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15

PASSENGER MOTOR CARS

Background

During the period covered by this study, world production of passenger cars more than doubled (see Table 15.1). The largest gains in numbers of units produced were achieved by Germany, the United Kingdom, France, Italy, and Japan, in that order. Growth in output in the United States, where the automobile industry was already highly developed in 1953, was only 26 per cent. The U.S. share in world output declined from three-quarters of the world total to 43 per cent. (These figures refer to domestic production; U.S.-owned or -controlled production abroad, which is particularly important in the United Kingdom and Germany, is included in the data for those countries.)

World trade in passenger cars expanded even more rapidly than production. The extent to which the producing countries shared in the expansion of trade varied widely. Germany, which led in the growth of production, raised its export ratio from over a third of domestic production in 1953 to about a half in 1964. The United States exported about 2.5 per cent of its output both in 1953 and 1964, but its imports expanded from less than 0.5 per cent of domestic production to more than 7 per cent. The U.K. export ratio fell from half of domestic production to a third, partly because of a relaxation of government allocation policies that were still favoring export markets at the beginning of the period.

These figures understate the importance of U.S. exports, since they exclude exports of parts for assembly abroad, which played a larger role

Note: SITC 732.1 and 732.6. *Value of OECD exports in 1963:* $3.4 billion; 7.5 per cent of study total. *Coverage:* Passenger motor cars (other than buses or special vehicles) including chassis with engines mounted.

Table 15.1
Output and Exports of Passenger Cars, 1953 and 1964
(number of cars in thousands)

	1953			1964		
		Exports			Exports	
	Output (number)	Number	As Per Cent of Output	Output (number)	Number	As Per Cent of Output
U.S.	6,122	154	2.5	7,751	192	2.5
U.K.	595	302	50.8	1,868	673	36.0
Germany	369	135	36.6	2,650	1,437	54.2
France	368	81	22.0	1,321	444	33.6
Italy	143	31	21.7	1,029	282	27.4
Japan	7	NA	NA	580	79	13.6
Total	7,597	703	9.3	15,199	3,107	20.4
Total world	8,110			17,826		

Source: For 1953: Data for Japan and world production from *Statistical Yearbook*, United Nations, 1957, p. 282. All other data from *International Trade, 1955*, GATT, May 1956, p. 65. For 1964: Production from *World Motor Vehicle Production and Registration, 1965–66*, U.S. Dept. of Commerce, November 1966. Exports from *Statistisches Jahrbuch für die Bundesrepublik Deutschland, 1966*, Federal Republic of Germany, 1966, p. 101.

in the trade of the United States than in that of the other countries. Even allowance for this factor, however, could hardly raise the U.S. export percentage above 5 or 7 per cent.[1]

Despite the notable development during these years of automobile industries outside of North America and western Europe, the older centers of production still accounted for 90 per cent of all the cars produced in 1964. The largest new producers were Japan, with 580,000 cars, and Australia, with 341,000. Among the other countries, the Soviet Union, the Union of South Africa, Argentina, and Brazil passed the 100,000 mark.

[1] The exact figure is somewhat uncertain because exports of parts for assembly were not reported separately for passenger cars but only for passenger cars in combination with trucks and buses. In 1964, the aggregate of such exports was $520 million, compared with complete-vehicle exports of $295 million for passenger cars, $316 million for trucks, and $26 million for buses. If all the parts exports were for passenger cars, the percentages of U.S. passenger car production that was exported would still be under 7 per cent. The importance of parts exports for the United States is connected with direct U.S. investments in automobile production in Canada, Latin America, Oceania, and other regions. For further comment on this point and for the sources of the statistics cited in this note, see Chapter 14.

The OECD countries, including Japan, accounted for well over 90 per cent of world exports by value. The six largest OECD members—the United States, the United Kingdom, Germany, France, Italy, and Japan—accounted in turn for over 90 per cent of OECD exports by value (Table 15.2).

The United States was the major supplier to the Latin American market, but Germany dominated the much larger European market. The EEC itself absorbed about 30 per cent of German exports and 50 per cent of French exports.

The U.S. share in OECD exports declined precipitously from 32 per cent to less than 9 per cent, although in absolute terms the dollar volume expanded a little (Table 15.3). The United Kingdom also lost in terms of shares—31 per cent to 19 per cent—although the dollar value of its exports increased more than two and a half times. Germany made the largest gains: Its share increased from 15 per cent to 40 per cent, and its foreign exchange earnings went up more than elevenfold. Japan's gains, though small in comparison to Germany's, represented a phenomenal rate of growth. Her exports of passenger cars were negligible in 1953, but by the end of the period, she was the sixth largest exporter of passenger cars.

Time-to-time Changes in Domestic Automobile Prices

Data

Our price data include more than 1,000 observations for the United States and 700 for five foreign countries—the United Kingdom, Germany, France, Italy, and Japan. Six model years (1953, 1957, 1961, 1962, 1963, and 1964) and every important make in every country are represented. The distribution of the observations over time and among the countries is shown in Table 15.4. The six countries accounted for 85 per cent of world production of passenger cars in 1964 and for a substantially higher percentage of world exports.

A major disadvantage of the data for our purposes is that the prices are domestic list prices (excluding sales and purchase taxes) rather than the export prices which are most relevant to international price competitiveness. In a number of cases, particularly in regard to U.S. exports, we were informed that the domestic and export prices were the same, but no one claimed that this was true for all countries and periods. Also,

Table 15.2
OECD Exports of Passenger Cars (SITC 732.1 and 732.6), by Origin and Destination, 1963
(dollars in millions)

	Value of Exports	Per Cent of OECD Exports in 732.1+732.6	Share in OECD Exports (per cent)								
						EEC					
			OECD	U.S.	U.K.	Total	Germany	France	Italy	Japan	Canada
Total, all destinations	$3,360	100.0	100.0	8.8	19.8	66.5	39.4	14.8	7.5	1.2	0.8
Destination											
U.S.	531	15.8	100.0		20.1	72.9	62.2	6.8	2.9	0.7	0.3
OECD Europe	1,805	53.7	100.0	3.6	15.1	78.5	42.1	18.2	9.8	a	0.1
U.K.	53	1.6	100.0		1.7	85.0	26.9	19.5	12.1		2.8
EEC total	1,102	32.8	100.0	3.6	12.8	82.8	36.5	22.6	11.7	a	0.1
Germany	188	5.6	100.0	3.9	6.6	87.9		42.2	34.3		a
France	184	5.5	100.0	2.6	20.6	76.2	45.4		20.0		a
Italy	251	7.5	100.0	0.4	14.6	84.9	50.4	33.4			a
Canada	83	2.5	100.0	32.5	22.5	40.0	34.7	5.0	0.4	0.1	
Japan	20	0.6	100.0	42.6	16.7	40.2	36.8	2.0	1.5		
Latin America	195	5.8	100.0	54.5	6.0	34.3	20.0	9.4	4.4	2.1	1.6
Others	727	21.6	100.0	12.1	34.7	44.6	21.8	14.9	6.9	4.1	2.7

Source: Appendix A.
[a]Less than 0.05 per cent.

Table 15.3
OECD Exports of Passenger Cars, 1953, 1957, 1961–64
(dollars in millions)

	Value of OECD Exports	Share in OECD Exports (per cent)								
					EEC					
		OECD	U.S.	U.K.	Total	Germany	France	Italy	Japan	Canada
1964	$3,795	100.0	8.6	19.0	65.8	39.9	11.6	7.4	2.0	1.7
1963	3,360	100.0	8.8	19.8	66.5	39.4	14.8	7.5	1.2	0.8
1962	2,936	100.0	9.3	20.5	65.7	36.8	14.6	9.1	1.0	0.7
1961	2,334	100.0	9.6	17.8	69.1	41.0	15.2	7.9	.	0.7
1957	1,643[a]	100.0	18.6	25.9	51.9	30.2	13.0	6.1	NA	1.4
1953	874[a]	100.0	32.3	30.9	32.3	15.4	10.6	4.2	NA	4.2

[a]Excluding Switzerland and Spain. Their exports were only about $1 million in 1961 and would not affect the percentages shown.

Table 15.4
Number of Models Included in Regressions Based on Domestic List Prices of Domestic Cars, 1953, 1957, 1961–64

Model Year	U.S.	U.K.	Germany	France	Italy	Japan
1953	106	23	12	8	4	
1957	130	39	20	15	7	9
1961	210	36	30	13	14	19
1962	195	45	33	18	14	21
1963	216	54	29	21	16	34
1964	207	67	40	17	17	50
Total	1064	264	164	92	72	133

the size of the average discount from list price given to domestic purchasers may change from time to time, and thus make the list prices unreliable guides to actual price movements even in home markets. This possibility is reduced, but not eliminated, by our practice of taking prices as of the beginning of the model year, when discounting is generally at a minimum.

Changes in the extent of discounting from list prices in retail sales could have come about through changes in the discount from list allowed to dealers by the manufacturers or through changes in dealer profit margins. Information on profit margins supplied by the National Automobile Dealers Association suggests that they did not change enough to be a serious source of error in our indexes. The averages for the years covered in our study were as follows: [2]

	Ratio (per cent)	
	Gross Profit to All Sales	*Washout Profit to New and Used Unit Sales*
1953	15.2	NA
1957	14.4	9.6
1961	15.3	10.1
1962	15.2	10.3
1963	14.8	10.1
1964	14.7	10.1

[2] It must be noted, however, that new passenger cars account for less than half of the total sales of the dealers, since their sales include trucks, used vehicles, parts, and

The main factor tending toward change in the discount from list allowed to dealers was the introduction of compact cars, on which the discount was smaller than on full-sized cars. However, even if compact cars had risen from zero to a quarter of our sample between 1957 and 1961, the effect on our price index would not have been more than about 1 per cent.[3]

As far as possible, the sample is limited to standard sedans.[4] Station wagons, convertibles, hardtops, and sports cars were excluded in order to avoid the uncertainties that would be encountered in classifying cars into these sometimes overlapping categories, and, secondarily, to avoid adding more variables to a list already long. We had intended to include only four-door sedans, since the deletion of two-door cars would have resolved some uncertainties about the classification of a car as a sedan or sports car. However, two-door cars figured prominently in our German data, and their exclusion would have eliminated a number of German observations. Thus both two-door and four-door variants of a particular car were included whenever separate data on price and physical characteristics could be obtained for them.

Deluxe models were excluded unless they were larger or more powerful than the standard models for which we had data. Since we had no independent variables designed to measure the amount of chrome or the luxuriousness of the interior, including cars differentiated from standard models solely by such characteristics seemed pointless. Of course, heavier and more powerful cars may also have more chrome and more luxurious interiors, and to the extent this is the case, our regression coefficients for the included characteristics such as weight and displacement will be biased upward, since they will reflect in part higher prices really attributable to the missing variables.

The data on U.S. automobiles were taken in the first instance from *Ward's Statistical Report* or *Automotive Industries*. Data on weight,

service. The gross profit figures include parts, service, and finance, as well as new and used vehicles. The washout profit covers only new and used vehicles but is net of gains and losses from resale of traded-in vehicles.

[3] There is little information in the public domain concerning discounts at the retail level. A series of articles by A. F. Jung in the *Journal of Business*, 1959 and 1960, indicated that discounts in the Chicago area averaged around 15 per cent in 1959 and 1960. At about the same time, the *Economist* (July 23, 1960, p. 383) reported that current discounts in England on one major make were around 10 per cent.

[4] Two- and four-door sedans accounted for 44 per cent of U.S. passenger car factory sales in 1964. Hardtops, the next most important category, accounted for 38 per cent (*Automotive Industries*, March 15, 1966, p. 96).

length, horsepower, engine displacement, number of cylinders, and price were gathered. The prices were retail and excluded federal and local taxes, delivery, and handling charges. The material in these sources was usually so arranged that it was necessary to collate data from different tables in order to complete the information about each car. It was sometimes difficult to be certain that this could be done correctly from the published data. Information transcribed from these published sources was therefore sent to the automobile companies for their review and correction. Although the entire sample was not subject to this process of review and correction, we believe few errors remain.

The starting point for accumulating the data on European cars was a series of production surveys in the United Kingdom, Germany, France, and Italy made available to us by a large automobile manufacturer. For each of the more important models produced by makers whose annual output exceeded a certain minimum (15,000 cars in most years), the surveys gave the model name or number, list price, number of cylinders, number of doors, engine displacement, and estimated volume of production. For the United Kingdom, where the number of makes is larger than in any of the other three countries, a few of the most important producers with outputs less than the minimum were also listed. The listed makes thus accounted for at least 95 per cent of national output in every case, and for more than 99 per cent in the last few years.

The next step was to add information on weight, length, and brake horsepower for each model. Basic reliance was placed on tabulations of foreign car characteristics appearing in the mid-March issues of the U.S. publication *Automotive Industries*. The matching of cars between the two sources was based on model name or number and on engine displacement. Other sources were the *London Times* "Survey of the British Motor Industry" and the *Autocar* "Buyers Guide" and the French publication *Argus*. For 1953 models some data were drawn from a tabulation in the *Economist* of October 25, 1952.

In a number of instances, these sources gave conflicting information—particularly on price and weight—about what seemed, on the basis of model name or number and engine displacement, to be the same car. Where the numerical differences were substantial and there was no clear-cut basis for thinking one was right and the other wrong, the car was generally dropped. Small differences (generally within 1 or 2 per cent) in list prices for British cars between our private source and the

published materials referred to above were resolved by taking the lower of the two prices. In the case of French cars, apparently unsystematic differences between prices given by our private source and those in *Argus,* sometimes reaching as high as 7 or 8 per cent, were settled by using *Argus* prices. Since there were some discrepancies between *Argus* and *Automotive Industries* about length, horsepower, and weight, *Argus* data were chosen for these characteristics also, in order to minimize errors in the matching of prices and physical characteristics. This had the disadvantage of using "running weight" for French cars, and "shipping weight" for all other cars; the former includes water, oil, and possibly some gasoline, while the latter is dry weight.

The surveys prepared by the private source reported retail list prices (excluding sales and purchase taxes) as of the beginning of the model year, which was taken as the October or November preceding a given calendar year. Thus the 1964 data we used are based on tables for November 1963 prepared by our private source, on French (*Argus*) and English (*Autocar* and the *London Times* "Survey") publications appearing in October 1963, and on a U.S. publication (*Automotive Industries*) appearing in March 1964. While the change-over from one year's model to the next in the fall of each year is less systematic in Europe than in the United States, all things considered there seemed to be no better way to maximize comparability than by placing the prices for all countries on a beginning-of-model-year basis.

All the Japanese data were obtained from a single Japanese source.

Foreign prices were converted to dollars at the exchange rates prevailing as of the month of the price list. The sample averages (unweighted) for the terminal year are shown in Table 15.5.

Independent Variables

The physical characteristics considered for use as independent variables—weight, length, horsepower, displacement, number of cylinders, and number of doors—represent only a few of the literally hundreds of specifications that are used to describe an automobile. Beyond a certain point, the gain from including a larger number is not worth the statistical complications. Our experience with regression methods (see Chapter 5) indicates that it is usually possible to account for a high proportion of the price variation (something like 90 per cent) with three to five variables; once a very high correlation coefficient is reached, further additions

Table 15.5
Average Price and Characteristics of 1964 Models Included in Regressions of Domestic Cars

	Price (dollars)	Weight (pounds)	Length (in.)	Horse-power (number)	Piston Displacement (cu. in.)	Mean Effective Pressure[a]
U.S.						
All cars	2,407	3,206	202.4	200.4	282.9	69.03
Excl. auto. trans.[b]	2,228	3,121	201.1	192.5	274.3	68.50
U.K.	2,004	2,233	164.9	79.6	106.4	74.54
Germany	1,974	2,053	169.9	71.3	91.8	76.94
France	1,656	1,894	167.0	51.5	68.4	76.15
Italy	2,494	2,264	163.7	81.9	94.7	85.28
Japan	2,160	2,249	162.5	66.5	89.9	74.87

[a](Horsepower x 100) divided by piston displacement.
[b]All cars, excluding twelve with automatic transmission as a standard feature.

of independent variables often have little impact on either the correlation coefficient or the price indexes derived from the regressions. The variables we included are strategic in that they are closely related to many of the omitted ones [5] and are also, among the alternatives available, those used most by consumers to differentiate one sedan from another. (There are international differences on this last point; horsepower is used more widely as an indicator of power in the United States, while displacement is relied upon more in Europe.)

The independent variables tend to be highly intercorrelated. The correlation coefficients below were found, for example, when 1963 and 1964 data for the United States were pooled:

	Weight	*Length*	*Displacement*	*Horsepower*
Length (L)	.91			
Displacement (D)	.81	.73		
Horsepower (H)	.74	.67	.95	
Mean effective pressure (M)	.48	.45	.67	.85

Mean effective pressure as used in our calculations is simply the ratio of horsepower to piston displacement. Actually, the correct formula is

$$M = \frac{Hk}{DR}$$

where k is a constant, and R is revolutions per minute.[6] R is not included in our data, but its range of variation is small and H/D is probably a good surrogate for M.[7]

The variables we have do not, of course, measure all of the qualities that are important to the automobile purchaser. Style, size and comfort, and power are probably the key considerations, although factors such as reliability and economy of operation may also be significant. We have variables that represent size and comfort and power, but none that can be regarded as a proxy for style. We tried to minimize the effect of this omission by basing our study on sedans and excluding

[5] The multicollinearity between the included and excluded is no advantage in obtaining unbiased estimates of the coefficients of the included variables, but helps to explain a large portion of the variance in prices.

[6] See A. R. Rogowski, *Elements of Internal-Combustion Engines,* New York, 1953, p. 53.

[7] For the 173 cars included in the French market data, referred to below, the coefficient of correlation between D and DR was 0.98.

sports cars and other models for which styling is a more important factor.

Size and at least the gross differences in comfort are probably reflected in length and weight.[8] Length and weight are usually highly correlated, as in the illustration of U.S. cars given above, but sometimes one and sometimes the other explains price variation better. We could, of course, include whichever was better in each situation, but we prefer if possible to establish a common set of independent variables to use for all price comparisons. The inclusion of both length and weight usually adds to the correlation coefficient; even where it does not, there is little impact on our price comparisons.

In measuring power we must limit ourselves to three of the four variables in the expression $H = MDR/k$; otherwise we should be including the same thing twice.[9] One possibility is to include horsepower alone. (It would be desirable to have an objective test measurement of horsepower, performed by the same impartial body on the engines of all countries, rather than the manufacturer's advertised horsepower, which is what we have.) There is, however, an advantage to including the elements that determine horsepower—that is, M, D, and R—rather than horsepower itself, for reasons given in Chapter 5.

The basic independent variables that we used, therefore, were W, L, D, and M. Since we have no independent data on M and no data on R, we derive what we shall call "M" by dividing D into H.

We considered and rejected as independent variables the number of doors and volume of production. The door variable frequently had insignificant coefficients and created computational difficulties in some cases where there were only one or a few observations of two-door models. Since four-door models are heavier than two-door ones, the effect of dropping this variable was to allow the weight variable to

[8] Weight has both a positive aspect in adding to the size and comfort of a car and a negative aspect in requiring a more powerful motor and greater fuel costs. Technical progress has aimed in part at weight reduction, and thus tended to make weight an unreliable guide to quality over time. However, in any one year, weight often adds significantly to the explanatory power of the regression, and the amount of weight-saving technical change has probably been small from one of our reference years to the next. Even one of the more important changes, the shift to aluminum block engines and subsequently to lightweight cast-iron engines, must be assessed in terms of the fact that the engine is only around 15 per cent of the weight of the total car.

[9] This is one of the points, referred to earlier, at which we could further split out variables. Displacement, for example, is the product of the displacement per piston and the number of pistons; the advantage of more pistons, given the total displacement, is that firing is more continuous and performance therefore smoother.

bear the burden of explaining price differences attributable to the number of doors.[10]

Although the scale of production is not per se an element of utility to consumers [11] (unless it is considered to bring about such benefits as more widespread and less costly repair services and higher resale values) differences in scale may produce direct price differences for cars of equivalent quality. In that event, a scale variable should be included in our equations; otherwise price differences attributable to scale might be incorrectly ascribed to the other independent variables (W, L, etc.), and the coefficients used to estimate the price differences might also be biased. We would, of course, regard scale as one of the reasons for real price differences confronting consumers, unlike differences in the quality variables (W, L, etc.) which produce differences in nominal prices for which corrections must be made.[12] Since the effects on price were uniformly small and not always in the same direction, it seemed preferable to delete this variable.[13]

[10] The coefficient for two-door cars was usually negative. However, positive coefficients are also credible; they signify that two-door models were expensive relative to four-door models, holding weight, length, displacement, and pressure constant.

[11] Small volume may, however, help provide prestige for the purchasers. It may, on the other hand, merely reflect the failure of the producer to gain acceptance for the car.

[12] We considered a number of alternative ways of associating a scale variable—i.e., volume of production—with each passenger car in our sample:

1. The output of the maker (e.g., Chevrolet in the United States or Austin in England).
2. The output of a whole group of commonly owned makes (e.g., G.M. rather than Chevrolet in the United States, and the British Motor Corporation rather than Austin in the United Kingdom).
3. The output of the particular model whose price and other characteristics were taken as an observation.
4. The output of the particular model plus some or all of the output of closely related models. (E.g., in the case of the two-door Falcon standard 6, all or part of the output of four-door Falcon standard 6 or of all other Falcons might be added to the number of two-door standard sizes.)

We experimented with maker's output (No. 1) and a variant of series output (No. 4) in which we took model volume as the output of the particular model plus half the output of closely related models. The estimation of series output for each car necessarily involved heavy reliance on similarity or dissimilarity of the names assigned to different models, and a number of arbitrary decisions had to be made. Without detailed knowledge of the manner in which different models share common parts and overhead items (such as design costs), it is impossible to get good measures of the true scale of production for each observation.

[13] Another variable falling outside of the category of performance characteristics that we considered was size classification into compacts, standards, etc. It seemed preferable to allow length to explain price differences on this score, particularly since lengths regarded as standard in some years were regarded as compact in others. (The standard four-door sedans of the three major U.S. producers in 1953 were all under 200 inches, the length regarded as the upper limit for compacts when they were first introduced. Later, some of the compacts of the more expensive brands crept over the 200-inch limit.)

About 10 per cent of the U.S. cars in our sample came equipped with automatic transmission as a standard item, and a dummy variable was added to take account of this influence on price. Some of the same cars also came with power brakes and/or power steering as standard equipment, but we did not add separate dummy variables for these items. Cars in which these features were standard items were higher priced, and the coefficient for automatic transmission probably reflects not only the addition to price for this feature (and sometimes power brakes and power steering) but also luxury features such as exterior and interior trim that are not picked up by W, L, D, or M.

Scope and Form of the Regressions

The basic approach was to pool data for successive pairs of years in the regression analysis for each country. For each pair of years price was correlated with W, L, D, M, and one or more dummy variables which were inserted to measure the difference in price between the two years.[14] We begin by estimating an equation in which there is a dummy variable for the second year and an interaction term for each combination of time and characteristic (W, L, D, M). The time dummy distinguishes the intercept of the second year from that of the base year; the interaction terms distinguish the slope of each characteristic in the second year from the slope of the same characteristic in the base year. By dropping the dummy and interaction terms that do not prove to be significant and retaining those that do, we use the whole size and range of the combined sample for the two years to estimate the coefficients which seem to be common to them while permitting the estimation of separate coefficients where these appear to be warranted. We thus avoid the imposition of equal coefficients for W, L, D, and M on equations for the two years.

In each pooled regression we tested each of the intercept and slope dummies to see whether it should be retained, according to the rules described in Chapter 5.[15]

[14] For further details and for other regression approaches, including pooling of all the situations and use of separate regressions for each situation, see Chapter 5.

[15] See section on "Pooling with International Differences in Element Prices." However, a minor difference in the rules was that in the automobile comparisons, the intercept dummy was retained when it was at least as large as its standard error even when the constant term was not significant. This treatment assumes that the constant term, which refers to the price of a car with zero weight, length, etc., does not have an economic interpretation but is merely a device for providing a better fit within the range of observation.

With respect to mathematical form, a number of experimental regressions were computed for each of the six countries using linear, semilog, inverse semilog, and double log equation forms. The inverse semilog form (in which logarithmic price is the dependent variable and the independent variables are in arithmetic form) was chosen chiefly because it almost always accounted for a higher proportion of the price variation than any other form, regardless of the country or the combination of independent variables used. This form (like the double log form) has the advantage for our purpose of minimizing the squares of percentage deviations rather than the squares of absolute deviations: A larger absolute error is acceptable in estimating the price of a $4,000 automobile than of a $2,000 one.

Time-to-time Movement of Domestic Automobile Prices

The year-to-year changes in domestic automobile prices estimated by these methods are shown for each of the six countries in Table 15.6 and as indexes on a 1962 base in Table 15.7. Since the automobile prices were always converted into dollars before being used, adjusted figures in parentheses are given for Germany and France (the two countries which changed their exchange rates within our period) to show how the indexes would appear to persons spending the domestic currencies of those countries rather than dollars.

Automobile prices declined by 17 per cent in Italy between 1953 and 1957 and by 29 per cent in Japan between 1957 and 1961. In both cases the volume of production greatly increased, and the price movements were probably associated with the attainment of greater economies of scale. The price decline was arrested in Italy after 1961 but continued in Japan, although at a diminishing rate. In France, automobile prices rather consistently increased in terms of domestic currency during the period, although for 1957–61, owing to a 29 per cent currency devaluation, dollar prices declined by 14 per cent. For the period as a whole, only Japanese and Italian prices declined significantly. French prices converted to dollars at official exchange rates were almost as high at the end as at the beginning. German prices did not change much in domestic terms but rose slightly in dollar terms after the appreciation of the mark in 1961. U.K. prices were about 8 per cent higher and U.S. prices about 11 per cent higher in 1964 as compared to 1953.

While these results are the best we were able to derive from our data

Table 15.6
Price Relatives, Domestic Cars, Preferred Regressions, 1953, 1957, 1961–64

	1957/1953	1961/1957	1962/1961	1963/1962	1964/1963
United States					
Price relative	99	105	107	100	100
$\bar{R}^2$	.91	.85	.85	.88	.90
Dummies	*TLD*	*TWL*	*TLD*	*WDM*	*WM*
United Kingdom					
Price relative	95	106	101	101	105
$\bar{R}^2$	.92	.93	.96	.96	.94
Dummies	*TM*	*TLM*	*TM*	*T*	*TWLM*
Germany					
Price relative	100	99	106	102	98
$\bar{R}^2$	.96	.96	.97	.97	.98
Dummies	*WL*	*TWLM*	*TL*	*M*	*LM*
France					
Price relative	101	86	106	103	104
$\bar{R}^2$	.90	.94	.91	.89	.90
Dummies	*TWLM*	*DM*	*TL*	*M*	*M*
Italy					
Price relative	83	92	100	101	100
$\bar{R}^2$	.99	.93	.93	.94	.96
Dummies	*TW*	*WLD*	*WL*	*T*	*T*
Japan					
Price relative	NA	71	95	95	97
$\bar{R}^2$	NA	.88	.89	.87	.89
Dummies	NA	*WM*	*TLD*	*W*	*TLD*

Note: All regressions involve log of price and arithmetic values of the independent variables, which were weight (*W*), length (*L*), piston displacement (*D*), and mean effective pressure (*M*). A separate regression was computed for each pair of years. Since the method of flexible pooling was used, the independent variables included not only *W*, *L*, *D*, and *M* but also dummy variables as indicated in the table. *T* stands for a time or intercept dummy. The basis for selecting the dummy variables is described in the text.

Table 15.7
Indexes of Domestic Car Prices, 1953, 1957, 1961–64
(1962 = 100)

	1953	1957	1961	1962	1963	1964
U.S.	89	89	93	100	100	100
U.K.	98	93	99	100	101	106
Germany	96	96	94	100	102	100
	(101)	(101)	(99)	(100)	(102)	(100)
France	109	110	95	100	103	108
	(84)	(85)	(95)	(100)	(103)	(108)
Italy	133	109	100	100	101	101
Japan	NA	147	105	100	95	92

Note: Based on data summarized in Table 15.6 (with slight rounding differences). Figures in parentheses reflect trend of prices in terms of domestic currency; other figures in terms of dollars.

in terms of the economic rationale and statistical methods we employed, we must point out that other choices of regression method would yield different answers. Results from some of the more likely alternatives are shown in Table 15.8, and in Table 15.9 our preferred results are compared with the automobile price changes measured by wholesale and consumer price indexes. For the United States, the largest differences in both tables occur for the period 1953–57. In the United States, our preferred method shows a 1 per cent decline, while the use of horsepower alone as an independent variable in place of its two components, D and M, produces a 4 per cent increase. The preferred equation is, however, clearly superior; its pooled variables (W, L, D, and M) have coefficients that are more than two times their standard errors and $\bar{R}^2$ is .912, while in the other equation the horsepower coefficient is smaller than its standard error and $\bar{R}^2$ is .890. Among the official indexes in Table 15.9, the U.S. wholesale price index produces a 12 per cent increase in prices between 1953 and 1957 while the consumers price index shows only a 5 per cent rise; the difference could be due to a narrowing of retail margins, but this seems improbable particularly in the light of the dealer margin data cited earlier.

It will be noted that for the period as a whole the NBER indexes show an 11 per cent increase in automobile prices in the United States while the official indexes show only a 9 per cent increase for the con-

Table 15.8
Price Relatives for Domestic Cars, Comparison of Various Regression Estimates, 1953, 1957, 1961–64

Country	Variables	Mean $\bar{R}^2$[a]	1957/1953	1961/1957	1962/1961	1963/1962	1964/1963
U.S.[b]	*WLDM*	.879	99	105	107	100	100
	WLH	.861	104	105	106	100	98
	WLDM[c]	.873	99	105	107	100	100
U.K.	*WLDM*	.940	95	106	101	101	105
	WLH	.917	100	109	103	102	106
	WLDM[c]	.939	96	106	101	101	104
Germany	*WLDM*	.970	100	99	106	102	98
	WLH	.973	94	99	105	102	99
	WLDM[c]	.967	100	99	106	101	98
France	*WLDM*	.906	101	86	106	103	104
	WLH	.873	105	83	101	103	104
	WLDM[c]	.893	99	85	106	102	104
Italy	*WLDM*	.950	83	92	100	101	100
	WLH	.944	81	89	100	101	100
	WLDM[c]	.948	82	88	100	101	100
Japan	*WLDM*	.882		71	95	95	97
	WLH	.854		74	94	95	98
	WLDM[c]	.852		82	93	95	97

Note: The variables are weight (*W*), length (*L*), piston displacement (*D*), mean effective pressure (*M*). The first two regressions in each set are based on flexible pooling and in some cases therefore include slope dummies; the last, marked b, is based on complete pooling. The *WLDM* regressions are those set out in Table 15.6.

[a]Average of $\bar{R}^2$ for five periods.

[b]All U.S. regressions include a dummy variable for automatic transmission.

[c]Based on complete pooling. See Note above.

Table 15.9
Time-to-time Changes in Domestic Car Prices, NBER vs. Other Indexes, 1953, 1957, 1961–64

Country	Source of Index	1957/1953	1961/1957	1962/1961	1963/1962	1964/1963
U.S.	NBER[a]	99	105	107	100	100
	WPI[b]	112	104	99	99	100
	CPI[b]	105	105	100	99	100
	F-G-K	83	100	NA	NA	NA
	Triplett	NA	NA	104	100	100
Germany	NBER[a]	100	99	106	102	98
	WPI[c]	88	105	103	101	100
	CPI[c]	NA	NA	101	101	101
	EPI[d]	99[e]	103	100	100	100
France	NBER[a]	101	86	106	103	104
	WPI[c]	103	77	102	102	101
	CPI[b]	NA	NA	102	102	102
Japan	NBER[a]	NA	71	95	95	97
	WPI[b]	73	82	99	99	97
	CPI[b]	NA	NA	100	96	94
	EPI	NA	NA	98	98	100

WPI = wholesale price indexes.

CPI = consumer price indexes.

EPI = export price indexes.

F-G-K = Calculated by applying data for average weight, length, and horsepower from our pooled samples to regression coefficients given by F. M. Fisher, Z. Griliches, and C. Kaysen, "The Costs of Automobile Model Changes since 1949," *Journal of Political Economy*, October 1962, p 436. Our estimate of the 1957/1953 relative was obtained by calculating the price in both years of a car with the average characteristics of the cars in our pooled sample for those two years, and the 1961/1957 relative by an analogous manner.

EPI = export price index.

Triplett = "Adjacent-year weights," "full model" estimates reported by Jack E. Triplett, "Automobiles and Hedonic Quality Measurement," *Journal of Political Economy*, May–June 1969, Table 3.

[a]As of beginning of each model year.

[b]December prior to each calendar year.

[c]Annual averages.

[d]June of each year.

[e]1957/1954.

sumers index and a 14 per cent increase for the wholesale index. However, the NBER indexes are probably biased upward relative to the BLS indexes because the NBER did not, and the BLS did, make adjustments for changes from one model year to the next in accessories included as standard features. (Such changes were taken account of in the NBER indexes only to the degree to which they added to the weight of the car, and this understated their value.) If the changes shown for two important U.S. models in Tables 15.10 and 15.11 are typical of U.S. cars in general, the net additions of equipment, valued at list prices, would have amounted to about 11 per cent of the first year's price.[16] Only part of this net increase is taken into account by the weight variable in the regression. Thus it is clear that the rise in the NBER index would be less than the increases of 9 and 14 per cent shown by the BLS indexes if the additional equipment were fully accounted for. Incidentally, the inclusion of heaters in the price of standard cars in 1962 was the most important single change not taken into account in the NBER indexes; judging from the relationships for these two models only, the 1962/1961 price relative would have been 104 rather than 107 had allowance been made for the addition of heaters assuming that the NBER indexes had taken no account of their inclusion via the weight variable. (The addition and deletion of automatic transmission in the Buick and other cars through the years were measured in our regressions, since we had a dummy variable for automatic transmission, although the estimates were not necessarily the same as those that would have been obtained from valuing the transmissions at list prices.)

We do not know to what extent European makers or even other U.S. manufacturers made net additions to the accessories included in the price of a standard car, but the trend has probably been in this direction. If this is so, our time-to-time indexes for these countries are also biased upward, though not necessarily to the same degree as the United States or as each other.

The NBER indexes also differ from the BLS and other official indexes because of differences between the regression and conventional approaches. In the conventional method efforts are usually made to match nearly comparable automobiles in two situations and to adjust prices (on a cost basis) for the differences between them not only in accessories

[16] Net additions were equivalent to 11.1 per cent of the 1953 price of the Chevrolet and to 10.1 per cent of the 1953 price of the Buick.

Table 15.10
Changes in Standard Items Included in List Price of Low-priced Four-door Chevrolet Sedan, 1953, 1956–64

Model Year[a]	List Price[b]	Kind of Equipment	Value of Equipment Made Standard and Incl. in Price
1953	$1,575		
1956	1,705	Directional signals	$15.75
1957	1,857		
1958	1,955	Vacuum booster windshield wipers ($10.50), 30-amp generator ($7.00), junction block ($3.40)	20.90
1959	2,091	Electric windshield wiper	6.00
1960	2,106	Arm rests, right side sun shade, cigar lighter	15.00
1961	2,106		
1962	2,164[c]	Heater	69.00
		Oil filter	8.50
1963	2,164		
1964	2,202	Positive crankcase ventilation	10.00
		Rear seat arm rests	9.00
		Deluxe steering wheel	3.50
		Foam rubber rear seat cushion	4.35
		Front seat belts	10.00
		Deluxe floor covering	11.15
Total			183.15
Net			174.15

[a]There were no changes in standard equipment in the model years omitted from the table.

[b]For four-door Chevrolet Sedan: Model 150 from 1953–57, Del Ray in 1958, and Biscayne 1959–64; all six cylinder.

[c]Smaller tires, valued at $9.00, were made optional and excluded from the price.

Table 15.11
Changes in Standard Items Included in List Price of Regular Four-door Buick Sedan, 1953, 1957, 1959–64

Model Year[a]	List Price[b]	Kind of Equipment	Value of Equipment Made Standard and Incl. in Price
1953	$2,064		
1957	2,412		
1959	2,545	Aluminum brake drum	$18.50
		Larger tires	16.00
1960	2,606	Instrument panel padding	15.00
		Custom trim (interior)	46.00
1961	2,826	Automatic transmission	205.00
1962	2,937	Heater	92.00
1963	2,732[c]	Positive crankcase ventilation	5.00
		Front seat belts	10.00
		Permanent coolant	6.50
1964	2,712		
Total			414.00
Net			209.00

[a]There were no changes in standard equipment in the model years omitted from the table.

[b]For regular four-door sedan: Buick Special 40, 1953–58; LeSabre from 1959–64. All eight-cylinder.

[c]Automatic transmission, valued at $205.00, was made optional and excluded from the price.

such as arm rests but also in such continuous characteristics as weight and horsepower. The adjusted prices are then compared to determine the price differences. This exercise may be carried out—often quite carefully and in consultation with the industry—for three, six, or a dozen or more models. The price change for automobiles is then taken as an average of these price comparisons. However, the bases for selecting the comparable pairs and, more important, the choices among alternative ways of making the price adjustments are *ad hoc* and are rarely described very fully.[17]

[17] The fullest account known to us is that by Margaret S. Stotz of the BLS, "Introductory Prices of 1966 Automobile Models," *Monthly Labor Review*, February 1966, pp. 178–181. See also O. A. Larsgaard and L. J. Mack, "Compact Cars in the Con-

The data below, referring to a standard six-cylinder, four-door, Chevrolet Biscayne sedan, illustrate the problem:

	1962	*1963*
Price (dollars)	$2,164	$2,164
Weight (pounds)	3,480	3,280
Length (inches)	209.6	210.4
Piston displacement (cubic inches)	235.5	230.0
Horsepower	135	140

The list price was the same in both years, but weight and piston displacement declined in 1963 while horsepower and length increased. How much should price be adjusted for the 6 per cent decline in weight and how much for the 4 per cent increase in horsepower? If interpolations are made in a systematic fashion in such cases, the method has never been described, to the best of our knowledge, by any producer of the important price indexes.[18]

The little that has been publicly said in the United States about the procedures in automobile price measurement in the official price indexes is consistent with a wide variety of practices at different times; quite possibly, no method has been consistently in use over the period covered by this study.

It is to be expected that the possibility for different answers to emerge from different methods will be greater the larger the changes in specifications between two periods. In our automobile data, as we mentioned, relatively large divergences in results were obtained from different methods during the period 1953–57, when the mix of specifications built into the average car was very greatly changed. In the United States in particular there was a sharp shift toward more powerful engines. Aver-

sumers Price Index," *Monthly Labor Review*, May 1961. Until the 1960 model year, quality adjustments were confined to changes in optional equipment made standard or vice versa (*The Consumer Price Index: Technical Notes, 1959–63*, BLS Bull. 1554, p. 5). The sample for the BLS consumer price index before 1961, Larsgaard and Mack report, was limited to standard Chevrolets, Fords, and Plymouths. In 1966, Stotz indicates, the CPI was based on eight models, of which four were sports cars or hardtops; and the wholesale price index, on eighteen models.

[18] The Biscayne was not used in 1966, according to Stotz (*op. cit.*), but lists of models used for the earlier indexes have not, as far as we know, been published. The point made in the text applies, however, to the models that were used in 1966 unless the sample has been changed each year as a result of a systematic and successful search for models that were unchanged from the preceding year. Even if an adequate number of unchanged models could always be found among the volume sellers, a bias would be introduced if producers follow a policy of making larger price changes for models with altered specifications than for models with unchanged specifications.

Table 15.12
U.S. Price Competitiveness,[a] Cars, 1953, 1957, 1961–64
(1962 = 100)

	1953	1957	1961	1962	1963	1964
Relative to						
U.K.	110	104	106	100	101	106
Germany	108	108	101	100	102	100
France	122	124	102	100	103	108
Italy	138	122	108	100	101	101
Japan	NA	165	113	100	95	92

[a]Measured by the ratio of the foreign to the U.S. domestic price indexes in Table 15.7.

age horsepower of cars produced in the United States rose from 125 in 1953 to 233 in 1957; the peak of 260 came in 1958, and by our reference year 1961 it had dropped to 201, only to resume the climb back to 233 by our final year, 1964.[19] Judging from our samples, the same thing happened, at a lower horsepower level and to a smaller degree, abroad; in the United Kingdom and in Germany, average horsepower of the sedans in our sample rose by around 25 per cent between 1953 and 1957. No other pair of years saw such big changes in power or other specifications. Neither in the United States nor abroad was there any matching increase in size; indeed, the length of sedans tended to remain unchanged and weight declined somewhat.

The broad picture of changes in relative prices seems fairly clear. The price competitiveness of Japanese and Italian automobiles has improved substantially, and the positions of the United Kingdom and the United States have worsened. The details of these changes, as measured by our preferred price indexes, are shown in Table 15.12. The decline in U.S. price competitiveness was arrested in 1962; after that date, only Japan (which was, as we shall see, a high-priced producer) improved its price position vis-à-vis the United States. Some of the smaller changes shown in the table should be considered in the light of our earlier statements concerning our inability to allow for changes in the addition of accessories as standard features and the existence of a range of indeterminancy in price measurement. The underlying indexes represent the results of

[19] *Automotive Industries*, March 15, 1965, p. 122.

methods which we have described and which in our judgment are preferable to others, but there is room for disagreement and further improvement of methods in this area of statistical work.

International Comparisons of Automobile Prices, 1964

Home Market Comparisons

The regression methods used to derive time-to-time indexes of the domestic prices of automobiles were also employed to make international price comparisons for the last of our reference years, 1964. The situations paired this time were different countries for the same time period rather than different times for the same country. Data for each of the five foreign countries, in turn, were pooled with U.S. data.[20] For each foreign-U.S. pair, prices were correlated with weight, length, displacement, and pressure, and with country and slope dummies which were retained or discarded by the criteria set out above. The results are set out in the first bank of figures in Table 15.13.

Two things are evident from a glance at the results. First, the domestic prices of foreign automobiles appear to be higher than the domestic prices of U.S. automobiles. This outcome, it should be remembered, is based on the assumption that the size and power of an automobile as measured by weight, length, displacement, and pressure are adequate measures of the relative amounts of automobile embodied in each particular model.

The second striking aspect of the figures is that it makes a great deal of difference whether prices are compared for a U.S.- or foreign-type car. When based on the specifications of the average U.S. car in our sample, French prices, for example, are calculated to be more than four times as great as U.S. prices; when, on the other hand, the comparison is made in terms of the average French car, French prices are slightly lower than U.S. prices. Intermediate results are obtained when the calculations are based on the midpoints of the U.S. and French averages—i.e., the "median" car.

An alternative method is to limit the comparisons to ranges of cars which are produced in both countries, as in the second bank of figures

[20] Since none of the foreign cars had automatic transmission as a standard feature, the twelve U.S. cars with automatic transmission were deleted for the international comparisons.

Table 15.13
International Comparisons of Domestic Car Price Levels, Based on Regression Analysis, 1964
(U.S. = 100 for price relatives)

	U.K.	Germany	France	Italy	Japan
All cars pooled, each country paired with U.S.[a]					
$\bar{R}^2$	.917	.933	.902	.920	.895
Number of foreign cars[b]	67	40	17	17	50
Foreign-U.S. price relative for car with specifications of					
U.S. average car[c]	134	322	420	379	462
Foreign average car[c]	108	105	98	125	119
Median car[d]	120	183	203	218	235
Overlapping models (80–149 H.P.) pooled, each country paired with U.S.[a]					
$\bar{R}^2$	.848	.900		.907	.822
Number of foreign cars[e]	21	11		10	19
Foreign-U.S. price relative for car with specifications of median car[f]	125	143	NA	214	197
Individual country regressions[a, g]					
$\bar{R}^2$	.923	.967	.892	.957	.910
Foreign-U.S. price relative for car with specifications of					
U.S. average car[c]	140	332	437	342	459
Foreign average car[c]	108	105	99	125	119
Median car[d]	123	183	208	207	233

[a]All are pooled regressions based on the method of flexible pooling; all have log of price as the dependent variable and weight (W), length (L), piston displacement (D), and mean effective pressure (M) as independent variables. Twelve U.S. cars having automatic transmission as a standard feature are excluded.

[b]In each case, 195 U.S. cars.

[c]See Table 15.5 for specifications.

[d]Simple average of average specifications for the United States and the foreign country.

[e]In each case, 70 U.S. cars.

[f]The "median" cars here for each bilateral comparison are based on the average of the U.S. and foreign average specifications for models in the 80–149 horsepower range:

	U.S.	U.K.	Germany	Italy	Japan
Weight (lbs.)	2,843	2,780	2,442	2,626	2,764
Length (in.)	196	180	182	176	179
Displacement (cu. in.)	194	142	117	119	119
Pressure ($H.P. \times 100 \div D$)	62	77	89	90	78

[g]Numbers of cars same as in pooled regression; $\bar{R}^2$ for U.S. = 0.845.

in Table 15.13, based on regressions that included only cars in the 80 to 149 horsepower range. France, with only two observations, was excluded,[21] and the number of observations for Italy and for Germany was reduced to less than a dozen. The new results are similar to the former ones for median cars for Italy and the United Kingdom but lower for Germany and Japan.

The final bank of figures in Table 15.13 shows the basic price comparisons derived from separate regressions for each of the countries. The results are not very different from those obtained by the method of flexible pooling which was used to derive the estimates in the first bank. The individual-country regressions are summarized in Table 15.14.

In view of the wide range of results presented in Table 15.13, the extent and consequences of the differences in the size and power of U.S. and foreign cars must be considered more closely. Our samples are comprehensive in the sense that they include almost every two- and four-door standard sedan produced in volumes of more than a few thousand in the United States or Europe. The sample averages in Table 15.5 and the distribution of sample cars by horsepower in Table 15.15 and by weight in Table 15.16 clearly reveal the larger size and greater power of U.S. cars relative to the others. Both the averages and the distributions suggest that the differences between the United States and the other countries are greater in power than in size; even the larger European cars tend to be less powerful than U.S. ones. The differences in size are large enough, however, to affect engine design; they may help explain the tendency abroad to produce engines that are smaller than American ones for a given horsepower output (i.e., have a smaller displacement and higher pressure).

There are differences among the other five countries also. Generally, however, the differences in prices and kinds of cars produced are small among the foreign countries relative to the differences between the United States and the rest. This is not surprising, since the five countries are more alike in the characteristics which determine the size and power of automobiles demanded on the domestic markets; the United States

[21] The actual prices of these two cars were 114 and 158 per cent, respectively, of the prices that cars with similar specifications sold for in the United States, the U.S. prices being estimated from a regression equation for seventy U.S. cars in the 80–149 horsepower range. Incidentally, in the French regression the predicted prices of these cars were 6 per cent and 15 per cent, respectively, less than the actual prices, lending support to the speculation that French prices for more powerful cars would be relatively high.

Table 15.14

Regressions of Domestic Prices of Cars on Selected Physical Characteristics, Six OECD Countries, 1964
(dependent variable, price, in logs; independent variables in arithmetic terms; figures in parentheses are *t*-ratios)

	U.S.[a]						
	(A)	(B)	U.K.	Germany	France	Italy	Japan
Weight (102 lbs.)	0.0150	0.0254	0.0413	.0143	-.0241	.0274	0.0005
	(6.25)	(7.70)	(6.66)	(3.49)	(-1.10)	(.72)	(.06)
Length (10 in.)	0.0139	-0.0019	0.0118	.0391	.1146	.0837	0.0259
	(1.78)	(-.02)	(1.07)	(2.40)	(3.26)	(.96)	(.80)
Displacement (cu. in.)	0.0004	0.0001	0.0009	.0065	.0084	.0042	0.0084
	(4.00)	(1.00)	(1.00)	(1.00)	(2.71)	(1.75)	(7.00)
Pressure ($10^2 H/D$)	0.0014	0.0022	0.0072	.0085	.0024	.0031	0.0063
	(2.00)	(2.20)	(7.20)	(9.44)	(1.41)	(1.15)	(4.50)
Constant	2.1328	2.1629	1.1677	.6949	.5594	.4300	1.3473
	(20.41)	(14.39)	(6.63)	(3.14)	(1.45)	(.63)	(3.90)
$\bar{R}^2$	.8451	.9042	.9233	.9674	.8922	.9570	.9100
S.E. of estimate	.0486	.0742	.1040	.0655	.0873	.1158	.1071
No. of observations	195	207	67	40	17	17	50

S.E. = standard error.

[a]A excludes cars with automatic transmissions as a standard feature. B includes them. The coefficient for the dummy variable for automatic transmission in the B equation was 0.0426, with *t*-ratio of 1.41.

Table 15.15
Number and Price per Horsepower Unit of Domestic Cars, by Horsepower Class, Six OECD Countries, 1964

Horsepower	U.S.	U.K.	Germany	France	Italy	Japan
			NUMBER OF CARS			
Under 50		9	7	7	3	13
50–74						
75–99	9	10	6	2	6	16
100–149	61	12	5		5	3
150–199	52		1			1
200–249	24	2				
250–299	23	1				
300 and over	26					
Total	195	67	40	17	17	50
			AVERAGE PRICE PER UNIT OF HORSEPOWER			
Under 50		$30.07	$30.73	$39.85	$34.03	$40.30
50–74		26.14	26.20	29.39	30.55	33.46
75–99	$20.75	25.08	24.72	29.61	28.20	29.16
100–149	16.26	26.40	25.54		31.83	34.98
150–199	12.24		31.97			29.57
200–249	10.48	17.35				
250–299	9.61	17.68				
300 and over	7.87					
All cars	11.57	25.19	26.58	32.17	30.45	32.50

is unique with respect to its per capita income, high-speed highways, distances traveled, and price of gasoline.

These generalizations based on our samples appear to be supported by the rough estimates that we have been able to make of the distribution of European and U.S. production by piston displacement, the variable with which we have been best able to obtain a look at the distribution of European output. When the percentage distributions of cars in our European samples are compared with those of production, as in Table 15.17, we see that because models with smaller engine sizes were produced in greater volume than those with large engines, our sample frequencies tend to underrepresent the importance of small cars, most seriously in the case of Italy. In the United States, there was no

output below 2,360 cubic centimeters, and we estimate that only 13 per cent of 1964 production fell between that lower limit and 2,999, with another 6 per cent in the low 3,000's. Our sample frequencies correspond closely; 15 per cent of the observations are between 2,360 and 2,999 cubic centimeters.

The differences in the kinds of cars produced in each country affect our comparisons in two ways, one statistical and the other economic. Statistically, our regressions measure the relationship between price and the independent variables only within the range of observation provided by our sample. Prices for cars with specifications outside this range have

Table 15.16
Number and Price Per Pound of Domestic Cars, by Weight Class, Six OECD Countries, 1964

Weight (lbs.)	U.S.	U.K.	Germany	France	Italy	Japan
			NUMBER OF CARS			
Under 1,200				2	2	2
1,200–1,599		9	6	3	1	6
1,600–1,999		25	17	4	1	7
2,000–2,399	3	9	9	6	5	12
2,400–2,799	49	11	2	2	5	9
2,800–3,199	60	4	5		2	14
3,200–3,599	52	7	1		1	
3,600–3,999	27	1				
4,000 and over	4	1				
Total	195	67	40	17	17	50
			AVERAGE PRICE PER POUND			
Under 1,200				$0.95	$0.72	$1.25
1,200–1,599		$0.88	$0.84	0.91	0.79	0.92
1,600–1,999		0.88	0.84	0.91	0.82	0.96
2,000–2,399	$0.76	0.79	0.96	0.78	1.02	0.93
2,400–2,799	0.74	0.76	0.97	0.99	0.85	0.85
2,800–3,199	0.72	1.05	0.91		1.48	1.04
3,200–3,599	0.70	0.89	1.72		1.67	
3,600–3,999	0.69	1.19				
4,000 and over	0.73	1.41				
All cars	0.71	0.90	0.92	0.87	1.10	0.96

Table 15.17
Estimated Percentage Distribution of Car Production and NBER Sample, by Piston Displacement, Four European Countries, 1964

Piston Displacement (cubic centimeters[a])	U.K.	Germany	France	Italy	Four Countries Combined
		NUMBER PRODUCED			
Under 500		3	12	26	7
500–999	22	14	45	35	26
1,000–1,499	48	59	26	33	45
1,500–1,999	24	17	16	5	17
2,000–2,999	4	7	1	1	4
Over 3,000	2	[b]			1
Total	100	100	100	100	100
		NUMBER IN SAMPLE			
Under 500			12	12	
500–999	7	15	35	6	
1,000–1,499	43	50	35	41	
1,500–1,999	24	23	18	18	
2,000–2,999	18	12		23	
Over 3,000	8				
Total	100	100	100	100	

[a]16.39 c.c. = 1 cubic inch. The class limits in the table convert to cubic inches as follows:

c.c.	cu. in.
500	30.5
1,000	61
1,500	92
2,000	122
3,000	183

[b]Less than 0.5 per cent.

to be estimated by extrapolation, and we cannot be sure that the relationship really would hold in this unobserved range. In an extreme case, we might find ourselves trying to compare prices for two countries which produced in completely different ranges of output so that extrapolation would be necessary if prices were to be compared. We are close to this situation in comparing France and the United States. If

the matching criterion is displacement there is no overlap. With respect to horsepower, our French sample contains only 2 cars (out of a total of 17) with horsepower as great as 80 and none with horsepower over 90, whereas the U.S. sample includes no car with less than 80 horsepower and only 3 (out of 195) with less than 90 horsepower.

From an economic standpoint, the relationships between price and size and power in any country may be influenced by the scale of production in different ranges of size and power. As figures in the lower bank of Table 15.15 show, the prices of automobiles do not increase proportionately as horsepower rises. However, in the United States, where economies of scale are obtained for a wide range of horsepower, price per unit of horsepower is not only lower in each horsepower class but declines more sharply with increasing horsepower than in any other country. In other countries, the downward thrust of price per horsepower is lost as early as the 75–99 horsepower range, where the scale of production declines. Our rough estimates indicate that in France, for example, nearly two-thirds of 1964 output was concentrated in a range of horsepower from 18 to 50, and the scale of production even for leading makes was relatively small at horsepowers in the low 80's. Because of the greater economies of scale at the lower horsepower ranges, regressions for France and the other foreign countries will produce high prices relative to those of the United States for cars in the upper horsepower range observed abroad and very high prices indeed for the powerful cars which are in the middle of the U.S. distribution but well beyond the French or other distributions.

A similar set of influences can be seen at work with respect to weight in Table 15.16. In this case, however, the tendency is toward a U-shaped curve, with price per pound declining as the volume-produced middle range of each country's distribution is approached and then rising again as volume thins out with heavier cars. There appears to be less tendency for increasing weight per se to pull cost per pound down as does increasing horsepower with respect to cost per horsepower. But the effect upon the regressions is probably the same since the prices per pound for the heavier weights near the end of the distribution tend to be higher than for the very light cars at the beginning.

The reverse impact on the U.S. regressions—that is, the tendency for them to be tilted so as to produce very high prices when extrapolated to small cars with low-powered motors—is weaker. U.S. production is

dispersed over a much wider horsepower range, and even at low horsepowers (80–100 units) and weights (2,000–2,399 pounds)—low, that is, for U.S. cars—cost per pound is not much higher than average, and the rise in cost per horsepower may be close to that inherent in engines of different size, scale of production being given. Even for these cars, the United States appears to have been able to obtain substantial economies of scale.[22]

These statistical and economic aspects of the regressions have a bearing upon their suitability for providing the answers we are seeking about international price competitiveness in automobiles. Our primary interest is in finding for comparison the prices in each producing country of the kinds of cars that enter international trade.[23] We do not have direct data on the characteristics of these cars but, bearing in mind both the country origins of exports (Table 15.3) and the type of cars produced in each country (Tables 15.5 and 15.15–15.17), we selected five cars of different sizes to represent the kinds of cars that are important in world trade.

The identity and specifications of these cars, and the share of OECD exports assigned to each are given in Table 15.18. The selection of the Italian Fiat and the German Volkswagen poses little question since each is not only representative of an important class of cars but important itself in its country's output and exports. French production, and probably exports as well, are concentrated in a less powerful range of cars than the Peugeot selected, but we needed a car in this range, and this one is at least well known both in its home market and abroad. Much the same is true of the English Zephyr. The U.S. Chevrolet is at the lower end of the U.S. horsepower distribution, but even so it already involves extrapolation beyond the observed horsepower range for France, and the U.S. production average (210 horsepower) would be beyond the ranges for all the other countries except the United Kingdom.

[22] A rough estimate based on data in *Ward's* indicates that more than 400,000 cars were produced in the United States in 1964 with horsepowers between 80 and 100. This number, though only a little more than 5 per cent of U.S. output, was equivalent to nearly one-third of total French production.

[23] Two questions still more difficult to answer on the basis of the regressions are: (1) What would be the price of an American-type car in Europe if it were produced in the same circumstances (particularly scale of production for individual firms and for the industry as a whole) as prevailed in 1964 for types actually produced, and (2) what would be the price of a European-type car in the United States if it were produced in the same circumstances as prevailed in 1964 for the types actually produced. Had we been able to develop a better indicator of the scale of production (see discussion of independent variables), it might have been possible to try to answer these questions.

Table 15.18
Specifications of Five Cars Taken as Representative of World Trade and Shares of Trade Represented

	Shares of Trade Represented[a]	Weight (lbs.)	Length (in.)	Displacement C.C.	Displacement Cu. In.	Horse-power
Fiat 600D (Italy)	20%	1,290	130.5	767	46.8	32
Volkswagen 1200 (Germany)	50	1,615	160.2	1,192	72.7	40
Peugeot 404 (France)	15	2,359	174.3	1,618	98.7	72
Zephyr 6 (U.K.)	5	2,618	180.9	2,553	155.8	106
Chevrolet Biscayne (U.S.)	10	3,300	209.9	3,770	230.0	140

[a]The starting point for estimates of the relative importance in OECD exports of cars best represented by each of these five was the share in OECD exports of each country. On this basis, we assigned 10 per cent (a little more than equivalent to U.S. and Canadian exports) to the Chevrolet Biscayne. The initial distribution for the other 90 per cent was based on the relative importance of different engine sizes in European production (the rightmost column of Table 15.17). However, an examination of exports by size classes for the one country (the United Kingdom) for which such data were available, and of unit values for the other European countries and Japan, suggested that very small cars (Fiat) were less important in trade than in production while the opposite was true for the next size class (Volkswagen). We therefore shifted ten percentage points from the initial estimates from the Fiat to the Volkswagen category, the amount of the shift being chosen to make our estimates of the net export prices approximate the unit values when the prices were weighted by the percentages in the distribution.

The price of each of these five cars in each foreign country was compared with the U.S. price by means of the regressions involving flexible pooling of all cars, pairing each country in turn with the United States. The results are set out in Table 15.19.

The comparisons for the Fiat and Volkswagen require extrapolations beyond the range of U.S. observations, but for reasons given above, we do not believe that the extrapolations lead to unreasonable results. Otherwise, aside from France, for which the observations do not cover even the Zephyr range of power, the comparisons are based in the main on cars actually produced—however uneconomically in some instances.

Table 15.19
Home-market Price Comparisons, Five Makes of Car, 1964
(U.S. price for each car = 100)

	Index: Ratio to United States of				
	U.K.	Germany	France	Italy	Japan
Fiat	79	71	72	72	92
Volkswagen	80	81	105	105	101
Peugeot	110	112	112	138	125
Zephyr	116	155	167	187	188
Chevrolet	134	247	307	337	305
Weighted mean	92	104	123	131	128
Addendum:					
$\bar{R}^2$	.92	.93	.90	.92	.89
Dummies retained[a]	*WMC*	*LDMC*	*WLDC*	*LDMC*	*WDMC*

[a] W = weight, L = length, D = piston displacement, M = mean effective pressure, C = country dummy.

Within the entire range of its actual production, the United States is the low-priced producer. The regressions tell us U.S. prices would be higher for Fiat- and Volkswagen-sized cars, if America produced them. It is possible that America could not beat European costs even if such cars were produced here in the same volume as current compacts and standard sedans; this might be the case if, for example, only small savings in labor costs were involved in shifting from production of a Zephyr- (or U.S. compact-) type to a Volkswagen- or Fiat-sized car.

Among the European producers the Continental countries are the low-priced producers of the smallest cars, but as we get to larger and more powerful models the United Kingdom emerges as the most price-competitive country. Germany, however, holds its own through the range that probably accounts for the great bulk of the export market. France becomes more and more expensive relative to the United Kingdom and Germany as car size increases, and Italy still more so. Japanese prices for very small cars are relatively high.

In the final row of the table we present a weighted average which indicates that overall the United Kingdom is about 8 per cent cheaper than the United States, Germany a little more expensive than the United States, and the other countries considerably higher priced. This outcome

is highly sensitive to the weights we employed, as might be inferred from the substantial differences in the price relatives for the five cars. In any case, even a properly weighted overall average would throw much less light upon competition in the world motor market than the price relatives for the individual types of cars. The market is really a number of different markets for distinct types of cars with elasticities of substitution that are probably low between cars that differ widely in size and power. The relation between price levels and trade should be examined for each of these separate types, not for the aggregate of all automobiles. The influence of the low U.S. price for large cars, which may explain the U.S. market share for U.S.-type cars, is obscured in the world market where the demand for smaller cars predominates.

Comparisons in Selected Markets

All the estimates considered thus far are deficient for our purposes because they relate to the prices of each country's car in its home market, and thus may not provide reliable guides to international price competitiveness. The manufacturers in one country may follow a one-price policy for sales at home and abroad while those in another country may charge different prices in different markets. The general pricing policies of the different producers are difficult to ascertain, and even when it can be established that different prices are charged, it is extremely difficult to get the systematic information necessary for regression analysis.

In view of these difficulties, we sought another approach to the measurement of price competitiveness—viz., the comparison of cars from different competing countries in particular markets. Ideally, we should like to have such a comparison for several important automobile-consuming countries which import a wide range of cars from all six of our producing countries without any discriminatory import regulations and without the complication of having varying degrees of domestic assembly and parts manufacture. What we actually have falls far short of this, viz., prices and specifications for a list of imported and domestic cars on each of four markets—the United States, the United Kingdom, France, and Japan. Furthermore, except for the French market data the number of observations for individual producing countries is not very large—often less than 10 (see the notes to Table 15.20). While

Table 15.20
Regression Comparisons of Home Prices and Prices on Four Other Markets, Five Makes of Car, 1964
(U.S. = 100 except in Japanese market, where Japan = 100)

	U.S.	U.K.	Germany	France	Italy
Home market prices					
Fiat	100[a]	79	71	72	72
Volkswagen	100[a]	80	81	105	105
Peugeot	100	110	112	112	138
Zephyr	100	116	155	167[a]	187
Chevrolet	100	134	247	307[a]	337
(No. of observations)	(195)	(67)	(40)	(17)	(17)
U.S. market					
Fiat	100[a]	98	99	81	80
Volkswagen	100[a]	102	105	91	86
Peugeot	100	120	136	142	115
Zephyr	100	142	178	228	159
Chevrolet	100	169	234[a]	366[a]	217
(No. of observations)	(129)	(11)	(7)	(6)	(3)
U.K. market					
Fiat	100[a]	33	38	39	40
Volkswagen	100[a]	38	49	48	52
Peugeot	100[a]	47	74	64	70
Zephyr	100	59	101	84[a]	117
Chevrolet	100	92	195	145[a]	236[a]
(No. of observations)	(110)	(50)	(11)	(8)	(12)
French market					
Fiat	100[a]	54	40	33	41
Volkswagen	100[a]	58	47	44	88
Peugeot	100[a]	63	65	48	79
Zephyr	100	77	65	59[a]	130
Chevrolet	100	95	76	90[a]	293
(No. of observations)	(33)	(54)	(32)	(33)	(20)

(continued)

Table 15.20 (concluded)

	U.S.	U.K.	Germany	France	Italy
Japanese market					
Fiat					202
Volkswagen		179	173	173	
Peugeot			212		
Zephyr	184		262		167
Chevrolet	112				
(No. of observations)	(2)	(3)	(7)	(1)	(2)

Note: In the description, below, of the regressions, *C* stands for a country dummy; *D*, piston displacement; *H*, horsepower; *L*, length; *M*, mean effective pressure, and *W*, weight.

Home markets: Each country pooled in turn with the United States. Independent variables: *WLDM*. Flexible pooling. See Table 15.19 and notes to Table 15.13.

U.S. market: Restricted to cars with 225 horsepower or less. All countries in one regression ($\bar{R}^2$ = .88). Independent variables: *WH*. Flexible pooling; country and *H* slope dummies retained for all four foreign countries.

U.K. market: Each country pooled in turn with the United States. Independent variables: *WLDM*. Flexible pooling. The dummies retained and $\bar{R}^2$ are, for the United States, *DM* and .91; for Germany, *WC* and .90; for France, *W* and .89; and for Italy, *D* and .87.

French market: Each country pooled in turn with the United Kingdom. (U.K. observations matched ranges of other countries better than French.) Independent variables: *WLDM*. Flexible pooling. The dummies retained and $\bar{R}^2$ are, for the United States, *DMC* and .93; for Germany, *WLDC* and .90; and for France, *WLC* and .92.

Japanese market: All countries in one regression ($\bar{R}^2$ = .98). Independent variable: *H*. Flexible pooling; country dummy retained for the United Kingdom and France, and *H* dummy for the United States, Germany, and Italy. There were 7 observations for Japanese cars.

Source: Home markets: See text discussion of Tables 15.1 and 15.2. U.S. market: U.S. cars as in home market; foreign cars from *Automotive News*, 1964 Almanac issue. U.K. market: *Autocar Buyers Guide*, October 11, 1963. French market: *Argus*, October 1963. Japanese market: Prices from *Oriental Economist*, May 1964; other data from source for home markets.

[a]Represents comparisons that fall outside the range of observed values of the country.

it is believed that all of the major imported models are included, the smaller the number of observations the more likely it is that the addition of another model could significantly affect the results.

The price comparisons for each of the four markets, derived by the methods applied to the home market data, are presented in Table 15.20 along with the Table 15.19 results. In France and the United Kingdom

home-produced cars tended to be cheaper—usually by upward of 15 per cent—than the equivalent cars of the lowest-priced foreign supplier, while in the United States the same was true for the range of cars actually produced domestically. Whatever the country, transport costs, import duties and restrictions, and other cost elements encountered by foreign producers gave the domestic makes a substantial advantage in the home market. The results showed also that the pattern of comparative advantage tended to be similar in all the sets of price comparisons. The U.S. advantage, it is again shown, lay with large cars. Indeed, for the main part of its output, which was well beyond the Chevrolet Biscayne in size and power, the United States was the cheapest supplier. Even for the Chevrolet Biscayne range, only German exports destined for the French market were cheaper. France and Italy had a comparative advantage relative to the United Kingdom and Germany in very small cars.

Germany, the world's leading exporter, is rarely found to be the low-priced supplier. Only in the French market were its cars priced at or below the prices of other foreign countries. In the U.K. market, French prices were as low as the German or lower for cars through the Peugeot range, and the United States was cheaper for large cars. In the U.S. market, France and Italy were cheaper than Germany for small cars, and the United Kingdom was cheaper for large ones.

Since we were interested in comparative export prices, we attempted to estimate the various elements that constitute the difference between foreign retail and f.a.s. export prices. The estimates are rough and are based on information, supplied mainly by two manufacturers, about freight and insurance costs, duties and other (nonretail) taxes, and dealer discounts and other distributive costs. The results, it can be seen from Table 15.21, again show patterns similar to the earlier ones. As is to be expected from the adjustments, the foreigners in each market look more competitive relative to the local producer than they were before, and the United States looks more competitive vis-à-vis other foreigners, particularly in the French market where Germany and Italy have preferential tariff access and the high French taxes and slightly higher dealers' margins allowed by U.S. firms magnify the higher U.S. transport costs.

The results of Tables 15.20 and 15.21 are puzzling in two respects. First, there is, as already mentioned, the absence of evidence of strong

Table 15.21
Export Price Level Comparisons Estimated from Regression Equations, Four Markets, Five Makes of Car, 1964
(U.S. = 100)

Market and Type of Car	Producing Country				
	U.S.	U.K.	Germany	France	Italy
U.S. market					
Fiat	100[a]	65	66	54	53
Volkswagen	100[a]	68	70	61	57
Peugeot	100	80	91	95	77
Zephyr	100	95	119	152	106
Chevrolet	100	113	156	244[a]	145[a]
U.K. market					
Fiat	100[a]	58	40	41	42
Volkswagen	100[a]	66	52	51	55
Peugeot	100[a]	82	78	68	74
Zephyr	100	103	107	89[a]	124
Chevrolet	100	161	207	154[a]	250[a]
French market					
Fiat	100[a]	64	52	73	53
Volkswagen	100[a]	69	61	97	114
Peugeot	100[a]	75	84	106	102
Zephyr	100	92	84	130[a]	168
Chevrolet	100	113	98	198[a]	379

Note: The U.S. duty was 6.5 per cent, and a 10 per cent federal excise was levied on the duty-paid value; U.K. duties were 25.5 per cent; and French import levies (including a compensatory tax for internal excises) were 41 per cent for cars from EEC members and 58 per cent for cars from third countries (U.S. duty from F. K. Topping, *Comparative Tariffs and Trade*, Committee for Economic Development, March 1963; U.K., from *Her Majesty's Customs and Excise Tariffs of the United Kingdom, Great Britain and Northern Ireland;* and French, *Journal of Commerce*, December 1, 1964). Transport costs, dealer discounts, and distributive expenses borne by manufacturers have been estimated on the basis of data supplied by two automobile manufacturers. U.S. shipping costs to the U.K. and French markets have been taken at 15 per cent of the plant net price on the assumption that cars were shipped completely assembled; costs would be much lower—around 3 per cent—for knockdown shipments. All the estimates are rough, and no attempt was made to prepare separate estimates for cars of different sizes.

On the basis of these estimates export price comparisons were derived by dividing the figures in Table 15.17 by the following factors: U.S. market: 1.50 for all foreign countries; U.K. market: 1.75 for the United States, 1.65 for other foreign countries; French

(continued)

Notes to Table 15.21 (concluded)

market; 2.20 for the United States, 1.85 for the United Kingdom, and 1.70 for Germany and Italy. Data were reconverted to United States as 100 in the case of U.K. and French market adjustments.

The method used, it should be noted, involves the comparison in each foreign market of the home country's domestic prices with the export prices of the other countries. It is, therefore, the relationships among these "other" countries' prices that is most significant in evaluating export price competitiveness.

[a]Represents comparisons that fall outside the range of observed values of the country.

price competitiveness on the part of Germany. One possibility is that German prices really are lower but our methods do not reveal it. German cars might have superior qualities that are not reflected by our independent variables. For example, there is not much ground for choosing, solely on the basis of our size and power variables (W, L, D, M), between the German Mercedes Benz 190 and a U.S. Chevy II,[24] but the German car sold for twice the price of the American car in the U.S. market and for 40 per cent more than the U.S. home price in the German market and was clearly regarded as a higher-quality car. However, for this factor to explain our results, the average quality of German cars, holding size and power constant, would have to be superior to that of the other countries. But the United Kingdom and Italy also turn out expensive cars reputed to be high in quality that are no larger or more powerful than cheaper cars; in the United Kingdom, for example, the Daimler, Jaguar, and Rover probably fall into this category. A more thorough and more expert study than we have been able to make might be able to identify the physical characteristics that mark off these more prestigious cars from the others and include one or more of these qualities among the independent variables.

The second problem posed by the results of our price comparisons is that even after adjustment for transfer costs, U.S. price competitiveness in European markets is much weaker than is suggested by the comparisons of home market prices. If the adjustments had been correctly made and if all producers followed single-price policies, the figures in Table 15.21 for each of the three markets should approximate the

[24]

	Chevy II	*Mercedes 190*
Weight (lbs.)	2,495	2,591
Length (in.)	183	186
Piston displacement (cu. in.)	153	116
Horsepower	90	90

comparisons of home market prices in Table 15.19. In most cases, however, the foreign-to-U.S. export price ratios are lower than the home market price ratios.

The market price data tell us that wrong or incomplete adjustments are unlikely to be wholly responsible for the large price increases in U.S. cars when they are sold abroad as compared to those of European cars when they are sold outside of their home markets. In the U.K. market, for example, the costs of entry for German, French, and Italian cars should be moderately lower (probably in the range of 2 to 12 per cent lower owing to the difference in transport cost);[25] but they all cost less there compared to American cars than would be inferred from home market price comparisons among the four.

Another possibility is that the comparisons are not for the same models and that the differences in the samples produce the differences in results. This again seems improbable at least for the French and home market samples.

The remaining explanation is that the pricing policies of the U.S. producers differ from those of the European producers.

We have not found a way to sort out the relative roles of these factors very precisely, but some evidence may be found by comparing foreign and home prices for identical models. In the French market, for example, we were able to find seven U.S. cars in the 100–199 horsepower range which were in our U.S. sample. They were being offered at prices which ranged from 222 to 278 per cent of their U.S. prices (median, 253 per cent). The United Kingdom, which faces the same tariff and related obstacles in the French market and which has a transport advantage over the United States that probably does not exceed 12 or 13 per cent, had among its offerings in the same horsepower range five cars that were selling at prices varying from 111 to 169 per cent of their U.K. domestic prices (median, 153 per cent). In similar comparisons, summarized in Table 15.22, the foreign prices of U.S. cars consistently bear a higher ratio to home prices than do those of any of the other producing countries.

When the actual ratio of foreign to home prices is compared to the ratio that might be expected on the basis of entry and distribution costs,

[25] The actual difference is probably near the lower limit for U.S. cars shipped knocked down and near the upper limit for those shipped fully assembled. According to an industry source 60 per cent of U.S. exports were shipped assembled in 1964.

Table 15.22
Foreign-market as Percentage of Home-market Prices of Identical Cars, 1964
(range and median in percentages)

Producing Country and Horsepower Range	Foreign Market			
	U.S.	U.K.	France	Japan
U.S. cars				
Under 200 H.P.[a]				
No. of cars		3	7	2
Range of price relatives		147–252	222–278	316–333
Median		184	253	325
Over 200 H.P.				
No. of cars		2	5	
Range of price relatives		199–234	245–305	
Median		216	282	
U.K. cars				
Under 100 H.P.				
No. of cars	5		13	3
Range of price relatives	115–138		111–169	198–223
Median	135		153	208
100–199 H.P.				
No. of cars	2		5	
Range of price relatives	143–155		150–162	
Median	149		153	
200 and over				
No. of cars	1		3	
Range of price relatives	149		155–174	
Median			168	
German cars				
Under 100 H.P.				
No. of cars	5	4	11	6
Range of price relatives	126–145	116–147	108–138	188–247
Median	130	128	118	214
Over 100 H.P.				
No. of cars	3	2	3	1
Range of price relatives	120–150	147–150	139–168	266
Median	141	148	144	

(continued)

Table 15.22 (concluded)

Producing Country and Horsepower Range	Foreign Market U.S.	U.K.	France	Japan
French cars				
Under 100 H.P.				
No. of cars	5	4		1
Range of price relatives	119–130	105–125		190
Median	124	118		
Italian cars				
Under 100 H.P.				
No. of cars	3	5	6	2
Range of price relatives	108–149	112–144	101–144	193–264
Median	123	112	113	228
Over 100 H.P.				
No. of cars	1		6	
Range of price relatives	114		124–141	
Median			139	

[a]No car with less than 100 H.P. was available for the comparisons in the French market and only one (95 H.P.) for the U.K. and Japanese markets.

as in Table 15.23, the contrast between foreign pricing by the United States and that by other countries again seems quite striking. The figures are subject to wide margins of error, since the adjustments are quite crude, but it seems clear that transport costs and tariffs cannot explain the relatively large gap between foreign and domestic prices of U.S. cars.

The explanation may lie in costs not included in our calculations, such as the need to maintain servicing and sales facilities; in view of the low volume of sales of U.S. cars in these markets, high prices may be necessary to recover these costs. But the other foreign countries are able to reach higher volume; why not the United States?

Perhaps U.S. firms already established in Europe do not find it economical to compete for the European market from so great a distance. This situation may be due in part, at least, to the European need for somewhat different design features—cars that are adapted to maneuverability in narrow city streets, driving on rough country roads, expensive

Table 15.23
Expected vs. Actual Foreign Market Prices of Cars, 1964
(prices as per cent of home market price)

	Foreign Market		
	U.S.	U.K.	France
U.S. cars			
Expected		140	176
Actual		199	266
U.K. cars			
Expected	120		148
Actual	137		155
German cars			
Expected	120	132	136
Actual	136	138	120
French cars			
Expected	120	132	
Actual	124	118	
Italian cars			
Expected	120	132	136
Actual	118	112	124

Note: Expected prices in foreign markets are those that would prevail if our estimates of entry and foreign distribution costs were correct and if producers did not discriminate between home and foreign markets in their price policies. The percentages of home prices that these expected prices represent were derived by dividing the adjustment factors given in the Note to Table 15.21 by 1.25 on the assumption that home retail list prices were 25 per cent higher than f.a.s. export prices.

Actual prices as a percentage of home prices for identical cars represent the median percentages of all the cars (without classification by horsepower) included in Table 15.22 for each producing country in each foreign market.

gasoline, and the investment of smaller amounts of capital to go with lower income levels.[26]

The variation of the ratios for individual producing countries in each market (in Table 15.22) clearly suggests that producers do not in general follow uniform pricing policies at home and abroad. As between markets also, there is some evidence (in Table 15.23) that a given producing country does not necessarily maintain the same export price or even the same (duty paid) price to dealers. German cars, for exam-

[26] At least in some European markets, U.S. exports consist mainly of expensive specialty-type models.

ple, are higher priced in the U.S. market and lower priced in France than one would expect solely on the basis of German home market prices and entry costs in those two markets. Similarly, French cars are cheaper than expected in the U.K. market. These differences, it may be noted, are consistent with the findings of the regression analysis (cf. Table 15.20). In some instances, such as some French cars in the U.K. market and Italian cars in France, the foreign car prices were only slightly above the home prices (Table 15.22), even though entry costs amounted to more than 30 per cent of the home price.

Summary of International Comparisons

In Table 15.24 we bring together the various means we have found to compare the prices of automobiles produced by different countries. The summary figures derived from the regressions (columns 3 to 6) represent weighted averages of the comparisons for the five types of cars presented earlier.

Despite some puzzling aspects, the results seem on the whole consist-

Table 15.24
Summary of Indicators of Relative Automobile Prices, 1964
(U.S. = 100)

	Domestic Price per			Foreign Market Data: Export Price per Car[d]		
	H.P.[a] (1)	Pound[b] (2)	Car[c] (3)	U.S. Market (4)	U.K. Market (5)	French Market (6)
U.S.	100	100	100	100	100	100
U.K.	121	104	92	104	83	68
Germany	119	130	104	140	70	62
France	143	112	123	205	66	86
Italy	136	126	131	128	73	81
Japan	141	122	128			

[a]Cars with 75–99 H.P. (see Table 15.15).

[b]Cars weighing 2,000–2,799 pounds (see Table 15.16).

[c]Based on averages of price comparisons for five cars, each computed from regressions in which each country was paired with the United States (see Table 15.19).

[d]Data in Table 15.21 weighted as follows: U.K. and French market weights based on distribution of production shown in Table 15.17; U.S. market weights based on new-car registrations giving data for imported cars and breakdowns for all cars by cylinder (*Automotive Industries*, March 15, 1967, p. 102). In columns 4–6 the domestic prices of the home country's cars are compared with the export prices of the other countries.

ent with the trade flows. The price relationships in the French market in particular seem correctly to mirror the premier position of Germany in world exports and the runner-up place of the United Kingdom. German price competitiveness shows up less favorably in the other markets; the U.K. and U.S. foreign market data results may be discounted because they are based on a small number of observations, but this is not true of the home market data. It is possible, of course, and indeed even likely, that the relative price positions of different countries vary from one market to another and that our comparisons are correct for each market. It seems clear that the German price position is highly favorable to exports, but it is possible that German cars of a given size and horsepower tend in some markets to command premium prices relative to cars in a similar category produced by other countries.

The United States has the lowest home prices for the types of cars it actually produces, but its competitive position abroad is adversely affected by a number of factors, including foreign preferences for smaller and less powerful cars and higher markups in foreign markets over home prices than are found for cars produced by other countries.