Chapter 1
Introduction

Objective and Background of the Study

When the weakness of the world economy became sharply accentuated after 1979 and trade imbalances increased, trade frictions between Japan and the U.S. became serious. Tension over these matters still persists in spite of the three-year, voluntary trade-restraint measures and the one-year extension that resulted from the political judgments of both governments. These judgments were based on the poor state of the U.S. economy and, in particular, unemployment problems. They represented a "voluntary action" taken by the Japanese to minimize protectionist pressures in the United States and to give the U.S. automakers time to regain their competitive strength and readjust to changed market conditions.

The recovery of the U.S. economy that began early in 1983 is encouraging, but the auto industry's problems have not been automatically resolved. The auto issue between Japan and the United States is rooted in the more fundamental problem of the economic relationship among the industrialized nations, the origins of which can be traced, to a great extent, to recent changes in the world economic climate—such as the volatility and uncertainty of energy prices, the changing availability of natural resources to specific countries as a result of rapidly shifting prices, sharp fluctuations and imbalances in exchange rates, decreases in economic growth rates, and the changing balance in the relative economic strength of the industrialized nations. As such, they apply with equal force to Western Europe and have a major impact on the developing nations.

Governmental restrictions in such a key area as the automobile industry threaten the viability of the liberal international trading system. Yet, at the same time, we cannot ignore the central role of the automobile industry in many national economies, the employment impacts that result from large and sudden shifts in trading patterns, and the industry's significance for national security. Under conditions of economic stagnation, tremendous political pressure builds up to redress imbalances, often in a bilateral fashion. This is especially the case because these seemingly "automotive" issues are not only a matter of one specific industrial sector. They involve several major sectors, such as the steel and machine-tool industries, that are important for the whole economy of the respective nations. How should we respond to political pressures for a resolution of these economic problems? What conditions will allow for the prosperous coexistence of the respective automobile industries?

Framework of the Study

In the course of this study, we identified several critical issues. One concerns macro political and economic problems such as trade friction, unemployment, and decline in economic growth rates. While recognizing that these are indispensable concerns that establish critical parameters of what is possible, this study focuses on the evolution of the automotive industry both in an aggregate sense and in the paths to be taken by firms and national auto industries. In particular, we investigated the specific characteristics of auto firms and national auto industries that can lead them to a renewal in the future.

The term "renewal," of course, has different meanings for different companies and the different national industries. In the case of the United States, renewal generally involves regaining a competitive edge, lost as a result of the shift away from its unique large-car market to a situation where its markets are exposed to highly efficient worldwide competitors. In the case of the Japanese auto industry, the issue concerns how to restore a growth trajectory for the industry now that its domestic market has become largely a replacement market and significant worldwide restrictions on Japanese car exports have been instituted.

There are those who argue that the automobile industry will take the same path as that of the iron and steel industry or the shipbuilding industry. That is, when the world market starts to be saturated by expanded production capacity and enhanced productivity, an industry that fails to introduce a new technological breakthrough can be characterized as highly mature and subject to future decline. This suggests, of course, that technology is one of the driving forces for market growth and, thus, that the auto industry should be concerned with the conditions that foster technological innovation.

With regard to these comparisons, the automobile industry displays a number of distinctive characteristics, notwithstanding that it also shares a number of features with these other mature industries. These characteristics are as follows:

(1) The automobile is a consumer durable that meets some of the fundamental needs of the mass consumer. In this sense, it is distinctively different from steel or ships. Individual ownership of automobiles meets basic transportation needs, and the automobile has no serious competition for meeting the needs of the mass public for personal transportation. It is closely associated with the personal freedom of individuals to go where they will when they will. To be sure, mass transportation of one kind or another can fill important niches, but no form of mass transportation has yet evolved that seriously threatens the hegemony of the automobile in those societies where it has been established. As a product subject to the taste and aspirations of the mass public, we would expect that, in a competitive market, the automobile would change its shape and function according to the desire of consumers.

With these thoughts in mind, we suggest that the viability of the automobile industry *per se* is not in question, assuming its ability to service such basic needs. Yet the viability and growth rates of particular firms and national industries—and therefore the future pattern and structure of the industry—will be very much dependent on whether or not existing firms will be able to reasonably anticipate changes in consumer demands. In addition to "industry push," "consumer pull" is also important in determining future directions. Yet, the survival of particular firms and national industries requires integrating the results of past research and development with consumer demand. That is, technological innovation may be seen as antecedent to meeting consumer aspirations and central to determining the outcome of emerging competitive relationships among firms. To put the matter more sharply, such technological innovation can be a central feature in the renewal of the auto industry through the creation of new markets. Such a scenario is critical to reversing or at least slowing the decline in the growth of world automobile population that has occurred since the early 1960s (see chapter 6).

(2) The second characteristic observed in our research relates again to the consumer as a driving force in industry developments. Increasingly, in the industrialized nations, there is a diversification and volatility in consumer taste leading to rapid changes in consumer preferences, further market segmentation, and changes in production systems. In Japan, for example, there are increasing signs of a market segmentation between the inexpensive minicar market and the luxurious compact-car market.

We see the continued evolution of flexible manufacturing systems of subassemblies and finished vehicles—both *strategically* and in the specific sense of manufacturing technology—in order to better satisfy versatile and rapidly changing consumer tastes. This impacts the very organization of factories and the work process, manufacturer-supplier relations, and product-development strategies. For example, in order to reduce lead time for product development, greater stress is being placed on improving the coordination between product-development and manufacturing staffs, including the personnel of suppliers. This is particularly the case in the United States where longer product-development cycles have put producers at a competitive disadvantage. Computer-aided design (CAD) and computer-aided manufacturing (CAM) are important technological developments that have already shown their utility in significantly reducing lead times. In this area, it is the Japanese who are playing "catch-up." In still another important area, firms are reexamining their relative degree of vertical integration to meet the diversification of consumer taste and the need for greater flexibility. In Japan, we may see greater vertical integration as original equipment manufacturers (OEMs) move upstream in the production process in such areas as materials, particularly new materials. In the United States, the

already highly integrated automobile firms seem to be moving toward less vertical integration in a search for greater economies and flexibility.

(3) There are many innovations occurring inside and along the periphery of the automobile industry, and there is no doubt that such changes can open up a new future in the fashion described above. One of the most revolutionary changes, for example, relates to the explosion of communications technology. This technology operates on the future of the automobile in two major respects. First, by altering the nature of work sites and the need to travel, it suggests the possibility of radical changes in one of the major functions of the automobile, commuting to work. The balance between transmitting people's thoughts versus people seems likely to shift. The notion of "electronic cottage industry" as a dominant form of work organization in the future is extreme, yet there is little doubt that communication technology has the potential to transform the geographical concentration of work organizations and, thereby, the role of the automobile. This is particularly the case in those countries such as the United States, where the combination of a geographically dispersed industry combined with a relatively weak public-transportation system often makes access to an automobile crucial to securing a job and, therefore, one's livelihood.

Second, the new communications technology means that the automobile is no longer a "closed box"; it is potentially able to communicate with the outside world anywhere at anytime. Telecommunication technology has made it possible, perhaps through satellite systems, for an automobile user to be interconnected with outside information networks. Due to the telecommunication revolution and the rapid progress in developing the social infrastructure appropriate to an advanced information system, the image of a car and its functions will be dramatically changed in the future.

Other revolutionary changes already occurring are in the field of automotive electronics, including the areas of engine and transmission control, diagnostics, etc. All these developments discussed above raise the further possibility that firms in the communications industry will play a major role in the evolution of the automobile industry, perhaps even to the detriment of existing automobile firms. Because those inside an industry tend to concentrate on marginal differences between their products and those of their competitors, major innovations often come from outside. While such interindustry competition is not uncommon, it usually comes as a complete surprise. For example, the chemical industry developed permanent-press washable fabrics and essentially eliminated the once thriving laundry business. One can also cite the impact of General Motors on existing steam-locomotive manufacturers or the impact of IBM on typewriter manufacturers.

Moreover, the quickening pace of technological innovation is not limited to electronics but spreads into other areas such as new materials and process technology. As William Abernathy and his associates note, the significance

of technological change is the extent to which it disrupts established production, competence, marketing and distribution systems, capital equipment, organizational structures, and the skills of workers and managers. There is increasing evidence that this "disruption" is taking place in the auto industry, and the basis for competition is rapidly changing with it.

(4) The fourth characteristic notable in the automobile industry is the rapid internationalization of the industry in all its varied aspects. This interacts with the worldwide evolution of automotive and communications technology and the strategy of meeting diversified consumer tastes through worldwide production strategies. A variety of cooperative arrangements among the existing automobile companies, including the parts producers, ranging from merger, joint venture, and licensing in the design, production, and marketing phases are transforming the geography of automobile production. With the most rapidly growing markets expected to be in Third World countries, these countries will play a significant role in future developments.

Many of the developing countries have adopted restrictive practices designed to limit imports and thereby encourage local production. Indeed, there has been a growing sentiment worldwide that trans-national companies have an obligation to provide jobs, pay taxes, and support the economy of the developing nations they are serving. A number of the newly developing countries, such as Taiwan and Korea, are developing significant infrastructures for automobile production. The possibility of new entries into auto production in conjunction with cooperative tie-ups to existing producers appears quite likely over the next few decades. The role of new actors on the world automotive stage seems likely to range from those that are thoroughly integrated into the production strategy of existing producers (such as is currently the case with Brazil and Mexico) to those that will come to participate in a relatively more independent fashion.

In this era of growing integration of a worldwide industry, however, we are unlikely to see the entry of new, totally independent producers. As opposed to some of the mature "footloose" industries such as apparel, there is not likely to emerge a pattern of world-market penetration by a rapid succession of low-wage developing countries. The rising capital requirements, the increasingly demanding technology, and the need for large-scale management coordination of the design, production, and marketing of a product of considerable complexity operate to limit easy entry by low-wage, less-developed economies.

These four characteristics—the consumer base of the industry, flexible manufacturing strategies, rapidly evolving technology, and the internationalization of the industry—seem destined to transform the industry as we now know it. The existing automobile companies and their employees face a period of great uncertainty and transition. The competitive relationships

among existing and new firms will be heightened at the same time that specific cooperative relationships develop. The stakes will be high for direct employees, indirect employees, consumers, shareholders, and the governments that benefit from the location of automotive companies within their national borders.

Throughout this study, we have seen already how these four driving forces are manifesting themselves in dramatic changes occurring in American and Japanese automobile firms. In addition, these dramatic changes are reflected in specific aspects of the respective industries. We note the following similarities and differences in the ongoing and expected changes in the two industries:

1. Technology

United States	a. Rapid introduction of production automation and reduction of in-process inventory. b. Major reductions of lead time for new product development (e.g., through the use of CAD/CAM). c. Appearance of new applications, products, and materials. d. Better integration of product and process engineering.
Japan	a. Rapid introduction of production automation. b. Major reductions of lead time for new product development (e.g., through the use of CAD/CAM). c. Appearance of new applications, products, and materials.

2. Human Resources and Labor Relations

United States	a. Continuing attempt to upgrade sharply human resource training and utilization and expand union cooperation. This will proceed in a delicate balance with efforts to change work practices so that more efficient operations result. b. Growing recognition of the need to mobilize all human resources in competitive struggle, including blue-collar workers. Office automation will transform the number and deployment of white-collar employees. The organization of management will be restructured.
Japan	a. New labor-management agreements regarding the introduction of robots and other labor-saving machinery. b. New strategies for coping with an aging labor force and the need to supervise operations and personnel in foreign countries.

3. Manufacturing

United States	a. Continued major restructuring of relationships, with reduction in numbers of existing suppliers accompanied by less vertical integration of OEMs. Closer long-term relationships with surviving suppliers. b. Increased sourcing from abroad. c. Continued strong emphasis on productivity and quality improvements. d. Gradual shrinkage of employment opportunities for blue-collar and white-collar employees with social and political consequences.
Japan	a. Rapid enhancement of technological capability of parts suppliers (including strong stress on the introduction of flexible manufacturing systems). b. Internationalization of the supplier industry.

4. Management Philosophy and External Environment

United States	a. Ongoing reconceptualization of the industry's competitive strategies, including the recentralization of domestic production operations in the Midwest and cooperative arrangements with other world producers in minimizing costs of bringing new products to market.
Japan	a. Diversification and differentiation of the domestic auto market (e.g., increasing segmentation between inexpensive minicar and luxurious compact car). b. Ongoing reconceptualization of the industry's competitive strategies, including the internationalization of production operations and cooperation with other producers, in response to trade conflict.

Within each category, the ongoing changes are not necessarily the same for every company. This is due to the different historical experiences and differing competitive niches of the two national industries and the different producers within each country. Generally speaking, changes in the United States reflect the need for producers to restructure their operations to more effectively compete both domestically and in worldwide markets. In Japan, the challenge is both to stay competitive and to cope with a more restrictive worldwide environment for Japanese imports. In the subsequent chapters, we will discuss in detail the various manifestations of this ongoing process.

Perspectives

The issue of the U.S. and Japanese automobile industries and their mutual relationships has to be examined in the context of the rapidly changing climate of the industry. Lack of information on what has been happening and on the nature of the transformation of the industry in recent years leads to misunderstanding and mistrust. Information sharing and frank discussion between both parties, Japan and the United States, is of great importance. This can be encouraged through the process of technical cooperation, marketing agreements, and other forms of cooperation across national boundaries. Yet, it is not to be thought that this is a simple problem that can be solved by increased communication. Quite naturally, interests can often be expected to differ, not only between the national industries but also among the various producers in both countries.

Automotive markets in the industrialized nations continue to shift from growth markets to primarily replacement markets. Furthermore, they have become more transitional in nature. Under such circumstances, the competitive outcome—and the direction of trade imbalances—will be very much conditioned by the capacity of the automobile companies in the two countries to produce competitive cars to meet market demands. This, in turn, will depend to a significant extent on the technological capability of given automobile companies. To be sure, wage rates, exchange rates, production location, and other factors impact on the ability of companies to produce competitive cars. Yet, the technological factor, broadly conceived, is a critical one in our judgment.

Judging from past performance and statistics of research and development (R&D) expenditure and expenditures on research manpower, there is no doubt that the technological level of U.S. and Japanese automobile companies is high. The capacity for technological innovation of both industries stands on a world-class level.

In the U.S. market, the recent, modest shift of U.S. consumers to larger cars—in the context of reduced gasoline prices—suggests that the U.S. automobile industry will maintain its competitiveness in this traditional, though quite restricted, market. However, with regard to the world market, and presumably also in the United States, it is to be expected that the strong demand for small-sized cars will continue in the future. Therefore, the real competition in the auto market will be in this category.

Increasingly, competition may be between enterprises and coalitions of enterprises rather than national-flag industries. These cooperative relationships and coalitions will evolve as a strategy to exploit new technologies and to strengthen competitiveness in the changing environment of the automobile market. Expressed differently, they are strategies to reduce uncertainty in a rapidly changing environment.

In essence, this movement toward strengthened corporate linkages derives primarily from two factors. First, no automobile company can monopolize a superior position in the world automotive market. This is the case because rapidly changing technology in the hands of competitors constantly threatens established positions. New materials, new manufacturing technology, the possibility of shifting energy sources, and the expanded role of electronics are but specific manifestations of this dynamic state.

Second, during this transitional stage a large R&D investment is needed. Yet, with the volatility and diversification of consumer preference, the life of specific products is shortened. Under these conditions, the automobile companies must find a way to compensate for the huge investments that are required while still maintaining sufficient variety to meet varied consumer demands. The obvious solution is to expand sales of specific models, and cross-national cooperation among producers is seen as an important strategy to assure a larger market for products.

History suggests that, in the long run, one must be concerned that this pattern does not lead to a cartelization of world markets that would end up diminishing competition. For the time being, however, on a worldwide scale, vigorous competition among the emerging coalitions appears the norm. Restriction of competition, whether from cartelization or import restrictions, would lead to a decline in technological innovation and, therefore, in the incentive of manufacturers to service consumer demands in a timely fashion.

Yet, one cannot ignore the existence of crucial macro political and economic problems, such as national and international economic slumps, rapidly shifting trade imbalances as exchange rates respond to surges of financial flows, and the process of politicization of the issues that inevitably accompany such events as rising unemployment levels. While various measures to accommodate to these pressures will understandably be taken, these measures must not be allowed to protect permanently the industries of the advanced industrial nations. To allow this to happen not only would weaken the technological competitiveness of the automotive industry in the specific country in question but also would discourage the ongoing dramatic changes in management philosophies, human resource development and labor relations, manufacturer-supplier relations, and manufacturing processes. Such permanent protection would lead to a choking of the future potential of the industry and cause it to decline along the lines of the steel and shipbuilding industries.

A related outcome of such stagnation in technological progress would be that the comparative advantage in automobile production currently held by the industrialized nations would quickly dissipate. We cannot afford to indulge ourselves in the mistaken "Suez mentality" that assumes that the less-developed nations do not have the capacity to learn to operate complicated technological processes. Thus, technological progress in the

automobile industry of the industrialized nations must go forward lest the industry be caught up in a vicious cycle of decline. Such a decline would invite still greater policy interventions on behalf of protectionism, thereby further weakening the competitiveness of existing firms. The core of the dilemma facing industrialized nations is how to make the adjustments to the macro political and economic problems without succumbing to a vicious cycle inviting restrictions, stagnation, and decline.