# VOLUNTARY EXPORT RESTRAINTS (VERs) AND THE QUESTION OF QUALITY UPGRADING

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**ABSTRACT**

One of the most appealing policies for trade restrictions is Voluntary Export Restraints (VERs). When a domestic industry faces rapid growth of imports, the importing country may negotiate VERs with one or several major exporting countries. A VER is inherently discriminative policy. It limits the exports of a set of suppliers while the quantities of other suppliers are excluded from these restrictions.

There have been many theoretical studies that examined the effect of VERs on the importing country's welfare. The main findings of theses studies indicate that VERs lead to higher prices and profits for both the domestic and foreign firms and net welfare loss to the importing country. These findings also suggest that VERs may lead to quality improvements in the restricted good. Also, there have been some empirical studies that support this quality upgrading argument. The objective of this paper is to examine the question of quality upgrading as a result of the VERs imposed on Japanese automobiles imports to the United States in the early 1980s. Using hedonic regression analysis and incorporating the effect of changes in exchange rates and regional variations, this study found no evidence for such quality upgrading.

JEL Classification: F1

**Key Words:**
VERs
Quality upgrading
Hedonic regression

## 1. INTRODUCTION

In the 1970s the U.S. economy suffered two recessions, one after the oil crisis of 1973 and lasted until 1976. The second followed the oil crisis of 1979 and prevailed until 1982. These two recessions besides the increasing market share of foreign imports (especially Japanese) in the U.S. domestic market caused the U.S. automobile production and employment in the industry to decline. All of this resulted in a record loss for the auto industry; in 1980 net income of General Motors, Ford, Chrysler, and American Motors was -$4.2 billion[1].

These events created a hostile environment toward Japanese trade in general and Japanese auto imports in particular. Also, as was noted by Crandall (1987), the roughly 60% appreciation of the real value of the U.S. dollar between 1979 and 1985 created an environment that was increasingly conducive to protectionist policies in the United States equipments markets[2]. In this environment, the 1981 Voluntary Export Restraints agreement with Japan on automobiles marked the first attempt to protect the U.S. automobile industry from imports since WWII. In early 1985 the U.S. authorities judged that the domestic automobile industry had been able to adjust to import competition and announced that they would not ask Japan to extend the restraints. But the Japanese government decided to extend the restraints for additional two years through March 1987. During the 1981-84 period, automobile prices increased rapidly and the price of imported cars increased more than the increase in the price of domestic cars. In 1983 and 1984, the U.S. automakers achieved record levels of net income. This is in part due to efforts by the industry to control cost of production and may be in part due to the restraints.

Since VERs have become a prevalent means of restricting exports, consequently, they have received most of the attention in the existing literature. Most of the theoretical research has concentrated on the effects of VERs on the importing country's price and welfare. This has been contrasted with tariff or quota under various market structures. In these studies, the asymmetry

[1] See Tables A1 and A2 in the Appendix.

[2] In this environment, automobile and steel quotas were imposed. A textile quota bill was passed in the House of Representatives. Motorcycles were subjected to quotas and tariffs. Calls mounted for protection of the semiconductor and telecommunications

introduced by the VERs actually "facilitates" collusion between the foreign and domestic firms resulting in higher prices and profits for each and net welfare loss to the importing country. For this line of research see for example Bhagwati (1965), Takacs (1978), Krishna (1983), Murray et al (1983), Harris (1985), Buffie and Spiller (1986), Dean and Gengopadhgay (1986), Brecher and Bhagwati (1987), Cooper and Riezman (1989), and Shivakumar (1993).

Another line of research focused on the quality upgrading effect of the VERs and the findings of this research indicate that the imposition of the VERs may lead to quality improvements in the restricted good. See for example Falvey (1979), Rodriguez (1979), Das and Donnenfeld (1987, 1989), Krishna (1987). Other studies took different approaches; for example Hillman and Ursprung (1988) incorporated foreign interest in the determination of a country's international trade policy into a model of political competition between candidates contesting elective office. The candidates make trade policy pronouncements to maximize political support from producer interests. Their analysis shows that tariffs are divisive but VERs are consistent with conciliatory policy positions yielding mutual gains to foreign and domestic interests.

Anderson (1992) showed that the prospect of a VER might lead to a domino effect of dumping and antidumping activities.

At the empirical front, there has been increasing number of studies that sought to examine the effect of the automobile VERs agreement between the U.S. and Japan in the early 1980s. The main focus of these studies has been to examine the effect of the VERs on automobile prices, welfare loss, and employment in the U.S. auto industry. See for example Crandall (1984), Tarr and Morkre (1984), Hichock (1985), The USITC (1985), Crandall (1987), Collyns and Dunaway (1987), Co (1997), Winston et al (1987),
Dinopoulos and Krenin (1988), Fuss et al (1992), Goldberg (1994, 1995), Berry et al (1999). In general, these studies produced inconsistent findings. For example, the most recent and more sophisticated of these studies, Goldberg (1994, 1995) and Berry et al (1999) produced conflicting findings with regard to the timing of the effect. For example Goldberg (1994, 1995) concluded that the VERs had its most effect during the early years while Berry et al (1999) concluded that

this effect happened in the late years and had almost no effect in its early years. This leaves the door open to more empirical investigation.

Besides examining the effect of the automobile VERs on price and welfare in the U.S., some other studies examined the effect of the VERs on quality and concluded that there was quality upgrading because of the VERs. See for example Feenstra (1984, 1985, and 1988).

Levinsohn (1994) has noted that one of the rewards of researching the US automobile industry is that there is seldom a lack of interesting questions. In this paper, I will examine one of these questions; did the Japanese automobiles VERs lead to quality upgrading in automobiles sold in the U.S. market?

The paper is organized as follows: Section 2 presents a theoretical model of the effect of VERs on quality. Section 3 is devoted for the analysis and results of the study. A summary and some concluding remarks can be found in section 4.

## 2. Theoretical Model

### 2.1 Hedonic Price Model

Rosen (1974) developed a model of product differentiation based on the hedonic hypothesis that goods are valued for their utility-bearing attributes or characteristics. In this model, he had buyers and sellers choosing their optimal positions. Each good has *n* objectively measured characteristics $z = (z_1, z_2, ........, z_n)$, where $z_i$ measures the amount of the characteristics contained in each good. The price of the good is $p(z) = p(z_1, z_2, ........, z_n)$.
Consumers and producers choose the optimal price along the vector of equilibrium price schedule $p(z)$.

#### 2.1. 1 The Consumer's Decision:

The consumer utility from buying a unit of the differentiated product is:

(1) $U = U(z, x; \alpha)$ where: $x$ is the quantity of a numeraire good and α is a vector of consumer parameters reflecting taste.

The consumer maximizes utility subject to the budget constraint $y = p(z) + x$ (assuming *p(x)=1*).

The Lagarangian function for utility maximization is:

(2) $$L = U(z, x; \alpha) + \lambda[y - p(z) - x]$$

FOC are:

(3) $$\frac{\partial L}{\partial z} = U_z[z, y - p(z); \alpha] - \lambda p_z(z) = 0$$

(4) $$\frac{\partial L}{\partial x} = U_x - \lambda = 0$$

(5) $$\frac{\partial L}{\partial \lambda} = y - p(z) - x = 0$$

From FOC we can get:

(6) $$U_z[z, y - p(z); \alpha] = U_x[z, y - p(z); \alpha] p_z(z)$$

(7) $$p_z(z) = U_z[z, y - p(z); \alpha] / U_x[z, y - p(z); \alpha]$$

Equation (7) represents the usual FOC for utility maximization; the marginal rate of substation between characteristic $z_i$ and the numeraire good equals their price ratio.

### 2.1.2 The Production Decision:

The decision facing producers is what package of characteristics to be assembled. If M(z) denotes the number of units produced by a firm offering specification *z*, then total costs for domestic or foreign firms are C(M, z; ß), where M is the quantity produced of the differentiated product with characteristics z, and ß is a vector of firm parameters. These parameters reflect firm-specific technological knowledge, as well as differences in factor prices across countries. Feenstra (1988) modified this model to include a quota. In Feenstra's model, the foreign firm faces a quota of $M \leqq \overline{M}$ *where* $\overline{M}$ *may differ across firms*.

The Lagrangian for foreign firms is:

(8) $L = p(z)M - C(M, z; \beta) + S(\overline{M} - M)$

where s≥0 is the shadow price of the quota constraint. When the quota is binding, the first-order conditions for foreign firms are:

(9) $\frac{\partial L}{\partial z} = p_z(z)\overline{M} - C_z(\overline{M}, z; \beta) = 0$

(10) $\frac{\partial L}{\partial M} = p(z) - C_M(\overline{M}, z; \beta) = 0$

Rearranging (9) and (10) yields:

(11) $p_z(z) = C_z(\overline{M}, z; \beta) / \overline{M}$

(12) $p(z) = C_M(\overline{M}, z; \beta) + s$

Equation (11) determines the optimal choice of *z* for a foreign firm and equation (12) determines quota rent per unit produced. Equations (7), (11), and (12) determine the full equilibrium conditions for the foreign firms. The equilibrium conditions for domestic firms are similar (with $s = 0$ and *M* endogenous). The final equilibrium condition is that supply equals demand for each product type.

### 2.1.3 The Effect on Quality:

Suppose the quota level $\overline{M}$ is reduced across foreign firms, this will change $C_z$ and affect *z* directly in (11). Also, the reduction in $\overline{M}$ will change the equilibrium price schedule *p(z)*, which can also affect the choice of $z$ in (12). To examine the direct effect, differentiate (11) to obtain:

$$P_{zz} dz = \left[ \left( C_{zz} dz + C_{z\overline{M}} d\overline{M} \right) \overline{M} - C_z d\overline{M} \right] / \overline{M}^2$$

which can be rearranged to yield:

(13) $\frac{\partial z}{\partial \overline{M}} = \left[ p_{zz} - \left( \frac{C_{zz}}{\overline{M}} \right) \right]^{-1} \left[ \frac{C_{zM}}{\overline{M}} \left( \frac{C_z}{\overline{M}^2} \right) \right]$

The matrix $\left[ p_{zz} - \left( \frac{C_{zz}}{\overline{M}} \right) \right]$ and its inverse are negative definite from the second-order conditions for profit maximization. The column vector $\left[ \frac{C_{zM}}{\overline{M}} \left( \frac{C_z}{\overline{M}^2} \right) \right]$ is the change in marginal cost of each characteristic when output varies. Convexity of the cost function in (*M, z*) does not determine the sign of this vector and as a result, the effect of the quota on quality is ambiguous. However, Feenstra indicated that intuition suggests that this effect should be positive. This is because a firm that experiences a decline in output would find itself with unused amounts of fixed inputs, which could be used to upgrade the units being produced. He demonstrated that this intuition applies for cost functions of the form: $C(M, z; \beta) = c[g(Mz; \beta)] = c[Mg(z; \beta)]$, where *g* is homogenous of degree one and can be thought of as a unit-cost function, and *c* is an increasing and convex transformation. This functional form specifies that the relevant units for measuring output are Mz, i.e., the total amount produced of each characteristic.

### 2.1.4 The Effect on Price:

In the short run, the price schedule *p(z)* could change nonlinearly as firms move along their marginal cost curves and adjust to the new consumer demands. In the long-run equilibrium plants are constructed to achieve minimum average cost, which is:

$$h(z; \beta) \equiv \min_M MC(M, z; \beta)/M$$

Total costs are $Mh(z; \beta)$ and the firm maximizes profits. The Lagrangian function for this problem is:

$$L = p(z)M - Mh(z; \beta) + s(\overline{M} - M)$$

The first-order conditions are:

$$\frac{\partial L}{\partial z} = p_z(z)M - Mh_z(z; \beta) = 0$$

$$\frac{\partial L}{\partial M} = p(z) - h(z; \beta) = 0$$

It follows from the FOC that:

(14) $p_z(z)M = h_z(z; \beta)$

(15) $p(z) = h(z; \beta) + s$

Foreign firms will switch product types within their output quotas and the equilibrium foreign price schedule is:

(16) $p(z) = \phi(z) + s$

where $\phi(z) \equiv \min_{\beta} h(z;b)$ is the envelope of firm's minimum average cost. A reduction of the quota leads to a rise in the quota rents which results in a price increase in (16) .

## 2.2 Hedonic Price Regression:

To measure the quality of Japanese auto imports, hedonic regression is used. The hedonic regression is an estimate of the equilibrium price schedule p(z). In this estimation I pool data over the 1979-90 period. In the model, the logarithm of the suggested retail price is regressed against some quality characteristics which include the logarithm of the acceleration variable, ln(HP/Wt), the logarithm of the space variable, ln(space), the logarithm of the cost of driving variable, ln(MPD), three binary variables (Air, Auto, PS). Besides these model attribute variables, the list of the independent variables also includes region dummies for Japan and Europe (jap, euro), trend variables (jtrend, etrend), the logarithm of the exchange rate (lexrte), the logarithm of the lagged exchange rate (llagexrte), and the interaction between the region dummies and the exchange rate (jap*lexrte, eur*lexrte). Also included in the analysis are annual dummy variables (D79-D90) which reflect the effect of any other variables not included in the above list of explanatory variables, mainly the effect of the VER. Therefore, the model to be estimated is:

$$\begin{aligned} ln(p) = {} & \beta_1 + \beta_2\, ln(HP/Wt) + \beta_3\, ln(Space) + \beta_4\, ln(MPD) + \beta_5\, (Air) + \beta_6\, (Auto) \\ & + \beta_7\, (PS) + \beta_8\, (jap) + \beta_9\, (euro) + \beta_{10} (jtrend) + \beta_{11} (etrend) + \beta_{12}\, (lexrte) \\ & + \beta_{13}\, (llagexrte) + \beta_{14}\, (jap{*}lnexrte) + \beta_{15}\, (eur{*}lexrte) + \beta_{16}\, (D80) + \beta_{17}\, (D81) \\ & + \beta_{18}\, (D82) + \beta_{19}\, (D83) + \beta_{20}\, (D84) + \beta_{21}\, (D85) + \beta_{22}\, (D86) + \beta_{23}\, (D87) \\ & + \beta_{24}\, (D88) + \beta_{25}\, (D89) + \beta_{26}\, (D90) \end{aligned}$$

After estimating the model, coefficients of the model characteristic variables are used to develop a predicted price for each model based on its quality features weighting the predicted price by the sales of each model. These fitted prices reflect the unit quality value for each model and can be used as proxy for quality upgrading.

## 3. Analysis and Results

### 3.1 Data

Data for this study was obtained from two sources; Automotive News Market Data Book, and the Economic Report of the President. The data is annual and covers the period 1979-1990. The data obtained from the Automotive News Market Data Book include:

1. Annual sales for all models of all passenger cars sold in the United States during the study period (Q). Only sales of exotic models (e.g. Ferrari and Rolls-Royce) are not included in the analysis.
2. Suggested retail price for the base model for each nameplate (P).
3. Horsepower for each model (HP).
4. Vehicles weight in lbs (Wt).
5. Vehicle's length in inches (Lng).
6. Vehicle's width in inches (wdth).
7. EPA miles per gallon rating (mpg).
8. Three binary variables for air-conditioning (air), automatic transmission (auto), and power steering (PS). These variables take the value of one if the service is a standard feature and zero otherwise.

Besides the above variables, annual macroeconomic variables were obtained from the Economic Report of the President. These variables are:

1. Exchange rates for foreign currencies in U.S. dollar.
2. Consumer price indices (cpi) for the U.S. and for the main exporting countries to the U.S. automobile's market.
3. Gasoline price.

Another macroeconomic variable is the number of households in the U.S. (HH), which was obtained from the Current Population Report, Household and Family Characteristics, published by the Bureau of the Census.

### 3.2 Descriptive Statistics of the Data

Tables A3-A10 in the Appendix present the means for the main variables used in the analysis. Besides price, sales, and the three binary variables (air, auto, and ps), three other variables are derived:

1. HP/Wt which is model horsepower divided by its weight. This is a measure of acceleration.
2. Space which equals model length times width.
3. MPD which equals gas price in constant 1983 dollars divided by mpg times ten.

   Therefore it is the cost of driving (per 10 miles) in constant 1983 dollars.

All the variables in these Tables are weighted averages and prices are deflated for inflation using the consumer price index (1982-1984 as the base).

Table A3 presents the means of these variables by size class for the whole span of the study. The first observation from the table is that foreign car manufactures had more models of subcompacts, luxury, and sports cars compared to domestic manufacture. Also, during the study period, the large size cars was produced only by domestic producers and there were only seven medium size foreign models (one in 1988, two in 1989, and four in 1990). Foreign models tend to be smaller, more expensive, have more acceleration power, and less costly to drive.

Table A4 presents the means of these variables by size class over time. It can be seen that, except for average model sales, the cost of driving, and space, all the variables had increasing trends over the span of the study period. For the number of models, we notice that the number of foreign models experienced a significant increase in 1981 but it declined the following three years (the beginning of theVERs period). This decrease did not last long as the number of foreign models experienced another sharp increase in 1985. It is worth noticing that the number of domestic models was always greater than the number of foreign models.

It can also be seen that the retail price for foreign models was higher than that for domestic models for each year. Also, model sales had no clear trend during the study period, but domestic sales suffered a decline in the early 1980s and then started to increase in 1983.

The measure of acceleration, HP/Wt, increased slightly over the study period, and again, its value for foreign models was greater than that of domestic models. This is the opposite for the space variables where foreign models were smaller compared to domestic models. The overall trend was that automobiles were getting smaller over time. This trend continued until 1987 when the size of automobiles started to get bigger.

The cost of driving is the only variable with a decreasing trend over the entire study period, most probably due to the improvement in design and fuel efficiency. It is worth noting that the cost of driving is less for foreign models in all years included in the study.

With regards to the three binary variables, they had increasing trend during the span of the analysis. This finding indicates that cars became better equipped over time.

Tables A5-A10 represent the descriptive statistics for each size class over the span of the study. The main conclusion when looking at these tables is that these size classes have different attributes and these attributes change differently and affect price differently from one size class to another. For example, while most size classes became better equipped over time, this was not the case for subcompact cars.

### 3.3 Results of the Hedonic Price Regression:

Table 3.1 presents the results of the hedonic regression for each region separately, and Table 3.2 presents these results for all models together and for each size class separately. Some of the explanatory variables were omitted from the regression for some of the size classes to avoid the colinearity among the regressors. For example, the power steering dummy was omitted as explanatory variables from the regression of the medium and standard size models because this feature was standard for all models in these two classes. Also, the region, trend, and exchange variables were omitted from the medium and standard size models since all the standard size models were domestic and there were only seven medium size foreign models in the whole sample. The regression's estimates presented in Tables 3.1, 3.2 are corrected for heteroskedasticity and autocorrelation. The procedure proposed by White (1978) was used to correct for heteroskedasticity, and the procedure proposed by Beach and Mackinnon (1978) was used to correct for autocorrelation. Both procedures are outlined in Green(1991).

From Table 3.1 it can be seen that all the coefficients of model attributes have the expected sign, except for the size of domestic models, noting the effect is statistically significant with few exceptions. Also, the coefficients for the year dummies are positive and statistically significant after the imposition of the VERs for domestic models only. Nevertheless, the effect is mixed and not statistically significant for Japanese and European models except for the 1989 Japanese models. These results also hold when estimating the model for each size class separately with little exception, which indicates that the VERs did not lead to price increases for imported automobiles.

Findings presented in Table 3.2 show that the HP/Wt attribute negatively affects the price of compact cars. Also the sign of the vehicle's size is negative for the medium size, which is not expected, and for sports cars, which is expected since the most expensive sport cars are generally the smallest ones. All of this negative effect is statistically insignificant. Also there are some coefficients with the expected positive sign but have a statistically insignificant effect on price. These are the coefficient of the cost of driving subcompact cars (which is not surprising), the coefficient of the auto transmission dummy for subcompact, compact, and standard cars, and the coefficient of the size variable for the standard size.

The coefficients for the region dummies indicate that European cars are sold at a premium for all size classes except the sports cars. Japanese models are sold at a premium for the subcompact and compact models only.

The coefficients of the trend variable suggest that prices of Japanese and European models had trended downward compared to American models during the span of the study. This downward trend was statistically significant except for the sport models and the Japanese luxury models.

The results in Table 3.2 also indicate that there is little pass through effect of the exchange rate on prices. Both the current and lagged exchange rates had mixed and statistically insignificant effect on prices except for the lagged exchange rate where it had positive and statistically significant effect on all models when combined together and for luxury cars. Also, the coefficients for the interaction of the region dummies with the exchange rate had mixed and statistically insignificant effects across size class.

The coefficients of the years dummies measure the change in automobiles prices, compared to 1979 since it is the omitted year, due to other factors not included in the regressors; mainly the effect of the VER. The results show that prices of all models, except compact cars, dropped in 1980 but this drop was not statistically significant except for the standard size models. Prices of standard and luxury cars dropped also in 1981 although it was statistically insignificant. Beginning in 1982, after the imposition of the VER, prices of all models started to increase with few exceptions. The increase was statistically insignificant for the sport models where the price decrease continued until 1985.

Table 3.1: Hedonic Regression Results for Automobiles
By Region [Dependent variable is ln (P)]

| Variable | Domestic | Japanese | European |
|---|---|---|---|
| | $\overline{R}^2 = 0.84$<br># of obs=835 | $\overline{R}^2 = 0.85$<br># of obs=297 | $\overline{R}^2 = 0.81$<br># of obs=357 |
| Constant | 12.794* | -0.714 | -2.369 |
| | (0.836) | (1.537) | (1.849) |
| ln (HP/Wt) | 0.261* | 0.586* | 0.818* |
| | (0.044) | (0.065) | (0.085) |
| ln (Space) | -0.304* | 1.262* | 1.567* |
| | (0.091) | (0.163) | (0.199) |
| ln (MPD) | 0.533* | 0.335* | 0.353* |
| | (0.055) | (0.083) | (0.125) |
| Air | 0.476* | 0.257* | 0.255* |
| | (0.018) | (0.030) | (0.051) |
| Auto | 0.126* | -0.006 | 0.336* |
| | (0.019) | (0.038) | (0.046) |
| PS | 0.168* | 0.102* | 0.085 |
| | (0.019) | (0.025) | (0.055) |
| lexrte | | 1.019 | -0.017 |
| | | (0.549) | (0.021) |
| llagexrte | | -1.04 | 0.022 |
| | | (0.558) | (0.023) |
| D80 | -0.092* | -0.069 | -0.046 |
| | (0.035) | (0.050) | (0.105) |
| D81 | -0.027 | | -0.054 |
| | (0.035) | | (0.096) |
| D82 | 0.035* | 0.087 | 0.002 |
| | (0.034) | (0.069) | (0.106) |
| D83 | 0.133* | -0.09 | -0.025 |
| | (0.034) | (0.078) | (0.109) |
| D84 | 0.130* | -0.075 | -0.075 |
| | (0.036) | (0.062) | (0.116) |
| D85 | 0.093* | -0.063 | -0.113 |
| | (0.035) | (0.062) | (0.112) |
| D86 | 0.317* | -0.346 | -0.032 |
| | (0.044) | (0.230) | (0.127) |
| D87 | 0.301* | -0.021 | -0.003 |
| | (0.044) | (0.118) | (0.125) |
| D88 | 0.334* | -0.018 | 0.019 |
| | (0.046) | (0.107) | (0.125) |
| D89 | 0.303* | 0.165* | 0.022 |
| | (0.046) | (0.068) | (0.124) |
| D90 | 0.279* | 0.088 | -0.058 |
| | (0.047) | (0.067) | (0.135) |

Standard error between parentheses.
* Significant at 0.05 level.

Table 3.2: Hedonic Regression Results for Automobiles by Size Class
[Dependent Variable is Ln (Price)]

| Variable | All<br>$\overline{R}^2 = 0.84$<br># of obs.=1496 | Sub-Compact<br>$\overline{R}^2 = 0.66$<br># of obs.=279 | Compact<br>$\overline{R}^2 = 0.81$<br># of obs.=317 | Medium<br>$\overline{R}^2 = 0.78$<br># of obs.=267 | Standard<br>$\overline{R}^2 = 0.84$<br># of obs.=84 | Luxury<br>$\overline{R}^2 = 0.70$<br># of obs.=295 | Sports<br>$\overline{R}^2 = 0.89$<br># of obs.=254 |
|---|---|---|---|---|---|---|---|
| Constant | 6.252* | -2.125 | -0.806 | 12.102* | 7.943* | 3.377 | 12.891* |
| | (0.762) | (1.578) | (1.395) | (1.516) | (1.871) | (1.747) | (2.485) |
| ln(HP/Wt) | 0.657* | 0.402* | -0.074 | 0.199* | 0.152 | 0.280* | 0.715* |
| | (0.037) | (0.080) | (0.061) | (0.046) | (0.078) | (0.089) | (0.088) |
| ln(Space) | 0.520* | 1.315* | 0.994* | -0.268 | 0.188 | 0.728* | -0.141 |
| | (0.083) | (0.161) | (0.146) | (0.158) | (0.202) | (0.187) | (0.270) |
| ln(MPD) | 0.368* | 0.071 | 0.216* | 0.206* | 0.537* | 0.456* | 0.545* |
| | (0.049) | (0.083) | (0.067) | (0.077) | (0.175) | (0.125) | (0.131) |
| Air | 0.349* | 0.194* | 0.257* | 0.213* | 0.206* | 0.173* | 0.272* |
| | (0.018) | (0.073) | (0.025) | (0.023) | (0.024) | (0.071) | (0.041) |
| Auto | 0.128* | 0.035 | 0.006 | 0.094* | 0.022 | 0.196* | 0.411* |
| | (0.018) | (0.121) | (0.033) | (0.016) | (0.096) | (0.035) | (0.058) |
| PS | 0.122* | 0.192* | 0.140* | 0.177* | | | 0.060 |
| | (0.018) | (0.049) | (0.020) | (0.017) | | | (0.039) |
| jap | 0.903 | 2.106* | 2.226* | | | 1.596 | 1.280 |
| | (0.525) | (0.540) | (0.629) | | | (4.316) | (0.908) |
| euro | 2.632* | 2.549* | 4.004* | | | 2.772* | 1.709 |
| | (0.470) | (0.691) | (0.556) | | | (0.803) | (0.928) |
| jtrend | -0.009 | -0.024* | -0.025* | | | -0.007 | -0.017 |
| | (0.006) | (0.006) | (0.007) | | | (0.032) | (0.010) |
| etrend | -0.025* | -0.027* | -0.043* | | | -0.022* | -0.014 |
| | (0.006) | (0.008) | (0.007) | | | (0.010) | (0.011) |
| lexrte | -0.030 | 0.00002 | - 0.006 | | | -0.117 | -0.028 |
| | (0.021) | (0.027) | (0.041) | | | (0.402) | (0.041) |
| llagexrte | 0.050* | 0.015 | -0.011 | | | 0.292* | -0.036 |
| | (0.016) | (0.022) | (0.030) | | | (0.049) | (0.045) |
| jap*lexrte | - 0.017 | 0.0001 | | | | | 0.010 |
| | (0.033) | (0.027) | | | | | (0.076) |
| eur*lexrte | 0.006 | -0.013 | 0.056 | | | 0.065 | 0.081 |
| | (0.013) | (0.018) | (0.034) | | | (0.400) | (0.062) |
| D80 | -0.054 | -0.050 | 0..005 | -0.018 | -0.118* | -0.058 | -0.093 |
| | (0.045) | (0.041) | (0.051) | (0.034) | (0.047) | (0.094) | (0.094) |
| D81 | 0.028 | 0.029 | 0.091 | 0.027 | -0.080 | -0.033 | -0.009 |
| | (0.044) | (0.039) | (0.053) | (0.033) | (0.042) | (0.088) | (0.087) |
| D82 | 0.108* | 0.067 | 0.193* | 0.073* | 0.002 | 0.130 | -0.047 |
| | (0.047) | (0.042) | (0.055) | (0.030) | (0.042) | (0.090) | (0.091) |
| D83 | 0.140* | 0.042 | 0.197* | 0.082* | 0.147* | 0.136 | 0.031 |
| | (0.046) | (0.047) | (0.057) | (0.031) | (0.048) | (0.092) | (0.094) |
| D84 | 0.105* | 0.054 | 0.214* | 0.075* | 0.149* | 0.113 | -0.013 |
| | (0.047) | (0.052) | (0.061) | (0.034) | (0.050) | (0.099) | (0.093) |
| D85 | 0.098* | 0.101 | 0.163* | 0.052 | 0.145* | 0.114 | -0.018 |
| | (0.046) | (0.053) | (0.058) | (0.034) | (0.047) | (0.099) | (0.093) |
| D86 | 0.234* | 0.139 | 0.271* | 0.160* | 0.361* | 0.356* | 0.160 |
| | (0.053) | (0.071) | (0.070) | (0.044) | (0.091) | (0.118) | (0.117) |
| D87 | 0.266* | 0.153* | 0.311* | 0.194* | 0.311* | 0.378* | 0.261* |
| | (0.053) | (0.072) | (0.069) | (0.044) | (0.090) | ((0.121) | (0.116) |
| D88 | 0.281* | 0.174* | 0.343* | 0.216* | 0.367* | 0.364* | 0.322* |
| | (0.055) | (0.075) | (0.073) | (0.048) | (0.103) | (0.126) | (0.118) |
| D89 | 0.284* | 0.154 | 0.326* | 0.172* | 0.367* | 0.378* | 0.381* |
| | (0.056) | (0.080) | (0.075) | (0.046) | (0.010) | (0.128) | (0.120) |
| D90 | 0.229* | 0.063 | 0.297* | 0.176* | 0.397* | 0.358* | 0.334* |
| | (0.059) | (0.082) | (0.080) | (0.047) | (0.096) | (0.133) | (0.129) |

Standard error between parentheses.
* Significant at 0.05 level.

Rodriguez (1979) developed a model to estimate demand for import services and Feenstra (1984, 1985, and 1988) and Dinopoulus and Kreinen (1988) used this model to estimate automobiles' quality improvements. In this type of analysis, demand for services (S) is estimated as the sum of the predicted price from the hedonic regression (excluding the year's dummies) times quantity:

$$S = \sum\left(\hat{P} \times Q\right)$$

and the quality of automobiles is then derived by dividing total services by total quantity:

$$Quality = \frac{\sum(\hat{P} \times Q)}{\sum Q} = \frac{S}{\sum Q}$$

In other words, the measure of quality is the weighted average of the predicted prices, using sales as the weights.

The hedonic regression results presented in Tables 3.1 and 3.2 are used to estimate automobile quality improvements for each region and then for each size class in each region. These results are presented in Tables 3.3-3.6. The results show that there is no clear trend in quality improvement over time. These findings are not in line with those of Feenstra (1984, 1985, and 1988) probably due to the fact that he did not take account of the effects of many of the explanatory variables used in this study.

Table 3.3: Estimated Quality Improvement for Automobiles by Region

| Year | Domestic | | Japanese | | European | |
|---|---|---|---|---|---|---|
| | Quality $ | % | Quality $ | % | Quality $ | % |
| 1979 | 7325 | - | 6112 | - | 11702 | - |
| 1980 | 8155 | 11 | 6387 | 4 | 12815 | 10 |
| 1981 | 8243 | 1 | 6873 | 8 | 15225 | 19 |
| 1982 | 7824 | -5 | 6888 | 0.22 | 16186 | 6 |
| 1983 | 7410 | -5 | 6624 | -4 | 15900 | -2 |
| 1984 | 7428 | 0.24 | 7089 | 7 | 16282 | 2 |
| 1985 | 7649 | 3 | 7145 | 1 | 18564 | 14 |
| 1986 | 6524 | -15 | 7231 | 1 | 15559 | -16 |
| 1987 | 7107 | 9 | 7263 | 0.44 | 15123 | -3 |
| 1988 | 6924 | -3 | 7567 | 4 | 15346 | 1 |
| 1989 | 7441 | 7 | 7696 | 2 | 18877 | 23 |
| 1990 | 7512 | 1 | 8232 | 7 | 17673 | -6 |
| Average | 7474 | 0.49 | 7181 | 2.80 | 16141 | 4.40 |

Table 3.4: Estimated Quality Improvement for Domestic Automobiles by Size Class

| Year | Subcompact | | Compact | | Medium | | Standard | | Luxury | | Sports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quality $ | % | Quality $ | % | Quality $ | % | Quality $ | % | Quality $ | % | Quality $ | % |
| 1979 | 6081 | - | 7224 | - | 6900 | - | 8848 | - | 18288 | - | 8217 | - |
| 1980 | 6147 | 1 | 6634 | -8 | 7212 | 5 | 10248 | 16 | 18945 | 4 | 9006 | 10 |
| 1981 | 5502 | -10 | 5691 | -14 | 7620 | 6 | 9946 | -3 | 18669 | -1 | 8434 | -6 |
| 1982 | 5488 | -0.25 | 5396 | -5 | 7595 | -0.33 | 9674 | -3 | 16488 | -12 | 7776 | -8 |
| 1983 | 5549 | 1 | 5928 | 10 | 7620 | 0.33 | 9143 | -5 | 16409 | -0.48 | 7076 | -9 |
| 1984 | 5744 | 4 | 5285 | -11 | 8002 | 5 | 8297 | -9 | 15865 | -3 | 7510 | 6 |
| 1985 | 5322 | -7 | 5680 | 7 | 7894 | -1 | 8544 | 3 | 15037 | -5 | 7239 | -4 |
| 1986 | 5017 | -6 | 5313 | -6 | 7477 | -5 | 7748 | -9 | 13192 | -12 | 6390 | -12 |
| 1987 | 5150 | 3 | 5617 | 6 | 7719 | 3 | 8472 | 9 | 13345 | 1 | 9073 | 42 |
| 1988 | 5457 | 6 | 5593 | -0.43 | 7742 | 0.29 | 8067 | -5 | 13248 | -1 | 6778 | -25 |
| 1989 | 5173 | -5 | 5420 | -3 | 8061 | 4 | 8652 | 7 | 13769 | 4 | 6805 | 0.39 |
| 1990 | 5426 | 5 | 5317 | -2 | 8283 | 3 | 8696 | 1 | 13950 | 1 | 6663 | -2 |
| Average | 5504 | -1 | 5758 | -2 | 7677 | 2 | 8861 | 0.18 | 15601 | -2 | 7581 | -1 |

Table 3.5: Estimated Quality Improvement for Japanese Automobiles by Size Class

| Year | Subcompact | | Compact | | Luxury | | Sports | |
|---|---|---|---|---|---|---|---|---|
| | Quality $ | % | Quality $ | % | Quality $ | % | Quality $ | % |
| 1979 | 5318 | - | 7170 | - | - | - | 7709 | - |
| 1980 | 5462 | 3 | 7597 | 6 | - | - | 7586 | -2 |
| 1981 | 5736 | 5 | 7220 | -5 | - | - | 8561 | 13 |
| 1982 | 5702 | -1 | 6978 | -3 | - | - | 8528 | -0.39 |
| 1983 | 5489 | -4 | 6265 | -10 | - | - | 8314 | -3 |
| 1984 | 5588 | 2 | 5773 | -8 | 13186 | - | 8394 | 1 |
| 1985 | 5865 | 5 | 5564 | -4 | 11003 | -17 | 7976 | -5 |
| 1986 | 6566 | 12 | 5295 | -5 | 9912 | -10 | 7545 | -5 |
| 1987 | 5706 | -13 | 5438 | 3 | 9866 | -0.46 | 7153 | -5 |
| 1988 | 6265 | 10 | 5668 | 4 | 10764 | 9 | 7229 | 1 |
| 1989 | 5908 | -6 | 5635 | -1 | 11077 | 3 | 7884 | 9 |
| 1990 | 6132 | 4 | 5972 | 6 | 11752 | 6 | 6882 | -13 |
| Average | 5811 | 2 | 6128 | -2 | 6464 | -2 | 7813 | -1 |

Table 3.6: Estimated Quality Improvement for European Automobiles by Size Class

| Year | Subcompact | | Compact | | Luxury | | Sports | |
|---|---|---|---|---|---|---|---|---|
| | Quality $ | % | Quality $ | % | Quality $ | % | Quality $ | % |
| 1979 | 5457 | - | 6580 | - | 10729 | - | 8275 | - |
| 1980 | 6380 | 17 | 6458 | -2 | 10716 | -0.12 | 9143 | 10 |
| 1981 | 5827 | -9 | 7592 | 18 | 13052 | 22 | 9342 | 2 |
| 1982 | 5776 | -1 | 7191 | -5 | 12092 | -7 | 9072 | -3 |
| 1983 | 5623 | -3 | 6986 | -3 | 11537 | -5 | 8600 | -5 |
| 1984 | 6345 | 13 | 7046 | 1 | 10385 | -10 | 9561 | 11 |
| 1985 | 8225 | 30 | 6547 | -7 | 11324 | 9 | 10907 | 14 |
| 1986 | 5176 | -37 | 6183 | -6 | 10011 | -12 | 9824 | -10 |
| 1987 | 5034 | -3 | 6484 | 5 | 10269 | 3 | 9706 | -1 |
| 1988 | 5180 | 3 | 6060 | -7 | 10311 | 0.41 | 11986 | 23 |
| 1989 | 5520 | 7 | 5837 | -4 | 11104 | 8 | 16599 | 38 |
| 1990 | 5848 | 6 | 5986 | 3 | 10641 | -4 | 14094 | -15 |
| Average | 5866 | 2 | 6579 | -1 | 11014 | 0.34 | 10592 | 6 |

## 4. SUMMARY AND CONCLUSIONS

Many researchers have examined the effect of VERs on the importing country's prices and welfare and quality improvement in the restricted good. With regard to quality upgrading of the restricted good, there have been some theoretical research that suggested that may VERs lead to upgrading of those qualities. Also, there has been some empirical research that examined the effect of VERs on the Japanese automobiles exports to the U.S. in the early 1980s. The findings of this research suggest that the restraints led to quality upgrading in those automobiles. In this paper, I have sought to examine this quality-upgrading question in the context of the VERs automobile agreement between the U.S. and Japan in the early 1980s using more extensive data set and including more explanatory variables in the analysis. Using hedonic regression models and incorporating the effect of exchange rate changes and regional variations, and using data for U.S., Japanese, and European new models sold in the U.S. during the 1979-1990 period, the findings of this study show no evidence of such quality upgrading when conducting the analysis for automobile models by make (U.S., Japanese, and European) or by size class (subcompact, compact, medium, standard, luxury, and sports).

This means that the only beneficiaries of these export restraints are domestic and foreign producers of the restricted good. No gains to the consumers in terms of better quality goods.

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# APPENDIX

Table A1: Ratio of Auto Import to U.S. Auto Sales (measured in Units)

| Year | Total Import to Sales Ratio | Ratio to Sales of Import from Japan | Canada | Europe |
|---|---|---|---|---|
| 1979 | 28.2% | 15.1% | 6.4% | 6.7% |
| 1980 | 35.0 | 22.4 | 6.7 | 5.9 |
| 1981 | 33.3 | 22.3 | 6.6 | 4.4 |
| 1982 | 38.5 | 23.7 | 9.3 | 5.5 |
| 1983 | 33.6 | 20.1 | 9.0 | 4.5 |
| 1984 | 33.7 | 18.3 | 10.2 | 5.0 |

Source: U.S. International Trade Commission (1985).

Table A2: Profit (or loss) in millions of dollars of the U.S. Automobile Industry

| | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|
| Net sales | 88,413 | 72,100 | 80,734 | 79,495 | 108,003 | 131,000 |
| Cost of goods sold | 88,813 | 76,767 | 83,030 | 80,048 | 102,673 | 119,600 |
| Net profit (or loss) | (400) | (4,667) | (2,296) | (553) | (5,330) | (10,400) |

Source: U.S. International Trade Commission (1985).

Table A3: Summary Statistics for Automobiles Characteristic by Size Class

| Class | No. of Models | Price (1000s) $ | Quantity (1000s) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| Subcompact: | 279 | 6.252 | 72.917 | 0.035 | 10520 | 0.400 | 0.005 | 0.019 | 0.054 |
| Dom | 99 | 5.845 | 74.582 | 0.034 | 10591 | 0.423 | 0.000 | 0.000 | 0.038 |
| For | 180 | 6.483 | 72.007 | 0.036 | 10481 | 0.385 | 0.008 | 0.030 | 0.064 |
| Compact: | 317 | 7.733 | 87.400 | 0.038 | 11908 | 0.410 | 0.070 | 0.085 | 0.445 |
| Dom | 171 | 7.103 | 113.750 | 0.037 | 11944 | 0.421 | 0.029 | 0.104 | 0.361 |
| For | 146 | 9.217 | 56.538 | 0.041 | 11825 | 0.382 | 0.167 | 0.042 | 0.642 |
| Medium: | 267 | 8.619 | 106.300 | 0.036 | 13556 | 0.524 | 0.066 | 0.597 | 0.735 |
| Dom | 260 | 8.596 | 107.480 | 0.036 | 13571 | 0.526 | 0.062 | 0.604 | 0.732 |
| For | 7 | 10.538 | 55.246 | 0.045 | 12322 | 0.361 | 0.357 | 0.000 | 1.000 |
| Large: | 84 | 10.466 | 114.680 | 0.038 | 16007 | 0.612 | 0.381 | 0.972 | 0.972 |
| Dom | 84 | 10.466 | 114.680 | 0.038 | 16007 | 0.612 | 0.381 | 0.972 | 0.972 |
| For | - | - | - | - | - | - | - | - | - |
| Luxury: | 295 | 19.428 | 32.824 | 0.041 | 14630 | 0.591 | 0.984 | 0.833 | 1.000 |
| Dom | 123 | 17.822 | 58.114 | 0.039 | 15234 | 0.628 | 0.993 | 0.996 | 1.000 |
| For | 172 | 23.955 | 14.739 | 0.045 | 12929 | 0.486 | 0.958 | 0.372 | 1.000 |
| Sport: | 254 | 9.412 | 42.574 | 0.041 | 12329 | 0.510 | 0.097 | 0.020 | 0.646 |
| Dom | 98 | 8.297 | 69.748 | 0.039 | 12854 | 0.534 | 0.027 | 0.027 | 0.689 |
| For | 156 | 11.328 | 25.502 | 0.045 | 11427 | 0.463 | 0.195 | 0.009 | 0.571 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A4: Some Descriptive Statistics for Automobiles sales in the U.S. 1979-90

| Year | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| !979: | 102 | 7.588 | 82.742 | 0.035 | 13425 | 0.636 | 0.047 | 0.186 | 0.257 |
| Dom | 61 | 7.494 | 111.140 | 0.035 | 14137 | 0.665 | 0.056 | 0.226 | 0.306 |
| For | 41 | 8.024 | 40.499 | 0.034 | 10522 | 0.517 | 0.011 | 0.023 | 0.058 |
| 1980: | 103 | 7.718 | 71.567 | 0.035 | 12956 | 0.738 | 0.078 | 0.216 | 0.243 |
| Dom | 62 | 7.577 | 91.924 | 0.035 | 13638 | 0.762 | 0.089 | 0.275 | 0.296 |
| For | 41 | 7.584 | 40.784 | 0.034 | 10633 | 0.558 | 0.040 | 0.015 | 0.062 |
| 1981: | 116 | 8.349 | 62.030 | 0.035 | 12863 | 0.677 | 0.094 | 0.256 | 0.386 |
| Dom | 60 | 8.263 | 88.862 | 0.034 | 13528 | 0.724 | 0.101 | 0.329 | 0.482 |
| For | 56 | 8.593 | 33.282 | 0.036 | 10960 | 0.544 | 0.075 | 0.049 | 0.109 |
| 1982: | 110 | 8.831 | 61.893 | 0.035 | 12771 | 0.577 | 0.134 | 0.330 | 0.415 |
| Dom | 66 | 8.722 | 73.663 | 0.034 | 13418 | 0.614 | 0.135 | 0.441 | 0.441 |
| For | 44 | 9.105 | 44.238 | 0.037 | 11155 | 0.486 | 0.132 | 0.052 | 0.149 |
| 1983: | 115 | 8.821 | 67.878 | 0.035 | 12764 | 0.508 | 0.126 | 0.394 | 0.483 |
| Dom | 71 | 8.735 | 80.725 | 0.034 | 13347 | 0.539 | 0.122 | 0.511 | 0.580 |
| For | 44 | 9.059 | 47.147 | 0.038 | 11152 | 0.422 | 0.138 | 0.070 | 0.216 |
| 1984: | 113 | 8.870 | 85.933 | 0.036 | 12933 | 0.495 | 0.129 | 0.415 | 0.622 |
| Dom | 67 | 8.816 | 113.500 | 0.035 | 13399 | 0.519 | 0.115 | 0.523 | 0.668 |
| For | 46 | 9.067 | 45.784 | 0.039 | 11249 | 0.406 | 0.181 | 0.023 | 0.455 |
| 1985: | 136 | 8.939 | 78.143 | 0.037 | 12645 | 0.515 | 0.140 | 0.391 | 0.600 |
| Dom | 77 | 8.648 | 105.010 | 0.037 | 13085 | 0.538 | 0.108 | 0.481 | 0.678 |
| For | 59 | 9.863 | 43.075 | 0.039 | 11248 | 0.439 | 0.243 | 0.105 | 0.350 |
| 1986: | 130 | 9.382 | 83.756 | 0.038 | 12486 | 0.367 | 0.176 | 0.388 | 0.653 |
| Dom | 74 | 9.223 | 107.880 | 0.037 | 12944 | 0.380 | 0.155 | 0.494 | 0.693 |
| For | 56 | 9.819 | 51.882 | 0.041 | 11229 | 0.333 | 0.234 | 0.099 | 0.545 |
| 1987: | 143 | 9.965 | 67.667 | 0.039 | 12462 | 0.372 | 0.229 | 0.370 | 0.688 |
| Dom | 77 | 9.821 | 88.242 | 0.039 | 12944 | 0.389 | 0.239 | 0.515 | 0.757 |
| For | 66 | 10.306 | 43.664 | 0.040 | 11326 | 0.333 | 0.205 | 0.028 | 0.524 |
| 1988: | 150 | 10.069 | 67.078 | 0.040 | 12510 | 0.355 | 0.237 | 0.418 | 0.706 |
| Dom | 80 | 9.968 | 90.187 | 0.039 | 12927 | 0.363 | 0.248 | 0.556 | 0.761 |
| For | 70 | 10.328 | 40.667 | 0.041 | 11453 | 0.335 | 0.208 | 0.068 | 0.567 |
| 1989: | 147 | 10.321 | 62.914 | 0.041 | 12588 | 0.371 | 0.289 | 0.380 | 0.740 |
| Dom | 73 | 10.147 | 87.426 | 0.039 | 13044 | 0.389 | 0.320 | 0.507 | 0.809 |
| For | 74 | 10.707 | 38.732 | 0.043 | 11573 | 0.331 | 0.218 | 0.097 | 0.588 |
| 1990: | 131 | 10.324 | 66.377 | 0.042 | 12704 | 0.365 | 0.308 | 0.372 | 0.779 |
| Dom | 67 | 10.276 | 88.472 | 0.041 | 13121 | 0.377 | 0.358 | 0.520 | 0.825 |
| For | 64 | 10.426 | 43.247 | 0.044 | 11811 | 0.339 | 0.200 | 0.056 | 0.679 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A5: Some Descriptive Statistics for Subcompact Car sales in the U.S. 1979-90

| Year | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| 1979 | 35 | 6.284 | 76.962 | 0.034 | 10626 | 0.482 | 0.000 | 0.000 | 0.000 |
| Dom | 16 | 5.791 | 88.612 | 0.035 | 11018 | 0.488 | 0.000 | 0.000 | 0.000 |
| For | 19 | 6.832 | 67.152 | 0.033 | 10191 | 0.475 | 0.000 | 0.000 | 0.000 |
| 1980: | 34 | 6.210 | 74.479 | 0.034 | 10664 | 0.576 | 0.010 | 0.000 | 0.010 |
| Dom | 16 | 5.746 | 76.390 | 0.035 | 10994 | 0.620 | 0.000 | 0.000 | 0.000 |
| For | 18 | 6.642 | 72.780 | 0.033 | 10356 | 0.535 | 0.020 | 0.000 | 0.020 |
| 1981: | 29 | 6.342 | 66.307 | 0.035 | 10481 | 0.504 | 0.004 | 0.000 | 0.000 |
| Dom | 7 | 6.039 | 78.088 | 0.034 | 10259 | 0.512 | 0.000 | 0.000 | 0.000 |
| For | 22 | 6.463 | 62.559 | 0.035 | 10569 | 0.501 | 0.005 | 0.000 | 0.000 |
| 1982: | 24 | 6.299 | 68.524 | 0.034 | 10542 | 0.447 | 0.000 | 0.000 | 0.000 |
| Dom | 6 | 5.813 | 60.598 | 0.033 | 10398 | 0.465 | 0.000 | 0.000 | 0.000 |
| For | 18 | 6.437 | 71.166 | 0.035 | 10583 | 0.441 | 0.000 | 0.000 | 0.000 |
| 1983: | 24 | 5.823 | 80.691 | 0.034 | 10477 | 0.369 | 0.000 | 0.000 | 0.016 |
| Dom | 10 | 5.684 | 77.367 | 0.033 | 10614 | 0.393 | 0.000 | 0.000 | 0.000 |
| For | 14 | 5.916 | 83.064 | 0.035 | 10386 | 0.354 | 0.000 | 0.000 | 0.027 |
| 1984: | 19 | 5.780 | 94.744 | 0.035 | 10549 | 0.375 | 0.006 | 0.000 | 0.062 |
| Dom | 8 | 5.513 | 116.460 | 0.034 | 10556 | 0.401 | 0.000 | 0.000 | 0.108 |
| For | 11 | 6.066 | 78.953 | 0.035 | 10542 | 0.349 | 0.012 | 0.000 | 0.012 |
| 1985: | 19 | 6.579 | 76.431 | 0.035 | 10587 | 0.379 | 0.012 | 0.123 | 0.028 |
| Dom | 7 | 5.700 | 58.373 | 0.032 | 10262 | 0.385 | 0.000 | 0.000 | 0.058 |
| For | 12 | 6.924 | 86.964 | 0.036 | 10714 | 0.376 | 0.017 | 0.172 | 0.017 |
| 1986: | 19 | 6.688 | 80.909 | 0.035 | 10408 | 0.276 | 0.008 | 0.138 | 0.275 |
| Dom | 7 | 5.959 | 61.624 | 0.031 | 10164 | 0.237 | 0.000 | 0.000 | 0.081 |
| For | 12 | 6.972 | 92.160 | 0.037 | 10504 | 0.292 | 0.011 | 0.192 | 0.351 |
| 1987: | 21 | 6.472 | 53.993 | 0.035 | 10168 | 0.270 | 0.010 | 0.000 | 0.089 |
| Dom | 7 | 6.500 | 41.835 | 0.032 | 10186 | 0.249 | 0.000 | 0.000 | 0.100 |
| For | 14 | 6.462 | 60.073 | 0.036 | 10162 | 0.277 | 0.014 | 0.000 | 0.085 |
| 1988: | 20 | 6.440 | 71.707 | 0.037 | 10467 | 0.285 | 0.006 | 0.000 | 0.109 |
| Dom | 6 | 6.249 | 72.744 | 0.035 | 10300 | 0.245 | 0.000 | 0.000 | 0.209 |
| For | 14 | 6.523 | 71.263 | 0.039 | 10540 | 0.303 | 0.080 | 0.000 | 0.066 |
| 1989: | 17 | 6.223 | 68.018 | 0.038 | 10380 | 0.264 | 0.005 | 0.000 | 0.072 |
| Dom | 4 | 6.033 | 67.525 | 0.037 | 10011 | 0.233 | 0.000 | 0.000 | 0.000 |
| For | 13 | 6.339 | 65.771 | 0.038 | 10575 | 0.277 | 0.006 | 0.000 | 0.128 |
| 1990: | 18 | 6.053 | 63.239 | 0.039 | 10576 | 0.274 | 0.004 | 0.000 | 0.088 |
| Dom | 5 | 6.281 | 57.731 | 0.039 | 10195 | 0.262 | 0.000 | 0.000 | 0.000 |
| For | 13 | 5.975 | 65.358 | 0.040 | 10705 | 0.279 | 0.005 | 0.000 | 0.118 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A6: Some Descriptive Statistics for compact Car sales in the U.S. 1979-90

| Year | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| !979: | 19 | 6.838 | 94.460 | 0.036 | 14176 | 0.692 | 0.012 | 0.012 | 0.066 |
| Dom | 8 | 6.018 | 105.630 | 0.035 | 14449 | 0.694 | 0.000 | 0.000 | 0.000 |
| For | 11 | 12.324 | 11.489 | 0.040 | 12355 | 0.677 | 0.094 | 0.094 | 0.505 |
| 1980: | 17 | 7.497 | 34.268 | 0.035 | 13139 | 0.687 | 0.030 | 0.020 | 0.065 |
| Dom | 7 | 6.875 | 68.971 | 0.034 | 13265 | 0.701 | 0.000 | 0.000 | 0.000 |
| For | 10 | 10.506 | 9.977 | 0.035 | 12533 | 0.618 | 0.176 | 0.117 | 0.380 |
| 1981: | 18 | 7.317 | 60.694 | 0.035 | 11781 | 0.616 | 0.056 | 0.027 | 0.154 |
| Dom | 8 | 6.541 | 115.330 | 0.034 | 11674 | 0.601 | 0.000 | 0.000 | 0.047 |
| For | 10 | 11.529 | 16.985 | 0.040 | 12364 | 0.696 | 0.362 | 0.174 | 0.737 |
| 1982: | 21 | 7.590 | 63.251 | 0.035 | 11635 | 0.504 | 0.096 | 0.028 | 0.192 |
| Dom | 12 | 6.736 | 87.870 | 0.035 | 11469 | 0.491 | 0.000 | 0.000 | 0.102 |
| For | 9 | 10.879 | 30.427 | 0.038 | 12273 | 0.555 | 0.468 | 0.137 | 0.538 |
| 1983: | 25 | 8.055 | 61.286 | 0.036 | 12115 | 0.480 | 0.111 | 0.171 | 0.438 |
| Dom | 14 | 7.253 | 77.763 | 0.035 | 12157 | 0.479 | 0.018 | 0.205 | 0.391 |
| For | 11 | 10.024 | 40.316 | 0.039 | 12015 | 0.482 | 0.340 | 0.090 | 0.552 |
| 1984: | 22 | 7.426 | 95.820 | 0.037 | 11672 | 0.418 | 0.051 | 0.000 | 0.287 |
| Dom | 11 | 6.666 | 132.260 | 0.037 | 11631 | 0.421 | 0.012 | 0.000 | 0.080 |
| For | 11 | 9.120 | 59.378 | 0.039 | 11764 | 0.409 | 0.137 | 0.000 | 0.747 |
| 1985: | 33 | 7.168 | 97.956 | 0.039 | 11634 | 0.499 | 0.066 | 0.089 | 0.324 |
| Dom | 20 | 6.802 | 124.060 | 0.039 | 11707 | 0.511 | 0.010 | 0.111 | 0.314 |
| For | 13 | 8.376 | 57.788 | 0.039 | 11394 | 0.458 | 0.251 | 0.017 | 0.357 |
| 1986: | 36 | 7.699 | 102.100 | 0.037 | 11782 | 0.335 | 0.0063 | 0.126 | 0.387 |
| Dom | 20 | 7.381 | 133.820 | 0.037 | 11885 | 0.336 | 0.009 | 0.167 | 0.365 |
| For | 16 | 8.553 | 62.439 | 0.040 | 11503 | 0.333 | 0.210 | 0.014 | 0.444 |
| 1987: | 38 | 8.115 | 98.750 | 0.038 | 11795 | 0.343 | 0.114 | 0.065 | 0.548 |
| Dom | 21 | 7.572 | 114.870 | 0.038 | 11863 | 0.348 | 0.106 | 0.101 | 0.535 |
| For | 17 | 9.091 | 78.834 | 0.039 | 11671 | 0.335 | 0.127 | 0.000 | 0.572 |
| 1988: | 36 | 8.203 | 107.270 | 0.039 | 11881 | 0.332 | 0.097 | 0.180 | 0.630 |
| Dom | 21 | 7.752 | 128.630 | 0.039 | 11916 | 0.335 | 0.083 | 0.230 | 0.578 |
| For | 15 | 9.253 | 77.355 | 0.040 | 11799 | 0.328 | 0.130 | 0.064 | 0.752 |
| 1989: | 29 | 7.934 | 102.780 | 0.041 | 11759 | 0.350 | 0.056 | 0.059 | 0.589 |
| Dom | 16 | 7.052 | 108.950 | 0.039 | 11677 | 0.368 | 0.000 | 0.037 | 0.503 |
| For | 13 | 9.176 | 95.192 | 0.044 | 11875 | 0.324 | 0.134 | 0.090 | 0.709 |
| 1990: | 23 | 7.697 | 112.520 | 0.041 | 11944 | 0.331 | 0.014 | 0.058 | 0.696 |
| Dom | 13 | 6.860 | 122.170 | 0.040 | 11755 | 0.323 | 0.000 | 0.095 | 0.529 |
| For | 10 | 9.028 | 99.975 | 0.044 | 12244 | 0.344 | 0.037 | 0.000 | 0.960 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A7: Some Descriptive Statistics for Medium Size Car sales in the U.S. 1979-90

| Year | | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|---|
| !979: | Dom | 17 | 7.030 | 140.100 | 0.034 | 14891 | 0.694 | 0.000 | 0.191 | 0.251 |
| | For | - | | | | | | | | |
| 1980: | Dom | 18 | 7.117 | 136.510 | 0.035 | 14027 | 0.781 | 0.000 | 0.226 | 0.226 |
| | For | - | | | | | | | | |
| 1981: | Dom | 21 | 7.747 | 114.730 | 0.035 | 13741 | 0.751 | 0.000 | 0.281 | 0.530 |
| | For | - | | | | | | | | |
| 1982: | Dom | 26 | 8.230 | 74.393 | 0.034 | 13455 | 0.609 | 0.032 | 0.533 | 0.573 |
| | For | - | | | | | | | | |
| 1983: | Dom | 26 | 8.318 | 84.715 | 0.035 | 13336 | 0.529 | 0.000 | 0.705 | 0.670 |
| | For | - | | | | | | | | |
| 1984: | Dom | 23 | 8.633 | 115.360 | 0.035 | 13628 | 0.511 | 0.000 | 0.779 | 0.960 |
| | For | - | | | | | | | | |
| 1985: | Dom | 22 | 8.409 | 119.600 | 0.035 | 13294 | 0.511 | 0.000 | 0.702 | 0.886 |
| | For | - | | | | | | | | |
| 1986: | Dom | 22 | 8.885 | 113.340 | 0.035 | 13153 | 0.382 | 0.000 | 0.694 | 0.905 |
| | For | - | | | | | | | | |
| 1987: | Dom | 22 | 9.624 | 98.945 | 0.037 | 13194 | 0.384 | 0.051 | 0.841 | 0.901 |
| | For | - | | | | | | | | |
| 1988: | | 24 | 10.005 | 91.940 | 0.037 | 13386 | 0.361 | 0.107 | 0.862 | 0.904 |
| | Dom | 23 | 10.040 | 93.052 | 0.037 | 13432 | 0.362 | 0.110 | 0.889 | 0.901 |
| | For | 1 | 10.499 | 66.354 | 0.042 | 11923 | 0.333 | 0.000 | 0.000 | 1.000 |
| 1989: | | 24 | 9.707 | 102.530 | 0.037 | 13198 | 0.380 | 0.253 | 0.699 | 0.974 |
| | Dom | 22 | 9.745 | 107.880 | 0.037 | 13234 | 0.381 | 0.263 | 0.724 | 0.973 |
| | For | 2 | 10.572 | 43.685 | 0.042 | 12311 | 0.359 | 0.000 | 0.000 | 1.000 |
| 1990: | | 22 | 9.871 | 104.720 | 0.039 | 13305 | 0.382 | 0.360 | 0.651 | 1.000 |
| | Dom | 18 | 9.718 | 116.190 | 0.039 | 13381 | 0.383 | 0.340 | 0.717 | 1.000 |
| | For | 4 | 11.381 | 53.106 | 0.046 | 12557 | 0.374 | 0.557 | 0.000 | 1.000 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A8: Some Descriptive Statistics for Standard Size Car sales in the U.S. 1979-90

| Year | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| !979: Dom | 8 | 8.923 | 126.230 | 0.034 | 16385 | 0.737 | 0.091 | 0.737 | 0.737 |
| For | - | | | | | | | | |
| 1980: Dom | 9 | 9.148 | 75.520 | 0.035 | 16549 | 0.859 | 0.200 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1981: Dom | 11 | 9.415 | 64.443 | 0.033 | 16628 | 0.821 | 0.200 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1982: Dom | 6 | 9.703 | 113.220 | 0.033 | 16753 | 0.771 | 0.219 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1983: Dom | 5 | 10.557 | 135.320 | 0.032 | 16868 | 0.678 | 0.295 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1984: Dom | 6 | 9.576 | 176.070 | 0.033 | 16380 | 0.635 | 0.000 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1985: Dom | 6 | 9.802 | 152.630 | 0.035 | 16349 | 0.658 | 0.000 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1986: Dom | 6 | 10.976 | 156.500 | 0.040 | 15338 | 0.460 | 0.419 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1987: Dom | 6 | 11.665 | 122.620 | 0.043 | 15392 | 0.469 | 0.759 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1988: Dom | 6 | 11.772 | 116.870 | 0.044 | 15060 | 0.429 | 0.753 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1989: Dom | 7 | 12.247 | 111.300 | 0.046 | 15169 | 0.447 | 0.949 | 1.000 | 1.000 |
| For | - | | | | | | | | |
| 1990: Dom | 8 | 12.520 | 93.905 | 0.046 | 15216 | 0.447 | 0.976 | 1.000 | 1.000 |
| For | - | | | | | | | | |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A9: Some Descriptive Statistics for Luxury Car sales in the U.S. 1979-90

| Year | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|
| !979 | 12 | 18.872 | 30.826 | 0,039 | 15860 | 0.884 | 0.792 | 0.981 | 1.000 |
| Dom | 7 | 18.001 | 48.198 | 0.040 | 16076 | 0.908 | 0.848 | 1.000 | 1.000 |
| For | 5 | 27.911 | 6.506 | 0.032 | 13614 | 0.634 | 0.211 | 0.789 | 1.000 |
| 1980 | 14 | 19.188 | 26.813 | 0.035 | 15418 | 0.994 | 0.953 | 0.926 | 1.000 |
| Dom | 7 | 18.437 | 47.794 | 0.035 | 15646 | 1.035 | 1.000 | 1.000 | 1.000 |
| For | 7 | 25.346 | 5.831 | 0.033 | 13543 | 0.658 | 0.565 | 0.319 | 1.000 |
| 1981 | 23 | 19.528 | 19.308 | 0.035 | 15519 | 0.921 | 0.986 | 0.964 | 1.000 |
| Dom | 8 | 17.219 | 45.775 | 0.035 | 15916 | 0.972 | 1.000 | 1.000 | 1.000 |
| For | 15 | 30.385 | 5.193 | 0.034 | 13650 | 0.679 | 0.921 | 0.795 | 1.000 |
| 1982 | 19 | 19.920 | 27.933 | 0.341 | 15400 | 0.750 | 0.948 | 0.892 | 1.000 |
| Dom | 10 | 17.445 | 42.300 | 0.033 | 15808 | 0.788 | 1.000 | 0.967 | 1.000 |
| For | 9 | 29.641 | 11.969 | 0.039 | 13799 | 0.600 | 0.743 | 0.595 | 1.000 |
| 1983 | 19 | 19.454 | 32.795 | 0.034 | 15362 | 0.695 | 0.955 | 0.939 | 1.000 |
| Dom | 9 | 17.475 | 53.233 | 0.034 | 15968 | 0.733 | 1.000 | 1.000 | 1.000 |
| For | 10 | 26.039 | 14.400 | 0.035 | 13348 | 0.567 | 0.804 | 0.737 | 1.000 |
| 1984 | 21 | 17.036 | 47.769 | 0.037 | 15153 | 0.656 | 1.000 | 0.870 | 1.000 |
| Dom | 11 | 16.350 | 75.159 | 0.036 | 15688 | 0.686 | 1.000 | 1.000 | 1.000 |
| For | 10 | 20.251 | 17.640 | 0.044 | 12646 | 0.516 | 1.000 | 0.262 | 1.000 |
| 1985 | 30 | 17.742 | 38.379 | 0.038 | 14263 | 0.634 | 1.000 | 0.801 | 1.000 |
| Dom | 11 | 16.083 | 77.426 | 0.037 | 14780 | 0.657 | 1.000 | 1.000 | 1.000 |
| For | 19 | 22.458 | 15.772 | 0.042 | 12793 | 0.568 | 1.000 | 0.237 | 1.000 |
| 1986 | 24 | 18.429 | 47.878 | 0.041 | 14095 | 0.467 | 1.000 | 0.769 | 1.000 |
| Dom | 11 | 17.058 | 74.775 | 0.040 | 14665 | 0.479 | 1.000 | 1.000 | 1.000 |
| For | 13 | 21.880 | 25.118 | 0.045 | 12659 | 0.437 | 1.000 | 0.189 | 1.000 |
| 1987 | 29 | 19.971 | 33.6-6 | 0.042 | 14120 | 0.465 | 1.000 | 0.759 | 1.000 |
| Dom | 11 | 18.112 | 59.850 | 0.040 | 14758 | 0.482 | 1.000 | 1.000 | 1.000 |
| For | 18 | 23.841 | 17.568 | 0.046 | 12792 | 0.429 | 1.000 | 0.258 | 1.000 |
| 1988 | 34 | 20.073 | 31.945 | 0.045 | 14141 | 0.450 | 1.000 | 0.800 | 1.000 |
| Dom | 14 | 18.239 | 54.483 | 0.044 | 14709 | 0.458 | 1.000 | 1.000 | 1.000 |
| For | 20 | 24.400 | 16.168 | 0.047 | 12802 | 0.430 | 1.000 | 0.359 | 1.000 |
| 1989 | 37 | 21.432 | 26.349 | 0.046 | 14332 | 0.464 | 1.000 | 0.801 | 1.000 |
| Dom | 12 | 19.695 | 53.342 | 0.044 | 15105 | 0.473 | 1.000 | 0.993 | 1.000 |
| For | 25 | 24.752 | 13.392 | 0.050 | 12855 | 0.447 | 1.000 | 0.435 | 1.000 |
| 1990 | 33 | 21.706 | 30.326 | 0.046 | 14452 | 0.460 | 1.000 | 0.795 | 1.000 |
| Dom | 12 | 20.770 | 53.795 | 0.046 | 15244 | 0.470 | 1.000 | 1.000 | 1.000 |
| For | 21 | 23.406 | 16.915 | 0.052 | 13011 | 0.441 | 1.000 | 0.422 | 1.000 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.

Table A10: Some Descriptive Statistics for Sports Car sales in the U.S. 1979-90

| Year | | No. of Models | Price (1,000's) $ | Quantity (1,000's) | HP/Wt | Space | MPD | Air | Auto | PS |
|---|---|---|---|---|---|---|---|---|---|---|
| !979 | | 11 | 7.723 | 92.105 | 0.037 | 12865 | 0.697 | 0.000 | 0.000 | 0.387 |
| | Dom | 5 | 7.218 | 157.500 | 0.037 | 13423 | 0.712 | 0.000 | 0.000 | 0.499 |
| | For | 6 | 9.487 | 37.611 | 0.037 | 10918 | 0.643 | 0.000 | 0.000 | 0.000 |
| 1980 | | 11 | 7.918 | 67.667 | 0.039 | 12556 | 0.726 | 0.049 | 0.000 | 0.159 |
| | Dom | 5 | 7.644 | 104.560 | 0.040 | 13265 | 0.758 | 0.070 | 0.000 | 0.226 |
| | For | 6 | 8.565 | 36.922 | 0.036 | 10882 | 0.651 | 0.000 | 0.000 | 0.000 |
| 1981 | | 14 | 9.508 | 44.122 | 0.039 | 12538 | 0.699 | 0.047 | 0.000 | 0.285 |
| | Dom | 5 | 8.141 | 75.594 | 0.036 | 13300 | 0.736 | 0.077 | 0.000 | 0.465 |
| | For | 9 | 11.663 | 26.638 | 0.044 | 11338 | 0.640 | 0.000 | 0.000 | 0.000 |
| 1982 | | 14 | 9.554 | 49.363 | 0.039 | 12408 | 0.613 | 0.102 | 0.033 | 0.364 |
| | Dom | 6 | 8.102 | 67.862 | 0.035 | 12937 | 0.640 | 0.055 | 0.055 | 0.534 |
| | For | 8 | 11.637 | 35.489 | 0.044 | 11650 | 0.574 | 0.168 | 0.000 | 0.120 |
| 1983 | | 16 | 9.166 | 52.179 | 0.040 | 12482 | 0.547 | 0.025 | 0.000 | 0.355 |
| | Dom | 7 | 7.705 | 72.968 | 0.035 | 12950 | 0.565 | 0.000 | 0.000 | 0.527 |
| | For | 9 | 11.468 | 36.010 | 0.047 | 11744 | 0.519 | 0.064 | 0.000 | 0.083 |
| 1984 | | 22 | 9.146 | 49.518 | 0.041 | 12227 | 0.515 | 0.125 | 0.030 | 0.657 |
| | Dom | 8 | 8.315 | 85.172 | 0.038 | 12765 | 0.538 | 0.045 | 0.045 | 0.634 |
| | For | 14 | 10.535 | 29.144 | 0.046 | 11328 | 0.477 | 0.258 | 0.006 | 0.697 |
| 1985 | | 26 | 8.629 | 47.861 | 0.040 | 12083 | 0.506 | 0.089 | 0.002 | 0.711 |
| | Dom | 11 | 7.423 | 72.495 | 0.037 | 12570 | 0.529 | 0.000 | 0.000 | 0.726 |
| | For | 15 | 10.782 | 29.796 | 0.044 | 11212 | 0.466 | 0.249 | 0.006 | 0.683 |
| 1986 | | 23 | 9.083 | 47.556 | 0.043 | 12120 | 0.386 | 0.119 | 0.000 | 0.848 |
| | Dom | 8 | 7.756 | 77.482 | 0.039 | 12705 | 0.409 | 0.000 | 0.000 | 0.809 |
| | For | 15 | 10.820 | 31.595 | 0.049 | 11355 | 0.356 | 0.275 | 0.000 | 0.900 |
| 1987 | | 27 | 10.683 | 33.444 | 0.051 | 12175 | 0.415 | 0.148 | 0.031 | 0.902 |
| | Dom | 10 | 9.844 | 51.860 | 0.055 | 12702 | 0.453 | 0.082 | 0.054 | 0.885 |
| | For | 17 | 11.815 | 22.611 | 0.045 | 11464 | 0.365 | 0.238 | 0.000 | 0.926 |
| 1988 | | 30 | 10.712 | 25.733 | 0.042 | 12337 | 0.381 | 0.192 | 0.044 | 0.952 |
| | Dom | 10 | 9.708 | 47.301 | 0.041 | 12809 | 0.390 | 0.077 | 0.065 | 0.949 |
| | For | 20 | 12.299 | 14.950 | 0.044 | 11591 | 0.365 | 0.373 | 0.010 | 0.956 |
| 1989 | | 33 | 11.472 | 27.173 | 00.043 | 12380 | 0.388 | 0.179 | 0.067 | 0.958 |
| | Dom | 12 | 9.655 | 48.025 | 0.041 | 12659 | 0.388 | 0.073 | 0.066 | 0.964 |
| | For | 21 | 14.740 | 15.257 | 0.048 | 11877 | 0.388 | 0.371 | 0.070 | 0.947 |
| 1990 | | 27 | 9.956 | 33.825 | 0.043 | 12016 | 0.361 | 0.079 | 0.041 | 0.890 |
| | Dom | 11 | 9.011 | 51.140 | 0.041 | 12285 | 0.370 | 0.058 | 0.058 | 1.000 |
| | For | 16 | 11.472 | 21.922 | 0.047 | 11585 | 0.346 | 0.112 | 0.013 | 0.715 |

Price is in 1,000's of constant 1982-1984 dollar.
Quantity is average model sales in thousands.
HP/WT is horsepower divided by weight in lbs.
Space is vehicle width in inches times vehicle length in inches.
Air, Auto, PS is one if air condition, automatic transmission or power steering is standard equipment and zero other wise.