1984

ECONOMIC REVIEW

FEDERAL RESERVE BANK
of CLEVELAND

SUMMER

Economic Review
Summer 1984

The Implementation of Industrial Policy 2

Proposals for a coordinated industrial policy, designed to enhance the productivity and competitive position of the U.S. economy, have attracted many supporters. Industrial policy will require the creation of an agency to plan and execute governmental directives. Using the American experience with national economic planning during two World Wars and the New Deal, economist Daniel A. Littman discusses the ability of government to implement such a policy. The author identifies serious problems that may frustrate government attempts to implement an industrial policy for the 1980s.

Voluntary Export Restraints: The Cost of Building Walls 17

At the urging of the U.S. government, the Japanese restricted exports of new cars to the United States in 1981. Designed to protect jobs in the U.S. auto industry, these voluntary export restraints (VERs) have done so at the expense of American consumers. Economists Michael F. Bryan and Owen F. Humpage derived estimates of the restraint program's cost and its contribution to U.S. auto-related employment by developing a model of the market for Japanese cars in the United States. The model incorporates dealers' inventory positions and allows for variable dealers' markups over options-adjusted wholesale costs.

Economic Review is published quarterly by the Research Department of the Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, OH 44101. Telephone: 216/579-2000.

Editor: Pat Wren. Assistant editor: Meredith Holmes. Design: Jamie Feldman. Typesetting: Lucy Balazek.

ISSN 0013-0281

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The Implementation of Industrial Policy

by Daniel A. Littman

A growing coalition of U.S. political, labor, and business leaders is lobbying for a coordinated interventionist national industrial policy. This coalition advocates measures designed to enhance the competitiveness and productivity of the U.S. economy. The term *industrial policy* means various things to various people, a fact that manifests itself in the wide variety of policy proposals under consideration. Industrial policy enthusiasts agree only that the U.S. economy is experiencing grave structural problems and that the federal government has both the obligation and the capacity to implement policies to alleviate these problems.

The industrial policy proposals range from measures intended to enhance the long-run efficiency of competitive markets, to steps to allow the federal government to undertake decisions normally handled by the private market. Some proposals include modifications of the tax code to promote research and development activities, and relaxation of antitrust guidelines to permit consolidation of production facilities in troubled industries. More common are proposals with such ambitious elements as establishing a government-financed Development Bank to extend preferential credit to so-called *sunrise* and *sunset* industries; forming a nonpartisan council to supervise the bank's activities and coordinate the industrial policy initiatives of government agencies; and restricting interstate business mobility and corporate diversification.

The existing critical literature on industrial policy focuses on diagnosing the structural problems of the U.S. economy and on the success or failure of domestic sector-specific and comprehensive foreign industrial policies (see box 1). However, even if a consensus were to develop regarding the sources of and remedies for the U.S. economy's structural ailments, industrial policy still faces an uncertain transition from law to delivery—

a process known as *implementation*. In this article, our concern is the government's ability to implement a complex and coherent array of government actions under the umbrella of industrial policy.

Any activity engaged in by a democratic government requires policy choices by elected representatives and their appointees, as well as policy execution by civil servants. The activities of those charged with implementing policy—detailed design, delivery, performance monitoring, and enforcement—have been analyzed extensively, and they have been found to be afflicted by predictable limitations and imperfections.[1] The ability to implement policies legislated by a government frequently is neglected in policymaking and analysis. Seeming to believe that implementation is a relatively easy task, legislators invariably are upset when policy goes awry, or when policy results are contrary to legislative intentions. When the objectives of policy are not realized, the possible causes are many. The fault could lie in a misdiagnosis of the problem, or problems, to be solved. Legislative intent might have been defective: the objectives of policy may have been unattainable, or the policy targets poorly selected. Another explanation may be that implementation was faulty: the mandated activities were improperly executed or experienced damaging delays.

Policy implementation is complex. It begins with the passage of legislation; works through establishing an administrative structure to initiate policy and select objectives, targets, and instruments; and ends with delivery. The process involves an intricate web of relationships among policy advisors, legislators, executive branch officials, and superiors and subordinates within the agencies charged with execution. It must be recognized that governments and their component bureaucratic institutions are not monolithic (Downs 1967), a fact of considerable importance in the translation of policy directives into policy

1. *See Pressman and Wildavsky (1973), Mazmanian and Sabatier (1983), and Peirce (1981).*

Box 1 Critical Views on Industrial Policy

The critical literature on industrial policy has focused on two sets of issues. First, analysts have questioned the extent to which the U.S. economy is experiencing grave structural problems. Advocates maintain that the structural difficulties of the U.S. economy are reflected in the following phenomena:

(1) a progressive *deindustrialization* that could harm manufacturing industries and union workers in the short run and could threaten national economic growth in the long run;

(2) a secular deterioration in productivity, capital investment, and international competitiveness;

(3) a national capital market that discriminates against infant industries, research and development ventures, and investments in public infrastructure.

Since these assertions have been analyzed in recent literature, it is not our purpose here to provide an extensive review. Critics cast doubt on assertions that the U.S. economy is burdened with unparalleled difficulties of a structural nature. The literature also suggests that the government would, even under ideal conditions, lack the information necessary to make responsible and potentially effective policy decisions.[a]

Second, researchers have examined comprehensive foreign and domestic sector-specific industrial policies used as models by advocates. They maintain that industrial policy was a crucial factor in the rapid postwar growth in Japan, West Germany, and France. Critics point out that such research has failed to demonstrate a causal relationship running from industrial policy to economic growth. Using standard and quantifiable economic, cultural, and demographic measures, advocates have not been able to explain all of the postwar economic growth of the three countries. The often large and unexplained residual is then attributed to the effectiveness of industrial policy.[b] Regarding sector-specific industrial policies in the United States, Nelson (1982) argues that failures have been at least as common as successes, and that success has occurred under special circumstances, suggesting that policy replicability may be limited.[c] For instance, government support of research and development in American agriculture (the quintessential sector-specific policy) is a poor model of centralized planning for the manufacturing sector.

a. See Daniels and Kieschnick (1978) and *Industrial Change and Public Policy* (1983).
b. See Maunder (1979), Trezise (1983), Burton (1983), and Pavitt and Walker (1976).
c. See Nelson (1982) and Wescott (1983).

outcomes. Within each bureau, for instance, high echelon officials are charged with the design and execution of policy directives. Because officials consider numerous policies, each single policy is defined in general terms. Deputies are left to work out the details. These deputies, in turn, typically delegate much of the detail work to individuals below them in the organizational structure. Orders from the top are expanded and made more specific as they move downward. Since each participant has some discretion in selecting alternatives, the policies of an organization (or a government) are defined at all levels, not simply at the top.

The *theory of agency* has been employed by researchers from a variety of social and behavioral science disciplines to examine the kind of complex problems that surface in the implementation process. An agency relation exists when one party, the *agent*, is acting for another party, the *principal*. The agent generally is construed to be acting for the benefit of the principal. Since the principal is separated from the activities conducted by the agent on his or her behalf, he or she must establish systems of monitoring and control to assure that the agent behaves as desired.[2]

The implementation process consists of many layers of responsibility and delegation. In this article we examine industrial policy based on three layers of delegation, from objective-setting to the delivery of policy. The topmost officials, including the president, cabinet members, and congressional committees, are the *principals* for whom industrial policy is implemented. Although they often possess contradictory policy preferences, the principals must provide the organizing direction and general objectives of policy to *agents* employed to design and execute policy. The officials and staff of the industrial policy bureau, a second group, are the *primary agents* responsible for developing a detailed policy design and directing the instruments of policy. For industrial policy to be potentially effective, it required that another layer of *secondary agents*—the individual firms and plants in each regulated industry—actively buy into and participate in the implementation process.

In the implementation of public policy, principals must concern themselves with four agent-control strategies, to assure that the policies implemented conform to initial directives. First, principals must determine the degree to which the policy preferences of their selected agents diverge from their own. The combination of differing preferences, a normal amount of responsibility delegation, and agent discretion concerning policy alternatives can result in policies that bear little resemblance to the principals' original directives. Second, principals must transmit detailed, intelligible, and feasible policy specifications to their agents. Agents may then be expected to discriminate between actions that are desirable and undesirable in the principals' eyes. Third, principals must be able to monitor the behavior and performance of agent actions on their behalf, by establishing information feedback mechanisms and by identifying performance measures that possess a predictable relationship to the desired final policy outcomes. Finally, principals need to formulate a system of rewards and penalties to help assure that agents are implementing the proper policy with a minimum of delay and deviation.

The existing literature on industrial policy overlooks the implementation process. Potential barriers to industrial policy cannot be analyzed directly, since examples of coordinated and interventionist policy envisioned by advocates are not in place to provide a basis for study. The history of U.S. economic interventions, however, provides a useful laboratory for examining industrial policy.[3]

2. For further discussion of the principal/agent model and its applications, see Mitnick (1974), Mitnick and Backoff (1983), and Banfield (1975).

3. The potential implementation problems of modern industrial policy might be identified via three avenues, only one of which—historical evidence—is pursued in this article. The implementation difficulties encountered by policymakers in Japan, France, and West Germany could be relevant, despite the substantial differences in culture, political systems, and economic structure between these nations and the United States. Alternatively, the implementation experience of domestic sector-specific industrial policies could be examined for applicable problems.

In three episodes of national crisis during the twentieth century, the federal government established powerful executive agencies to coordinate and direct a broad range of private economic activities. Today's proposals envision a similar agency. In World War I, President Woodrow Wilson formed the Council of National Defense (CND) and the War Industries Board (WIB) to mobilize the private economy for war. During his celebrated first 100 days in office, President Franklin Roosevelt formed the National Recovery Administration (NRA) to plan and stimulate the private economy. Finally, early in our involvement in World War II, President Roosevelt established the War Production Board (WPB) to plan and supervise our industrial and transportation sectors. Each of these agencies closely resembled, in structure and responsibilities, the proposed delivery agency for contemporary industrial policy. None was designed to serve exclusively partisan interests, and senior staff included representatives from government, business, labor, and the public. All three were assigned broad responsibilities to direct and coordinate the related activities of other executive agencies. Each was associated with a government agency whose responsibilities included lending to the private sector. Finally, all three were conceived as clearinghouses for information, research, and planning of public and private-sector activities.

I. Agents and Institutional Capacity

The enabling legislation for the WIB, NRA, and WPB gave unprecedented and unfamiliar powers to the federal government. In the world of public policy, there is, however, no assurance that implementation will be effective, or that governments will only choose policies that feasibly can be executed. *Institu-*

War Industries Board

Sudden involvement in World War I forced the first U.S. attempt at economic and social control on a comprehensive national scale. For almost two years, the national government sought to command the major industrial and manpower resources of the United States; recruited, trained, and armed an expeditionary force; and served the financial, ordnance, and economic needs of our European allies. The government's wartime economic powers required some central coordination, although public officials had no familiarity with large-scale economic planning. Established in 1917, the Council of National Defense (CND) and the War Industries Board (WIB) were charged with the coordination of industries, resources, and transportation facilities for the national security and welfare. The WIB replaced the marketplace where large industry was concerned, employing persuasion, threats, and calls to patriotic duty to gain "acceptable" prices, adjustment of competing claims for scarce resources, and priorities in military and civilian contracting. Among its specific duties were advising the president, executive agencies, and Congress on appropriate and necessary courses of action to mobilize the private economy; coordinating transportation, communication, and production facilities; acquiring strategic raw materials; establishing and enforcing priorities in production and delivery of war materials; fixing prices of military and civilian goods ranging from bullets and machine guns to coal and grain; directing the conversion and/or construction of manufacturing and transportation facilities for defense production; and coordinating the purchases of Allied governments in the United States. The WIB worked closely with other agencies established in the national emergency, including the Emergency Fleet Corporation, the United States Railroad Administration, the U.S. Food and Fuel administrations, the War Finance Corporation, and the National War Labor Board. The WIB was dissolved in December 1918, just one month after the war ended. While the WIB established a semblance of order in economic mobilization by the summer of 1918, the agency never secured unified control over that mobilization. It lacked clear authority to set civilian and military prices and to coordinate transportation, duties that were covered, in part, by other agencies. Throughout the war, its officials remained unsure of their legal authority to coerce businesses and to enforce contracts with military agencies. The WIB's rapid dissolution prevented wide public awareness of the serious weaknesses and inconsistencies of government economic controls during the war. For greater detail on the WIB and its sister agencies, see Cuff 1973, Garfield 1921, and Willoughby 1934.

tional capacity, defined here as a combination of the government's organizational management skills and technical knowledge, is an important influence on the speed of the implementation process and the potential for successful outcomes, particularly with respect to new policy directives. Finegold and Skocpol (1982, p. 260) observe, "Governments that have, or can quickly assemble, their own knowledgeable administrative organizations are better able to carry through interventionist policies than are governments that must rely on extragovernmental experts and organizations." In addition, new agencies are usually influenced disproportionately by the regulated groups that lobbied for their creation.

The interventions authorized by the industrial policy legislation of 1917, 1933, and 1939 presented the federal government with serious technical and organizational capacity problems. No ready-made administrative structure existed within the federal government to design and implement such policies. Compared with our allies in Western Europe, the federal government was handicapped by a historical tradition that emphasized decentralized decisionmaking and "anti-statist" rhetoric.[4] Elected representatives, civil servants, and political appointees did not have the vast technical and bureaucratic knowledge necessary to design and implement industrial policy. By World War I, the evolution of large private companies and industry trade associations had given *some* of these important skills to the private sector (Chandler and Galambos 1970). The Wilson and Franklin Roosevelt administrations desired rapid implementation of industrial policy, but could not easily assemble from the government's own resources either the necessary administrative apparatus or the technically skilled personnel needed to direct and staff the agencies. In what should be considered classic cases of *regulation by the regulated*, both presidents turned to the private sector for their industrial policy agents.

The CND and the WIB were essentially exercises in improvisation. The proposals to establish the two agencies were put forward by a coalition of major defense contractors and other private businessmen and did not originate with the president or Congress. Once the agencies were operational, initiatives for administrative change and new powers came, once again, from the business community. President Wilson used his considerable emergency powers to work out interim agency arrangements with private-

4. See Skowronek (1982) and Fine (1956). For comparisons with the European political and institutional tradition, see Hartz (1964) and Batchelder and Freudenberger (1983).

National Recovery Administration

Created in 1933 under the National Industrial Recovery Act, the NRA was modeled on the WIB of World War I and included key personnel of the WIB among its staff. The NRA's primary feature was the organization and administration of *industrial self-government*, suspending antitrust enforcement and allowing government-sponsored cartelization of industry. Elaborate codes of business behavior for employment, investment, output, wages, and prices were to be established by mutual agreement. Eventually, over 500 individual industry codes were developed, and signatories to these agreements were allowed to display the NRA *blue eagle* insignia. While the NRA lasted for two years and vanished with hardly an institutional trace, it was the centerpiece of government recovery policy in the early New Deal. The codes were intended to encourage cooperation that would eliminate overproduction and the resulting downward pressure on prices and wages—that is, to stem deflation. Conservatives believed that the end of destructive competition, as they viewed it, would bring optimism and a renewal of private investment. More ambitious proponents reasoned that if codes could be drafted to keep prices down but deliberately increase wages, industry, in effect, would be forced to come up with the money to revive U.S. purchasing power. Having failed for many reasons, some of its own making, the NRA was repudiated by many of its early supporters by the time the Supreme Court declared it unconstitutional in 1935. For greater detail on the NRA, see Finegold and Skocpol 1982, Bellush 1975, Hawley 1969, and Brand 1983.

sector interests. The WIB was directed and staffed primarily by businessmen, financiers, and trade association lobbyists from the private sector, although labor and government had token representation.

The WIB was disbanded immediately after World War I, with its staff returning to private-sector employment. The Harding and Coolidge administrations dismantled most of the formal institutional legacy of the World War I era (with prominent exception of informal planning activities conducted by the newly formed U.S. Department of Commerce in the 1920s). The federal government thus faced the Great Depression with little more internal administrative and technical capacity than it possessed in 1917. President Franklin Roosevelt and his advisors employed the WIB as a model for the NRA, asking several WIB veterans to form the staff nucleus of the agency. Although the staff included representatives of government and organized labor, the NRA came to reflect the interests of large U.S. private corporations and their executives. The deputy administrators were drawn almost entirely from the ranks of business, and were often assigned to direct code negotiations with their own industries. Likewise, the code authorities formed to monitor compliance were staffed by business executives and by trade association personnel (the NRA promoted the formation of trade groups in industries with no pre-existing association).

The U.S. government entered World War II with a large organizational structure, courtesy of the New Deal. The government, however, did not have the technical expertise necessary to prepare the private economy for war. The NRA was disbanded in 1935, and major segments of the business community were alienated from the Roosevelt program. The WPB staff was recruited from the private sector, and often conducted procurement and price-fixing negotiations with their own industries.

The federal government established principal/agent relationships to implement industrial policy in 1917, 1933, and 1939, largely as a result of technical and organizational deficiencies. Such arrangements are (and were) not unusual in public policy: the relation between the president and government bureaus staffed by professional civil servants

War Production Board

The mobilization of the U.S. economy in World War II was an achievement without precedent in magnitude, complexity, or duration. The defense mobilization and production requirements greatly exceeded those of World War I, and wrought sweeping changes in the operations of government and in the structure of the U.S. economy. The federal government established a number of agencies with overseeing authority over the huge effort, beginning with the War Resources Board (1939), the National Defense Advisory Commission (1940-41), the Office of Production Management (1941-42), and the Supply Priorities and Allocations Board (1941-42). The evolution toward a centralized economic planning agency culminated in the War Production Board (1942-45). The WPB had considerably greater powers to mobilize the national economy than either of its predecessors—the WIB or the NRA. It was given authority to divide resources between civilian and military claimants, establish production and delivery priorities within the two groups, coordinate and oversee the building of production facilities and the conversion of existing facilities, and coordinate manpower needs. The WPB was dissolved shortly after the cessation of hostilities in the Pacific theatre in August 1945. The WPB's responsibilities were often ambiguous, and they frequently overlapped with the jurisdictions of other emergency agencies, with predictable confusion resulting. The demands of World War II on the U.S. economy and on the government's planning agencies were so great that even an abundance of internal and external experts could not fashion a coherent set of government institutions or policies. The economic planning agencies of World War II were rarely effective as long-term strategic planners, but relatively successful at crisis management. For greater detail on the WPB, see Civilian Production Administration 1947, Novick, Anshen, and Truppner 1949, Koistinen 1980, and Rockoff 1984.

is also one of principals and agents. However, the industrial policy episodes were unusual in certain respects. Government officials found it necessary to assemble the required staff from private-sector resources, and relied little on the existing administrative and personnel resources of government. Indeed, the federal government sought and found the necessary expertise among the very industries and corporations that would ultimately be subjected to industrial policy regulation. More important, evidence reveals that the preferences of these agents differed from many businesses in regulated industries (especially small business), from the president and congressional committees (principals), and from alternative agents (civil servants and military officers employed by other government entities).[5]

The Wilson and Roosevelt administrations were aware of these important policy differences and sought to develop strategies and control procedures that might prevent such differences from distorting public policy. The control procedures involved three elements: instructions, performance monitoring, and incentive systems.

II. Instructions and Consensus Problems

The public and political debates that preceded the establishment of the WIB, NRA, and WPB occurred in an atmosphere of impending crisis. Advocates of all persuasions recognized that a rapid policy response was imperative. In the charged environment, legislative and executive actions to create an industrial policy apparatus were hasty. Congressional debate and media comment of the day show that the objectives, powers, and policy instruments available to the three agencies were not clearly defined. Given the dramatic expansion of state power sanctioned by the legislation, the absence of controversy seems remarkable, being attributable perhaps to the perception of external threats to the nation and the resulting urgency in policymaking.

The consensus was an illusion. The three agencies only superficially satisfied the diverse interest groups that had supported enactment. With respect to the NRA, Hawley (1969) comments:

> As written, the National Industrial Recovery Act could be used to . . . cartelize the economy, establish overhead planning, or attempt to eliminate the market riggers and enforce competition. There were those who would move in each [direction] and it was not surprising that a conflict ensued (p. 35).

Since the principals—the president, cabinet, and congressional committees—were unclear initially about the role, responsibilities, and powers of the industrial policy agencies, they could not transmit clear and intelligible policy instructions to their agents. As a result, the bureaus themselves became battlegrounds for the definition and details of policy—a divisive phenomenon that delayed the design and execution of policy initiatives. The NRA was plagued by serious internal conflict over powers and responsibilities from the beginning. The conflict interfered with the NRA's efforts to develop a coherent policy and stabilize the economy. The continuation of wartime crisis and the effectiveness of government-engineered propaganda muffled the external criticism of, and, to a lesser extent, the vocal conflict within, the WIB and WPB. Nevertheless, Cuff (1973), Koistinen (1984), and Novick, Anshen, and Truppner (1949) show that the internal policy debates of the WIB and WPB were haunted by philosophical conflict. Goldman (1971), Willoughby (1934), Solo (1959), and Garfield (1921) show that internal contradictions also handicapped other wartime agencies, which often delayed or precluded the implementation of important policy initiatives.

The NRA never seems to have received clear instructions from the Roosevelt administration about the details of policy. The preparation of the industry codes consumed a tremendous amount of time, and sketchy evidence of code compliance did not arrive on the president's desk until the spring of 1934. By

5. Cuff (1973), Koistinen (1980), Solo (1959), and Christman (1973) show that the WIB and WPB had frequent policy disputes with the president, his cabinet, and congressional committees responsible for agency oversight. Serious conflicts took place between the two agencies and other bureaus of government, especially the military procurement departments. Himmelberg (1968) discusses the attempt, by WIB supporters, to establish a peacetime price-fixing agency (the Industrial Board of the Department of Commerce) in 1919, while President Wilson was in France. Hawley (1969) and Bellush (1975) reveal significant and acrimonious policy differences between the congressional committees, many New Dealers, small businesses, and the NRA policymakers.

then, the NRA codes were under strong attack from major segments of the business community, and many of Roosevelt's close advisors had lost faith in the agency's ability to stabilize the economy. In May 1935, the NRA was declared unconstitutional by the U.S. Supreme Court. Bellush (1975) suggests that the Roosevelt administration adopted a hands-off attitude to the NRA, given the public and legal controversies that surrounded its short, ineffectual existence. In contrast, the agents in charge of the WIB and WPB succeeded in their persistent quest for clearer instructions from Presidents Wilson and Roosevelt, in large part because their planning activities were essential in wartime (in contrast to the NRA). Such instructions usually applied to quite specific regulatory and crisis-related matters, yet at times concerned long-term strategic planning issues. Although the two agencies continued to be viewed by their principals as long-term planning agencies, the force of unpredictable events compelled principals and agents alike to concentrate planning resources and regulatory efforts on crisis management.

III. The Monitoring of Agent Performance

The industrial policy *principals* had to monitor the behavior of their implementation *agents*, to assure a minimum of delay, policy deviation, and corruption. Principals and primary agents alike had to select and monitor quantifiable measures of policy performance, to assure that policy was yielding the desired economic results. This information could later be used to modify agent instructions, to discipline agents who performed in a substandard fashion, and to reward agents whose performance exceeded expectations.

Clear lines of communication and authority between principals, primary agents, and secondary agents obviously are necessary for effective monitoring. These communication lines must also be used at frequent intervals to discuss substantive matters of performance and policy. The historical record suggests that Presidents Wilson and Roosevelt and their advisors held frequent, substantive discussions with their wartime economic planning agents. During most of 1917, for example, Wilson (or his close advisors Colonel Edward M. House and Secretary of War Newton D. Baker) met with WIB and CND officials as often as once a week. Such meetings featured discussions of WIB powers, relations with other government and military agencies, and Allied purchases in the United States. NRA officials appear to have communicated on a frequent basis with President Roosevelt and his advisors, but the content of discussion seems to have been oriented, to a greater extent than in the wartime agencies, toward the political repercussions of policy actions.

During the first six months of 1919 President Wilson was absent in Versailles negotiating the peace, the only identifiable period that frequent communication subsided between the principals and agents of industrial policy. It is not mere coincidence that during this period WIB supporters, freed from close supervision, established a peacetime price-fixing agency in the Department of Commerce—the Industrial Board. The board was dissolved upon Wilson's return from France, in part because the president believed that wartime powers were not consistent with a peacetime economy.

Communication between the industrial policy agencies and participating businesses—the primary and secondary agents of policy—possessed unusual characteristics. Frequent and substantive discussions were typically confined to major defense contractors, large private corporations, and trade associations—

the former and future employers of many top-level agency staff members. In some industries, the WIB, NRA, and WPB officials made few attempts to communicate with the secondary agents of industrial policy (especially small and medium-sized businesses), leaving such efforts to trade association personnel and other industry spokesmen. Such practices exacerbated existing splits within industries, hampering policy execution by reducing the level of secondary agent compliance with directives.

The second aspect of monitoring concerns the ability of principals and agents alike to measure the performance of industrial policy—that is, the effect of policy execution on policy targets. Ideally, planners would have liked to have measured the *value* to society of marginal changes in policy targets resulting from policy execution. However, the three industrial policies were designed to remedy competitive *market failures* through the use of *nonmarket* instruments. National defense, a *public good*, could not be provided in sufficient quantities by the private sector in World Wars I and II. While there was certainly a public demand for national defense, it possessed no market price, since national defense was (and is) provided by government outside the market mechanism. Without an explicit price, the marginal *value* to society of government actions to enhance U.S. defense capabilities, and triumph in war, could not be calculated. The NRA also was designed to correct a market failure: New Deal planners and corporate executives argued that U.S. businesses were too self-centered to recognize that "cut-throat competition" was causing a very damaging deflation in prices and wages. They believed only government sponsorship of explicit collusion might remedy this market imperfection.[6]

Since government could not calculate the marginal value to society of policy-induced changes in targets, principals and agents had to settle for output or cost measures of performance. Wolf (1979) indicates, however, that

> nonmarket outputs are usually hard to define in principle, ill-defined in practice, and extremely difficult to measure independently of the inputs which produce them. They are generally intermediate products which are, at best, only remote proxies for the 'real' or final intended output. Measuring outputs by their inputs becomes accepted because measuring outputs directly is so difficult (p. 113).

Table 1 depicts stylized performance measurement problems that were confronted by principals and agents engaged in the three industrial policy efforts. It is reasonable to assume that proximity to final output and value is associated with superior performance measurement capabilities. Thus, well defined measures of final physical inputs contain more information about final output and value than crude physical inputs.

The NRA could not measure the amount of price and employment stability created by an industrial policy designed to affect those economic variables. In the absence of output quantities, the NRA could not derive a measure of cost effectiveness in the delivery of

Table 1 An Illustration of Performance Measurements

Tiers	WIB	NRA	WPB
Policy objectives	Defend the homeland and Allies	Stabilize price and employment levels	Defend the homeland and Allies
Final physical outputs	Enemy casualties	None	Enemy casualties
Final physical inputs	Number of rifles and tanks	None	Number of rifles and tanks
Intermediate physical inputs	Number of procurement contracts	Number of complaints settled	Number of procurement contracts
	Size of strategic stockpile	Number of signatories to codes	Number of product priority orders
Crude physical inputs	Dollars in budget	Dollars in budget	Dollars in budget
	Number of employees	Number of employees	Number of employees
	Number of contracts negotiated	Number of codes written	

6. The difficulty of measuring the value of government output to society is not peculiar to industrial policy. Indeed, such problems afflict most government policies. For further discussion of the problems of measuring public-sector output, see Wolf (1979) and Olson (1973). It should also be noted that contemporary theories of market failure would not accept the market imperfection arguments made by NRA proponents.

output. The New Dealers also had no appropriate measure of final inputs, or the percent of national output, employment, and business firms complying fully with industry codes. The Roosevelt administration and the NRA staff settled for intermediate and crude proxies in their quest for performance measures, such as the number of industry codes written, business signatories to the codes, and code compliance actions taken and resolved. Yet, these input measures bore little relation to performance. While the NRA staff could count the number of businesses that had signed the codes, they could calculate neither the weight of those businesses in each industry nor the proportion of signatories actually complying with the codes. Likewise, the number of code violations that came to the attention of authorities was a poor performance measure. Bellush (1975) suggests that the largest numbers of code violations came from industries where compliance seems to have been more widespread, while smaller numbers came from industries where little compliance was evident.

Like the NRA, the WIB and WPB could not estimate the marginal value to society of their defense mobilization efforts. The military services have sometimes measured their performance (a final physical output of the planning agencies) on the basis of enemy casualties; yet, as observers of the Vietnam conflict noted, casualty rates may not be a satisfactory measure of output. The wartime industrial policy agencies had, as their primary responsibility, the design and execution of policies that would assure the maintenance of adequate supplies for the war machine. Therefore, performance could be (and was) measured by simply counting the number of physical units such as ordnance, uniforms, medical supplies, and fighter aircraft delivered to the military establishment. If necessary, such final physical inputs could be used to calculate measures of cost effectiveness. In wartime, such measurement may not have mattered (in peacetime, however, military and civilian agencies share measurement problems). Novick, Anshen, and Truppner (1949, p. 16) argue

> in the war economy, the prices of products needed for the military machine are of no importance. Failure to provide the necessary weapons results in national calamity. . . . It is true that part of the attention of government is devoted to price controls and the avoidance of inflation. Those concerned with this problem are looking out for the general health of the economy during and after the war. Price is never a factor in influencing the satisfaction of the needs of the war machine. Industrial output for military needs is taken outside the sphere of peacetime economic operations.

Although principals and agents shared the problem of performance measurement, the agents possessed an advantage—one that could have been used to exaggerate (intentionally or unintentionally) their own performance. The agents selected to implement policy possessed a better understanding of business conditions and industry practices than principals. The historical record contains no definitive evidence suggesting that the agents employed to implement industrial policy intentionally sought to conceal evidence of poor performance from their principals. Not surprisingly, the industrial policy agents did argue that the policies they had devised and implemented were responsible for favorable turns of events, but not for unfavorable outcomes. Thus, the moderate expansion of the economy and the relative stability of prices that occurred from 1933 to 1935 was attributed to the NRA. Yet, subsequent analysis has shown that the NRA was not effective in either area. Given their own inexpert knowledge, principals had few ways to judge such assertions on the part of their agents, and therefore were not adequately prepared to issue new instructions to correct the defects in industrial policy design. To measure agent performance, principals had to rely on the observed behavior of agents (cor-

ruption, for example, or ability to get along in the bureaucracy) rather than on the efficiency of agents in carrying out their policy assignments.

IV. Rewards and Penalties

The relations between industrial policy principals, primary agents, and secondary agents can be guided, in part, by a system of rules promising rewards for performance or behaviors that exceed expectations, and penalties for substandard performance or malfeasance. Information assembled through the monitoring process ideally is used to operationalize such an incentive system. Two distinct sets of relations and incentive systems occurred in the implementation of industrial policy. Industrial policy principals (the president and congressional committees) operated an incentive system as part of their relations with primary agents—individuals employed by the federal government. The policing of behavior and performance of secondary agents was, in turn, delegated by principals to their primary agents.

Businessmen and others consented to serve as primary agents of industrial policy for many of the same reasons that individuals enter government service today—income, job security, status and prestige, amenities, and power. In addition, the government promoted policy as a chance for active participation in a patriotic fight against an external foe. Another incentive may have been the ability to manipulate the business environment to benefit ones' own industry. All three agencies constructed elaborate codes of conduct for industry, regarding output, wages, prices, material costs, collective bargaining, and investment. All three featured price controls as a key element of policy (minimum prices in the NRA, and maximum in the two wars). Cuff (1973) and Koistinen (1980) agree that the codes and price controls may have favored companies and industries that were well represented in the wartime agencies. Likewise, since truly competitive bidding did not characterize wartime procurement procedures, representation may have helped secure military contracts. Finegold and Skocpol (1984) argue that, while business leaders sought to benefit through participation and representation in the NRA, wide divisions in the ranks of secondary agents prevented success.

The system of agent incentives constructed by principals suffered from important defects. Although senior agency staff were not offered civil-service protection, the president found it difficult to fire, demote, or transfer agents who exhibited substandard performance or behavior. Agents were protected by their close alliances with powerful private-sector interests and congressional leaders, and by the presidents' inability to assemble clear evidence of unacceptable behavior or inadequate performance. In addition, many industrial policy agents possessed divided loyalties—divided between their industries and companies and the principals by whom they had been hired. Agent actions that, implicitly or explicitly, favored an industry or a company over another were frowned on by principals on the few occasions that they came to light. Yet agents could expect to be rewarded by private-sector interests for such actions.

Primary agents were responsible for establishing and maintaining an incentive system for secondary industrial policy agents. In wartime, secondary agents were offered such incentives as cost-plus and/or fixed-price contracts with progress payments prior to delivery, a guaranteed market for their output through government procurement, and production priority schemes that legalized sales in the rationed and shortage-ridden civilian economy. Penalties for misbehavior or substandard performance included the cancellation of procurement contracts, legal action, and inability to secure high-priority assignations. The incentive scheme was not, however, administered in an evenhanded manner. First, primary agents possessed a set of industry-specific contacts that could not encompass all of the companies and produc-

tion facilities in an industry. Thus, imperfect information about production capacity, prices, and other industry characteristics led to the appearance of prejudice in the administration of incentive systems. Second, *regulation by the regulated* did not mean that all of the regulated had an equal voice in the maintenance of self-serving policies. Asymmetries in primary agent representation could have biased policy and served to accentuate pre-existing industry divisions (as small and large firms or single- and multi-plant companies). Third, although incentives existed in regulated civilian markets, industrial policy agencies concentrated their policing in the government-procurement area. The development of a sizable black market during both world wars was one result. Clinard (1969) cites several World War II studies, conducted by the Office of Price Administration, that suggest that 5 percent to 25 percent of civilian foods and gasoline were sold on the black market in 1943 and 1944.

The incentive schemes developed by the WIB, WPB, and their sister agencies were intended to establish "orderly" markets in periods of extremely high demand, by sponsoring industry-by-industry collusion and dampening competition. While the schemes may not have been equitable, neither did they seriously retard government-procurement efforts or transform the entire civilian market into an underground economy. The NRA codes also sought to establish orderly markets, yet the agency was not granted the same degree of legal enforcement power available to the WIB and WPB (even though the wartime agencies' enforcement powers over the civilian economy were little used). In addition, the encouragement of wartime economic collusion was intended to benefit, first and foremost, the government and the military machine. In the peacetime NRA, the benefits were supposed to accrue to those who engaged in collusive activities, with a positive spillover to price and employment levels (objectives of government policy). The NRA could offer few rewards for collusion, and possessed limited ability to enforce discipline among secondary agents. Moreover, NRA policies served to accentuate existing industry divisions, preventing sufficient numbers of secondary agents from buying into the program.

V. Contemporary Industrial Policy Proposals

The current proposals for government intervention in the private economy, under the industrial policy umbrella, contain social and economic objectives quite different from those of the WIB, NRA, and WPB. Nevertheless, the proposals bear a remarkable resemblance to the historical record. Policy is conceived as a broad, coordinated, and highly interventionist attempt by government to manipulate the private economy. The policy-making and implementing agencies proposed today are structured in a nearly identical manner to the agencies of World Wars I and II and the Depression. The similarities between current proposals and the historical record in these and other areas strongly suggest that an industrial policy for the 1980s would not escape from the implementation problems experienced in the first half of this century.

Initiatives frequently proposed by industrial policy advocates would involve the federal government in a wide variety of private decisions normally handled by individual companies, that is, the most "promising" production technologies to pursue in research and development ventures; the most profitable technologies for production; the optimal location of plants; the most effective methods for withdrawing from declining industries; and the proper degree of corporate diversification. Today's federal government is larger and employs more expert civil servants than it did four decades ago. Yet, it may not be any better prepared to make such traditionally private decisions, especially in times of peace.

The technical and administrative skills necessary for informed decisionmaking would force the federal government, acting as principal, to seek qualified agents from the private sector.

The agents would, in all likelihood, have policy preferences that differ from other interested parties, including elected representatives, alternative agents within federal, state, and local governments, and other industry and labor spokespersons. The primary agents of industrial policy in our three historical cases represented a relatively narrow subset of private businesses in each regulated industry, although efforts were made to include the voices of organized labor, government, and the public. Organized labor would play a more influential role in the design and implementation of an industrial policy for the 1980s. Some proponents believe that labor representation will serve as a counterweight to private business executives. Yet, business and labor sentiments often converge, as evident in protectionist trade policies. Such policies are certainly detrimental to U.S. consumers and exporters (see Bryan and Humpage, this *Economic Review*), but these groups are not likely to be well represented among the agents selected to implement industrial policy.

Supportive coalitions for the WIB, NRA, and WPB were forged in times of menacing national crisis. Industrial policy enthusiasts must agree that the U.S. economy is not now facing a similar external threat. The likelihood of developing a broad coalition in a nonthreatening peacetime environment must be considered remote. Nevertheless, policymakers have more time to select objectives and design programs that represent a consensus and are potentially effective. Currently, the industrial policy debate remains confused, with no single approach or goal seemingly acceptable to most advocates. Thus, legislative action at this point would be premature, leading to unclear instructions for agents.

Contemporary industrial policy proposals seek to increase U.S. productivity and enhance the competitive position of U.S. products in the international marketplace. Like the objectives of the WIB, NRA, and WPB, the *value* of policy-induced marginal improvements to society would be indeterminate. Government and its industrial policy agents would face great difficulties in attempts to measure the final physical output of policy. Principals and agents alike would have to settle for crude and intermediate measures of performance that might not have any quantifiable or predictable relation to the ultimate goals of policy.

The absence of effective performance measures will cause difficulties in the design and maintenance of an incentive system for the agents of industrial policy. The application of rewards and penalties might be limited to observable agent behavior (for example, the ability to get along in large bureaucracies) and not related to effective performance in carrying out policy directives. Imperfect information, divided agent loyalties, and asymmetrical agent representation may also make it difficult to gain the trust and compliance of secondary agents, whatever the formal incentive structure.

Good intentions are not sufficient to produce effective public policy. If enacted, a coordinated and interventionist U.S. industrial policy would have to negotiate an arduous obstacle course on the way to delivery. The barriers to effective implementation are not insurmountable: both the WIB and WPB achieved a measure of success. In peacetime, however, the implementation difficulties are likely to be more severe. The arguments and evidence developed in this paper should convince industrial policy advocates and critics that questions of policy implementation are just as important as the content of the policies themselves.

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The authors would like to thank William Gavin, Roger Hinderliter, Edward Weber, Paul Gary Wyckoff, and especially K.J. Kowalewski for their valuable comments throughout the preparation of this article. Diane Mogren provided highly competent research assistance. Any errors that remain, of course, are the responsibility of the authors.

Voluntary Export Restraints: The Cost of Building Walls

by Michael F. Bryan
and Owen F. Humpage

Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offence.

ROBERT FROST

Concerned over the impact of foreign competition, U.S. industries have increasingly turned to elected representatives to seek protective barriers against the flow of imports. Calls for protectionist legislation are intensifying as elections draw near. Proponents of such legislation argue that trade restrictions are necessary to protect U.S. jobs, but protectionist devices usually secure jobs at a substantial cost to consumers and economic efficiency. When building protectionist walls, policymakers should consider the individuals to whom such barriers would likely give offense. The Japanese Voluntary Export Restraint (VER) program, which restricts exports of Japanese cars to the U.S. market, provides a recent example of such a barrier.

This article develops a supply and demand equation for new Japanese cars to estimate the price and quantity impacts of the Japanese VER program. In theory, the impact of a quota, whether voluntary or mandatory, is to raise the price of a good in a given market while reducing sales. Because retail prices for new Japanese cars are not publicly available, we must estimate them. The retail price model consists of dealers' markups over options-adjusted wholesale prices of Japanese cars. The markups vary as dealers adjust their inventory positions to market conditions. This is an important avenue by which pressures from the VER program influence market prices and consequently market sales. Combined with a demand equation, the wholesale price model is simulated under a set of non-VER assumptions, yielding estimates of the price and quantity impacts of the VER program. These estimates enable us to approximate measures of income transfers and efficiency losses associated with the VER program.

The results of our study show that the VER program initially had little impact on the new-car market. By 1983, however, the program added over $1,114 to the options-adjusted price of a new Japanese car, transferred roughly $2.0 billion from consumers of new Japanese cars to producers and dealers, and generated $166.4 million in efficiency

costs. These results are based on a partial equilibrium model that does not consider secondary price effects, that is, the price of substitute cars. While not explicitly considered in this analysis, such effects also could add to the efficiency costs of the program. Separately, we estimate that the VER program "protected" at most 1,500 new jobs for domestic autoworkers.

I. The Framework for Analysis

The Setting for Restraint

Until the mid-1970s, sales of intermediate- and full-sized cars dominated the U.S. auto market. Confronted with rapidly rising gasoline prices and economic recessions, American consumers dramatically altered their automobile preferences in favor of more economical, fuel-efficient models. By 1980, subcompact cars represented the largest component of the U.S. new-car market, accounting for 42 percent (compared with 20 percent in 1975 and 12 percent in 1965). Foreign producers, especially the Japanese, had an apparent advantage in the production of small, fuel-efficient cars and gained a substantial share of the U.S. new-car market during the 1970s.[1] The Japanese market share rose from 6 percent in 1972 to 12 percent in 1978. As the decade closed, the U.S. market contracted: domestic new-car sales fell 29 percent between 1978 and 1980. Japanese sales, however, continued to expand, with the Japanese market share increasing sharply to 21 percent by 1980.

As declining domestic new-car sales idled labor and capacity, the United Auto Workers (UAW) and some of the large domestic car producers began seeking protection from their foreign competitors, especially the Japanese automakers. In June 1980, the UAW petitioned the International Trade Commission (ITC), alleging that imports were a substantial cause of serious injury to the domestic industry and seeking both higher tariffs and quantity restrictions against car imports. Ford Motor Company filed a similar petition in August 1980. The ITC, however, rejected the petitions, finding that imported cars were not an overriding cause of injury to the U.S. car market. Instead, the ITC determined that the U.S. recession and a shift in consumer preferences toward small, fuel-efficient cars were more detrimental to the domestic automobile industry than were imported cars.

Following the ITC's decision, the pressures to limit car imports were aimed more directly toward the Japanese government. Both the Carter and the Reagan administrations, favoring neither legislated quotas nor tariffs, encouraged the Japanese voluntarily to limit their new-car exports to the United States. Neither administration, however, could rule out U.S. legislation, and both the U.S. House of Representatives and the Senate introduced quota legislation in an effort to pressure the Japanese to impose their own limitations. In May 1981, the Japanese government agreed "voluntarily" to limit their car shipments to the United States.

Japan initially agreed to limit car exports to the United States over the three-year period from April 1981 through March 1984; in November 1983, the Japanese extended the agreement through March 1985. In the first year, the agreement limited Japanese car exports to the United States to 1.68 million units, contrasting with sales of 1.75 million units in 1979 and 1.91 million units in 1980.[2] In subsequent years of the program, the VER limitations were to rise by 16.5 percent of the growth experienced in U.S. new-car sales during the previous year. The recession in the United States, however, continued to hamper domestic sales: U.S. new-car sales actually declined from 8.9 million units in the year preceding the VERs to 8.1 million units in both 1981 and 1982. Because the U.S. market failed to grow over the first two years of the VER period, Japanese car limitations remained at 1.68 million units throughout the first three years of the program. Under the current, fourth-year extension of the program, the VER limitations have risen to 1.85 million units.

1. For a summary of studies on the Japanese cost advantage in automobile production, see Loos (1984).

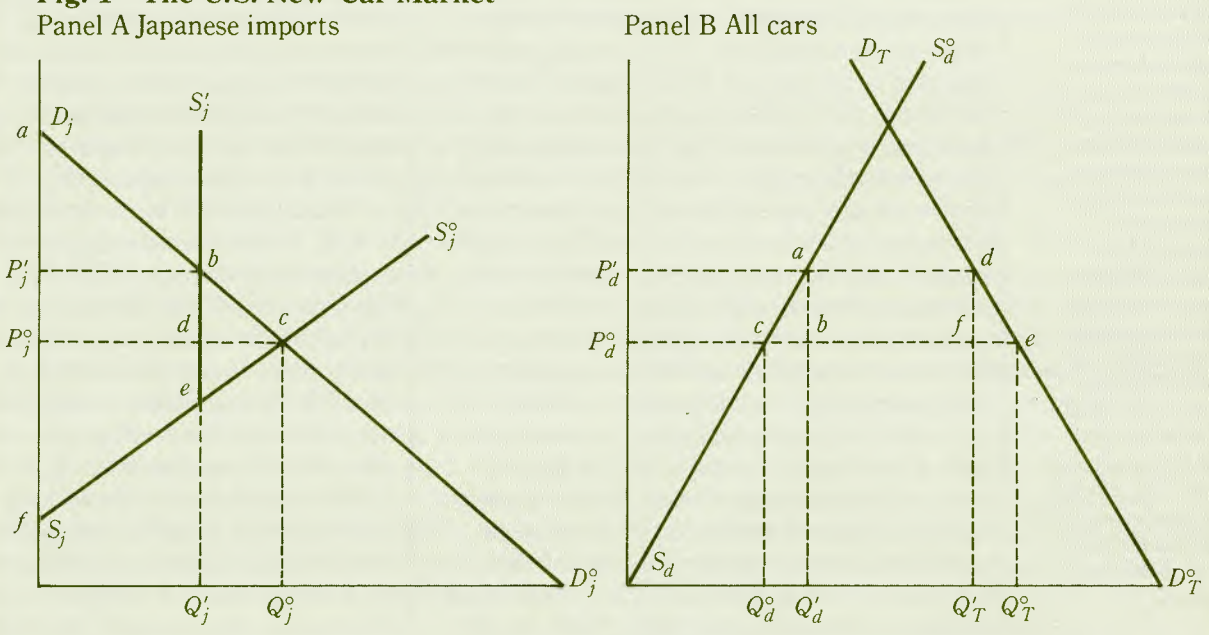
2. The quota figures cited do not include certain car-like vehicles (that is, some four-wheel drive vehicles) that, when included, raise the limitations to 1.76 million units per year in the 1981-83 period and 1.95 million units per year currently.

Theoretical Effects of Trade Restraints

Trade restraints limit the flow of foreign goods into domestic markets and raise the prices of imports, the protected goods, and their substitutes. In doing so, trade restraints transfer real income away from consumers toward domestic producers of the protected good and foreign producers of the restricted good, and create production and consumption inefficiencies. Figure 1 presents a simple, comparative static model of the U.S. market for Japanese cars and helps to illustrate some of the effects of the VER program. The downward sloping line $D_jD_j^\circ$ in panel A is the U.S. demand curve for imported Japanese cars. Assuming that domestic and foreign cars are close substitutes, the import-demand curve is constructed as the horizontal difference between the total U.S. demand curve for all cars $D_TD_T^\circ$ and the domestic supply curve $S_dS_d^\circ$ (see panel B). The import-demand curve $D_jD_j^\circ$ shows the number of Japanese cars that U.S. consumers would purchase at various prices or, conversely, the maximum per-unit price that U.S. consumers would pay for a given quantity of imported Japanese cars. The upward sloping line $S_jS_j^\circ$ in panel A is the supply schedule for Japanese cars exported to the United States. It depicts the number of cars that profit-maximizing Japanese producers are willing to export at any given price, or the minimum per-unit price the Japanese producers must receive to export a specific quantity of new cars. The intersection of the import-demand curve and the export-supply curve determines the price/quantity combination of new Japanese cars imported into the United States. In the absence of VERs, Q_j° Japanese cars are sold in the United States at price P_j°.

To illustrate the effects of the VERs, we rely on the concepts of *consumers' surplus* and *producers' surplus*. For quantities of new Japanese cars less than Q_j°, U.S. consumers are

Fig. 1 The U.S. New-Car Market



where $Q_T^\circ = Q_d^\circ + Q_j^\circ$, and
$Q_T' = Q_d' + Q_j'$

willing to pay a price greater than P_j° as indicated by the demand curve $D_jD_j^\circ$. The triangular area below the demand curve and above the price line, $P_j^\circ ac$, represents a benefit that consumers receive called *consumers' surplus*. Similarly, Japanese producers are willing to supply quantities of cars smaller than Q_j° at prices below P_j° as described by the supply curve $S_jS_j^\circ$. The triangular area $P_j^\circ cf$ below the price line but above the supply curve measures the *producers' surplus*, which accrues to producers as economic rents.

The empirical measures developed in this article are related to consumers' surplus only.[3] The use of consumers' surplus (and producers' surplus) to measure the costs and benefits of trade policies has generated a great deal of discussion among economists (see Currie, Murphy, and Schmitz 1971). One major aspect of the debate centers on the partial equilibrium nature of the model. Our model considers only the Japanese new-car market, but the VER program could have price effects (upward and downward) on many other goods and services. The prices of new cars, domestic and imported from other foreign countries, for example, probably will rise following the VER program. Used-car prices also could rise. Any increase or decrease in consumers' surplus associated with such secondary price effects is relevant to the calculations of the costs and benefits associated with trade restraints. By considering only the Japanese new-car market and assuming that the price impacts in other car markets are small, we have understated the income transfers and efficiency losses associated with the VER program. Many economists also argue that consumers' surplus should be measured under demand curves that are compensated for the income effects of price changes. We have not done so under the assumption that the income effects associated with the VER-induced price increases are small (see Willig 1976). Despite these and other concerns about the use of partial equilibrium models and the concept of consumers' surplus for measuring the effects of trade restraints, the approach has been widely used (see Morkre and Tarr 1980).

Our study views the VER program basically as a quota organized by the Japanese government (see Bergsten 1975). If the Japanese government imposes a quota equal to Q_j' in figure 1, panel A, the U.S. price of Japanese cars will rise to P_j', since this is the price U.S. consumers are willing to pay for Q_j' Japanese cars. The quota effectively shifts the Japanese supply schedule from the diagonal $S_jS_j^\circ$ to feS_j', which becomes vertical at point e. As the price of new Japanese cars rises, some U.S. consumers will switch to new domestic cars. The price of domestic cars will rise and production will increase $Q_d' - Q_d^\circ$, as shown in figure 1, panel B. As the prices of new Japanese and American cars rise, fewer cars in total will be produced and purchased.

By raising the price of imported Japanese cars to P_j', the VER program reduces the consumers' surplus in panel A by an amount given by area $P_j^\circ P_j' bc$.[4] Part of this reduction in consumers' surplus represents an income transfer to Japanese producers from U.S. consumers who continue to buy Q_j' imported Japanese cars at $P_j' - P_j^\circ$ more per car than before the VERs. This income transfer, shown by area $P_j^\circ P_j' bd$, does not represent a loss to the world economy, but it does represent a loss to the U.S. economy, especially in the short run.[5] Although most of the income transferred from U.S. consumers to Japanese producers eventually returns to the United States as foreigners buy U.S. exports and invest in the United States, such transactions could take many years to complete. Even in the long run, the United States could incur a loss if the price of U.S. imports rises relative to the price of U.S. exports because of the VERs.

The second part of the overall reduction in consumers' surplus represents a net loss to both the U.S. and world economies and is given by area *bcd* in figure 1, panel A. Because we constructed the import-demand curve in panel A as the horizontal difference between the total-demand curve and the

3. We measure the welfare effects of the VERs following a competitive model. By organizing the Japanese export market, the VER program could confer on Japanese producers increased oligopoly power. This implies a greater welfare loss than measured in our competitive model.

4. The more inelastic the import demand curve, the greater the reduction in consumers' surplus resulting from the VER program.

5. The manner in which the Japanese administer the VER program determines how the income transferred from U.S. consumers is divided between Japanese producers and the Japanese government. If, for example, the Japanese government simply allocates market shares among its producers, all of the income transfer accrues to the Japanese producers. If, however, the Japanese government elects to sell the rights to export cars to the U.S. market, the government then will capture some of the additional revenue.

6. The more inelastic the Japanese supply curve, the greater the loss in producers' surplus resulting from the VER program.

domestic-supply curve in panel B, the loss depicted by area *bcd* in panel A under the import-demand curve represents the combined losses given by areas *abc* and *def* in panel B. The first of these losses results from greater inefficiency in car production. An increase in domestic production of $Q_d' - Q_d^\circ$ in panel B replaces part of the reduction in Japanese new-car imports. Before the VERs, the Japanese provided these additional units at a total cost of $cbQ_d'Q_d^\circ$, but domestic producers can provide these units only at an additional cost given by area *abc*. This area measures production inefficiencies resulting from the VER program. The second net loss area, *def*, is a loss in consumers' surplus. Because of the VER program, total car purchases have fallen from Q_T° to Q_T', and consumers incur a loss represented by the area *def*. This area represents the consumers' surplus that would have been received from buying these units at a price below their demand schedule (except at the margin).

From an international perspective, area *dce* (figure 1, panel A) also represents a net loss measured in terms of foregone producers' surplus.[6] Japanese producers intially bear this loss. Because this article focuses on the costs of the VER program to the United States, and because we lack sufficient information about Japanese production costs, we do not measure this loss. Nor can we estimate the change in Japanese producers' profits resulting from the VER program. However, we can approximate the change in Japanese producers' net revenues via panel A. Area $P_j^\circ P_j' bd$ represents additional revenues from higher prices on the Q_j' units sold after the VERs are imposed. Area $dcQ_j^\circ Q_j'$ measures the revenue lost because of a reduction in total units sold. The difference between these two areas is the net effect on revenues, and it can be positive or negative, depending on the price elasticity of the import-demand curve. If the demand curve is elastic, Japanese producers will lose revenue as a result of the VER-induced price increases. This revenue estimate provides a link between our model of Japanese new cars and domestic new cars.

In section II of this article, we develop an econometric model to estimate the effects of the VER program on prices of new Japanese cars and on the number of new Japanese cars sold in the United States. Following the theoretical analysis in figure 1, panel A, we can then obtain estimates of the income transfers and efficiency losses associated with the rise in Japanese new-car prices and borne by U.S. consumers. These measures are as follows:

(1) transfers from U.S. consumers of Japanese cars to Japanese producers =

$$(P_j' - P_j^\circ)Q_j';$$

(2) net efficiency losses =

$$\tfrac{1}{2}(P_j' - P_j^\circ)(Q_j^\circ - Q_j').$$

Similarly, we can measure the loss to Japanese new-car manufacturers as

(3) change in Japanese producers' revenue =

$$[(P_j' - P_j^\circ)Q_j'] - [P_j^\circ(Q_j^\circ - Q_j')].$$

The empirical model departs from the theoretical model presented in figure 1, as it introduces into the analysis the role of U.S. dealers of Japanese cars. (A theoretical discussion of dealers appears in section II.) The measures of the consumers' surplus loss described in figure 1 remain basically the same except that we calculate the income transfers to Japanese producers using the change in wholesale prices; we estimate the income transfer to U.S. dealers of Japanese cars using the change in the dollar value of dealers' margins, and we calculate the efficiency loss borne by U.S. consumers using the change in the transactions price of new Japanese cars. With the introduction of U.S. automobile dealers into the analysis, we also broaden the measure of revenue lost to include both Japanese producers and U.S. dealers.

The Quality Adjustment Phenomenon

Before turning to the empirical section, we should consider the possibility that the VER program could alter the quality composition of Japanese cars. If quality improvements occur, measures of the income transfers and efficiency losses associated with the VERs will be overstated since price changes will reflect greater product services in addition to economic rents. This section considers theoretical arguments for believing that quality upgrading occurs as a result of the VERs.

When faced with trade restraints on import quantities, foreign manufacturers often upgrade the quality of their products in an attempt to maintain profits in the restricted market. The effect has been observed in the markets for imported textiles, footwear, dairy products, steel, and, recently, Japanese cars.[7] Quotas, specific tariffs, and VERs are examples of such quality-altering trade restraints. Trade restraints based on the value of imports do not promote quality upgrading. The theoretical literature offers two explanations for the quality-upgrading phenomenon (see Feenstra 1982).

One explanation of quality upgrading involves changes in the specifications of a single, narrowly defined commodity that primarily reflects the response of foreign producers to trade restraints (see Rodriguez 1979 and Santoni and Van Cott 1980). According to this view, an imported good consists of a bundle of characteristics appealing to consumers. A car, for example, provides transportation, comfort, and aesthetic appeal. A VER limits the physical quantity of an imported good, not the composition and amounts of other characteristics embodied in the product. Foreign suppliers, facing quantity restraints, have a strong incentive to upgrade and increase the unrestrained attributes of their product. In the car example, VERs limit the amount of transportation that Japanese producers can sell in the U.S. market, but not the amounts of comfort and aesthetic appeal that they provide. The quality of imported Japanese cars should increase in response to the VERs.[8]

The second explanation of quality upgrading involves a shift to a better grade of merchandise within a broad product category, largely reflecting adjustments to restraints from the demand side of the market (see Falvey 1979). Consider a Japanese car market consisting of two models that are close, but not perfect, substitutes. The models differ in terms of quality and options, and their prices reflect these differences. Following Feenstra (1982), the basic and higher-quality Japanese cars will have unit production costs of C_1 and C_2, respectively, such that C_1 is less than C_2. In the long-run competitive equilibrium with no restraints, the following condition holds:

(a) $P_1 = C_1 < P_2 = C_2$,

where P_1 and P_2 are the respective car prices. Under a VER program, the prices of both cars will rise to P_1' and P_2', respectively. At the margin the profit-maximizing manufacturer will produce the car yielding the highest return, ensuring that at the new equilibrium

(b) $P_1' - C_1 = P_2' - C_2$.

Substituting from equation 1 yields

(c) $P_1' - P_1 = P_2' - P_2$.

The profit-maximizing producer will raise the prices of both cars by the same dollar amount, but this implies a reduction in the price of the more expensive car compared with the price of the less expensive car:[9]

$$\frac{P_2'}{P_1'} < \frac{P_2}{P_1}.$$

Under some rather restrictive assumptions about the own-price and cross-price elasticities for the car models, a larger proportion of the expensive cars will be sold (see Falvey 1979, pp. 1106–8). Even though the VERs reduce the overall quantity of new Japanese

7. See Santoni and Van Cott (1980), Falvey (1979), and Feenstra (1982) for references and examples.

8. When the restraint is based on value, such as an ad valorum *tariff, the incentive to upgrade quality does not exist. Quality increases raise the value of the product and would raise the import duty by a proportional amount under an* ad valorum *tariff. There is no advantage in this case to improving quality.*

9. In contrast, a restriction based on the value of imports such as an ad valorum *tariff would raise the price of each car by the tariff rate, θ,*

$P_1' = P_1(1 + \theta)$,

and

$P_2' = P_2(1 + \theta)$.

Relative prices would not change:

$$\frac{P_2'}{P_1'} = \frac{P_2(1 + \theta)}{P_1(1 + \theta)}.$$

cars, the proportion of more luxurious car imports will rise.

The income transfers and efficiency losses associated with VERs when quality upgrading occurs are less than those associated with VERs when quality remains unchanged (see Feenstra 1982, p. 14). When quality upgrading occurs following the imposition of trade restraints, the observed price increases include both the rents resulting from artificial restraints in the marketplace and the costs of the improved quality. In measuring the welfare effects of VERs, price increases attributable solely to quality improvements in the restricted goods can be excluded, as these do not reduce consumers' economic well-being.

II. The Model

We estimated a supply and demand model for the Japanese new-car market in the United States. Unfortunately, data on retail (transactions) prices of new Japanese cars, necessary to estimate the two equations, are not available. As did earlier researchers, we found ourselves in the unenviable position of having to construct a measure of transactions prices from available wholesale price data.

In this section, we envision a price-setting process whereby new-car transactions prices consist of three components: wholesale cost, constant markup (reflecting overhead costs), and variable markup (reflecting temporary shortage or surplus in the marketplace). In addition to the wholesale price, we assume that the variable markup is a major channel of transmitting VER influence into the marketplace. The signal by which U.S. dealers recognize changing market conditions, and consequently adjust variable margins, is provided by dealers' inventory pressures.

In our analysis we first built an inventory model of new Japanese cars from which we derived a ratio of desired to actual Japanese new-car inventories. This ratio is the crucial (and admittedly tenuous) link to the variable margin component. Next, we formulated a wholesale cost equation, where the dealer cost of cars is a function of unit sales, the bundle of car options, and the dollar/yen exchange rate. Using a two-stage least squares regression technique, we estimated models of wholesale prices and Japanese new-car demand with quarterly data over an eight-year period (1976:IQ to 1984:IQ).

The Basic Framework with Inventories

The quotas on new cars from Japan restrict imports rather than sales. Given the existence of inventories, sales of Japanese cars need not directly equal imports.

(1) Japanese sales = imports from Japan − change in inventory stocks.

As a result, the degree to which quotas bind the marketplace and generate consumer price increases depends on the state of inventories over the period. In 1981, sales of new Japanese autos (and utility vehicles) exceeded the quota by 21,000 units.[10] Over the same period, inventories of new Japanese cars fell 34,000 units. Did the first year of the quotas influence Japanese new-car prices? Only insofar as the quotas forced dealers' inventories below desired levels, which respond to overall economic conditions. Just prior to the VER program, for example, U.S. interest rates reached unusually high levels and the auto market was in a state of cyclical contraction. U.S. dealers of Japanese cars could have intentionally liquidated inventory stocks in response to the declining market environment. If the inventory corrections that occurred in 1981 were adjustments to desired levels and not quota-induced, the VER program would be nonbinding, having no price, quantity, or related effects. The initial task, therefore, is to measure actual Japanese new-car inventories relative to a desired inventory position.

Virtually all new-car inventories are held by independently owned dealerships that

10. This figure is a rough estimate. In any given year, the number of vehicles actually arriving in the United States need not equal the number of vehicles exported from Japan because of a shipping time lag. A small number of vehicles not covered by the 1.68-million unit limit (for example, some four-wheel drive vehicles, which have a separate quota) are included in sales data. The VERs do not include Japanese cars shipped to the United States via another country, which may also cause a slight data discrepancy.

compete in a highly competitive marketplace where inventory stocks and retail prices adjust rapidly to market conditions. If an overstock of inventories exists, new-car dealers will lower prices, thus stimulating sales; if inventories fall below desired levels, dealers increase retail prices. Such a market-clearing process has important implications to our analysis, implying that the transactions prices of new cars are tied to dealers' inventory positions and that transactions price patterns can deviate from wholesale new-car price patterns.

Inventories and variable dealers' margins in the market-clearing process allow the dealers' supply curve, S_d (the *effective* short-run market supply curve), to deviate from the manufacturers' supply curve, S_m, over short periods of time (see figure 2). To illustrate, imagine that foreign manufacturers are in a state of equilibrium in that they import an amount equal to consumer demand into the domestic market. Such a state could be represented by point A in figure 2. The dealer is in a state of equilibrium in that inventory stocks are at desired levels. In such a case, the retail price of the product, P_1, is equal to the wholesale price plus a constant dealers' margin. Suppose that demand in the marketplace suddenly surges from D_1 to D_2. Inasmuch as increased foreign imports require a substantial lead time for delivery from a foreign manufacturer, sales in part will be maintained by an "undesired" inventory liquidation at the dealers' level: the dealers experience inventory shortages. Dealers are induced into the shortage condition because of higher margins (or dealers' rents) as consumers bid up the existing price of the product in short supply (represented as the difference between P_1 and P_2). A short-term equilibrium is achieved at point B in figure 2, where the dealers' supply curve intersects the market demand curve. However, this is only a temporary equilibrium, since competition and manufacturers' pressure will tend to increase dealers' supplies. Shipments are made by the foreign manufacturer, and dealers restock inventories to desired levels. Consequently, the dealers' supply curve travels along the manufacturers' supply curve (S_d to S_d') as the level of imports is increased, and a more lasting equilibrium is reached at point C. Here, dealers are again earning no economic rents, while manufacturers are selling more of the foreign product at higher wholesale prices. Retail prices in the final equilibrium, P_3, are higher than the initial retail price, P_1, but lower than the retail price immediately following the demand shift, P_2.

The existence of inventories can dramatically change the standard supply-constraint analysis shown in figure 1 to an environment more accurately resembling that in figure 3. Notice that, in situations where the existence of inventories is significant, the supply curve of the restricted product does not become vertical until inventories are zero. That is, the point at which the market supply curve becomes fully binding, S_1, is lengthened by the amount of the inventory stock, S_1 to S_2. Indeed, the temptation is to argue—erroneously—that import restrictions need never be binding as long as inventories exist. Imagine that in the current period we are at equilibrium with respect to inventory stocks, or the dealers' supply curve intersects the manufacturers' supply curve at current unit sales levels, represented by point A in figure 4. Notice that this equilibrium sales quantity is also equal to the level of imports from the manufacturer, since only if unit sales match imports will actual inventories equal desired inventories. Next we institute a limit on imports such that they cannot exceed the level designated by the current unit sales level. If demand increases such that unit sales exceed the quota, undesired inventory liquidations occur, and dealers earn rents (figure 4, point B). Inasmuch as the quota prevents further shipments from a foreign country, the dealers' supply schedule is essentially

fixed to the intersection of the manufacturers' supply curve at point A. Over time, as inventories are depleted and approach zero, the vertical supply constraint, S_2, collapses leftward toward the import quota, S_1 (figure 5). Likewise, as the vertical supply constraint converges on the import quota constraint, the dealers' supply curve becomes more vertical, and, in the limit, the dealers' supply curve becomes vertical at the quota level. Eventually, the market will settle in a quota-induced equilibrium at point D.

Fig. 2 Inventories and Supply

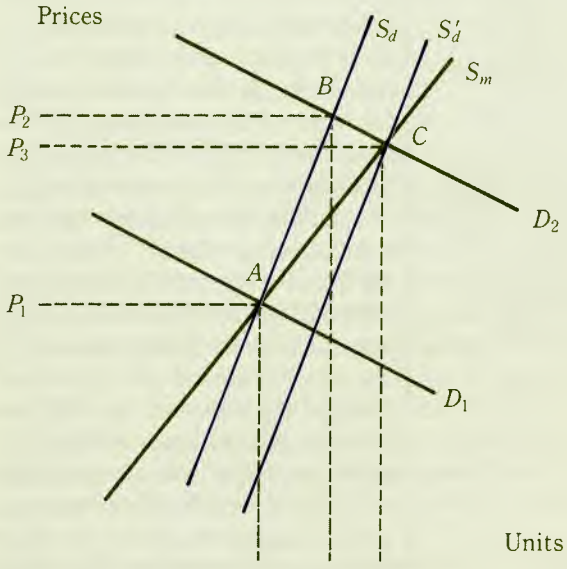


Fig. 3 Inventories and VERs

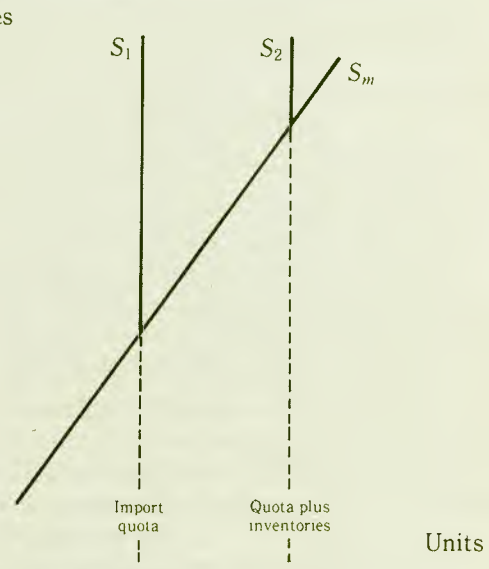


Fig. 4 Short-run Equilibrium

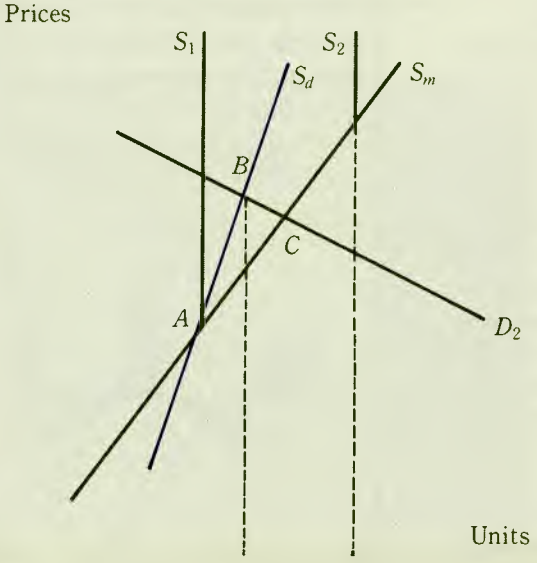
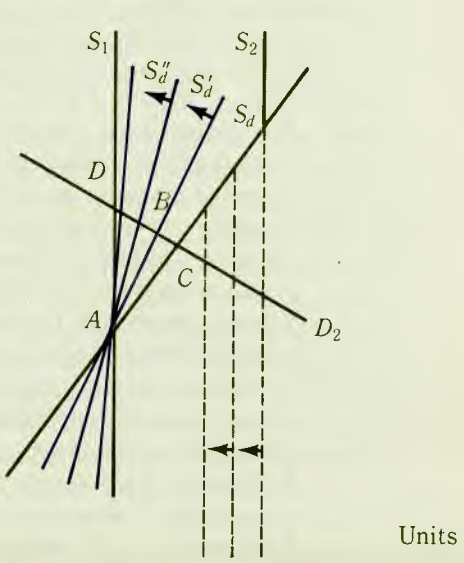


Fig. 5 Long-run Equilibrium



11. *See appendix for a detailed description of the variables used in this article.*

12. *Although many alternative functions were estimated, all yielded strikingly similar results.*

The Inventory Model

Irvine (1979) has demonstrated that monthly models of dealers' new-car inventory behavior outperform similarly specified quarterly models. Inventory adjustments at the dealers' level proceed rapidly, and, consequently, adjustments between desired and actual dealers' inventory holdings often occur within a matter of months. That is, inventory disequilibrium in the absence of constraints does not persist over long time horizons. For this reason, we have chosen to specify a Feldstein/Auerbach target-adjustment inventory model that allows rapid inventory adjustment to a relatively slowly changing, desired inventory target (Feldstein 1976). This inventory model hypothesizes that dealers' inventories are equal to a desired inventory position plus a fraction of the unanticipated dealers' sales forecast error and a random error (see Feldstein 1976, p. 369).

$$(2) \quad I_t = I_t^* + \theta(S_t^e - S_t) + e_t,$$

where

I_t = actual unit inventories in period t,
I_t^* = desired unit inventories in period t,
S_t = actual sales in period t,
S_t^e = dealers' sales expectations in period t.[11]

Dealers hold inventories for many different reasons. Primarily, dealers hold a desired level of inventories to provide an immediate supply to the retail market and to meet a continuous demand for sales between periodic deliveries from a foreign manufacturer. These inventories must further allow for a sufficient variety of models to satisfy alternative consumer preferences. As sales increase, dealers' inventory holdings should increase. Inventories also involve costs to the dealers in terms of wholesale price and borrowing expenses. These costs tend to offset the sales influence on the dealers' desired inventory positions. Therefore, following Irvine (1979, p. 3), we specify a dealer's desired inventory position as a linear function of sales and the real cost of holding inventories, or

$$(3) \quad I_t^* = a_1 S_t + a_2 S_t C_t,$$

where

C_t = real marginal inventory holding cost during the current quarter.

Substituting equation 3 into equation 2 and dividing through by sales, we can estimate new-car inventory behavior in quarters-supply form. A nonseasonal, quarterly model was specified to isolate the influence of seasonal fluctuations in new-car inventories that eventually translate into seasonally sensitive transactions prices.[12] The equation was estimated over the non-VER period, 1975:IQ to 1981:IQ, using second-order serial correlation correction. The t-statistics are in parentheses. The estimation horizon does not include the VER period, since we expect that the quotas may have artificially prevented actual new-car inventories from maintaining a "desired" level and consequently precipitated a long-term inventory shortage. Since we do not have an accurate measure of the VER influence on inventories, estimating a Feldstein-Auerbach inventory specification over the full time horizon runs the risk of biasing the regression results. The estimated inventory equation was

$$I_t/S_t = \underset{}{1.51} - \underset{(3.27)}{0.055}C_t + \underset{(0.72)}{0.132}(S_t^e - S_t)/S_t$$
$$- \underset{(3.63)}{0.23}DQ2 - \underset{(3.80)}{0.31}DQ3 + \underset{(1.32)}{0.08}DQ4$$
$$+ \underset{(9.75)}{1.217}RHO1 - \underset{(3.50)}{0.753}RHO2,$$

($DW = 1.90$, $R^2 = 0.72$, $SEE = 0.162$, $F = 9.78$).

13. After adjusting for the first-quarter seasonal dummy, the constant value is 1.39.

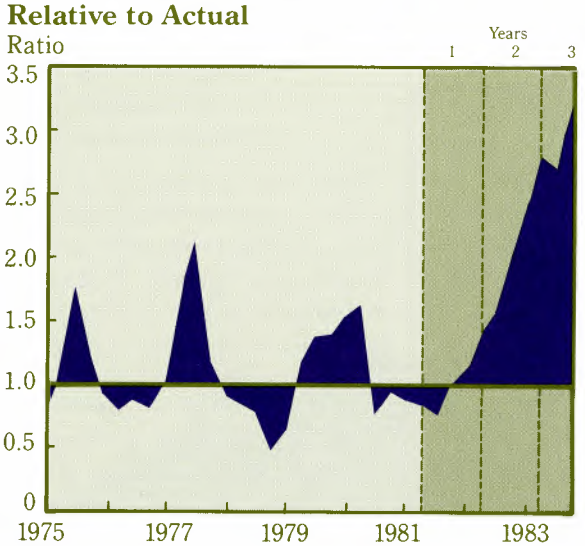
14. The presence of a strong seasonal pattern can also account for some of the serial correlation detected in this equation, inasmuch as these dummies are only a crude approximation of what may be a much more complex seasonal influence.

The results of this model were encouraging in coefficient values and fit, but discouraging because of the presence of second-order serial correlation. Many factors can generate serial correlation. Our primary concern is that we may have omitted a determinant of new-car inventory behavior. One possible omission, found in Irvine (1979), is a price expectation variable that enters into the inventory cost component. Dealers can hold inventories in anticipation of future price increases that would yield capital gains on new-car stocks. Attempts to capture such a "speculative" auto inventory behavior using various expected inflation measures were all unsuccessful. However, the existence of serial correlation may simply be a consequence of a desired inventory level that displays a tendency toward inertia. Indeed, the significant, but small, value on the cost variable suggests that target inventory levels adjust quite slowly to changes in inventory-holding costs. The constant term is significantly larger than 1, which implies that dealers maintain an inventory buffer against random fluctuations in sales.[13] The high coefficient also could reflect holdings of a mix of model types. The presence of large and highly significant dummy coefficients (*DQ*2, *DQ*3, *DQ*4) indicates a strong seasonal pattern in the automobile market. Relative to sales, auto inventories are most plentiful during the first half of the model year (IVQ and IQ), while inventories relative to sales dramatically decline during the third quarter as manufacturers make the transition to new models.[14] Although further research may result in superior inventory specifications, the econometric model presented here is consistent with previous auto inventory analysis.

From these estimates, we calculated the dealers' desired inventory-to-sales position. The desired dealers' inventory-sales ratio can be expressed as a ratio of total inventories to sales, yielding a quarterly measure of new-car inventory pressure called *SHORT* (that is, $SHORT = I^*/I$). As the ratio increases (or decreases) from 1, a shortage (or surplus) of inventories develops at the retail level. Figure 6 shows the estimated quarterly fluctuations of desired Japanese dealers' inventories relative to actual inventories over the 1975:IQ to 1984:IQ period.

In the pre-VER period, the series accurately illustrates quarters that experienced substantial inventory shortages or surpluses. For example, between the second and third quarters of 1975, a shortage of domestic subcompacts, combined with surging gasoline prices, fueled a mini-sales boom in the Japanese new-car market. Consequently, actual dealers' inventory positions temporarily strayed from desired levels. After showing equilibrium in inventories for the earlier quarter, the shortage variable rose to a value of 1.74 in 1975:IIIQ, or desired dealers' inventories of Japanese cars were approximately 74 percent above actual levels. The index fell to 1.23 in the following quarter. In mid-1977, an unexpected, record-producing surge in Japanese new-car sales created another inventory shortage: the shortage variable rose from 1.01 in 1977:IQ to 1.70 in 1977:IIQ to 2.06 in 1977:IIIQ. By 1977:IVQ, the shortage virtually

Fig. 6 Desired Dealer Inventories Relative to Actual



disappeared, and the ratio of desired inventories relative to actual inventories remained at 1.17.

Using the non-VER inventory model, we calculated inventory shortages over the VER period, attributing any inventory shortage to the effects of the VER program. These estimates suggest that a meaningful shortage of Japanese cars at the retail level did not exist during the VERs' first year, as the beginning of the program coincided with a cyclical decline in Japanese new-car sales and relatively high U.S. interest rates that induced dealers to liquidate their desired inventories. According to our estimates, an overstock of Japanese new-car inventories existed at the dealers' level, on average, throughout the first year of the VER program. Although more binding during their second year, the VERs were weakened as the market for new Japanese cars continued to deteriorate during 1982. Inventories deviated substantially from desired levels by year-end 1982, however, and during the third year of the VERs the Japanese new-car market experienced unprecedented shortages.

The Price Model

Data on the dealers' (wholesale) costs of new Japanese cars are readily available, but there are no publicly available data on Japanese new-car transactions prices. We have attempted to specify the relationship that ties these two price series together. The link between the wholesale cost to dealers and the market price ultimately paid by consumers depends on dealers' margins. As a transactions price proxy, earlier analyses have used wholesale price data (dealers' cost of new cars) adjusted by a constant dealers' margin (see Feenstra 1982; Carlson 1978; and Carlson and Umble 1983). However, in an environment where dealers play an important role in the market-clearing process (that is, under conditions where inventories are highly volatile and wholesale prices are not), a constant margin model may fail to reflect the underlying price mechanism. We have augmented the constant margin model to allow for two dealers' margin components: (1) a long-run margin (or marginal costs at the dealers' level), and (2) a short-run margin (or the dealers' rents), as shown in equation 4.

$$(4) \quad P_j = V \cdot M \cdot R,$$

where

P_j = transactions price of new Japanese cars,
V = wholesale value of new Japanese cars (in dollars),
M = 1 + marginal cost margin,
R = 1 + dealers' rents.

The long-run equilibrium margin, M, was constructed by using 1 plus the average annual markup of Japanese cars (dealers' cost vs. list price); over the 1977 to 1984 period, this markup averaged 16.8 percent.[15] The short-run margin, R, was assumed to be a function of short-run market conditions, or the relative shortage of dealers' inventories, as specified in equation 5:

$$(5) \quad R = (SHORT_{t-1})^k,$$

where

k = price adjustment parameter that determines degree to which inventory disequilibrium generates transactions price changes.

This specification is appealing because it allows undesired fluctuations in inventories to translate into the price variable, as described in figure 2. We maintain the competitive property of no long-run dealers' rents, since desired dealers' inventories tend toward actual inventories over time (in the absence of supply constraints). As a matter of empirical convenience, this specification allows us to substitute the inventory shortage variable into the demand equation as a proxy for fluctuations in dealers' margins—the missing link in the transactions price specification.

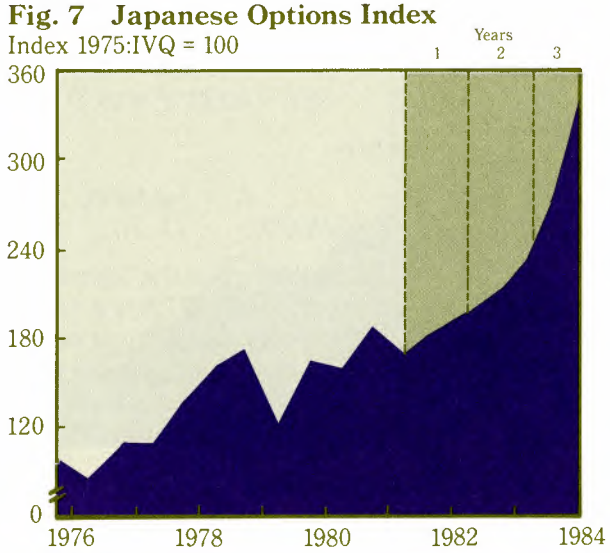
15. The equilibrium, or trend, markup was calculated using annual data found in Consumer Reports *(April issues, 1977 through 1983). The markup represents the percentage difference between dealers' costs and list prices of a sales-weighted composite of Japanese models.*

This is not to say that dealers are assigned all of the market-clearing responsibility. Indeed, there exists a manufacturers' supply function, which makes it necessary to estimate a wholesale price equation that is responsive to market conditions. As a result, our wholesale price model includes a sales variable in an effort to capture the influence of market demand on Japanese new-car prices.

Also embedded in the wholesale price data are changes in product quality. As discussed in section I, if product quality changes are significant, studies that fail to adjust for the influence of these changes on the price variable will necessarily bias the estimated price elasticity. As a proxy for such quality shifts, we constructed an index of five Japanese new-car options (automatic transmissions, power steering, air conditioning, sunroof, and audio systems), using data from *Ward's Automotive Reports* (see appendix). The historical pattern of the Japanese options index is shown in figure 7.

The Japanese options index has risen considerably since its 1975 base year, with a strong underlying trend. It is likely that the trend increase in the quality index simply reflects a maturing product life cycle. The Japanese entered the new-car market as a low-margin, high-volume competitor. Having succeeded in this market, the Japanese subsequently expanded the boundaries of their market influence. After 1982, the second year of the VER program, the options index rose noticeably above its historic trend rate of increase, suggesting further that the VER program had little impact in the marketplace during its initial years. Beyond 1982, as inventories of new Japanese cars sharply tightened, the options index rose substantially faster than trend.

Fig. 7 Japanese Options Index



Our wholesale price model also accounts for fluctuations in the dollar/yen exchange rate, which influences the wholesale price of Japanese cars to U.S. dealers. That is, as the dollar/yen exchange rate rises, the dollar wholesale price of new Japanese cars will rise, other things being equal. The resulting wholesale price model is shown in equation 6:

$$(6) \quad VJ72_t = f(SALES_t, OPTION_t, YEN_t),$$

where

$VJ72_t$ = real wholesale cost of new Japanese cars,
$SALES_t$ = per capita Japanese new-car sales, in units,
$OPTION_t$ = Japanese options index,
YEN_t = dollar/yen exchange rate.

The Demand Model

The final step in our modeling process involves the specification of the demand equation. Since Chow's seminal work in 1957, auto demand models have been cast in a stock-adjustment framework, where sales are a function of the difference between desired and actual auto stocks (called *new demand*) and auto stocks of the last period (called *replace-*

16. The two-stage estimation procedure used in this analysis is the Fair estimator with serially correlated errors. The computer program we used was PEC 9.1 (Jon K. Peck, PEC (Program for Econometric Computation), Version 9.1, Yale University, March 1982). Care should be used when interpreting the t-statistics, as the standard errors are not exactly correct. For a thorough discussion of the procedure, see Fair (1970).

17. An alternative procedure would have been to estimate the equation over the non-VER period and forecast out of sample through 1984:IQ. Because of the small sample problems that already exist, this alternative did not appear feasible.

ment demand). Desired stocks are determined generally by relative prices, real income, and demographics.

$$(7) \quad S_t = f(K_t^* - K_{t-1}) + d(K_{t-1}),$$

where

f and d = functional forms,
S_t = sales of new cars in current period,
K_{t-1} = stock of cars in previous period,
K_t^* = desired stock of new cars in current period.

and

$$(8) \quad K_t^* = f(P_t, GAS72_t, Y72_t, HH_t),$$

where

P_t = price of new cars relative to rate of inflation,
$GAS72_t$ = weighted operating costs of cars relative to rate of inflation,
$Y72_t$ = real per capita permanent income,
HH_t = U.S. civilian, noninstitutional population.

Unfortunately, the stock-adjustment approach does not lend itself easily to this analysis, as data on auto stocks are available on an annual basis and therefore limit our ability to estimate the impacts of an import-restraint program that has been in effect since April 1981. As in many auto-demand studies, we instead chose to estimate directly per capita new-auto sales as a function of desired stock explanatory variables: real price (specified in equation 4), real operating cost, and real income.

$$(9) \quad SALES_t = f(P_{jt}, GAS72_t, Y72_t),$$

where

$SALES_t = S_t/HH_t$,
P_{jt} = relative price of new Japanese cars.

Estimation

Given the wholesale price model of equation 6, and having specified the transactions price mechanism in equation 4, we can estimate the supply and demand equations for the Japanese new-car market. The equations were estimated using two-stage least squares with first- and second-order serial correlation correction.[16] The estimation period was 1976:IQ to 1984:IQ.[17]

$$(10) \quad LVJ72_t = \underset{(2.24)}{4.63} + \underset{}{0.10LSALES_t} + \underset{(4.46)}{0.19LOPTION_t} + \underset{(2.42)}{0.27LYEN_t} + \underset{(5.82)}{0.96RHO1} - \underset{(1.96)}{0.32RHO2},$$

$(DW = 2.21,\ R^2 = 0.98,\ SEE = 0.027,\ F = 590.0).$

$$(11) \quad LSALES_t = \underset{(1.17)}{-4.84} - \underset{}{1.31LVJ72_t} - \underset{(2.07)}{0.17LSHORT_{t-1}} + \underset{(1.26)}{0.60LGAS72_t} + \underset{(2.15)}{7.54LY72_t} + \underset{(3.21)}{0.53RHO1} - \underset{(1.95)}{0.32RHO2},$$

$(DW = 1.92,\ R^2 = 0.65,\ SEE = 0.132,\ F = 13.2).$

where

L = log form,
$SHORT_{t-1} = I_{t-1}^*/I_{t-1}$.

The coefficient on the log-adjusted wholesale-price variable ($LVJ72$) is a direct estimate of the own-price elasticity of new Japanese cars, -1.31; the coefficient on the log markup variable ($LSHORT$) represents this price elastic-

ity times the dealers' rents adjustment, k.[18] Our price elasticity estimate is slightly larger than that found by Carlson (1978) for subcompact and compact cars and slightly smaller than that found by Carlson and Umble (1983) for compact cars.[19]

The other components of the Japanese new-car demand model conform to our expectations and to the results of other auto-demand studies. As nearly all auto-demand studies find, real permanent income is the primary determinant of new-auto sales. The Japanese market is no exception. In addition, the cost of operating cars has a positive influence on Japanese new-car purchases. Carlson (1978), Carlson and Umble (1983), and Tishler (1982) had similar findings for the subcompact and compact new-car markets.

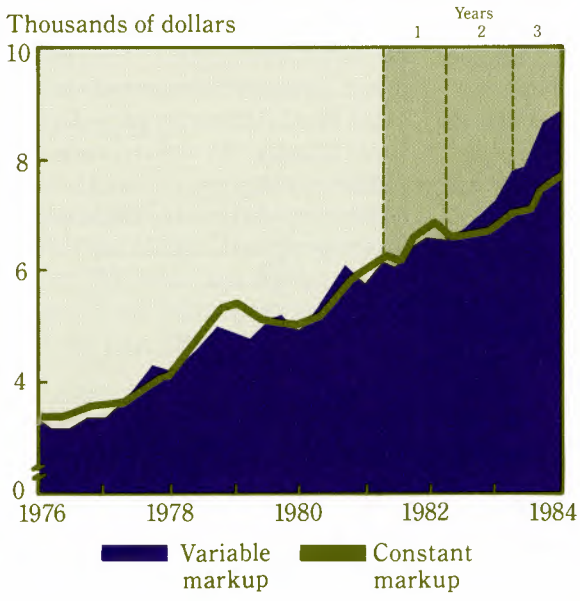
III. The Results

Model Simulations

Our final task is to simulate the wholesale price and demand equations under a set of non-VER assumptions to speculate on the quantity and price combinations that would have resulted in the absence of the program. These simulations are highly dependent on our assumptions concerning non-VER market conditions and thus should be viewed with a measure of caution. However, each assumption was made to allow for the *maximum* price and quantity impacts on the system. In the price equation, we assume that, in the absence of the VERs, the options index would have maintained its 1981:IVQ value throughout the 12-quarter VER period.[20] In the demand equation, we assume that dealers' inventory positions would have maintained an equilibrium ratio of 1 over each of the VER years.[21] The results of these simulations are shown in table 1. According to our simulations, in its first year the VER program had virtually no effect on the U.S. automobile market. The options-adjusted transactions prices of new Japanese cars increased by only $11 per unit because of the restrictions, primarily reflecting a rise in wholesale prices. Dealers did not significantly raise their markups following the VER program; they experienced an overstocked inventory position prior to the VER program that lasted halfway through the program's first year. The VERs consequently

18. Remembering that the price specification is $P_j = V \cdot M \cdot R$, the estimated price elasticity is the coefficient on the log of P_j, or, in this instance, $\beta_0 \ln P_j = \beta_0(\ln V + \ln M + k \ln SHORT)$. Our estimate of k, the sensitivity of Japanese inventory shortages on transactions prices, is 0.133. (An estimate of 0 suggests that inventory shortages play no role in the price-setting process, while an estimate of 1 suggests that percentage changes in shortages generate equal percentage changes in transactions prices.)

Fig. 8 Japanese New-Car Prices



Although we use real, options-adjusted prices throughout the estimations, nominal unadjusted price estimates have been included in figure 8 to show the behavior of actual consumer prices over the VER period and to compare these with the price estimates found in a constant markup model. The variable margin specification yields an average price that seasonally fluctuates around the constant markup price variable throughout the non-VER period. As VER-related shortages develop in the marketplace though, the constant markup price measure fails to register meaningful increases compared with the dramatic acceleration in prices estimated by our approach. For example, our estimates suggest that the average price of a new Japanese car during 1983 was approximately $8,315, while a constant markup approach would yield an average price of $7,385.

lowered sales by only 4,000 units during the first year, a negligible amount for a market in which sales averaged approximately 1.8 million units in the previous two years.

During the second year of the VER program, transactions prices increased $273 as dealers experienced more sizable inventory shortages. Most of this increase reflected dealers' markups, as wholesale prices of new Japanese cars increased $51. Unit sales fell 78,000 during the second year of the VER program. With the U.S. economic recovery under way in 1983, the VER impact on prices intensified; transactions prices rose $1,114. Again, most of the options-adjusted price increases reflect dealers' markups ($956), compared with an options-adjusted wholesale price increase of $158. As a result, unit sales fell 299,000 units between 1983:IIQ and 1984:IQ.

The total, three-year loss in consumers' surplus resulting from the VER-induced increase in Japanese new-car prices was approximately $2.7 billion (see table 2). Most of the loss was experienced in 1983, when the program was most binding on the U.S. market. Of this total amount, $2.6 billion represents a transfer of purchasing power to producers and dealers of Japanese cars from U.S. consumers who continue to buy Japanese cars at artificially high prices. Approximately 80 percent of this income transferred to U.S. dealers of Japanese cars and does not represent a net loss to the United States. Japanese producers received the remaining $401 million. Although most funds eventually will return to the United States via world trade, such a return would be a long-term phenomenon. Because of the VERs, the prices of U.S. imports could rise relative to the prices of U.S. exports, producing a loss to the United States. Of the total reduction in consumers' surplus, we attribute $177 million to increased inefficiencies in production and foregone consumption opportunities, also representing a loss to the United States.

We also measured the net change in revenues accruing to the Japanese automobile producers and U.S. dealers because of the VERs. Over the three-year period, Japanese producers and U.S. dealers lost $125 million in revenues because of the VER program; higher prices on the units sold did not generate enough revenue to offset a reduction in volume, because the import demand curve is elastic. Without knowledge of Japanese cost curves, however, we do not know how these revenue reductions translate into profit performance.

Impact on the U.S. Market

Using the estimates obtained from the Japanese auto demand model, we can speculate about the *largest* possible effects of the VER program on the number of U.S. cars produced and the number of U.S. workers hired. A fairly standard assumption in the literature on automobile demand is that the overall price elasticity of demand for new cars equals 1. This implies that the total amount of revenue spent on new cars does not change overall. As an extreme case, we assume that any revenue not spent on new Japanese cars is spent on other new cars. We further assume that revenue not spent on new Japanese cars is spent entirely on new U.S. subcompact cars. This is an overestimate, as consumers would spend some of this revenue on new non-Japanese foreign cars and on compact or full-sized American cars. Dividing this revenue transfer by the average price of a new subcompact American car, we obtain a rough estimate of the additional units of new U.S. cars produced. Following this procedure, we determined that the VER program increased U.S. car production by 399 units in 1981, 3,444 units in 1982, and 16,768 units in 1983 (see table 3).

Having estimated the units produced, we can determine the associated employment effects using assumptions about labor productivity and average hours worked. Table 3 shows the total hours necessary to produce the additional units, adopting a U.S. Congress (1982) estimate that it takes 200 man-

19. Carlson (1978) found a price elasticity of 0.82 for the subcompact new-car market and 1.21 for the compact market. Carlson and Umble (1983) found the price variable to be insignificant in the subcompact market, with a compact new-car price elasticity of 1.47.

20. In fact, it is quite likely that the Japanese would have continued some options upgrading in light of such a strong trend component. This result would tend to decrease the influence of the VERs in the simulations.

21. Because the "glut" experienced in the Japanese new-car market in 1981 conceivably could have been more severe without the VERs, these simulations may understate the VERs' influence. However, observation suggests that such severe surpluses are rare; the possibility of a more dramatic surplus in 1981 is remote. It is possible that the glut was in part VER-induced, if manufacturers attempted to build inventories in anticipation of a shortage that never fully materialized.

hours to produce one subcompact car in the United States.[22] We estimate that the VER program stimulated an additional 79,800 production man-hours during its first year, 688,800 hours in 1982, and 3.4 million hours in 1983. The link between our hours estimates and actual employment gains is uncertain, as additional hours may be distributed among the existing workforce. As a conservative estimate, we can assume that the average hours worked per U.S. autoworker remain unchanged as a result of the export restraints, in which case additional U.S. employment can be determined using the average hours worked per U.S. autoworker. We estimate that VERs increased U.S. automobile employment by 38 workers in 1981, 328 in 1982, and 1,492 in 1983. This compares with indefinite layoffs of 250,000 U.S. autoworkers at the industry's 1982 employment trough. Because these employment estimates are based on our model's results, they too are small relative to the findings of the other studies cited.

22. The man-hours estimate refers to autoworkers and workers in directly related industries (see U.S. Congress 1982).

Table 1 Impacts of VERs on Prices and Quantities of New Japanese Cars

	1981	1982	1983
Dealer cost, in dollars			
With VERs	5,479	5,759	6,294
Without VERs	5,469	5,709	6,137
Difference	10	51	158
Percent change	0.2	1.1	2.6
Transactions price, in dollars			
With VERs	6,284	6,941	8,282
Without VERs	6,273	6,668	7,168
Difference	11	273	1,114
Percent change	0.2	4.1	15.5
Unit sales estimates, in thousands			
With VERs	1,962	1,829	1,831
Without VERs	1,966	1,908	2,130
Difference	-4	-78	-299
Percent change	-0.2	-4.1	-14.0

NOTE: Annual data are derived from quarterly estimates and may not sum exactly because of rounding errors. Years correspond to VER years, beginning in the second quarter of the current year and running through the first quarter of the subsequent year.

These employment gains do not represent net benefits to the United States because of the VER program, especially in the long run. As discussed earlier, the U.S. revenue gains represent a transfer from consumers to domestic producers and workers. These funds now remain in the United States and increase jobs in the automobile industry, but this does not necessarily imply a net increase in U.S. employment in the long run. Most funds sent abroad to pay for Japanese imports eventually return to the United States as foreigners buy U.S. exports. In the long run, any gains in auto industry employment because of the VERs must be compared with possible losses in U.S. employment among export-oriented industries. The net result depends on the decline in exports and the relative intensity of labor in the production functions of these two industries. Such comparisons are beyond the scope of this article, but gains in autoworker employment should not be labeled as net benefits in the absence of such comparisons.

Results in Perspective

To the best of our knowledge, ours is the only study that considers the effects of the VER program over its first three years. Moreover, it is difficult to compare our results with those of other studies, because of methodological differences (see Crandall 1984; Feenstra 1982; Gomez-Ibanez, Leone, and O'Connell 1983; Stuchlak, Shickman, and Pochiluk, Jr. 1983; and Wharton 1983). Our results show substantially weaker first-year effects than other studies but a large impact by 1983. Two factors seem to distinguish our results from those of earlier studies. Unlike other researchers (except Feenstra), we adjusted wholesale prices for options. As discussed earlier, studies that fail to adjust for options will overstate the impact of the VER program on prices and measures derived from prices. We also introduced the role of inventories into the analysis. This should dampen

the estimated impacts of VERs, especially in 1981 and 1982, relative to the results of studies that implicitly assume no inventories.

Table 2 Income Transfers and Efficiency Losses Associated with VERs
In millions of dollars

	1981	1982	1983	Total
Total consumers' surplus loss	21.6	510.8	2,206.4	2,738.8
Income transfers				
To Japanese manufacturers	19.4	92.6	288.8	400.8
To U.S. dealers	2.2	407.5	1,751.2	2,160.9
Total	21.6	500.1	2,040.0	2,561.7
Efficiency loss	0.0	10.7	166.4	177.1
Market revenue loss	2.3	21.3	101.7	125.3

NOTE: Annual data are derived from quarterly estimates and may not sum exactly because of rounding errors. Years correspond to VER years, beginning in the second quarter of the current year and running through the first quarter of the subsequent year.

Table 3 Impacts of VERs on U.S. Autoworker Employment

Output, hours, or employment	1981	1982	1983
Revenues lost by Japan, dollars	2,300,000	21,300,000	101,700,000
U.S. average subcompact price, dollars	5,768	6,184	6,065
Additional U.S. supcompact production, units	399	3,444	16,768
Additional U.S. production hours	79,800	688,800	3,353,600
Average annual man-hours per worker	2,125.9	2,103.8	2,247.7
Additional U.S. auto employment	38	328	1,492

NOTE: Annual data are derived from quarterly estimates and may not sum exactly because of rounding errors. Years correspond to VER years, beginning in the second quarter of the current year and running through the first quarter of the subsequent year.

Feenstra and Gomez-Ibanez, Leone, and O'Connell provide sufficient description to make some useful comparisons with our results. After adjusting for inflation, Feenstra observes that the average import price of new Japanese cars rose 8.4 percent in 1981. He provides a detailed explanation of quality upgrading and concludes that 5.3 percent of the observed price increase reflects VER-induced quality adjustments. The remaining 3.1 percent increase is the VER-induced rents component of the price rise. Assuming own-price elasticities for Japanese automobile services of 2 and 3, Feenstra estimates that 1981 sales of Japanese cars fell 220,000 units and 277,000 units, respectively. The resulting gains in U.S. autoworker employment were 5,600 and 11,100 workers, respectively. After adjusting for the influence of quality, Feenstra calculates that the consumers' surplus loss was between $322 million and $327 million in 1981 under his respective elasticity assumptions. Feenstra also examines the effects of VERs under the assumption of an inelastic own-price demand for Japanese automobile services (0.9). In this case, sales of Japanese cars would have fallen (123,000 units); total revenues spent on Japanese cars would have risen. Consequently, U.S. new-car sales would have *declined* 5,300 units and U.S. autoworker employment would have *fallen* by 600 workers. The total loss in consumers' surplus for the inelastic scenario equaled $314 million.

Gomez-Ibanez, Leone, and O'Connell constructed a model of the U.S. market to measure the effects of the VER program that did not include a quality-adjustment allowance or an inventory influence. Instead, they divided the U.S. market into basic small cars (Japanese and all others), luxury small cars (Japanese and all others), and traditional cars. The researchers simulated their model, which is not specific to a particular year, under alternative assumptions about the overall strength of the U.S. new-car market and different price/quantity reactions to the VER program from domestic car producers. The case of a weak U.S. market (total new-car sales of 8.8 million units) and both price and quantity responses from U.S. manufacturers

seems the most representative of the actual market environment.[23] In this case, the VERs raised Japanese new-car prices 2.6 percent per year and reduced Japanese new-car sales in the United States 6.7 percent per year. U.S. car production rose 0.5 percent, and U.S. autoworker employment increased 6,500 workers. Gomez-Ibanez, Leone, and O'Connell estimated that the loss to consumers in all segments of the market was $566 million per year.

IV. Conclusion

International trade theory demonstrates that artificial barriers against imports raise prices of traded goods, transfer income from consumers to producers, and create production and consumption inefficiencies. This article has illustrated these effects for the case of the Japanese VERs on new-car imports to the United States. The results of our empirical analysis are tentative approximations because of the small size of our sample and the unavoidable difficulties of estimating structural models. Given the partial equilibrium nature of our analysis, the costs of the VER program could be greater than we have estimated.

Our results suggest that in its initial year the VER program had little effect on the U.S. market for Japanese cars and did not appreciably create new auto-industry employment in the United States. At the time, inventories of new Japanese cars were overstocked because of weakening new-car demand and high-inventory carrying costs. With the U.S. economic recovery under way in 1983, inventory shortages at the dealers' level became extreme. According to our partial equilibrium estimates, the VER program so far has cost the United States approximately $2.7 billion in lost consumers' surplus. The VER program is an expensive way to increase U.S. auto industry employment. Such expensive walls for the U.S. auto industry surely must give offense to U.S. consumers.

Appendix

S =
Japanese new-car sales are measured nonseasonally adjusted in thousands of units (data from *Ward's Automotive Reports*). The sales data include *captives* (Japanese new cars sold by U.S. manufacturers), since the captive market is included in the VERs. Regardless, the captive share of the Japanese new-car market historically has been quite small (less than 5 percent). Per capita auto sales, *SALES*, were found by dividing unit sales by the total U.S. civilian, noninstitutional population.

S^e =
sales forecast variable, S_t^e, is derived from a specification similar to that found in Irvine (1979):

$$S_t^e = S_{t-4} + S_{t-4}(S_{t-1} - S_{t-5})/S_{t-5}.$$

I =
inventories are nonseasonally adjusted, measured in thousands of units, from *Ward's Automotive Reports* (quarterly data, 1974 to 1984).

VJ72 =
nonseasonally adjusted wholesale price index of Japanese cars was obtained from the Bureau of the Census, *U.S. General Imports: Schedule A, commodity by country* (FT135). The price was determined by dividing the total customs value (c.i.f.) of new Japanese cars and utility vehicles, including shipping costs to the port of entry (c.i.f.) by the volume of Japanese new-car imports. The average, nominal wholesale price was deflated, using the implicit price deflator for personal consumption expenditures.

Y72 =
the income variable used in this analysis was real permanent income, calculated as the fitted quarterly values of real disposable income regressed against four years of lagged values. The income variable was generated in per capita form, using the total U.S. noninstitutional civilian population.

23. Actual new-car sales were 8.1 million units in 1981, 8.0 million units in 1982, and 9.2 million units in 1983.

C72 =
real marginal costs of new Japanese car inventories was calculated as the product of real dealer new-car costs (*VJ72*) and the nonseasonally adjusted 90-day commercial paper rate, i, or

$$VJ72 \cdot i.$$

OPTION =
the options index was calculated with the following equation:

$$\text{Index} = \sum_{i=1}^{5} W_i \cdot O_i,$$

where the weights, W_i, were determined according to each options 1980 list price relative to the total options package costs:

	W_i
Automatic transmission	0.174
Power steering	0.087
Air conditioning	0.283
Sunroof	0.348
Audio system	0.108
	1.000

The options data, O_i, represent the percentage of each option installed in Japan relative to total Japanese imports. Data on options installations are available semiannually over the 1975 to 1983 period. The index was then linearly interpolated to create a quarterly time series.

GAS72 =
for an approximate measure of Japanese car operating costs, we generated an index of average car operating expenses relative to the total consumer price index (CPI). The components of the CPI include gasoline (weight = 0.66), auto insurance (weight = 0.18), and auto repairs (weight = 0.16). Each weight was determined by the component's relative importance in the CPI (December 1982). Ideally, a variable that also captures operating efficiency differences between Japanese and domestic subcompacts would be useful. Data that would allow such comparisons are not readily available. Indeed, it is unclear that significant operating cost differences between the two markets exist.

YEN =
the dollar/yen exchange rate is nonseasonally adjusted.

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Working Paper Review

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Dollar Intervention and the Deutschemark-Dollar Exchange Rate: A Daily Time Series Model

Working Paper 8404.
September 1984. 28 pp. Bibliography.

In March 1973, the major industrialized nations abandoned the Bretton Woods fixed-exchange-rate system. Observers have characterized the subsequent exchange-rate regime as a *dirty float*. While the major industrialized countries generally have allowed fundamental market forces to determine their exchange rate, they periodically have bought and sold foreign exchange to influence the market outcome. The volume and frequency of exchange-market intervention have varied greatly among the developed countries.

Economists have questioned the efficacy of foreign-exchange-market intervention, especially if intervention is divorced from monetary policy (sterilized) and especially if exchange markets are highly efficient. An emerging consensus holds that sterilized intervention has no lasting impact in foreign-exchange markets and cannot be used to supplant the impact of such market fundamentals as relative money-stock-growth rates, inflation rates, or interest rates. Researchers, however, have not rejected the possibility that sterilized intervention has a short-run or temporary impact on exchange rates.

In this working paper we develop a simultaneous time-series model to investigate the daily interactions between U.S. exchange-market intervention and the deutschemark-dollar exchange rate. Such an investigation involves answering two questions. How does the Federal Reserve System react to exchange-rate movements? How does the exchange rate respond to intervention? By incorporating both a morning-opening and an afternoon-closing deutschemark-dollar quote, and by assuming that U.S. intervention occurs only during the interim, this study attempts to interpret the direction of causality between contemporary exchange-rate movements and intervention. The model divides U.S. intervention into dollar purchases or sales of deutschemark and dollar purchases or sales of all other currencies to capture both the direct and cross-rate effects of intervention. The model also includes an aggregate measure for the intervention of the other large developed countries. Using autoregressive integrated moving average (ARIMA) techniques, we estimate the model from November 2, 1978, to October 31, 1979, a period of frequent, often heavy intervention.

The model indicates that, on average over the period investigated, U.S. intervention reacted without a lag to unanticipated changes in the morning-opening exchange rate in a manner consistent with a *leaning-against-the-wind* strategy. Such a strategy would tend to dampen exchange-rate fluctuations if it were capable of altering the exchange rate in the appropriate direction. The results, however, do not indicate that intervention, on average over this period, was effective in changing the exchange rate in the desired direction. The coefficients on the intervention terms suggest that U.S. and foreign intervention accentuated movements in the afternoon-closing exchange rate. The size of the effect, however, was very small.

The seemingly perverse exchange-rate response could be rational from the perspective of private exchange-market participants. Foreign-exchange speculators could view central-bank support for a currency as underscoring that currency's fundamental weakness, and they could react by selling that currency. Moreover, the experiment's failure to find the expected exchange-rate response to intervention could result because the volume of intervention was too small relative to the volume of daily exchange-market transactions or because the influence of daily intervention deteriorates too quickly to be detected by the closing quote.

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