The U.S.-Japan Automotive Bilateral 1994 Trade Deficit

May 1991

for
The Automotive Parts Advisory Committee

by
The Office for the Study of Automotive Transportation
The University of Michigan Transportation Research Institute

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The overall objectives of the Office for the Study of Automotive Transportation (OSAT) are to provide information resources, industry analysis, communication forums, and academic research that meet the continually changing needs of the international automotive and automotive-related industries.

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16. Abstract

This report examines the bilateral automotive trade deficit with Japan which still accounts for a larger share of the overall U.S. trade deficit than any other bilateral, product-specific category of trade. In 1990, the U.S.-Japan automotive trade deficit was $31.1 billion, or 28% of the U.S. total trade deficit and 76% of the overall 1990 U.S. trade deficit with Japan. This analysis indicates that the size of this deficit will not be reduced in coming years, but will change importantly in composition. An understanding of the development of this specific trade deficit is critical in the formation of policies meant to improve overall U.S. trade performance. This report's estimate of the level of the U.S.-Japan bilateral automotive trade deficit is a combination of separate forecasts of the vehicles and parts deficits. However, developments in U.S.-Japan vehicle trade largely determine patterns in the parts trade imbalance. A major result of this study is the estimate of the growing importance of the parts deficit in the overall bilateral deficit. Implications are that almost half of the bilateral deficit will be directly determined by Japanese sourcing. This report's analysis and projections suggest a continuing serious problem in the bilateral automotive trade deficit with Japan.

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Executive Summary

The specific bilateral deficit we examine in this report—the bilateral automotive trade deficit with Japan—still accounts for a larger share of the overall U.S. trade deficit than any other bilateral, product-specific category of trade. In 1990, the U.S.-Japan automotive trade deficit was $31.1 billion, or 28% of the U.S. total trade deficit and 76% of the overall 1990 U.S. trade deficit with Japan. Our analysis indicates that the size of this deficit will not be reduced in coming years, but will change importantly in composition. An understanding of the development of this specific trade deficit is critical in the formation of policies meant to improve overall U.S. trade performance.

Our estimate of the level of the U.S.-Japan bilateral automotive trade deficit is a combination of separate forecasts of the vehicles and parts deficits. However, developments in U.S.-Japan vehicle trade largely determine patterns in the parts trade imbalance. The 1990 vehicle deficit—or the trade imbalance between the United States and Japan in assembled cars, trucks and vans—is virtually the same, measured in constant dollars, in 1990 as it had been in 1985. However, the constant dollar automotive parts deficit grew during 1985-1990 at an annual average rate of almost 17%. In 1990, the U.S.-Japan automotive parts deficit, a total of $10.5 billion, accounted for 99% of the total U.S. trade deficit in automotive parts. In other words, except for Japan, 1990 U.S. trade in automotive parts with the rest of world was virtually in balance.

We use a "scenario-modelling method," to forecast the 1994 bilateral vehicles trade deficit with Japan. We first develop scenarios of the 1994 U.S. market, our best judgements of developments in the U.S. automotive market by 1994. That, in turn, requires forecasting the sales goals and achievements of the vehicle manufacturers, both Japanese and Big Three. We then link these projected sales patterns to the manufacturer's domestic-and foreign-vehicle sourcing patterns. We tie these automotive scenarios to the vehicle categories underlying the official statistics on the U.S. vehicle deficit.

Our "Most Likely" vehicle trade scenario estimates 1994 Japanese vehicle imports of 2.3 million, and U.S.-sourced vehicle exports to Japan of 89,000. In constant dollars, the vehicle import bill increases .05%, to $21.3 billion, while the current dollar increase is just over 20%, reaching $25.6 billion. Vehicle exports pass $1.5 billion constant dollars, up over 260%, and $1.8 billion current dollars, an increase of over 300%. Subtracting vehicle exports from imports leaves a U.S. deficit of just under $19.8 billion constant dollars, down some 4% from 1990, or about $23.7 billion current dollars, some 15% higher than in 1990.

We use a statistical forecast method to estimate the 1994 bilateral automotive parts trade deficit with Japan. The model is based on an analysis of the effects of Japanese transplant production, aftermarket demand, and demand from traditional U.S. vehicle producers for imported Japanese auto parts during 1985-1990. For example, about $3,200 of imported of auto parts from Japan are related to unit assembly of Japanese vehicles in the United States during 1985-1990. Our 1994 forecast of parts imports from Japan is partially based, then, on a 1994 forecast of Japanese transplant vehicle production of 2.5 million.

Our "Most Likely" parts trade scenario estimates that Japanese parts imports into the United States will reach $21.5 billion constant dollars in 1994, up over 89%, while the current dollar increase is just over 126%, reaching $25.7 billion. We simply trend U.S. parts exports to Japan on the basis of annual average growth demonstrated by such shipments in 1985-1990. Thus, we forecast constant dollar parts exports to Japan of $3.1 billion in 1994, a 247% increase, while the current dollar increase is 320%, reaching $3.8 billion. Subtracting parts exports from imports leaves a U.S. deficit of $18.3 billion constant dollars, up almost 75% from 1990, or about $22.0 billion current dollars, some 110% higher than in 1990.

We also perform a detailed analysis of the sourcing practices of a "leading" Japanese transplant assembler in 1989. The selected case study is found to be the leading Japanese transplant producer in terms of U.S. domestic sourcing of parts and component purchases. The purpose of the exercise is to check our statistical results on likely patterns in transplant sourcing in recent years, and the future behavior of other, lower volume and more recent transplant producers in future years. Our analysis is based on both public and internal, OSAT sources of information. Our results indicate that, in 1989, approximately 38% of customs the value of the transplant's U.S. vehicle production was sourced from Japan, 46% from transplant facilities in the United States, including the transplant's own, and 16% from U.S. traditional automotive suppliers and third country imports. We estimate that this producer achieved an average customs value based domestic content level of 62% in 1989.

Our vehicle and parts trade forecasts are combined to yield overall estimates of the U.S.-Japan bilateral automotive deficit for 1994. Our "Most Likely" case projects a constant dollar 1994 deficit of $38.1 billion, up 23% from 1990, or about $45.7 billion current dollars, 47% higher than in 1990. On the other hand, our "Best Case" scenario projects a total bilateral automotive trade deficit, including both vehicles and parts, of $29.4 billion (constant dollars), down some 5% from 1990.

A major result of this study is our estimate of the growing importance of the parts deficit in the overall bilateral deficit. For example, our "Most Likely" constant and current dollar forecasts call for the share of the parts deficit to rise from 34% in 1990, to 48% in 1994. This would imply that almost half of the bilateral deficit will be directly determined by Japanese automotive firms operating in the United States or Japan through their specific decisions on sourcing. Our analysis and projections, then, suggest a continuing serious problem in the bilateral automotive trade deficit with Japan.

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I. Introduction

The United States still finds itself, at the beginning of the 1990s, facing a number of serious economic problems. The "twin deficits"—the federal budget deficit and the balance of trade deficit—are still among the most serious and consistent of these areas of concern. This report focuses on a conceptually narrow component of the U.S. trade deficit: the U.S. deficit in one product area with one country. Although limited in scope, the specific bilateral deficit we examine—the bilateral automotive trade deficit with Japan—still accounts for a larger share of the overall U.S. trade deficit than any other bilateral, product-specific category of trade. Our analysis indicates that the size of this deficit will not be reduced in the coming years, but will change importantly in composition. An understanding of the development of this specific trade deficit is critical in the formation of policies meant to improve overall U.S. trade performance.

This report updates and extends our earlier 1989 study and forecast of the 1993 U.S.-Japan automotive trade deficit.[1] We think this update is necessary. Our prior study highlighted the vehicle component of the trade deficit and lacked adequate information on the most dynamic portion of the overall U.S.-Japan automotive trade imbalance: the deficit in automotive parts and components. In this study we attempt to improve our prior analysis of the automotive parts imbalance through the use of new information and more advanced methods. Once again, the ultimate focus of our analysis is to project the likely bilateral automotive balance with Japan for a specific forecast year: 1994. Once again, we recognize that much of the forecast will be based on factors, developments, and events that are important in automotive competition, but may be less important in other trade areas.

The U.S. Automotive Trade Balance

Figure 1 displays the U.S. automotive trade deficit from 1985 through preliminary estimates for 1990.[2] Automotive products generated a current-dollar deficit of $53 billion in 1990, up from about $41 billion in 1985, but slightly down from about $57 billion in 1989. Complete vehicles accounted for a deficit of about $43 billion, up from a level of $41 billion in 1989, reflecting vehicle imports of $53 billion and exports of $11 billion. Automotive parts,

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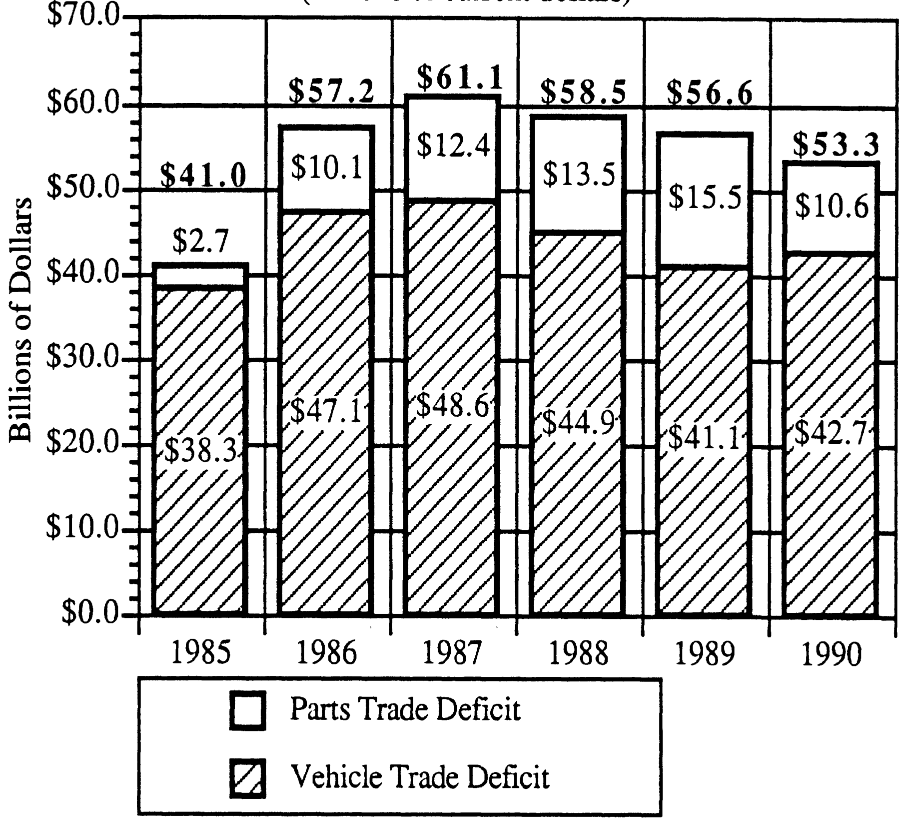
[1]Michael S. Flynn, Sean P. McAlinden, and David J. Andrea, <u>The U.S.-Japan Bilateral 1993 Automotive Trade Deficit</u>, Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan, Ann Arbor, 1989.

[2]All automotive trade figures, unless otherwise noted, were supplied directly by the U.S. International Trade Commission, Washington D.C. Please see Appendix I for historical, trade-related data tables.

on the other hand, generated a deficit of almost $11 billion in 1990, a considerable reduction from $16 billion in 1989.

Figure 1
U.S. Total Automotive Trade Deficit
1985-1990
(billions of current dollars)



Source: U.S. International Trade Commission

The importance of the automotive sector in overall U.S. trade performance is clear. **The automotive trade deficit accounted for 49% of the preliminary estimate of the total U.S. merchandise deficit of $109 billion in 1990. In 1989, the automotive trade deficit accounted for 61% of the U.S. manufactured goods deficit, 52% of the merchandise trade deficit, and 51% of the total U.S. current account deficit.**[3] As before, we are reluctant to attach specific causal meaning to the relationship of the automotive deficit to these broader deficits, which are composed of

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3 Preliminary estimate of 1990 U.S. merchandise trade deficit reported in Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, March 1991, p. 43. Other 1989 non-automotive, customs value trade deficits are taken from various publications of International Trade Administration. The 1989 current account deficit reported in Federal Reserve Bulletin, Board of Governors of the Federal System, Washington D.C., Volume 77, Number 3, March 1991, p. 53.

thousands of bilateral, specific surpluses and deficits. We do contend however, that the automotive deficit represents a serious impediment to the further reduction of these broader deficits. In effect, the automotive deficit remains a significant, ongoing barrier to further serious improvement in overall U.S. trade performance. The scale of effort required to offset the automotive trade deficit through exports in other product areas would be enormous, and would require, we feel, a deliberate policy of picking "winners and losers" in U.S. trade and manufacturing in a world hardly yet characterized by free trade.

Two patterns are present in the U.S. automotive trade deficit from 1985-1990. First, there is a growing importance of the automotive parts deficit in the overall automotive trade imbalance. In 1985, the automotive parts category accounted for less than 7% of the overall automotive deficit. The parts share rose to 27% of the total auto deficit by 1989, and then dropped to 20% in 1990. In fact, 73% of the increase in the automotive deficit between 1985 and 1990 is due to change in the parts deficit. A second clear development is the consistent share of the Japanese bilateral deficit in the overall automotive trade deficit. Japanese automotive trade with the United States accounted for 57% of the automotive deficit in 1985, fell to 55% in 1987, but peaked again at 59% in 1989, and remained over 58% in 1990. No other U.S. bilateral automotive deficit has demonstrated such a consistent pattern in its shares of the broader deficit measures.

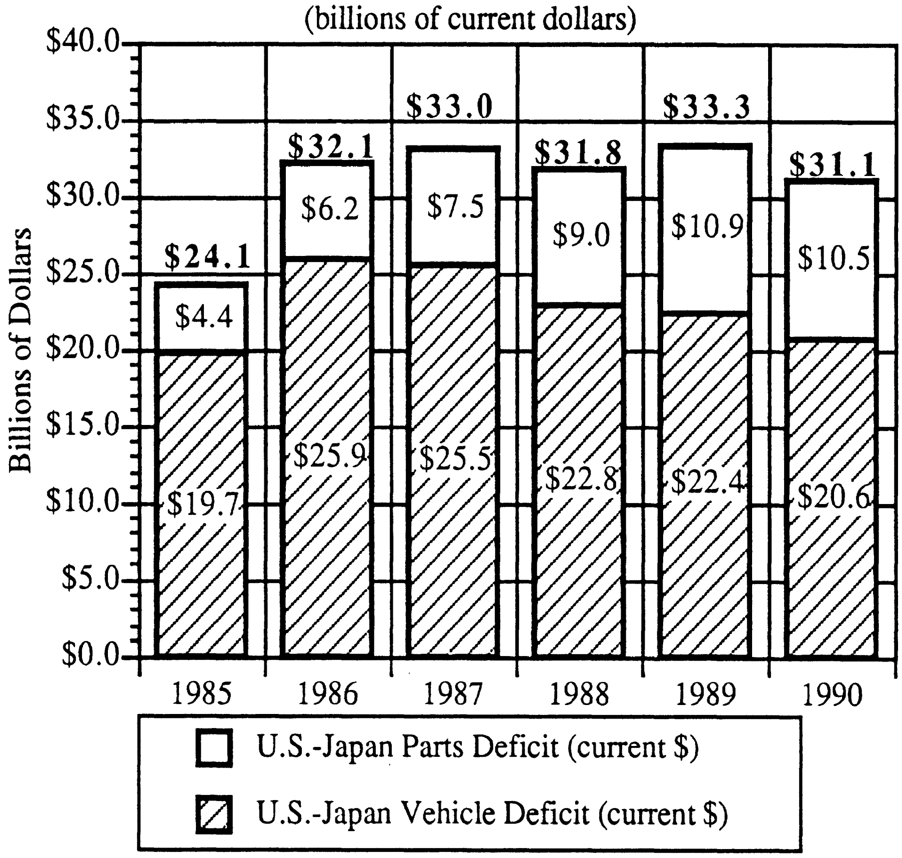
The U.S.-Japan Automotive Trade Deficit

Figure 2 displays the U.S.-Japan automotive trade deficit from 1985 through preliminary estimates for 1990. U.S. automotive trade with Japan generated a current dollar deficit of $31.1 billion in 1990, up 29% from $24.1 billion in 1985, but down slightly from $33.3 billion in 1989. In constant dollars, this deficit peaked at $34.8 billion in 1987, and the 1990 level is 11% below this historic peak, representing an 18% increase from the 1985 level.[4] This constant dollar increase in the deficit developed in a period that saw the yen/dollar exchange rate fall from a level of 238 in 1985 to 138 in 1990, a macro-economic adjustment, many believe, which should have resulted in major decreases in this deficit.

[4]Constant dollars of automotive shipments in this report are computed by using the Producer Price Index (PPI) for Motor Vehicle Equipment and Parts products, generated by the Bureau of Labor Statistics, U.S. Department of Labor and reported in various issues of the Survey of Current Business. The base period is September, 1990. Prior annual shipments are inflated using annual levels of the PPI for that year in ratio to the September, 1990 level. Prior monthly shipments are inflated using monthly levels of the PPI for that month in ratio to the September, 1990 level.

A striking development in the automotive trade imbalance with Japan is the growing contribution of the parts deficit to that overall bilateral deficit. In 1985, the parts deficit of $4.4 billion accounted for about 18% of the total U.S.-Japan automotive deficit. The parts share rose to almost 23% in 1987, and continued to rise to almost 37% in 1990 when it reached $10.5 billion. It is important to note that, in constant dollars, the level of the vehicles deficit—or the trade imbalance between the United States and Japan in assembled cars, trucks, and vans—was virtually the same in 1990 as it had been in 1985. Even in constant dollars, however, the parts deficit grew throughout 1985-1990, at an annual compound rate of 16.6%. The entire percentage increase in the overall U.S.-Japan automotive deficit, then, can be attributed to the increase in the parts imbalance. **In 1990, the U.S.-Japan automotive parts deficit accounted for 99% of the total U.S. trade deficit in auto parts. In other words, except for Japan, 1990 U.S. trade in auto parts with the rest of the world was essentially in balance.**

Figure 2
U.S.-Japan Automotive Trade Deficit
1985-1990
(billions of current dollars)

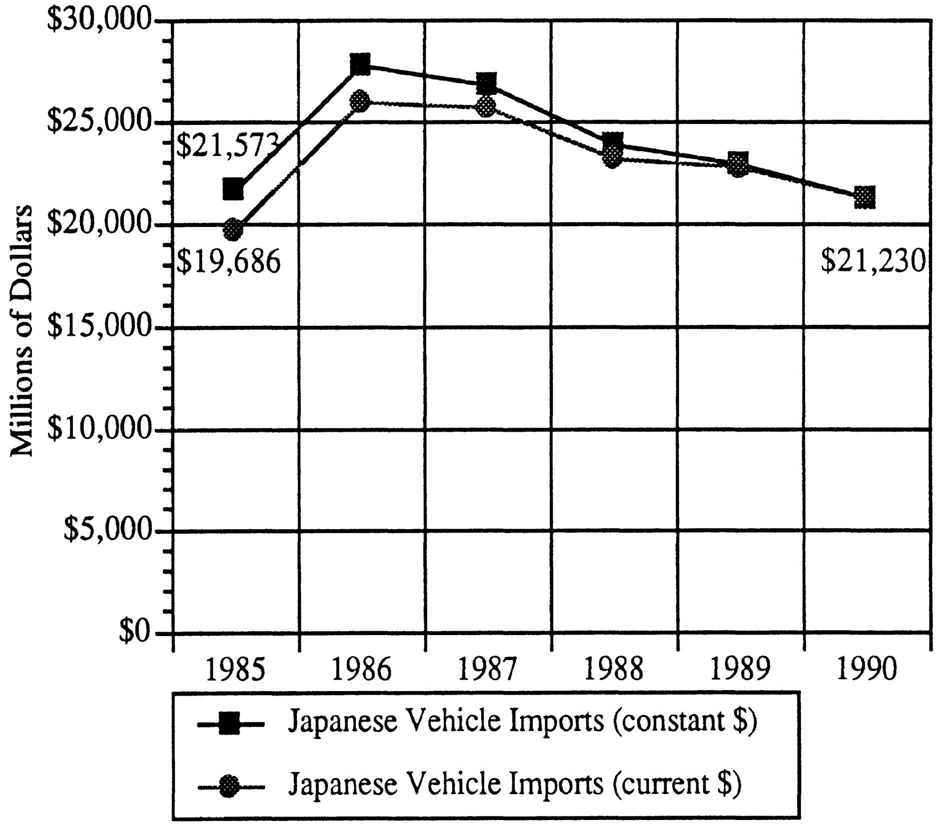


Source: U.S. International Trade Commission

Figures 3 and 4 provide further detail on patterns in U.S.-Japan automotive trade. Dollar levels of vehicle imports into the United States from Japan peaked in both current and real dollars in 1986, a record U.S. sales year for motor vehicles. The constant dollar level of Japanese vehicle imports in 1990, however, was essentially at the same level as 1985. Dollar levels of parts imports to the United States, on the other hand, only recently peaked in 1989 at $11.6 billion, and only fell somewhat in 1990 to $11.4 billion. The recent 1989-1990 decline in parts imports was the only year-to-year decline in 1985-1990, a period during which Japanese parts imports grew at an annual compound growth rate of 19.6% measured in current dollars, or 17.4% using constant dollar amounts.

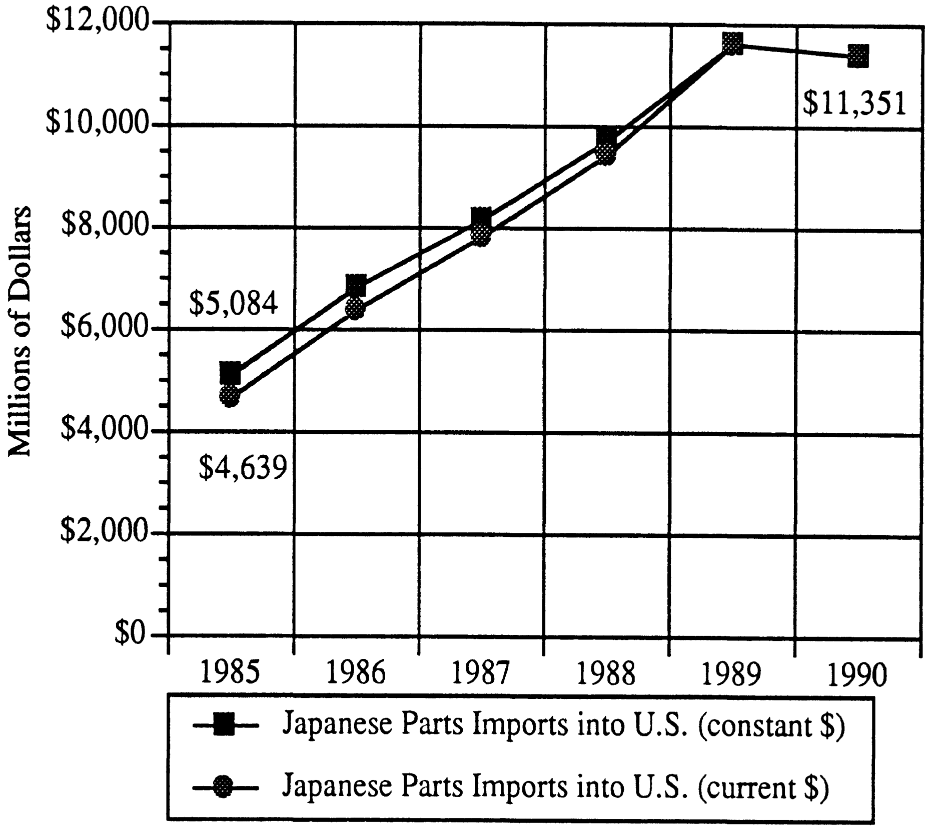
Growth rates in U.S. exports of automotive products to Japan are even more impressive than those for parts imports from Japan. Unfortunately this impressive growth is based upon exceedingly small initial amounts. The United States exported only $20 million in vehicles to Japan in 1985, a total which grew at an annual rate of over 97% during 1985-1990 to reach $587 million in 1990. In a similar fashion, U.S. 1985 parts exports to Japan of $203 million grew at an annual rate of 34% through 1990, to reach $893 million in 1990. Clearly, these trends are positive developments. However, it is also clear that they must be maintained for some period of time to reduce substantially the overall level of the U.S.-Japan automotive trade imbalance.

Figure 3
Value of Japanese Vehicle Imports into the United States
1985-1990



Source: U.S. International Trade Commission

Figure 4
Value of Japanese Parts Imports into the United States
1985-1990



Source: U.S. International Trade Commission

The U.S.-Japan automotive trade deficit has historically accounted not only for a large share of the total U.S. automotive trade deficit, but also for an important share of the overall U.S.-Japan merchandise trade deficit. Preliminary estimates indicate that this larger, overall deficit may have fallen by 16% in 1989-1990, to a level of $41.1 billion. If so, the 1990 automotive imbalance with Japan was responsible for 76% of the overall U.S. merchandise trade deficit with Japan, up from 70% in 1989. U.S.-Japan automotive trade also affects a number of other broader bilateral deficits with Japan. This has become especially important with the construction and operation of over 250 Japanese affiliated automotive assembly and parts facilities in the United States, and with the further expansion of Japanese automotive production in a number of countries that trade with the United States.

Any comprehensive discussion on the full effect of the Japanese automotive sector on U.S. trade performance must reflect the following developments:

- Japanese automotive firms have invested at least $13 billion in production facilities located in the United States by 1989. The purpose of these facilities is to produce vehicles and automotive parts, primarily for sale in the United

States. Yet there is considerable evidence that the bulk of the investment in construction of these facilities was sourced to Japanese construction firms operating in the United States, and that an overwhelming share of the machine tools and other equipment placed in these facilities were imported from producers based in Japan. Finally, many of the financial services associated with these investments were provided by Japanese financial firms. The first and third of these activities increase the U.S. current account and services deficits with Japan, although they are not reflected in the official "automotive trade deficit." The second, Japanese imports of machine tools and equipment for use in their transplant facilities, increases the U.S. merchandise deficit with Japan in products outside of the automotive sector.

- Profits earned on these transplant investments will eventually return to Japan and exacerbate the U.S. current account deficit for years to come.[5]

- Imports of parts and components—connected to sales of Japanese vehicles in the United States—from Japanese-affiliated suppliers in third nations such as Taiwan, South Korea, Canada, Mexico, and Malaysia, worsen the overall automotive and merchandise trade position of the United States, although they do not appear in the bilateral trade figures with Japan.

- Japanese automotive competition in traditional overseas U.S. export markets for automotive products, such as Canada, Latin America, and the Middle East, reduces U.S. exports to those regions. Finally, Japanese competition in Western Europe can be expected to reduce the profit performance of U.S. subsidiaries operating in those regions, and thus the U.S. current account.

The trade effects of these developments are not reflected in the official bilateral automotive trade statistics, which increasingly, therefore, underestimate the full impact of Japanese automotive activity on the U.S. trade balance. However, these additional trade effects are not a direct subject of this study. Furthermore, we do not discuss the social and economic costs—other than their direct effects on bilateral automotive trade—of Japanese automotive competition in the United States. These costs—which include, for example, the rapid socioeconomic decline of a number of U.S. central cities, and the loss of many billions in tax revenue through reduced U.S. economic growth—surely exist, and are tremendous in scope. The goal of this study, however, is to understand and forecast the more narrowly defined U.S.-Japanese bilateral automotive trade in vehicles and parts through 1994.

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[5]For a precise discussion of the effect of transplants on this area of the national income and product accounts see: Larry R. Moran, "Motor Vehicles, Model Year 1990," Survey of Current Business, Volume 70, Number 11, November 1990, p. 29.

II. Data and Method

We use a "scenario-modelling method," a combination of accounting and regression models, to forecast the 1994 bilateral automotive trade deficit with Japan. We first develop scenarios of the 1994 U.S. market, our best judgments of developments in the U.S. automotive market by 1994. That, in turn, requires forecasting the sales goals and achievements of the vehicle manufacturers, both Japanese and Big Three. We then link these projected sales patterns to the manufacturers' domestic- and foreign-vehicle sourcing patterns. We tie these automotive scenarios to the vehicle categories underlying the official statistics on the U.S. vehicle deficit.

The linkage of these automotive scenarios to the deficit is based on the analysis of U.S. sales, build, fleet, and import data over the 69 months from January, 1985 through September, 1990. This analysis yields coefficients that link vehicle sales volumes and sourcing patterns to the customs value of vehicle imports, and vehicle build and fleet composition to the customs value of part imports. These coefficients, characteristic of the 1985-1990 period, are then applied to the 1994 automotive scenarios. This yields the predicted customs values, in constant dollars, of vehicle and part imports from Japan in 1994. The current dollar estimate is formed by correcting these constant dollars to reflect increases in the consumer price index (CPI), vehicle prices, and the exchange rate.

Forecasting the 1994 automotive trade deficit with Japan also requires developing a scenario of 1994 U.S. vehicle and parts exports to Japan. We again tie the customs values of U.S. vehicle exports to Japan to our automotive scenarios. We project part exports to Japan by simply extrapolating the trend of the 1985 to 1990 period.[6] This permits taking both bilateral imports and exports into account.

We rely on two automotive scenarios, both grounded in the description of the U.S. market in 1990. These scenarios focus on the performance of Japanese produced vehicles in the 1994 U.S. market, including the likely sourcing of those vehicles from Japanese and U.S. production facilities. These 1994 market projections reflect our assumptions and analyses of

[6]We simply do not have enough knowledge of the plans of the Japanese manufacturers to develop specific U.S. sourcing scenarios. Our projection is, in our view, almost assuredly optimistic, calling for more than tripling the value of U.S. part exports to Japan by 1994. However, that makes it conservative in estimating the trade deficit, because overestimating these parts exports introduces an underestimation of the parts deficit.

the corporate goals and strategies of the automotive producers and the likely decisions of U.S. consumers.

We develop two alternative scenarios because there are ample grounds for honest and reasonable disagreement among analysts on each of the many assumptions and arguments that underlie any particular scenario. The first scenario adopts those assumptions and outcomes we feel are the most likely to develop, without prior regard to or consideration of their influence on the size or composition of the trade deficit. This scenario constitutes a "Most Likely Case." The second scenario adopts those plausible assumptions and outcomes that would minimize the bilateral automotive trade deficit with Japan. This is the "Best Trade Case" from a deficit reduction perspective. The presentation of these two scenarios will not satisfy all readers, but it should narrow the grounds of debate.

Direct automotive trade between the United States and Japan is composed of two primary categories of goods: finished or fully built-up (FBU) vehicle units; and parts and components. Both of these goods are important to the overall bilateral balance, but they exhibit different patterns and reflect different dynamics. As a result, separate analyses of these two major categories of automotive trade are performed in this study. The results of these analyses are then combined to produce an overall forecast of 1994 U.S.-Japan automotive trade.

This study first examines trends and patterns in trade of finished vehicles between the United States and Japan. We estimate likely Japanese vehicle market shares in the United States, by segment, and then forecast the source of these segment sales from Japan and from U.S.-based Japanese transplants. Important considerations in this analysis include the likely use of captive imports and transplants by the traditional North American producers, and the export intentions of Japanese transplants themselves. The vehicle trade section of this study is a critical first step, not only for the purpose of estimating the likely vehicle deficit of 1994, but also in terms of providing information needed in the forecast of parts trade. Parts trade is analyzed in a separate section of the study.

Standard multiple regression techniques are applied to parts trade data for the period 1985-1990. These techniques permit the use of appropriate controls and corrections for measured quantities, and allow for a formal estimate of automotive imports into the United States from Japan. We analyze the 1985-1990 period because pre-1985 data are now less useful in developing a forecast model of parts trade for a future characterized by large volumes of transplant production, lack of U.S. government involvement in the Voluntary Export Restraint (VER) program, and increasing sales penetration by Japanese producers in large vehicle segments. The vehicles trade analysis provides several key forecast parameters in this estimation procedure, including transplant build levels in 1994. Since the growth trend in parts trade has recently been highly volatile, this section concludes with an examination of percentage changes in specific imported and exported products over the 1985-1989 period. The purpose of the product analysis is to detect any apparent patterns in specific parts and components that might inform the overall forecast of parts trade.

We conclude with a special case study of the sourcing and trade content of a major Japanese transplant assembler in the United States. The trend in Japanese parts imports connected to transplant production is highly controversial. We selected a "leading" producer, in terms of its stated "domestic content" performance and the maturity of its production operations in the United States. By 1994, a number of transplant producers will have operated in the United States for a period of years, theoretically allowing their domestic sourcing to develop and mature. We perform this case study analysis in order to gain some insight about the likely trade effects of overall transplant production in 1994. The selected Japanese-affiliated assembler produced a large number of vehicles in the United States in 1990, and has been assembling vehicles in the United States for some time. An examination of the level of domestic sourcing exhibited by this transplant in 1989, and its sourcing patterns over time may tell us much about the likely future performance of other, newer Japanese transplant producers.

Our analysis relies on three essential types of data. The first is government statistics. The U.S. International Trade Commission (ITC) and International Trade Administration (ITA) provided data on U.S. general automotive exports to and imports from Japan, including cars, trucks, and components. The ITC provided monthly data, corrected for the January, 1989 conversion to "harmonized" codes for the calender years 1985 through September, 1990, or a total of 69 months. This monthly data set contains 61 parts categories and provides great detail on the import and export dollar values and vehicle quantities underlying the bilateral deficit. The ITA provided a separate list of annual dollar values for general parts exports and imports at an even finer level of detail (215 parts categories) for the calender years 1985-1990. Both the ITA and ITC vehicle and parts category lists are displayed in Appendix II and III.

The second type of data is the published estimates of the industry media. Levels of actual monthly U.S. sales for the various trade categories of vehicles were collected from the annual *Automotive New Market Data Book*. Levels of traditional and transplant monthly U.S. production, by vehicle category, were taken from *Ward's Automotive Reports* for the January, 1985 through September, 1990 period.

A third type of data is the information collected to perform the transplant sourcing case study. We use the most recent Foreign Trade Zone Board annual report information to determine the base levels of the transplant's parts markets and the value of its output. We then rely on several well regarded and comprehensive studies of the contribution of specific parts, components, and operations to vehicle unit cost to determine specific parts markets for this transplant's output. Finally, we use a variety of automotive parts sourcing directories, including our own internal directory of transplant parts suppliers,[7] to identify domestic suppliers to this transplant and determine its likely capacity for domestic sourcing.

[7] Brett C. Smith, Japanese Automotive Supplier Investment Directory, Third Edition, Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan, Ann Arbor, 1990.

III. Trade in Motor Vehicles

What will the bilateral vehicle deficit with Japan be in 1994? This section develops two automotive scenarios to propose alternative answers to this question. These scenarios detail vehicle imports from Japan and exports to Japan. They also estimate the U.S. build of Japanese-owned U.S. production facilities, and their exports to Europe, for use in Section IV's analysis of the parts deficit. These scenarios will then be linked to the bilateral automotive trade deficit, relying on procedures discussed in Section II.

These automotive scenarios require forecasting the 1994 sales goals, achievements, and sourcing patterns of the vehicle manufacturers, both Japanese and Big Three. We suspect that, in addition to normal business considerations, the "politics of trade" will influence the Japanese manufacturers' sales goals and sourcing plans. Therefore, our scenarios reflect our judgments of the political as well as business drivers influencing the 1994 market.

We also must allocate these projected sales to domestic and foreign vehicle sourcing patterns. This is important because both Japanese and Big Three manufacturers will rely on import and domestically produced vehicles to meet their U.S. sales goals. Moreover, these sourcing patterns will influence not only the level of the vehicle deficit, but the composition of the overall bilateral automotive deficit, which reflects both vehicles and parts. While vehicle imports from Japan directly affect the size of the vehicle trade deficit, Japanese nameplate vehicles produced in the United States directly affect the size of the parts trade deficit. Japanese vehicles produced in the United States contain a higher proportion of parts imported from Japan than do Big Three vehicles. So even if the Japanese manufacturers substitute U.S. vehicle production for imported vehicles, it will not totally eliminate the value of foregone vehicle imports from the bilateral deficit. Rather, it will eliminate some of that value and shift some of it into the parts deficit.

Seven Japanese vehicle manufacturers now have production capacity in the United States, and that capacity will reach about 2.5 million vehicles by 1994, as displayed in Table 1. Their combined sourcing patterns will be a powerful determinant of the level of parts imports from Japan. If they maintain high levels of Japanese import content as their U.S. production volumes increase, then imports of Japanese parts will correspondingly accelerate. If, on the other hand, these manufacturers increase their current levels of U.S. sourcing, then the rise in parts imports will be smaller, even though volume increases will undoubtedly still result in some increase in total parts imports.[8]

Table 1
Announced 1994 Japanese Transplant Capacity Estimates
for the United States

Company	Location	Car	Truck	Total
Honda	Marysville and East Liberty, OH	510,000	0	510,000
Toyota	Georgetown, KY	480,000	0	480,000
Nissan	Smyrna, TN	310,000	150,000	460,000
NUMMI	Fremont, CA	205,000	120,000	325,000
Mazda	Flat Rock, MI	245,000	0	245,000
Diamond-Star	Normal, IL	240,000	0	240,000
SIA	Layfayette, IN	60,000	60,000	120,000
Ford-Nissan	Avon Lake, OH	0	100,000	100,000
	U.S. Total	2,050,000	430,000	2,480,000

Source: Office for the Study of Automotive Transportation, University of Michigan, 1991.

1994 Automotive Scenarios

Our two automotive scenarios present two possible 1994 markets, reflecting our assumptions and analyses of the corporate goals and strategies of the automotive producers and the likely decisions of U.S. consumers. The first scenario reflects our view of the "Most Likely Case," those assumptions and outcomes we feel are the most likely to develop. The second scenario adopts those plausible assumptions and outcomes that would result in the minimization of the bilateral automotive trade deficit with Japan, our view of the "Best Trade Case." While these two scenarios will not satisfy all readers, they should narrow the automotive terms of debate in reference to the 1994 bilateral automotive deficit.

The "1990 Case"

Figure 5 displays Japanese light vehicle unit sales in the United States from 1985 through 1990, presenting import and transplants separately. Total Japanese sales receded after

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[8]The bilateral deficit with Japan would also fall if the Japanese manufacturers shifted their sourcing for U.S. production from Japan to third countries, such as Malaysia or Taiwan, rather than to the United States. However, such a strategy would not reduce the overall U.S. auto parts deficit.

1986, the largest vehicle sales year in U.S. history, but reached a new peak in 1990, although the size of the total light vehicle market fell about 15% compared with 1986. There has been a steady decline in vehicle imports, from just under 3.5 million in 1986, to about 2.3 million in 1990, but this decline has been offset by a steady increase in transplant production, from under 300,000 in 1986 to well over one million in 1990. The sourcing of Japanese sales has shifted rather substantially, falling from 91% import in 1986 to 61% import in 1990, as the Japanese manufacturers have brought U.S. production capacity on line.

Figure 6 breaks out Japanese exports to the United States by type of vehicle. Car imports peaked in 1986, at just about 2.5 million, and declined to some 1.7 million by 1990. Light truck imports reached almost 1 million units in 1986, and fell to just under 600,000 in 1990. Throughout this period passenger cars, as a percentage of total imports, have remained fairly stable, accounting for some 70% to 75% of total imports.

Figure 5
Japanese U.S. Vehicle Sales by Source
1985-1990
(thousands of units)

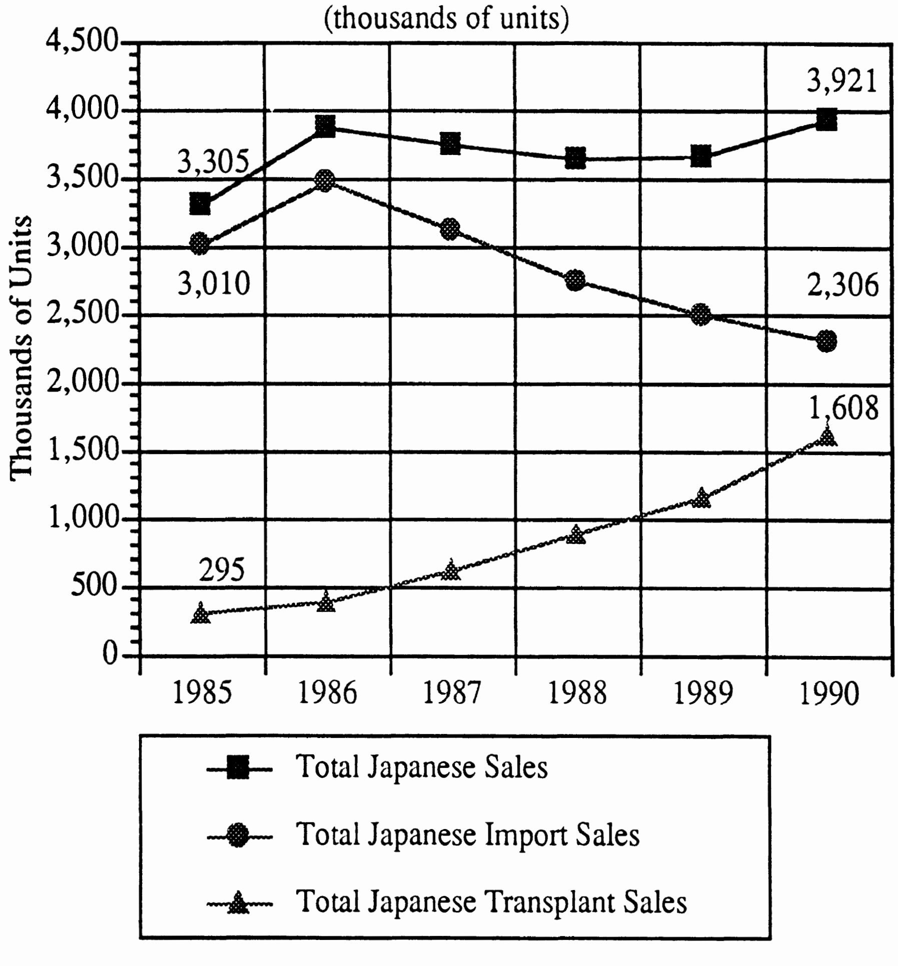
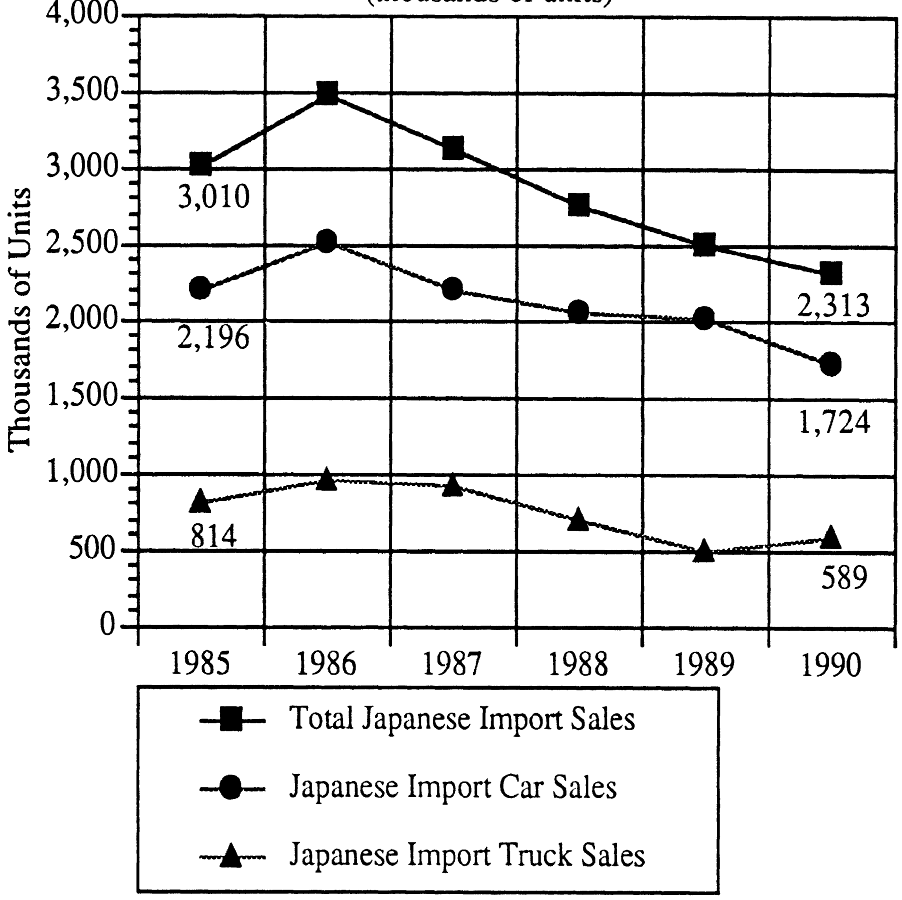


Table 2 displays some statistics on the 1990 vehicle market and trade year, totalling 9.3 million passenger vehicles and 4.6 million light trucks, including vans, trucks, and sports/utility vehicles. This market comprised three broad segments: small cars at 35% of the total, intermediates at 43%, and large/luxury cars at 22%.[9]

Figure 6
Japanese Vehicle Imports into the U.S.
1985-1990
(thousands of units)



Japanese imports, including captives retailed by the Big Three, amounted to some 1.7 million sales, or 18.5% of the passenger car market, while Japanese production facilities in the

[9]Differing segmentations of the market exist, reflecting weight, wheelbase, interior space, price, engine size, etc. and combinations thereof. We collapsed the segmentation scheme of *Ward's Automotive Reports* to the three categories (roughly small, middle, and large/luxury). This segmentation emphasizes price and size, and permits the most direct conversion to the engine-based categories used in trade data. Examples would be Ford Escort and Tempo (small), Ford Taurus (intermediate), and Lincoln Continental (large/luxury). Our earlier forecasts relied on a four-way segmentation of the vehicle market. We have reduced this to three-way to permit more ready transfer between these automotive market categories and the three-way classification approach relied upon for trade data. The conversions of this Table to trade classifications can be found in Table 1 of Appendix VII.

United States accounted for another 1.5 million sales (14.5%), again including captive vehicles in this total. Thus Japanese manufacturers combined sales of U.S. and Japanese produced passenger cars reached about 3.1 million, or 33% of the passenger car market, up about six points since 1988. Japanese shares reached 50% in small cars, 38% in intermediates, and 10% in large/luxury passenger cars. Japanese imports were predominantly small (51%), while 38% were intermediates, and 11% fall into the large/luxury segment. All U.S. production by Japanese manufacturers was in the small (57%) or intermediate (43%) market segments.

Table 2
1990 U.S. Sales of Japanese Vehicles
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
Small	35.2%	875	765	1,639	50.1%	53.5%	50.9%
Inter-mediate	42.8	646	579	1,225	30.8	40.0	37.6
Large/ Luxury	22.0	197	0	197	9.7	6.4	11.5
Total	100.0%	1,718	1,344	3,061	——	99.9%	100.0%

Light Truck Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
588	156	743	16.3%

Memo: The 1990 passenger car market equalled 9.3 million units. Of the 1990 market, transplants (like Figure 5, including some, but not all, Canadian vehicles and excluding Mexico) held 14.5% market share; and Japanese imports, 18.5%. The 1990 light truck market equalled 4.559 million units. Of the 1990 light truck market, transplants (with no Canadian units) held 3.4% and Japanese imports 12.9%.

It merits comment that the Japanese share of the large/luxury market has almost doubled in the past two years, moving from 5% to just under 10%. This vehicle category is extremely important for the trade deficit because these passenger cars have high customs values. While the Japanese manufacturers decreased their unit passenger car imports some 18% from 1988 to

1990, from 2.1 to 1.7 million, they increased these high value imports some 89%, from just over 100,000 to just under 200,000, raising their share of Japanese imported cars from 5% to over 11%. This has protected the Japanese industry's revenue flow from the United States and prevented the dollar value of the bilateral vehicle deficit from falling proportionally to the decrease in import vehicles.

Light trucks registered just under 4.6 million sales, or nearly 33% of the total 1990 light duty vehicle market of 13.9 million. These included 588,000 Japanese imports, for a 12.9% market share, and an additional 156,000 (3.4%) domestically produced Japanese nameplates, reaching a total Japanese manufacturer share of just over 16%, up about 1.5 points since 1988.[10]

As discussed above, we forecast 1994 values through a combination of regression and accounting models. For vehicles, we project values by associating unit customs values, determined by our regression analysis of trade data, with the number of units predicted by the automotive scenarios. As displayed in Table 3, when these combined techniques are applied to "forecast" the 1990 trade deficit, the results are quite close (within 5%) to the actual figures for 1990. These results provide some confidence in the usefulness of the overall method.

We see the 1994 market as likely consisting of roughly 11.0 million passenger car sales and 5.0 million light trucks, reflecting expected growth as the economy recovers later in 1991.[11] This market maintains the current segment structure of the passenger car market and sets truck share at just over 31%. This market is consistent with other available projections.

The key factors for predicting the vehicle trade deficit are the market share of Japanese imports, the level of vehicle exports to Japan from the United States, and the value of traded vehicles. The key market factor for projecting the parts deficit is the total number of Japanese vehicles produced here, and the domestic/offshore parts sourcing for those vehicles. This

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[10]We exclude the Mazda Navajo, produced for Mazda by Ford at its Louisville, KY plant, from this calculation for the same reason that we include captive passenger cars manufactured by Japanese companies, but retailed by the Big Three: production share of sales is more directly related to the bilateral deficit, in both vehicles and parts, than is nameplate market share.

[11]The similarity of these projections to our earlier forecasts is not an accident. Those forecasts were predicated on an economic forecast that called for the economic downturn to develop in 1990, and for 1991 to be the first year of the recovery. That downturn developed about one year later than that forecast, making 1994 equivalent in the economic cycle to the 1993 of those earlier forecasts.

section covers the 1994 market projections for both types of vehicles, although the tying of domestically produced vehicles to the parts trade deficit is covered in Section IV.

Table 3
1990 U.S.-Japan Vehicle Deficit
Model Trade Case

U.S. Import of Japanese Vehicles

Category	Units (in thousands)	Customs Value 1990 average	Constant Billions of Dollars 1990 average	1990 Actual Billions of Dollars
4 cylinder	1,390	$ 8,425	$ 11.711	$ n.a.
6 cylinder	271	13,746	3.725	n.a.
8 cylinder	57	25,870	1.475	n.a.
Truck	588	5,602	3.294	n.a.
Total	2,306	—	$ 20.204	$ 21.230

Exports of U.S. Vehicles to Japan

Units	Customs Value	Constant Billions of Dollars	1990 Actual Billions of Dollars
33,771	$17,376	$ 0.587	$ 0.587

U.S.-Japan Vehicle Deficit

	Constant Billions of Dollars	Current Billions of Dollars
U.S.-Japan Vehicle Deficit	$ 19.617	$ 20.643

Note: n.a. = not available

The 1994 "Most Likely" Scenario

If the market develops as we think most likely, what would the bilateral automotive trade deficit be in 1994? The answer to this question requires the formulation of an automotive scenario for 1994, conversion of that scenario to a customs categorization, and assignment of customs values to the import and export vehicles.

Corporate Strategies. Some analysts expect to see lower levels of Japanese vehicle sales in the United States. They argue that a resurgent Big Three will capture market share from at least some Japanese manufacturers. We are not persuaded that this assumption is tenable.

We see little on the horizon that suggests that the Big Three is likely to recapture market share from the Japanese. First, Big Three production share of the U.S. passenger car market continues to fall, shrinking another point from 1990:1 to 1991:1, reaching 58.7% in the latter period. Second, while the Big Three appear to hold a price advantage over the Japanese manufacturers at this time, even that has not reversed their share erosion. Third, we see no evidence that the Big Three have succeeded in winning back significant numbers of younger buyers, or that first-time buyers are substantially increasing their preference for traditional domestic vehicles. Fourth, we do not feel that announced Big Three product offerings suggest that major shifts in these patterns are likely by 1994. To be sure, the Big Three have had products that met with encouraging market success, and undoubtedly will continue such achievements. However, these successes have been limited and focused, and primarily led to share shifts within the Big Three. None have yielded the sustained and broad appeal that recaptured market share from the Japanese manufacturers.

Moreover, the Japanese manufacturers have often gained share during market downturns, then held near that share gain as the market recovered. We know of no persuasive evidence that suggests that their 1991:1 share gains will prove temporary as the 1990/1991 downturn ends. Rather, we think it likely that the Japanese manufacturers will adjust their product offerings, building on their time-to-market advantage, and pursue price strategies as necessary to preserve current share levels.

The increased competitiveness of the Big Three will more likely show itself in a reduced share of the U.S. market held by European importers. To be sure, some of the Japanese manufacturers may experience share loss. The smaller manufacturers, like Subaru and Daihatsu, certainly could experience severe difficulties by 1994. However, we expect that any share losses they experience will more likely go to the major Japanese players, like Honda and Toyota than to the Big Three. Moreover, GM shows no evidence of decreasing its reliance on Isuzu and Suzuki, and the success of GM's Geo strategy suggests GM will probably increase its sourcing from its Japanese affiliates as the market turns up. While Chrysler has decreased its captive imports from Mitsubishi, that may simply provide Mitsubishi the vehicles it needs to expand its dealer network and to pursue share more aggressively under its own nameplate.

On the other hand the U.S. manufacturers are becoming more competitive, both in price and quality, so increases in Japanese share will not come as readily as they have in the past. What kind of market will 1994 bring, and what will be the pattern of Japanese sales?

We think Honda will fight fiercely to defend its increased share of the U.S. market, which reached 9.2% for 1990. While the media has concentrated attention on Honda's sales decline during 1991:1, Honda has managed to increase its share over 1990:1, moving from 8.2% to 8.8%. We think that Honda will be hard pressed to increase its share beyond the 1990 levels, but see little reason to expect Honda share to fall.

On the other hand, we think that Toyota will undertake a concerted effort to replace Honda as the number one Japanese passenger car nameplate in the United States, perhaps increasing from its 1990 8.4% share to about 10%. We think that Toyota will seek to have its leadership position in the Japanese industry reflected in its sales position in the world's largest market. Moreover, we think that Toyota has the human and financial resources to accomplish this.

Nissan is a bit of a puzzler, managing to take only 5% of the U.S. market, trailing Honda badly, although Nissan substantially outsells Honda in both Japan and Europe. We think Nissan will aggressively pursue market share increases, but are not persuaded that they will be successful. Nissan has managed to recover some earlier share losses in Japan over the past few years, but that success has not carried over to the U.S. market. Nissan's share in 1991:1 fell to 4.4%, from 4.8% in the comparable quarter of 1990.

We believe that Mazda and Mitsubishi will make serious efforts to increase their production share of U.S. sales. If their captive sales through Ford and Chrysler, respectively, fall off, we are confident that they will seek to expand their own nameplate sales. Mazda had very good years in Japan and Europe in 1990, and we expect their U.S. performance to follow suit. Mitsubishi has been increasing its share in Japan over the past few years, and has enormous resources behind it. Taking these factors into consideration, we think it is likely that these two companies will increase their combined U.S. market share by about 1 point by 1994, whether through captives or under their own nameplate.

Subaru has faced serious market problems the past few years, and we expect this to continue. The fates of Isuzu and Suzuki are largely in the hands of General Motors, and we expect GM to increase its sourcing from these affiliates as the market turns up. Daihatsu remains at peril because of its small volumes and low VER quota. These companies could well lose about 1.5 points of their 1990 4.2% share of the U.S. market. Nevertheless, if they should lose share, it almost certainly will be to other Japanese companies.

We believe that these company scenarios, or any number of other likely scenarios developed on the basis of corporate performance and strategies, suggest that the Japanese manufacturers will probably increase their combined share by about one point, to just under 34% of the passenger car market. In fact, they might gain even more, perhaps as much as three points, but we think that is less likely.

Passenger Car Sourcing. Many analysts anticipate that the expected Japanese manufacturers increases in U.S. production will substitute for import vehicles. We are much less sanguine that the Japanese manufacturers will substitute transplant production for imports. To date, only Toyota shows evidence of following this strategy, and decreases in the import activity of other producers, notably Nissan, are more readily explained by difficulties in a falling market. Undoubtedly some substitution will occur, but we do not expect it to reach substantial levels.

We believe that most, if not all, Japanese manufacturers will continue to resist substituting transplant production for imports from Japan. Their production base in Japan must run at or near planned capacity to maintain its efficiency and to provide employment for the home workforce. While market growth elsewhere in the world may absorb some of the output currently targeted to the United States, we do not think it will be sufficient to redirect a major portion of that output. Moreover, the Japanese manufacturers stress the independence of their American operations, and resist analyses that treat these facilities as "Japanese,"[12] and link their production to import levels.

We assume that 2.3 million vehicles, the current VER limit, continues to represent the Japanese manufacturers' preferred level of passenger car exports to the U.S. market. We believe that domestic U.S. production represents additional sales, rather than import substitutes, in the strategies of the manufacturers. To be sure, all these manufacturers would like to see imports fall. However, we think each of them hopes that their competitors will provide the decrease, while their own strategies and goals call for fairly high levels of exports to the United States. There are two reasons why continued high levels of vehicle exports from

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[12]It is interesting to note that the Japanese "Big Three" appear to have followed quite different strategies during 1991:1 in response to the passenger car market downturn. All three have experienced sales losses compared to 1990:1, although Honda (-11.5%) and Toyota (-13.2%) have outperformed the market (-17.5%), while Nissan has underperformed it (-25.1%). Both Honda and Toyota have experienced greater sales declines for their U.S. produced cars than for their imports, 13.4% vs. 9.2%, and 20.0% vs. 8.0%, respectively. Nissan shows the reverse pattern, with an increase of 21.0% for U.S. produced cars, and a decrease of 36.7% for imports. We feel that this reflects different sales strategies, at least partially grounded in differing concerns with protecting levels of production in the United States and Japan.

Japan are likely. First, they will be required to meet the Japanese manufacturers' U.S. market share targets. Second, they will be needed to meet goals for Japanese production volumes.

We simply do not see these manufacturers surrendering significant U.S. export sales and balancing that production loss in Japan from exports elsewhere. This is especially the case in light of the capacity added in Japan over the past few years. Toyota, for example, has announced its intention to manufacturer 10% of the world's motor vehicles by 1995, and no credible strategy exists for achieving that without substantial increase in its share of the U.S. market. While Toyota might increase its U.S. production beyond its announced and rumored capacity plans, it still must maintain production volumes at home to ensure efficient capacity utilization and worker cooperation. And that means continued exporting of vehicles to the United States.

Nevertheless, the Japanese manufacturers will not have totally unrestricted choice of Japanese or U.S. sourcing of vehicles. They will need to maintain production in both countries, and will find themselves constrained by other developments. For example, some of these companies may reach a "natural" market ceiling, some will find themselves constrained by product allocation decisions, and most will face economic and political pressure to maintain substantial levels of U.S. production. These levels will have to be sufficient to ward off charges that U.S. operations are simply extra capacity that can be idled or closed when market conditions warrant.

We think that Japanese passenger car exports to the United States are likely to remain at roughly their current volume levels, and, thus, capture a decreased market share as the 1994 market grows by some 18% over the 1990 market. This would lower their 1994 share by about three points. We thus see a stronger Japanese performance than many, calling for sales of about 1.7 million Japanese exports in the 1994 U.S. market, but at a substantially lower market share—about 15.5% —of that 11 million passenger car market.

We think that the transplants will be successful, with most operations selling at or above their rated capacities. That raises their sales to about one million vehicles in each of the small and intermediate segments, for a total transplant sale just above two million passenger cars. Transplant share will thus reach 18.4%, and total Japanese share will reach 33.9%, up about one point from 1990. Total Japanese passenger car sales will reach 3.7 million, up from 3.1 million, or some 22% as the market increases by 18%.

However, our scenario suggests that the sourcing of those sales will change substantially. The Japanese manufacturers' passenger car sales in the 1990 market were 56% imports and 44% domestics. Our 1994 scenario calls for 46% imports and 54% domestics. Even though the 1994 vehicle imports will represent a richer mix, the constant dollar value of vehicle imports will almost certainly not rise; and even if the domestic content of the transplants increases, the value of parts imports will almost certainly increase. Thus, the vehicle share of the total bilateral deficit will likely decrease, while the parts share increases.

We think that the Japanese will continue to move aggressively upscale and capture larger shares of the intermediate and, especially, the large/luxury segments. The Japanese product plans clearly call for more intense emphasis on the large/luxury segment than on the intermediate segment. We also expect them to continue to enjoy success in this segment, as Honda and Toyota have notably achieved. The Japanese U.S. facilities will continue to produce small and intermediate cars, so we expect a substantial shift in the segmentation of Japanese imports. We see 1994 Japanese imports at 44% small, 27% intermediate, and 28% luxury/large. This is a much richer value mix than the 1990 mix.

Light Trucks. Mazda, Nissan, and Toyota are committed to being "full-line" manufacturers, and will compete aggressively in the light truck market. Mazda and Toyota compete successfully in both compact pick-up trucks and vans, and Nissan continues to seek an effective entry in the van segment. Isuzu and Daihatsu are perhaps stronger in this segment than they are in passenger cars.

However, the Big Three have clearly been more successful in the light truck market than in the passenger car market, whether that reflects the 25% tariff on most Japanese light trucks or the superior performance of the Big Three. Nevertheless, we see Japanese share in this important segment increasing by 1994, probably to about 22% of the light truck market. Again, Japanese strategies and the importance of this vehicle segment suggest that the Japanese manufacturers will aggressively target growth in this segment. The competitive strength of these manufacturers should provide them the means to reach such a level, although at this time we feel a "natural" market limit in light trucks will remain considerably below that limit in passenger cars.

To reach a 22% market share, Japanese light truck exports to the U.S. market will probably increase rather than decrease, and 1994 exports might exceed 600,000. This would be an increase of about 3.5% over 1990, and account for just over 12% of the market. The more competitive orientation in this market is likely to limit the transplants to about 500,000 light truck sales, another 10% of the market. Total Japanese light truck sales and share, then, would be somewhat over 1.1 million light trucks, or about 22% of the market.[13]

Table 4 displays this 1994 market.[14] Figure 7 expands Figure 5 and presents the sourcing of total Japanese vehicle sales for this 1994 market in the context of 1985 through 1990. Figure 8 displays 1994 Japanese imports of cars and light trucks, again in the context of 1985-1990 imports. Japanese share of the U.S. total light vehicle market rises to just above 30%, up from about 27.5% in 1990.

Table 4
1994 U.S. Sales of Japanese Vehicles: "Most Likely" Market
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
Small	35.2%	758	982	1,740	44.9%	46.6%	44.4%
Inter-mediate	42.8	468	1,044	1,512	33.1	40.5	27.4
Large/Luxury	22.0	480	0	480	19.8	12.9	28.1
Total	100.0%	1,706	2,026	3,732	——	100.0%	100.0%

1994 U.S. Sales of Japanese Light Trucks: "Most Likely" Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
608	500	1,108	22.2%

Memo: The 1994 passenger car market equals 11.0 million units. Of the 1990 market, tranplants (including some Canada) hold 18.4% market share; and Japanese imports, 15.5%. The 1990 light truck market equals 5.0 million units. Of the 1990 light truck market, transplants (with no Canadian units) hold 10.0% and Japanese imports 12.2%.

[13]We expect initial production of the oft-rumored Toyota fullsize pick-up truck to appear later in the 1994 sales year.

[14]The conversions of this Table to trade classifications can be found in Table 2 of Appendix VII.

Figure 7
Japanese U.S. Vehicle Sales by Source
1985-1990 and
Most Likely 1994 Forecast
(thousands of units)

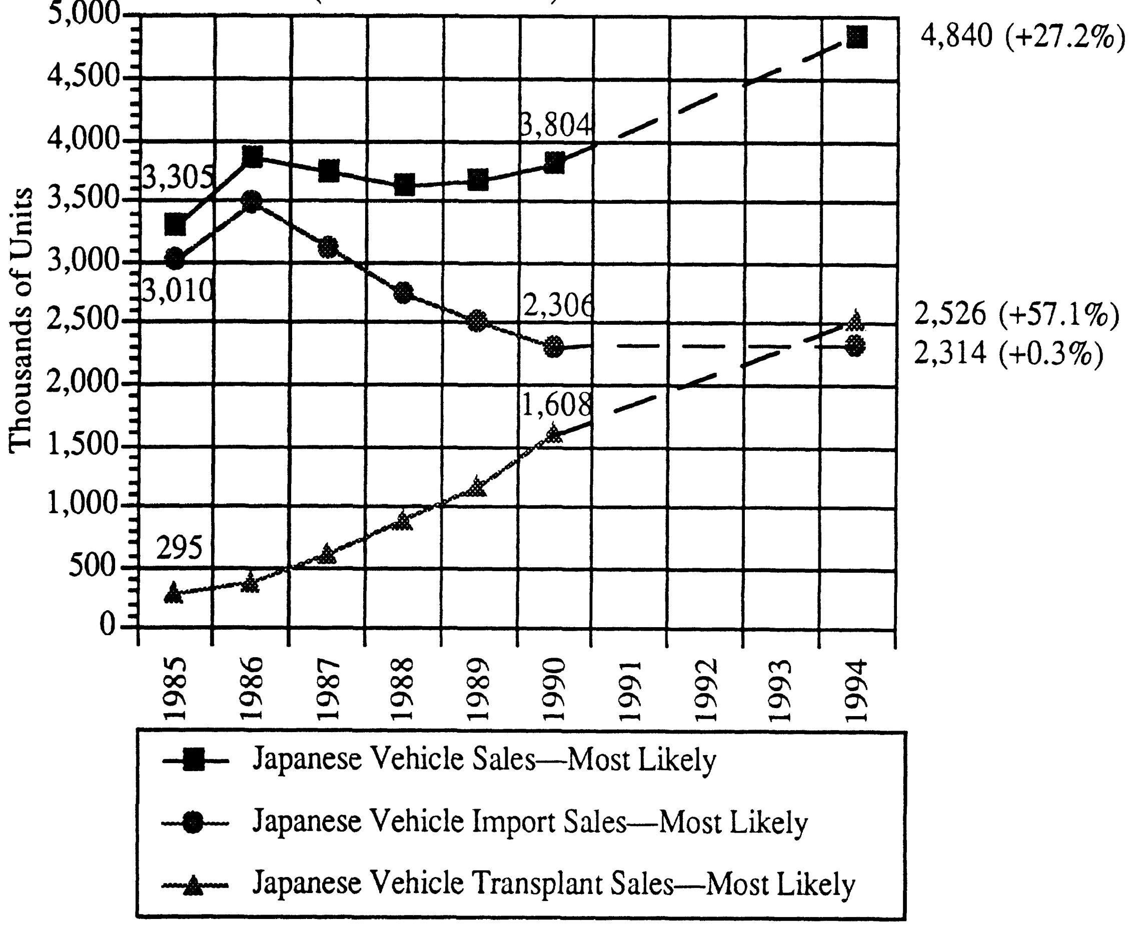
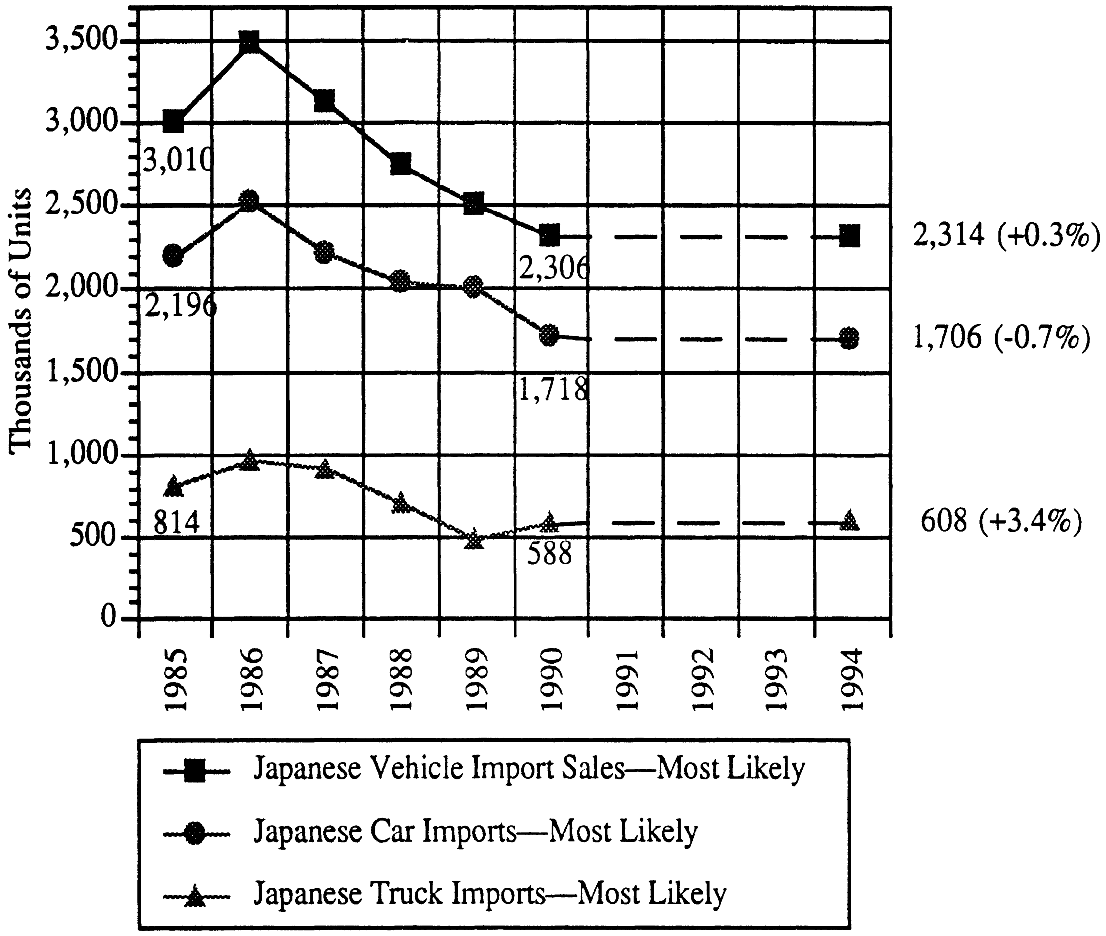


Figure 8
Japanese Vehicle Imports into the United States
1985-1990 and
Most Likely 1994 Forecasts
(thousands of units)



U.S. Vehicle Exports to Japan. Japan stands out from other major automotive producing nations more in its low level of import sales than in its high level of export production.[15] Automotive exports to Japan face numerous informal trade barriers that make the Japanese market quite expensive, by international standards, to penetrate. Factory control over dealers is much stronger in Japan than in the United States, so the Big Three cannot readily persuade Japanese dealerships to carry Big Three products. It is extremely costly to establish an independent dealer network, and it is unlikely that U.S. sales in Japan would justify these investment costs by 1994. It is possible that the U.S. manufacturers will secure expanded market access through their Japanese affiliates, although this may be a longer-term proposition.

[15]On the other hand, the U.S. industry stands out more for its low export share of production than for its high level of imports. That is one reason for concern that any market openings that develop in Japan will benefit the European industry more than our own.

The import share of the Japanese passenger car market has increased substantially over the past few years, and totalled about 5% (about 224,000 vehicles) in 1990. U.S. imports accounted for nearly 29,000 sales in 1990, 12.8% of all import sales, or about 0.6% of the total market. Vehicles produced by the Big Three captured over 13,000 sales, or roughly 47% of U.S. vehicle exports, and 6% of all imports.

While most analysts expect some decline in the 1991 Japanese market, as has developed in 1991:1, they expect strong growth in the 1992 through 1994 time frame, reaching a passenger car market of about 4.8 million. We think that pressure on Japan to open its car market further will continue, and import share might well reach 7.5% by 1994, or some 360,000 vehicles. Certainly the Japanese government and industry are in a position to relax some of the non-tariff, economic, and informal barriers to the Japanese market, and we think it is likely that they will.

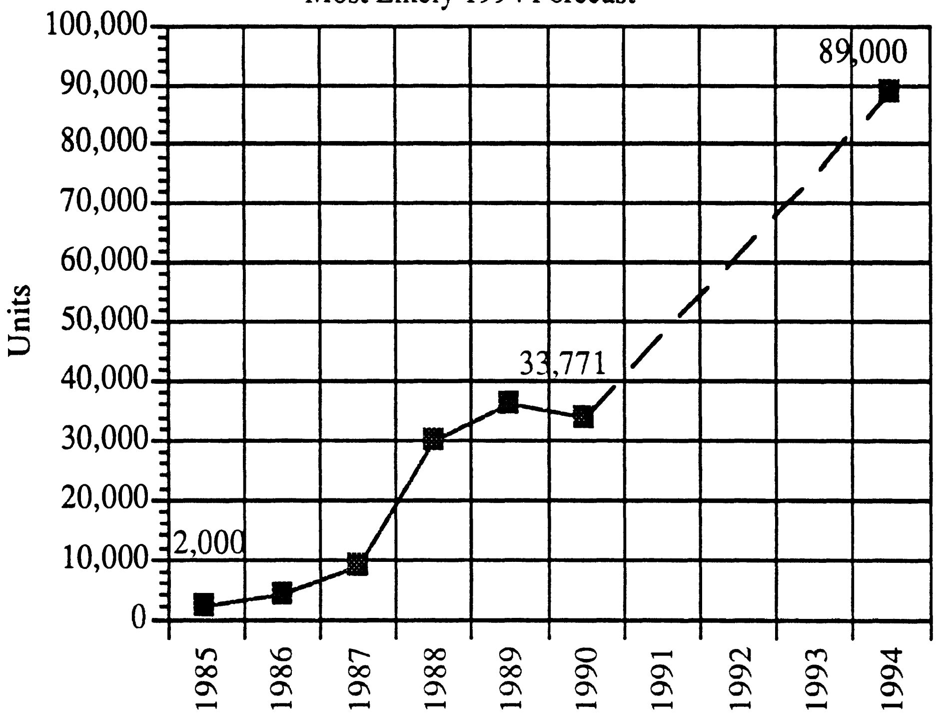
Further, we think it likely that traditional U.S. manufacturers will increase their share of all imports to about 11%, or 39,000 vehicles, simply because we cannot construct a credible scenario that calls for such overall import increases without substantial Big Three increases. Too many of the current imports to Japan, especially the European luxury cars, are probably already close to their natural market limits. For the Big Three to reach 11% of Japanese imports requires them to maintain their current share over the expanded import market, and capture some 13% of the balance of import growth. We think this is quite possible, assuming that Japan's import market share does increase, and that the Big Three pursue that opportunity.

We see a level of "symbolic" exports by the transplants. We expect that the Japanese manufacturers will export some 50,000 vehicles from their U.S. production facilities to Japan, up from just over 15,000 in 1990. Since some Japanese vehicles will only be produced in the United States, some of this export activity will reflect sourcing to support product offerings in Japan. Some of the export activity will reflect political concerns, including the Japanese manufacturers' concerns both with being "good citizens" and demonstrating that vehicles can indeed be exported to Japan.

If the transplant manufacturers export 50,000 vehicles to Japan, the combined traditional and transplant exports would reach 89,000. This represents our "Most Likely" estimate for vehicle exports, reflecting our belief that the Japanese are indeed serious about further market opening in automobiles. We see continued negligible export of light trucks to Japan, based on the characteristically different light truck styles and uses in the two markets.

Figure 9 displays our estimate of the unit light vehicle exports from the United States to Japan in 1994 and provides the actual levels for 1985 through 1990 for comparison purposes. We also expect the Japanese manufacturers to export about 35,000 vehicles to Europe from their U.S. facilities, primarily to establish their "U.S." identity for trade purposes. Two years ago we expected these exports to be much higher, perhaps reaching 100,000. Our thinking has changed, largely because the U.S. Trade Representative has already clearly announced the position that these vehicles are indeed U.S. vehicles. We believed then that the Japanese manufacturers would seek relatively large exports to Europe to increase the trade value to the United States of adopting such a position. Since the United States already has adopted this position, we expect the level of exports to be lower, reflecting more normal product allocation decisions, while maintaining some floor of exports to exercise and ensure the principle of U.S. rather than Japanese origin for these vehicles.

Figure 9
U.S. Vehicle Exports to Japan
1980-1985 and
Most Likely 1994 Forecast



Sources: International Trade Administration, OSAT

Of course, Japanese exports to Europe from the United States do not directly affect the bilateral deficit with Japan. However, they have an important indirect effect because these vehicles contain significant parts imports from Japan. They constitute part of the U.S. build by

Japanese manufacturers, and must be taken into account for our analysis of the parts deficit in a later section.

This scenario, then, calls for some 89,000 vehicle exports from the United States to Japan, and these directly enter the calculation of the bilateral vehicle deficit. It also calls for a Japanese build of 2.11 million passenger vehicles in the United States, composed of 2.026 million U.S. sales, 50,000 exports to Japan, and 35,000 exports to Europe. Adding 500,000 light trucks yields a total Japanese build of 2.616 million units.

The 1994 "Most Likely" Vehicle Deficit

Our "Most Likely" scenario calls for the 1994 vehicle deficit displayed in Table 5. In constant dollars, the vehicle import bill increases 0.5%, to $21.3 billion, while the current dollar increase is just over 20%, reaching $25.6 billion.[16] Vehicle exports pass $1.5 billion constant dollars, up over 260%, and $1.8 billion current dollars, an increase of over 300%.[17] Subtracting vehicle exports from imports leaves a U.S. deficit of just under $19.8 billion constant dollars, down some 4% from 1990, or about $23.7 billion current dollars, some 15% higher than 1990.

For a number of reasons, we think this custom values forecast may be somewhat on the conservative side. First, trade data is organized by engine size, rather than vehicle price. Our estimation procedure assumes that there is no change in the average customs value of vehicles within each category of engine size. That is, we simply multiply our predicted number of 1994 units within a category (Column 1) times the 1990 average customs value for that category (Column 2) to arrive at our forecast of the constant dollar 1994 deficit (Column 3) for that category. However, we think that it is unlikely that these customs values will in fact remain constant. This is because we strongly expect the Japanese manufacturers to import an enriched mix of vehicles, as presented in Table 4. Some of that enrichment will occur within the engine categories used for customs value, and thus is not reflected in our forecast. For example, vehicle imports in 1994 are likely to include more option-loaded and higher-priced 6 cylinders, but these are estimated at the current average value for 6 cylinders.

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[16]We forecast a 19.8% increase in Japanese custom value import price, from September, 1990 through September, 1994 to adjust our estimates to 1994 current dollars. A discussion of our method for the estimation of change import price is in Appendix V.

[17]We assume a 4.5% annual increase in U.S. automotive export prices for the period 1990-1994 to estimate the current dollar level of U.S. automotive exports to Japan.

Second, the customs values reported for light truck imports in 1990 are quite low compared to the values associated with 4 cylinder passenger cars. We are unsure why these reported values are so low, but think it likely that they too may rise by 1994.[18] Third, our export scenario may indeed prove to be optimistic, since it assumes that the Big Three will avail themselves of the possible export opportunities that we think may develop.

Table 5
1994 U.S.-Japan Vehicle Deficit
"Most Likely" Trade Case

U.S. Import of Japanese Vehicles

Category	Units (in thousands)	Customs Value (1990 average)	Constant Billions of Dollars (1990 average)	Current Billions of Dollars (x 1.197728)
4 cylinder	1,363	$ 8,425	$ 11.483	$ 13.754
6 cylinder	200	13,746	2.749	3.293
8 cylinder	143	25,870	3.699	4.430
Truck	608	5,602	3.406	4.080
Total	2,314		$ 21.337	$ 25.557

Exports of U.S. Vehicles to Japan

Units	Customs Value	Constant Billions of Dollars	Current Billions of Dollars
89,000	$17,376	$ 1.547	$ 1.845

U.S.-Japan Vehicle Deficit

	Constant Billions of Dollars	Current Billions of Dollars
U.S.-Japan Vehicle Deficit	$ 19.790	$ 23.712

An increase in customs value either within passenger car categories or for light trucks would, of course, increase our constant dollar estimate of the vehicle import bill, while a lower level of exports would decrease the estimate of export earnings. Either of these developments would increase the vehicle deficit.

[18]We do not think that the values of these vehicles is underreported because they are subject to a 25% tariff, since we assume the Customs Service performs audits on these vehicles. It is more likely that there is some sort of underestimate due to data problems, such as the possible inclusion of "truck chassis with engine attached" in this category.

The 1994 "Best Trade" Scenario

Our "Most Likely" scenario portrays our best judgment of what is likely to develop by 1994, and reflects our analysis and assumptions across a wide range of possible developments. Of course, any elaborate scenario runs the risk of error, so we also have developed a second scenario. This "Best Trade" scenario provides readers a more optimistic view of developments, and assesses its likely effect upon the bilateral automotive deficit with Japan. While neither scenario will exactly coincide with most readers' own preferred scenario, providing two does offer readers the opportunity to assess the likely magnitude of the effect of substituting their own.

For our "Best Trade" scenario we specifically created a scenario that would minimize the bilateral deficit. We reviewed our "Most Likely" scenario, asking how developments might differ in ways that would reduce the deficit, but not be so unlikely as to totally strain credulity. Thus, we do not think it at all plausible that Japanese manufacturers will voluntarily reduce vehicle imports to one million units or so; nor do we deem it credible that the United States will increase exports much above 150,000 units. Our intention is to describe a possible, but more optimistic, scenario.

Corporate Strategies. If neither government, nor the Japanese industry itself is likely to restrain Japanese vehicle exports to the United States, then any such reductions will have to be competitively forced by the Big Three. What are the prospects for enhanced Big Three competitiveness? What developments might lead to reduced Japanese import and/or transplant share of the U.S. auto market?

As discussed above, the Big Three have enormously improved their comparative quality performance, and now trail the Japanese fleet by less than half a defect per vehicle, down from about six defects per vehicle in 1980. Moreover, they appear to hold a price advantage against the Japanese, and that should eventually influence the market. We think it is critical that the Big Three break through the negative view of their vehicles' styling and value in the eyes of so many younger buyers. While we do not expect them to make major inroads on these fronts by 1994, we could be wrong. Perhaps some of their new vehicles will achieve higher market acceptance than we think likely. It is possible that GM's Saturn, for example, will appeal to younger buyers, and help break the image of a rather stodgy Big Three fleet held by many of these customers.

Moreover, the performance of the Japanese manufacturers might be weaker than we think likely. They certainly have made mistakes in the U.S. market, and they do not always do as well as analysts expect. The minivan segment provides illustrations of both these points. After a number of failures, Nissan is turning to a cooperative venture with Ford to enter this segment, and Mazda's and Toyota's entries, while good vehicles, have posed little threat to Chrysler's domination of this segment.

While we think it is most likely that Honda will maintain its 1990 market share, it is plausible that it will slip a bit by 1994. After all, Honda has a relatively limited range of vehicle offerings, and no light trucks. If any of their vehicles falter in the market place, they could lose share if only because they lack sufficient alternatives within their own line. Honda customers are also customers for light trucks, and to the extent that they purchase and like these vehicles, other manufacturers have a chance to win even satisfied car customers from Honda. Taking these arguments into consideration, it is plausible that Honda might lose a point of market share by 1994.

We still think that Toyota will make every effort to surpass Honda passenger car sales in the U.S. market, but this may require reaching only some 9% of the passenger car market, up a half point over 1990. While the Lexus, Toyota's luxury entry, has received rave reviews and enjoyed a good first year, its sales for 1991:1 fell much more sharply than did Honda's Acura line. Perhaps Lexus will not provide the image to take Toyota as far as we think likely.

Nissan, as we indicated, is difficult to predict, so we leave their 1990 share at 5%. Mazda might only increase its market share marginally, perhaps well under one point. Mitsubishi may lose captive sales through Chrysler and face difficulty in garnering those sales for its own nameplate. Its share loss would still be small, perhaps balancing Mazda's gain. These companies, then, collectively hold their current share under this scenario.

Subaru might continue its market share slide, perhaps falling to as low as 0.5%, and selling few vehicles beyond its transplant output. While we do not think it likely, GM might lessen its reliance on Isuzu and Suzuki for small passenger cars, and that might lower their combined share to just about 1% in passenger cars. Daihatsu's negligible share might hold, or even disappear. These "little four" lose substantial market share under this scenario, and the Big Three, rather than other Japanese nameplates, benefit.

Passenger Car Sourcing. Under this scenario, Japanese passenger car sales increase some 7% over 1990, reaching just under 3.3 million units. However, Japanese share falls some 3 points, to just under 30% of the U.S. passenger car market. We see the same ratio of imports to transplants supplying this U.S. demand for Japanese vehicles in this scenario as we portray in the "Most Likely" case. That yields some 1.5 million imports and just under 1.8 million transplant sales.

We also think it is plausible that the Japanese makers will be less successful in the luxury segment than we expect. After all, the Japanese are relatively new entrants in this segment, and their early success may be difficult to expand. We still expect them to increase their segment share, but a smaller expansion, to just over 12% is certainly plausible. This would further restrain the dollar value of Japanese imports, as they continue to be more concentrated in smaller vehicles.

Light Trucks. Our "Most Likely" scenario calls for Japanese light truck sales to increase from 16% to 22% of the market, based on the expectation that they would pursue this segment very aggressively and successfully. One could certainly argue that, unless the tariff is dropped, the Japanese manufacturers will continue to be less aggressive in this segment. It is also plausible to argue that their weaker performance in trucks than in passenger cars is a direct reflection of how Japanese vehicles competitively compare with the Big Three's. We still would argue that some increase in share is likely, simply because of the importance of this segment in the overall market, and the profits it yields to the manufacturers. But that increase plausibly could be on the order of two points, rather than the six points of our "Most Likely" case. Our best case scenario calls for 400,000 light truck imports and another half million transplant sales, for an 18% share of the market.

Table 6 displays our plausible, "Best Trade" case for the 1994 U.S. market.[19] Japanese sales increase to just below 4.2 million vehicles, up about 10% from some 3.8 million in 1990, as Japanese share of the total light vehicle market falls just over a point, to about 26%. Transplant sales reach just under 2.3 million units, up almost 42%, while import sales fall to 1.9 million, down almost 18% from 1990. Proportionately more of the decrease in imports comes in the truck category, falling about 32%, compared with the car category, which falls about 13%.

U.S. Vehicle Exports to Japan. Our "Most Likely" scenario calls for 89,000 unit exports to Japan, 50,000 from transplant operations and 39,000 from the Big Three. How might these

[19]The conversions of this Table to trade classifications can be found in Table 3 of Appendix VII.

increase? We have suggested that the most plausible, even if not likely, political development that would influence the bilateral deficit is the Japanese government taking action to further encourage vehicle imports into Japan.

If such "market opening" actions are undertaken, and if Japanese sales in the U.S. market are on the order of our "Best Trade Case" scenario, then we might see the transplant export as many as 80,000 vehicles to Japan. This would represent a good faith effort, and provide some cushion for U.S. production facilities.

Table 6
1994 U.S. Sales of Japanese Vehicles: "Best Trade" Market
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
Small	35.2%	870	865	1,735	44.8%	52.9%	58.0%
Inter-mediate	42.8	330	917	1,247	26.5	38.0	22.0
Large/ Luxury	22.0	300	0	300	12.4	9.1	20.0
Total	100.0%	1,500	1,782	3,282	——	100.0%	100.0%

1994 U.S. Sales of Japanese Light Trucks: "Best Trade" Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
400	500	900	18.0%

Memo: The 1994 passenger car market equals 11.0 million units. Of the 1990 market, transplants (including some Canada) hold 16.2% market share; and Japanese imports, 13.6%. The 1990 light truck market equals 5,000 million units. Of the 1990 light truck market, transplants (with no Canadian units) hold 10.0% and Japanese imports 18.0%.

It is plausible, although again we think not likely, that the Big Three would export another 10,000 vehicles to Japan above our "Most Likely" scenario, raising their total exports to 49,000. This would require them to maintain their current market share of imports to Japan, and capture 20%, rather than 13%, of the balance of import growth. Again, this scenario relies on both Japanese efforts to lower barriers, and Big Three pursuit of any such opportunities.

This scenario calls for a total U.S. vehicle export to Japan of almost 130,000 units. This is a difficult target to reach, and we think less likely than the 89,000 of our "Most Likely" case, but it is within the realm of plausibility. We think 35,000 transplant exports to Europe is a useful estimate. Transplant build should reach 2.397 million, made up of 1.782 million U.S. passenger car sales, 80,000 exports to Japan, 35,000 exports to Europe, and 500,000 U.S. light truck sales.

The 1994 "Best Trade Case" Vehicle Deficit

What does this "Best Trade Case"suggest about the likely bilateral automotive trade deficit in 1994? Our "Best Case" scenario calls for the 1994 vehicle deficit displayed in Table 7. In constant dollars, the vehicle import bill decreases about 17%, to $17.7 billion, while the current dollar falls under 1% to $21.2 billion. Vehicle exports pass $2 billion constant dollars, up over 350%, and pass $2.5 billion current dollars, an increase of over 400%. Subtracting vehicle exports from imports leaves a U.S. vehicle deficit of just about $15.4 billion constant dollars, down some 25% from 1990, or about $18.5 billion current dollars, some 10% lower than in 1990.

Table 7
U.S.-Japan Automotive Vehicle Deficit:
"Best Trade" Case

U.S. Import of Japanese Vehicles

Category	Units (in thousands)	Customs Value (1990 average)	Constant Billions of Dollars (1990 average)	Current Billions of Dollars (x 1.197728)
4 cylinder	1,235	$ 8,425	$ 10.405	$12.462
6 cylinder	150	13,746	2.062	2.470
8 cylinder	115	25,870	2.975	3.563
Truck	400	5,602	2.241	2.684
Total	1,900		$ 17.683	$ 21.179

Exports of U.S. Vehicles to Japan

Units	Customs Value	Constant Billions of Dollars	Current Billions of Dollars
129,000	$17,376	$2.242	$ 2.685

U.S.-Japan Vehicle Deficit

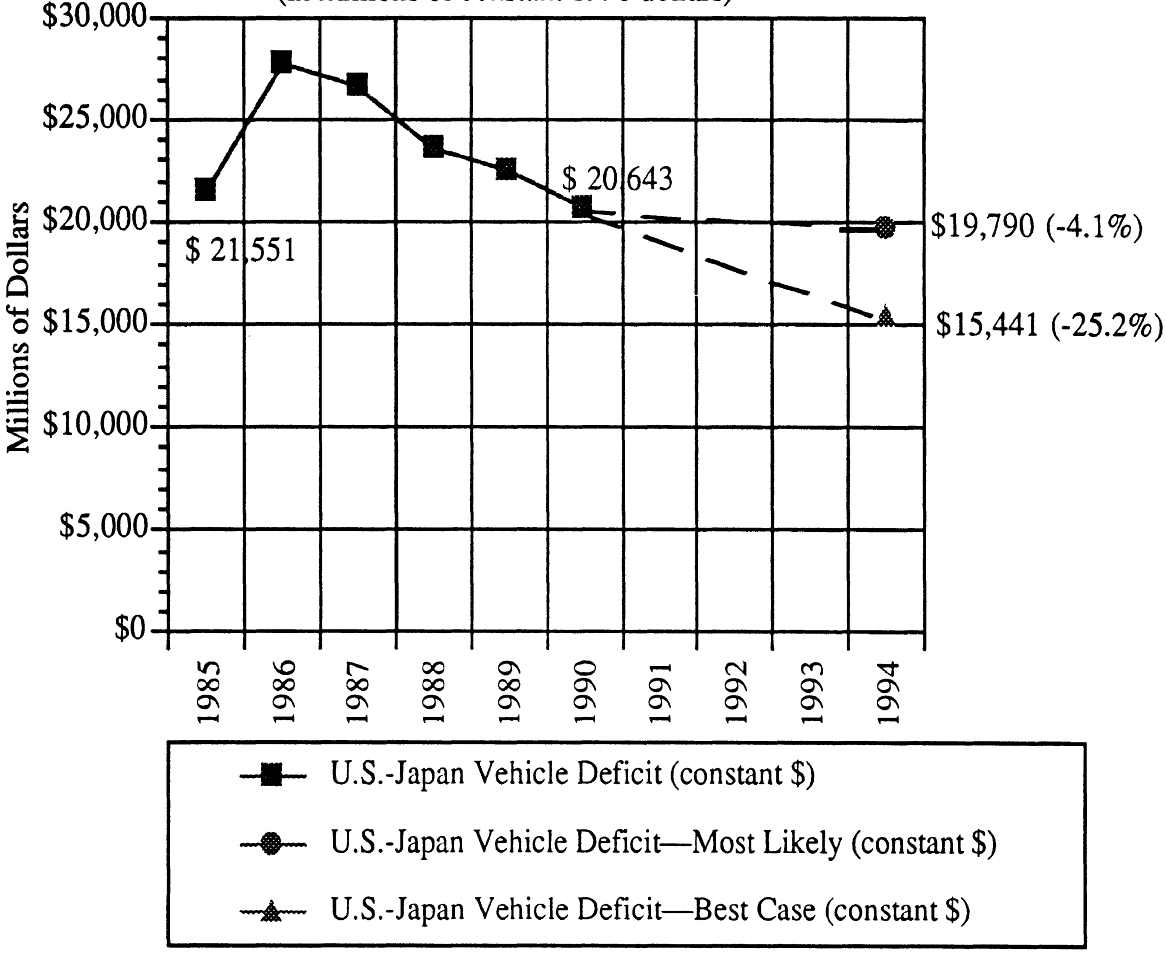
	Constant Billions of Dollars	Current Billions of Dollars
U.S.-Japan Vehicle Deficit	$ 15.441	$ 18.494

This scenario, then, calls for a substantial improvement in the U.S.-Japan bilateral vehicle trade deficit by 1994. A reduction of some 25% in four years is indeed impressive. At the same time, it leaves the United States facing a still major and important deficit, and still far from balanced trade.

Discussion

Figure 10 displays the forecast vehicle deficits under each scenario, providing again the data from 1985 through 1990 for interpretive context. Both these scenarios call for a reduction in the vehicle deficit, although both scenarios call for increased total light vehicle sales by the Japanese. Our more optimistic, "Best Trade Case" sees a reduction in the vehicle deficit of over 24%, while our more likely scenario forecasts a reduction on the order of 4%.

Figure 10
U.S.-Japan Vehicle Deficit
1985-1990 and
Best Trade/Most Likely 1994 Forecasts
(in millions of constant 1990 dollars)



The "Best Trade Case" calls for reduced imports, while the "Most Likely Case" forecasts a negligible increase. Both call for increased unit vehicle exports from the United States to Japan, with the "Best Trade Case" forecasting 40,000 more exports than does the "Most Likely Case."

The important mechanism, in each scenario, is the cross-over in the preponderance of the supply of Japanese vehicles from imports to U.S.-produced transplants. In the "Most Likely Case," increased Japanese sales and share as the market recovers is almost completely supplied by additional transplant production. In the "Best Trade Case", Japanese sales increase, although Japanese share falls somewhat, and transplant production not only supplies the increase, but substitutes for some 400,000 current import units.

This crossover in vehicle sourcing, then, is critical to vehicle deficit reduction. Neither of our scenarios calls for a substantial rollback in Japanese nameplate sales, and such scenarios today lack the little credibility they enjoyed through the mid-1980s. So the sourcing of these vehicles represents the only plausible avenue to substantial reductions in Japanese vehicle exports to the United States. At the same time, the rather extraordinary efforts required to raise U.S. vehicle exports to the level of our "Best Trade Case" scenario suggests that, whatever its merits may be in other sectors, an export solution offers little realistic possibility for bilateral vehicle deficit reduction.

However, that cross-over to greater sourcing from U.S. production raises another deficit issue. Whatever benefits it may provide in reducing the vehicle deficit, it is likely to exacerbate the bilateral parts deficit. The Japanese transplants heavily source parts from Japan, so increased transplant build almost inevitably will mean an increase in parts sourcing from Japan. We now turn to consider the role of parts trade in the overall bilateral automotive deficit with Japan.

IV. Trade in Parts and Components

Automotive parts trade between the United States and Japan became considerably more complex during the 1980s. Japanese parts exports to the United States totaled $1.3 billion in 1980, $4.6 billion in 1985, and peaked in 1989 at a level of $11.6 billion. U.S. parts exports to Japan totaled only $97 million in 1980, $203 million in 1985, and peaked in 1990 at $893 million. This consistent imbalance is all the more interesting when we consider that the United States possessed the largest automotive parts industry in the world in 1980. In fact, prior to 1980, the U.S. automotive parts industry had been the largest in world capacity for many years. In addition, the 1980s can hardly be described as a period when U.S. suppliers suffered from excess demand for any significant period of time. Probable causes for the rise in Japanese exports of automotive parts to the United States are examined below. Probable causes for the low level of U.S. automotive exports to Japan, however, are considerably more difficult to discern, and we do not comment on these matters at any great length.

We assume there are three essential sources of demand, or "income" variables, for Japanese imported automotive parts. First, Japanese parts are imported for use in the repair and servicing of the operating fleet of Japanese-affiliated vehicles in the United States, referred to as **Japanese aftermarket demand**. Second, Japanese produced parts and components are imported for installation into Japanese transplant vehicles assembled in the United States. We refer to this source of parts imports simply as **transplant demand**. Finally, Japanese produced parts are imported into the United States for installation into traditional North American produced cars and trucks. We refer to this type of demand as "**Big Three**" or **captive import parts demand**. Other, more minor sources of demand for Japanese imported parts might include parts reexported to other countries for production or aftermarket purposes, and aftermarket parts for Japanese components installed in traditional North American vehicles.

This section proceeds with a statistical forecast of U.S.-Japan automotive parts trade in 1994. Japanese exports of automotive parts are estimated using a special multiple regression model. U.S. exports of parts to Japan are simply trended through 1994. The two estimates are combined to produce a forecast of automotive parts trade between Japan and the United States. This forecast is followed by an analysis of percentage change trends in automotive parts exports and imports by parts category.

A Statistical Model of Japanese Automotive Parts Imports

Information concerning the three major sources of demand for imported Japanese parts, in combination with a relative price series, can estimate a demand function for Japanese imported parts useful for forecasting future import levels. Unfortunately, a specific Japanese-U.S. price series for automotive parts does not exist and cannot yet be constructed.[20] The yen/dollar exchange rate provides a crude substitute for relative price. However, that variable performed poorly in analysis.[21] We forecast Japanese parts exports to the United States, then, using information on the three income variables, or sources of demand, listed above.

Dependent Variable. We use ITC monthly levels of total Japanese exports to the United States of automotive parts as our "dependent variable." We generally use the 69 months of data from January, 1985 through September, 1990. The dollar amounts are "inflated" to September, 1990 levels through the use of a producer price index. Monthly observations allow us to use the maximum number of cases to estimate the relation between vehicle production in the U.S. and Japanese parts imports. Seasonal fluctuations are successfully corrected in the estimation. However, monthly data tends to suppress the influence of "structural" influences or feedback. Such influences may be important over the long run and an estimation model developed with monthly data may tend to hide interdependent effects. Finally, monthly data posed a serious challenge in terms of constructing monthly equivalents for certain information available only in annual form.

Complete coverage is a major concern in using the ITC monthly data. There is no guarantee that the "automotive" categories of imports or exports listed by the ITC constitute 100% of actual motor vehicle related commodity trade between the United States and Japan. In fact, the 1989 total, provided by the ITA, for Japanese automotive parts imports is $890 million higher than that provided by the ITC ($12.457 billion versus $11.566 billion). If this

[20]The International Price Program of the Bureau of Labor Statistics, U.S. Department of Labor produces a quarterly price index for imported motor vehicles and equipment and parts. But this index applies to all imports, regardless of source. A specific, quarterly price index for Japanese automotive imports into the United States is not produced. Since a large portion of automotive trade is carried out by U.S. domestic firms with their subsidiaries in Canada and Mexico, the overall automotive import price index reflects, to a large extent, domestic pricing by U.S. firms, making this price series useless for either trade or competitive analysis of U.S.-Japanese automotive trade. We can think of no greater assistance or contribution our government can make to the further understanding of U.S.-Japanese automotive trade, and the competitive standing of our domestic auto industry, than to produce a specific, bilateral price index series for Japanese imports of automotive products into the United States.

[21]See the discussion in Appendix IV.

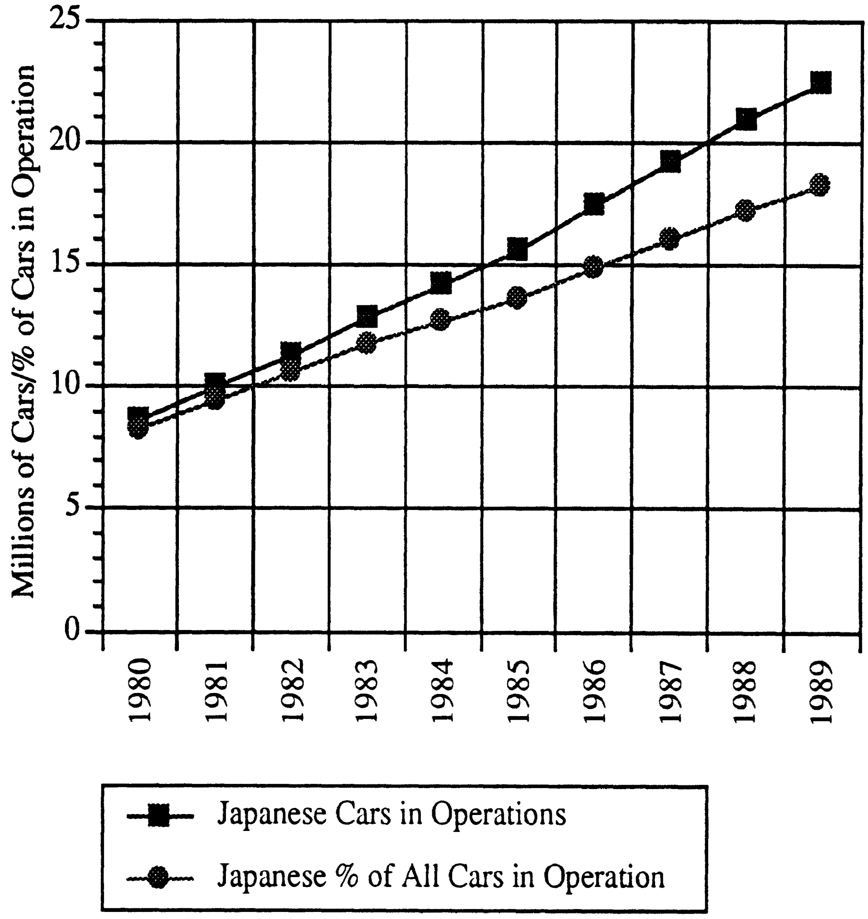
8% gap is consistent and meaningful, many of the effects we identify in our analysis below may be underestimated or biased. In truth, we are not entirely confident that the ITA figure is itself reliable or generally inclusive. However, the ITC provides monthly levels and we use these data for our analysis. Our concerns reflect the current sorry state of critical, industry-level U.S. trade information, a situation which has only worsened since the "conversion" to harmonized codes in January, 1989.

Aftermarket Demand. We assume that aftermarket demand for Japanese imported parts is related to the growth and total size of the Japanese-affiliated operating vehicle fleet in the United States. The U.S. Department of Commerce estimates the total U.S. retail market for aftermarket parts and components in 1990 at $75 billion,[22] or $426 per operating car or truck in the United States in 1989. Many Japanese vehicle aftermarket parts are heavily sourced from Japanese original equipment and primary suppliers in Japan, and this relationship has been reported in prior studies. Past studies, however, have consistently underestimated future levels of operating Japanese vehicles in the United States, because their forecasts were based on serious underestimates of future Japanese sales levels and gains in market share. This source of forecast error would tend to reduce the corresponding estimate of the Japanese-affiliated vehicle aftermarket in the United States, and thus the level of Japanese imports attributable to this source of demand.

We obtained annual estimates of the U.S. operating fleet of passenger cars, as of July 1, for 1980-1989. Figure 11 shows that the Japanese share rose from 8.3% of all operating passenger cars in the United States in 1980, to 13.6% in 1985, and peaked at 18.2% in July 1989. The Japanese fleet rose from 8.7 million in 1980, to 15.6 million in 1985, to peak at 22.4 million in 1989. Thus, Japanese passenger cars in operation in the United States grew at an annual compound rate of 9.6% during the 1985-1989 period. For this analysis, we transformed annual incremental change in the Japanese operating fleet into monthly incremental change by distributing the annual increase across the months of each year, based on weights derived from monthly Japanese sales (transplant and import). Since the latest year for which we had fleet data was 1989, our direct measurement of the effect of Japanese fleet size on Japanese exports of parts to the United States cover 54 months: January, 1985 through July, 1989. We were unsuccessful in obtaining comparable information on Japanese truck and van units in operation in the United States.

[22] 1991 U.S. Industrial Outlook, International Trade Administration, U.S. Department of Commerce, U.S. Government Printing Office, Washington D.C., January 1991, p. 37-11.

Figure 11
Japanese Cars in Operation and
Japanese Percentage of Cars in Operation
1980-1989



Source: Polk Statistics

Transplant Demand. Assembly of motor vehicles in the United States by Japanese automotive firms, independently or in joint venture with traditional producers, demonstrated remarkable growth during 1985-1990. Transplant production rose from essentially zero units produced in 1982 to a level of 361 thousand in 1985, and then rose by 217% to 1.145 million units in 1989. In 1990, Japanese transplant production rose by an additional 21% to 1.390 million cars and trucks.[23] The absolute percentage increase in transplant production, then, for the 1985-1990 period was 284%, or an annual compound growth rate of almost 31%. The figures refer to only Japanese vehicles assembled in the United States. In fact, if Canadian and Mexican

[23]This number is lower than the transplant sales figures in prior figures and tables. Those figures likely include some carry over 1989 production and some, as eariler indicated, Canadian production.

production is included, over 1.6 million North American Japanese transplant vehicles were sold in the United States in 1990, or some 41% of total Japanese vehicle sales.

Japanese producers in the United States felt they had little choice but to import a significant portion of the parts and components used in their early production. Many experts expect this portion to fall as both the length of time and volumes of U.S. operations and production increase. There are four distinct explanations for why Japanese transplant producers would tend to shift their sourcing to higher U.S. domestic content over time:

- It requires time, perhaps years, to construct an efficient network of domestic suppliers for components and parts. This is especially true if the assemblers insist on customer-supplier relations and Japanese manufacturing techniques similar to those existing in Japan. The process of increasing domestic content would also take considerable time if the goal were to source primarily to Japanese-affiliated suppliers with facilities in the United States. These "keiretsu" suppliers would need time to set up their own U.S.-based operations. As the "domestic maturity" of the transplant assemblers increase, domestic content in their vehicles should rise. Yet, if the Japanese continue to add new facilities and assembly plants to their U.S. operations, the average domestic maturity of their operations will only slowly increase. A considerable portion of Japanese operations in the United States remain dependent on Japanese imported parts and components, as long as they add capacity to their operations at current rates.

- Many parts and components can only be efficiently produced at large volumes. Such U.S.-based production, whether performed by traditional U.S. or Japanese-affiliated suppliers, could not be performed at efficient economies of scale in the early, low-volume phases of transplant operations. As volume increases over time, however, domestic content should rise when these efficient scale levels are reached. Figure 12, from a Japanese research study, portrays a stylized account of these economies of scale for various parts and components. However, only three Japanese vehicle manufacturers are expected to reach volumes above 300,000 units/year in North America (Honda, Toyota, Nissan) by 1994. In fact, as Figure 13 shows, despite the recent growth of total Japanese production in the United States, the average "company level" of production volume per year has remained consistently below 200,000. Many of the transplants only plan to produce at volumes far below efficient scale levels for many parts and components.

- Some experts believe that the Japanese method of motor vehicle production is based largely on localized production of parts and components, maintaining that parts production in close proximity to vehicle assembly is an essential requirement of the "lean" or "Toyota production system." The just-in-time (JIT) system, a tradition of highly interdependent manufacturers and suppliers, concerns about the reliability and costs of long supply lines, or even the uncertainty of currency exchange rates, should promote the increased sourcing of domestic content. Yet, the Japanese also hedge centralized production across regional markets worldwide, allowing them to avoid problems such as serious regional overcapacity or coordinating a dispersed production system. Moreover, long supply lines have never proven to be a serious obstacle to Japanese exports of any product to anywhere.

- Finally, some expect the Japanese to increase domestic content in their U.S. produced vehicles to clearly differentiate them from imports in political terms. However, political yardsticks are rarely accurate in economic matters, and the Japanese in the mid-1980s gained enormous political credit for U.S. assembly of vehicles that contained 70-80% Japanese content. Fairly minimal increases in U.S. content may meet their political objectives for the 1990s. An additional question concerns the type of parts and components that are, and will be, sourced to domestic suppliers. It is possible for a vehicle producer to retain "high margin" or high value-added production within the firm or the "affiliated" supplier network. This charge of "dualism" has been leveled at Japanese vehicle producers, and implies a consistent pattern of transplant sourcing of highly profitable parts from Japan or U.S.-based keiretsu affiliates, while sourcing less complex, low margin parts and components to traditional U.S. automotive parts producers. Assembler "domestic content," it seems, only measures a portion of the trade and economic effects of transplant production.

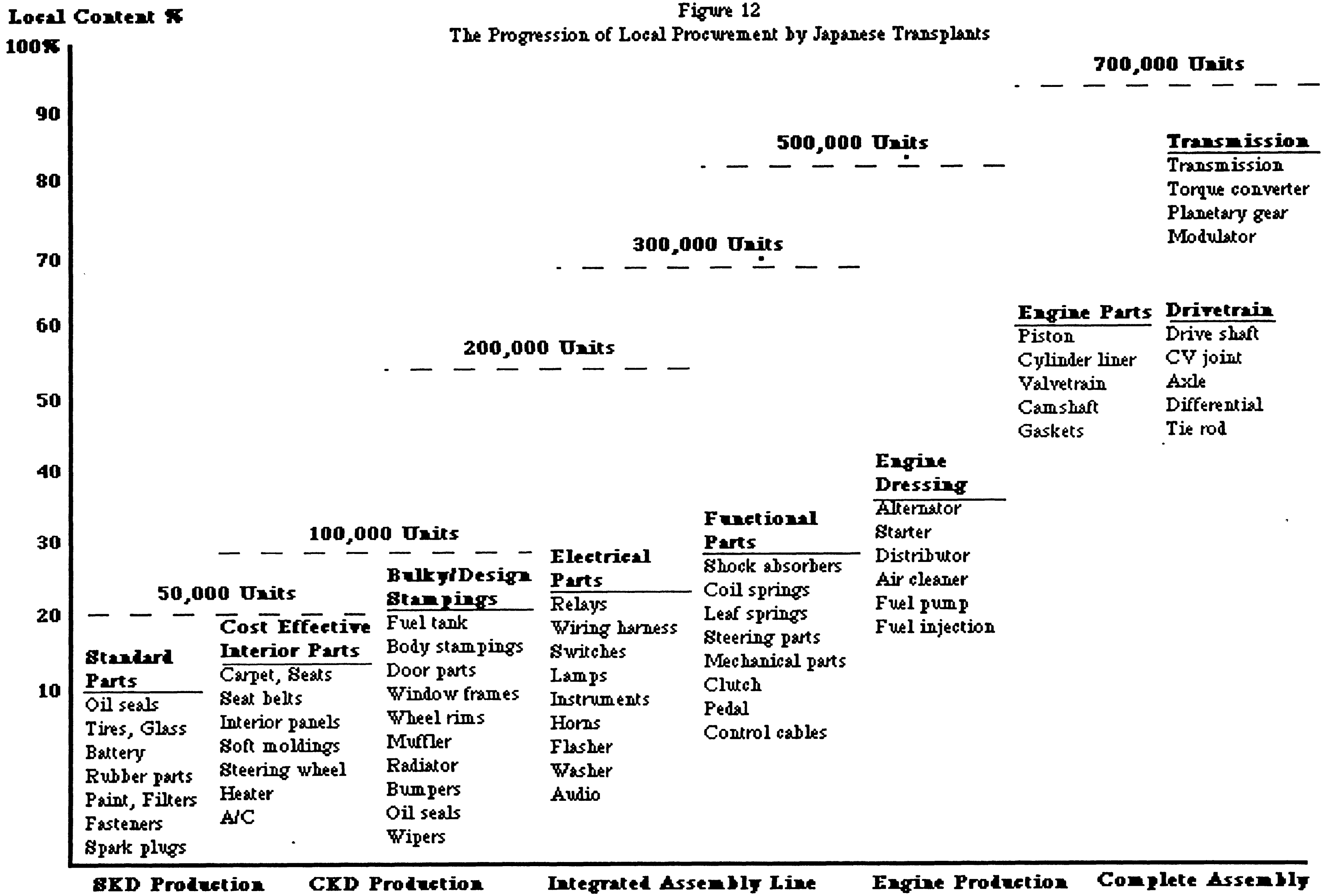
We can answer many of the issues regarding the influence of transplant production on Japanese exports of parts to the United States simply with an efficient estimate of Japanese parts content contained in an average transplant, and how this content has changed over time. Our statistical monthly model of Japanese parts imports includes total Japanese U.S. transplant production for the period January, 1985 through September, 1990. The lowest production level was February, 1985 at 23,220, and the highest, August, 1990 at 123,548. Other, more complex issues can only be addressed through careful case study analysis of major Japanese operations in the United States. We attempt to cover some of these additional concerns in our case study of a large and experienced Japanese transplant producer.

Captive Parts Imports. The Big Three used Japanese imported components in their domestically assembled vehicles throughout the 1980s. These components typically included various engines or manual transaxles, or other subcompact or compact car and truck components not yet produced by domestic manufacturers. The Big Three maintains 27 of the 35 assembly plant U.S. foreign trade zones, and recently has sourced products such as air conditioners or die-cast aluminum parts to U.S.-based Japanese partsmakers. Our model attempts to measure this source of demand directly by including monthly Big Three production levels of U.S.-built cars and trucks for the period January, 1985 through September, 1990.

The basic model to estimate Japanese imports, then, is the following:

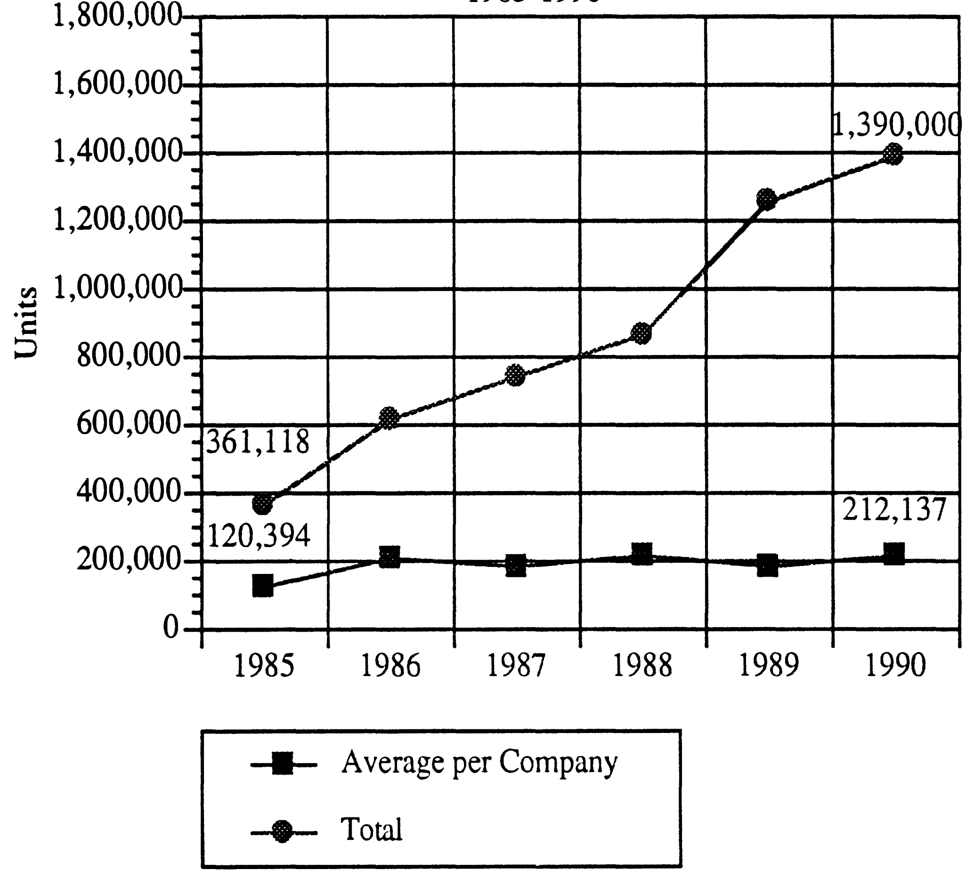
$$\text{Japanese Exports of Automotive Parts}_t = F(\text{Japanese Operating Fleet}_t, \text{U.S. Transplant Production}_t, \text{Big Three Production}_t)$$

Figure 12
The Progression of Local Procurement by Japanese Transplants



Source: Bernard Wolf and Glen Taylor, York University

Figure 13
Total Transplant Production vs.
Average Per Transplant Company
1985-1990



Parts Imports Estimation Results

A large number of specifications were tested for the best fit of the model. The details of that investigation are fully discussed in Appendix IV. Two final specifications were chosen for analysis: one using Japanese operating car fleet values for 54 cases from January, 1985 through July, 1989, the "fleet model," and one using all 69 available cases, but substituting a linear time trend for the fleet variable, the "linear trend model." There is a strong degree of intercorrelation between all three of the explanatory variables. In fact, the degree of negative intercorrelation between Big Three vehicle production and transplant production is so severe that one of the two variables had to be dropped to produce efficient coefficients. We elect to keep transplant production in our general forecast estimation model and drop Big Three production. As a result, this analysis does not permit a separate estimate of Big Three demand from aftermarket demand. We do estimate the rate of Big Three demand separately.

Our 54-case, "fleet" model associates $3,034 of parts imports with each transplant unit built. No significant change in this effect exists for any period through July, 1989. The same estimation produced a fleet coefficient for imports of $55.21 per operating Japanese passenger car per month. This implied, annual value of $662.52, might include the effects of aftermarket imports for operating Japanese trucks as well, and is corrected somewhat by a significant negative intercept term. A separate estimation that substitutes Big Three production for transplant production produces a highly significant Big Three coefficient for Japanese parts imports: $166.45 for each Big Three car or truck produced in the United States.

The "linear trend model," with 15 additional cases, provides alternative data and estimates. This estimate of the level of parts imports per transplant for the period 1985-1989 is $3,223. However, there is a significant interaction term that implies a decline of $1,542 in this effect for the first nine months of 1990. In other words, parts sourcing from Japan remained at a consistent $3,223 per transplant unit through the end of 1989, and then fell to $1,681 during the first nine months of 1990. We assume that this drop in import sourcing was heavily influenced by increased domestic or third country sourcing, especially at two specific transplant engine/transaxle facilities. A separate estimation that substitutes Big Three production for transplant production produced a significant Big Three coefficient of $149.36 of Japanese imports per Big Three car or truck produced in the United States.

Forecast of Japanese Parts Imports in 1994

We make four separate forecasts of Japanese parts exports to the United States in 1994. We use the "linear trend" model to perform our estimations, largely on grounds of superior performance in estimation. Our "Most Likely" scenario forecast reflects a level of imports we think is probable based on estimation results and certain assumptions. Our "Best Trade Case" scenario reflects our estimation of the lowest level Japanese exports to the United States might plausibly reach in 1994, although we feel this level is not likely. Both of the two scenarios are forecast in constant and current dollars. Constant dollars refer to prices that held in September, 1990. Current dollars reflect price increases we estimate for September, 1994. The rate of inflation for Japanese imported auto parts is the same as forecast for Japanese imported vehicles, about 19.8% for 1990-1994. The method of how this price effect was reached is described in Appendix V.

The linear trend estimation that includes transplant production and excludes Big Three production is selected as the forecast model of Japanese parts imports for this study. We do not consider the 1990 transplant effect coefficient of $1,681 per transplant build appropriate for our "Most Likely" forecast because it is based on only nine months of 1990 data. We have other objections, discussed below, to this result. We do, however, use this level of Japanese imported parts content in our "Best Trade Case" scenario, matched with the "Best Trade Case" scenario for U.S. transplant production developed in the Section III.

The "Best Trade Case" vehicle trade forecast of 1994 Japanese transplant build is 2.397 million cars and trucks. This level is multiplied by an average of $1,681 of imported parts per transplant vehicle assembly, as in the first nine months of 1990, generating $4.029 billion in imported Japanese parts due to transplant demand. The model also forecasts a total of $13.081 billion in imported parts shipments due to combined aftermarket and Big Three demand. The constant dollar total in this "Best Trade Case" scenario is $17.11 billion in parts imports, or 51% higher than the 1990 total of $11.35 billion. Our estimate of the current dollar "Best Trade Case" is $20.49 billion in parts imports, some 81% higher than the 1990.

Our "Most Likely Case" vehicle trade forecast of 1994 total build is 2.611 million. This level is multiplied by an estimated average of $3,223 per transplant vehicle to generate $8.415 billion in imported Japanese parts due to transplant demand. This is a considerably higher level for transplant demand than that forecast in the "Best Trade Case." This higher level is partly due to an additional build of 129,000 transplant vehicles in the "Most Likely Case" versus "Best Trade Case" scenarios. However, the major reason for the difference in the two dollar levels is the assumption of $3,223 in per unit parts imports in our "Most Likely Case" versus the $1,681 per unit assumed in the "Best Trade Case" scenario. In effect, we are assuming a higher level of transplant Japanese parts and component content in the "Most Likely Case" scenario. We make this assumption because we do not believe domestic sourcing, on a per-unit basis, can increase so dramatically in a period during which transplant production rises by over 1.2 million units. Our reasoning for this assumption is explained both later in this section and in the transplant case study analysis.

The "Most Likely" forecast also includes an additional total of $13.081 billion in imported parts shipments attributable to combined aftermarket and Big Three demand. The constant dollar total in this "Most Likely Case" trade scenario is then $21.49 billion in parts imports, or 89% higher than the 1990 total of $11.35 billion. Our estimate of the current dollar "Most Likely Case" is $25.74 billion in parts imports, or 127% higher than the level experienced in 1990.

In summary, we forecast a level of $17.11 billion in constant dollar imports of auto parts in our "Best Trade Case" 1994 forecast, and a level of $21.49 billion in our "Most Likely Case" 1994 forecast. These constant dollar estimates are shown in Figure 14. A rough 95% confidence interval associated with these two estimates calls for a range of plus or minus $1.5

billion around the total annualized point estimate. We also forecast a level of $20.49 billion in current dollar imports of auto parts in our "Best Trade Case" 1994 forecast, and a level of $25.74 billion in our "Most Likely Case" 1994 forecast. These current dollar estimates are shown in Table 8.

Figure 14
Imports of Japanese Automotive Parts into the U.S.
1985-1990 and
Best Trade/Most Likely 1994 Forecasts
(in millions of constant 1990 dollars)

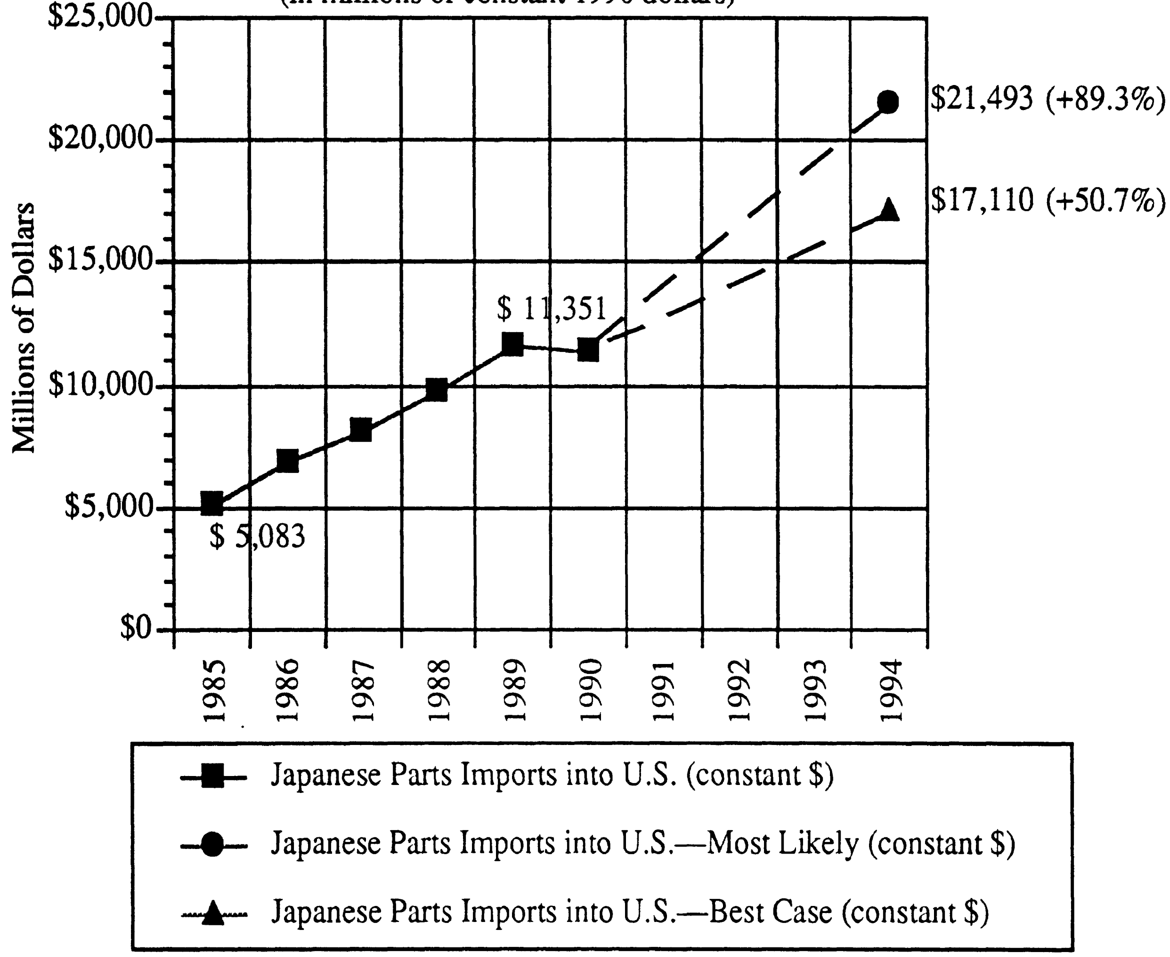


Table 8
U.S.-Japan Automotive Parts Deficit:
Two 1994 Scenarios
(in billions of dollars)

"Best Trade Case"

U.S. Import of Japanese Automotive Parts

	Constant Dollars	Current Dollars
Transplant Parts Imports ($1,681)	$ 4.029	$ 4.826
Aftermarket and Big Three Parts Imports	13.081	15.667
U.S. Parts Imports	$ 17.110	$ 20.493

Exports of U.S. Automotive Parts to Japan

	Constant Dollars	Current Dollars
U.S. Parts Exports	$ 3.145	$ 3.751

Most Likely Trade Case

U.S. Import of Japanese Automotive Parts

	Constant Dollars	Current Dollars
Transplant ($3,322)	$ 8.412	$ 10.075
Aftermarket and Big Three	13.081	15.667
U.S. Parts Imports	$ 21.493	$ 25.742

Exports of U.S. Automotive Parts to Japan

	Constant Dollars	Current Dollars
U.S. Parts Exports	$ 3.145	$ 3.751

Exports of Automotive Parts to Japan

In constant 1990 dollars, exports of auto parts from the United States to Japan grew from a level of $185.5 million in 1985 to $893.4 million in 1990. The constant dollar annual compound rate of growth for 1985-1990 was about 37%. We found remarkable consistency in this annual growth rate regardless of the period used for compounding (e.g., 1980-1990 or 1988-1990). A simple trend forecast based on the 1985-1990 annual growth trend yields a constant dollar level of exports of $3.145 billion for 1994. We use this level of parts exports to Japan in both our "Best Trade Case" and "Most Likely Case" scenarios to derive the U.S.-Japan parts and total automotive trade accounts in 1994. A 1994 current dollar forecast of exports of parts to Japan is produced by simply applying a 4.5% annual price increase to the 1994 constant dollar estimate. Both the current and constant dollar estimates of 1994 parts exports to Japan are shown in Figure 8. We do have some concerns about patterns in U.S. parts exports to Japan, however, based on our inspection of percentage changes in specific parts trade categories. These concerns are discussed below.

The 1994 U.S.-Japan Auto Parts Deficit

The 1994 parts deficit is calculated by subtracting the constant and current dollar level estimates of U.S. exports of parts to Japan from the "Best Trade Case" and "Most Likely Case" levels of estimated imports from Japan into the United States. **We forecast, then, a constant dollar parts deficit of $13.97 billion for the "Best Trade Case," or a 34% increase from 1990. Our current dollar "Best Trade Case" parts deficit is $16.74 billion, or a 60% increase in current dollars from 1990.** It should be remembered that the "Best Trade Case" scenario of the parts deficit was premised on an extremely low level of expected transplant-unit sourcing. Despite that assumption, the parts deficit forecast still increases by 1994.

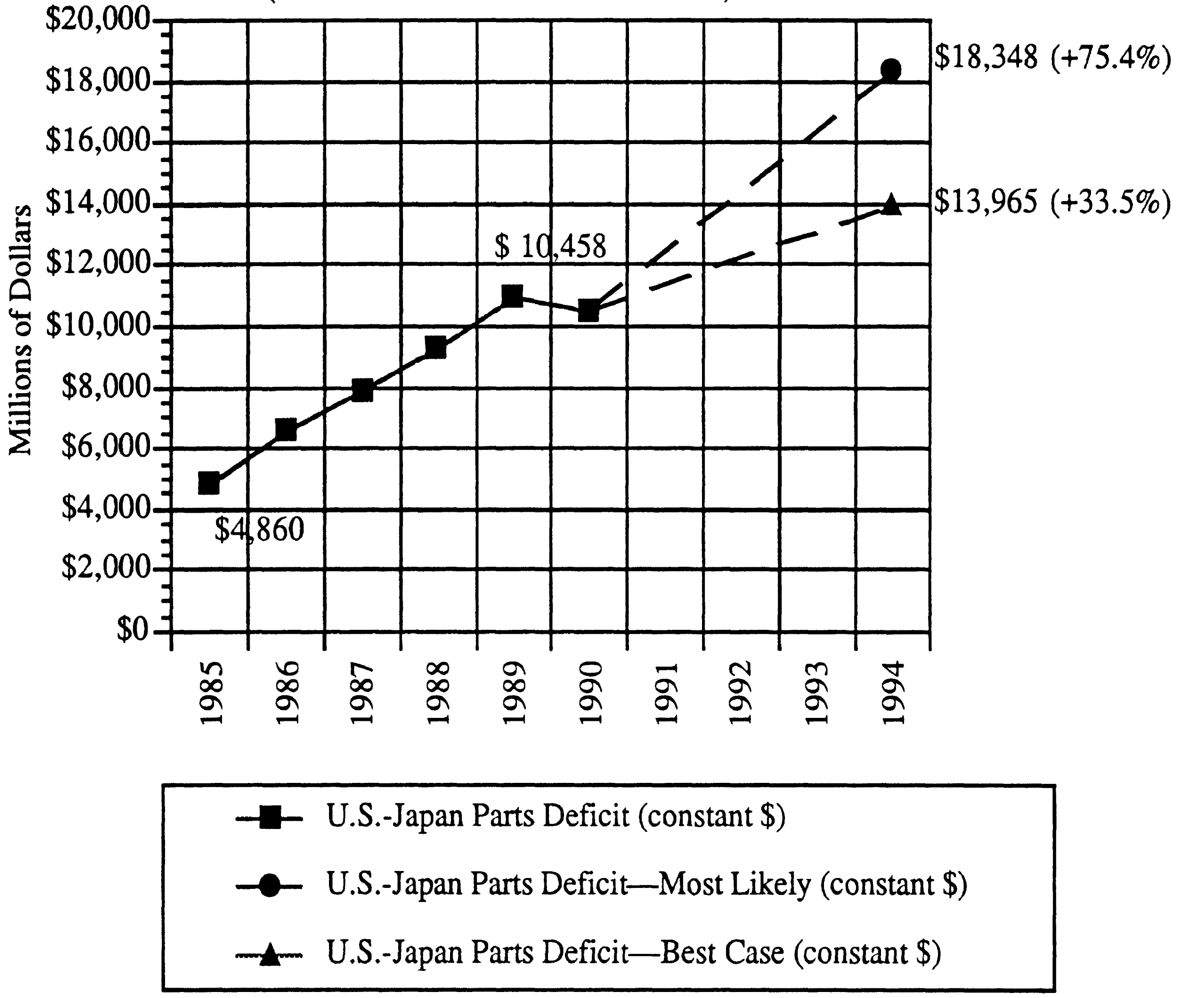
Our "Most Likely Case" 1994 parts deficit in constant dollars is $18.35 billion, a 75% increase from the 1990 level. In current dollars, the expected deficit rises to $21.99 billion, or a 110% increase from 1990.

The constant and current dollar "Best Trade Case" and "Most Likely Case" scenarios for the U.S.-Japan auto parts deficit are given in Table 9, while constant dollar forecasts are shown in Figure 15.

Table 9
U.S.-Japan Automotive Parts Deficit:
Two 1994 Scenarios
(in billions of dollars)

"Best Trade Case"		
U.S.-Japan Automotive Parts Deficit	Constant Dollars	Current Dollars
U.S.-Japan Auto Parts Deficit	$ 13.965	$ 16.742
"Most Likely Trade Case"		
U.S.-Japan Automotive Parts Deficit	Constant Dollars	Current Dollars
U.S.-Japan Auto Parts Deficit	$ 18.348	$ 21.991

Figure 15
U.S.-Japan Automotive Parts Deficit
1985-1990 and
Best Trade/Most Likely 1994 Forecasts
(in millions of constant 1990 dollars)



Discussion

It is useful to consider further the possible contributions of the various sources of Japanese import parts demand to total parts imports, combining results from separate estimations. It is also appropriate to discuss likely future levels of transplant vehicle content based on these results and additional information available to this study.

Tables 10 and 11 provide some detail to separate the relative contribution of Big Three captive parts demand from demand for Japanese aftermarket parts. We combined the two sources in our above forecast for a total constant dollar estimate of $13.081 billion in both our "Most Likely Case" and "Best Trade Case" scenarios. In Table 10, we list the per-unit contributions to import parts demand estimated for the production of transplant and Big Three traditional content vehicles for the years 1989, 1994 ("Best Trade Case") and 1994 ("Most Likely Case"). In Table 11 we list the levels of Japanese parts imports we attribute to each source of domestic assembly. In 1989, for example, we attribute $3.69 billion in Japanese parts imports to transplant assembly of 1.14 million at $3,223 per unit built in the United States. An additional $1.43 billion of Japanese parts imports are attributed to the production of 9.614 million Big Three traditional content, U.S.-built cars, trucks and vans at $149 per unit assembled.

Table 10
Expected Per Unit Source Effects:
1994 Japanese Parts Exports to the United States
(constant 1990:9 dollars)

Source	1989	1994 "Best Case"	1994 "Most Likely"
Transplant per unit assembled	$3,223	$1,681	$3,223
Big Three per unit assembled	149	149	149
Aftermarket per car in operation	287	314	314

The difference between $5.29 billion of Japanese parts imports attributable to transplant or Big Three production and 1989 total Japanese parts imports of $11.57 billion is a residual of $6.28 billion. We attribute the bulk of this residual to Japanese vehicle aftermarket demand. Based on this figure, a 1989 level of over 22.4 million Japanese affiliated cars in operation would produce a per unit aftermarket demand ratio of $287 per car in operation (CIO). This level is comparable to a 1985 U.S. Department of Commerce (USDOC) estimate of 1988 Japanese aftermarket sales per vehicle in operation of $260.[24] Our figure would be a bit higher because of our necessary exclusion of figures for operating Japanese trucks. The USDOC figure is meant to reflect retail pricing, however, which should be corrected for at least a 60% markup collected by the retail distributor. On the other hand, the USDOC study figure is given in 1982 prices, perhaps half the level of prices that held in 1989.

[24]Automotive Parts Industry and the U.S. Aftermarket for Japanese Cars and Light Trucks, Automotive Affairs and Consumer Goods, International Trade Administration, U.S. Department of Commerce, Washington D.C., March 1985, p. 67.

Table 11 attributes almost 32% of 1989 Japanese parts imports to transplant demand, almost 14% to Big Three demand, and well over half to the aftermarket for Japanese affiliated vehicles. The levels and contributions of these sources of demand are projected for our two 1994 scenario forecasts. In the "Best Trade Case," imported parts meant for transplant production rise only 9% from their 1989 level, to $4.03 billion, and the transplants' share of parts imports falls below 24%. Big Three imports rise to $1.48 billion, and their share falls to less than 9%. Imported aftermarket parts rise to $11.6 billion and a 68% share of total parts imports. The "Best Trade Case" reflects our most positive trade effect assumptions about U.S. Big Three and transplant build levels and the low $1,681 Japanese content level assumption for transplants.

Table 11
1994 Japanese Parts Exports to the United States
(billions of constant 1990:9 dollars

Source	1989	1994 "Best Case"	1994 "Most Likely"
Transplant	$3.69 (31.9%)	$4.03 (23.6%)	$8.41 (39.1%)
Big Three	1.43 (12.4%)	1.48 (8.6%)	1.39 (6.5%)
Aftermarket	6.45 (55.7%)	11.60 (67.8%)	11.69 (54.4%)
Total	11.57 (100%)	17.11 (100%)	21.49 (100%)

Our "Most Likely Case" scenario calls for imports of parts meant for transplant production of $8.41 billion, a 128% increase from 1989, and an increase in total import parts share to over 39%. Big Three demand, on the other hand, falls to $1.39 billion and a share of less than 7%. This scenario reflects a much higher production level for transplant production as well as a larger transplant content of $3,223, as well as lower share and build levels for the Big Three.[25] Once again, the Japanese aftermarket calls for $11.6 billion in Japanese parts

[25]Our best trade case Big Three 1994 sales level for light vehicles is 11.14 million, and our most likely estimate is 10.492 million. We assume the 1990 U.S. Big Three build to U.S. Big Three sales ratio of .89 will hold in 1994. Thus, our best case Big Three build estimate is 9.915 million, and our most likely estimate is 9.338 million.

imports. A rough estimate of the Japanese level of U.S. CIO is 37 million by 1994 (if we use 1985-1990 growth rates). This would work out to $314 of Japanese imported aftermarket parts per CIO in 1994.

The apparent size and growth of aftermarket demand for imported parts in the exercise above is remarkable. Yet this source of demand for imported parts has received relatively little attention from the media or academia, compared with transplant demand. Even in constant dollars, our forecast calls for an 85% increase in Japanese exports of aftermarket auto parts to the United States for 1989-1994. If the 1989 estimate of $281 per CIO reflects average annual demand for such parts over the typical 12 year life of a Japanese car, the sum $3,372 ($281*12) would exceed our estimate of imported parts needed to produce a transplant in the United States ($3,223) by almost 5%. **It is clear that Japanese affiliated vehicles, whether imports from Japan or transplants assembled in the United States, generate significant dollar imports and contribute to trade deficits for years after they are sold.**

The increasing importance of aftermarket parts imports in U.S.-Japan bilateral automotive trade may have strategic implications. Both Japanese and German vehicle importers have pursued a strategy of substituting fewer units of high-priced large cars for many units of lower-priced small cars. The number of units drops considerably, to the importers possible political benefit, while sales and profit dollar levels for vehicle imports remain constant, or even climb. This "leapfrog" strategy also protects import vehicle manufacturers somewhat from the wide swings in the value of the U.S. dollar, because of the large margins present in luxury cars.

Aftermarket parts also carry large margins in the market, much like luxury cars. Increased local sourcing of parts and components for domestic assembly can confer similar political benefits to those attained from declines in imported vehicles. A large portion of aftermarket parts from Japan in the total import mix would also protect Japanese traditional suppliers from swings in the dollar and still yield the bulk of inherent profit in the production of parts. **The Japanese may use the aftermarket as their luxury-car or "leapfrog" strategy equivalent in parts trade.**

Table 10 can also be used to generate a rough approximation of transplant sourcing in 1989. This speculation, illustrated in Table 12, is meant to inform the preliminary case study analysis in Section V. We start by assuming that the average custom value of a Japanese import vehicle in 1989, $9,189, is roughly equivalent to the average manufacturing value of their U.S. transplant vehicles. Thus, 1.145 million transplant vehicles would be worth $10.52 billion in customs value.

We continue by assuming a level of $3,223 worth of Japanese imports parts per transplant built in 1989, or $3.69 billion for 1.145 million transplant assemblies. Japanese imported parts constitute, then, 35.1% of transplant customs value, whether they are shipped directly into the assembly plant trade subzone or through domestic parts suppliers.

Our OSAT transplant directory lists a total of 222 Japanese-affiliated parts facilities operating in the United States by 1989. We estimate that these facilities employed an impressive total of 50,615 that year. In 1988, U.S. firms in SIC 3714 (motor vehicle parts and equipment manufacturing) produced an average level of $71,685 of value added per employee. If we inflate this figure by 4.5% (to $74,911) and apply it to our estimate of 1989 Japanese-affiliated parts employment in the United States, we can arrive at a generous level of $3.79 billion for the maximum domestic capacity of these producers in 1989. Perhaps 10% of the output of these firms is actually sold to Big Three producers for use in their traditional content vehicles. We assume that the remaining 90%, or $3.41 billion, is shipped eventually to transplant assembly plants. About 32.4%, then, of the customs value of transplant production is attributable to this source.

Table 12
1989 Japanese Transplant Sourcing in the United States

Source	Billions of Dollars	Percent of Total
Total Customs Value	$10.52	100%
Imports from Japan	3.69	35.1
Japanese Parts Facilities in the U.S.	3.41	32.4
Transplant Assembly, and Overhead/Profit	2.10	20.0
Traditional U.S. Parts Producers and Other	1.32	12.5

A critical assumption is the likely share of domestic content produced directly within the transplant assembly plants themselves. This share reflects a portion of vehicle profit and overhead, as well as the value of stamping and assembly manufacturing performed in the plants.

Three recent sources are used to project an average for this share of about 20.0%.[26] This sourcing estimate receives additional attention in our transplant sourcing case study. Our 20% assumption would assign $2.1 billion of transplant customs value to the U.S.-based, Japanese manufacturers themselves.

The final residual sourcing category in Table 12 remains for traditional U.S. auto parts producers and imports of parts from third countries. About $1.32 billion or 12.5% of the $10.52 billion in customs valuation is attributed to traditional U.S. parts suppliers and non-Japanese parts imports. The net share for traditional domestic parts producers, of course, is less than the full 12.5%.

Our simulation of 1989 transplant sourcing can bring some understanding to the potential of future domestic sourcing by Japanese motor vehicle firms in the United States. Our "Most Likely Case" vehicle trade scenario calls for a transplant build of over 2.6 million units in 1994, almost 1.5 million higher than in 1989. Given our most probable content level of of $3,223 per unit, Japanese imports of parts and components for 1994 transplant production would more than double from the 1989 level of $3.7 billion, to over $8 billion. The sourcing levels in Table 12 would also more than double. For example, parts sourcing to Japanese facilities in the United States would increase by 128% to $7.8 billion.

If, however, domestic content is dramatically increased by Japanese transplant producers to a level that reflects a ratio of only $1,681 of imported parts per unit, Japanese producers will need to source an additional $4.3 billion in parts to U.S. sources of supply. Table 12 reflects a 72% share of 78% of non-assembly plant U.S. sourcing to Japanese owned parts facilities in 1989. Given this pattern, an additional $3.4 billion of the new domestic

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[26]One source was: Mazda Motor Manufacturing (USA) Corporation, "Foreign Trade Subzone 70i, Annual Report to the Greater Detroit Foreign Trade Zone, Inc. October 1, 1987 to September 30, 1988," contained in the <u>Annual Report of the Greater Detroit Foreign-Trade Zone Inc. No. 70 for fiscal year ended September 30, 1989</u>. A second estimate is contained in "The Impact of changing the Rule of Origin Content Requirements for Automotive Products under the United-States-Canada Free Trade Agreement from 50 to 60 Percent," A Report to the Automotive Select Panel, Booz-Allen, New York, 1990. A third source is contained in a Statistics Canada estimate, supplied by the Canadian Auto Parts Manufacturing Association to the Automotive Select Panel, of the percentage breakout of passenger cars by cost and profit category.

sourcing would accrue to the Japanese affiliated parts producers, raising their total 1994 capacity needs for transplant production alone to over $11 billion.

We cannot foresee, at this time, an increase in the capacity of Japanese owned parts facilities by 1994 to a level of over $11 billion in value added. This would require a Japanese-affiliated U.S. automotive parts sector made up of 634 facilities employing 147,000. In 1989-1990, the Japanese added 17 new parts facilities and about 2,000 employees to their U.S. base. Current rates of Japanese expansion in the United States, then, will not provide the needed capacity. **The large shortfall must either be imported from Japan, as in the past, or sourced to U.S. traditional or third-country suppliers.**

In our first study of the U.S.-Japan automotive deficit we noted that transplant domestic "CAFE-content" levels beyond 75% (perhaps 61-62% manufacturing content) were highly unlikely. Higher levels would require the Japanese producers to maintain separate import and domestic fleets for CAFE performance purposes. We still believe that the 75% break-point content level is a serious obstacle or ceiling to higher levels of domestic sourcing for these vehicles. The maintenance of separate fleets highly complicates strategic decisions on the sourcing of complete vehicles and parts. This would especially be true for Japanese firms that source large numbers of vehicles from both Japan and their plants in the United States. For this reason, and for the capacity limitations outlined above, we see domestic content for these vehicles rising slowly through 1994 to reach a level, at best, just below 75%, in CAFE-content.[27]

Trends in Percentage Changes in Imports and Exports of Parts

The ITA supplied annual import and export automotive trade levels for 215 parts categories for the years 1985-1989. We performed some simple percentage change calculations, based on these annual data, for the very specific ITA parts trade categories. Our intent is to identify patterns in the types of parts that are traded, and the relative rates of change in trade for specific parts.

Types of U.S. Automotive Parts Imports from Japan

The ITA data show Japanese exports of automotive parts to the United States rising from $5.2 billion in 1985 to $12.5 billion in 1989, an absolute percentage increase of 138%.

[27]This analysis also makes us skeptical that the value of imported parts fell to $1,681, for that would mean that the transplants are averaging almost 82% domestic content. None of these operations claim to be above 75% in 1990.

The annual compound growth rate for total parts imports from Japan, then, was about 24%. We computed the same percentage change figures for each of the 215 ITA import parts categories and found a surprising degree of variance in growth rates across the categories. We grouped various parts categories by levels of percentage change relative to the total average change for all parts. The full results of this exercise are listed in order of 1985-1989 percentage change in Appendix VI. At least three large groups of parts merit discussion here.

There was a large number of new or fast growing imported parts from Japan. We defined these parts categories as those that increased by 275% or more (twice the average increase) in dollar exports to the United States during 1985-1989. In fact, a number of these part or component types were not even listed in 1985-1988, and only make their appearance with the new, harmonized coding in 1989. If we ignore this source of confusion, however, a general pattern for types of fast growing imports can be discerned.

The upper portion of Table 13 gives a sample listing of fast growing parts imports. These parts generally fall into three large categories: complete engines, high value-added parts and sub-assemblies for large components, and high-margin aftermarket parts. We assume that the complete engines are sourced to both transplant and Big Three assembly plants. It is also likely that the component parts are being shipped to new Japanese-affiliated component facilities in the United States that sell to both transplant assemblers and the Big Three.

The remarkable growth of these parts cannot be explained just by the 217% increase in transplant assembly production or the 50% increase in the Japanese CIOs in the United States during 1985-1989. Percentage increases of over 275% for these parts can only mean that they are necessary inputs into the rapidly growing Japanese affiliated automotive parts sector in the United States. The transplant parts makers increased their operations in the 1986-1989 period at a very rapid pace, and have only recently slowed their additions to capacity. Many of the parts that make up the fastest growing categories of imports during 1985-1989 are clearly meant for use in the assembly of final components in these U.S. facilities.

A second group of parts imports increased at a medium or near average rate during 1985-1989. We defined these parts categories as those that increased by 67 to 274%. In general, imports of these parts can be explained by growth in transplant production and the Japanese aftermarket. Items such as wheels, starters, fuel and water pumps, or ball bearings, then, reveal no important change in their sourcing patterns.

An interesting group of import parts are those that exhibited relatively slow or even negative growth in shipments to the United States in 1985-1989. As shown in Table 13, we define these parts categories as those that grew by 66 to -81%. Some components, such as carburetors, declined due to technological displacement (by fuel injectors in the case of carburetors). Other low value-added items such as jacks, seat belts, or various plastic parts were no doubt sourced to domestic producers. The low value of these parts reflects partially their low technology requirements, as well as low profit content. After the decline of the dollar against the yen in 1985-1987 it became less efficient to export these parts from Japan.

We are not surprised that a number of large components, such as transmissions or complete engines still show large growth in shipments from Japan to the United States. Even by 1990, only two of the eight transplant assemblers were manufacturing engines and transmissions in the United States. Yet, imports of several large components, such as complete air conditioners, did decline in in the 1985-1989 period. This positive development is clearly offset, to a certain extent, by fast growing imports of high-value sub-assemblies, such as air conditioner compressors, during the same period.

Types of U.S. Automotive Parts Exports to Japan

The ITA data show U.S. exports of automotive parts to Japan rising from $216 million in 1985 to $625 million in 1989, an absolute percentage increase of 189.0%. The annual compound growth rate for total U.S. parts imports, then, was about 32%. We computed the same percentage change figures for each of the 215 ITA export parts categories and found an even larger degree of variance in growth rates across the categories than was the case for U.S. imports from Japan. Once again, we grouped various parts categories by levels of percentage change relative to the total average change for all parts. The full results of this exercise are listed in order of 1985-1989 percentage change in Appendix VI. Two large groups of parts merit discussion here.

We define very fast growing parts exports to Japan to include types that increased by 377% (twice the average percentage increase) or more during 1985-1989. A sample listing of these parts is shown in the upper portion of Table 14. Many of the same parts and components that fell into the slow or negative growth group of parts exports from Japan to the United States reappear as parts with the highest growth rates in exports from the United States to Japan. These include parts such as jacks and spark plugs.

A similar relationship between slow or negative growth types of parts exports to Japan and fast growing parts types exported to the United States seems to hold. We define slow growth exports as those parts whose shipments to Japan from the United States increased by 95% or less during 1985-1989. Examples of such parts are steering systems, oil filters, and fuel injector parts.

Table 13 Trends in Parts Imports from Japan 1985-1989	
New or very fast growing parts imports from Japan: Twice the 1985-1989 average percentage increase change or > 275%	Engines Steering components Air conditioning compressors Fuel injector parts Fans Windshield wipers Steering wheels Engine parts of all kinds (subassemblies) Crankshafts Disc brake parts Transmission parts Clutches and parts Gaskets, oil and air filters, exhaust systems, shock absorbers
Parts imports from Japan with near average growth: from 274% to 67% increase	Windshields Battery parts Brake drums and rotors Tires Stampings Lighting equipment Signaling equipment Ball bearings Starter motors Magnetos Fuel and water pumps Wheels Defrosters
Parts imports from Japan with below average or negative growth: from 66% to -81% change	Connecting rods Distributors Jacks Spark plugs Seat belts Complete air conditioners Gear boxes Horns Carburetors Tape players Brake fluids Belts Floor mats

Table 14 Trends in Parts Exports to Japan 1985-1989	
New or very fast growing parts exports to Japan: Twice the 1985-1989 average percentage increase change or > 377%	Jacks Bumpers Fans and blowers Mirrors Seats and parts Brake linings Fuel injectors Wheels Stampings Spark plugs Lighting equipment Gaskets Seat belts Ignition coils Generators Distributors
Parts exports to Japan with near average growth: from 366% to 96% increase	Springs Ball bearings Windshields Wire harnesses Shock absorbers Air conditioning Bumpers Headlamps
Parts exports to Japan with below average or negative growth: from 95% to -100% change	Clutches 12 volt batteries Steering systems Parts of fuel injectors Magnetos Defrosters Wipers Antifreeze Oil filters Steering wheels Starters Gear boxes Odometers Locks

It is possible to explain the negative correlation between high growth category of parts imports and the low growth category of exports through the theory of simple comparative advantage. Yet comparative advantage cannot explain why certain parts, such as jacks, whose production is most efficiently performed locally, are even involved in such long distance trade.

We suspect that the answer has to do with the growth of the Japanese transplant parts manufacturing sector in the United States. As these facilities enter operation, shipments of their final products from Japan decline, while imports of various related sub-assemblies needed in production increase very quickly. Many of these facilities are of a size needed for efficient economies of scale. Initial demand for their output in the United States, however, may not reach their capacity levels. This excess capacity may be shipped back to Japan for installation into vehicles assembled there for the export or even domestic market. A large portion of U.S. parts exports to Japan, then, may well be attributable to Japanese-affiliated transplant parts makers in the United States.

If the bulk of parts exports to Japan are shipments from Japanese transplant parts facilities in the United States, we must add a note of caution to our 1994 forecast of U.S. parts exports to Japan. We have forecast the 1994 U.S. vehicle sales market to reach a level of 16 million. In this strong market, we also forecast a transplant build level of over 2.6 million units. It is very likely that the Japanese transplant assemblers will need all of the capacity available from their affiliated suppliers, leaving little capacity to produce output for export to Japan. If this is true, exports of U.S. made parts to Japan could decline as imports of parts rise, for the same reasons. Our forecast of the level of U.S. auto parts exports to Japan could be a serious overestimate. The auto parts deficit with Japan may now be highly cyclical, rising dramatically in large sales years, and falling in slow sales years, reflecting primarily the capacity needs of Japanese transplants in the United States.

V. A Case Study of Transplant Sourcing and Trade Content

As a "reality check" to the statistical analyses performed on Japanese automotive parts imports and transplant production, the research team undertook a case study of one transplant facility's component sourcing. In addition, we sought a better understanding of the location of manufacturing value-added—from imports, in-house transplant assembly plant, transplant supplier, or traditional domestic supplier. Honda of America Manufacturing's Marysville assembly plant was selected as a well established transplant facility to give the best indication of future sourcing patterns for all transplant facilities. This established facility has high production volumes and extensive experience working with the U.S. supply base. As transplant production volumes grow and movement along experience curves develop we believe most transplant operations will follow a similar pattern.

Methodology

We created a sourcing matrix, Table 15, by dividing the automobile into ten major subsystems and two "other" categories. Each of these subsystems is further divided into individual parts or assembly categories for a total of 46 items. Using periodical clipping files, supplier directories,[28],working knowledge, and publicly-available company information (Honda provided no confidential information), we then tie these parts to known import, transplant, or traditional domestic suppliers.

We add a component cost estimate to this matrix, also shown in Table 15. We estimated these costs from industry and government sources, but primarily from work performed for the Michigan Department of Commerce's Auto-In-Michigan project.[29] Using data obtained through the Foreign Trade Zone Board, we were able to estimate the value of in-bound and out-bound material from this plant. Dividing total vehicle production into out-bound value gives an average $10,013 value per vehicle produced. From Foreign Trade Board data on other transplant facilities and other references, we applied a 20% ratio for assembly and body-in-white value added by the assembly plant (or $2,000)—thus, total estimated purchased

[28]Japanese Automotive Investment Directory, Third Edition, 1990, Brett C. Smith, The University of Michigan Transportation Research Institute; The ELM Guide to Japanese Transplant Suppliers, Second Edition 1989, ELM International, East Lansing, Michigan; The ELM Guide to U.S. Automotive Sourcing, Third Edition 1989, ELM International, East Lansing, Michigan; The Japanese Auto-Parts Industries, 1989/90, Fourin, Incorporated, Nagoya, Japan.

[29]Andrea, David J.; Everett, Mark; and Luria, Daniel, "Automobile Company Parts Sourcing: Implications for Michigan Suppliers," Auto-In-Michigan Project Newsletter, May 1988.

components equal $8,013. We applied Auto-In-Michigan Project component cost ratios to the total $8,013 to obtain a new individual component cost base.[30]

Using the component costs shown in Table 15, we multiplied vehicle unit production by component cost to obtain total component purchase value. We next divided that total component purchase value into three categories: import, transplant, and traditional domestic suppliers, based on every supplier we were able to identify from public sources. Because we lacked complete sourcing information we had to rely on a number of reasonable assumptions and guidelines. We used a residual model, subtracting total available transplant component value and a proportion of total available traditional component value from total component purchase value to obtain import value:

Total component purchase value (estimated component cost * total production)

— **Total available to transplant suppliers** (see below for value determination)

— **Total available to traditional domestic suppliers** (again, see below)
Residual import value.

For each known transplant supplier, we multiplied the average auto industry value added per employee[31] by number of company employees and divided by number of customers to obtain available value for transplant suppliers:

Average auto industry value added/employee ($74,911 parts/$63,045 stampings)
* Number of employees (obtained from industry directories)
Theoretical maximum plant output

/ Number of Customers
Theoretical component value available to the model transplant.

This method puts a maximum company limit on what can be sourced into our case study's plant. For components having multiple suppliers we summed the individual companies to obtain a transplant supplier total. Because we were not able to obtain specific supplier dollar sales to the plant or the sales mix of individual suppliers, this is a rough estimate for any given supplier or component category. However, over the entire listing of 46 component entries and 116 transplant company entries (not including captive transplant production, but including multiple company entries), we assume this estimation process will roughly balance underestimates and overestimates.

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[30]Note: rounding errors resulted in components adding to $8,030 in table 14.
[31]1988 Annual Survey of Manufacturers, Statistics for Industry Groups and Industries, M88 (AS0-1), U.S. Department of Commerce, Bureau of the Census, May, 1990.

Table 15 Transplant Sourcing Matrix				
System/Component	Estimated Value	Imports	Sources from Transplants	Traditional
Engine	$1,163			
Engine assembly	349			
Cylinder block	140			
Valvetrain	116			
Crankshaft	82			
Intake manifold	82			
Other engine parts	395			
Transmission	$594			
Transmission assembly	154			
CV joints/half shaft assembly	142			
Transmission case	95			
Gear sets/transmission parts	83			
Torque converter	72			
Other transmission parts	48			
Engine/Emission Control	$643			
Catalytic converter	90			
Fuel injection/engine control module	198			
Fuel tank assembly	70			
Engine wiring harness	58			
Ignition system components	58			
Other engine/emission control parts	169			
Body	$1,523			
Major body surface panels	715			
Bumper/fascia assemblies	290			
Structural body panels	259			
Small stampings	183			
Other body parts	76			
Comfort/Convenience/Electrical	$925			
Air conditioning/heating system	178			
Audio system	126			
Chassis wiring harness	112			
Heat exchangers	83			
Other comfort/convenience parts	426			
Suspension/Steering	$659			
Axle/suspension components	132			
Steering system components	99			
Struts/springs	79			
Steering column components	66			
Other suspension/steering parts	284			
Glass	$157			
Hardware	$225			
Interior Hard and Soft Trim/Seats/Occupant Restraints	$522			
Instrument panel	99			
Seat covers	89			
Seat frames/mechanics	89			
Occupant restraint systems	42			
Other interior/occupant restraint parts	203			
Brakes/Wheels/Tires	$522			
Wheels	115			
Caliper assemblies	58			
Disk/drums	89			
Master cylinder/brake components	42			
Other (including tires) brake/wheel/tire parts	219			
Other Parts (used in a variety of systems)	$411			
Other Parts (not elsewhere classified including paint)	$686			
Total Parts	$8,030			
Assembly, profit, and overhead	$2,000			
Average Total Value Out-Bound per Vehicle	$10,030			

We proceeded in the same manner for traditional domestic suppliers, except we divided the total available by 50 percent to obtain our estimate of actual sourcing. We did this because employment numbers of the domestics are more difficult to obtain—many listings include non-automotive and aftermarket production employment, which adds artificially to our estimate of total company auto output. Also, the Big Three dominate the sales mix of traditional suppliers, so this 50 percent reduction helps correct the formula's built in assumption that all customers source the same production value.

Finally, to estimate pure imports into the plant, we subtracted the above results from our estimated total component value to obtain total import value. Several corrections were made to the above process to achieve our final sourcing estimates. First, on an individual component basis the above process was adapted as needed. For example, this plant sources engines and transmissions from allied plants in the United States and Japan. Because we were not provided employment numbers specific to products produced in allied U.S. plants, we assumed engine assembly and blocks and transmission assembly and blocks to be divided equally 50/50 between imports and transplant sourcing. Another typical adjustment assumes 25 percent import sourcing on components for which we found only one transplant supplier—although the value available from that transplant supplier is estimated to cover the entire component need, we assume the assembler has a second supplier to reduce supply interruption risk. We believe our assumptions are reasonable, given our base of specific and general industry practice information.

Our second major correction involves the estimation of second and third tier sourcing patterns. For transplant suppliers we assume that 25% of their production is import content and 5% is actually sourced from traditional domestic suppliers. This import estimate is conservative—some estimate this percentage as high as 50% or more. Whatever the actual number, we believe our final forecast provides a minimum likely import percentage and maximum, likely, domestic value-added percentage. For traditional domestic suppliers we assume 10% of sourcing is import content and no sourcing is from the transplant suppliers.

Results and Discussion

Table 16 summarizes our case study results by major system. Based on the information we were able to obtain and analyze, we estimate this transplant's output to be 38% import content, 46% from transplants (including assembly and allied operations), and 16% from traditional domestic suppliers.

Table 16
Transplant Sourcing Case Study
Summary Results

System	Import Sourced	Transplant Sourced	Traditional Domestic Sourced
Engine	58%	37%	5%
Transmission	62%	29%	9%
Engine/Emission Control	41%	39%	21%
Body	45%	46%	10%
Comfort/Convenience	58%	17%	25%
Suspension/Steering	60%	20%	20%
Glass	42%	15%	43%
Hardware	45%	9%	45%
Interior Hard/Soft Trim	22%	45%	33%
Brakes/Wheels/Tires	28%	37%	35%
Other Parts	47%	24%	29%
Other, not elsewhere	42%	31%	27%
Percentage of Total Components (based on $8,030)	48%	33%	20%
Total Components per Vehicle (based on $8,030)	$3,820	$2,625	$1,585
Percentage of Total Vehicle—Including Assembly (based on $10,030)	38%	46%	16%
Total Value per Vehicle	$3,820	$4,625	$1,585

Applying these percentages to our estimated $10,030, we estimate $3,820 of import parts value per transplant produced, with $4,625 contributed from transplant facilities (including wholely-owned and joint-venture facilities) and $1,585 from traditional domestic suppliers.

Scanning the systems, it is apparent that domestic suppliers are generally underrepresented in the three major vehicle systems: engine, transmission, and body structure. By our estimates, these systems have about $3,300 (33% of total) of value. The most significant systems inroads by the domestics—hardware, glass, brakes/wheels/tires, and interior hard and soft trim—have approximately $1,400 (14% of total) of value. This substantiates domestic supplier concerns through this transition period of Japanese production globalization. Japanese vehicle manufacturer component sourcing strategies to date have not yielded domestic suppliers relatively equal participation across all systems, but has concentrated that participation into categories that have lower value-added (thus, lower profit margins) and substantial competition (thus, increased marketing costs and risk of future loss of business).

Our concern about expansion of the transplant supply base is also substantiated by looking at the systems with high transplant-sourced (read new capacity) percentages. Engine, engine/emission control, stampings, interior hard and soft trim and seats, brakes/wheels/tires, and miscellaneous components lead transplant sourcing. In each of these systems, over one-third of this transplant facility's components are sourced from new transplant supplier capacity while each system has major domestic industry capacity available (e.g., Allied-Signal, Dana, Eaton, Johnson Controls, Kelsey-Hayes, and TRW).

We believe this case study presents a rational method for analyzing and representing the source of value-added from a transplant vehicle assembly plant. Our assumptions are conservative. The results show a lower domestic value-added than is publicly quoted by the company but higher than some recent academic studies.

Our case study results inform a number of remaining issues on transplant sourcing, as well as our most likely forecast of Japanese parts exports to the United States in 1994. The sourcing percentages listed at the bottom of Table 16 can first be compared with our aggregate estimates in Table 12. In Table 12, we estimated the average Japanese import content of 1989 to be 35%, yet our case study estimate is somewhat higher at 38%. The 38% import content level is near the level many experts say is needed to reach 74-75% "CAFE-content" for Honda. Since Honda is often considered by many experts to be the most advanced of the Japanese transplants in terms of domestic sourcing, the remaining high level of Japanese content is sobering. No other current transplant is likely to be operating at this reduced level of Japanese content. This could mean that we underestimated the likely level of 1994 Japanese parts exports to the United States and attribute too large a share of these exports to the aftermarket rather than to transplant demand.

Our 1989 aggregate sourcing estimate (Table 12) attributes only 12.5% of average transplant value to traditional U.S. suppliers and third country imports. Our case study attributes 16.0% to domestic sources, a more positive estimate. Other transplants can be expected, then, to increase their sourcing to traditional U.S. parts makers in a similar fashion. On the other hand, domestic parts contracts are likely to remain small. We have identified 203 U.S. facilities currently supplying Honda. This may be overstated because 19 facilities are joint ventures and may have reported sourcing from both the joint-venture facility as well as the parent firm. Of the 203, 113 are traditional domestic firms and 90 are transplants. The 113 traditional domestic firms may be overstated by the 19 joint venture operations. The 109 Japanese affiliated producers share 33% of total component value of output with the assembly firm itself. An additional 48% of total component value is imported from Japan. The remaining 20% of parts value is shared by the 94 traditional U.S. producers who make up 46% of the 203 domestic supplier facilities we identified for this case study. Thus, the average sales of true Japanese-affiliated suppliers to Honda are likely to be some 50% higher than the sales of the traditional domestics.

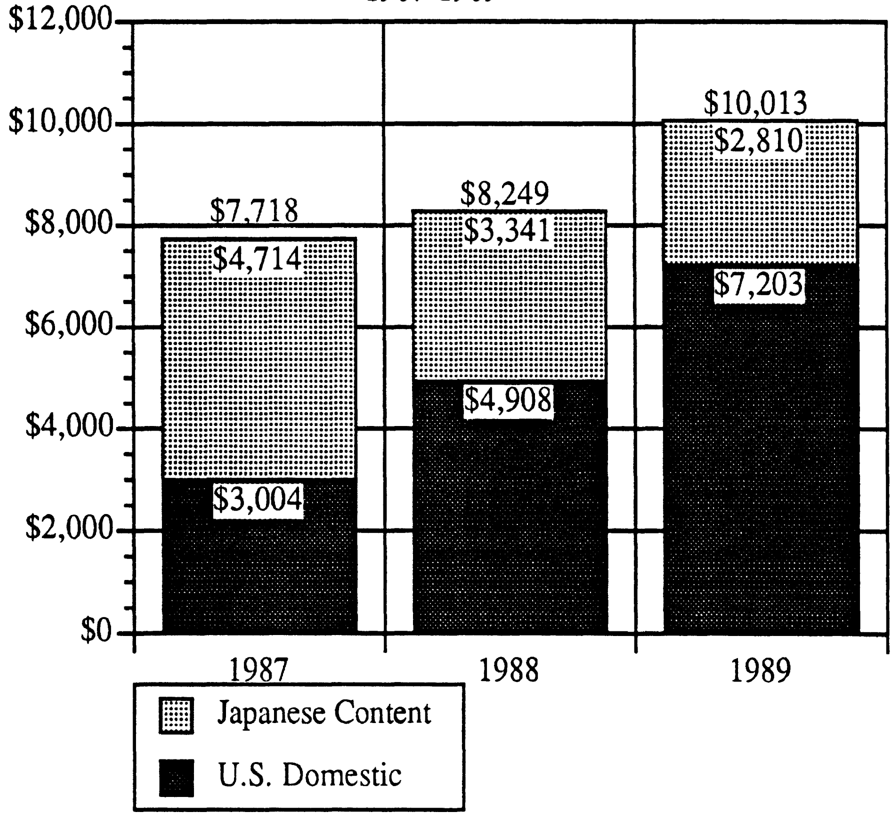
We did perform some analysis of the case study firm's sourcing in Japan compared with their practice in the United States. We used a popular supplier directory on Japanese automotive sourcing to identify 165 first-tier Japanese suppliers to Honda in Japan. Of these 165, 78 (47%) are currently producing in the United States. Our internal transplant sourcing directory lists 70 of these firms supplying the case study assembly plant. These 70 firms constitute 42% of the case study's 165 key Japanese suppliers in Japan, 78% of their solely Japanese-owned suppliers in the United States, and 35% of the total count of 203 U.S. located suppliers for this firm. We identified 30 "equity keiretsu" supplier firms, or firms in which the case study assembler owns significant shares of equity.[32] Of these 30, 17 now produce in the United States and supply the case study assembly plant.

We relate $3,820 of Japanese parts imports to each vehicle produced in the case study assembly plant. This level is considerably higher than the estimated $3,223 of Japanese imports related to transplant assemblies derived from our regression analysis. Yet we can attribute a large portion of the difference to the richer mix of cars produced in this assembly plant compared with those assembled across all transplants. In 1989, 233,000 of the 362,000 cars assembled at Honda Marysville were medium-priced compacts. Subzone data for this plant, for the years 1987-1989, is shown in Figure 16. Reported subzone imports of Japanese parts per vehicle fell from a level of $4,714 (61% of total shipments out of the plant) in 1987 to $2,810 per vehicle (28%) in 1989. The 1989 levels also reflect imported parts shipped through a nearby captive engine plant. The 1989 subzone report states that $7,203 of U.S. domestic

[32]The system of manufacturers holding equity share in suppliers is quite common in Japan, and is often treated in the United States as an important part of the "keiretsu" system. We note that Honda has consistently maintained that it does not participate in a keiretsu, nor does it maintain the tight control over its suppliers often attributed to other Japanese vehicle manufacturers. We do not think that the 17 equity participation suppliers now producing in the United States contradicts Honda's assertion.

parts or production were used in each car shipped from the zone. On the basis of our case study results, we estimate that $1,010 of the value of these parts ($3,810 - $2,810) were actually imported from Japan and sourced through domestic parts facilities into the assembly plant subzone. The actual domestic vehicle content level is $6,193 or 62% of the reported value of the cars shipped from the subzone. Subzone reporting clearly overestimates the domestic content of transplant vehicles, since all domestic parts shipments, except those from other subzones, are counted as 100% domestic.

Figure 16
Subzone 46b Official Content
per Vehicle Assembled
1987-1989



Source: Foreign Trade Zone Board

VI. Final Forecast and Discussion

Results. Our vehicle trade forecast—shown in Tables 5 and 7, and our parts trade forecast, shown in Table 9—are combined to yield overall estimates of the U.S.-Japan bilateral automotive deficit for 1994. Once again, we generate both constant and current dollar forecasts for both the "Best Trade Case" and "Most Likely Case" scenarios of the projected deficit.

Our various estimates of the bilateral automotive deficit are shown in Table 17 and Figure 17. Our "Best Trade Case" projects a constant dollar 1994 deficit of $29.41 billion, or a 5% reduction from the 1990 level of $31.10 billion. Our "Best Trade Case" forecast of the current dollar level of the deficit is $35.24 billion, or a 13% increase over the 1990 deficit. In both constant and current dollars, the share of parts deficit as a portion of the "Best Trade Case" overall automotive deficit rises from 34% in 1990 to 47% in 1994.

Table 17
U.S.-Japan Automotive Trade Deficit:
Two 1994 Scenarios
(in billions of dollars)

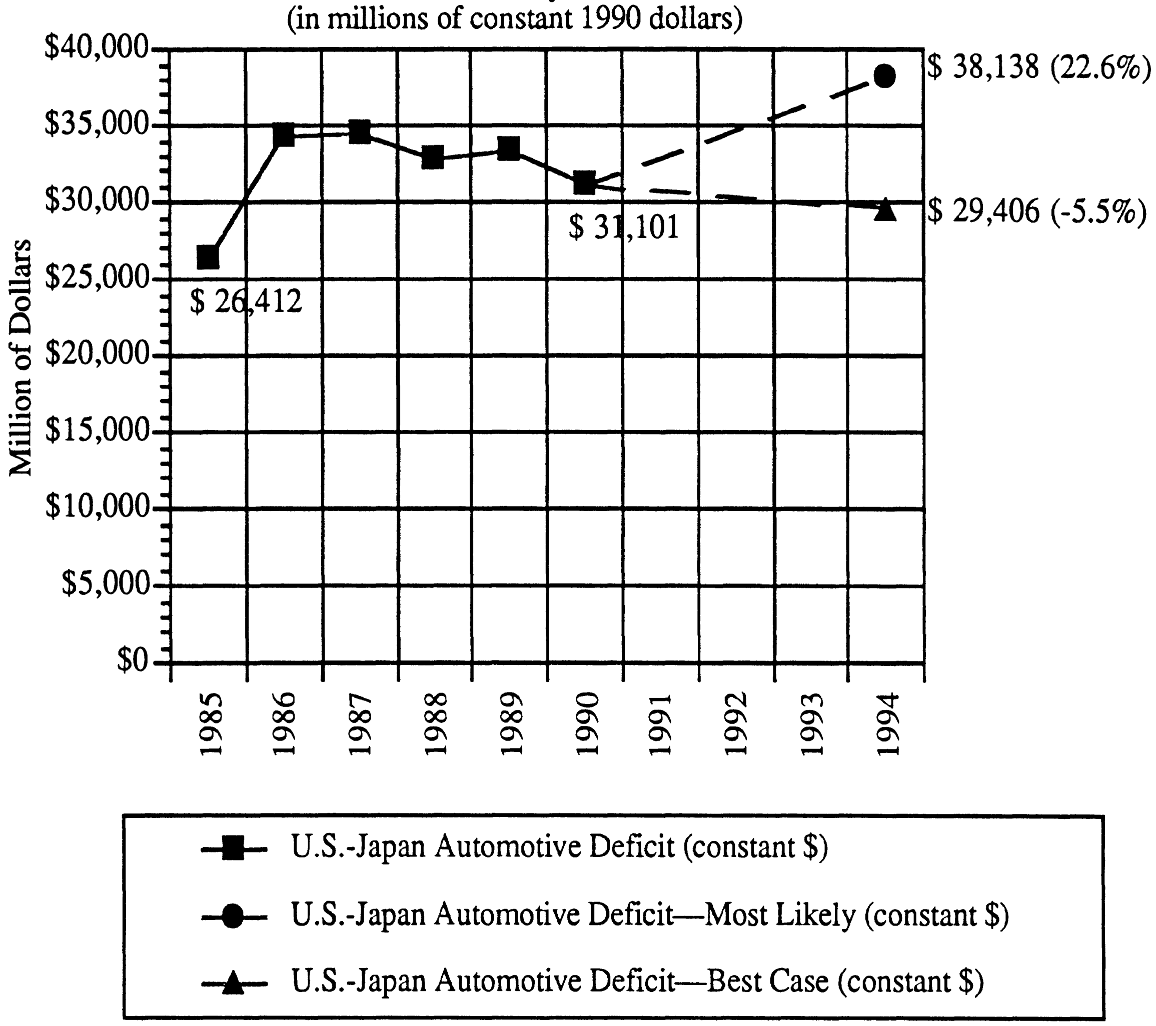
	"Best Trade Case"	
	Constant Dollars	Current Dollars
U.S.-Japan Vehicle Deficit	$ 15.441	$ 18.494
U.S.-Japan Automotive Parts Deficit	$ 13.965	$ 16.742
Total U.S.-Japan Automotive Trade Deficit	$ 29.406	$ 35.236
	"Most Likely Trade Case"	
	Constant Dollars	Current Dollars
U.S.-Japan Vehicle Deficit	$ 19.790	$ 23.712
U.S.-Japan Automotive Parts Deficit	$ 18.348	$ 21.991
U.S.-Japan Automotive Trade Deficit	$ 38.138	$ 45.703

Our "Most Likely Case" projects a constant dollar 1994 deficit of $38.14 billion, or a 23% increase from the 1990 level of $31.10 billion. Our "Most Likely Case" forecast of the current dollar level of the deficit is $45.70 billion, or an increase of 47% compared with 1990.

In constant and current dollars, the share of parts deficit as a portion of the "Most Likely Case" overall automotive deficit rises from 34% in 1990 to 48% in 1994.

We foresee a decline in the bilateral deficit in only one of the four projected deficits, the constant dollar "Best Trade Case"; and this decrease is limited to 5%. We foresee increases of 13 to 47% in our other three estimates. In all four estimates, the share of the parts deficit rises to almost half of the projected overall bilateral automotive deficit. We consider this development to be a major change in composition that will affect the course and meaning of future automotive trade between the United States and Japan. We expect two other sets of issues, economic and political, will also play large roles in affecting the pattern of future bilateral trade.

Figure 17
U.S.-Japan Automotive Trade Deficit
1985-1990 and
Best Trade/Most Likely 1994 Forecasts
(in millions of constant 1990 dollars)



Economic Issues. We estimate that by 1990, Japanese automotive firms invested $13 billion in buildings and equipment located in at least 250 parts and assembly facilities in the United States. Our conservative estimate of the U.S. employment of these 250 facilities is 78,000. We forecast that by 1994, Japanese automotive firms will assemble more vehicles in the United States than they will export to the United States from Japan. Despite these developments, perhaps even because of them, we confidently predict that the 1994 bilateral trade deficit will be 23% higher in constant dollars than the level experienced in 1990.

We believe that the major driver of future U.S.-Japanese automotive trade will be the same as in the past: the strategic behavior of Japanese automotive firms. These firms claim, with some justice, that trade deficits measured in U.S. dollars overstate the problem of the trade imbalance. Japanese firms seek to earn amounts measured in real yen. The general pattern of the bilateral deficits we examine in this study take on a different character when measured in Japanese currency. However, these deficits are a U.S. problem, and dollars are the appropriate measure of these problems. This study presents evidence of major changes in trade performance by Japanese exporters that will alleviate many of the problems of currency exchange rates, especially for earnings. Exports from Japan, in vehicles or parts, will include higher margins than in the past. A larger portion of Japanese exports to the United States will be composed of luxury cars and aftermarket parts than in the past. Production of low-margin products will be shifted to regional markets worldwide. Such behavior on the part of Japanese automotive producers is nothing less than an exercise in efficient resource allocation from their point of view.

Japanese automotive firms are still committed to rapid growth in their world market share, and eventually growth in their share of world automotive profits. To accomplish these goals, we believe, they will continue to seek policies that protect their domestic markets from serious inroads from foreign competition, in vehicles or parts. They will aggressively pursue market share in North America, Western Europe, and in developing markets that include Southeast Asia and Eastern Europe. They will adopt the price policies, design strategies, and productivity improvements that are necessary to maintain their growth. They will make full use of the Japanese economy's many exporting advantages for domestic firms. They will also take full advantage of their international competitor's disadvantages in responding to such competition in less able economies. In other words, Japanese automotive producers will continue to practice strategic trade.[33]

U.S. automotive firms also participate in foreign markets, and still practice a "community style" of globalization, exemplified by over 50 years of Ford and General Motors efforts in Western Europe. Overseas capacity is carefully built in periods of growth or through approved buyouts and joint ventures. This results in an almost completely independent foreign subsidiary, recognized by all as a full domestic producer with rights and duties, and largely innocent of bringing about displacement costs to workers, firms, communities, and national economies. Such operations require political skill, time, and above all, patience. The rewards include a share of business and a voice in decision making. The striking feature is that old capacity is purchased, current workers and suppliers reemployed by the new "foreign" owners, and new capacity only brought on line in an environment of market growth that can be shared with all.[34]

In stark contrast, the Japanese engage in a "new competitor style" of globalization, exemplified by Japan's aggressive use of new capacity, either in Japan or in North America, to displace traditional domestic capacity, as well as other imports. This style of globalization involves new plants, new workers, and new suppliers displacing current industry participants. This method requires enormous volumes of investment capital and the willingness to assume possibly severe political and economic costs in the medium run, since a serious overcapacity situation often directly results. Above all, new competitor globalization does not seem to permit sharing of markets with existing domestic capacity. In fact, existing competitors are placed under the most intense pressure during times of economic distress.

Our study has forecast that automotive parts will take a far larger future share of the overall bilateral deficit. **Instead of American consumers determining directly the size of the bilateral deficit through their choice of vehicle purchases, half the**

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[33]The VER program is actually administered by MITI. Recent, serious losses in net earnings by U.S. auto producers during the current sales downturn are clear evidence of the U.S. disadvantage in "fixed" not variable costs. The Japanese producers may now possess their largest competitive advantage, not in variable cost or quality, but in relative fixed costs per unit. Many of the components of fixed costs for U.S. producers are beyond their ability to control, and are more properly the subject of policy attention by government.

[34]A recent example is General Motors purchase of 50% of the equity of SAAB in Sweden. An existing SAAB plant will be converted to produce Opels. The only U.S. example of Japanese use of a brownfield site and existing workers is the NUMMI joint venture with General Motors in California.

deficit may now be determined directly by Japanese automotive firms operating in the United States or Japan, through their specific decisions on sourcing.

Perhaps the most intensive pressure is placed on the American automotive supplier industry. Our supplier industry, by itself, is the largest manufacturing industry in the United States, with shipments of at least $103 billion and employment of 618,000 in 1990.[35] The rising tide of Japanese imported automotive parts in recent years seems, at first inspection, to be a modern version of carrying "coals to Newcastle." Whatever the competitive reasoning for the imbalance in U.S.-Japan automotive parts trade, the size of our current industry and its general economic importance make further investigation of this disparity and the reasons behind it all the more critical.

The sum of social costs for regions facing Japanese corporate competition are high. The U.S. automotive trade deficit with Japan totals $185 billion in current dollars alone during 1985-1990; up to 500,000 U.S. employees and their families have been displaced since 1979; and many U.S. communities and a large portion of U.S. durable goods manufacturing are permanently depressed. Finally, these structural changes clearly have not assisted the U.S. government in its fiscal difficulties, either now or during the 1980s.

In return, U.S. communities have benefited from 78,000 new jobs in the Japanese affiliated auto industry, and consumers may have received higher value generally, if not currently lower prices, on their purchases of compact and subcompact cars.[36] A tradeoff with the social cost of Japanese competition does exist, and will certainly involve political decision making at the highest level.

Political Issues. A major political issue facing the United States and Japan is the sustainability of the current level of their bilateral trade imbalance. While both governments view it as unsustainable, the U.S. government has seemed remarkably tolerant of this deficit throughout the 1980s. Some analysts speculate that the United States perhaps views it as an appropriate exchange for Japanese political and diplomatic support, while others see it as a consistent

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[35] 1991 U.S. Industrial Outlook, International Trade Administration, U.S. Government Printing Office, Washington D.C., p.37-10.

[36] There does seem to be evidence that Japanese vehicles now sell at higher purchase prices than competing U.S. traditional vehicles in the same segments. This certainly should make the exercise of determining gains to consumer surplus from unilateral free trade with Japan all the more interesting. As far as we know, the argument that large bilateral trade imbalances generally raise consumer prices, not lower them, remains unrefuted.

application of the government's abiding belief in the principles of free trade and the efficacy of leading by example.

The U.S. government has pressured Japan to undertake structural reforms that would open its markets for many products, arguing that increased U.S. exports is a better solution to trade imbalances than reductions in U.S. imports. The government has even undertaken targeted MOSS[37] efforts in the automotive parts sector. However, both general and targeted efforts have been disappointing to date, and the imbalance remains large, and, as discussed in Section I, heavily concentrated in the automotive sector. Trade friction continues in many areas, including semiconductors, rice, and automotive goods.

The fundamental dilemma facing both the U.S. and Japanese governments is how long these deficits can continue, especially in light of the current recession in the United States. It will take some time for fundamental reforms to have an effect on this deficit, if indeed they ever will. The deficit may become an important domestic political issue in the United States, especially in the current economic conditions. Our own belief is that the U.S. government is very unlikely to take any serious steps to limit Japanese automotive imports or investments by 1994, and will view as acceptable any political risks this position may entail.

On the other hand, we expect the Japanese government to be concerned about potential political problems in the United States. The Japanese government recognizes that it must maintain a good relationship with the legislative as well as executive branch of the U.S. government, and frequently expresses concerns about the image of Japan among the American people. We suspect that the government will informally encourage the Japanese automotive industry 1) to restrain its activities in the United States; 2) to source more U.S. automotive parts; and 3) to avoid resisting the growth of import vehicle market share in Japan.

We think that the efforts of the Japanese government to reduce the bilateral automotive trade deficit will likely emphasize increasing U.S. automotive exports to Japan. This is consistent with the U.S. government strategy, and therefore offers some political benefits. Moreover, such efforts may be less disruptive to the Japanese automotive companies' strategies than a significant change in their export patterns. Of course, it faces the same inherent weakness: even a notably successful effort to improve U.S. automotive imports into Japan starts from such a low base that it is unlikely to have major effect on the imbalance by 1994.

[37]MOSS (for Market Oriented, Sector Specific) negotiations/discussions permit the U.S. government to address specific sources of trade friction with particular trading partners in isolation from general trade issues.

However, should the government make these efforts, it is unclear how successful it will be. The Japanese automotive industry, like its U.S. counterpart, is driven by corporate goals and strategies, and has proven itself capable of resisting government pressure. We suspect that any such Japanese government efforts will meet with limited success at best, as each company pursues its own best interest.

To be sure, the Japanese vehicle manufacturers are concerned with their public image in the United States, and certainly try not to be seen as rapacious or damaging to the U.S. economy. After all, six of the nine Japanese auto manufacturers enjoy higher unit sales in the U.S. market than in their home market. They undoubtedly will act in a restrained way if that is in their best interest. However, we suspect that such concerns will likely be muted by hopes that other companies will show the necessary restraint and concerns that they will not.

The growing importance of the bilateral automotive parts trade deficit makes it a sensible target for deficit reduction efforts. As indicated above, MOSS talks aimed at increasing U.S. parts exports to Japan are continuing between the two countries, reflecting the overall U.S. emphasis on reducing its trade deficits through expanding U.S. exports. However, the low current level of U.S. automotive parts exports to Japan make even a successful export effort a long-term solution at best. Japanese business practices in general, including close and enduring supplier relations, and automotive sourcing strategies in particular, including tying the selection of new suppliers to new model introductions, suggest that achieving significant levels of parts exports will take some time. It will take years for the Japanese manufacturers to develop interest in and consider U.S. parts, qualify them for use, and actually award the numerous and substantial contracts that will boost U.S. parts exports by the required factor of six to twelve times current levels.

Any near term hope of significantly reducing this key deficit lies in the reduction of Japanese parts exports to the United States. The two major sources of U.S. demand for these imported parts are for transplant manufacturing use, and the use of imported parts to service Japanese nameplate vehicles in operation. Transplant manufacturers represent both direct demand, through their own sourcing of Japanese parts, and indirect demand, due to their reliance on Japanese transplants suppliers, who themselves rely on high levels of parts sourced from Japan. This situation suggests a two-pronged strategy that the Japanese automotive industry itself might pursue to reduce the U.S. parts deficit. That strategy requires making serious and sustained efforts to increase the U.S. manufactured content of transplant vehicles. The most direct method of achieving this would be through, first, replacing Japanese import parts at both the manufacturers and transplant suppliers by, second, increased sourcing from traditional U.S. suppliers. Such a strategy could rapidly and significantly lower the bilateral parts deficit, and thus both the overall U.S.-Japan automotive deficit and the worldwide U.S. parts deficit.

The Japanese industry's standard rationale for its existing sourcing practices charges that the traditional U.S. parts industry cannot meet Japanese cost and quality requirements. In effect, this alleges that the U.S. supplier industry is not up to Japanese standards, and that competitive success demands, in some instances, direct parts imports from Japan, and in others, production in the United States, heavily supported by Japanese imports. However, the Japanese manufacturers certainly have it within their control to change these existing business strategies. The manufacturers could decide to undertake concerted efforts to select traditional U.S. suppliers, and work with these suppliers to upgrade their cost and quality performance. This would decrease the transplants' need to rely on imports, providing a major avenue to reduction of the trade deficit, and avoiding the potential explosion in parts imports forecast by our study. It might also eventually encourage expanded U.S. parts exports to Japan, as these U.S. suppliers pursued opportunities there, based on their performance records at the transplants.

To be sure, such an "affirmative action" effort might involve some near-term risks and costs in the Japanese industry's view. However, those risks are small. They might, at worse, entail some reduction in an assumed competitive advantage over the Big Three, but there is no reason to expect them to result in a competitive disadvantage. Moreover, the Japanese assemblers have recent—and successful—experience in rapidly developing a supplier industry to world class standards. After all, the Japanese supplier industry itself certainly benefited from just such an effort during the 1950s and 1960s, and the achievements of those suppliers have amply repaid any initial costs such a strategy imposed on the manufacturers.

Finally, reducing the bilateral imbalance in parts trade will confer other benefits on the Japanese industry, and those benefits will also provide compensation for any start-up costs in sourcing from traditional U.S. suppliers. These benefits will likely include enhanced perceptions of transplant vehicles as "American," and of their manufacturers as "good corporate citizens," two objectives the Japanese industry has been pursuing for some time. The potential benefits of such a strategy are such that we would consider the efforts to implement it as investments rather than costs, and investments with high potential returns at that.

Another Japanese strategy could preserve competitive success in the United States and permit a lessening of the bilateral automotive trade deficit. This strategy relies on sourcing automotive goods from Japanese-controlled facilities in third countries, and such facilities have been rapidly expanding since the yen strengthened during 1985 and 1986. For example, a Japanese manufacturer could import parts from its affiliates in Thailand for use in its U.S. production. That preserves the manufacturers sourcing preferences, but does not add to the bilateral parts deficit. Rather, it shifts some of the U.S. bilateral deficit with Japan into the U.S. bilateral deficit with Thailand. To the extent that the Japanese manufacturers rely on this strategy, our estimates of the specific bilateral balance with Japan will be high, although it will still accurately reflect the "Japanese-controlled" automotive deficit.[38]

The Japanese manufacturers' production in the United States has increased rapidly since the mid-1980s. It is virtually certain that at some point their sales in the U.S. market will "crossover," and be sourced more from U.S. production than from imports from Japan. We suspect that that will have two important political results. First, it will seriously undercut the political efficacy of any economic concerns about the health of the traditional U.S. vehicle manufacturers. Second, it will shift a substantial portion of the bilateral automotive deficit into the parts category, and that will weaken the traditional industry's ability to influence policy responses. The parts industry is simply less visible, less organized, and less influential than is the Big Three.

On balance, we expect to see little on the political front that will moderate the bilateral automotive trade deficit, at least by 1994. U.S. government efforts will continue along current lines, and will have, at best, marginal effect on the imbalance. We think that the Japanese industry may exercise some small restraint in the U.S. market, but these efforts may be directed more to image protection, through third-country sourcing, than to substantive efforts, such as increased domestic sourcing.

[38]One of the ironies of our trading relationship with Japan is that the success of the Japanese automotive industry in the U.S. market has supported its moves away from Japan and into Southeast Asia. Profits from the U.S. market have defrayed the costs of these moves, and the opportunity of exports to the United States makes these investments attractive to the host countries.

Appendix I

Historical U.S. International Trade and U.S.-Japan Bilateral Automotive Trade Data

U.S. Current Account Balance	
Year	Amount (billions)
1989	$ - 110
1988	- 135
1987	- 161
1986	- 141
1985	- 115
1984	- 107
1983	- 46
1982	- 9
1981	7
1980	2
Source: U.S. Department of Commerce and Bureau of Economic Analysis.	

U.S. Merchandise Trade Deficit	
Year	Amount (billions)
1989	$ -109.4
1988	-118.5
1987	-152.1
1986	-138.3
1985	-117.7
1984	-106.7
1983	-52.4
1982	-27.5
1981	-22.3
1980	-19.5
Source: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990, p. 29. Domestic and foreign merchandise, f.a.s.; general imports, Customs value.	

U.S. Manufacturer Trade Balance	
Year	Amount (billions)
1989	$ -92.4
1988	-105.7
1987	-124.6
1986	-116.8
1985	-89.5
1984	-66.8
1983	-22.2
1982	3.6
1981	22.0
1980	27.7

Source: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990, p. 29. Domestic and foreign merchandise, f.a.s.; general imports, Customs value.

Manufacturer Deficit as a Percent of Merchandise Trade Deficit	
Year	Percentage
1989	84.5 %
1988	89.2
1987	81.9
1986	84.5
1985	76.0
1984	62.7
1983	42.4
1982	113.0
1981	198.7
1980	241.6

Source: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990, p. 29. Domestic and foreign merchandise, f.a.s.; general imports, Customs value.

U.S. Bilateral Manufacturers Trade Balance with Japan and Canada ($ Billions)

Year	Japan	Canada
1989	$ -65.9	$ 3.9
1988	-67.2	2.7
1987	-67.6	0.4
1986	-64.3	-1.9
1985	-55.7	-1.9
1984	-44.4	-2.3
1983	-29.9	2.1

Source: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990, p. 61. Domestic and foreign merchandise, f.a.s.; general imports, Customs value.

Two Largest Bilateral Deficits as a Percent of U.S. Manufacturer Trade Balance

Year	Japan	Taiwan
1989	71.4 %	16.9 %
1988	63.5	14.3
1987	54.2	15.1
1986	55.1	13.5
1985	62.3	14.6
1984	66.3	17.2
1983	135.6	36.3

Source: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990, pp. 61 and 70. Domestic and foreign merchandise, f.a.s.; general imports, Customs value.

U.S. Automotive Trade Deficit (in current dollars)

Year	Total (billions)	Vehicles (billions)	Parts (billions)	Parts Percentage
1989	$ 56.6	$ 41.1	$ 15.5	27.4%
1988	58.5	44.9	13.5	23.1
1987	61.1	48.6	12.4	20.3
1986	57.2	47.1	10.1	17.7
1985	41.0	38.3	2.7	6.6

Source: Source: U.S. Motor Vehicle Trade 1985-1986, U.S. Department of Commerce, International Trade Administration.

U.S. Automotive Trade Deficit (in constant 1990:9 dollars)				
Year	Total (billions)	Vehicles (billions)	Parts (billions)	Percentage Parts
1989	$ 56.8	$ 41.2	$ 15.5	27.3%
1988	60.3	46.3	14.0	23.2
1987	63.7	50.8	13.0	20.4
1986	61.1	50.3	10.8	17.7
1985	44.9	42.0	3.0	6.7

Source: Source: U.S. Motor Vehicle Trade 1985-1986, U.S. Department of Commerce, International Trade Administration.

Automotive Trade Deficit as a Percent of Other Trade Deficits			
Year	Merchandise	Manufacturer	Current Account
1989	51.7%	44.5%	51.4%
1988	49.4	55.3	43.3
1987	40.2	49.0	38.0
1986	41.4	49.0	40.6
1985	34.8	45.8	35.7

U.S. Automotive Exports to Japan (in millions of dollars)

	Vehicles		Parts		Total	
Year	Current	Constant*	Current	Constant*	Current	Constant*
1990	$ 587.0		$ 892.7		$ 1,479.7	
1989	336.7	$ 337.9	682.0	$ 684.3	1,018.7	$ 1,022.2
1988	278.9	287.5	428.7	442.0	707.6	729.5
1987	74.7	78.0	261.3	272.8	336.0	350.8
1986	43.5	46.5	224.9	240.4	268.4	286.8
1985	19.6	21.5	203.3	222.8	222.9	244.3

* Constant 1990 dollars, using September 1990 and 1985 producer price index for motor vehicles from Survey of Current Business.
Source: U.S. International Trade Commission

U.S. Automotive Imports from Japan
General Imports
(in millions of dollars)

	Vehicles		Parts		Total	
Year	Current	Constant*	Current	Constant*	Current	Constant*
1990	$ 21,230.0		$ 11,351.0		$ 32,581.0	
1989	22,732.0	$22,810.3	11,566.4	$11,606.2	34,298.4	$ 34,416.5
1988	23,118.8	23,834.2	9,401.3	9,692.2	32,520.1	33,526.4
1987	25,582.8	26,705.1	7,785.0	8,126.5	33,367.8	34,831.6
1986	25,960.3	27,744.9	6,374.9	6,812.9	32,335.2	34,557.8
1985	19,685.7	21,572.9	4,638.8	5,083.7	24,324.5	26,656.6

* Constant 1990 dollars, using September 1990 and 1985 producer price index for motor vehicles from Survey of Current Business.
Source: U.S. International Trade Commission

U.S.-Japan Automotive Trade Deficit
(in millions of dollars)

	Vehicles		Parts		Total	
Year	Current	Constant*	Current	Constant*	Current	Constant*
1990	$ 20,643.0		$ 10,458.0		$ 31,101.0	
1989	22,395.3	$22,472.4	10,884.4	$10,921.9	33,279.7	$ 33,394.3
1988	22,839.9	23,546.7	8,972.6	9,250.2	31,812.5	32,796.9
1987	25,508.1	26,627.1	7,523.7	7,853.7	33,031.8	34,480.8
1986	25,916.8	27,698.4	6,150.0	6,572.5	32,066.8	34,270.9
1985	19,666.1	21,551.4	4,435.5	4,860.9	24,101.6	26,412.3

* Constant 1990 dollars, using September 1990 and 1985 producer price index for motor vehicles from Survey of Current Business.
Source: U.S. International Trade Commission

1989 Trade Deficits and Change from 1988		
Deficit	**Amount (billions)**	**Percent of 1988**
Current Account	$ 51.4	81.5 %
Merchandise Trade	109.4	92.3
Manufacturing	92.4	87.4
Automotive	56.6	96.8

Sources: U.S. Foreign Trade Highlights 1989, U.S. Department of Commerce, International Trade Administration, September 1990 and U.S. Motor Vehicle Trade 1985-1989, U.S. Department of Commerce, International Trade Administration.

Japanese Automotive Imports to the United States (in current dollars)

Year	Vehicle Imports (millions)	Part Imports (millions)	Total Imports (millions)	Vehicle Value as a Percent of Total
1990	$ 21,230.1	$ 11,351.2	$ 32,581.3	65.2%
1989	22,732.0	11,566.4	34,298.4	66.3
1988	23,118.8	9,401.3	32,520.1	71.1
1987	25,582.8	7,785.0	33,367.8	76.7
1986	25,960.3	6,374.9	32,335.2	80.3
1985	19,685.7	4,638.8	24,324.5	80.9

Sources: U.S. Motor Vehicle Trade 1985-1989, U.S. Department of Commerce, International Trade Administration, U.S. International Trade Commission, and *Automotive Parts International*, March 8, 1991

Appendix II

International Trade Commission
Listing of Automotive Parts
U.S.-Japan Bilateral Trade

1990 Automotive Parts
Domestic U.S. Exports to Japan

Category	Category
MV Bodies	Parts of Piston-type/Spark-ignition Engines
MV Body Stampings	Parts of Compression-ign. Engines
MV Chassis Fitted with Engines	Fuel Injection and Other Pumps and Parts
MV Bumpers and Parts	Fans, Blowers and Parts
MV Safety Seat Belts	Air or Gas Compressors and Parts
MV Wheels and Parts	Air and Vacuum Pumps and Parts
MV Radiators	Air-Conditioners and Parts
MV Mufflers and Tailpipes	Refrigerating Equipment and Parts
MV Brakes and Parts	Filters for Engines
MV Transmissions and Parts	Catalytic Converters
MV Shock Absorbers	Jacks, Hoists, Winches and Parts
Other Parts NESI in 8706-8708 of HTS	Taps, Cocks, and Valves
Electric Motors and Parts	Ball Bearings
Articles of Plastic	Roller Bearings
V-belts of Textile	Parts of Ball Bearings
Articles of Rubber	Parts of Roller Bearings
New Passenger Auto Tires	Transmission Shafts
New Truck and Bus Tires	Lead-Acid Storage Batteries & Parts
Tubes for Tires	Spark Plugs
Articles of Leather	Electrical Ignition & Starting Equip.
Articles of Wood	Electr. Lighting & Signaling Equip.
Articles of Textiles	Windshield Wipers, Defrost. and Demisters
Floor Coverings	Speakers, Amplifiers and Parts
Tempered Glass	Cassette Players
Laminated Glass/Windshields	Laser Disc Players
MV Rearview Mirrors	CB Transceivers
Other Automotive Glass Articles	Cellular Telephones
Pipes, Tubes, and Fittings	Radio-Tape Player Combinations
Wire, Ropes, Cordage, and Cables	Other Radios, Etc.
Fasteners	Burglar Alarm, Safety & Indic. Equip.
Springs and Leaves for Springs	Other Electrical Articles & Parts
Miscellaneous Articles of Metal	Sealed Beam Lamp Units
Locks, Hinges, and Parts	Other Automotive Lamps
Hood Ornaments	Ignition Wiring Sets
Flexible Tubing	Trailers and Parts
License Plates	Measuring, Test. and Control. Instruments
Piston-type/Spark-ignition Engines	Clocks and Parts
Compression-ignition Engines	Furniture for MV Use

1990 Automotive Parts U.S. Imports from Japan	
Category	Category
MV Bodies and Parts	Piston/Spark-Ignition Engines
MV Body Stampings	Compression-Ignition Engines
MV Chassis Fitted w/ Engines	Parts of Piston/Spark Ign. Eng.
MV Bumpers and Parts	Parts of Compress.-Ignition Eng.
MV Safety Seat Belts	Fuel Injection Pumps and Parts
MV Wheels and Parts	Air or Gas Compressors & Parts
MV Radiators	Fans and Parts
MV Mufflers and Tailpipes	Air-Conditioners and Parts
MV Brakes and Parts	Refrigerating Equipment and Parts
MV Transmissions and Parts	Filters for Engines
MV Shock Absorbers	Jacks, Hoists, Winches, and Parts
Other Parts NESI in 8706-8708 of HTS	Auto Maintenance Machines
Electric Motors, Generators, and Parts	Taps, Cocks, and Valves
Articles of Plastic	Ball Bearings
V-belts of Textile	Roller Bearings
Articles of Rubber	Parts of Ball Bearings
New Passenger Auto Tires	Parts of Roller Bearings
New Truck and Bus Tires	Transmission Shafts
Tubes for Tires	Lead-acid Storage Batteries and Parts
Articles of Leather	Spark Plugs
Articles of Wood	Electrical Ign. Starting Equip.
Articles of Textile	Electrical Lighting and Signaling Equipment
Floor Coverings	Windshield Wipers, Defrosters, and Demisters
Tempered Glass	Speakers, Amplifiers, and Parts
Laminated Glass/Windshields	Cassette Players
MV Mirrors	Laser Disc Players
Other Automotive Glass Articles	CB Transceivers
Pipes, Tubes, and Fittings	Cellular Telephones
Stranded Wire, Cordage, Cables, Etc.	Radio-Tape Player Combinations
Fasteners for MV use	Other Radios, Etc.
Springs and Leaves for Springs	Electrical Sound or Visual Signaling Equipment
Articles of Nickel	Other Electrical Articles and Parts
Articles of Aluminum	Sealed Beam Lamp Units
Articles of Tin	Other Automotive Lamps
Locks, Hinges, and Parts	Ignition Wiring Sets
Hood Ornaments	Trailers and Parts
Flexible Tubing	Measure, Test, and Control Instruments
License Plates	Clocks and Parts Thereof
	Furniture for Automotive Use

Appendix III

International Trade Administration Data
U.S.-Japan Bilaterial Trade in Automotive Parts
1985-1989
(sorted by 1989 commodity shipment value)

U.S. Automotive Parts Exports to Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
Total selected commodities	**$216,437**	**$238,039**	**$285,748**	**$445,644**	**$625,339**
4011100010--Radial tires of a kind used on motor cars	6,346	13,820	24,676	73,469	108,868
8708990050--Parts and acessories,nesoi,for vehicles,nesoi	20,293	23,828	21,219	26,753	103,603
8708290050--Pts and accessories,nesoi,of bodies hdg 8701,8705	20,294	23,828	21,219	26,765	80,161
4011100050--Pneumatic tire, exc radial, use motor cars, nesoi	1,376	4,646	31,131	58,161	56,507
8708925000--Mufflers and exhaust pipes for vehicles, nesoi	282	53	84	504	32,342
8708700050--Road wheels and prts for veh nesoi,of 8701,8705	898	1,213	3,347	9,475	18,066
9032900000--Pts, autom regulating/controlling inst & apprts	6,897	6,928	7,087	10,268	15,267
7007110000--Toughnd safety gls of size a shape for vehcls etc	183	194	231	3,163	13,751
7007211000--Windshields of laminated safety glass	4,102	5,668	7,842	11,344	13,287
8708390000--Brakes and servo-brakes,parts, of 8701,8705	2,569	3,925	5,577	6,353	12,261
8708100050--Bumpers and parts, nesoi, of headings 8701 to 8705	27	24	739	404	12,123
8421310000--Intake air filters for internal combustion engines	5,886	7,622	8,085	10,470	11,533
8708401000--Gear boxes,parts,subhd8701.20,hdg8702 or 8704	13,202	7,392	5,828	4,108	11,175
8414308030--Compressors, refrig & air cond, for motor vehicles	141	137	822	1,555	7,223
8409994000--Parts f diesel eng f road tr, bus, auto, truck	20,394	15,599	9,653	10,725	6,333
9031800060--Equip, testing elec characteristics of engines	6,858	6,487	7,472	12,265	6,182
8544410000--Insulated electric conductors =< 80 v with cntrs	1,484	1,242	1,309	1,911	5,558
3926904500--Gaskets,washers & other seals	127	262	506	778	4,750
6813100000--Brake linings a pads, asbestos, oth minrls, celuls	150	159	129	148	4,695
8302300000--Oth bs metl mountngs fttngs etc for motor vehicles	820	1,482	1,025	2,217	4,283
8413911000--Parts of fuel-injection pumps for comp-ignit pumps	6,920	7,097	7,645	9,580	4,054
4011200005--Radial tires used on light truck, on-the-highway	1,274	2,140	3,520	8,564	3,722
8708402000--Gear boxes and parts for vehicles of heading 8703	11,821	11,183	17,362	26,237	3,691
8539100040--Sealed beam lamp units =>15.24 cm	2,750	2,744	2,960	3,172	3,593
8716100030--Trailers and semi-trailers for housing les 10.6m	43	77	117	627	3,539
8431100090--Parts of winches, capstans and jacks	520	324	182	325	3,357
8408202000--Comp-ign eng fr prop veh ch87,rd tr,bus,auto,truck	4,314	2,800	2,389	2,548	3,275
8544300000--Insulated wiring sets for vehicles ships aircraft	868	970	1,399	1,244	2,760
8484100000--Gaskets,metal,2 or more layers,or with other matl	971	787	785	1,475	2,735
9401200000--Seats of a kind used for motor vehicles	217	387	731	497	2,349
8511100000--Internal combustion engine spark plugs	359	963	1,481	1,809	2,250
9401901000--Seat parts of a kind used for motor vehicles	1	2	5	13	2,132
8708805000--Suspension shock absorbers for vehicles, nesoi	641	522	447	1,335	2,109
3819000000--Hydraulic brake fluids/liq for hydraulic trans etc	950	1,210	1,058	1,191	2,102
9032893000--Automatic voltage and voltage-current regulators	74	99	338	434	2,087
8421230000--Oil or fuel filters for internal combustion engine	5,886	7,622	8,085	10,470	2,057
8511500000--Internal combustion engine generators,nesoi	94	87	241	1,160	2,052
8415830040--Automotive air conditioners	884	974	850	3,261	1,900
7007215000--Laminated safety glass for vehcls, exc windshields	1,827	2,181	2,764	3,868	1,781
8511908000--Parts for electrical apparatus used on ic engines	128	112	312	334	1,663
4011200015--Radial tire use bus/truck, exc lt truck, on hwy	85	168	57	47	1,653
4012106000--Retread tire, rub, exc on-the-hwy trk & bus, nesoi	220	34	293	179	1,602
8482105020--Radial ball bearings, 9mm & ov but not ov 30 mm	456	313	212	402	1,503
4013100010--Inner tubes, of rubber, used on motor cars	7	48	512	2,009	1,474
8539100020--Sealed beam lamp units < 15.24 cm	452	207	585	1,630	1,405
8708945000--Steering wheels,steering columns,steering boxes,ve	20,294	23,828	21,219	26,765	1,402
8708406000--Gear boxes for vehicles,nesoi,of 8701 to 8705	734	749	620	787	1,359

U.S. Automotive Parts Exports to Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
8708935000--Clutches and parts for vehicles, nesoi	7,835	5,511	4,091	6,120	1,252
8708310000--Mounted brake linings of motor veh of hd,8701,8705	489	952	466	565	1,212
8512908000--Parts for windshield wipers, defrosters for mt vhc	4,896	6,038	6,259	8,254	1,116
8511806000--Other internal combustion engine ignition equipmnt	436	347	909	901	1,106
8425490000--Jacks, nesoi; hoists used for raising vehicles	2	31	29	54	1,083
8512202000--Motor vehicle lighting equipment	135	333	224	276	1,077
8707905080--Bodies for vehicles of heading 8705	2	13	69	12	1,059
4013900000--Inner tubes, of rubber, nesoi	123	50	380	1,462	1,020
4011200050--New pneumatic tire, rub for bus/trk off-hwy, nesoi	1	6	22	26	996
4011200020--Tire, exc radial, use bus, exc lt truck, nesoi	46	17	39	56	985
8407342000--Sp-lg eng f rd tr, bus, auto, truck, ov 1000 cc	765	1,074	568	1,942	970
8708600050--Non-driving axles and parts for vehicles,nesoi	371	808	537	592	929
8527290000--Radiobroadcast receivers for motor vehicles nesoi	1,010	3,264	4,876	2,975	902
8413301000--Fuel-injection pumps for compression-ignition engs	44	70	966	406	866
8512902000--Parts of motor vehicle or cycle signaling equipme	43	129	165	344	791
8716100075--Trailers and semi-trailers for housing 10.6m, more	2	30	248	528	772
8413309000--Fuel,lubricat or cooling med pumps,exc fuel-inject	89	273	213	685	743
9029900000--Pts for revolution counters, odometer, etc	3,201	2,537	2,234	1,767	738
4011200010--Tires, exc radial, use lt truck, on hwy, nesoi	112	105	214	365	726
8707100040--Bodies for vehiles, nesoi, of heading 8703	17	89	474	72	704
4016995010--Mechanic article for motor vehicle, vulcanized rub	198	243	266	344	685
8482105030--Radial ball bearings, ov 30 mm but not over 52 mm	182	131	154	220	643
8512402000--Motor vehicle defrosters and demisters	4,896	6,038	6,259	8,254	618
8707100020--Bodies for passenger autos of heading 8703	346	174	792	1,051	604
8708210000--Safety seat belts and parts of 8701 to 8705	70	79	53	83	598
8708915000--Radiators for vehicles, nesoi	45	41	553	928	584
8511400000--Internal combustion engine starter motors	475	390	414	898	571
4011200025--Radial tire, use bus/truck, rim >=40.6 cm diameter	6	20	17	64	566
4012200000--Used pneumatic tires of rubber	361	46	493	1,636	566
7315200000--Skid chain of iron or steel	2	27	0	0	503
8482101000--Ball bearings with integral shafts	2,273	246	293	154	465
8708100010--Stampings of bumpers and parts, head 8701 to 8705	100	52	109	329	454
8511300040--Internal combustion engine distributors	56	73	132	199	434
4012105020--Retread tires, rub, for on-the-hwy truck & bus	67	16	95	108	421
8507100090--Lead-acid batteries, new, other than 12 volt	292	548	673	395	417
8716400000--Trailers and semi-trailers, nesoi	67	55	146	70	415
8511300080--Internal combustion engine ignition coils	18	53	24	37	387
8507904000--Parts for lead acid storage batteries	13	438	161	1,816	381
9029100000--Revolution counters, production counters, etc	545	422	253	300	343
8707909500--Bodies (including cabs) for vehicles,nesoi	5	25	135	21	342
8484900000--Sets or assortments of gaskets and similar joints	51	41	41	78	323
8483101020--Cam/crankshaft f spark ign eng f vehicles of ch 87	101	82	133	191	281
8512905000--Parts for lighting equipment for motor vehicles	158	299	332	524	270
8302103000--Hinges and parts for motr vehcls ir/st, alum, zinc	18	8	10	66	243
7320201000--Helical springs suitble fr motor-vehcl susp ir/stl	5	19	2	85	224
4011200030--Tire, exc radial, use on bus, rim >=40.6 cm	1	6	22	26	218
6813900000--Oth friction materl, asbestos, oth minrls, celluls	84	88	72	82	205
7320905030--Springs of iron or steel wire, nesoi	28	52	43	41	192

U.S. Automotive Parts Exports to Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
8707905060--Bodies for vehicles of heading 8704	104	152	518	257	190
8716390040--Trailers and semi-trailers, nesoi, van type, nesoi	41	20	98	406	190
8507200040--Lead acid storage batteries, nesoi, new, 12 volts	331	403	154	115	180
8708500050--Drive axles with differntl for vehicles,nesoi	96	202	135	235	176
7009100000--Rear-view mirrors for vehicles	7	8	74	20	163
8511200000--Internal combustion engine magnetos, magneto-dynam	436	347	909	901	156
8708290010--Stampings of bodies of 8701 to 8705	28	13	28	169	148
8507200080--Other lead acid storage batteries, nesoi	70	132	162	95	147
8716390090--Trailers and semi-trailers, nesoi, tranprt goods	12	8	38	26	143
9403901000--Parts of furniture use for motor vehicles	653	1,164	2,199	1,505	139
8511802000--Internal combustion engine voltage reg,6, 12, 24 v	101	128	122	130	129
7320100000--Leaf springs and leaves therefor, of iron or steel	0	40	48	70	126
8407322000--Sp-ig eng f rd tr,bus,auto,truck, >50 but =<250 cc	8	11	6	20	126
7320905060--Springs of iron or steel, other than of wire nesoi	28	52	43	41	95
4006100000-- camel-back strips for retreading rubber tires	2,053	2,714	4,012	4,328	79
8507100050--Lead-acid batteries, new, 12 volts	1,377	1,676	641	479	74
8716200000--Self-loading or self-unloading trailers,semi-trail	40	54	115	138	72
8512204000--Motor vehicle visual signaling equipment	20	36	25	24	69
3820000000--Antifreezing prep & prepared deicing fluids	95	88	57	144	63
8512300000--Electrical sound signaling equipment for mtr vhl	13	101	253	54	55
8407332000--Sp-ig eng f rd tr,bus,auto,trck,>250 but =<1000cc	24	34	18	61	51
8414598040--Fans and blowers for motor vehicles	1	52	77	34	40
8707905040--Bodies for vehicles of heading 8702	50	0	0	96	28
8507100020--Lead-acid batteries, used, for the recovery of met	21	28	17	11	27
8512404000--Motor vehicle windshield wipers	4,896	6,038	6,259	8,254	25
4013100020--Innertubes, of rubber, used on trucks and buses	10	0	7	8	17
4011200035--Radial tire, use on bus, exc use on rim >=40.6 cm	6	20	17	64	15
8301200000--Locks of a kind used on motor vehicles, base metal	101	138	22	387	15
8716390030--Trailers and semi-tr, nesoi, for veh of hd 8703	178	274	513	701	10
9029206000--Stroboscopes	46	210	44	150	9
8707905020--Bodies for vehicles of subhdg 8701.20	0	27	43	83	5
8507200020--Lead acid batteries,nesoi, used, for recovery metl	21	28	17	11	3
8483103010--Cam/crankshafts for vehicles of chapt 87, nesoi	326	272	216	349	0
8511906020--Parts for internal combustion engine dstbr points	0	40	0	0	0
8531800038--Radar detectors of a kind used in motor vehicles	33	2	5	1	0
8716310000--Tanker trailers and tanker semi-trailers, nesoi	5	1	41	55	0
8716390050--Trailers and semi-trailers, nesoi, platform type	1	0	13	18	0
8716900000--Parts,nesoi,of trailers,semi-trailers;veh nesoi	0	0	0	0	0

U.S. Automotive Parts Imports from Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
Total selected commodities	**$5,244,163**	**$6,891,497**	**$8,322,397**	**$10,223,055**	**$12,456,558**
8708995090--Parts,nesoi,of motor vehicles,nesoi, hds8701,8705	0	0	0	0	1,730,056
8407342080--Sp-ig rec pst eng, rd tr,bus,auto,trks,>1000cc,new	0	0	0	0	1,417,818
8708402000--Gear boxes for vehicles of heading 8703	179,711	349,856	454,640	709,503	1,311,148
8708290010--Stampings of bodies of 8701 to 8705	182,342	225,411	297,278	267,726	544,618
8527211010--Motor vehicle radio-tape players, cassette, stereo	588,866	588,318	608,724	556,582	409,307
4011100010--Radial tires of a kind used on motor cars	232,582	265,118	283,796	383,290	385,603
8414308030--Compressors, refrig & air cond, for motor vehicles	0	0	0	0	380,089
8409919190--Parts for sp-ig pst eng for rd tr,bus,auto,trucks	0	0	0	0	373,259
8708290050--Pts and accessories,nesoi,of bodies hdg 8701,8705	0	0	0	0	354,420
8407322080--Sp-ig rec pst eng, f rd tr, bus, auto, truck, new	0	0	0	0	296,110
8407332080--Sp-ig rec pst eng instl in rd tr,bus,auto,trk,new	0	0	0	0	276,621
4011200015--Radial tire use bus/truck, exc lt truck, on hwy	0	0	0	0	260,966
8708395050--Brakes,parts,nesoi,for vehicles, of 8701,8705	0	0	0	0	230,511
9031800080--Measure/check inst,appln&machines,nesoi in chap 90	0	0	0	0	191,779
8708505000--Drive axles with differential for vehicles,of 8703	11,678	16,443	21,357	26,418	180,039
8708945000--Steering wheels,steering columns,steering boxes,ve	179	226	268	314	154,645
8415900040--Parts of automotive air conditioners	95,768	114,913	131,648	120,372	152,703
8414308050--Compressors, ref & a/c,exc ammonia,exc 1/4n/exc1h	0	0	0	0	147,060
8511400000--Internal combustion engine starter motors	52,669	71,371	92,980	121,107	142,093
8413309000--Fuel,lubricat or cooling med pumps,exc fuel-inject	50,419	73,005	74,558	116,303	138,275
8708805000--Suspension shock absorbers for vehicles, nesoi	27,055	31,014	68,231	79,335	134,589
8708925000--Mufflers and exhaust pipes for vehicles, nesoi	33,803	55,982	71,472	94,277	127,250
8483101030--Cam/crankshaft f spark ign eng f vehicles of ch 87	0	0	0	0	127,231
8708708010--Wheels for vehicles, nesoi	82,041	123,426	125,272	135,411	107,108
8512202000--Motor vehicle lighting equipment	28,853	36,038	45,204	60,501	106,121
8708210000--Safety seat belts and parts of 8701 to 8705	116,775	141,721	196,100	265,297	105,620
8511500000--Internal combustion engine generators,nesoi	24,095	30,480	48,277	83,584	103,775
8302303000--Oth mountngs, fttngs etc for motor vehc, ios al zn	7,495	10,482	10,808	14,445	102,645
8511906040--Other parts for internal combustion engine ignitio	0	0	0	0	97,858
8708100050--Bumpers and parts, nesoi, of headings 8701 to 8705	0	0	0	0	84,880
8708605000--Non-driving axles and parts for veh of hd 8703	11,678	16,443	21,357	26,418	79,150
8413911000--Parts of fuel-injection pumps for comp-ignit pumps	2,098	2,512	2,247	16,291	78,664
8531800050--Other signaling devices, electric, nesoi	0	0	0	0	74,691
8708935000--Clutches and parts for vehicles, nesoi	11,856	16,669	21,625	26,731	71,662
8482105040--Radial ball bearings, ov 52 mm but not over 100 mm	0	0	0	0	69,859
4011200005--Radial tires used on light truck, on-the-highway	298,793	264,955	270,788	328,063	67,483
8544300000--Insulated wiring sets for vehicles ships aircraft	40,635	78,511	121,818	98,033	64,254
8421230000--Oil or fuel filters for internal combustion engine	12,854	24,311	31,943	48,080	55,903
8708708050--Parts & accessories f wheels f veh o/t tractors	0	0	0	0	49,629
8301200000--Locks of a kind used on motor vehicles, base metal	12,232	23,002	41,838	32,368	49,582
4011200030--Tire, exc radial, use on bus, rim >=40.6 cm	0	0	0	0	49,158
8482105030--Radial ball bearings, ov 30 mm but not over 52 mm	0	0	0	0	48,810
8414308060--Compressors, ref & a/c,exc ammonia,exc 1 n/exc 3hp	0	0	0	0	48,629
8511100000--Internal combustion engine spark plugs	30,723	30,770	36,899	45,414	46,963
8708315000--Mounted brake linings, veh, nesoi, 8701 to 8705	49,126	63,641	90,002	139,217	45,637
8708395010--Brake drums and rotors of heading 8701 to 8705	23,134	34,971	47,230	74,746	45,123
4016995050--Other article vulcanized rub, exc hard rub, nesoi	0	0	0	0	41,839

U.S. Automotive Parts Imports from Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
8482105090--Ball bearings, other than radial	0	0	0	0	41,411
8708608050--Non-driving axles and parts for vehicles, nesoi	0	0	0	0	40,301
8421310000--Intake air filters for internal combustion engines	8,813	16,563	21,601	32,479	40,254
8482105020--Radial ball bearings, 9mm & ov but not ov 30 mm	0	0	0	0	38,263
8414598040--Fans and blowers for motor vehicles	47,763	63,723	69,250	91,221	35,513
4011200020--Tire, exc radial, use bus, exc lt truck, nesoi	0	0	0	0	34,856
8708100010--Stampings of bumpers and parts, head 8701 to 8705	45,142	58,356	56,961	60,304	34,423
8409999190--Parts fr comp-ig pst eng fr rd tr,bus,auto,trucks	0	0	0	0	33,452
8511806000--Other internal combustion engine ignition equipmnt	14,960	27,779	26,287	28,008	31,126
8302103000--Hinges and parts for motr vehcls ir/st, alum, zinc	29,979	41,929	43,233	57,779	30,982
4011100050--Pneumatic tire, exc radial, use motor cars, nesoi	0	0	0	0	29,209
8708401000--Gear boxes subhd 8701.20, hdg 8702 or 8704	77,536	135,581	153,554	141,709	29,110
4011200025--Radial tire, use bus/truck, rim >=40.6 cm diameter	0	0	0	0	28,495
7009100000--Rear-view mirrors for vehicles	3,823	5,665	7,857	7,164	27,821
8482105050--Radial ball bearings over 100 mm	0	0	0	0	25,974
7007110000--Toughnd safety gls of size a shape for vehcls etc	14,370	18,672	20,378	20,525	25,202
8483103050--Camshafts and crankshafts, nesoi	0	0	0	0	24,753
8531800010--Indicator panels incorporating fluorescent devices	58,752	67,437	82,963	86,588	24,683
8512906000--Motor vehicle lighting equipment parts	28,853	36,038	45,204	60,501	24,565
8544410000--Insulated electric conductors =< 80 v with cntrs	9,526	11,270	14,837	17,275	23,688
8415830040--Automotive air conditioners	67,262	89,114	94,417	91,256	23,089
8512204000--Motor vehicle visual signaling equipment	11,594	16,118	16,611	17,768	22,488
8511300080--Internal combustion engine ignition coils	0	0	0	0	22,137
9029204080--Speedometers&tachometers,exc used in civil aircraf	0	0	0	0	22,110
8414598090--Fans, axial, nesoi	0	0	0	0	20,628
8527290040--Motor vehicle radio receivers, fm or am/fm only	0	0	0	0	20,354
8708915000--Radiators for vehicles, nesoi	20,427	20,792	16,550	29,166	17,886
8708508000--Drive axles with differential for vehicles, nesoi	11,678	16,443	21,357	26,418	16,943
7320100000--Leaf springs and leaves therefor, of iron or steel	18,085	22,785	25,550	19,800	16,586
8708608010--Spindles for non-drive axles for vehicles, nesoi	46,661	55,684	28,338	9,267	16,526
8707905060--Bodies for vehicles of heading 8704	0	0	0	0	15,602
8414598060--Fans, centrifugal, nesoi	0	0	0	0	15,117
9029908040--Pts&accessories of speedometers and tachometers	7,062	8,513	9,416	9,099	14,573
8415900090--Parts of air conditioning machines, nesoi	0	0	0	0	14,320
8407342040--Sp-ig rec pst eng,rd tr,bus,auto,trks,>1000cc,used	417,220	598,573	853,839	1,308,697	13,870
8482101000--Ball bearings with integral shafts	8,143	8,290	6,878	9,366	13,142
9031800070--Equip, testing exc elec characteristics of engines	0	0	0	0	13,019
8484900000--Sets or assortments of gaskets and similar joints	3,625	4,183	3,959	4,847	12,892
9401200000--Seats of a kind used for motor vehicles	13,486	21,760	31,291	30,752	11,699
8512909000--Parts of windshield wipers	0	0	0	0	10,946
8413301000--Fuel-injection pumps for compression-ignition engs	4,895	5,862	5,243	38,012	10,623
8507100030--Batteries, lead-acid, piston engine, 12v, =< 6 kg	0	0	0	0	10,350
8483101050--Camshafts and crankshafts, f spark ign eng, nesoi	0	0	0	0	10,235
8511200000--Internal combustion engine magnetos, magneto-dyna	2,998	5,564	5,260	5,602	9,454
7007211000--Windshields of laminated safety glass	4,931	12,310	9,397	8,983	8,925
8415830050--Condensing unit not exc 15,120 kcal	0	0	0	0	8,756
8409999110--Conn rods for comp-ig pst eng fr rd tr,bus,auto,tk	35,016	33,591	28,663	38,991	8,707
8484100000--Gaskets,metal,2 or more layers,or with other matl	1,812	2,091	1,979	2,424	8,259

U.S. Automotive Parts Imports from Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
4010101050--Conveyor belt, vulcanized rub, exc cotton > by wt	0	0	0	0	7,953
7320201000--Helical springs suitble fr motor-vehcl susp ir/stl	952	1,199	1,345	1,042	7,742
4016995010--Mechanic article for motor vehicle, vulcanized rub	20,558	23,746	26,073	37,104	7,522
8511300040--Internal combustion engine distributors	10,323	18,281	18,139	22,833	7,510
8512404000--Motor vehicle windshield wipers	0	0	0	0	7,402
4011200050--New pneumatic tire, rub for bus/trk off-hwy, nesoi	0	0	0	0	7,233
8483103010--Cam/crankshafts for vehicles of chapt 87, nesoi	22,444	29,694	19,971	39,092	7,183
8415830070--Heat exchangers, not inc a refrig unit, nesoi	0	0	0	0	7,164
8527211020--Motor vehicle radio-tape players, cassette, nesoi	0	0	0	0	7,062
9029108000--Revolution counters, production counters,etc,nesoi	7,197	9,484	10,730	8,541	7,023
4012105005--Retread radial tire, rub, use passenger cars	23,852	4,092	2,628	2,298	6,627
4012105025--Retread radial tire for truck & bus, exc lt trucks	0	0	0	0	6,515
4010101010--Conveyor belt, vulcanized rub, cotton > by wt	10,691	13,016	15,910	17,189	6,313
8531800040--Other electric sound signaling devices, nesoi	0	0	0	0	6,308
8414598095--Fans, nesoi	0	0	0	0	6,204
8511902000--Parts for internal combustion engine voltage regul	244	368	630	1,049	6,119
8527211030--Motor vehicle radio-tape players, nesoi	0	0	0	0	5,969
8431100090--Parts of winches, capstans and jacks	0	0	0	0	5,753
9031800060--Equip, testing elec characteristics of engines	44,645	59,556	56,598	68,858	5,668
8507100060--Batteries, lead-acid, piston engine, 12v, > 6 kg	0	0	0	0	5,280
8512300040--Motor vehicle sound signaling equip except horns	0	0	0	0	5,097
8409911040--Cast-iron pts f sp-ig pst eng f rd tr,bus,auto,trk	17	42	34	69	5,086
4013100020--Innertubes, of rubber, used on trucks and buses	0	0	0	0	4,950
8511802000--Internal combustion engine voltage reg,6, 12, 24 v	1,219	1,842	3,152	5,245	4,691
8407322040--Sp-ig rec pst eng for rd tr, bus, auto, truck,used	10,870	12,214	15,156	19,856	4,551
8512902000--Parts of motor vehicle or cycle signaling equipme	3,865	5,373	5,537	5,923	4,454
8425490000--Jacks, nesoi; hoists used for raising vehicles	4,558	7,067	4,119	3,452	4,400
8507904000--Parts for lead acid storage batteries	2,114	1,891	2,401	3,062	4,270
9802005040--Other articles exported repair/alt warranty, nesoi	0	0	0	0	4,190
8414308020--Compressors, refrig & air cond,screw typ,exc 200hp	0	0	0	0	4,178
8407332040--Sp-ig rec pst eng,bus,auto,trk,>250no>1000cc, used	6,370	8,058	10,771	15,431	4,173
9403901000--Parts of furniture use for motor vehicles	674	1,088	1,565	1,538	4,168
8482105010--Radial ball bearings with diameter under 9 mm	138,597	126,009	130,929	195,680	4,002
8414308010--Compressors, refrig & air cond, screw typ,n/e 200h	214,850	256,901	347,867	394,655	3,904
8531800020--Indicator panels, nesoi	0	0	0	0	3,627
8527290060--Motor vehicle radio receivers, nesoi	0	0	0	0	3,573
8414308080--Compressors, ref & a/c,exc ammonia,exceeding 10 hp	0	0	0	0	3,478
8414308070--Compressors, ref & a/c,exc ammonia,exc 3 n/exc10h	0	0	0	0	3,284
4011200010--Tires, exc radial, use lt truck, on hwy, nesoi	0	0	0	0	3,011
8527290020--Motor vehicle radio receivers, am only	43,673	39,730	36,806	34,474	2,769
8531800035--Paging alert devices	0	0	0	0	2,582
8539100040--Sealed beam lamp units =>15.24 cm	0	0	0	0	2,576
8512300020--Motor vehicle horns	10,638	11,264	12,500	12,227	2,453
9029908080--Pts,of revolution counters,odometers,etc,nesoi	0	0	0	0	2,386
8431100010--Pts,puly tkle & hoists exc skip or for raising veh	4,660	12,735	8,958	9,686	2,283
4012105050--Retread tire, exc radial, bus, exc on hwy, nesoi	0	0	0	0	2,242
8507100090--Batteries, lead-acid, piston engine, o/t 12 v	0	0	0	0	2,125
9032892000--Autom voltage-current rugulators, use 6,12,or 24 v	2,925	4,417	7,560	12,583	2,120

U.S. Automotive Parts Imports from Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
8408202000--Comp-ign eng fr prop veh ch87,rd tr,bus,auto,truck	47,844	37,325	18,316	3,301	2,004
7007215000--Laminated safety glass for vehcls, exc windshields	2,076	5,104	4,011	3,838	1,844
8531800038--Radar detectors of a kind used in motor vehicles	0	0	0	0	1,677
4011200035--Radial tire, use on bus, exc use on rim >=40.6 cm	0	0	0	0	1,667
8415830090--Air cond machs not incorporat a refrig unit, nesoi	0	0	0	0	1,609
8708405000--Gear boxes for vehicles, nesoi	4,028	40,847	25,037	23,687	1,314
9403406000--Wooden furniture, kitchen use, for motor vechicles	0	0	0	0	1,258
8539100020--Sealed beam lamp units < 15.24 cm	3,509	2,888	2,267	4,101	1,227
8707100020--Bodies for passenger autos of heading 8703	692	156	549	656	1,104
8716905050--Parts, nesoi f trailrs & oth veh not mech propelld	0	0	0	0	952
8531800030--Horns, electric,except vehicle or cycle	0	0	0	0	948
8409919110--Conn rods for sp-ig pst eng for rd tr,bus,auto,trk	120,057	155,484	241,097	282,002	900
4012105015--Retread radial tire for lt trucks, on-the-highway	0	0	0	0	867
8511906020--Parts for internal combustion engine dstbr points	38,082	68,709	65,514	69,882	820
8708995060--Radiator cores for motor vehicles, nesoi	0	0	0	0	802
8483101010--Camshafts and crankshafts for motorcycles	29,200	37,055	47,670	59,247	766
8409911080--Cast-iron pts for spark-ignition pst engines,nesoi	0	0	0	0	611
8707905090--Bodies (including cabs) for vehicles, nesoi	0	0	0	0	582
8409991060--Cast-iron pst for comp-ignition pst eng for marine	0	0	0	0	567
8512907000--Parts of motor vehicle or cycle defrosters, demist	204	158	163	179	547
6813100050--Brk lngs a pads asbsts etc incl cmb w tx o oth mat	0	0	0	0	524
4013100010--Inner tubes, of rubber, used on motor cars	5,951	5,015	4,843	4,904	440
4012105029--Retread tire, exc radial, truck, exc lt trk, nesoi	0	0	0	0	402
8409911060--Cast-iron pts for sp-ig pst eng for marine propuls	0	0	0	0	377
4012105019--Retread tire, exc radial, lt truck on hwy, nesoi	0	0	0	0	297
9029206000--Stroboscopes	180	111	52	272	295
8708993000--Cast iron parts of motor vehicles, 8701 to 8705	221	2	10	0	279
8302306000--Oth mountngs, fttngs etc nes for motr veh bs metal	2	7	4	6	249
4012105009--Retread tire, exc radial, use passenger car, nesoi	0	0	0	0	237
4012105035--Retread radial tire for truck & bus, exc on hwy	0	0	0	0	220
8415900060--Parts of heat pumps	0	0	0	0	200
3819000000--Hydraulic brake fluids/liq for hydraulic trans etc	196	141	178	320	167
8415830060--Condensing unit exceed 15,120 kcal	0	0	0	0	159
8414308090--Compressors, refrigerating & air-condition, ammoni	0	0	0	0	155
6813900050--Asbstos friction material and articles nesoi	0	0	0	0	149
8708995030--Beam hanger brackets,nesoi,of motor vehicles,nesoi	986,072	1,560,921	2,022,221	2,497,100	120
8409991080--Cast-iron pst for comp-ignition pst eng, nesoi	0	0	0	0	115
8707905020--Bodies for vehicles of subhdg 8701.20	121,052	143,401	143,702	135,012	99
9032902000--Pts, voltage-current rugulators,use in 6,12;or 24v	488	736	1,260	2,097	94
8409991040--Cst trn f comp-ig pst eng for rd tr,bus,auto,truck	11	28	22	46	65
8716400000--Trailers and semi-trailers, nesoi	130	173	288	396	45
9029104000--Taximeters	12	108	11	17	21
6813100010--Brk lngs a pads for use in civil aircraft	428	457	367	290	18
9029204040--Speedometers&tachometers used in civil aircraft	21,102	24,596	27,245	27,857	18
8512402000--Motor vehicle defrosters and demisters	4,204	2,934	2,562	2,456	11
3820000000--Antifreezing prep & prepared deicing fluids	0	0	0	0	3
8707905040--Bodies for vehicles of heading 8702	0	0	0	0	2
9029902000--Parts and accessories of taximeters	3	27	3	4	1

U.S. Automotive Parts Imports from Japan (in thousands of U.S. dollars): 1985-1989

	1985	1986	1987	1988	1989
4010101020--Belt used with internal combustion engines	0	0	0	0	0
4010101030--Power transmission belts, nesoi	0	0	0	0	0
4010101040--Power transmission belting	0	0	0	0	0
4010101090--Conveyor belt, vulcanized rub, exc cotton > by wt	0	0	0	0	0
6813900010--Asbstos bsd frctn matls for civil arcrft nesoi	433	457	368	291	0
7007110010--Toughnd safty gls size a shape fr mtr vhcls chpt87	0	0	0	0	0
7007110090--Toughnd safty gls fr arcft, spcft, vsls, nesoi	0	0	0	0	0
7007211010--Lamintd safty glss wndhlds fr mtr vhcls of chp 87	0	0	0	0	0
7007211090--Lamntd safty gls wndshlds f arcft,spcft,vsls,nesoi	0	0	0	0	0
8413309030--Fuel pumps, exc fuel-inject, for intrl comb pst eg	0	0	0	0	0
8413309060--Lubricating pumps for internal combustion pst engs	0	0	0	0	0
8413309090--Cooling medium pumps for internal comb piston engs	0	0	0	0	0
8507100020--Batteries, lead-acid, piston engine, used recvry	16,286	20,043	11,294	17,534	0
8707100040--Bodies for vehiles, nesoi, of heading 8703	0	0	0	0	0
8708290025--Truck caps for bodies of motor vehicles	0	0	0	0	0
8708290060--Pts and accessories,nesoi,of bodies hdg 8701,8705	0	0	0	0	0
8716310000--Tanker trailers and tanker semi-trailers, nesoi	389	532	867	1,229	0
8716390010--Trailers and semi-trailers,nesoi,for agricultural	391	563	881	1,430	0
8716905010--Axles & pts f trailers & oth veh not mech propelld	25,159	33,304	37,792	42,065	0
9403901040--Parts of furniture use for motor vehicles of metal	0	0	0	0	0
9403901080--Parts of furniture use for motor vehicles, nesoi	0	0	0	0	0
9802005020--Internal comb engines exp repair/alt warnty, nesoi	7,961	7,876	7,196	7,124	0
9802005030--Internal comb engines exp repair/alt warnty, nesoi	0	0	0	0	0
9802005060--Other articles exported repair/alt warranty, nesoi	0	0	0	0	0

Appendix IV

Empirical Models and Estimations

Appendix IV

This appendix details the empirical models and estimations we use to forecast the level of Japanese automotive parts exports to the United States in 1994. A special focus of this analysis are the contribution effects or rates of various sources of demand for imported Japanese auto parts. The essential estimation model used in our multiple regression analysis is the following:

$$\mathbf{PartsImports_t = F[TransProd_t, Big3Prod_t, JapanFleet_t, Time]}$$

Where:

$\mathbf{PartsImports_t}$ refer to monthly levels, in thousands of dollars, of ITC reported, total levels of customs valued automotive parts imports into the United States from Japan for the period January, 1985 through September, 1990. These values were inflated by the BLS producer price index for motor vehicles and equipment (SIC 371), with September, 1990 as the base month.

$\mathbf{TransProd_t}$ refers to monthly levels of reported Japanese transplant vehicle production in the United States for the period January, 1985 through September, 1990.

$\mathbf{Big3Prod_t}$ refers to monthly levels of reported General Motors, Ford and Chrysler "traditional content" vehicle production in the United States for the period January, 1985 through March, 1990.

$\mathbf{JapanFleet_t}$ refers to a special series of estimated monthly levels, in thousands, of the Japanese affiliated operating car fleet in the United States for the period January, 1985 through September, 1990. The data source is Polk Statistic's *Vehicles in Operation as of July 1, Import Passenger Cars* for the years 1985-1989. The monthly levels are derived from our transformation of annual incremental change in the Japanese operating fleet into monthly incremental change bases on weights calculated from monthly Japanese vehicle (transplant and import) sales in the United States. Since the latest year for which we were provided fleet data was 1989, the fleet levels cover only 54 months: January, 1985 through July, 1989.

We explain in Section IV that Japanese imported parts price information, on any series basis, does not exist. We did attempt to include a series on the yen-dollar exchange rate, both real and alternatively nominal, in the multiple regression analysis. This variable performed poorly, regardless of the specification used. The performance of the exchange rate in analysis was expected. We also obtained poor results for a Japanese import passenger car price variable in our 1989[1] study, quarterly estimation. Price and exchange rate variables were also expected to lack significance or effect in an estimation using a monthly series. Parts contracts in the auto industry, particularly the Japanese motor vehicle industry, are reassigned on a longer basis than month-to-month. However, we did attempt to use a variety of coincident, lead and moving average transformations of the yen-dollar rate in our analysis with no success.

Descriptive statistics for the major analytical variables are shown in Table IV-1.

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[1]Michael S. Flynn, Sean P. McAlinden, and David J. Andrea, The U.S.-Japan Bilateral 1993 Automotive Trade Deficit, Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan, Ann Arbor, 1989, Appendix III.

Table IV-1 Descriptive Measures					
Variable	N	Minimum	Maximum	Mean	Std. Div.
$PartsImports_t$	69	.37158 +6	.10897 +7	.72009 +6	.20789 +6
$TransProd_t$	69	23220.	.13039 +6	28027	68810.
$Big3Prod_t$	62	.41634 +6	.10609 +7	.85213 +6	.14213 +6
$JapanFleet_t$	54	14888.	22333.	18671.	2252.2

Correlation Matrix

A major concern in our analysis was intercorrelation between the explanatory variables. A simple correlation matrix of these variables is given in Table IV-2.

Table IV-2
Correlation Matrix

Variable	$PartsImports_t$	$Big3Prod_t$	$TransProd_t$	$JapanFleet_t$	Time
$PartsImports_t$	1.0000				
$Big3Prod_t$	-.0855	1.0000			
$TransProd_t$	.9045	-.0221	1.0000		
$JapanFleet_t$	.9020	-.2342	.9273	1.0000	
Time	.9053	-.2238	.9288	.9995	1.0000

N= 54 DF= 52 R@ .0500= .2681 R@ .0100= .3477

Strong positive correlation exists between $\mathbf{TransProd_t}$ and $\mathbf{JapanFleet_t}$ and between these two variables and time. A mild negative correlation is found between, both time and $\mathbf{JapanFleet_t}$ and $\mathbf{Big3Prod_t}$. On the other hand, no correlation is found between $\mathbf{TransProd_t}$ and $\mathbf{Big3Prod_t}$ (-.0221<.2681 at .05) in the matrix results shown in Table III-2. On the other hand, a simple pairwise correlation between these two variables does detect negative correlation that cannot be rejected at the .05 level of significance:

Correlation Matrix

N= 62 DF= 60 R@ .0500= .2500 R@ .0100= .3248

Correlation Between $Big3Prod_t$ and $TransProd_t$ = -.2882

In practice, we could not simultaneously include **Big3Prod$_t$ and TransProd$_t$** in our regression estimations. When both variables are included, standard errors of both regression coefficients increase to very high levels, and a nonsensical sign appeared for **Big3Prod$_t$**. These are classic symptoms of strong multicollinearity.

We directly estimate the effects of **TransProd$_t$** and **JapanFleet$_t$** on **PartsImports$_t$** in our 54 case "fleet model." The results are shown in Table IV-2.

Table IV-3
Least Squares Regression
Analysis of variance of PartsImports N= 54 out of 69

SOURCE	DF	SUM SQRS	MEAN SQR	F-STAT	SIGNIF
REGRESSION	3	.16965+13	.56550+12	131.70	.0000
ERROR	50	.21469+12	.42938+10		
TOTAL	53	.19112+13			
MULT R	.94216				
R-SQR	.88767				
SE	65527.				

VARIABLE	PARTIAL	COEFF	STD ERROR	T-STAT	SIGNIF
CONSTANT		-.53339 +6	.14849 +6	-3.5922	.0007
Transprod.	.33499	3.0339	1.2068	2.5140	.0152
JapanFleet	.56489	55.216	11.407	4.8407	.0000
DECJAN	-.51701	-.11594 +6	27146.	-4.2709	.0001

VARIABLE	TOTAL	VALID	MISS	DW	#VAR
Durbin-Watson	69	54	15*	2.2660	3

A significant coefficient of $3,034 for coincident **TransProd$_t$** is found in this estimation. The fleet coefficient for **JapanFleet$_t$** is $55.22 (per Japanese CIO per month). A significant dummy variable for the months of December and January improves the standard error of the regression. A variety of dummy variables and transplant interaction terms with calender and model year periods failed to prove significant. The presence of autocorrelation was not detected.

A second estimation, "the linear trend" model," is performed that uses all 69 cases available for **PartsImports$_t$** and **TransProd$_t$**. A simple linear count or time is included in place of **JapanFleet$_t$** and presumably **Big3Prod$_t$**. The results are shown in Table IV-4.

Table IV-4
Least Squares Regression
Analysis of Variance of PartsImports N= 69 out of 69

SOURCE	DF	SUM SQRS	MEAN SQR	F-STAT	SIGNIF
REGRESSION	4	.26823+13	.67058+12	167.28	.0000
ERROR	64	.25656+12	.40087+10		
TOTAL	68	.29389+13			
MULT	.95535				
R-SQR	.91270				
SE	63314.				

VARIABLE	PARTIAL	COEFF	STD ERROR	T-STAT	SIGNIF
CONSTANT		.28381 +6	27980.	10.144	.0000
Transprod.	.40898	3.2225	.89878	3.5854	.0007
TransInteraction-90	-.59796	-1.5420	.25837	-5.9682	.0000
DECJAN	-.47425	-97467.	22617.	-4.3095	.0001
Time	.59739	7187.3	1206.1	5.9594	.0000

VARIABLE	TOTAL	VALID	MISS	DW	#VAR
Durbin-Watson	69	69	0*	2.2729	4

A significant coefficient of $3,223 for coincident **TransProd**$_t$ is found in this estimation. A significant interaction term for the first nine months of 1990 **TransProd**$_t$ is found that lowers the estimate of import sourcing by -$1,542 per transplant unit. Once again, we find that a January and December dummy variable improves the fit of the regression. The time trend variable proved highly significant. Autocorrelation was not detected. It is this estimation that we use to perform our forecast of 1994 Japanese automotive parts exports to the United States. The corrected and uncorrected, for time interaction effects, coefficients for transplant import sourcing allow us to hypothesize both "best trade" and "most likely" scenarios. The standard error is $63.3 million and is the best obtained in any of our estimations. The effects of **JapanFleet**$_t$ and presumably **Big3Prod**$_t$ are captured by the linear time trend. Our study forecast of 1994 Japanese automotive parts exports to the United States uses forecast transplant build levels and relevant case numbers for 1994 to calculate the two forecasts.

The above linear specifications are also used to gain some understanding as to the direct effect of **Big3Prod**$_t$ on levels of Japanese exports of auto parts to the United States. This variable is substituted for **TransProd**$_t$ in the two estimations. The results are shown in Tables IV-5 and IV-6. **Big3Prod**$_t$ is significant in both estimations. It should be mentioned that a variety of other specifications were employed in this analysis aside from the linear forms shown here. Autoregressive, "log-linear," and "log-log" specifications all performed poorly in analysis.

Table IV-5
"Big3Prod Fleet" Model Estimation
Least Squares Regression
Analysis of Variance of PartsImports N= 54 out of 69

SOURCE	DF	SUM SQRS	MEAN SQR	F-STAT	SIGNIF
REGRESSION	3	.16883+13	.56276+12	126.23	.0000
ERROR	50	.22291+12	.44582+10		
TOTAL	53	.19112+13			
MULT R	.93988				
R-SQR	.88337				
SE	66769.				

VARIABLE	PARTIAL	COEFF	STD ERROR	T-STAT	SIGNIF
CONSTANT		-.10324 +7	.11754 +6	-8.7834	.0000
BIG3Prod.	.27969	.16645	.80805 -1	.0446	2.0599
JapanFleet	.93942	83.658	4.3169	19.379	.0000
DECJAN	-.55909	-.12781 +6	26804.	-4.7683	.0000

VARIABLE	TOTAL	VALID	MISS	DW	#VAR
Durbin-Watson	69	54	15	2.3005	3

Table IV-6
"Big3Prod. Linear Trend" Model Estimation
Least Squares Regression
Analysis of Variance of Parts Imports N= 62 out of 69

SOURCE	DF	SUM SQRS	MEAN SQR	F-STAT	SIGNIF
REGRESSION	3	.23153+13	.77178+12	178.23	.0000
ERROR	58	.25115+12	.43303+10		
TOTAL	61	.25665+13			
MULT R	.94981				
R-SQR	.90214				
SE	65805.				

VARIABLE	PARTIAL	COEFF	STD ERROR	T-STAT	SIGNIF
CONSTANT		.22237 +6	66807.	3.3286	.0015
BIG3Prod	.28045	.14936	.67122	-1 2.2252	.0300
Time	.94455	11610.	529.97	21.907	.0000
DECJAN	-.55347	-.12057 +6	23824.	-5.0609	.0000

VARIABLE	TOTAL	VALID	MISS	DW	#VAR
Durbin-Watson	69	62	7	2.2363	3

Appendix V

Assumptions and Empirical Estimations: Conversion of Constant Dollar 1994 Forecasts to 1994 Current Prices

Appendix V

This Appendix details the assumptions and empirical estimations we use to translate our constant dollar 1994 forecasts of U.S.-Japan automotive trade to 1994 current prices. Generally, different methods are applied to imports and export parts categories.

Exports to Japan

Dollar levels of 1994 vehicle exports to Japan are determined by multiplying our unit level forecasts by 1990 average reported custom value. We transformed these resulting dollar amounts to current 1994 dollars by assuming a 4.5% annual growth rate in price, 1991 through 1994, or a total average price percentage change of 19.25%. This same percentage increase is simply applied to the current dollar forecast for automotive parts exports to Japan from the United States.

Imports from Japan into the United States

Our 1989 study of the bilateral deficit includes an analysis of the determinants of Japanese vehicle price change based on price data for 1972-1988 supplied by a domestic manufacturer. Our analysis found that a 10% decline the real yen-dollar rate would result in a 3.4% increase in Japanese vehicle list price controlling for the effects of the U.S. Consumer Price Index-All Urban Consumers (CPI). Japanese list price was also related to the CPI; a 10% increase in this index bringing about an average 8% increase in Japanese vehicle list price. Japanese list price was then related to change in vehicle customs value, or the "pass through" effect. The "pass through" effect typically lowered the change in custom value to 60% of the given estimated change in Japanese list price based on forecast changes in the level of the U.S. CPI and the real yen-dollar exchange rate.

We used this method to produce current dollar levels of our constant dollar forecasts with one major change. We did not reduce the expected change in Japanese custom values by an expected "pass through" effect," but assumed the full expected change in 1994 Japanese list price would be reflected in average 1994 customs value. We assumed a four-year change in the level of the CPI of 19.25%, and a drop in the level of the real yen-dollar rate from 135 in 1990 to 120 in 1994. This resulted in an estimated percentage change in price of 19.7% for the 1991-1994 period. This percentage change is applied to both vehicle and parts imports levels we forecast for 1994 to produce companion current dollar levels.

Appendix VI

U.S.-Japan Automotive Components Trade
1989 Yearly Data and
1985-1989 Average Yearly Growth Rate/
Percentage Change Between 1985 and 1989

U.S. Automotive Component Exports to Japan

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Seat parts of a kind used for motor vehicles	2,132	4,177.5	213,100.0
New pneumatic tire, rubber for bus/truck off-highway, nesoi	996	1,128.9	99,500.0
Jacks, nesoi; hoists used for raising vehicles	1,083	858.8	54,050.0
Bodies for vehicles of heading 8705	1,059	2,405.8	52,850.0
Bumpers and parts, nesoi, of headings 8701 to 8705	12,123	1,455.9	44,800.0
Trailers and semi-trailers for housing 10.6m, more	772	571.4	38,500.0
Skid chain of iron or steel	503	#NUM!	25,050.0
Tire, excluding radial, used on buses, rim >=40.6 cm	218	380.8	21,700.0
Inner tubes, of rubber, used on motor cars	1,474	454.5	20,957.1
Mufflers and exhaust pipes for vehicles, nesoi	32,342	1,698.6	11,368.8
Radial tire, used on bus/truck, rim >=40.6 cm diameter	566	319.8	9,333.3
Trailers and semi-trailers for housing less than 10.6m	3,539	257.8	8,130.2
Toughened safety glass of size a shape for vehciles, etc.	13,751	407.3	7,414.2
Bodies (including cabs) for vehicles, nesoi	342	571.0	6,740.0
Compressors, refrigerator and air conditioning, for motor vehicles	7,223	237.7	5,022.7
Helical springs suitable for motor-vehcle suspension, iron/steel	224	1,126.0	4,380.0
Bodies for vehicles, nesoi, of heading 8703	704	412.3	4,041.2
Pneumatic tire, excluding radial, used on motor cars, nesoi	56,507	222.9	4,006.6
Fans and blowers for motor vehicles	40	1,277.5	3,900.0
Gaskets,washers, and other seals	4,750	190.9	3,640.2
Brake linings a pads, asbestos, other minerals	4,695	768.5	3,030.0
Parts for lead acid storage batteries	381	1,038.7	2,830.8
Automatic voltage and voltage-current regulators	2,087	171.1	2,720.3
Rear-view mirrors for vehicles	163	370.3	2,228.6
Internal combustion engine generators, nesoi	2,052	156.9	2,083.0
Internal combustion engine ignition coils	387	285.0	2,050.0
Tire, excluding radial, used on bus, excluding light truck, nesoi	985	442.2	2,041.3
Road wheels and parts for vehicles nesoi, of 8701,8705	18,066	121.2	1,911.8
Fuel-injection pumps for compression-ignition engines	866	348.6	1,868.2
Radial tire used on bus/truck, excluding light truck, on-highway	1,653	857.8	1,844.7
Parts of motor vehicle or cycle signaling equipment	791	116.6	1,739.5
Radial tires of a kind used on motor cars	108,868	110.6	1,615.5
Spark ignited engines for on-road truck, bus, and auto >50cc but =<250 cc	126	188.8	1,475.0
Hinges and parts for motor vehicles iron/steel, aluminum, zinc	243	199.4	1,250.0

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Parts for electrical apparatus used on internal combustion engines	1,663	142.8	1,199.2
Radiators for vehicles, nesoi	584	317.7	1,197.8
Trailers and semi-trailers, nesoi	143	190.0	1,091.7
Seats of a kind used for motor vehicles	2,349	127.0	982.5
Significant outlying growth rates			
Safety seat belts and parts of 8701 to 8705	598	164.3	754.3
Fuel, lubrication, or cooling med. pumps, excluding fuel-injection	743	103.7	734.8
Inner tubes, of rubber, nesoi	1,020	213.8	729.3
Motor vehicle lighting equipment	1,077	106.8	697.8
Internal combustion engine distributors	434	70.0	675.0
Retread tire, rubber, excluding on-the-highway truck and bus, nesoi	1,602	358.3	628.2
Springs of iron or steel wire, nesoi	192	108.0	585.7
Tires, excluding radial, used on light truck, on-highway, nesoi	726	66.8	548.2
Parts of winches, capstans and jacks	3,357	232.5	545.6
Sets or assortments of gaskets and similar joints	323	96.2	533.3
Retread tires, rubber, for on-the-highway truck and bus	421	180.3	528.4
Internal combustion engine spark plugs	2,250	67.1	526.7
Trailers and semi-trailers, nesoi	415	147.1	519.4
Stampings of bodies of 8701 to 8705	148	138.2	428.6
Other body sheet metal mountngs, fittings, etc. for motor vehicles	4,283	64.8	422.3
Parts and acessories, nesoi, for vehicles, nesoi	103,603	80.0	410.5
More than twice total selected commidities growth rate			
Brakes and servo-brakes, parts, of 8701,8705	12,261	50.4	377.3
Trailers and semi-trailers, nesoi, van type, nesoi	190	150.0	363.4
Stampings of bumpers and parts, heading 8701 to 8705	454	75.4	354.0
Electrical sound signaling equipment for motor vehicles	55	187.7	323.1
Parts and accessories, nesoi, of bodies headings 8701, 8705	80,161	58.0	295.0
Insulated electric conductors =< 80 volt with connectors	5,558	56.5	274.5
Radial ball bearings, over 30 mm but not over 52 mm	643	56.2	253.3
Mechanic article for motor vehicle, vulcanized rubber	685	40.2	246.0
Motor vehicle visual signaling equipment	69	58.2	245.0
Springs of iron or steel, other than of wire, nesoi	95	48.9	239.3
Radial ball bearings, 9mm and over but not over 30 mm	1,503	75.0	229.6
Suspension shock absorbers for vehicles, nesoi	2,109	55.9	229.0

U.S. Automotive Component Exports to Japan

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Windshields of laminated safety glass	13,287	34.6	223.9
Insulated wiring sets for vehicles, ships, aircraft	2,760	41.7	218.0
Sealed beam lamp units < 15.24 cm	1,405	73.3	210.8
Radial tires used on light truck, on-the-highway	3,722	54.8	192.2
Total selected commodities	**625,339**	**31.6**	**188.9**
Gaskets, metal, 2 or more layers, or with other materials	2,735	38.5	181.7
Camshafts/crankshafts for spark ignition engines for vehicles of chapter 87	281	33.5	178.2
Other internal combustion engine ignition equipment	1,106	40.9	153.7
Non-driving axles and parts for vehicles, nesoi	929	37.9	150.4
Radial tire, used on bus, excluded use on rim >=40.6 cm	15	104.6	150.0
Mounted brake linings of motor vehicles of headings, 8701,8705	1,212	44.8	147.9
Other friction material, asbestos, other minerals	205	37.6	144.0
Parts, automatic regulating/controlling inst. and apprts.	15,267	24.1	121.4
Hydraulic brake fluids/liquids for hydraulic transmissions, etc.	2,102	26.0	121.3
Automotive air conditioners	1,900	59.8	114.9
Spark ignition engines for on-road truck, bus, auto >250 but =<1000cc	51	54.3	112.5
Other lead acid storage batteries, nesoi	147	31.2	110.0
Intake air filters for internal combustion engines	11,533	18.8	95.9
Less than one half the total selected conmidities growth rate			
Gear boxes for vehicles, nesoi, of 8701 to 8705	1,359	21.1	85.1
Drive axles with differentials for vehicles, nesoi	176	31.6	83.3
Bodies for vehicles of heading 8704	190	52.6	82.7
Self-loading or self-unloading trailers, semi-trail	72	30.0	80.0
Bodies for passenger autos of heading 8703	604	73.9	74.6
Parts for lighting equipment for motor vehicles	270	27.4	70.9
Innertubes, of rubber, used on trucks and buses	17	#DIV/0!	70.0
Used pneumatic tires of rubber	566	262.7	56.8
Lead-acid batteries, new, other than 12 volt	417	18.7	42.8
Sealed beam lamp units =>15.24 cm	3,593	7.0	30.7
Lead-acid batteries, used, for the recovery of metal	27	26.1	28.6
Internal combustion engine voltage regulator, 6, 12, 24 v	129	7.0	27.7
Spark ignition engines for on-road truck, bus, autos over 1000 cc	970	46.3	26.8
Internal combustion engine starter motors	571	17.2	20.2
Laminated safety glass for vehicles, excluding windshields	1,781	8.0	-2.5

U.S. Automotive Component Exports to Japan

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Equipment, testing electronic characteristics of engines	6,182	6.1	-9.9
Radiobroadcast receivers for motor vehicles, nesoi	902	41.0	-10.7
Gear boxes, parts, subheadings 8701.20, headings 8702 or 8704	11,175	19.3	-15.4
Compression ignition engines for propelled vehicles chapter 87 on-road truck, bus, auto	3,275	-3.6	-24.1
Antifreezing and prepared deicing fluids	63	13.4	-33.7
Revolution counters, production counters, etc.	343	-7.4	-37.1
Parts of fuel-injection pumps for compression ignition pumps	4,054	-5.5	-41.4
Bodies for vehicles of heading 8702	28	#NUM!	-44.0
Lead acid storage batteries, nesoi, new, 12 volts	180	-2.2	-45.6
Internal combustion engine magnetos, magneto-dynamos	156	14.5	-64.2
Oil or fuel filters for internal combustion engine	2,057	-3.8	-65.1
Gear boxes and parts for vehicles of heading 8703	3,691	3.8	-68.8
Parts for diesel engines for on-road truck, bus, auto	6,333	-22.9	-68.9
Parts for revolution counters, odometer, etc.	738	-28.0	-76.9
Parts for windshield wipers, defrosters for motor vehicles	1,116	-6.9	-77.2
Parts of furniture use for motor vehicles	139	11.2	-78.7
Ball bearings with integral shafts	465	21.1	-79.5
Stroboscopes	9	106.1	-80.4
Clutches and parts for vehicles, nesoi	1,252	-21.3	-84.0
Locks of a kind used on motor vehicles, base metal	15	378.9	-85.1
Lead acid batteries, nesoi, used, for recovery metal	3	-28.5	-85.7
Significant outlying reduction rates			
Motor vehicle defrosters and demisters	618	-8.4	-87.4
Steering wheels, steering columns, steering boxes for vehicles	1,402	-15.5	-93.1
Trailers and semi-trailers, nesoi, for vehicles of headings 8703	10	19.8	-94.4
Lead-acid batteries, new, 12 volts	74	-37.5	-94.6
Camel-back strips for retreading rubber tires	79	-2.6	-96.2
Motor vehicle windshield wipers	25	-10.2	-99.5
Camshafts/crankshafts for vehicles of chapter 87, nesoi	0	-18.9	-100.0
Radar detectors of a kind used in motor vehicles	0	-31.0	-100.0
Tanker trailers and tanker semi-trailers, nesoi	0	963.5	-100.0
Trailers and semi-trailers, nesoi, platform type	0	#DIV/0!	-100.0

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Steering wheels, steering columns, and steering boxes	154,645	12,303.0	86,293.9
Cast iron parts for spark ignited piston engines for on-road truck, bus, auto	5,086	1,875.5	29,817.6
Other mountngs, fittngs, etc. necessary for motor vehicle body sheetmetal	249	1,076.8	12,350.0
Parts of fuel-injection pumps for compression ignition pumps	78,664	254.3	3,649.5
Parts for internal combustion engine voltage regulators	6,119	168.0	2,407.8
Drive axles with differential for vehicles, of 8703	180,039	169.0	1,441.7
Other mountings, fittings, etc. for motor vehicles, ios. aluminum zinc	102,645	171.8	1,269.5
Significant outlying growth rates			
Helical springs suitable for motor-vehicle suspensions, iron/steel	7,742	164.6	713.2
Gear boxes for vehicles of heading 8703	1,311,148	66.4	629.6
Rear-view mirrors for vehicles	27,821	91.6	627.7
Non-driving axles and parts for veh of hd 8703	79,150	73.5	577.8
Parts of furniture use for motor vehicles	4,168	68.6	518.4
Clutches and parts for vehicles, nesoi	71,662	65.5	504.4
Cast trn. for compression-ignition piston engines for on-road bus,auto,and truck	65	70.9	490.9
Suspension shock absorbers for vehicles, nesoi	134,589	55.1	397.5
Intake air filters for internal combustion engines	40,254	48.2	356.8
Gaskets, metal, 2 or more layers, or with other material	8,259	68.3	355.8
Oil or fuel filters for internal combustion engine	55,903	46.8	334.9
Internal combustion engine generators, nesoi	103,775	45.5	330.7
Locks of a kind used on motor vehicles, base metal	49,582	50.1	305.3
Internal combustion engine voltage regulators, 6, 12, or 24 volt	4,691	44.5	284.8
Mufflers and exhaust pipes for vehicles, nesoi	127,250	40.0	276.4
More than twice total selected commidities growth rate			
Motor vehicle lighting equipment	106,121	39.9	267.8
Sets or assortments of gaskets and similar joints	12,892	49.6	255.6
Internal combustion engine magnetos, magneto-dynamos	9,454	38.8	215.3
Stampings of bodies of 8701 to 8705	544,618	37.2	198.7
Fuel, lubricating, or cooling med. pumps, excluding fuel-injection	138,275	30.5	174.3
Internal combustion engine starter motors	142,093	28.3	169.8
Parts of motor vehicle or cycle defrosters, demisters	547	49.0	168.1
Insulated electric conductors =< 80 v with conductors	23,688	25.9	148.7
Total selected commodities	**12,456,558**	**24.2**	**137.5**
Fuel-injection pumps for compression-ignition engines	10,623	140.5	117.0
Other internal combustion engine ignition equipmnt	31,126	24.5	108.1
Parts and accessories of speedometers and tachometers	14,573	22.0	106.4
Parts for lead acid storage batteries	4,270	20.9	102.0
Brake drums and rotors of heading 8701 to 8705	45,123	26.2	95.1

U.S. Automotive Component Imports from Japan

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Motor vehicle visual signaling equipment	22,488	18.9	94.0
Windshields of laminated safety glass	8,925	30.2	81.0
Toughened safety glass of size and shape for vehicles, etc.	25,202	15.6	75.4
Taximeters	21	197.1	75.0
Less than one half total selected commidities growth rate			
Radial tires of a kind used on motor cars	385,603	14.2	65.8
Stroboscopes	295	85.0	63.9
Ball bearings with integral shafts	13,142	15.3	61.4
Bodies for passenger autos of heading 8703	1,104	65.6	59.5
Parts of automotive air conditioners	152,703	13.2	59.5
Insulated wiring sets for vehicles, ships, and aircraft	64,254	23.6	58.1
Internal combustion engine spark plugs	46,963	11.6	52.9
Drive axles with differential for vehicles, nesoi	16,943	14.6	45.1
Wheels for vehicles, nesoi	107,108	9.8	30.6
Cast iron parts of motor vehicles, 8701 to 8705	279	#DIV/0!	26.2
Parts of motor vehicle or cycle signaling equipment	4,454	6.1	15.2
Hinges and parts for motor vehicles iron/steel, aluminum, or zinc	30,982	7.6	3.3
Revolution counters, production counters, etc., nesoi	7,023	1.7	-2.4
Jacks, nesoi; hoists used for raising vehicles	4,400	6.2	-3.5
Mounted brake linings, vehicles, nesoi, 8701 to 8705	45,637	14.6	-7.1
Leaf springs and leaves therefor, of iron or steel	16,586	-0.2	-8.3
Safety seat belts and parts of 8701 to 8705	105,620	8.7	-9.6
Laminated safety glass for vehicles, excluding windshields	1,844	17.0	-11.2
Radiators for vehicles, nesoi	17,886	4.7	-12.4
Seats of a kind used for motor vehicles	11,699	10.4	-13.3
Hydraulic brake fluids/liquid for hydraulic transmissions, etc.	167	7.5	-14.8
Motor vehicle lighting equipment parts	24,565	6.2	-14.9
Stampings of bumpers and parts, headings 8701 to 8705	34,423	-2.5	-23.7
Fans and blowers for motor vehicles	35,513	3.2	-25.6
Internal combustion engine distributors	7,510	8.8	-27.2
Automatic voltage-current rugulators, 6,12, or 24 v	2,120	26.4	-27.5
Motor vehicle radio-tape players, cassette, stereo	409,307	-7.9	-30.5
Spark ignited reciprocating piston engines, bus, auto, truck >250 no >1000cc, used	4,173	7.6	-34.5
Conveyor belt, vulcanized rubber, cotton > by weight	6,313	-2.8	-41.0
Parts, pulley tackles and hoists excluding skip. or for raising vehicles	2,283	18.8	-51.0
Indicator panels incorporating fluorescent devices	24,683	-7.3	-58.0
Spark ignited reciprocating piston engines for on-road truck, bus, and auto, used	4,551	-2.4	-58.1
Gear boxes subheading 8701.20, heading 8702 or 8704	29,110	0.2	-62.5

Component	Thousands of Dollars 1989	Average Yearly Growth (percent)	Percent Change between 1985-1989
Mechanic article for motor vehicle, vulcanized rubber	7,522	-3.0	-63.4
Spindles for non-drive axles for vehicles, nesoi	16,526	-4.7	-64.6
Sealed beam lamp units < 15.24 cm	1,227	-7.1	-65.0
Trailers and semi-trailers, nesoi	45	12.1	-65.4
Automotive air conditioners	23,089	-9.9	-65.7
Parts and accessories of taximeters	1	167.4	-66.7
Gear boxes for vehicles, nesoi	1,314	193.9	-67.4
Camshafts and crankshafts for vehicles of chapter 87, nesoi	7,183	3.4	-68.0
Retread radial tire, rubber, used on passenger cars	6,627	14.3	-72.2
Connecting rods for compression ignition piston engines for on-road truck, bus, auto	8,707	-15.1	-75.1
Motor vehicle horns	2,453	-16.3	-76.9
Radial tires used on light truck, on-the-highway	67,483	-16.9	-77.4
Parts, voltage-current rugulators, used in 6,12, or 24v systems	94	23.2	-80.7
Equipment, testing electronic characteristics of engines	5,668	-10.4	-87.3
Significant outlying reduction rates			
Inner tubes, of rubber, used on motor cars	440	-27.2	-92.6
Motor vehicle radio receivers, AM only	2,769	-28.7	-93.7
Brake linings and pads for use in civil aircraft	18	-31.9	-95.8
Compresion ignition engines for propelled vehicles chapter 87, on-road truck, bus, auto	2,004	-48.5	-95.8
Spark ignited piston engines, for on-road trucks, bus, and autos, >1000cc, used	13,870	10.1	-96.7
Radial ball bearings with diameter under 9 mm	4,002	-13.4	-97.1
Camshafts and crankshafts for motorcycles	766	-4.7	-97.4
Parts for internal combustion engine distributor points	820	-4.1	-97.8
Compressors, refrigerator and air conditioning, screw type, n/e 200h	3,904	-7.6	-98.2
Connecting rods for spark ignited piston engines for on-road truck, bus, and auto	900	0.5	-99.3
Motor vehicle defrosters and demisters	11	-36.6	-99.7
Speedometers and tachometers used in civil aircraft	18	-17.6	-99.9
Bodies for vehicles of subheading 8701.20	99	-21.8	-99.9
Beam hanger brackets, nesoi, of motor vehicles, nesoi	120	2.8	-100.0
Asbestos-based friction materials for civil aircraft, nesoi	0	-33.7	-100.0
Batteries, lead-acid, piston engine, used recovery	0	-16.3	-100.0
Tanker trailers and tanker semi-trailers, nesoi	0	10.4	-100.0
Trailers and semi-trailers, nesoi, for agriculture	0	15.7	-100.0
Axles and parts for trailers and other vehicles not mechanically propelled	0	-10.7	-100.0
Internal combustion engines exp. repair/alt. warranty, nesoi	0	-27.7	-100.0

Appendix VII

Conversion of Vehicle Segments to Trade Classifications 1990 and 1994 "Best Case" and "Most Likely" Scenarios

Table 1
Japanese Vehicles in the 1990 U.S. Market
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
4 Cylinder	53.0%	1,390	1,301	2,691	54.6%	87.9%	80.9%
6 Cylinder	34.0	271	43	314	9.9	10.2	15.8
8 Cylinder	13.0	57	0	57	4.7	1.9	3.3
Total	100.0%	1,718	1,344	3,061	——	100.0%	100.0%

Light Truck Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
588	156	743	16.3%

Memo: The 1990 passenger car market = 9.3 million; Japanese transplants (including Canada), 15%; Japanese imports, 18.6%. The 1990 light truck market = 4.559 million; Japanese transplants (no Canadian), 3.4%; Japanese imports, 12.9%.

Table 2
1994 U.S. Sales of Japanese Vehicles: "Best Case" Market
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
4 Cylinder	53.0%	1,235	1,562	2,797	48.0%	85.2%	82.3%
6 Cylinder	34.0	150	220	370	9.1	11.3	10.0
8 Cylinder	13	115	0	115	8.0	3.5	7.7
Total	100.0%	1,500	1,782	3,282	——	100.0%	100.0%

1994 U.S. Sales of Japanese Light Trucks: "Best Case" Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
400	500	900	18.0%

Memo: The 1994 passenger car market = 11.0 million; Japanese transplants (including possible Canada), 16.2%; Japanese imports, 13.6%. The 1990 light truck market = 5.0 million; Japanese transplants (no Canadian), 10.0%; Japanese imports, 18.0%.

Table 3
1994 U.S. Sales of Japanese Vehicles: "Most Likely" Market
(units in thousands)

Passenger Car Market

Segment	U.S. Segment Mix (percent)	Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)	Total Japanese Sales Mix (percent)	Japanese Import Sales Mix (percent)
4 Cylinder	53.0%	1,363	1,778	3,141	54.1%	84.5%	79.9%
6 Cylinder	34.0	200	238	438	11.7	11.7	11.7
8 Cylinder	13.0	143	0	143	10.0	3.8	8.4
Total	100.0%	1,706	2,016	3,722	—	100.0%	100.0%

1994 U.S. Sales of Japanese Light Trucks: "Most Likely" Market

Japanese Imports (units)	Japanese Transplant (units)	Total Japanese Sales (units)	Japanese Segment Share (percent)
608	500	1,108	22.2

Memo: The 1994 passenger car market = 11.0 million; Japanese transplants (including possible Canada), 18.4%; Japanese imports, 15.5%. The 1990 light truck market = 5.0 million; Japanese transplants (no Canadian), 10.0%; Japanese imports, 12.2%.

Notes: Segment market shares were estimated based on domestic build from *Ward's Automotive Reports*, with Japanese import sales added.

Build schedules for transplant passenger cars:

Best Trade Case: build 1.897 million, sell 1.782 million (export 70,000 to Japan, and 35,000 to Europe)

Most Likely Case: build 2.110 million, sell 2.026 million (export 50,000 to Japan, and 35,000 to Europe)

We assume that there are no exports in light trucks, so sales equals build, subject to the usual caveats about linking sales and production data.

Build schedule for traditional domestic passenger cars:

Best Trade Case: 7.040 million for U.S. sale (64% of the market), plus 39,000 for export to Japan, plus other exports. 49,000 exports to Japan reflect Japanese market of 4.8 million, with 7.5% import share, and U.S. maintaining 5.96% current share of imports, plus 20% of import share increase.

Most Likely Case: 6.600 million for U.S. sale (60% of the market), plus 39,000 for export to Japan, plus other exports. 39,000 exports to Japan is less optimistic than 49,000, reflect about 13% of import share increase rather than 20% on base of 5.96% share.