES PER GALLON (WEFA):							
5								
6	TOTAL		16.18	16.63	17.09	17.56	17.96	18.23
7		%GROWTH	2.62	2.76	2.76	2.76	2.26	1.52
8								
9	SUBCOMPACT		22.80	23.29	23.70	24.12	24.46	24.85
10		%GROWTH	2.13	2.17	1.73	1.80	1.39	1.61
11								
12	COMPACT		18.09	18.60	19.14	19.69	20.14	20.45
13		%GROWTH	4.65	2.83	2.89	2.90	2.27	1.54
14								
15	MID-SIZE		15.14	15.60	16.08	16.58	16.99	17.23
16		%GROWTH	3.40	3.02	3.09	3.11	2.51	1.36
17								
18	FULL SIZE		14.05	14.49	14.96	15.48	15.94	16.14
19		%GROWTH	2.24	3.17	3.24	3.46	2.93	1.31
20								
21	LUXURY		13.44	13.88	14.34	14.81	15.24	15.42
22		%GROWTH	2.13	3.27	3.29	3.25	2.91	1.20
23								
24	NEW AUTO M.P.G. BY FOR/DOM (WEFA):							
25								
26	TOTAL DOMESTIC		15.57	16.03	16.51	17.00	17.42	17.67
27		%GROWTH	3.01	2.92	3.00	2.98	2.46	1.45
28								
29	TOTAL FOREIGN		22.37	22.73	22.95	23.28	23.50	23.90
30		%GROWTH	0.73	1.60	0.97	1.47	0.93	1.72
31								
32	DOMESTIC SUBCOMPACT		22.15	22.72	23.32	23.75	24.21	24.55
33		%GROWTH	3.46	2.58	2.63	1.86	1.94	1.41
34								
35	FOREIGN SUBCOMPACT		23.43	23.85	24.06	24.47	24.69	25.13
36		%GROWTH	0.83	1.78	0.87	1.73	0.87	1.80
37								
38	DOMESTIC COMPACT		17.91	18.43	18.97	19.54	19.99	20.29
39		%GROWTH	4.84	2.90	2.96	2.97	2.30	1.52
40								
41	FOREIGN COMPACT		20.91	21.28	21.66	22.04	22.44	22.85
42		%GROWTH	1.70	1.77	1.79	1.75	1.82	1.84
43								
44	DOMESTIC LUXURY		13.06	13.52	13.99	14.48	14.93	15.12
45		%GROWTH	2.19	3.51	3.49	3.53	3.07	1.24
46								
47	FOREIGN LUXURY		17.13	17.30	17.55	17.68	17.93	18.07
48		%GROWTH	1.55	1.00	1.43	0.73	1.43	0.78

TABLE 1.05 MILES PER GALLON

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	OVERALL FLEET MILES PER GALLON - WEFA		16,38	16,78	17,15	17,52	17,88	18,20
2		%GROWTH	2,53	2,44	2,25	2,14	2,04	1,78
3								
4	NEW AUTO MILES PER GALLON (WEFA):							
5								
6	TOTAL		18,48	18,76	19,02	19,31	19,43	19,55
7		%GROWTH	1,36	1,52	1,39	1,50	0,64	0,62
8								
9	SUBCOMPACT		25,13	25,56	25,89	26,36	26,52	26,69
10		%GROWTH	1,13	1,70	1,29	1,81	0,64	0,63
11								
12	COMPACT		20,77	21,10	21,43	21,75	21,89	22,02
13		%GROWTH	1,55	1,61	1,57	1,50	0,62	0,61
14								
15	MID-SIZE		17,46	17,71	17,95	18,20	18,31	18,42
16		%GROWTH	1,37	1,43	1,38	1,38	0,61	0,60
17								
18	FULL SIZE		16,36	16,58	16,80	17,02	17,13	17,23
19		%GROWTH	1,31	1,38	1,32	1,33	0,60	0,60
20								
21	LUXURY		15,61	15,81	16,01	16,20	16,30	16,40
22		%GROWTH	1,27	1,26	1,27	1,21	0,60	0,60
23								
24	NEW AUTO M.P.G. BY FOR/DOM (WEFA):							
25								
26	TOTAL DOMESTIC		17,92	18,18	18,44	18,72	18,83	18,95
27		%GROWTH	1,38	1,48	1,44	1,48	0,62	0,62
28								
29	TOTAL FOREIGN		24,15	24,53	24,74	25,08	25,24	25,40
30		%GROWTH	1,04	1,57	0,85	1,37	0,64	0,62
31								
32	DOMESTIC SUBCOMPACT		24,90	25,34	25,85	26,38	26,54	26,71
33		%GROWTH	1,42	1,76	2,01	2,05	0,62	0,61
34								
35	FOREIGN SUBCOMPACT		25,35	25,76	25,92	26,34	26,51	26,68
36		%GROWTH	0,86	1,64	0,62	1,60	0,66	0,65
37								
38	DOMESTIC COMPACT		20,60	20,93	21,25	21,58	21,71	21,85
39		%GROWTH	1,53	1,59	1,55	1,56	0,62	0,61
40								
41	FOREIGN COMPACT		23,28	23,73	24,18	24,32	24,48	24,64
42		%GROWTH	1,86	1,93	1,90	0,61	0,65	0,65
43								
44	DOMESTIC LUXURY		15,30	15,50	15,70	15,90	15,99	16,09
45		%GROWTH	1,25	1,31	1,25	1,26	0,60	0,59
46								
47	FOREIGN LUXURY		18,33	18,48	18,75	18,89	19,01	19,13
48		%GROWTH	1,43	0,83	1,44	0,76	0,65	0,64

TABLE 1.05 MILES PER GALLON

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	OVERALL FLEET MILES PER GALLON - WEFA		18,48	18,73	18,95	19,15	19,31	19,47
2		%GROWTH	1,55	1,35	1,16	1,06	0,87	0,82
3								
4	NEW AUTO MILES PER GALLON (WEFA):							
5								
6	TOTAL		19,66	19,77	19,87	19,98	20,08	20,20
7		%GROWTH	0,56	0,54	0,56	0,53	0,50	0,58
8								
9	SUBCOMPACT		26,86	27,03	27,19	27,37	27,54	27,72
10		%GROWTH	0,63	0,62	0,62	0,66	0,60	0,65
11								
12	COMPACT		22,16	22,29	22,42	22,57	22,70	22,84
13		%GROWTH	0,61	0,60	0,60	0,64	0,58	0,63
14								
15	MID-SIZE		18,53	18,64	18,75	18,87	18,98	19,10
16		%GROWTH	0,60	0,59	0,58	0,63	0,57	0,62
17								
18	FULL SIZE		17,33	17,43	17,53	17,64	17,74	17,85
19		%GROWTH	0,59	0,59	0,58	0,63	0,57	0,62
20								
21	LUXURY		16,50	16,59	16,69	16,80	16,89	17,00
22		%GROWTH	0,59	0,59	0,58	0,63	0,57	0,62
23								
24	NEW AUTO M.P.G. BY FOR/DOM (WEFA):							
25								
26	TOTAL DOMESTIC		19,06	19,16	19,27	19,38	19,48	19,59
27		%GROWTH	0,56	0,55	0,56	0,56	0,52	0,59
28								
29	TOTAL FOREIGN		25,55	25,69	25,84	26,00	26,14	26,30
30		%GROWTH	0,59	0,58	0,58	0,58	0,55	0,60
31								
32	DOMESTIC SUBCOMPACT		26,87	27,03	27,19	27,37	27,53	27,70
33		%GROWTH	0,61	0,60	0,60	0,64	0,59	0,63
34								
35	FOREIGN SUBCOMPACT		26,85	27,02	27,19	27,38	27,55	27,73
36		%GROWTH	0,64	0,64	0,63	0,68	0,62	0,67
37								
38	DOMESTIC COMPACT		21,98	22,11	22,24	22,38	22,51	22,66
39		%GROWTH	0,60	0,60	0,59	0,64	0,58	0,63
40								
41	FOREIGN COMPACT		24,80	24,96	25,11	25,28	25,44	25,61
42		%GROWTH	0,64	0,63	0,63	0,68	0,62	0,66
43								
44	DOMESTIC LUXURY		16,18	16,27	16,37	16,47	16,57	16,67
45		%GROWTH	0,59	0,58	0,58	0,63	0,57	0,62
46								
47	FOREIGN LUXURY		19,25	19,38	19,50	19,63	19,75	19,88
48		%GROWTH	0,63	0,63	0,62	0,67	0,61	0,66

TABLE 1.05 MILES PER GALLON

LINE	ITEM		1999	2000
1	OVERALL FLEET MILES PER GALLON - WEFA		19.61	19.74
2		%GROWTH	0.69	0.69
3				
4	NEW AUTO MILES PER GALLON (WEFA):			
5				
6	TOTAL		20.30	20.41
7		%GROWTH	0.51	0.54
8				
9	SUBCOMPACT		27.88	28.06
10		%GROWTH	0.59	0.64
11				
12	COMPACT		22.97	23.11
13		%GROWTH	0.57	0.62
14				
15	MID-SIZE		19.20	19.32
16		%GROWTH	0.56	0.61
17				
18	FULL SIZE		17.95	18.06
19		%GROWTH	0.56	0.61
20				
21	LUXURY		17.09	17.20
22		%GROWTH	0.56	0.61
23				
24	NEW AUTO M.P.G. BY FOR/DOM (WEFA):			
25				
26	TOTAL DOMESTIC		19.69	19.81
27		%GROWTH	0.52	0.56
28				
29	TOTAL FOREIGN		26.44	26.59
30		%GROWTH	0.54	0.58
31				
32	DOMESTIC SUBCOMPACT		27.86	28.03
33		%GROWTH	0.58	0.62
34				
35	FOREIGN SUBCOMPACT		27.90	28.08
36		%GROWTH	0.61	0.65
37				
38	DOMESTIC COMPACT		22.79	22.93
39		%GROWTH	0.57	0.62
40				
41	FOREIGN COMPACT		25.76	25.93
42		%GROWTH	0.60	0.65
43				
44	DOMESTIC LUXURY		16.76	16.86
45		%GROWTH	0.56	0.61
46				
47	FOREIGN LUXURY		20.00	20.12
48		%GROWTH	0.60	0.65

TABLE 1.06 DOMESTIC AUTO PRICES

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	TOTAL AUTO PRICES							
3	SUBCOMPACT	DOLLARS	3744.	3922.	4175.	4479.	4757.	5008.
4		%GROWTH	12.84	4.75	6.45	7.29	6.21	5.27
6	COMPACT	DOLLARS	4280.	4471.	4747.	5083.	5410.	5708.
7		%GROWTH	13.92	4.45	6.18	7.08	6.43	5.52
9	MID-SIZE	DOLLARS	5168.	5398.	5725.	6122.	6507.	6857.
10		%GROWTH	14.91	4.44	6.06	6.92	6.30	5.38
12	FULL SIZE	DOLLARS	5864.	6125.	6487.	6932.	7358.	7744.
13		%GROWTH	14.74	4.45	5.91	6.86	6.15	5.25
15	LUXURY	DOLLARS	9021.	9416.	9957.	10638.	11269.	11841.
16		%GROWTH	15.36	4.38	5.75	6.83	5.93	5.08
18	STATE AND LOCAL TAXES							
20	SUBCOMPACT	DOLLARS	158.24	168.79	183.02	199.99	216.14	231.56
21		%GROWTH	14.63	6.67	8.43	9.28	8.08	7.13
23	COMPACT	DOLLARS	180.05	191.48	207.11	225.87	244.57	262.57
24		%GROWTH	15.70	6.35	8.16	9.06	8.28	7.36
26	MID-SIZE	DOLLARS	218.04	231.83	250.38	272.56	294.60	315.74
27		%GROWTH	16.70	6.32	8.00	8.86	8.09	7.18
29	FULL SIZE	DOLLARS	247.02	262.64	283.23	308.12	332.47	355.81
30		%GROWTH	16.51	6.33	7.84	8.79	7.90	7.02
32	LUXURY	DOLLARS	383.48	407.42	438.62	476.99	513.83	549.13
33		%GROWTH	17.12	6.24	7.66	8.75	7.72	6.87
35	TRANSPORTATION CHARGES							
37	SUBCOMPACT	DOLLARS	100.60	102.71	105.32	108.96	115.89	121.74
38		%GROWTH	9.43	2.09	2.55	3.45	6.36	5.05
40	COMPACT	DOLLARS	134.40	137.80	141.80	147.40	158.10	167.40
41		%GROWTH	11.53	2.53	2.90	3.95	7.26	5.88
43	MID-SIZE	DOLLARS	147.77	152.24	157.85	165.73	180.98	194.13
44		%GROWTH	12.59	3.03	3.68	4.99	9.20	7.27
46	FULL SIZE	DOLLARS	175.93	181.59	188.69	198.69	218.12	234.95
47		%GROWTH	13.21	3.22	3.91	5.30	9.78	7.71
49	LUXURY	DOLLARS	190.75	196.93	204.37	214.67	234.77	252.52
50		%GROWTH	13.99	3.24	3.78	5.04	9.36	7.56

TABLE 1,06 DOMESTIC AUTO PRICES

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	5198,	5406,	5649,	5873,	6101,	6352,
4		%GROWTH	3,80	3,99	4,49	3,98	3,89	4,11
5								
6	COMPACT	DOLLARS	5934,	6177,	6456,	6715,	6977,	7263,
7		%GROWTH	3,96	4,09	4,52	4,01	3,91	4,10
8								
9	MID-SIZE	DOLLARS	7115,	7391,	7711,	8004,	8299,	8624,
10		%GROWTH	3,76	3,88	4,32	3,80	3,69	3,91
11								
12	FULL SIZE	DOLLARS	8023,	8321,	8669,	8988,	9309,	9666,
13		%GROWTH	3,61	3,72	4,18	3,68	3,57	3,84
14								
15	LUXURY	DOLLARS	12243,	12675,	13185,	13654,	14128,	14663,
16		%GROWTH	3,40	3,53	4,03	3,56	3,47	3,78
17								
18	STATE AND LOCAL TAXES:							
19								
20	SUBCOMPACT	DOLLARS	244,56	258,78	275,13	291,11	307,77	326,10
21		%GROWTH	5,62	5,81	6,32	5,81	5,72	5,96
22								
23	COMPACT	DOLLARS	277,70	294,05	312,70	330,91	349,89	370,67
24		%GROWTH	5,76	5,89	6,34	5,82	5,73	5,94
25								
26	MID-SIZE	DOLLARS	333,22	352,00	373,43	394,27	415,87	439,65
27		%GROWTH	5,53	5,64	6,09	5,58	5,48	5,72
28								
29	FULL SIZE	DOLLARS	374,87	395,30	418,71	441,49	465,09	491,26
30		%GROWTH	5,36	5,45	5,92	5,44	5,35	5,63
31								
32	LUXURY	DOLLARS	577,45	607,94	643,17	677,47	713,03	752,81
33		%GROWTH	5,16	5,28	5,80	5,33	5,25	5,58
34								
35	TRANSPORTATION CHARGES:							
36								
37	SUBCOMPACT	DOLLARS	126,40	131,71	137,36	142,21	146,66	151,13
38		%GROWTH	3,82	4,20	4,29	3,53	3,13	3,05
39								
40	COMPACT	DOLLARS	174,90	183,50	192,50	200,30	207,60	214,87
41		%GROWTH	4,48	4,92	4,90	4,05	3,64	3,50
42								
43	MID-SIZE	DOLLARS	204,75	217,03	230,31	241,85	252,56	263,45
44		%GROWTH	5,47	6,00	6,12	5,01	4,43	4,31
45								
46	FULL SIZE	DOLLARS	248,57	264,38	281,53	296,48	310,39	324,55
47		%GROWTH	5,80	6,36	6,49	5,31	4,69	4,56
48								
49	LUXURY	DOLLARS	267,06	283,89	301,77	317,52	332,38	347,34
50		%GROWTH	5,76	6,30	6,30	5,22	4,68	4,50

TABLE 1,06 DOMESTIC AUTO PRICES

LINE	I T E M		1987	1988	1989	1990	1991	1992
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	6609,	6869,	7140,	7421,	7691,	7979,
4		%GROWTH	4,04	3,94	3,94	3,94	3,63	3,74
5								
6	COMPACT	DOLLARS	7558,	7858,	8170,	8493,	8801,	9130,
7		%GROWTH	4,06	3,97	3,97	3,96	3,63	3,73
8								
9	MID-SIZE	DOLLARS	8958,	9299,	9652,	10017,	10366,	10738,
10		%GROWTH	3,88	3,80	3,80	3,78	3,48	3,59
11								
12	FULL SIZE	DOLLARS	10035,	10410,	10799,	11201,	11587,	12000,
13		%GROWTH	3,81	3,73	3,74	3,73	3,45	3,56
14								
15	LUXURY	DOLLARS	15216,	15777,	16362,	16966,	17546,	18168,
16		%GROWTH	3,77	3,69	3,70	3,70	3,42	3,54
17								
18	STATE AND LOCAL TAXES:							
19								
20	SUBCOMPACT	DOLLARS	345,27	365,20	386,28	408,61	430,86	454,80
21		%GROWTH	5,88	5,77	5,77	5,78	5,45	5,56
22								
23	COMPACT	DOLLARS	392,50	415,26	439,31	464,71	489,94	517,06
24		%GROWTH	5,89	5,80	5,79	5,78	5,43	5,54
25								
26	MID-SIZE	DOLLARS	464,64	490,62	518,06	546,96	575,68	606,56
27		%GROWTH	5,68	5,59	5,59	5,58	5,25	5,36
28								
29	FULL SIZE	DOLLARS	518,78	547,40	577,61	609,42	641,11	675,22
30		%GROWTH	5,60	5,52	5,52	5,51	5,20	5,32
31								
32	LUXURY	DOLLARS	794,69	838,24	884,26	932,73	981,08	1033,21
33		%GROWTH	5,56	5,48	5,49	5,48	5,18	5,31
34								
35	TRANSPORTATION CHARGES:							
36								
37	SUBCOMPACT	DOLLARS	155,62	160,35	165,20	170,08	175,31	180,56
38		%GROWTH	2,97	3,04	3,03	2,95	3,07	3,00
39								
40	COMPACT	DOLLARS	222,39	230,17	238,23	246,56	255,19	264,12
41		%GROWTH	3,50	3,50	3,50	3,50	3,50	3,50
42								
43	MID-SIZE	DOLLARS	274,50	286,25	298,46	310,86	324,29	337,92
44		%GROWTH	4,20	4,28	4,27	4,15	4,32	4,20
45								
46	FULL SIZE	DOLLARS	338,96	354,33	370,32	386,60	404,27	422,25
47		%GROWTH	4,44	4,53	4,51	4,39	4,57	4,45
48								
49	LUXURY	DOLLARS	362,97	379,30	396,37	414,20	432,84	452,32
50		%GROWTH	4,50	4,50	4,50	4,50	4,50	4,50

TABLE 1.06 DOMESTIC AUTO PRICES

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	8274.	8576.	8896.	9203.	9533.	9877.
4		%GROWTH	3.70	3.64	3.74	3.45	3.59	3.61
5								
6	COMPACT	DOLLARS	9468.	9812.	10176.	10522.	10891.	11273.
7		%GROWTH	3.70	3.63	3.71	3.40	3.51	3.51
8								
9	MID-SIZE	DOLLARS	11121.	11511.	11924.	12313.	12728.	13160.
10		%GROWTH	3.56	3.51	3.59	3.26	3.38	3.39
11								
12	FULL SIZE	DOLLARS	12424.	12856.	13314.	13744.	14204.	14682.
13		%GROWTH	3.53	3.48	3.57	3.23	3.35	3.37
14								
15	LUXURY	DOLLARS	18808.	19459.	20152.	20799.	21493.	22215.
16		%GROWTH	3.52	3.46	3.56	3.21	3.34	3.36
17								
18	STATE AND LOCAL TAXES:							
19								
20	SUBCOMPACT	DOLLARS	479.88	506.05	534.11	562.10	592.36	624.38
21		%GROWTH	5.52	5.45	5.55	5.24	5.38	5.40
22								
23	COMPACT	DOLLARS	545.50	575.12	606.83	638.24	672.02	707.61
24		%GROWTH	5.50	5.43	5.51	5.18	5.29	5.30
25								
26	MID-SIZE	DOLLARS	638.93	672.61	708.65	744.15	782.33	822.55
27		%GROWTH	5.34	5.27	5.36	5.01	5.13	5.14
28								
29	FULL SIZE	DOLLARS	710.94	748.12	787.92	827.03	869.12	913.48
30		%GROWTH	5.29	5.23	5.32	4.96	5.09	5.10
31								
32	LUXURY	DOLLARS	1087.83	1144.69	1205.63	1265.35	1329.74	1397.64
33		%GROWTH	5.29	5.23	5.32	4.95	5.09	5.11
34								
35	TRANSPORTATION CHARGES:							
36								
37	SUBCOMPACT	DOLLARS	185.95	191.59	197.36	203.27	209.32	215.62
38		%GROWTH	2.98	3.03	3.01	2.99	2.98	3.01
39								
40	COMPACT	DOLLARS	273.37	282.94	292.84	303.09	313.70	324.68
41		%GROWTH	3.50	3.50	3.50	3.50	3.50	3.50
42								
43	MID-SIZE	DOLLARS	352.06	366.99	382.46	398.46	415.02	432.46
44		%GROWTH	4.18	4.24	4.21	4.18	4.16	4.20
45								
46	FULL SIZE	DOLLARS	440.93	460.72	481.25	502.55	524.63	547.94
47		%GROWTH	4.42	4.49	4.46	4.43	4.39	4.44
48								
49	LUXURY	DOLLARS	472.67	493.94	516.17	539.40	563.67	589.03
50		%GROWTH	4.50	4.50	4.50	4.50	4.50	4.50

TABLE 1.06 DOMESTIC AUTO PRICES

LINE	ITEM		1999	2000
1	TOTAL AUTO PRICES:			
2				
3	SUBCOMPACT	DOLLARS	10228.	10601.
4		%GROWTH	3.56	3.64
5				
6	COMPACT	DOLLARS	11662.	12068.
7		%GROWTH	3.45	3.48
8				
9	MID-SIZE	DOLLARS	13597.	14054.
10		%GROWTH	3.33	3.36
11				
12	FULL SIZE	DOLLARS	15167.	15673.
13		%GROWTH	3.30	3.34
14				
15	LUXURY	DOLLARS	22946.	23711.
16		%GROWTH	3.29	3.33
17				
18	STATE AND LOCAL TAXES:			
19				
20	SUBCOMPACT	DOLLARS	657.80	693.58
21		%GROWTH	5.35	5.44
22				
23	COMPACT	DOLLARS	744.55	783.71
24		%GROWTH	5.22	5.26
25				
26	MID-SIZE	DOLLARS	864.25	908.37
27		%GROWTH	5.07	5.10
28				
29	FULL SIZE	DOLLARS	959.45	1008.08
30		%GROWTH	5.03	5.07
31				
32	LUXURY	DOLLARS	1468.01	1542.50
33		%GROWTH	5.03	5.07
34				
35	TRANSPORTATION CHARGES:			
36				
37	SUBCOMPACT	DOLLARS	222.18	228.77
38		%GROWTH	3.04	2.97
39				
40	COMPACT	DOLLARS	336.04	347.80
41		%GROWTH	3.50	3.50
42				
43	MID-SIZE	DOLLARS	450.79	469.41
44		%GROWTH	4.24	4.13
45				
46	FULL SIZE	DOLLARS	572.50	597.51
47		%GROWTH	4.48	4.37
48				
49	LUXURY	DOLLARS	615.54	643.24
50		%GROWTH	4.50	4.50

TABLE 1.07 DOMESTIC AUTO PRICES

LINE	I T E M		1975	1976	1977	1978	1979	1980
1	BASE PRICE: FIXED-WTD AVG TOT	DOLLARS	4251.	4425.	4678.	5005.	5296.	5558.
2		%GROWTH	14.99	4.08	5.73	6.98	5.81	4.96
3								
4	SUBCOMPACT	DOLLARS	3163.	3291.	3480.	3723.	3939.	4135.
5		%GROWTH	14.99	4.08	5.73	6.98	5.81	4.96
6								
7	COMPACT	DOLLARS	3367.	3504.	3705.	3963.	4194.	4402.
8		%GROWTH	14.93	4.08	5.73	6.98	5.81	4.96
9								
10	MID-SIZE	DOLLARS	3898.	4057.	4289.	4589.	4856.	5096.
11		%GROWTH	14.98	4.08	5.73	6.98	5.81	4.96
12								
13	FULL SIZE	DOLLARS	4378.	4557.	4818.	5154.	5454.	5724.
14		%GROWTH	15.02	4.08	5.73	6.98	5.81	4.96
15								
16	LUXURY	DOLLARS	7094.	7384.	7807.	8352.	8837.	9275.
17		%GROWTH	15.00	4.08	5.73	6.98	5.81	4.96
18								
19	MAX OPT PRICE: FIXED-WTD AVG	DOLLARS	1305.73	1374.94	1439.18	1513.27	1583.97	1648.48
20		%GROWTH	10.46	5.30	4.67	5.15	4.67	4.07
21								
22	SUBCOMPACT	DOLLARS	1169.61	1231.61	1289.15	1355.52	1418.85	1476.63
23		%GROWTH	6.34	5.30	4.67	5.15	4.67	4.07
24								
25	COMPACT	DOLLARS	1234.59	1300.03	1360.77	1430.83	1497.68	1558.67
26		%GROWTH	8.50	5.30	4.67	5.15	4.67	4.07
27								
28	MID-SIZE	DOLLARS	1286.57	1354.77	1418.07	1491.07	1560.74	1624.29
29		%GROWTH	9.97	5.30	4.67	5.15	4.67	4.07
30								
31	FULL SIZE	DOLLARS	1325.56	1395.82	1461.04	1536.26	1608.03	1673.52
32		%GROWTH	10.51	5.30	4.67	5.15	4.67	4.07
33								
34	LUXURY	DOLLARS	1520.49	1601.09	1675.90	1762.18	1844.51	1919.62
35		%GROWTH	17.41	5.30	4.67	5.15	4.67	4.07
36								
37	VALUE OF OPTIONS INSTALLED:							
38	SUBCOMPACT	DOLLARS	322.83	359.14	406.44	447.14	485.90	520.29
39		%GROWTH	-4.41	11.25	13.17	10.01	8.67	7.08
40								
41	COMPACT	DOLLARS	599.21	637.49	693.47	746.48	813.65	876.94
42		%GROWTH	8.57	6.39	8.78	7.64	9.00	7.78
43								
44	MID-SIZE	DOLLARS	904.71	957.13	1027.72	1094.49	1176.26	1251.29
45		%GROWTH	14.58	5.79	7.38	6.50	7.47	6.38
46								
47	FULL SIZE	DOLLARS	1062.69	1123.71	1196.81	1270.66	1353.30	1428.78
48		%GROWTH	13.45	5.74	6.51	6.17	6.50	5.58
49								
50	LUXURY	DOLLARS	1352.19	1427.92	1507.65	1594.25	1682.87	1763.84
51		%GROWTH	17.03	5.60	5.58	5.74	5.56	4.81

TABLE 1,07 DOMESTIC AUTO PRICES - CONTINUED

LINE	I T E M		1981	1982	1983	1984	1985	1986
1	BASE PRICE: FIXED-WTD AVG TOT	DOLLARS	5734,	5926,	6159,	6372,	6587,	6834,
2		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
3								
4	SUBCOMPACT	DOLLARS	4265,	4408,	4582,	4740,	4900,	5084,
5		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
6								
7	COMPACT	DOLLARS	4540,	4693,	4878,	5046,	5216,	5412,
8		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
9								
10	MID-SIZE	DOLLARS	5257,	5433,	5647,	5842,	6039,	6266,
11		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
12								
13	FULL SIZE	DOLLARS	5905,	6103,	6343,	6562,	6784,	7038,
14		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
15								
16	LUXURY	DOLLARS	9568,	9889,	10278,	10633,	10992,	11405,
17		%GROWTH	3,15	3,35	3,94	3,45	3,38	3,75
18								
19	MAX OPT PRICE: FIXED-WTD AVG	DOLLARS	1696,71	1742,31	1793,36	1842,51	1891,24	1944,54
20		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
21								
22	SUBCOMPACT	DOLLARS	1519,83	1560,69	1606,41	1650,43	1694,09	1741,83
23		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
24								
25	COMPACT	DOLLARS	1604,27	1647,39	1695,65	1742,12	1788,21	1838,60
26		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
27								
28	MID-SIZE	DOLLARS	1671,82	1716,75	1767,05	1815,48	1863,50	1916,02
29		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
30								
31	FULL SIZE	DOLLARS	1722,48	1768,78	1820,60	1870,49	1919,97	1974,08
32		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
33								
34	LUXURY	DOLLARS	1975,78	2028,89	2088,33	2145,56	2202,32	2264,38
35		%GROWTH	2,93	2,69	2,93	2,74	2,65	2,82
36								
37	VALUE OF OPTIONS INSTALLED:							
38	SUBCOMPACT	DOLLARS	562,31	607,30	654,13	699,87	747,07	791,07
39		%GROWTH	8,08	8,00	7,71	6,99	6,74	5,89
40								
41	COMPACT	DOLLARS	941,24	1006,58	1073,44	1137,83	1203,63	1265,92
42		%GROWTH	7,33	6,94	6,64	6,00	5,78	5,18
43								
44	MID-SIZE	DOLLARS	1320,52	1389,01	1459,50	1525,47	1591,08	1654,60
45		%GROWTH	5,53	5,19	5,07	4,52	4,30	3,99
46								
47	FULL SIZE	DOLLARS	1494,91	1558,79	1625,25	1687,91	1749,97	1812,27
48		%GROWTH	4,63	4,27	4,26	3,86	3,68	3,56
49								
50	LUXURY	DOLLARS	1830,51	1893,97	1961,74	2026,50	2090,73	2157,86
51		%GROWTH	3,78	3,47	3,58	3,30	3,17	3,21

TABLE 1,07 DOMESTIC AUTO PRICES - CONTINUED

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	BASE PRICE: FIXED-WTD AVG TOT	DOLLARS	7090,	7348,	7618,	7896,	8161,	8447,
2		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
3								
4	SUBCOMPACT	DOLLARS	5274,	5466,	5667,	5874,	6071,	6284,
5		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
6								
7	COMPACT	DOLLARS	5614,	5819,	6032,	6253,	6463,	6689,
8		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
9								
10	MID-SIZE	DOLLARS	6500,	6737,	6984,	7240,	7482,	7745,
11		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
12								
13	FULL SIZE	DOLLARS	7301,	7568,	7845,	8132,	8405,	8699,
14		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
15								
16	LUXURY	DOLLARS	11831,	12262,	12712,	13177,	13619,	14096,
17		%GROWTH	3,74	3,65	3,67	3,66	3,35	3,50
18								
19	MAX OPT PRICE: FIXED-WTD AVG	DOLLARS	2000,19	2056,75	2114,88	2174,56	2232,38	2292,41
20		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
21								
22	SUBCOMPACT	DOLLARS	1791,68	1842,34	1894,41	1947,87	1999,66	2053,43
23		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
24								
25	COMPACT	DOLLARS	1891,22	1944,69	1999,66	2056,09	2110,75	2167,51
26		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
27								
28	MID-SIZE	DOLLARS	1970,85	2026,57	2083,85	2142,66	2199,63	2250,78
29		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
30								
31	FULL SIZE	DOLLARS	2030,57	2087,98	2147,00	2207,59	2266,28	2327,22
32		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
33								
34	LUXURY	DOLLARS	2329,18	2395,04	2462,74	2532,23	2599,56	2669,46
35		%GROWTH	2,86	2,83	2,83	2,82	2,66	2,69
36								
37	VALUE OF OPTIONS INSTALLED:							
38	SUBCOMPACT	DOLLARS	833,92	877,06	921,46	968,69	1013,89	1059,77
39		%GROWTH	5,42	5,17	5,06	5,13	4,67	4,52
40								
41	COMPACT	DOLLARS	1329,06	1393,76	1460,28	1529,17	1593,68	1659,67
42		%GROWTH	4,99	4,87	4,77	4,72	4,22	4,14
43								
44	MID-SIZE	DOLLARS	1719,07	1784,44	1851,23	1919,67	1983,60	2049,13
45		%GROWTH	3,90	3,80	3,74	3,70	3,33	3,30
46								
47	FULL SIZE	DOLLARS	1875,92	1940,38	2006,20	2073,59	2137,51	2203,24
48		%GROWTH	3,51	3,44	3,39	3,36	3,08	3,08
49								
50	LUXURY	DOLLARS	2227,09	2297,29	2369,16	2442,84	2513,65	2586,75
51		%GROWTH	3,21	3,15	3,13	3,11	2,90	2,91

TABLE 1.07 DOMESTIC AUTO PRICES - CONTINUED

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	BASE PRICE: FIXED-WTD AVG TOT	DOLLARS	8741.	9039.	9357.	9649.	9966.	10294.
2		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
3								
4	SUBCOMPACT	DOLLARS	6502.	6724.	6961.	7178.	7413.	7658.
5		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
6								
7	COMPACT	DOLLARS	6921.	7158.	7410.	7641.	7892.	8152.
8		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
9								
10	MID-SIZE	DOLLARS	8014.	8287.	8579.	8847.	9137.	9438.
11		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
12								
13	FULL SIZE	DOLLARS	9001.	9309.	9636.	9937.	10263.	10601.
14		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
15								
16	LUXURY	DOLLARS	14586.	15084.	15614.	16102.	16630.	17178.
17		%GROWTH	3.48	3.41	3.52	3.13	3.28	3.30
18								
19	MAX OPT PRICE: FIXED-WTD AVG	DOLLARS	2353.94	2416.30	2481.42	2543.40	2607.49	2673.65
20		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
21								
22	SUBCOMPACT	DOLLARS	2108.55	2164.41	2222.74	2278.26	2335.67	2394.93
23		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
24								
25	COMPACT	DOLLARS	2225.70	2284.65	2346.23	2404.83	2465.43	2527.99
26		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
27								
28	MID-SIZE	DOLLARS	2319.41	2380.85	2445.01	2506.09	2569.24	2634.43
29		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
30								
31	FULL SIZE	DOLLARS	2389.70	2452.99	2519.11	2582.03	2647.10	2714.26
32		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
33								
34	LUXURY	DOLLARS	2741.12	2813.73	2889.56	2961.74	3036.37	3113.41
35		%GROWTH	2.68	2.65	2.70	2.50	2.52	2.54
36								
37	VALUE OF OPTIONS INSTALLED:							
38	SUBCOMPACT	DOLLARS	1106.44	1154.26	1204.30	1259.45	1317.84	1378.95
39		%GROWTH	4.40	4.32	4.33	4.58	4.64	4.64
40								
41	COMPACT	DOLLARS	1727.28	1795.90	1866.85	1939.26	2013.64	2089.47
42		%GROWTH	4.07	3.97	3.95	3.88	3.84	3.77
43								
44	MID-SIZE	DOLLARS	2116.14	2183.83	2253.91	2323.05	2394.01	2466.48
45		%GROWTH	3.27	3.20	3.21	3.07	3.05	3.03
46								
47	FULL SIZE	DOLLARS	2270.39	2338.22	2408.61	2477.02	2547.34	2619.39
48		%GROWTH	3.05	2.99	3.01	2.84	2.84	2.83
49								
50	LUXURY	DOLLARS	2661.48	2737.09	2815.76	2891.47	2969.50	3049.71
51		%GROWTH	2.89	2.84	2.87	2.69	2.70	2.70

TABLE 1.07 DOMESTIC AUTO PRICES - CONTINUED

LINE	ITEM		1999	2000
1	BASE PRICE: FIXED-WTD AVG TOT	DOLLARS	10626.	10973.
2		%GROWTH	3.22	3.26
3				
4	SUBCOMPACT	DOLLARS	7904.	8163.
5		%GROWTH	3.22	3.26
6				
7	COMPACT	DOLLARS	8414.	8689.
8		%GROWTH	3.22	3.26
9				
10	MID-SIZE	DOLLARS	9742.	10061.
11		%GROWTH	3.22	3.26
12				
13	FULL SIZE	DOLLARS	10943.	11300.
14		%GROWTH	3.22	3.26
15				
16	LUXURY	DOLLARS	17732.	18311.
17		%GROWTH	3.22	3.26
18				
19	MAX OPT PRICE: FIXED-WTD AVG	DOLLARS	2740.56	2809.47
20		%GROWTH	2.50	2.51
21				
22	SUBCOMPACT	DOLLARS	2454.87	2516.60
23		%GROWTH	2.50	2.51
24				
25	COMPACT	DOLLARS	2591.25	2656.41
26		%GROWTH	2.50	2.51
27				
28	MID-SIZE	DOLLARS	2700.35	2768.26
29		%GROWTH	2.50	2.51
30				
31	FULL SIZE	DOLLARS	2782.18	2852.14
32		%GROWTH	2.50	2.51
33				
34	LUXURY	DOLLARS	3191.32	3271.57
35		%GROWTH	2.50	2.51
36				
37	VALUE OF OPTIONS INSTALLED:			
38	SUBCOMPACT	DOLLARS	1444.00	1516.26
39		%GROWTH	4.72	5.00
40				
41	COMPACT	DOLLARS	2166.88	2247.34
42		%GROWTH	3.70	3.71
43				
44	MID-SIZE	DOLLARS	2539.94	2615.54
45		%GROWTH	2.98	2.98
46				
47	FULL SIZE	DOLLARS	2692.26	2767.28
48		%GROWTH	2.78	2.79
49				
50	LUXURY	DOLLARS	3130.82	3214.40
51		%GROWTH	2.66	2.67

TABLE 1.08 FOREIGN AUTO PRICES

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	3904.	4160.	4319.	4551.	4794.	5012.
4		%GROWTH	3.30	6.57	3.81	5.39	5.33	4.56
5								
6	COMPACT	DOLLARS	6432.	6921.	7203.	7655.	8150.	8604.
7		%GROWTH	9.87	7.60	4.09	6.28	6.47	5.57
8								
9	LUXURY	DOLLARS	12690.	13833.	14451.	15498.	16626.	17665.
10		%GROWTH	13.37	9.00	4.47	7.25	7.27	6.25
11								
12								
13	STATE AND LOCAL TAXES:							
14								
15	SUBCOMPACT	DOLLARS	165.40	179.56	189.72	203.54	218.10	232.00
16		%GROWTH	4.71	8.56	5.66	7.28	7.15	6.38
17								
18	COMPACT	DOLLARS	273.63	299.90	317.73	343.75	372.36	399.99
19		%GROWTH	11.49	9.60	5.94	8.19	8.32	7.42
20								
21	LUXURY	DOLLARS	543.42	603.24	641.35	700.14	764.08	825.99
22		%GROWTH	15.05	11.01	6.32	9.17	9.13	8.10
23								
24								
25	TRANSPORTATION CHARGES:							
26								
27	SUBCOMPACT	DOLLARS	95.18	97.30	99.93	103.59	110.57	116.46
28		%GROWTH	9.26	2.23	2.71	3.67	6.73	5.33
29								
30	COMPACT	DOLLARS	131.10	134.40	138.30	143.80	154.20	163.30
31		%GROWTH	11.10	2.52	2.90	3.98	7.23	5.90
32								
33	LUXURY	DOLLARS	177.00	182.70	189.60	199.20	217.80	234.30
34		%GROWTH	14.46	3.22	3.78	5.06	9.34	7.58
35								
36								
37	BASE PRICES:							
38								
39	SUBCOMPACT	DOLLARS	3320.	3524.	3623.	3797.	3979.	4144.
40		%GROWTH	3.88	6.14	2.79	4.82	4.81	4.13
41								
42	COMPACT	DOLLARS	5428.	5849.	6054.	6421.	6810.	7164.
43		%GROWTH	9.91	7.76	3.51	6.07	6.06	5.20
44								
45	LUXURY	DOLLARS	10617.	11619.	12112.	13005.	13961.	14841.
46		%GROWTH	12.81	9.43	4.25	7.37	7.35	6.31

TABLE 1.08 FOREIGN AUTO PRICES

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	5202.	5398.	5601.	5808.	6022.	6236.
4		%GROWTH	3.77	3.77	3.77	3.70	3.67	3.55
5								
6	COMPACT	DOLLARS	8982.	9372.	9777.	10193.	10624.	11062.
7		%GROWTH	4.39	4.33	4.33	4.25	4.23	4.13
8								
9	LUXURY	DOLLARS	18506.	19375.	20291.	21244.	22239.	23274.
10		%GROWTH	4.76	4.69	4.73	4.70	4.68	4.65
11								
12								
13	STATE AND LOCAL TAXES:							
14								
15	SUBCOMPACT	DOLLARS	244.96	258.62	273.03	288.09	303.92	320.25
16		%GROWTH	5.59	5.57	5.57	5.51	5.50	5.37
17								
18	COMPACT	DOLLARS	424.87	451.02	478.72	507.84	538.62	570.72
19		%GROWTH	6.22	6.15	6.14	6.08	6.06	5.96
20								
21	LUXURY	DOLLARS	880.37	937.66	998.99	1064.16	1133.48	1206.97
22		%GROWTH	6.58	6.51	6.54	6.52	6.51	6.48
23								
24								
25	TRANSPORTATION CHARGES:							
26								
27	SUBCOMPACT	DOLLARS	121.15	126.49	132.18	137.06	141.54	146.04
28		%GROWTH	4.02	4.41	4.50	3.69	3.27	3.18
29								
30	COMPACT	DOLLARS	170.60	179.00	187.80	195.40	202.50	209.59
31		%GROWTH	4.47	4.92	4.92	4.05	3.63	3.50
32								
33	LUXURY	DOLLARS	247.80	263.40	280.00	294.60	308.40	322.28
34		%GROWTH	5.76	6.30	6.30	5.21	4.68	4.50
35								
36								
37	BASE PRICES:							
38								
39	SUBCOMPACT	DOLLARS	4273.	4405.	4542.	4683.	4829.	4978.
40		%GROWTH	3.12	3.09	3.11	3.11	3.11	3.09
41								
42	COMPACT	DOLLARS	7446.	7735.	8037.	8352.	8679.	9016.
43		%GROWTH	3.93	3.89	3.91	3.92	3.92	3.88
44								
45	LUXURY	DOLLARS	15547.	16280.	17050.	17859.	18706.	19587.
46		%GROWTH	4.76	4.71	4.73	4.74	4.75	4.71

TABLE 1.08 FOREIGN AUTO PRICES

LINE	ITEM		1987	1988	1989	1990	1991	1992
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	6456.	6681.	6913.	7154.	7380.	7611.
4		%GROWTH	3.53	3.49	3.48	3.49	3.16	3.12
5								
6	COMPACT	DOLLARS	11521.	11995.	12487.	12998.	13478.	13970.
7		%GROWTH	4.14	4.12	4.11	4.09	3.69	3.65
8								
9	LUXURY	DOLLARS	24368.	25507.	26700.	27947.	29124.	30343.
10		%GROWTH	4.70	4.68	4.68	4.67	4.21	4.18
11								
12								
13	STATE AND LOCAL TAXES:							
14								
15	SUBCOMPACT	DOLLARS	337.35	355.24	374.02	393.83	413.33	433.63
16		%GROWTH	5.34	5.30	5.29	5.30	4.95	4.91
17								
18	COMPACT	DOLLARS	604.81	640.76	678.75	718.92	758.38	799.72
19		%GROWTH	5.97	5.94	5.93	5.92	5.49	5.45
20								
21	LUXURY	DOLLARS	1285.78	1369.43	1458.47	1553.20	1646.64	1745.19
22		%GROWTH	6.53	6.51	6.50	6.49	6.02	5.98
23								
24								
25	TRANSPORTATION CHARGES:							
26								
27	SUBCOMPACT	DOLLARS	150.56	155.32	160.21	165.12	170.38	175.67
28		%GROWTH	3.10	3.16	3.15	3.07	3.19	3.10
29								
30	COMPACT	DOLLARS	216.92	224.52	232.37	240.51	248.92	257.64
31		%GROWTH	3.50	3.50	3.50	3.50	3.50	3.50
32								
33	LUXURY	DOLLARS	336.78	351.93	367.77	384.32	401.61	419.69
34		%GROWTH	4.50	4.50	4.50	4.50	4.50	4.50
35								
36								
37	BASE PRICES:							
38								
39	SUBCOMPACT	DOLLARS	5134.	5293.	5457.	5626.	5783.	5942.
40		%GROWTH	3.12	3.10	3.10	3.10	2.78	2.75
41								
42	COMPACT	DOLLARS	9370.	9736.	10116.	10510.	10877.	11253.
43		%GROWTH	3.93	3.90	3.90	3.89	3.49	3.46
44								
45	LUXURY	DOLLARS	20518.	21489.	22505.	23567.	24563.	25591.
46		%GROWTH	4.76	4.73	4.73	4.72	4.22	4.19

TABLE 1.08 FOREIGN AUTO PRICES

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	TOTAL AUTO PRICES:							
2								
3	SUBCOMPACT	DOLLARS	7849.	8093.	8346.	8610.	8883.	9166.
4		%GROWTH	3.13	3.11	3.12	3.17	3.17	3.19
5								
6	COMPACT	DOLLARS	14483.	15010.	15557.	16124.	16709.	17316.
7		%GROWTH	3.67	3.64	3.64	3.64	3.63	3.64
8								
9	LUXURY	DOLLARS	31623.	32949.	34333.	35774.	37272.	38841.
10		%GROWTH	4.22	4.20	4.20	4.20	4.19	4.21
11								
12								
13	STATE AND LOCAL TAXES:							
14								
15	SUBCOMPACT	DOLLARS	454.94	477.21	500.59	525.34	551.36	578.75
16		%GROWTH	4.92	4.90	4.90	4.95	4.95	4.97
17								
18	COMPACT	DOLLARS	843.44	889.33	937.66	988.60	1042.16	1098.67
19		%GROWTH	5.47	5.44	5.43	5.43	5.42	5.42
20								
21	LUXURY	DOLLARS	1850.17	1961.06	2078.62	2203.12	2334.83	2474.91
22		%GROWTH	6.02	5.99	5.99	5.99	5.98	6.00
23								
24								
25	TRANSPORTATION CHARGES:							
26								
27	SUBCOMPACT	DOLLARS	181.10	186.77	192.58	198.53	204.62	210.97
28		%GROWTH	3.09	3.13	3.11	3.09	3.07	3.10
29								
30	COMPACT	DOLLARS	266.65	275.99	285.65	295.64	305.99	316.70
31		%GROWTH	3.50	3.50	3.50	3.50	3.50	3.50
32								
33	LUXURY	DOLLARS	438.57	458.31	478.93	500.48	523.00	546.54
34		%GROWTH	4.50	4.50	4.50	4.50	4.50	4.50
35								
36								
37	BASE PRICES:							
38								
39	SUBCOMPACT	DOLLARS	6107.	6275.	6448.	6626.	6809.	6997.
40		%GROWTH	2.77	2.76	2.76	2.77	2.75	2.77
41								
42	COMPACT	DOLLARS	11645.	12049.	12467.	12900.	13347.	13812.
43		%GROWTH	3.49	3.47	3.47	3.48	3.46	3.48
44								
45	LUXURY	DOLLARS	26672.	27793.	28960.	30179.	31445.	32770.
46		%GROWTH	4.22	4.20	4.20	4.21	4.19	4.21

TABLE 1.08 FOREIGN AUTO PRICES

LINE	ITEM		1999	2000
1	TOTAL AUTO PRICES:			
2				
3	SUBCOMPACT	DOLLARS	9460.	9768.
4		%GROWTH	3.21	3.26
5				
6	COMPACT	DOLLARS	17944.	18596.
7		%GROWTH	3.62	3.63
8				
9	LUXURY	DOLLARS	40473.	42178.
10		%GROWTH	4.20	4.21
11				
12				
13	STATE AND LOCAL TAXES:			
14				
15	SUBCOMPACT	DOLLARS	607.58	638.19
16		%GROWTH	4.98	5.04
17				
18	COMPACT	DOLLARS	1158.08	1220.78
19		%GROWTH	5.41	5.41
20				
21	LUXURY	DOLLARS	2623.13	2780.44
22		%GROWTH	5.99	6.00
23				
24				
25	TRANSPORTATION CHARGES:			
26				
27	SUBCOMPACT	DOLLARS	217.57	224.20
28		%GROWTH	3.13	3.05
29				
30	COMPACT	DOLLARS	327.78	339.26
31		%GROWTH	3.50	3.50
32				
33	LUXURY	DOLLARS	571.13	596.83
34		%GROWTH	4.50	4.50
35				
36				
37	BASE PRICES:			
38				
39	SUBCOMPACT	DOLLARS	7191.	7390.
40		%GROWTH	2.76	2.77
41				
42	COMPACT	DOLLARS	14291.	14788.
43		%GROWTH	3.47	3.48
44				
45	LUXURY	DOLLARS	34148.	35586.
46		%GROWTH	4.21	4.21

AUTO MODEL FORECAST 1975 - 2000

TABLE 1.09 USED CAR MARKET

LINE	ITEM		1975	1976	1977	1978	1979	1980
1	AVERAGE WHOLESALE PRICE	DOLLARS	2009,33	2150,65	2200,92	2367,88	2576,64	2752,71
2		%GROWTH	5,23	7,03	2,34	7,59	8,82	6,83
3								
4								
5	PRICE OF 1 YR OLD CAR/NEW CAR							
6								
7	SUBCOMPACT	RATIO	0,874	0,856	0,786	0,776	0,798	0,806
8		%GROWTH	3,18	-2,14	-8,17	-1,24	2,79	1,06
9								
10	COMPACT	RATIO	0,825	0,746	0,705	0,704	0,724	0,723
11		%GROWTH	3,40	-9,57	-5,43	-0,10	2,84	-0,24
12								
13	MID-SIZE	RATIO	0,636	0,697	0,629	0,631	0,643	0,653
14		%GROWTH	-10,24	9,59	-9,73	0,20	1,91	1,56
15								
16	FULL SIZE	RATIO	0,648	0,691	0,592	0,573	0,604	0,621
17		%GROWTH	0,61	6,57	-14,37	-3,14	5,34	2,84
18								
19	LUXURY	RATIO	0,716	0,738	0,689	0,678	0,694	0,703
20		%GROWTH	4,79	3,12	-6,66	-1,70	2,45	1,31
21								
22								
23	TOTAL USED CARS PURCHASED	MILL AUTOS	16,89	18,95	15,50	15,41	16,52	17,34
24		%GROWTH	22,41	12,18	-18,19	-0,59	7,24	4,95

TABLE 1.09 USED CAR MARKET

LINE	ITEM		1981	1982	1983	1984	1985	1986
1	AVERAGE WHOLESALE PRICE	DOLLARS	2873,15	2909,37	3133,36	3258,97	3371,51	3506,83
2		%GROWTH	4,38	4,05	4,02	4,01	3,45	4,01
3								
4								
5	PRICE OF 1 YR OLD CAR/NEW CAR							
6								
7	SUBCOMPACT	RATIO	0,780	0,782	0,803	0,813	0,813	0,819
8		%GROWTH	-2,20	-0,87	2,70	1,31	-0,04	0,71
9								
10	COMPACT	RATIO	0,699	0,691	0,709	0,714	0,713	0,719
11		%GROWTH	-3,29	-1,13	2,66	0,66	-0,15	0,80
12								
13	MID-SIZE	RATIO	0,653	0,649	0,654	0,659	0,658	0,662
14		%GROWTH	0,04	-0,62	0,80	0,80	-0,17	0,61
15								
16	FULL SIZE	RATIO	0,613	0,604	0,625	0,641	0,642	0,647
17		%GROWTH	-1,31	-1,41	3,45	2,63	0,08	0,79
18								
19	LUXURY	RATIO	0,699	0,694	0,706	0,714	0,714	0,717
20		%GROWTH	-0,61	-0,66	1,62	1,18	0,02	0,38
21								
22								
23	TOTAL USED CARS PURCHASED	MILL AUTOS	17,71	16,90	17,92	18,88	18,89	19,08
24		%GROWTH	2,09	-4,54	6,05	5,31	0,08	0,99

AUTO MODEL FORECAST 1975 - 2000

TABLE 1,09 USED CAR MARKET

LINE	I T E M		1987	1988	1989	1990	1991	1992
1	AVERAGE WHOLESALE PRICE	DOLLARS	3644,62	3783,37	3931,39	4091,69	4253,05	4422,61
2		%GROWTH	3,93	3,81	3,91	4,08	3,94	3,99
3								
4								
5	PRICE OF 1 YR OLD CAR/NEW CAR							
6								
7	SUBCOMPACT	RATIO	0,823	0,820	0,813	0,806	0,805	0,809
8		%GROWTH	0,55	-0,43	-0,81	-0,81	-0,13	0,44
9								
10	COMPACT	RATIO	0,722	0,719	0,714	0,709	0,706	0,709
11		%GROWTH	0,51	-0,49	-0,65	-0,78	-0,40	0,44
12								
13	MID-SIZE	RATIO	0,663	0,662	0,659	0,658	0,657	0,659
14		%GROWTH	0,09	-0,16	-0,35	-0,21	-0,19	0,37
15								
16	FULL SIZE	RATIO	0,653	0,649	0,641	0,633	0,634	0,637
17		%GROWTH	0,90	-0,58	-1,26	-1,22	0,14	0,53
18								
19	LUXURY	RATIO	0,720	0,718	0,713	0,709	0,710	0,712
20		%GROWTH	0,42	-0,29	-0,61	-0,59	0,08	0,26
21								
22								
23	TOTAL USED CARS PURCHASED	MILL AUTOS	19,61	19,69	19,63	19,65	19,67	20,04
24		%GROWTH	2,80	0,38	-0,30	0,12	0,08	1,89

AUTO MODEL FORECAST 1975 - 2000

TABLE 1.09 USED CAR MARKET

LINE	ITEM		1993	1994	1995	1996	1997	1998
1	AVERAGE WHOLESALE PRICE	DOLLARS	4588.36	4754.64	4929.76	5103.71	5284.11	5473.54
2		%GROWTH	3.75	3.62	3.68	3.53	3.53	3.58
3								
4								
5	PRICE OF 1 YR OLD CAR/NEW CAR							
6								
7	SUBCOMPACT	RATIO	0.810	0.809	0.809	0.809	0.810	0.812
8		%GROWTH	0.17	-0.16	-0.04	-0.01	0.14	0.24
9								
10	COMPACT	RATIO	0.710	0.708	0.709	0.707	0.708	0.710
11		%GROWTH	0.11	-0.19	0.03	-0.27	0.21	0.22
12								
13	MID-SIZE	RATIO	0.659	0.659	0.658	0.659	0.659	0.659
14		%GROWTH	-0.05	-0.04	-0.05	0.10	0.01	0.07
15								
16	FULL SIZE	RATIO	0.639	0.638	0.637	0.639	0.640	0.642
17		%GROWTH	0.29	-0.17	-0.16	0.39	0.07	0.35
18								
19	LUXURY	RATIO	0.713	0.712	0.711	0.713	0.713	0.714
20		%GROWTH	0.13	-0.09	-0.07	0.16	0.04	0.16
21								
22								
23	TOTAL USED CARS PURCHASED	MILL AUTOS	20.32	20.43	20.51	20.72	20.82	21.06
24		%GROWTH	1.42	0.52	0.43	1.02	0.45	1.18

TABLE 1.09 USED CAR MARKET

LINE	ITEM		1999	2000
1	AVERAGE WHOLESALE PRICE	DOLLARS	5666.34	5867.92
2		%GROWTH	3.52	3.56
3				
4				
5	PRICE OF 1 YR OLD CAR/NEW CAR			
6				
7	SUBCOMPACT	RATIO	0.812	0.812
8		%GROWTH	0.03	-0.04
9				
10	COMPACT	RATIO	0.709	0.709
11		%GROWTH	-0.03	-0.03
12				
13	MID-SIZE	RATIO	0.660	0.660
14		%GROWTH	0.03	0.08
15				
16	FULL SIZE	RATIO	0.643	0.642
17		%GROWTH	0.12	-0.10
18				
19	LUXURY	RATIO	0.714	0.714
20		%GROWTH	0.05	-0.05
21				
22				
23	TOTAL USED CARS PURCHASED	MILL AUTOS	21.22	21.28
24		%GROWTH	0.73	0.27

TABLE 1.10 UNADJUSTED SHARES BY SIZE CLASS

LINE	ITEM	1975	1976	1977	1978	1979	1980
1	DESIRED SHARES IN STOCK						
2	BEFORE RECONCILING SUM TO 1.0						
3							
4	SUBCOMPACT & COMPACT	0.4246	0.4080	0.3948	0.3898	0.3929	0.3975
5							
6	MID-SIZE	0.2315	0.2352	0.2358	0.2364	0.2372	0.2364
7							
8	FULL SIZE	0.2418	0.2786	0.3005	0.3071	0.2993	0.2913
9							
10	LUXURY	0.0901	0.0900	0.0900	0.0903	0.0912	0.0921
11							
12	TOTAL	0.9880	1.0118	1.0211	1.0236	1.0206	1.0173
13							
14							
15	DESIRED SHARES IN NEW REGISTRATIONS						
16	BEFORE RECONCILING SUM TO 1.0						
17							
18	SUBCOMPACT & COMPACT	0.5085	0.4285	0.4172	0.4037	0.4063	0.4115
19							
20	MID-SIZE	0.2273	0.2846	0.2574	0.2408	0.2287	0.2292
21							
22	FULL SIZE	0.1690	0.1983	0.2593	0.2951	0.2903	0.2841
23							
24	LUXURY	0.0927	0.0917	0.0910	0.0912	0.0925	0.0938
25							
26	TOTAL	0.9975	1.0031	1.0248	1.0309	1.0178	1.0186

TABLE 1.10 UNADJUSTED SHARES BY SIZE CLASS

LINE	I T E M	1981	1982	1983	1984	1985	1986
1	DESIRED SHARES IN STOCK						
2	BEFORE RECONCILING SUM TO 1.0						
3							
4	SUBCOMPACT & COMPACT .	0.3960	0.3946	0.3925	0.3888	0.3847	0.3833
5							
6	MID-SIZE	0.2372	0.2372	0.2373	0.2382	0.2376	0.2377
7							
8	FULL SIZE	0.2882	0.2900	0.2926	0.2970	0.3031	0.2993
9							
10	LUXURY	0.0931	0.0940	0.0948	0.0956	0.0965	0.0973
11							
12	TOTAL	1.0145	1.0158	1.0171	1.0195	1.0219	1.0177
13							
14							
15	DESIRED SHARES IN NEW REGISTRATIONS						
16	BEFORE RECONCILING SUM TO 1.0						
17							
18	SUBCOMPACT & COMPACT	0.4088	0.4048	0.4008	0.3944	0.3883	0.3901
19							
20	MID-SIZE	0.2322	0.2316	0.2317	0.2330	0.2316	0.2350
21							
22	FULL SIZE	0.2850	0.2902	0.2946	0.3001	0.3075	0.2998
23							
24	LUXURY	0.0952	0.0964	0.0974	0.0984	0.0996	0.1005
25							
26	TOTAL	1.0211	1.0231	1.0244	1.0260	1.0270	1.0254

TABLE 1.10 UNADJUSTED SHARES BY SIZE CLASS

LINE	ITEM	1987	1988	1989	1990	1991	1992
1	DESIRED SHARES IN STOCK						
2	BEFORE RECONCILING SUM TO 1.0						
3							
4	SUBCOMPACT & COMPACT	0.3812	0.3793	0.3775	0.3761	0.3750	0.3729
5							
6	MID-SIZE	0.2374	0.2370	0.2366	0.2368	0.2357	0.2359
7							
8	FULL SIZE	0.2975	0.2948	0.2925	0.2886	0.2867	0.2832
9							
10	LUXURY	0.0982	0.0992	0.1001	0.1011	0.1021	0.1031
11							
12	TOTAL	1.0144	1.0103	1.0067	1.0027	0.9995	0.9952
13							
14							
15	DESIRED SHARES IN NEW REGISTRATIONS						
16	BEFORE RECONCILING SUM TO 1.0						
17							
18	SUBCOMPACT & COMPACT	0.3901	0.3908	0.3911	0.3923	0.3932	0.3932
19							
20	MID-SIZE	0.2368	0.2383	0.2393	0.2414	0.2401	0.2420
21							
22	FULL SIZE	0.2962	0.2920	0.2889	0.2838	0.2825	0.2792
23							
24	LUXURY	0.1015	0.1025	0.1035	0.1045	0.1055	0.1065
25							
26	TOTAL	1.0246	1.0236	1.0229	1.0220	1.0212	1.0209

AUTO MODEL FORECAST 1975 - 2000

TABLE 1.10 UNADJUSTED SHARES BY SIZE CLASS

LINE	ITEM	1993	1994	1995	1996	1997	1998
1	DESIRED SHARES IN STOCK						
2	BEFORE RECONCILING SUM TO 1.0						
3							
4	SUBCOMPACT & COMPACT	0.3704	0.3677	0.3655	0.3627	0.3604	0.3588
5							
6	MID-SIZE	0.2355	0.2352	0.2349	0.2346	0.2344	0.2341
7							
8	FULL SIZE	0.2812	0.2794	0.2772	0.2767	0.2757	0.2747
9							
10	LUXURY	0.1042	0.1052	0.1063	0.1074	0.1084	0.1095
11							
12	TOTAL	0.9913	0.9875	0.9839	0.9814	0.9790	0.9771
13							
14							
15	DESIRED SHARES IN NEW REGISTRATIONS						
16	BEFORE RECONCILING SUM TO 1.0						
17							
18	SUBCOMPACT & COMPACT	0.3921	0.3908	0.3899	0.3875	0.3858	0.3849
19							
20	MID-SIZE	0.2425	0.2429	0.2433	0.2434	0.2436	0.2434
21							
22	FULL SIZE	0.2788	0.2787	0.2781	0.2797	0.2804	0.2804
23							
24	LUXURY	0.1075	0.1086	0.1097	0.1108	0.1119	0.1129
25							
26	TOTAL	1.0209	1.0210	1.0210	1.0214	1.0216	1.0216

TABLE 1.10 UNADJUSTED SHARES BY SIZE CLASS

LINE	ITEM	1999	2000
1	DESIRED SHARES IN STOCK		
2	BEFORE RECONCILING SUM TO 1.0		
3			
4	SUBCOMPACT & COMPACT	0.3572	0.3551
5			
6	MID-SIZE	0.2338	0.2343
7			
8	FULL SIZE	0.2741	0.2736
9			
10	LUXURY	0.1105	0.1115
11			
12	TOTAL	0.9756	0.9744
13			
14			
15	DESIRED SHARES IN NEW REGISTRATIONS		
16	BEFORE RECONCILING SUM TO 1.0		
17			
18	SUBCOMPACT & COMPACT	0.3837	0.3817
19			
20	MID-SIZE	0.2432	0.2444
21			
22	FULL SIZE	0.2809	0.2810
23			
24	LUXURY	0.1139	0.1148
25			
26	TOTAL	1.0216	1.0219

TECHNICAL NOTES ON THE FORECASTS

Constant Adjustments

The following are the constant adjustments applied. Those for desired stock and shares were primarily continuations of their 1974 trends. Those for new registrations and shares were applied to align the forecast with currently available data. Those for transportation base and options prices adjust for 1974 U.S. data revisions.

Variable	Value	Period
KEND*AY/FM	0.025	1975-2000
SHRS/SC*A	0.021	1975-2000
SHRSC*A	0.042	1975-2000
SHRM*A	0.0376	1975-2000
SHRF*A	-0.1062	1975-2000
SHRL*A	-0.002	1975-2000
OMVUANR	0.272	1975
	0.25	1976
	0.15	1977
SHRSCTNR	0.0103	1975
	-0.02	1976

Variable	Value	Period
SHRS/SCTNR	-0.0124	1975
SHRMDNR	-0.01	1975
	0.05	1976
	0.03	1977
	0.015	1978
SHRFDNR	-0.002	1975
	-0.03	1976
	-0.015	1977
USSDPUTRN	-1.83	1975-2000
USMDPUTRN	-11.42	1975-2000
USFDPUTRN	-14.53	1975-2000
USSFPUTRN	-7.94	1975-2000
USTDPUBASEFW	-100.0	1975-2000
USTDPOPTMFW	-30.0	1975-2000

Exogenized Values

The following series were exogenized due to their inadequate simulation performance.

SHRSDNR	0.4694	1975
	0.48	1976-2000
SHRCDNR	0.9264	1975
	0.93	1976-2000

Value	Period
0.8793	1975
0.88	1976-2000

Growth-rate set to 1.4* (growth-rate PXRGT)

Growth-rate set to 1.8* (growth-rate PXRGT)

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