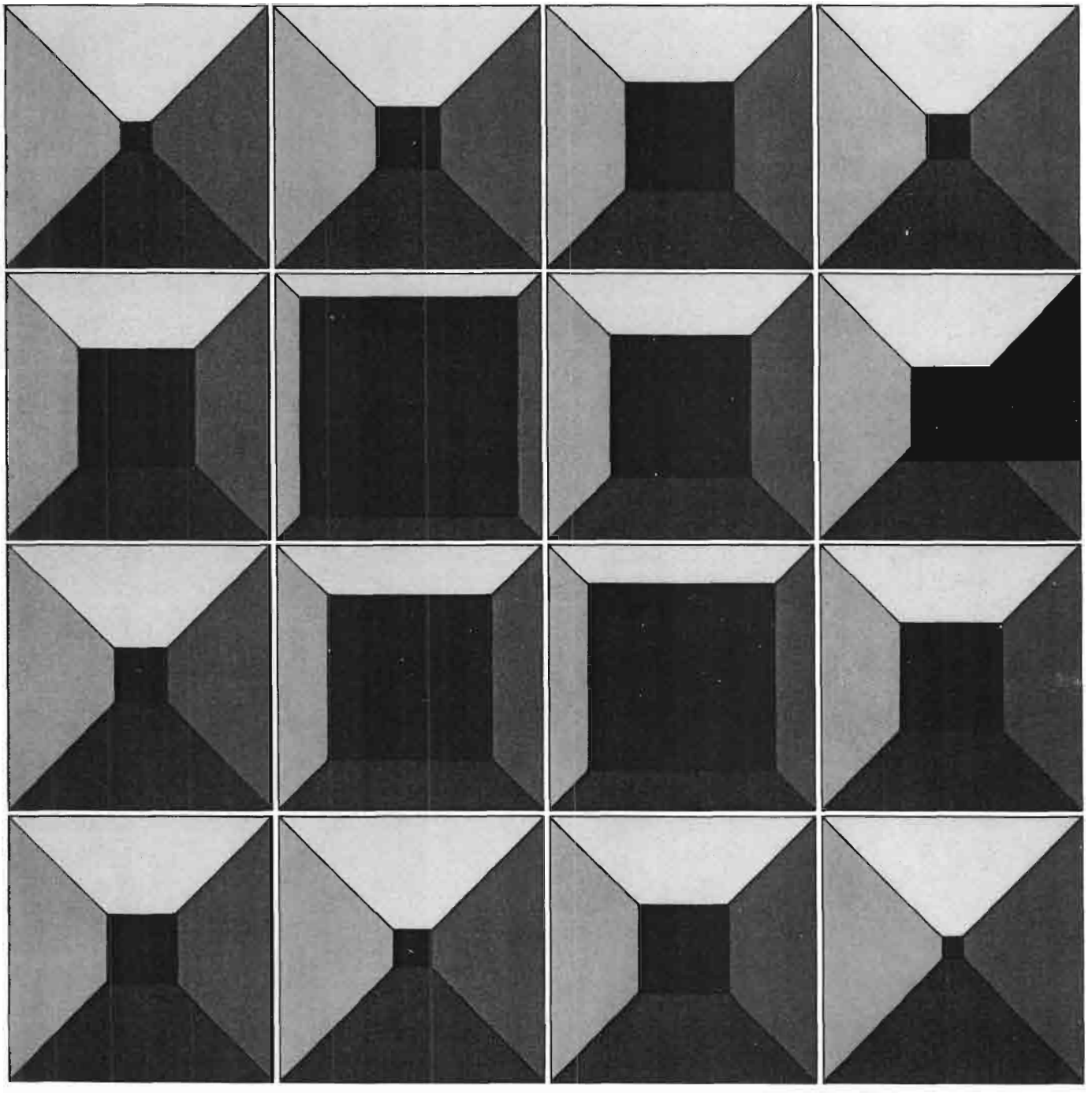
A CBO STUDY

The Effects of Import Quotas on the Steel Industry

July 1984

Congress of the United States
Congressional Budget Office



THE EFFECTS OF IMPORT QUOTAS ON THE STEEL INDUSTRY

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PREFACE

The Congress is now considering legislation (S. 2380 and H.R. 5081) that would impose a quota on steel imports. In response to a request from the Subcommittee on Trade of the House Ways and Means Committee, the Congressional Budget Office (CBO) has prepared this evaluation of the proposed quota and its effects on the steel industry and the economy. The report updates and expands testimony delivered to the subcommittee on June 20, 1984. A subsequent study for the subcommittee will examine other policy options available to address conditions in the steel industry. In keeping with CBO's mandate to provide objective analysis, this report makes no recommendations.

The report was written by Louis L. Schorsch of CBO's Natural Resources and Commerce Division, under the supervision of David L. Bodde and Everett M. Ehrlich. The econometric simulations were directed by Thomas J. Lutton. Theresa Dailey provided valuable research assistance. The author wishes to thank Janet North, of the American Iron and Steel Institute, for promptly providing up-to-date statistics. Comments on early drafts of the report were received from Joseph Spetrini and Linda Ludwig of the Department of Commerce and James Collins of the American Iron and Steel Institute. The manuscript was prepared for publication by Kathryn Quattrone, Deborah Dove, Betty Jarrells, and Philip Willis, and was edited by Francis Pierce.

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Director

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CONTENTS

CONTENTS (Continued)

TABLES

37-748 O - 84 - 2

TABLES (Continued)

FIGURES

SUMMARY

The imposition of a five-year, 15 percent quota on steel imports, as called for in H.R. 5081 and S. 2380, would increase prices, output, and employment in the domestic steel industry but would generate offsetting losses in the rest of the economy. The quota would release substantial sums for investment in the domestic steel industry, although it is questionable whether this would suffice to raise investment to the level that the industry claims is necessary to restore its competitiveness. Moreover, there is little prospect that the quota would reverse the secular decline in the industry, since it does not address the underlying factors that have conditioned this decline.

CONDITION OF THE U.S. STEEL INDUSTRY

The industry is currently emerging from very depressed conditions in 1982 and 1983, the worst years of the postwar era for U.S. steel producers. In 1982, the industry operated at less than 50 percent of capacity. Shipments and production were lower than at any time since the late 1940s. These conditions precipitated substantial layoffs and industrywide operating losses of about $2.5 billion. Production increased somewhat in 1983 but not enough to offset the 1982 downturn. Financial losses continued at the 1982 pace, and roughly 10 percent of the industry's capacity was permanently retired. During 1983, the industry employed only 60 percent of the labor force it had engaged in 1979. These conditions were exacerbated by record levels of import penetration, amounting to over 22 percent of domestic steel consumption in 1982 and over 20 percent in 1983.

The industry showed significant improvement in the first few months of 1984, and most steel firms are likely to be marginally profitable in this year. But employment has not increased greatly and imports continue to claim roughly 25 percent of the U.S. market. Moreover, the most recent data suggest that the steel market has again weakened during May and June.

Changes in market conditions do not hit all steel producers with the same impact; the U.S. steel industry is not monolithic. The industry comprises three distinct sectors: integrated producers, specialty steel producers, and "minimills." The brunt of the 1982-1983 downturn was borne by the integrated producers, such as the United States Steel Corporation and Bethlehem Steel Corporation. Although these firms have traditionally dominated the industry, their market share has been shrinking since at least

1960. In contrast, minimills have increased their share of domestic steel production from about 3 percent in 1960 to almost 20 percent today. These firms, which use a different technology, have been highly profitable and highly competitive against both domestic integrated and foreign producers. While minimills were adversely affected by recent weak market conditions, the long-term prospects for this sector are good. Minimills provide the clearest evidence that the industry is undergoing a significant restructuring rather than a uniform decline. They are particularly well adapted to the underlying forces that have shaped the U.S. steel market during the postwar period: relatively slow growth in domestic steel consumption, significant technological changes, and the gradual shift of global steel production and consumption away from the United States.

The record levels of import penetration in 1982 and 1983 have led to major efforts on the part of U.S. steel producers (particularly the integrated firms) to achieve some trade restrictions. Since January 1982, the industry has used U.S. trade laws to file a large number of countervailing duty (anti-subsidy) and anti-dumping cases with the International Trade Commission (ITC). In the fall of 1982, these cases led to an arrangement with the European Community, effectively limiting imports from that region to slightly more than 5 percent of U.S. steel consumption. Other countries, such as Japan, have voluntarily restrained their steel exports to the United States, while several trade cases (particularly against steel producers in developing countries) have been filed with the ITC.

The principal thrusts in the drive to limit steel imports, however, have been the legislative effort to restrict imports to 15 percent of the U.S. steel market (H.R. 5081 and S. 2380) and the "201" case filed with the ITC by the Bethlehem Steel Corporation and the United Steelworkers of America. (Section 201 of the 1974 Trade Act allows the President to restrain imports--even if fairly traded--provided the ITC finds that imports have been a substantial cause of injury to a domestic industry.) Like H.R. 5081, the steel 201 case, as originally filed, sought to limit imports to 15 percent of the U.S. steel market. The ITC ruled for the petitioners in five of the nine product categories covered in the case, accounting for over 70 percent of U.S. steel shipments. The ITC has recommended the imposition of five-year quotas for most of these products, supplemented by tariffs for semifinished shapes and wire products. The President must now decide how to handle these cases. H.R. 5081, on the other hand, represents a more sweeping program of steel import restraints than would be provided through the 201 process.

H.R. 5081's EFFECTS ON THE STEEL INDUSTRY

CBO has developed a model of the steel industry that makes it possible to estimate the approximate effects of the proposed 15 percent quota on steel imports. Projections generated by this model suggest that the quota might have the following effects:

- The average price of steel consumed in the United States would increase by about 10 percent.
- Domestic steel prices would be roughly 3 percent higher in the first year of the quota and roughly 7 percent higher in the fifth year.
- The price of imported steel would be roughly 34 percent higher in the first year of the quota and roughly 24 percent higher in the fifth year.
- U.S. steel consumption would decrease between 4 and 5 percent.
- Domestic steel shipments would increase by about 6 percent.
- Steel-industry employment would increase by 6 to 8 percent.
- The quota would transfer between $1.7 billion (in the first year) and $4.5 billion (in the last year) to the domestic steel industry in the form of pretax profits.
- The quota would transfer between $2.3 billion and $1.9 billion annually to foreign steel producers, presuming the U.S. government did not seek to capture this sum through auctioning off import licenses or similar measures.

For steel firms and steel workers, therefore, the quota would have a positive effect. Output and employment would increase, as would steel-industry revenues. H.R. 5081 includes a provision requiring steel firms to invest "substantially all of the cash flow generated by the steel sector" in steel operations. Since the quota would increase steel firms' pretax profits, it would increase cash flow and, according to the bill's provisions, generate an increase in steel investment. Since cash flow hinges on the tax status of individual firms, it is impossible to project accurately the increase in investment that would occur as a result of the quota. But given reasonable assumptions concerning future tax liabilities, it appears that the quota might raise steel industry investment by $1.5 billion to $2.5 billion annually (in 1983 dollars).

37-748 O - 84 - 3

EFFECTS ON OTHER SECTORS AND ON THE ECONOMY AS A WHOLE

The price increases generated by the quota would affect the U.S. economy's overall performance. For industries that consume large amounts of steel, these effects could be substantial.

The Economy as a Whole. According to one study, the projected 10 percent increase in the average steel price would increase the producer price index for intermediate materials by up to 0.65 percent in the first year of the quota. 1/ Some indication of the quota's inflationary impact can be inferred from the fact that during 1983 the producer price index for intermediate materials increased by 1.8 percent. It is difficult, however, to translate a 0.65 percent increase in the producer price index for intermediate materials into a corresponding increase in the Consumer Price Index or in the implicit price deflator for the gross national product. Presumably, a 10 percent increase in steel prices would have a smaller effect on more general indexes of inflation.

Steel-Consuming Industries. A 15 percent steel quota would lead to losses in employment and output, as well as higher prices, in steel-consuming industries, offsetting the benefits it would create in the steel industry. The quota's effects would be particularly injurious to steel-consuming industries that face international competition, especially since U.S. steel prices are already roughly 20 percent above prevailing world prices. Should foreign countries retaliate against the imposition of a steel quota by restricting a similar value of U.S. exports, the quota's net effect on U.S. employment and output would be negative and substantial.

Consumers. Finally, the quota would impose costs on U.S. consumers (except those who work in the steel industry). While these losses are difficult to estimate, they would approximate the total transfer of income to domestic and foreign steel producers and related efficiency losses. The quota would entail efficiency losses of approximately $0.9 billion per year. When added to the income transfers that occur as a result of the quota, this suggests that a 15 percent steel quota would cost U.S. consumers (outside the steel sector) between $4.3 billion and $5.9 billion, in 1983 dollars, for each of the five years the quota was in effect. These costs would rise over the duration of the quota.

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1. David J. Cantor, "Effects of Hypothetical Increases in Steel Prices on the Producer Price Index for Intermediate Materials, December 1983-December 1984," Congressional Research Service, April 2, 1984.

OTHER CONSIDERATIONS: RESTRAINTS ON IRON-ORE IMPORTS AND IMPLEMENTATION

H.R. 5081 would also limit imports of iron ore to 25 percent of projected domestic supply. In recent years, U.S. iron-ore imports, particularly from Canada, have accounted for roughly 30 percent of U.S. supply. U.S. iron-ore reserves are poorer than those found in countries such as Australia and Brazil. As a result, U.S. ore costs are substantially above those incurred by the world's low-cost iron-ore producers. Even allowing for transportation and associated costs, domestic steel producers relying on U.S. iron ore are at a competitive disadvantage compared with those using imported ore. Similarly, high U.S. iron-ore costs represent a significant disadvantage for U.S. producers facing competition from foreign steel producers. This provision in H.R. 5081, therefore, would work against the bill's underlying goal of improving the competitive performance of the U.S. steel industry.

H.R. 5081 might prove extremely difficult to implement. In particular, several aspects of the bill might raise significant administrative problems. It would require the Secretary of Commerce to develop highly product-specific forecasts of steel consumption and to allocate projected product-specific import tonnages among a large number of countries. It would also require the Secretary of Commerce to monitor steel-industry investment plans, but is not specific as to the criteria that would guide this monitoring. Finally, the costs of H.R. 5081 could be higher than those discussed above if the elimination of import competition allowed domestic integrated producers to reduce the level of competition in some product lines.

CHAPTER I. INTRODUCTION

The domestic steel industry is currently emerging from the most severe market downturn of the postwar era. In 1982, steel production and shipments fell to levels not experienced since the late 1940s, while capacity utilization dropped to levels reminiscent of the Great Depression. Market conditions continued to be very weak in 1983. The effects of this downturn were compounded by record levels of imports and by the fact that no boom period intervened between the steel industry downturns of 1980 and 1982-1983.

The direct consequences of the 1982-1983 downturn were both severe and predictable. Employment in the industry dropped precipitously; in 1983, steel-industry employment was less than 60 percent of the 1979 level. Many of those laid off are unlikely to return to work in the steel industry. Steel firms also experienced unprecedented financial losses. If the costs of permanently closing facilities are included, gross annual losses in steel production approached $5 billion in both 1982 and 1983. As a consequence, capital expenditures fell far below the levels that the industry sees as needed to maintain or improve its competitiveness. Finally, the severe conditions in 1982-1983 forced major reductions (about 10 percent) in capacity.

Indirectly, the 1982-1983 experience is likely to speed the structural changes that are occurring in the steel market. In particular, many of the traditional integrated firms are restructuring, closing outmoded facilities, targeting investment, abandoning product lines in which they are uncompetitive, investigating merger opportunities, and seeking closer relations with foreign producers. The other sectors of the industry were much less debilitated by weak market conditions, thus enhancing their positions within the industry and their long-term market prospects.

The downturn in the steel industry is a direct result of economic recessions in the United States and the rest of the industrialized world. The decline in world demand, together with high dollar exchange rates, have placed the domestic steel industry under increased pressure from foreign competition. Imports reached a record 22 percent of domestic consumption in 1982. The depressed conditions in the steel industry, in part a result of sales lost to foreign producers, have led to legislative proposals to restrain imports (H.R. 5081 and S. 2380).

These bills are meant to provide the industry with temporary relief from foreign competition so that it can modernize to become more competitive. Proponents are willing to accept the price increases that the bill would generate on the grounds that the quota would reverse the longstanding decline in the competitiveness of the American steel industry.

H.R. 5081 and its companion bill, S. 2380, would establish highly product-specific restrictions on steel imports into the United States. H.R. 5081 would restrict total steel imports to 15 percent of U.S. steel consumption and empower the Secretary of Commerce to enforce the quota by imposing allowable import levels on countries and regions that export steel to the United States. The quota would last for five years, although the President could extend it for three additional years without Congressional approval. In addition, H.R. 5081 would limit iron-ore imports to 25 percent of total U.S. iron-ore supply. The bill also contains a reinvestment condition requiring the steel companies to reinvest substantially all of its added cash flow from the steel sector in steel operations during the period in which the quota is in effect.

This report assesses the likely economic effects of the 15 percent quota that H.R. 5081 and S. 2380 would establish. It looks not only at the direct effects of such a quota but also at the background of the U.S. steel industry's current difficulties. In addition, it discusses the industry's longer-term prospects and the extent to which H.R. 5081 and S. 2380 could alter those prospects.

Chapter II describes the various components of the U.S. steel industry and depicts the market conditions faced by the industry over the past decade. In the main, the statistics presented in Chapter II are drawn directly from primary data concerning output, employment, import levels, profitability, and so on. The chapter also presents various estimates of the cost competitiveness of U.S. producers relative to their principal foreign competitors. The chapter concludes with an assessment of the principal long-term trends that affect the U.S. steel market.

The specific goals and provisions of H.R. 5081 and S. 2380 are described in Chapter III. CBO's estimates of the economic effects of a 15 percent quota on steel imports, both in the steel market and in the economy as a whole, are given in Chapter IV. That chapter also discusses the bills' proposed restriction on iron-ore imports, the problems of implementing the quota, and the possibility that import restraints could lead to market abuses by the domestic industry.

CHAPTER II. THE U.S. STEEL INDUSTRY: CURRENT CONDITIONS AND HISTORICAL BACKGROUND

This chapter depicts current conditions in the U.S. steel industry as well as the historical background to the industry's difficulties. Before turning to these issues, however, it describes the three sectors that make up the industry.

THE COMPOSITION OF THE U.S. STEEL INDUSTRY

The U.S. steel industry is divided into three sectors, based on differences in product mix and technology. Since the problems and prospects of each sector are different, general steel policies that benefit one sector may be inappropriate for others. The following comments provide a brief description of the three sectors: integrated producers, specialty-steel producers, and minimills.

The Integrated Sector

Integrated producers are the traditional core of the industry. They are referred to as "integrated" for two reasons. First, they typically own raw materials properties (especially iron ore and metallurgical coal) as well as transportation networks and some manufacturing operations (such as shipbuilding) that use steel. Second, they the integrated technology, which begins with coke ovens and blast furnaces, produces steel in basic oxygen furnaces or open hearth furnaces, and then rolls the steel into finished products. (See Appendix A for a more detailed discussion of steelmaking technologies.) Integrated firms typically own several large plants. (The Inland Steel Corporation, which has a single plant in Indiana Harbor, Indiana, is the major exception to this pattern.)

The largest integrated firms, together with their estimated market shares for various years, are listed in Table 1. As the table suggests, the major problems in the industry lie in its integrated sector, which has suffered tremendous losses in market share since 1950. Inroads by foreign producers and domestic minimills, which are discussed below, account for this decline. The deterioration in market share has been most precipitous and most longstanding for the United States Steel Corporation, which controlled over 30 percent of the U.S. market in 1950 and only 13 percent in 1983. The company's loss of market share from 1950 to 1983 almost

TABLE 1. MAJOR INTEGRATED STEEL FIRMS AND THEIR ESTIMATED U.S. MARKET SHARES (In percent)

Firm	1950	1960	1970	1983
U.S. Steel	30.8	25.0	19.9	13.3
Bethlehem Steel	14.9	15.3	13.1	10.3
J&L (LTV) a/	9.3	9.4	8.0	6.8
Republic Steel	8.7	7.2	6.4	5.7
Inland	4.5	6.8	4.5	5.6
National b/	5.5	7.1	6.9	5.4
Armco	4.1	6.7	5.1	5.1
Wheeling-Pittsburgh c/	4.5	3.5	2.8	1.9
Total	82.2	81.0	66.7	54.1

SOURCES: Iron Age, "Annual Financial Supplement" (various years) and company annual reports.

a. Jones & Laughlin Steel, which became a subsidiary of the LTV Corporation in 1968, merged with Youngstown Sheet and Tube in 1978. Data for previous years are combined.

b. National Steel merged with Granite City Steel in 1971. Data for previous years are combined.

c. Merged in 1968. Data for previous years are combined.

equals total import penetration in 1983. More important, that loss has altered the conditions that shaped the American steel industry's culture and behavior throughout most of this century. The decline of the former industry leader reflects the emergence of new competitive conditions that have challenged the traditional integrated firms. 1/

1. See Louis Schorsch, "The Abdication of Big Steel," Challenge (March 1984).

Most of the recent facility closings and capacity reductions have occurred at integrated plants. Smaller integrated firms (not listed in Table 1) have also experienced severe financial problems in the 1980s; many have gone into bankruptcy proceedings or have been offered for sale. These include McLouth Steel (in Detroit), Rouge Steel (in Detroit, owned by the Ford Motor Co.), CF&I (in Colorado), and Kaiser Steel (in California).

The Specialty-Steel Sector

Specialty-steel producers typically melt scrap in electric furnaces to produce alloy, stainless, and tool steels. These are higher-valued, technology-intensive products that are gradually increasing as a share of total U.S. steel output. Whereas alloy and stainless steels accounted for 8 percent of total U.S. shipments in 1963, they comprised 11 percent in 1983. Most of the major integrated firms produce some specialty steel; and the largest specialty firms, such as Allegheny Ludlum, may use integrated techniques (blast furnaces and basic oxygen furnaces). Nevertheless, the specialty-steel sector includes a large number of small, specialized producers.

Specialty steel is used heavily in such industries as aircraft production and nuclear power, and to a smaller extent in most manufacturing industries (for example, the chrome parts in automobiles). Nonspecialty or "carbon steel" is predominant in such industries as construction, automobile production, machinery production, and canning. While there is no hard and fast boundary between the markets for the two kinds of steel, specialty steel is generally more expensive than carbon steel. Specialty-steel producers make up an obviously related but nonetheless distinct industry from carbon-steel producers. This report concentrates on the carbon-steel industry.

The Minimill Sector

Minimills are a relatively new force in the American steel industry, although their roots can be traced back to the 1930s. 2/ Minimills melt scrap in electric furnaces to produce carbon-grade (nonspecialty) steel, a

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2. The gradual recognition of minimills' significance can be traced in J. Wyman, "Steel Mini-mills--an Investment Opportunity?" (Shearson American Express, 1980); Office of Technology Assessment, Technology and Steel Industry Competitiveness (1980); and Donald F. Barnett and Louis Schorsch, Steel: Upheaval in a Basic Industry (Ballinger, 1983).

37-748 0 - 84 - 4

product also made by integrated producers. The output of minimills is typically 100 percent "continuously cast," a technologically advanced process that accounts for less than 25 percent of the steel produced at integrated plants. (See Appendix A.) Since 1960, minimills have increased their share of U.S. steel production from about 3 percent to almost 20 percent. Some integrated producers operate plants that use the minimill technology, but these have generally proved less successful than their independent counterparts. Several of these facilities (Bethlehem Steel's Los Angeles plant, for instance) have been closed or sold in recent years.

Minimills are frequently located in the South and West, and they typically rely on local or regional markets for both sales and scrap supplies. Generally, they produce less sophisticated products, and they tend to be nonunionized. There are exceptions to each of these statements, however, and the most aggressive minimill firms (for example, Nucor, North Star, Chapparral, and Raritan) are expanding into new product markets and wider sales regions. In most cases, minimills are highly profitable, technologically advanced, and highly competitive with imports. According to some forecasts, their share of U.S. production could grow to 35 percent by the year 2000. 3/

The growth prospects of the minimill sector depend on whether it can overcome the technological barriers that currently restrict minimills' entry into new product lines, especially flat-rolled products (sheet and strip). Minimills will be able to produce some flat-rolled products if techniques are developed for continuously casting thin slabs. Most observers expect such techniques to be commercialized within the next three to eight years.

Since minimills use a different technology and produce different products, they cannot be viewed as a substitute for the integrated sector of the industry. Their significance lies in what they portend for the ongoing restructuring of the U.S. steel industry--namely, that technological changes will probably continue to erode the integrated firms' traditional dominance of the steel market, making the industry much more fragmented in the future than it is now. Moreover, the minimills' managerial approach may provide a useful model even for firms that remain firmly committed to the integrated technology.

PRODUCTION AND SHIPMENTS

The changes in the steel industry's structure that have occurred during the past 25 years have been accelerated by the severe market downturn in

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3. Barnett and Schorsch, Steel, p. 278.

1982 and 1983. As Table 2 indicates, these years were among the worst in the industry's history, and the downturn in steel was far more severe than could have been predicted from the pattern of past recessions. Steel consumption typically lags economic recovery; and that was the case in 1983, when steel shipments increased only slightly over the 1982 level despite the macroeconomic recovery.

During the first five months of 1984, there was strong evidence of an upturn in the steel industry. For the last week in May, total U.S. steel production was 2.12 million tons, an increase of 33 percent compared with the first week of 1984. This suggested that 1984 shipment levels might reach 80 million tons, compared with 67.5 million tons in 1983. 4/ Capacity utilization has also increased substantially over the comparable 1983 level (in part due to capacity reductions), and there are some indications that prices are increasing as well. More recently, however, output levels have fallen off.

THE IMPORT PROBLEM

Import penetration in the U.S. market is shown in Table 2. During the past ten years, changes in import share have been caused primarily by fluctuations in steel consumption rather than by changes in import tonnage. Steel imports have been a major factor in the U.S. market since the mid-1960s, and for most of the period since 1968 some controls have been placed on them.

Past Restraints on Steel Imports

Since the mid-1960s, the industry's principal response to the problem of deteriorating performance has been to seek some restraint on imports. In 1959, steel imports into the U.S. market exceeded exports for the first time in this century. By 1968, imports approached 17 percent of U.S. consumption, a state of affairs that led to intense lobbying for trade restraints. In 1969, the Nixon Administration responded by negotiating Voluntary Restraint Agreements (VRAs) with Japan and the European Community (EC), which countries committed themselves to restricting their total tonnage shipments to the U.S. market. The VRAs were renegotiated in 1972 and lasted for a total of six years, but in the industry's eyes they were ineffective. Since they were voluntary, the VRAs did not require Japan and

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4. The CBO model of the steel industry, discussed in Chapter IV, projects 1984 shipments of 78.5 million tons.

TABLE 2. PRODUCTION, CONSUMPTION, SHIPMENTS, AND TRADE FLOWS IN THE U.S. STEEL MARKET (In millions of net tons and in percent)

Year	Raw Steel Production a/	Apparent Consumption b/	U.S. Shipments	Exports	Imports	Import Penetration (In percent) c/
1950	96.8	70.6	72.2	2.6	1.0	1.4
1960	99.3	71.5	71.1	3.0	3.4	4.8
1970	131.5	97.1	90.8	7.1	13.4	13.8
1973	150.4	122.5	111.4	4.1	15.2	12.4
1974	145.5	119.6	109.5	5.8	16.0	13.4
1975	116.8	89.0	80.0	3.0	12.0	13.5
1976	127.9	101.1	89.4	2.7	14.3	14.1
1977	124.7	108.5	91.1	2.0	19.3	17.8
1978	136.7	116.6	97.9	2.4	21.1	18.1
1979	136.3	115.0	100.3	2.8	17.5	15.2
1980	112.1	95.2	83.9	4.1	15.5	16.3
1981	120.8	104.0	88.4	2.9	19.9	19.1
1982	72.9	74.7	59.8	1.8	16.7	22.4
1983	83.4	83.1	67.5	1.2	17.1	20.6
1983, First Quarter	18.4	18.3	15.1	0.3	3.3	18.7
April 1983	7.3	6.5	5.3	0.1	1.2	18.3
May 1983	7.4	6.9	5.6	0.1	1.4	19.7
1984, First Quarter	25.0	25.6	19.4	0.2	6.5	25.2
April 1984	9.0	8.6	6.5	0.1	2.2	25.7
May 1984	9.2	8.8	6.9	0.1	2.0	22.6

SOURCES: American Iron and Steel Institute and U.S. Department of Commerce.

a. Raw steel production exceeds domestic shipments because of yield losses.

b. Shipments minus exports plus imports.

c. Imports divided by apparent consumption.

the EC to restrict import tonnage; both parties exceeded their quotas in 1971. Since the VRAs restricted tonnage rather than import value, they provided an incentive for foreign producers to shift toward higher-valued products. As a result of these limitations, the industry continued to lobby for stronger import restrictions until the world steel boom of 1973-1974, when imports fell for economic reasons and the VRAs were allowed to lapse.

Between 1975 and 1978, no explicit restrictions limited carbon-steel imports, although quotas for specialty-steel imports were in effect from 1976 to 1980. As a result of the world steel boom, imports fell to around 13 percent of U.S. consumption in 1973 and 1974. In addition, the decline in the value of the dollar tended to raise foreign producers' prices in the U.S. market, thereby reducing import pressure. By 1978, however, imports claimed a record 18.1 percent of U.S. steel consumption, and in May of that year the Carter Administration implemented the Trigger Price Mechanism (TPM).

The TPM was designed to deal with allegations that foreign producers were dumping steel. On the basis of the U.S. industry's claims that it was competitive with Japanese producers, the TPM established a "fair" import price, based on Japanese costs plus an 8 percent markup to account for profit. Imports at prices below the trigger price were subject to accelerated investigations for dumping. In effect, this program accepted the fact that producers with higher costs than the Japanese (the great majority of other foreign producers) would sell below "fair" costs if their steel was imported at the trigger price. Since U.S. producers were assumed to be competitive at the trigger price, however, this was not deemed a serious weakness in the program. Moreover, the trigger price did not foreclose the filing of antidumping and countervailing duty suits by U.S. producers, although the Carter Administration did contend that the TPM program would have to be terminated if a significant number of trade cases were filed.

As was the case with the VRAs, the TPM at first led to a reduction in imports (the dollar also declined in 1978 and 1979, providing another explanation for reduced import penetration). Nevertheless, the program was subject to fairly sharp criticism by the industry, which challenged the Japanese industry's cost data and the program's enforcement. Given the weakness in the world steel market that had prevailed since 1975, many foreign producers sought to increase sales in the U.S. market, especially since the TPM and the relatively strong performance of the U.S. economy increased U.S. prices relative to global norms. In addition, increased involvement by foreign governments (subsidies, for example) made foreign producers less concerned about bottom-line results. By 1980, such factors combined to generate increased import penetration despite the TPM.

Industry dissatisfaction with the program led the industry to file several antidumping and countervailing duty cases before the International Trade Commission (ITC) in March 1980. In response to these actions, the TPM was suspended--only to be reinstated, in a somewhat strengthened form, when the trade cases were dropped that fall. As the dollar appreciated in 1981, however, imports continued to increase. The TPM was finally eliminated in early 1982, when the industry filed a massive number of countervailing duty cases against foreign producers, particularly those in the EC.

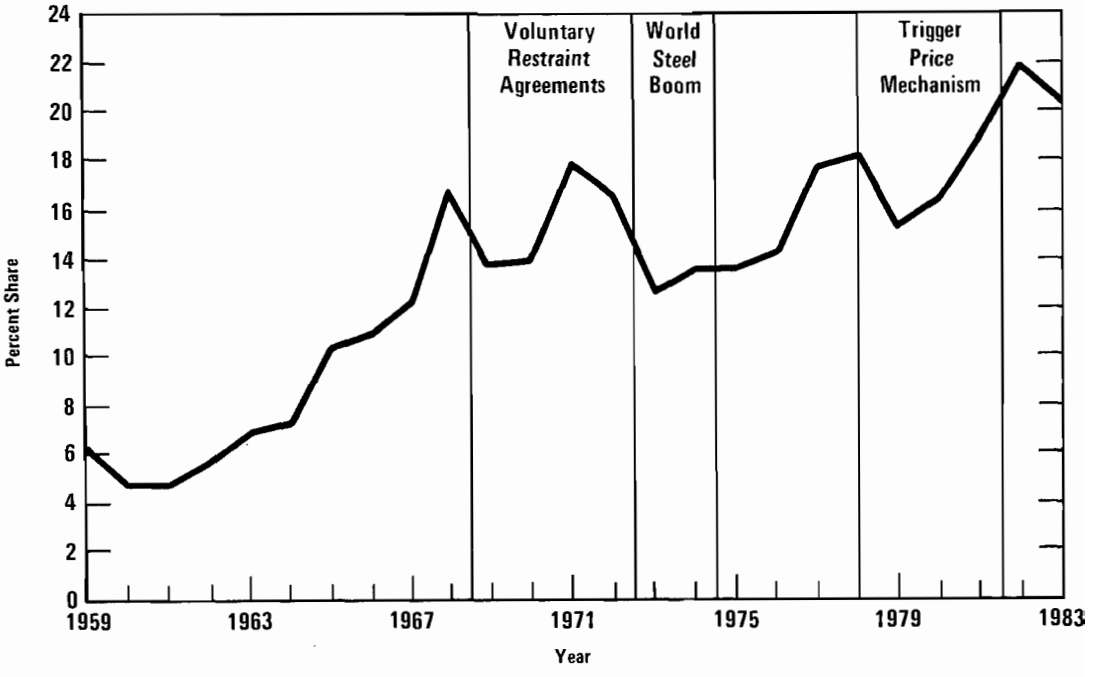
The countervailing duty and antidumping cases against EC steel producers were withdrawn in the fall of 1982, when the EC agreed to an export-licensing arrangement on most of its steel exports to the U.S. market. But imports from other regions offset the reductions negotiated with the EC. Soon after that agreement was concluded, the industry sought to obtain a more explicit restraint against the Japanese and filed a number of countervailing duty cases against developing countries. In addition, in 1983 specialty-steel producers were granted quota relief under Section 201 of the 1974 Trade Act, which allows restraints even against fairly traded imports if imports are judged to be a substantial source of injury to domestic producers. In January 1984, Bethlehem Steel and the United Steelworkers of America filed a 201 case relating to carbon steel. On June 12, the International Trade Commission ruled that U.S. producers had been injured by imports in five of the nine product categories raised in the 201 case. The products in which positive findings were reached account for more than 70 percent of shipments by domestic producers. The ITC has recommended a combination of quotas and tariffs for those products where injury was found. The President must now decide whether to adopt the ITC recommendations, pursue other remedies, or provide no relief.

This brief synopsis of the industry's and the government's responses to the steel import problem fails to mention the steady stream of dumping cases filed by the industry in the 1970s. Nevertheless, even this partial discussion indicates the long and complex history leading to the introduction of H.R. 5081. Although U.S. steel producers have also pressed for policy changes in other areas (for example, accelerated depreciation and regulatory relief), imports have dominated the industry's--and the union's--policy agenda. Since 1969, some sort of steel import program has been in effect for every year except 1975. Carbon steel imports were limited in 1969-1974 and from 1978 to the present. Nevertheless, the industry's complaints about imports have intensified rather than subsided.

The Pattern of Import Penetration

Figure 1 shows the pattern of import penetration in the U.S. steel market since 1959 and illustrates how the pattern of steel imports since the

Figure 1. Share of Imports in U.S. Steel Market, 1959–1983



late 1960s reflects the interaction of U.S. restrictions and market conditions in this country and the rest of the world. The increase in import penetration during the 1960s was reversed in the first years of the Voluntary Restraint Agreements (VRAs), although imports rose again after the first two years of that program. The world steel boom of 1973-1974 made the U.S. market less attractive, so that the import share dropped. A revival of the long-term trend toward increased imports led to the imposition of the trigger-price mechanism (TPM) in 1979, causing import share to drop in 1979. Nevertheless, import penetration rose thereafter, probably reflecting the combined effects of very poor global demand conditions and the increasing value of the dollar. The slight drop in import share in 1983 may be due to political factors such as the current arrangement limiting steel imports from the European Community to about 5 percent.

Because of the prevalence of trade restraints, it is difficult to determine what the import share would be under free (and fair) market conditions. Some foreign producers, such as Japan, restrict their steel exports to the United States below what they could be were the market

completely open. Other producers would be much less competitive in the U.S. market if they did not receive some form of government support.

The most recent data on import share are obviously disturbing to domestic producers. For the first four months of this year, foreign producers claimed over 25.3 percent of the U.S. market. All else being equal, U.S. shipments would have been 5.3 percent higher--approximately 4 million tons at an annual rate--in the first four months of 1984 if imports had remained at the 20 percent penetration level characteristic of 1983.

Country of Origin

During the postwar period, the pattern of U.S. imports has reflected the global shift of steel capacity away from traditional steel-making regions like the United States and Europe. European producers, which dominated U.S. imports in the 1950s, were overtaken by Japan in the 1960s and 1970s. In recent years, other producers have emerged as major suppliers to the U.S. market: not only less developed countries like Brazil and Korea, but also advanced industrial countries other than Japan and Europe. In 1983, U.S. steel imports were almost equally split among Japan, the ten countries that make up the European Community, other advanced countries, and the less developed countries (LDCs). For the first four months of 1984, these regions have claimed the following approximate shares of the U.S. market: Japan, 6.5 percent; EC, 5.5 percent; other advanced countries, 7.1 percent; and LDCs, 6.2 percent.

Among the other advanced countries, Canada predominates, accounting for almost half that category's imports in the first four months of 1984. This category also includes European countries outside the EC (of which Spain has been the most significant in early 1984), Australia and New Zealand, and South Africa.

Major LDC suppliers to the U.S. steel market include Korea and Brazil, which in 1983 increased their shipments to the United States by 63 and 108 percent, respectively (compared with 1982). In recent months, Mexico has also become a major source of steel imports. The sudden emergence of nontraditional exporters to the U.S. steel market is apparent from the fact that in the first four months of 1984 the top seven sources of foreign steel were, in order: Japan, Canada, West Germany, Korea, Brazil, Spain, and Mexico.

Recent shifts in the regional pattern of U.S. imports suggest that increased shipments from nontraditional sources have rapidly replaced (and even more than replaced) the reductions resulting from Japanese self-

restraint and the arrangement with the EC. This is indicated by the data displayed in Table 3 and Figure 2. The increase in the number of foreign suppliers to the U.S. market has made it more difficult for the government to control steel trade flows by means of negotiations with traditional exporters like Japan and the EC.

TABLE 3. STEEL IMPORTS BY REGION OF ORIGIN (In thousands of net tons)

Year	Japan	EC a/	Canada	Other Advanced Countries b/	Brazil	Korea	Other LDC
1975	5,844	4,123	1,009	474	43	397	122
1976	7,984	3,188	1,304	623	67	790	329
1977	7,820	6,833	1,892	1,416	65	790	491
1978	6,487	7,436	2,364	2,624	292	1,052	880
1979	6,336	5,405	2,354	1,632	432	986	373
1980	6,007	3,887	2,370	1,430	458	1,040	303
1981	6,220	6,482	2,898	2,095	548	1,218	437
1982	5,183	5,646	1,844	1,838	605	1,062	485
1983	4,236	4,113	2,379	1,958	1,257	1,728	1,397
1984, First Quarter	1,630	1,387 c/	826	1,006	444	532	642
April 1984	604	489 c/	315	292	150	252	114

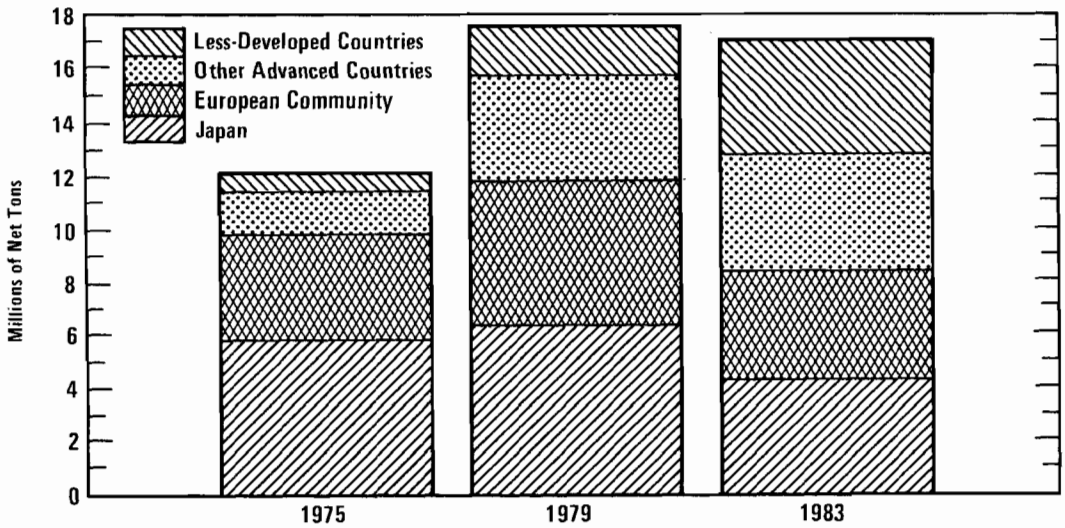
SOURCE: U.S. Department of Commerce.

a. European Community (EC): France, Italy, West Germany, Great Britain, Belgium, Luxembourg, the Netherlands, Denmark, and Ireland. Since 1981, this total includes Greece.

b. Europe outside the EC, Australia, New Zealand, and South Africa.

37-748 O - 84 - 5

Figure 2. U.S. Imports of Steel Mill Products by Region of Origin 1975, 1979, and 1983 (In millions of net tons)



European Community: Belgium, Netherlands, Luxembourg, France, Italy, West Germany, United Kingdom, Ireland, and Denmark.

Other Advanced Countries: Canada, Australia, New Zealand, European countries not included in EC, Israel, and South Africa.

Imports by Product Line

Tables 4 and 5 describe the import tonnage in major product markets and the import share of U.S. consumption in those product markets. In general, imports by product parallel overall trends in the U.S. market. In terms of absolute tonnage, imports are greatest in sheet and strip (including tinplate), the predominant product market in the United States. (Sheet and strip products are used for automobile bodies, appliances, containers, and the like.) In addition, year-to-year variations in imports reflect demand conditions in different product markets. This is evident in the major increase in pipe and tube imports in 1981-1982 and the 1983 increase in sheet and strip imports. The pipe and tube market boomed in the early 1980s, when domestic oil exploration expanded as a result of the second oil price shock. While pipe and tube consumption has fallen drastically since 1981, the import share of this market has remained high, in part because the current arrangement with the EC only partially covers pipe and tube. The 1983 surge in the import share of sheet and strip consumption reflects the fact that this market was one of the first to recover from the 1982 recession. By contrast, the import share in the lagging capital-equipment

TABLE 4. IMPORTS OF IRON AND STEEL PRODUCTS (In thousands of net tons)

Year	Sheet and Strip a/	Plates	Heavy Structurals	Bars and Rods b/	Pipe and Tube	Other c/	Total
1973	6,492	1,349	1,338	3,117	1,659	1,195	15,150
1974	6,050	1,623	1,234	3,820	1,895	1,348	15,970
1975	4,946	1,403	876	2,036	1,685	1,065	12,011
1976	6,033	1,596	1,424	2,057	2,005	1,169	14,284
1977	8,712	2,116	1,817	2,705	2,474	1,482	19,306
1978	8,799	2,925	1,927	2,664	3,046	1,775	21,136
1979	7,196	1,820	1,985	2,113	2,920	1,485	17,519
1980	4,856	2,060	1,829	1,689	3,777	1,284	15,495
1981	5,099	2,448	2,076	1,875	6,569	1,833	19,900
1982	4,778	1,620	1,598	1,734	5,250	1,682	16,662
1983	7,532	1,103	1,559	2,160	2,861	1,854	17,069
1984, First Quarter	2,795	393	583	862	1,161	672	6,468
April 1984	962	122	182	261	426	260	2,216

SOURCE: U.S. Department of Commerce.

a. Includes tinplate, galvanized, and related products.

b. Includes light structural shapes and tool steel.

c. Semifinished shapes, wire products, and rails and accessories.

markets (for example, plates and heavy structurals) has tended to decline in recent years.

Two further points are worth mentioning. First, the import share of bar and rod markets, in which minimills are active, is relatively low. In the 1960s, foreign producers had a much greater share of such markets. (These products may have become less attractive to foreign producers since they tend to be lower-valued.) Nevertheless, foreign producers, particularly in developing countries, have increased their share of bar and rod markets since 1981, and this has caused some minimills to enlist in the campaign for import relief. This development can be ascribed, at least in part, to exchange-rate movements. It does not contradict the basic assessment that

TABLE 5. IMPORT SHARE OF IRON AND STEEL PRODUCTS (In percent)

Year	Sheet and Strip a/	Plates	Heavy Structurals	Bars and Rods b/	Pipe and Tube	Other c/	Total
1973	10.56	12.57	16.40	13.65	16.23	13.10	12.36
1974	10.76	13.40	15.28	16.34	17.43	15.08	13.35
1975	12.14	14.13	15.07	12.42	18.93	14.74	13.49
1976	11.24	18.39	25.84	11.55	25.78	15.31	14.13
1977	15.54	22.08	29.78	13.79	25.89	19.67	17.80
1978	15.27	25.76	28.23	12.21	27.99	21.00	18.07
1979	12.85	17.09	26.70	9.48	28.06	18.22	15.24
1980	11.39	20.74	26.58	9.95	30.45	20.06	16.27
1981	11.09	25.27	29.04	9.79	40.10	25.80	18.87
1982	13.10	28.70	31.34	11.79	53.33	36.40	21.81
1983	16.31	22.90	30.38	13.06	48.96	37.46	20.45
1984, First Quarter	20.59	25.65	35.16	16.93	55.08	40.83	25.29
April 1984	20.8	23.4	36.5	16.4	55.7	42.9	25.7

SOURCE: U.S. Department of Commerce.

a. Includes tinplate, galvanized, and related products.

b. Includes light structural shapes and tool steel.

c. Semifinished shapes, wire products, and rails and accessories.

minimills have succeeded in reducing import penetration in the characteristic minimill product markets.

Second, import penetration in the "other" category--made up of semifinished shapes, wire products, and rails and accessories--has increased significantly in the last two years, although such products still made up only 11 percent of total 1983 imports. The increase in this category is the result of major increases in the importation of semifinished shapes--intermediate products, such as slabs, that are rolled into finished products. U.S. producers have traditionally imported semifinished shapes, especially from Canada, to compensate for disruptions in production caused by new construction, furnace relinings, and so on. Since 1980, however, several U.S. producers (for example, Kaiser, Wheeling-Pitt, and U.S. Steel) have considered long-term agreements to import slabs as a means of offsetting high steelmaking

costs. An example of this was U.S. Steel's announcement in the fall of 1983 that it was seeking a long-term arrangement with the British Steel Corporation to import slabs for its Fairless plant outside Philadelphia. This plan, which would have allowed U.S. Steel to shut down the steelmaking facilities at the Fairless plant, is not being pursued at the present time. The ITC has recommended, as part of its 201 decision, that imports of semifinished shapes be limited by means of quotas and tariffs.

CAPACITY AND CAPACITY UTILIZATION

U.S. steelmaking capacity reached a peak of 160 million net tons in 1977, after which it fell gradually to a level of 150.6 million net tons in January 1983. 5/ In the figures released last January, however, reported steelmaking capacity dropped precipitously to 134.4 million net tons, although some of this drop reflected the delayed writeoff of facilities that had been closed in 1982. In the past two years, steel production has effectively ceased at major plants such as U.S. Steel's South Chicago and Homestead Works and Bethlehem Steel's Lackawanna Works. As recently as ten years ago, these three plants employed almost 50,000 people. Estimated capacity, production, and operating rates for recent years are shown in Table 6.

Capacity reductions present a policy dilemma: the need to boost the industry's competitiveness may conflict with the goal of maintaining current levels of steel-industry employment. Severe capacity reductions--plant closings--obviously have adverse effects on the communities in which they occur. They have similar, albeit short-term, negative effects on the balance sheets of the firms involved: assets must be written off, while liabilities (such as pension commitments) increase. At the same time, however, capacity reductions are probably necessary if the industry is to become more competitive. They boost the operating rate associated with a given level of shipments and thus reduce costs. In addition, capacity reductions permit investment funds to be concentrated at relatively efficient plants, thereby increasing the prospects for improved performance.

Three additional points are worth considering when evaluating capacity figures. First, capacity reductions may be somewhat overstated in terms of shipment capability. Measured capacity refers to crude steel

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5. Capacity refers to maximum sustainable output, given a full order book. This implies that capacity estimates, which the industry collects annually, allow for necessary maintenance work, such as the relining of furnaces.

TABLE 6. ESTIMATED CAPACITY, PRODUCTION, AND OPERATING RATES

Year	Annual Capacity (In millions of net tons)	Crude Steel Production (In millions of net tons)	Capacity Utilization (In percent)
1973	155.0	150.8	97.3
1974	155.6	145.7	93.7
1975	153.1	116.6	76.2
1976	158.3	128.0	80.9
1977	160.0	125.3	78.4
1978	157.9	137.0	86.8
1979	155.3	136.3	87.8
1980	153.7	111.8	72.8
1981	154.3	120.8	78.3
1982	154.0	74.6	48.4
1983	150.6	84.6	56.2
1984	134.4	N/A	N/A
1984, First Half	67.4	51.3	76.2

SOURCES: American Iron and Steel Institute, Annual Statistical Report (various years) and Council on Wage and Price Stability, Prices and Costs in the American Steel Industry (1977).

NOTE: N/A = not available.

production rather than to shipments of finished steel-mill products. The relationship between crude steel and shipments is determined by yield factors, which describe the amount of crude steel lost in processing. Technical improvements, of which continuous casting is a prime example, generate gradual improvements in yield. U.S. yields now approach 75 percent for integrated producers (up from about 70 percent in the early 1970s) and over 85 percent for minimills (resulting from their simpler product mix and higher percentage of continuous casting). Increased yields mean that a given level of shipments requires a lower level of crude steel output. The

U.S. industry's shipment capacity, therefore, has fallen less than its measured production capacity. 6/

Second, the overall reduction in capacity during the past ten years masks even larger changes in the industry that result from the combined effect of two opposing trends: increased minimill capacity and reduced integrated capacity. Since 1975, minimill capacity has grown by approximately 9 million tons. The 19 million-ton drop in aggregate capacity during the same period, therefore, represents a reduction of roughly 28 million tons in integrated capacity.

Third, recent increases in capacity utilization reflect both stronger steel demand and the previously discussed reductions in capacity. From the first week in January to the last week in May, output increased by 33 percent, and capacity utilization rose from 62 percent to 82 percent. (June output, however, was 15 percent below the May level.) Calculated against 1983 capacity, production in the first half of 1984 would have led to a capacity utilization rate of 68 percent instead of the 76 percent associated with the reduced capacity estimates used since last January.

EMPLOYMENT

The combination of sharply reduced output and significant plant closings has had a devastating impact on steel employment. According to data collected by the Bureau of Labor Statistics, steel industry employment fell from 512,000 in 1980 to 394,000 in 1982 and 343,100 in 1983 (see Table 7). The substantial reduction in employment from 1982 to 1983--despite a significant increase in output--indicates that the depth of the 1982-1983 downturn provoked a permanent drop in the employment required for a given level of output. In the past, a 13 percent increase in output such as occurred between 1982 and 1983 would have boosted steel industry employment. The observed decline in 1983 employment reflects the closing of relatively inefficient (that is, more labor-intensive) facilities, changes in operating practices (such as work rules) that have reduced labor requirements, and the elimination of a large number of salaried positions. These changes are likely to be permanent.

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6. It should be pointed out, however, that current estimates of capacity may not reflect all of the reductions that have actually occurred in response to the depressed conditions of 1982 and 1983.

TABLE 7. STEEL INDUSTRY EMPLOYMENT

Year	Number of Employees (In thousands)
1973	604.6
1974	609.5
1975	548.2
1976	549.4
1977	554.3
1978	560.5
1979	570.5
1980	511.9
1981	506.1
1982	394.3
1983	343.1
1984:	
First Quarter	345.9
April(p)	349.6
May(p)	350.5

SOURCE: Bureau of Labor Statistics.

NOTE: p = provisional.

COST PERFORMANCE

The issue of cost competitiveness lies at the heart of the steel trade issue. Supporters of steel trade restraints often argue that U.S. costs are competitive with those of most foreign producers, especially when transportation, duties, and related costs are considered. Accordingly, they maintain that unfair trading practices are responsible for the success of foreign producers in the U.S. market. For that reason, it is necessary to discuss the issue of cost performance, although there are no official statistics that describe comparative costs. The data discussed in this section, therefore, often depend on more assumptions than the statistics used elsewhere in this report.

Employment Costs

Employment costs account for roughly 30 percent of the total cost per ton of steel produced in the United States. The competitive impact of U.S. employment costs depends on two factors: actual hourly employment compensation, including non-wage benefits, and labor productivity. Hourly employment compensation in the U.S. steel industry has generally exceeded foreign hourly labor compensation. Indeed, in relative terms, this differential was greater in the 1950s than it is today. In the early postwar period, however, U.S. productivity outstripped that achieved by foreign producers, offsetting the impact of higher U.S. hourly employment compensation. By and large, this productivity advantage has now been lost, so that high U.S. hourly employment costs are a significant competitive disadvantage.

In the late 1950s, U.S. labor productivity in steel was roughly three times that achieved by the Japanese. 7/ This advantage made it possible for the U.S. industry to sustain much higher wage rates. Japanese productivity met or exceeded the U.S. level by the early 1970s, however, a result that was conditioned by the rapid growth in Japanese steel consumption, the concomitant construction of up-to-date, large-scale facilities, and the industrial relations characteristic of the Japanese economy (quality-control circles and the like). To a lesser extent, a similar pattern has prevailed in other countries. These factors, together with the much older average age of U.S. facilities, make it difficult for the U.S. industry to keep pace with productivity improvements abroad.

Table 8 describes various estimates of hourly compensation and productivity relationships in the U.S. steel industry and in two foreign steel industries. As the differences show, estimating labor costs is not a straightforward operation; it encounters obstacles in the data and in practices such as the use of contract labor. Nevertheless, the estimates presented in Table 8 suggest overwhelmingly that hourly labor compensation is a significant disadvantage for the U.S. steel industry. All of them agree that in recent years hourly compensation in the U.S. industry has been roughly twice that of Japan. Even the most positive estimates of U.S. labor productivity--those generated by World Steel Dynamics--are not adequate to offset the difference in compensation.

This competitive disadvantage may have diminished somewhat as a result of the market downturn in 1982 and 1983. In early 1983, the United Steelworkers ratified an agreement that immediately reduced hourly compensation by $1.31. More important, the union and the companies agreed on

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7. Donald F. Barnett and Louis Schorsch, Steel, p. 119.

37-748 O - 84 - 6

TABLE 8. ESTIMATES OF STEEL INDUSTRY HOURLY COMPENSATION, UNIT LABOR REQUIREMENTS, AND UNIT LABOR COSTS IN VARIOUS COUNTRIES, 1980 AND 1982

	Hourly Compensation (dollars per hour)	Labor Requirements (hours per ton)	Unit Labor Costs (dollars per ton)
		1980	
Bureau of Labor Statistics			
United States	17.67	10.4	183.8
Japan	9.14 a/	7.7 b/	70.4
West Germany	15.51	10.4 c/	161.3
Barnett and Schorsch d/			
United States	18.80	7.2	135.4
Japan	11.00	5.8	63.8
WSD			
United States	19.06	8.3	158.2
Japan	10.24	8.3	85.0
West Germany	14.92	10.0	149.2
		1982	
Bureau of Labor Statistics			
United States	22.97	11.5	264.2
Japan	9.62 e/	8.3 f/	79.8
West Germany	13.24	10.6 g/	140.3
WSD			
United States	24.67	7.8	192.4
Japan	10.89	8.1	88.2
West Germany	13.27	11.1	147.3

SOURCES: Bureau of Labor Statistics, Office of International Comparisons, unpublished estimates; Donald F. Barnett and Louis Schorsch, Steel: Upheaval in a Basic Industry (Ballinger, 1983), p. 64; and World Steel Dynamics (WSD), Steel Strategist #9 (Paine Webber Mitchell Hutchins, 1989).

a. Midpoint of estimated range: $9.01 to $9.36.
b. Midpoint of estimated range: 6.9 hours to 8.4 hours.
c. Midpoint of estimated range: 10.0 hours to 10.8 hours.
d. Refers to cold-rolled sheet, a representative product.
e. Midpoint of estimated range: $9.44 to $9.81.
f. Midpoint of estimated range: 7.4 hours to 9.2 hours.
g. Midpoint of estimated range: 10.2 hours to 11.0 hours.

many work-rule changes that have increased labor productivity. In combination with the closing of relatively inefficient plants, these changes may have generated a substantial increase in productivity. WSD, for instance, estimates that U.S. labor requirements fell from 7.8 hours per ton in 1982 to 6.6 in 1983. Even these rates of improvement, while significant, will require either increased investment or further closings of relatively inefficient integrated capacity if they are to be sustained.

The analysis presented above does not apply to minimills, many of which are nonunionized and have base pay-rates lower than those faced by integrated producers. Average hourly compensation for U.S. minimills is roughly 75 percent of the integrated average. More important, minimills achieve very high productivity--because of a simpler product mix, different work rules, and newer technology. The best minimills require only one to two labor hours per ton of output, so that even when their employment costs are higher, these costs are offset by superior performance. 8/

International comparisons of employment compensation are complicated by exchange-rate considerations. Since the value of the dollar should reflect the overall performance of the U.S. economy, including the level of labor productivity, absolute differences in employment compensation may be offset by exchange rates. In this context, the relevant concern is the relationship between steel-industry hourly employment costs and average compensation in U.S. manufacturing.

The wide difference between U.S. steel-industry compensation and the manufacturing average confirms the belief that relative employment costs are a disadvantage for domestic steel producers and suggests that this problem will not be eliminated should the dollar fall from its current high level. In most countries, steelworkers' earnings exceed the manufacturing average: by roughly 20 percent in Europe, by roughly 25 percent in Canada, and by roughly 60 percent in Japan. During the 1960s and early 1970s, hourly compensation of U.S. steelworkers was less than 50 percent above the manufacturing average. In 1973, however, the major steel companies and the United Steelworkers of America signed a novel labor contract, the so-called Experimental Negotiating Agreement. The union renounced the right to strike in exchange for guaranteed wage increases and a relatively liberal

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8. Through incentive plans, however, some minimills pay out annual average wages that meet or exceed the payments made by integrated producers. See "Mini-mills, Maxi-profits," Time (January 24, 1983), p. 59.

cost-of-living allowance. Because of the high rates of inflation that prevailed between 1973 and 1981, this agreement (which lasted until 1982) led to great increases in hourly compensation in the steel industry. Inflation had the effect of depressing real wages in many other manufacturing industries, so that the premium paid to steelworkers increased significantly after 1973. By 1981, U.S. steelworkers earned 74 percent more than the manufacturing average. While recent givebacks may reverse this trend, the fact remains that the relatively high premium paid to U.S. steelworkers places the industry in a vulnerable competitive position.

Energy and Materials Costs

Materials, including energy, account for almost 60 percent of total steelmaking costs for integrated producers, and this share has been increasing for the past two decades. For U.S. producers, iron ore is the most significant material cost (roughly 15 percent of total costs per ton), followed by coal and coke (about 12 percent), other energy, especially electricity (about 12 percent), and scrap (about 4 percent). Integrated producers also incur materials costs for alloying agents, fluxes, refactories, and so on. Since 1973, the share of energy costs (including coke) in total integrated steelmaking costs has increased from about 20 percent to 24 percent.

Since the United States is relatively rich in raw materials, U.S. steel producers have traditionally enjoyed a competitive advantage in raw materials costs. This advantage has to a great extent been eliminated during the past 25 years. There are several reasons for this:

- Materials and energy costs depend not only on the prices of those inputs but also on the efficiency with which they are used. Since many foreign producers have newer and more efficient plants, their better performance can offset disadvantages in the price of inputs.

- Foreign producers in resource-poor countries, such as Japan, have offset this disadvantage by building coastal plants and using new sources of rich and inexpensive raw materials, especially iron ore. This trend has transformed the U.S. reliance on domestic and Canadian iron-ore sources, which are low-grade and expensive by international standards, from an advantage into a disadvantage.

- The energy crisis has pushed U.S. energy costs nearer the international level. Compared to most foreign steelmakers, U.S. producers still enjoy an advantage in energy costs, particularly

coal and coke; yet this advantage has declined relatively during the past ten years.

Table 9 shows estimates of the prices of the principal raw materials used by steel producers in the United States and Japan, per ton of input. Table 10 makes similar comparisons per ton of steel shipped. They reflect the trends described above. The reversal in the U.S. industry's position in regard to iron-ore prices is most striking, and the current price disadvantage is exacerbated by the more rapid efficiency improvements achieved by the Japanese. Nevertheless, the United States still enjoys an advantage in coal-based costs and in scrap. Since scrap is a substitute for iron ore, greater reliance on it at least partially offsets the U.S. disadvantage in iron-ore prices, although there are technological limits to its use in basic oxygen furnaces.

The above comments do not describe the competitive position of U.S. minimills. For minimills, materials costs (including energy) account for about 70 percent of total costs. Scrap accounts for about one-third of total minimill costs, and electricity for about 15 percent. The predominance of

TABLE 9. PRICES OF ENERGY AND MATERIAL INPUTS AT INTEGRATED MILLS, UNITED STATES AND JAPAN (In current dollars per ton of input)

	1964	1972	1980	1984 Estimated
Iron Ore (In dollars per ton)				
U.S.	12.00	14.55	36.00	43.00
Japan	12.85	10.90	25.50	29.00
Coking Coal (In dollars per ton)				
U.S.	9.25	15.74	52.50	61.00
Japan	14.65	20.00	65.00	73.00
Scrap (In dollars per ton)				
U.S.	34.60	30.83	89.50	105.00
Japan	38.20	36.75	100.00	114.00

SOURCES: Donald F. Barnett and Louis Schorsch, Steel, p. 64; World Steel Dynamics.

TABLE 10. MATERIALS AND ENERGY COSTS OF INTEGRATED MILLS, UNITED STATES AND JAPAN
(In current dollars per ton of steel shipped)

	1964	1972	1980	1984 Estimated
Iron Ore				
U.S.	17	23	58	69
Japan	22	20	46	50
Coking Coal				
U.S.	8	15	45	47
Japan	14	18	58	63
Scrap				
U.S.	7	5	14	19
Japan	3	a/	a/	a/
Other Energy				
U.S.	15	20	46	58
Japan	16	17	42	44

SOURCES: Donald F. Barnett and Louis Schorsch, Steel, p. 64; World Steel Dynamics.

a. Insignificant.

materials costs for minimills reflects their outstanding labor productivity. Since minimills' material costs are concentrated in areas of relative U.S. advantage (scrap and electricity), U.S. minimill producers are highly competitive with foreign producers.

Overall Cost Competitiveness

While the preceding discussions of employment costs and materials costs suggest some of the cost dynamics in the international steel market, it is beyond the scope of this report to undertake a comprehensive and independent assessment of comparative overall costs. Table 11 provides a representative sample of estimated costs per ton of finished product in

several countries. These estimates are drawn from the pathbreaking work of the Federal Trade Commission (now somewhat out-of-date), a recently published book (Barnett and Schorsch), and a regularly updated series produced by a financial service, World Steel Dynamics (WSD). 9/

Most analysts agree that the Japanese steel industry became the low-cost supplier to the U.S. steel market by the late 1960s or early 1970s. U.S. producers had traditionally maintained a cost advantage relative to European producers, provided transportation costs were added to European production costs. Newly industrializing countries, especially Korea, are widely believed to be the lowest-cost suppliers to the world market, outperforming even the Japanese.

Recent developments have placed the U.S. industry at a severe cost disadvantage. In particular, the increased value of the dollar since 1980 and very low U.S. operating rates in 1982 and 1983 have pushed U.S. costs far above international norms. According to WSD, for instance, U.S. costs were almost 40 percent above comparable Japanese costs in 1982. WSD now projects a substantial closing of this gap in 1984, reflecting expectations of a declining dollar, increased U.S. demand, and continued vigilance by U.S. producers in regard to costs. The last column in Table 11 shows the cost relationships that would have prevailed in 1983 (using WSD estimates) were exchange rates at their average values for 1973-1982. While this comparison may be misleading insofar as it does not reflect national differences in inflation, it does show that U.S. cost performance relative to European producers would improve if the dollar's value was nearer its historical norm. For Japan, however, the opposite result holds, suggesting that the cost difference between U.S. and Japanese integrated producers would not diminish if the yen-dollar relationship was nearer its recent historical average.

When considered in historical perspective, the most significant feature of comparative steel costs is the consistent widening of the gap between the United States and Japan. While the U.S. industry has maintained some degree of cost competitiveness relative to European producers--depending on exchange rates--this reflects the fact that both U.S. and European producers have been losing ground relative to the most efficient world producers. This assessment is indisputable in regard to Japanese performance, and it probably also applies to the most efficient producers in the less developed countries (such as the Koreans). Given the extreme conditions

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9. To some extent, differences in coverage (choice of product or treatment of financial costs, for instance) account for the differences in these estimates, none of which include transportation costs.

TABLE 11. ESTIMATED INTEGRATED COSTS PER NET TON SHIPPED (In dollars)

	1972	1976	1980	1983 d/	1983 e/
FTC a/					
U.S.	141	267	N/A	N/A	N/A
Japan	76	147	N/A	N/A	N/A
Barnett/Schorsch b/					
U.S.	155	N/A	374	N/A	N/A
Japan	113	N/A	286	N/A	N/A
WSD c/					
U.S.	187	312	460	518	518
Japan	155	266	395	431	402
West Germany	172	324	468	434	483
United Kingdom	169	306	603	395	529
France	164	355	524	454	716

NOTE: N/A = Not Available.

a. The source for these estimates is the Federal Trade Commission report, The United States Steel Industry and Its International Rivals (Government Printing Office, 1977). They refer to operating costs only.

b. The source for these estimates is Donald F. Barnett and Louis Schorsch, Steel: Upheaval in a Basic Industry (Ballinger, 1983). They include operating costs only and refer to one product only, cold-rolled sheet. This is a representative integrated product.

c. World Steel Dynamics (WSD) is a subsidiary of Paine Webber Mitchell Hutchins, Inc., that provides data and consulting services to and about the steel industry. These estimates refer to total costs (that is, they include financial costs) and to an average or composite cost. They are drawn from the WSD report, "The Steel Strategist No. 9."

d. Estimated.

e. Using average of 1973-1982 exchange rates.

that have prevailed in the steel industry during the past two years, current cost relationships are difficult to evaluate; but the fact remains that long-term trends are unfavorable to U.S. producers.

This overall judgment on cost competitiveness does not apply to minimills, however. Barnett and Schorsch, for instance, estimate that U.S. minimill costs in 1981 were highly competitive with their foreign counterparts, while U.S. integrated producers were at a significant disadvantage (see Table 12).

TABLE 12. ESTIMATED PER-TON COST OF WIRE ROD, 1981 (In dollars)

	U.S.	Japan	West Germany
Integrated	393	304	336
Minimill	284	275	283

SOURCE: Donald F. Barnett and Louis Schorsch, Steel: Upheaval in a Basic Industry (Ballinger, 1983).

PROFITABILITY

The recent recession brought unprecedented financial losses for the American steel industry. Although these will be offset in future years by the performance improvements achieved through closing inefficient plants, they may have lasting effects on the industry's investment and performance. Losses from steel operations were over $2.5 billion in 1982 and over $3 billion in 1983. Gross losses, including those from facility writeoffs, amounted to approximately $5 billion in each of these years. The seriousness of the 1982-1983 downturn is suggested by the fact that this recession marked the first time that minimills, as well as integrated producers, were severely affected by weak market conditions. Many minimills have failed to earn a profit in the past two years. Finally, the effects of the financial losses in 1982 and 1983 have been compounded by the fact that they occurred after a very weak 1981 recovery from the 1980 recession.

The dimensions of the industry's current profitability problems are suggested by Tables 13 and 14. Table 13 shows current net income as a

TABLE 13. RETURN ON SALES FOR SELECTED FIRMS (In percent)

	1981	1982	1983
Integrated			
U.S. Steel	4.3	-16.1	-12.6
Bethlehem Steel	6.0	-7.9	-2.1
LTV	7.0	-9.8	-6.8
Republic	4.3	-8.7	-7.2
Inland	2.3	-11.1	-3.1
National	2.1	-7.7	1.1
Armco	2.8	-9.3	0.2
Wheeling-Pitt	5.2	-7.8	-7.0
Minimill			
Nucor	6.4	4.6	5.1
Florida Steel	3.7	-2.7	-1.1

SOURCE: Company annual reports.

percent of sales for the major integrated companies and for two of the leading minimill firms. The data, which refer to steel operations only, show both the drastic drop in the industry's profitability in 1982 and its continued weakness in 1983. In some cases (U.S. Steel, LTV, National, and Armco), steel losses were offset, at least in part, by profits made in other operations. Lack of diversification has made other firms (Inland, Bethlehem, Republic, and Wheeling-Pitt) extremely vulnerable to the poor profit prospects of steel operations.

Table 14 provides estimates of profitability when measured as a return (or loss) on equity. These estimates are composites constructed by CBO from a sample of representative firms, chosen for their importance within the industry, their reliance on steel operations, and the availability of data. Since they are not comprehensive, these estimates should be viewed as indicative rather than exact. They suggest that the rate of return in the integrated steel industry is far below the manufacturing average. This discrepancy, evident since the late 1950s, worsened after 1974 and became extreme in 1982 and 1983. Minimill operations, by contrast, have been consistently profitable, their average rate of return even exceeding the manufacturing average. Although minimills were also buffetted by the 1982-1983 recession, their return to profitability is likely to be stronger and more rapid than the revival in the integrated sector.

TABLE 14. COMPARATIVE RETURN (LOSS) AS A PERCENT OF EQUITY

	Integrated Steel a/	Minimill b/	All Manufacturing c/
1972-1976	9.1	15.8	14.0
1977-1981	5.6	17.0	16.2
1982	(25.2)	0.8	11.0
1983	(16.5)	3.2	N/A

SOURCES: Iron Age, Annual Financial Supplement (various years) and company annual reports.

NOTE: N/A = Not Available.

a. Integrated composite made up of U.S. Steel, Republic, and Inland, weighted by steel production, for 1972-1981; Inland, Bethlehem, Republic, and Wheeling-Pitt for 1982; and Inland, Bethlehem, and Wheeling-Pitt for 1983.

b. Minimill composite made up of Nucor, Florida Steel, Northwestern Steel and Wire, and Cascade Steel Rolling Mills, weighted by total sales.

c. Estimated by Citibank.

The discrepancy between integrated and minimill profitability implies that minimills have pursued more effective investment strategies and thus have easier access to investment funds. This places minimills in a very favorable position: high profitability allows them to raise funds for investment; and sustained investment allows them to maintain high levels of efficiency and technological competitiveness, which in turn generate high profitability.

Integrated producers, on the other hand, face contrasting dynamics. Their longstanding record of poor profitability compared with both the minimill sector and the manufacturing average makes it difficult for integrated producers to attract funds for investment. Low levels of investment undermine the integrated sector's performance, including its profitability.

On the whole, demand and prices in the U.S. steel market have strengthened in 1984, suggesting that the recovery is finally reaching steel producers. When combined with the cost-reduction efforts implemented in the past two years, a stronger steel market makes it likely that the integrated sector will return to profitability in 1984. Nevertheless, average profitability in the integrated steel industry is unlikely to match the manufacturing average even when market conditions improve. The relatively poor profitability of integrated steel production is a well established, longstanding phenomenon, one that is unlikely to be reversed without significant changes in that sector's strategic orientation: its investment approach, its marketing philosophy, and its technological commitment.

LONG-TERM SOURCES OF THE STEEL INDUSTRY'S PROBLEMS

The U.S. industry's current problems, depicted above, represent the culmination of a long process of decline, the causes of which are to be found not in "unfair" foreign competition, unfavorable tax treatment, or excessive government regulation but in three more fundamental trends.

First, as a mature economy, the United States has been consuming less steel per dollar of GNP than have economies that are at earlier stages of maturity. Steel intensity, the relationship between steel consumption and overall economic activity, has been declining in the United States since the early 1950s. As a result, consumption has grown at a very slow rate in the postwar period relative to the growth rates experienced in most other countries--although growth has now slowed in other mature economies as well (see Table 15). The U.S. industry has had difficulty in accepting the poor overall growth prospects that prevail in its home market and in compensating for the advantages that more rapid growth gives its foreign competitors.

For several reasons, declining steel intensity is a well established feature of mature economies:

- Advanced economies have already undertaken large investments in steel-intensive infrastructure (ports, railways, roads, and the like);
- Technological progress introduces materials, such as plastics, that replace steel; and
- Service industries, which use relatively little steel, grow in relation to manufacturing industries as economies mature.

TABLE 15. GROWTH IN APPARENT STEEL CONSUMPTION
(Compound annual percentage rates, 1950-1981) a/

Period	U.S.	Japan	Canada	U.K.	EC b/
1950-1981	1.0	9.8	3.1	0.3	3.6
1950-1960	0.4	17.3	2.5	3.3	8.3
1960-1969	4.3	13.1	6.8	2.5	5.6
1969-1981	-0.9	1.3	1.6	-3.5	-0.9

SOURCES: Federal Trade Commission, Staff Report on the U.S. Steel Industry and Its International Rivals (1977); International Iron and Steel Institute, Statistical Yearbook (various years).

a. Calculated on a crude steel equivalent basis from three-year averages.

b. Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany.

A variety of factors suggest that U.S. steel intensity will continue to decline. In particular, increased use of advanced electronics, both in terms of business investment and personal consumption, reduces the relative importance of steel, since electronic equipment contains relatively little steel compared with more traditional business investments and consumer durables.

A second factor shaping the long-term prospects of the American steel industry is that significant technological developments have altered the standards of scale and efficiency that prevail in the steel market. These developments have two main aspects. First, foreign steel producers have matched or exceeded U.S. standards of technological performance. Given relatively high U.S. employment costs, the loss of technological preeminence has caused severe competitive problems for domestic integrated producers. Second, new technologies have been developed for making and processing steel, leading to a dis-integration of the industry.

The minimills are the clearest evidence of this second phenomenon. The minimills' success stems largely from their reliance on production methods that do not require the massive investments that the integrated firms claim they need for competitiveness. Though minimills are now largely limited to bar and rod products, they have proved quite successful at

expanding the range of markets in which they compete. This trend seems unlikely to diminish, further limiting the markets dominated by integrated producers.

Finally, steel production and consumption have gradually shifted away from their traditional centers in Europe and North America to developing countries. In 1961, the developing countries' shares of Western world steel production and consumption were 4.1 percent and 9.6 percent, respectively; by 1980, these figures had increased to 12.4 percent and 21.2 percent. To a great extent, this pattern reflects the relatively good prospects for increasing steel consumption in economies at early stages of development and the availability of basic steelmaking technology. Not surprisingly, low employment costs combined with advanced technology and, in some cases, a strong resource base make countries such as Korea, Brazil, and Mexico increasingly formidable competitors. Particularly in unsophisticated high-volume products (plates, for example), developing countries are commonly the low-cost suppliers not only to the U.S. market but to Europe and Japan as well.

No government policy is likely to reverse these trends. Thus no policy can spare the U.S. industry and its labor force from the need to adapt. In the past, the integrated sector has frequently resisted necessary changes. A prosperous industry in the future is likely to be smaller overall, reflecting the maturity of its market. The minimill sector will likely be much larger, however, and integrated firms may succeed by adopting many minimill characteristics. Finally, integrated firms will be under pressure to move gradually toward technologically sophisticated products, avoiding direct competition with lower-cost foreign producers in commodity-grade products.

Policies toward the steel industry--including quota bills--are best judged in terms of whether they could ease this transition. If not, they are likely not only to impose a substantial burden on the rest of the economy but also to hamper the eventual adjustment of the steel sector.

CHAPTER III. THE "FAIR TRADE IN STEEL ACT OF 1984" (H.R. 5081): UNDERLYING GOALS AND BASIC PROVISIONS

The "Fair Trade in Steel Act of 1984" (hereafter H.R. 5081) establishes highly product-specific quotas for the importation of steel mill products into the U.S. market. Like its Senate counterpart, S. 2380, H.R. 5081 represents a legislative response to the recent weakness in the domestic steel market, which has led to substantial layoffs, plant closings, and financial losses. The bill is designed to provide temporary relief from import competition--both fair and unfair 1/--in order to allow the industry to modernize and thus increase its competitiveness.

Chapter II presented a brief synopsis of the industry's and the government's responses to the steel import problem, indicating the long and complex history that has led to the introduction of H.R. 5081. From the industry's point of view, each of the previous governmental programs limiting carbon steel imports has been inadequate. The Voluntary Restraint Agreements were nonbinding; moreover, foreign producers were able to circumvent the underlying goal of the program by shifting to higher-valued products. The Trigger Price Mechanism, which in effect attempted to deal with the problem by setting a minimum price rather than directly limiting imports, was allegedly undermined by a variety of factors: foreign subsidies, administrative difficulties, and shifts in exchange rates. Many observers would also argue that the industry had been overconfident, as the TPM was being set up, about its ability to compete with the Japanese. Finally, the current arrangement with the European Community has allowed other foreign producers to replace EC producers as suppliers to the U.S. market.

H.R. 5081, which is strongly supported by the industry, has been designed to provide import relief while avoiding the alleged inadequacies of

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1. "Unfair" competition refers to cases in which foreign producers are subsidized by foreign governments, allowing them to sell in the United States at prices below their costs, or cases in which foreign steel is "dumped" in the United States. The 1974 revision of the trade laws expanded the definition of dumping (which had traditionally referred to the practice of pricing exports below the home-market price) to include protracted pricing below the cost of production, defined as including a margin of profit.

previous programs. Unlike the VRAs, H.R. 5081 is compulsory and product-specific, so that foreign producers cannot shift imports toward higher-valued products. Unlike the TPM, it targets quantities rather than prices, so that its effects cannot be diluted by subsidies and exchange-rate movements. Unlike the current arrangement with the EC, H.R. 5081 is global in scope. Finally, it spares the industry the expense and uncertainty associated with the existing trade laws, whose enforcement often entails significant delays and may not lead to the judgments that the industry seeks.

MAJOR GOALS

Supporters of H.R. 5081 argue that unfairly traded imports have been a (if not the) major source of the U.S. steel industry's current problems, and that current trade laws are inadequate to meet the threat. The direct goals of H.R. 5081, as stated in the legislation, are: "to safeguard the national security, insure (sic) orderly trade in steel mill products, reduce unfair trade in steel mill products and alleviate United States balance-of-payments problems."

The contributions that H.R. 5081 and its companion bill S. 2380 would make to two of the stated goals, safeguarding the national security and alleviating balance-of-payments problems, are dubious. Well below 1 percent of steel-industry shipments go to the ordnance industry. While steel may be an important input for several other industries (such as shipbuilding) that have a national-security aspect, there are few grounds for viewing steel imports as a threat to U.S. security. 2/ As far as the balance of payments is concerned, reduced steel imports are likely to be offset by reduced exports or increased imports of other products, so that the proposed quota's overall effect on the balance of payments cannot be determined in advance.

This suggests that the bill's principal goals are to ensure orderly trade in steel-mill products and to reduce unfair trade in such products. The wording of the bills also suggests two implicit goals. First, the proposed legislation seeks to reduce unemployment and related hardships in steel-making communities. Second, it is designed to provide relief from import competition of sufficient duration that the industry can modernize and thereby reestablish its competitiveness. Hence, the bill's proponents make the implicit assumptions that major job losses in the steel industry can be

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2. For an extensive discussion of this issue, see Robert Crandall, The U.S. Steel Industry in Recurrent Crises (The Brookings Institution, 1981), Chap. 5.

prevented and that the U.S. industry--particularly its integrated sector--can become competitive if provided with temporary import restraints.

BASIC PROVISIONS

In order to achieve these goals, H.R. 5081 requires the Secretary of Commerce to develop detailed forecasts of steel consumption and on that basis to establish allowable import tonnages, so that total imports do not exceed the maximum import penetration levels specified in the bill. The maximum allowable import share varies widely across the 44 product lines mentioned in the bill and is based on average import share in 1979-1981. The import quota in each product category is calculated to generate an overall import share of 15 percent of total U.S. steel consumption (in tonnage rather than in value terms). The bill also provides for the periodic revision of assigned import levels in light of discrepancies between forecast and actual steel consumption.

H.R. 5081 requires the Secretary of Commerce to assign allowable import tonnages to countries or groups of countries according to those criteria he deems relevant. The bill explicitly cites the current arrangement with the EC and findings of unfair trade practices as relevant criteria. Since the great majority of recent findings of unfair trade practice apply to producers in less developed countries, it seems probable that the quota will affect them the most. This is the only point at which the bill mentions unfair trade practices.

These requirements make up the basic elements of the proposed steel quota. In addition, however, H.R. 5081 contains several other significant provisions. The bill attempts to eliminate the possibility that the quota could impose hardships on consuming industries by allowing the Secretary to amend or lift the quota in cases of short supply. The bill also requires the Secretary to monitor imports of fabricated steel products to ensure that foreign producers do not circumvent the quota by shifting the mix of their exports toward products at a later stage of processing.

H.R. 5081 contains a provision requiring the steel industry to reinvest in steel operations "substantially all of the cash flow from the steel sector." This provision, which has the strong support of the United Steelworkers of America, is designed to ensure that the increased revenues generated by the quota are devoted to the modernization of the steel industry. Steel firms must provide the Secretary of Commerce with a description of their investment plans so that he can determine whether they are in fact using steel cash flow for reinvestment in steel operations. The Secretary must then publicize his findings concerning investment plans and monitor the

industry's performance--a process that is to be repeated annually. Should steel firms not meet this condition, the Secretary must amend or suspend the quota until the condition is met.

Besides its steel-related provisions, H.R. 5081 would establish a similar quota for iron-ore imports, which would be restricted to 25 percent of domestic supply. Presumably, this provision has been included to respond to current conditions in the U.S. iron mining industry, which are in many ways more depressed than those that prevail in the steel industry.

H.R. 5081 would be in effect for the five calendar years after its enactment. The bill allows the President to extend it for an additional three years without further Congressional action.

This description of H.R. 5081's major provisions indicates that the bill does not discriminate between fair and unfair steel imports. While it might ensure orderly trade in steel-mill products, therefore, it would not address the underlying problem of unfair trade practices, which are admittedly widespread in the international steel market. By circumventing existing U.S. trade laws, H.R. 5081 would make it difficult for the U.S. government to deal directly with violations of those laws.

The next chapter of this report presents estimates of the effects of H.R. 5081 on both the steel market and the economy. Before turning to these results, however, it should be noted that the potential use of steel import quotas represents only one approach to the steel import problem. Use and enforcement of existing trade laws, instead of a blanket quota, could make it possible to target those abuses and unfair trade practices that prevail in the world steel market. Alternatively, tariffs on imported steel could be imposed in lieu of quotas. The advantage of tariffs is that they penalize steel imports, but still allow them to compete, albeit on a disadvantaged basis, with domestic output. Foreign producers can lower their prices and profits to absorb part of a tariff, leading to a circumstance in which foreign firms and governments remit revenues to the U.S. Treasury. Greater use of existing trade laws and tariffs are among the options available to the Congress should it wish to assist the U.S. steel industry; these are the subject of a forthcoming CBO report.

CHAPTER IV. ASSESSING H.R. 5081: ECONOMIC EFFECTS AND IMPLEMENTATION

This chapter provides estimates of the effects of H.R. 5081 on the steel industry and the economy, including:

- o An overview of how steel trade restraints are likely to affect the U.S. economy;
- o The proposed quota's effects on the domestic steel market;
- o The proposed quota's effects on the rest of the economy;
- o The likely impact of the quota on the steel industry's long-term prospects; and
- o The problems of implementing H.R. 5081.

These issues are analyzed in terms of an econometric model of the steel industry, developed by the Congressional Budget Office, that makes it possible to assess the economic effects of a 15 percent quota on steel imports, such as proposed in H.R. 5081. The details of this model are presented in Appendix B. As with any econometric model, the results discussed in this chapter are approximate estimates, subject to the assumptions that underlie the model.

STEEL QUOTAS AND THE ECONOMY: AN OVERVIEW

The imposition of a quota would have immediate effects on the steel market, which in turn would affect the performance of the domestic steel industry. As the economy adjusted to changes in the steel sector, however, offsetting shifts would occur in other industries. The following comments describe in general terms the likely economic effects of a steel quota and thus provide a basis for evaluating the specific estimates of H.R. 5081's effects that are presented later in this chapter.

A quota's first effect would be to reduce the available supply of steel imports, which would cause their price to rise. As a result, the restraint on imports would tend to increase the demand for domestically produced steel, in turn causing domestic prices to rise. This would transfer income from consumers to both domestic and foreign steel firms.

The increase in both foreign and domestic steel prices would lower steel consumption. The extent of this decrease in consumption would depend on the sensitivity of demand and supply to changes in price--that is, on elasticities. CBO's model shows that steel supplies are relatively sensitive to price changes, while steel demand is relatively insensitive. This suggests that the increase in domestic output--and therefore in steel-industry employment and profitability-- would exceed the overall decrease in consumption, implying that steel-industry employment and profitability would be higher with the quota than without.

The impact of a steel quota on long-term trends in the steel industry is more difficult to predict. The quota-induced changes in steel-industry investment would depend on whether firms viewed the quota as temporary and/or whether they expected their competitive prospects to improve as a result of a temporary quota. If neither of these conditions was met, there would be no reason to expect a quota to generate significant increases in investment. H.R. 5081, however, assumes this result in requiring the reinvestment of steel cash flow into steel operations. An additional long-term consideration concerns the quota's effects on employment compensation. Insofar as the quota generated substantial increases in profits, pressure for wage increases would be likely to intensify. If the rate of such wage increases exceeded productivity growth, this might leave the industry less competitive after the quota than before.

A similar analysis applies to industries or firms that provide inputs to the steel sector (ore and coal mining, some equipment manufacturers, and so on). For these industries, a steel quota would be likely to raise prices, output, and employment.

The primary costs of the quota would be borne by other sectors of the economy, chiefly through the impact of higher steel prices on steel-consuming industries and final consumers. In general, the imposition of a steel import quota would increase these industries' costs both directly, through higher steel prices, and indirectly, as higher steel prices led to increased demand (and thus higher prices) for substitutes such as aluminum and plastics. The resulting pressure on costs would lead to higher prices and/or reduced profits in steel-consuming industries. As a result of higher prices, the consumption of products that contain steel would fall, leading to losses in output and employment that could offset the gains achieved in the steel sector. These problems would be particularly intense for sectors that face competition from foreign producers or from domestic producers of close substitutes that contain little steel.

The quota's consequences for the steel sector and for steel-consuming industries would be accompanied by macroeconomic effects. The overall

price level would tend to rise if steel quotas were imposed. Real GNP would be likely to decrease, because the gains in domestic steel output would tend to be offset by reduced output in steel-consuming sectors and the efficiency losses associated with diverting resources to steel output that would not be economic in the absence of a quota. The quota's overall effect on the balance of payments is difficult to predict, since this would depend on exchange-rate shifts. Likewise, there is no a priori basis for predicting whether overall employment would increase or decline, although the latter might be more likely given the inefficiencies that a quota would introduce into the economy.

Finally, the imposition of a steel quota could invite retaliation, which is particularly important since H.R. 5081 does not conform to the terms of the General Agreement on Tariffs and Trade (GATT). GATT permits the imposition of trade restraints only under certain conditions, and these are incorporated in U.S. trade laws. Unlike H.R. 5081, the steel 201 case on which the ITC recently ruled is an example of a GATT-sanctioned procedure, although the imposition of import restraints through the 201 procedure could also lead to retaliation. Though the likelihood and magnitude of any retaliation are matters of conjecture, retaliation by trading partners would clearly imply further offsets to any benefits that accrued to the steel industry as a result of the proposed quota.

PROJECTED EFFECTS OF H.R. 5081 ON THE STEEL MARKET

Table 16 describes CBO's projections of H.R. 5081's effects on the domestic steel market. The estimates for 1985 through 1989 are based primarily on CBO's projections of overall economic activity for those years and on some steel-related assumptions that are specified in Appendix B. Less weight should be placed on the absolute values presented in Table 16, which depend on macroeconomic assumptions, than on the proportional effect of the quota--that is, the percentage differences between the base-case and H.R. 5081 results. The following discussion concentrates on the estimates for 1989, the year in which the quota's effects would be greatest.

The modeling results indicate the following. The quota would lower 1989 imports from 26 million tons (about 24 percent of domestic consumption) to 15.4 million tons--the statutory limit of 15 percent of domestic consumption. CBO's model assumes that the imposition of the quota would eliminate the differential that has generally made import prices lower than domestic prices. [1/] This assumption is based on three main arguments:

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1. Even in the base case, the differential between domestic and import prices diminishes over time.

TABLE 16. STEEL MARKET TRENDS, ACTUAL 1983 AND PROJECTED 1985 THROUGH 1989: BASE-CASE [a] COMPARED WITH H.R. 5081

	1983 Actual	Projected 1985	1986	1987	1988	1989
		Dollars per Ton				
Domestic Price						
Base case	514 [b]	580	613	643	674	701
H.R. 5081	514	600	644	678	717	752
Import Price						
Base case	365	449	503	555	584	608
H.R. 5081	365	600	644	678	717	752
Composite Price [c]						
Base case	484	549	588	623	653	679
H.R. 5081	484	600	644	678	717	752
		Millions of Tons				
U.S. Demand						
Base case	83.04	104.88	103.65	104.84	107.31	107.50
H.R. 5081	83.04	100.66	99.68	100.90	102.85	102.61
		Millions of Tons				
U.S. Shipments [d]						
Base case	67.18	82.45	82.45	84.08	85.22	84.56
H.R. 5081	67.18	87.31	86.99	88.60	90.33	90.17
		Percent				
Import Share						
Base case	20.5	23.1	22.8	22.6	23.4	24.2
H.R. 5081	20.5	15.0	15.0	15.0	15.0	15.0
		Thousands of Steel Industry Jobs				
Steel-Industry Employment						
Base case	343	382	378	378	377	369
H.R. 5081	343	405	404	405	407	403

SOURCE: Congressional Budget Office.

a. Projected using CBO economic projections, holding the real price of inputs constant.

b. Estimated on the basis of partial 1983 data.

c. Average of import and domestic price in current-year dollars (that is, not adjusted for inflation), weighted by aggregate market share.

d. Includes projected exports.

- o First, that the highly product- and country-specific character of the proposed quota would eliminate much of the incentive for foreign producers to discount;

- o Second, that some foreign producers now exceed average domestic quality standards, thus offsetting the disadvantages created by the longer delivery times needed to supply foreign steel; and

- o Third, that all major U.S. industries now purchase some foreign steel, so that foreign producers do not face significant resistance in terms of reputation and consumer acceptance.

For these reasons, the CBO model assumes that import prices can reach but not exceed the domestic price level. 2/ Thus, according to the CBO model, the imposition of the quota would allow import prices to rise to the domestic level by 1985, a condition that would persist throughout the quota period. By 1989, the price that U.S. purchasers pay for the restrained level of imports--$752 per ton--would be $144 above the no-quota import price of $608.

In the domestic market, the imposition of a 15 percent quota would increase the demand for domestically produced steel, increasing both domestic output and domestic prices. In terms of the model's projections, 1989 domestic output would rise as a result of the quota from 84.6 million tons to 90.2 million tons. The domestic price, at $752 per ton, would be $51 above the no-quota level. The differential between the no-quota and the quota level of domestic prices would increase over the period of the quota.

Without the quota, the average steel price in the U.S. market (a quantity-weighted average of import and domestic prices) is projected to be $679 in 1989. With the quota, the average price would rise to $752, an increase of 11 percent. A difference in average U.S. steel prices of 9 to 11 percent would occur in each of the five years for which the quota would be imposed. In 1989, the average price increase would reduce projected domestic steel consumption from the no-quota level of 107.5 million tons to 102.6 million tons--a difference of about 5 percent.

Since domestic output would increase significantly as a result of the quota--despite the overall decrease in steel consumption--steel-industry employment would also increase. According to CBO's estimates, the quota would raise 1989 steel-industry employment by 34,000 workers--9 percent

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2. See Appendix B for a discussion of alternative assumptions concerning the differential between import and domestic prices.

above the no-quota level. With or without the quota, however, the number of future jobs provided by the steel industry is projected to decline owing to slow demand growth and productivity increases. Moreover, increased steel employment would probably be offset by decreased employment in other sectors of the economy.

H.R. 5081 AND THE U.S. ECONOMY AT LARGE

Predictably, the effects of the quota on the domestic steel industry would be positive--at least in terms of output and employment. The costs of the bill, however, would show up not in the steel market but in the rest of the economy, largely through higher prices and a resulting misallocation of resources. Nonetheless, the quota-induced changes are small enough in relation to the overall U.S. economy that the aggregate net impact would be difficult to capture definitively in a macroeconomic model. 3/

Some indication of the proposed quota's impact on macroeconomic variables can be obtained, however, by applying techniques such as input-output analysis. According to a recent report by the Congressional Research Service (using data provided by the Bureau of Labor Statistics), a 10 percent rise in the price of steel-mill products in 1984 would increase this year's producer price index (PPI) for intermediate materials by up to 0.65 percent. 4/ This estimate is based on very restrictive assumptions, particularly that both the quantity of steel demanded and all other prices remain unchanged. It is, therefore, an upper bound. Nevertheless, this report suggests that the price increases projected in the quota case might raise the PPI for intermediate materials by a maximum of 0.6 to 0.7 percent. The extent to which such a price increase would lead to an overall increase in inflation (in the Consumer Price Index or the implicit GNP price deflator, for instance) is difficult to determine, since it would depend on the conduct of macroeconomic policy and on the extent to which steel-consuming industries could pass on steel price increases. Nevertheless, the postulated upper-bound estimate of a 0.6 to 0.7 percent increase in the PPI for intermediate materials could represent a significant increase in

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3. For example, the increased steel-industry employment represents a change of 0.03 percent relative to the total U.S. labor force, a change that is too small to generate effects in other sectors that could be traced using conventional macroeconomic models.

4. David J. Cantor, Congressional Research Service, "Effects of Hypothetical Increases in Steel Prices on the Producer Price Index for Intermediate Materials, December 1983-December 1984," April 2, 1984.

inflationary pressure, since the actual increase in this index from December 1982 to December 1983 was only 1.8 percent.

The quota's impact on the rest of the economy can also be evaluated by estimating the associated income transfers and efficiency losses. CBO's estimates of these effects are described in Table 17. The income trans-

TABLE 17. ESTIMATED INCOME TRANSFERS AND EFFICIENCY LOSSES ASSOCIATED WITH A 15 PERCENT QUOTA ON STEEL IMPORTS (In billions of dollars)

Year	Income Transferred to Domestic Producers		Income Transferred to Foreign Producers		Efficiency Loss	
	Nominal Dollars	1983 Dollars	Nominal Dollars	1983 Dollars	Nominal Dollars	1983 Dollars
1985	1.7	1.5	2.3	2.1	0.8	0.7
1986	2.6	2.3	2.1	1.8	0.8	0.7
1987	3.0	2.5	1.9	1.5	0.7	0.6
1988	3.8	3.0	2.1	1.6	0.9	0.7
1989	4.5	3.4	2.2	1.7	1.1	0.8

SOURCE: Congressional Budget Office.

ferred to domestic steel firms would be equal to the increase in steel-industry revenues (pre-tax profits) that would be gained as a result of the quota. The bulk of this income transfer represents the increased revenues that are gained by selling the original pre-quota level of output at the higher post-quota price. In nominal dollars, the income transferred to domestic steel companies would increase from $1.7 billion in 1985 to $4.5 billion in 1989--a range of $1.5 billion to $3.4 billion in 1983 dollars.

The income transferred to foreign steel firms would be equal to the payments made by U.S. consumers for imported steel above the price that

would have prevailed were the quota not in effect. 5/ CBO estimates that the income transferred to foreign companies would be roughly $2 billion in each year of the quota, reflecting a range of $1.5 billion to $2.1 billion in 1983 dollars.

But while the price of imported steel would rise, foreign producers' revenues from steel sales in the United States would tend to fall as a result of the lower volume of imports imposed by the quota. As a result of these counteracting tendencies, foreign producers would lose revenues ranging from less than $2 billion in 1985 to $5.6 billion in 1989. It should be noted that this range represents a likely magnitude for the value of U.S. exports that would be adversely affected should foreign governments respond to the steel quota by equivalent retaliation against U.S. exports.

Finally, the quota would impose some efficiency losses on the U.S. economy, since U.S. resources would have to be diverted from other uses to steel production in order to produce steel that could have been purchased--at lower cost--from foreign producers. These efficiency losses would be roughly $0.9 billion for each year in which the quota was in effect. The efficiency losses would not be recaptured by steel producers. Rather, they represent the value of the output that the economy would forgo by diverting resources through a quota to otherwise uneconomic steel production.

The sum of the income transfers and efficiency losses resulting from the quota would represent a loss to U.S. consumers (more accurately, U.S. consumers outside the steel sector). The aggregate amount of this loss--as well as its distribution among income transfers to domestic steel firms, income transfers to foreign producers, and efficiency losses--would vary according to the patterns of price increases that the quota generated. In the early years of the quota, the discrepancy between domestic steel prices with and without the quota would be proportionally less significant than in the later years. As a result, the income transferred to domestic steel companies as a result of the quota would be smaller in earlier years than in later. A different relationship would hold for imports. Here the discrepancy between the no-quota price and the with-quota price would decline from 1985 to 1987 and increase thereafter. As a result, the income transfers to foreign producers would follow the same pattern.

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5. In principle, the transfer to foreign producers could be captured by the U.S. government if import licenses were auctioned off to foreign producers of if the quota was replaced by a tariff equal to the increase in import prices due to the quota. In the past, however, the U.S. government has allowed foreign producers to capture the gains associated with the higher import prices that a quota generates.

In aggregate terms, the total value of income transfers and efficiency losses--an approximation of the loss to U.S. consumers--would increase over the life of the quota. This sum would rise from $4.8 billion in 1985 to $7.8 billion in 1989 or from $4.3 billion to $5.9 billion in 1983 dollars.

While these costs would be dispersed throughout the economy, the quota's most noticeable negative effects would be on output and employment in those industries that consume significant quantities of steel--such as automotive production, machinery, and construction. This problem would be particularly pronounced for industries that face competition from close domestic substitutes that use little steel or from foreign firms that would enjoy lower steel prices than those in the United States. Current U.S. steel prices, which are roughly 20 percent above world prices, already represent a competitive disadvantage for many U.S. industries. Any increase in steel prices engendered by the quota would exacerbate this problem. In time, such developments might, in fact, encourage the firms affected to follow the steel industry's example in seeking protectionist solutions to their difficulties.

H.R. 5081 AND THE PROSPECTS FOR IMPROVED PERFORMANCE IN THE AMERICAN STEEL INDUSTRY

H.R. 5081 would impose significant costs on U.S. consumers, yet some may view these costs as acceptable should the quota also contribute to the revitalization of the American steel industry. This goal provides the rationale for the provision in H.R. 5081 requiring the industry to use "substantially all of the cash flow" provided by the steel sector for "reinvestment in, and the modernization of, the steel sector."

The consequences of the reinvestment provision would depend on its enforcement (a point discussed below) and on the specific tax status of individual firms, which determines the cash flow available for reinvestment. For these reasons, it is impossible to project accurately the funds that H.R. 5081 would provide for reinvestment, although an analysis of the income transferred to the domestic steel firms as a result of the quota provides some sense of their magnitude. Before undertaking such an analysis, however, it is worth providing some background concerning the industry's capital requirements and the problems associated with its alleged capital shortfall.

The "Capital Shortfall" Controversy

In 1980, several organizations estimated the level of capital expenditures that would be needed to revitalize the American steel industry. The American Iron and Steel Institute, the industry's trade association, estimated that the industry would need to spend about $6.5 billion per year--in 1983 dollars, like all the investment values discussed here 6/--throughout the 1980s in order to reestablish its competitiveness. 7/ In the same year, the Carter Administration's Steel Tripartite Committee--which comprised representatives of steel companies, the United Steelworkers union, and the government--estimated the industry's annual investment requirements at about $6 billion per year. 8/ Finally, the Office of Technology Assessment estimated the industry's capital requirements at roughly $5.5 billion per year. 9/ However, capital expenditures in the steel industry, as tabulated by the American Iron and Steel Institute, have averaged only $2.2 billion per year since 1980 10/ This amount is roughly one-third the level that the industry saw as necessary in 1980 and less than half the more modest target suggested by OTA.

One can look at this discrepancy in two ways. First, presupposing the necessity of maintaining the existing structure of the domestic steel industry, one can define the difference between actual investment and estimated capital requirements as a capital shortfall that needs to be filled. According to this view, which is reflected in H.R. 5081, government action is needed to make up the capital shortfall--by reducing tax burdens, by relaxing regulatory restrictions, and by providing import relief. Such measures should raise the industry's rate of return on investment and thus diminish or eliminate the capital shortfall.

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6. Calculated using the U.S. Department of Commerce implicit price deflator for nonresidential fixed investment.

7. American Iron and Steel Institute, Steel at the Crossroads (1980), p. 44. The sum cited here excludes nonsteel investment and funds needed for capacity expansion.

8. Report to the President by the Steel Tripartite Advisory Committee on the United States Steel Industry (September 25, 1980), p. 8.

9. Office of Technology Assessment, Technology and Steel Industry Competitiveness (1980), p. 319.

10. American Iron and Steel Institute, Annual Statistical Report, 1983.

Alternatively, one can address this issue by raising the question of why the steel industry--more accurately, the integrated firms--has been unable to achieve the levels of investment it claims to need. The problem cannot be blamed on capital markets, since U.S. minimills have had little difficulty raising investment funds. Viewed from this perspective, the problem involves not the level of funds available but the integrated firms' choice of investments, which have often earned very low rates of return. Relatively unprofitable investment choices could be the underlying reason for the persistence of alleged capital shortfalls.

The poor profitability of U.S. integrated firms suggests that their investment choices may have been inappropriate in the face of the long-term changes that were described in the preceding chapter: slow growth in demand, the emergence of minimill competition, and the shift in steel production and consumption toward less developed countries. Integrated producers have often been reluctant to adapt to these changes, instead seeking to preserve the patterns of behavior and performance (including investment strategies) that prevailed in the industry through most of this century. The fact that minimill producers have not suffered from a "capital shortfall" suggests that they may provide an appropriate model for the investment characteristics needed to revitalize the steel industry as a whole: low capital intensity, smaller scale, greater flexibility, and stronger emphasis on maintaining high technological standards. While minimills' technology may not yet be able to produce the full range of products made by integrated companies, their investment approach has wider relevance.

Too often, discussions of the U.S. steel industry's competitive problems focus on the alleged capital shortfall. This approach leads to calls for government intervention to make up the shortfall. The relevant question, however, concerns the reasons for the discrepancy between actual capital expenditures and the level of investment the industry would like to achieve. If capital can be invested more profitably elsewhere in the economy (in the minimill sector, for instance), should the government intervene to force investment toward the integrated steel sector?

The Estimated Effects of H.R. 5081 on Steel-Industry Investment

Since H.R. 5081 requires the industry to reinvest steel cash flow in steel operations, the extent to which the quota would increase steel cash flow is an important issue. A straightforward determination of how much H.R. 5081 would increase steel industry investment is unattainable, however, because of several factors:

- The increase in net cash flow would depend on the tax liabilities of individual firms;

- The increase in investment would depend on whether the quota-generated increase in cash flow would be added to existing levels of steel investment, which have exceeded the cash flow generated by steel operations in recent years; and

- The increase in cash flow would depend on the pattern of depreciation allowances, which in turn depends on the choice of investments.

Estimates of the increased cash flow generated by the quota, therefore, depend crucially on assumptions concerning steel firms' tax liabilities. Because the substantial losses incurred by steel firms in 1982 and 1983 can be carried forward against future tax liabilities for 15 years, it is likely that many steel firms will pay no corporate income taxes for the next several years. [11] Since the quota would increase steel firms' profitability, they might face tax liabilities in the later years of the quota, although the firms would then be able to use unclaimed depreciation expenses and investment tax credits to offset their tax burden somewhat.

The pre-tax increase in profits gained by the steel industry, as a result of the quota, would approximate the income transferred to steel firms. As shown in Table 17, this income transfer, in 1983 dollars, would range from $1.5 billion in 1985 to $3.4 billion in 1989. If one assumes that the steel firms pay no corporate income tax throughout the quota period, the quota-induced increase in cash flow would be equal to the entire value of the income transfer. Alternatively, one could assume that the increased profits generated by the quota are taxed at the corporate marginal rate of 46 percent. This would reduce the quota-induced increase in cash flow by about half. These two scenarios delimit the upper and lower bounds for the quota's effect on cash flow and are shown in Table 18.

The actual increase in steel firms' cash flow generated by the quota would likely fall between these extremes. The marginal tax rate faced by steel firms is likely to be small in the first years of the quota because of loss carry-forwards and to increase thereafter as those carry-forwards are exhausted. The last columns in Table 18 ("Mid-Range Case") show the pattern that would result from a marginal tax rate of 10 percent in the first

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11. Insofar as diversified firms have earnings in nonsteel businesses, these would offset the loss carry-forwards generated by steel operations.

TABLE 18. ESTIMATED INCREASE IN STEEL-INDUSTRY CASH FLOW AS A RESULT OF A FIVE-YEAR, 15 PERCENT QUOTA ON IMPORTS (In billions of dollars)

Year	Steel Firms Pay No Income Taxes		Steel Firms Are Taxed at the Full Marginal Corporate Rate		Mid-Range Case a/	
	Current Dollars	1983 Dollars	Current Dollars	1983 Dollars	Current Dollars	1983 Dollars
1985	1.7	1.5	0.9	0.8	1.5	1.4
1986	2.6	2.3	1.4	1.2	2.3	2.1
1987	3.0	2.5	1.6	1.4	2.4	2.0
1988	3.8	3.0	2.1	1.6	2.1	1.6
1989	4.5	3.4	2.4	1.8	2.4	1.8

SOURCE: Congressional Budget Office.

a. A marginal tax rate of 10 percent in the first two years of the quota, 20 percent in the third year, and the full 46 percent in the last two years.

two years of the quota, 20 percent in the third year, and the full 46 percent in the last two years. These estimates represent a more reasonable scenario for the quota's cash-flow effects than the extreme cases of no tax liabilities and the full statutory rate.

This exercise, while far from exact, suggests that the quota would be likely to raise steel firms' cash flow (in 1983 dollars) by roughly $1.5 billion to $2.0 billion annually during the period of the quota. If this sum were added to the industry's average level of investment in 1980-1982 ($2.2 billion in 1983 dollars), the industry would still be left with a capital shortfall relative to its estimated capital requirements. Moreover, these values may not be additive, since steel investment has exceeded steel cash flow since at

least the mid-1970s. 12/ This suggests that some portion of the quota-generated increase in steel cash flow could be used to replace funds that in the past had been diverted from nonsteel operations or borrowed from capital markets to finance steel investment. At the same time, however, the investment funds generated by H.R. 5081 in 1988 and 1989 could exceed $2.0 billion if other factors significantly reduced or eliminated steel firms' tax liabilities in those years.

The increased profitability generated by the quota might also encourage steel firms to raise more funds in debt or equity markets, further enhancing the funds available for steel-sector investment. This possibility is another reason why no precise forecast of the quota's impact on steel-industry investment can be made.

It is worth noting that, without the reinvestment requirement in H.R. 5081, a 15 percent quota would have at best a small effect on the industry's investment decisions. The import restraint could be removed after five years, while major investments in production facilities typically require two to four years to become operational. Since there is little reason to expect a temporary import quota to resolve the steel industry's long-term problems, there is likewise little reason to expect steel firms to increase their steel investments in response to such a temporary quota. The reinvestment requirement in H.R. 5081 forces such a result, however.

Is this outcome--mandatory expenditures on possibly unremunerative investments--an appropriate policy goal? While it seems reasonable for the Congress to require a quid-pro-quo in exchange for import restraints, the case has yet to be made for overriding the judgments of capital markets by requiring that each steel firm's cash flow be locked into steel capital. Even if the quota was able to raise the rate of return to integrated steel investments, this does not alter the judgment that the funds devoted to such investments would generate a higher rate of return if invested elsewhere. Only if investment strategies were grounded in the underlying trends that shape the steel market--declining steel intensity, the emergence of the minimills, and the global dispersion of steelmaking capacity--would the long-term modernization goals of H.R. 5081 be achievable. Without such a focus on new investment, the passage of H.R. 5081 offers little prospect of finally resolving the steel import problem or the U.S. steel industry's competitive weaknesses. Indeed, pressure for a perpetual import quota could be the ultimate outcome.

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12. See D. Cantor, "Steel Company Investment in Steel in Relation to Cash Flow from Steel Operations," Congressional Research Service, March 23, 1984.

H.R. 5081's RESTRICTIONS ON IRON ORE IMPORTS

Besides its steel-related provisions, H.R. 5081 would limit U.S. imports of iron ore to 25 percent of apparent domestic supply (domestic shipments plus imports minus exports). In recent years, U.S. imports of iron ore have accounted for about 30 percent of domestic supply, with most of the imports coming from Canadian mines that are partly or wholly owned by U.S. steel firms. The proposed limit on iron-ore imports reflects the fact that in recent years the U.S. iron-mining industry has been even more depressed than the domestic steel industry.

Nevertheless, the proposed restriction on iron-ore imports would work against H.R. 5081's underlying goal of improving the steel industry's competitiveness. Several foreign countries, particularly Australia and Brazil, have reserves of iron ore that are far richer than U.S. reserves. U.S. ores are primarily low-grade taconite, with a ferrous content of approximately 30 percent, compared with a ferrous content of roughly 60 percent in Australian and Brazilian mines. U.S. ores must, therefore, be upgraded at the mine site before they can be used for steelmaking. The upgrading process increases costs, as do relatively high U.S. wage rates. As a result, domestic ore costs range from 30 percent to 50 percent above those of the most efficient foreign producers. 13/ Brazilian ore is now competitive with U.S. ores even in the Great Lakes region, close to U.S. ore sites.

The difference between U.S. and foreign ore costs is likely to increase, if past trends are any guide. Relative to their U.S. competitors, foreign steel producers derive a significant cost advantage from their reliance on lower-cost ores. 14/ Forcing U.S. producers to use even less foreign ore than is currently the case is likely to undermine their cost competitiveness. The iron-ore provisions of H.R. 5081, therefore, decrease the prospects for achieving the bill's underlying goal of improving the domestic steel industry's performance.

OTHER CONSIDERATIONS: PROBLEMS OF IMPLEMENTATION AND REDUCED COMPETITION

This chapter's discussion of the quota's likely effects implicitly assumes that the quota could, in fact, be implemented and that it would not

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13. Barnett and Schorsch, Steel, pp. 302-303.

14. Indeed, Robert Crandall argues that this has been one of the principal reasons for the declining competitiveness of U.S. steel producers. See Crandall, Recurrent Crisis, Chap. 2.

alter the basic competitive structure of the steel market. These assumptions may not be appropriate, however.

Implementation

The administration of the quota specified in H.R. 5081 would be difficult and complex. The principal reasons for this judgment--in order of relative importance--are the following:

- Product-specific consumption projections must be developed;
- Allowable imports must be allocated among countries or regions; and
- The reinvestment condition must be interpreted and enforced.

H.R. 5081 establishes allowable import shares, ranging from 0.3 percent to 88.8 percent, in 44 product categories. The Secretary of Commerce must develop forecasts of U.S. consumption for each of these product categories in order to establish the actual tonnages that would be allowed into the United States. Each year's projections are to be announced in the preceding October and revised periodically as actual data warrant.

It would be difficult to overstate the problems involved in developing accurate, product-specific forecasts of the kind required by H.R. 5081. The industry's own projections of total 1982 steel consumption, for instance, erred by almost 20 percent as late as March of that year. 15/ Such inaccuracies would be greatly compounded by attempting to develop consumption forecasts in the wide range of product categories covered by H.R. 5081. The most likely scenario is that very rough guesses would be released and then revised in the course of the year as actual data became available. This suggests that violent fluctuations in allowed tonnage levels in individual products would be likely, making it very difficult for foreign producers, importers, and domestic steel-consuming industries to maintain acceptable standards of business relationships. As currently written, H.R. 5081 would be likely to make foreign producers unreliable sources of supply. This could force imports below their target 15 percent market share, thus exacerbating the inflationary impact of the bill.

H.R. 5081 introduces further complexity by requiring the Secretary of Commerce to allocate the projected allowable import tonnages in the 44

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15. "Armco '82 Shipment Figure 1.5 Million Tons Lighter," American Metal Market, March 2, 1984, p. 4.

product categories among the countries and regions that export steel to the United States. In 1983, 56 countries shipped steel to the U.S. market. This suggests that, at a maximum, H.R. 5081 would require the Secretary of Commerce to determine and regularly revise as many as 2,464 specific import levels (the number of product categories times the number of countries)--although not all of these countries make all of the products involved. In some cases--for example, with the European Community--the allowable import tonnages could be defined on a regional basis. Nevertheless, the administrative complexity of implementing highly product-specific and country-specific quotas, based on projected consumption levels that would probably require frequent and substantial revisions, is impressive.

Moreover, geopolitical considerations could make the allocation of import tonnages by country or region difficult to administer. H.R. 5081 explicitly mentions two criteria that should guide the Secretary of Commerce in determining allowable import tonnages by country or region: the current agreement limiting the European Community to somewhat over 5 percent of the U.S. market, and findings of unfair steel trade practices. Given these criteria, the Japanese might be given a market share similar to the Europeans, leaving less than 5 percent of the U.S. market to be allocated among Canada, other developed countries (such as Australia, Spain, and the Scandinavian countries), and the less developed countries. Since several of the less developed countries have been found guilty of unfair trading practices, they would likely lose the most. But given these countries' debt problems, sharp restrictions on their steel exports to the United States could have serious repercussions on international financial markets.

Finally, the reinvestment requirement contained in H.R. 5081 also raises some administrative concerns. Section 5 of the bill requires the Secretary of Commerce to "determine whether the companies in the steel industry, taken as a whole, have plans to utilize, during the effective period, substantially all of the cash flow from the steel sector for reinvestment in, and the modernization of, the steel sector." Implementing this requirement could entail the following difficulties:

- What are "the companies in the steel industry?" Would the requirement apply to minimills, which generally have an outstanding record of reinvestment, profitability, and employment security? What should the Secretary do if some firms met the requirement while others did not?

- What is "substantially all of the cash flow?" Presumably, this refers to after-tax cash flow. Would it affect steel firms' dividend payments?

- What is "reinvestment?" Would this include funds devoted to steel-related acquisitions and mergers? Would it include investment in mining operations or steel-fabricating activities?

Given the complexities associated with product-specific market forecasts, country-specific quotas, and the reinvestment requirement, H.R. 5081 might be very difficult to administer. While the problems in implementing the quota are not incorporated in CBO's estimates of the bill's economic effects, they are worthy of consideration in Congressional debate.

The Danger of Market Abuses

A final consideration concerns the extent to which the imposition of a 15 percent import quota would allow the domestic steel industry to establish (or reestablish) an oligopoly--that is, a market controlled by a small number of large firms. This is an important issue because of the potential losses of efficiency associated with reduced competition, including prices higher than those that would prevail in a competitive market and a reduced rate of technological improvement. While these dangers are difficult to weigh, they suggest that the CBO model may understate the negative effects of the quota.

During most of this century, the steel industry provided a classic example of an oligopoly. [16] Prices tended to be determined by the United States Steel Corporation, the industry's leading firm, and steel firms' principal goals were frequently the maintenance of market share and high levels of output. Econometric studies suggest that the industry's pricing behavior underwent a significant shift aroung 1960, when imports first became a significant factor in the U.S. market. [17] Indeed, some have argued that oligopolistic pricing encouraged import penetration. [18] Since the early 1960s, competition has been relatively strong in the steel industry. New entrants--foreign producers and domestic minimills--now control

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16. See, for example, Walter Adams and Joel Dirlam, "Steel Imports and Vertical Oligopoly Power," American Economic Review (September 1964), and "Big Steel, Invention, and Innovation," Quarterly Journal of Economics (May 1966); and Hearings of the Subcommittee on Antitrust and Monopoly, Administered Prices: Steel, 85:1 (1958).

17. Richard Rippe, "Wages, Prices, and Imports in the American Steel Industry," Review of Economics and Statistics (February 1970).

18. Adams and Dirlam, "Steel Imports and Vertical Oligopoly Power."

almost 40 percent of the U.S. market, so that the traditional steel oligopoly has lost most if not all of its pricing power.

Import restraints would not eliminate minimill competition. Since minimills now compete in a limited number of product markets, however, import restraints would greatly weaken competitive pressures in such major product lines as plate, sheet, and strip. Should integrated firms regain pricing power in those markets, steel prices would rise by more than CBO's model projects. This, in turn, would further reduce steel-industry output and employment, transferring more resources to steel firms and away from other sectors, while increasing steel firms' profitability and cash flow.

APPENDIXES

APPENDIX A. STEEL PRODUCTION PROCESSES

This appendix provides a basic description of steel production processes. 1/ Its purpose is to define some of the concepts used in this report and, more important, to provide a foundation for discussing technological trends and the composition of the U.S. steel industry.

The production of steel-mill products involves several stages: raw materials preparation, steelmaking, the production of semifinished shapes, and the production of final steel-mill products (bars, rods, sheet, plates, and so on) that are then used as inputs by other industries. The fundamental raw material for steelmaking is iron ore, the natural, oxidized form of iron. Before it can be used, iron ore must be reduced (the oxygen removed). The presence of carbon impurities makes the resulting iron brittle and unsuitable for general use. More desirable properties can be achieved by transforming the iron into steel, and that is the purpose of the steelmaking stage.

After the steel has been made (and is still in a molten state), it must be cooled and rolled into usable products. This is traditionally a multi-stage process. Molten steel is first poured into molds, where it cools into large blocks (ingots). The ingots must then be reheated to a uniform temperature and rolled into semifinished shapes by passing them through a series of heavy rolls. The principal semifinished shapes are slabs (oblong shapes about six inches thick), blooms (long shapes with a square cross section exceeding six inches), and billets (long shapes with a smaller square cross section). Each of these shapes is used to make a different category of final product. Very heavy products, such as large structural beams, can be rolled directly from ingots.

The market for semifinished shapes is small, since most semifinished products are rerolled into finished products by the same company. In principle, the process is the same as that used to roll ingots into semifinished shapes, although several steps may be needed. Flat-rolled products, (such as the sheet steel from which automobile bodies are made), account for over 50 percent of total U.S. steel shipments, and are rolled from slabs. The first step is the production of hot-rolled sheet in hot-strip mills. Hot-

1. For a fuller description of steel production processes see Office of Technology Assessment, Technology and Steel Industry Competitiveness (1980).

rolled sheet can be sold as such or processed further in cold-strip mills, annealing lines, galvanizing lines, tinplate mills, and so on--depending on the product characteristics desired. Slabs are also used to make plates. Blooms and billets, on the other hand, are rolled into such products as bars, rods, small structural shapes, pipes, tubes, and rails.

The production sequence described above is embodied in the traditional "integrated" mill--so-called because all the necessary steps, from raw-materials preparation to the shipment of finished products, are combined at one site. Such plants have ore and coal yards where raw materials are stored and prepared. They typically include coke ovens for transforming metallurgical coal into coke, which is needed as a fuel and a reducing agent. The iron input, which has generally been processed at a mine-site pelletizing plant or a steel-mill sintering plant, is reduced (using coke) in a blast furnace. The molten iron from the blast furnace is placed in a steelmaking furnace, along with steel scrap, limestone, and alloying agents. The molten steel produced in the steel furnace is poured into ingot molds, at which point the rolling process can begin. As the intermediate shapes pass through each rolling stage, they must first be reheated. Moreover, each rolling stage entails some loss of product, reducing overall yield.

Despite ongoing technological refinements, the sequence described above was basically established in the 19th century. This sequence can now be altered, however, using newer technologies, three of which are worth mentioning:

- Direct reduction techniques replace blast furnaces and coke ovens with less capital-intensive processes. Direct reduction is currently only marginally economic--at best--in the United States because of its high energy costs.

- Electric furnaces produce steel from scrap or from directly reduced iron, thus making it possible to eliminate all the steps prior to steelmaking (except for scrap preparation). Rapid progress in electric-furnace technology since the 1950s has made this a highly economic means for producing substantial quantities of steel.

- Continuous casting involves the pouring of molten steel (through a caster) directly into semifinished shapes. It therefore replaces two steps: ingot pouring and the rolling of ingots into semifinished shapes. Continuous casting increases output per worker, reduces energy needs, raises yield, and improves product quality.

All of these technologies reflect a general thrust toward the simplification of steelmaking processes and the continuous production of finished products from molten steel. The superior efficiency of the minimill sector stems from its use of electric furnaces and continuous casting.

APPENDIX B. DESCRIPTION OF THE CONGRESSIONAL BUDGET OFFICE STEEL MODEL

The CBO model of the steel industry includes six stochastic equations (Equations 1 through 6) and two identities (Equations 7 and 8) that are estimated as a simultaneous equation system, using a three-stage least-squares estimation procedure. The endogenous variables in this system are:

- o A measure of total U.S. operating costs (COST);
- o The price of domestically produced steel (PS);
- o The demand for domestically produced steel (QDD);
- o Imports (QUOTA in the H.R. 5081 case);
- o Exports;
- o The price of steel imports (IMPP);
- o Total U.S. demand (QDUS); and
- o Total U.S. shipments (QSDOM).

Projected employment is estimated independently using Equation 9. The conditional statement in Equation 10 is only used in the quota case. Finally, Equation 11 describes the composite or average price in the U.S. steel market.

This model follows the convention of separately treating the markets for imports and domestically produced steel. 1/ Unlike some other studies, however, the CBO model does not adopt the assumption that the import supply curve is infinitely elastic at the current price. Equations (1)-(10) are solved simultaneously for the period 1984-1990 without the quota and for the period 1985-1990 with the quota. During the simulation, the real prices of labor, ore, and other materials are held constant using CBO's projections of inflation (roughly 5 percent per year). Investment and automobile production are assumed to increase. The simulation uses CBO's projections of exchange rates, assumes that foreign capacity utilization increases, and assumes that foreign costs and the electric-furnance share of U.S. steel production follow historical trends.

The modeling results presented in Chapter IV are generally consistent with other results and with expected outcomes with one exception; import prices exceed the domestic price during the simulation for the quota case. As discussed in Chapter IV, this is an unlikely result for a variety of reasons, and may be attributed to limitations in both the model and the data. As a result, a composite price index is created (Equation 11) to depict the final prices faced by U.S. steel consumers.

The actual projected values attained from the model for import prices, domestic prices, and composite prices in the base case and quota case are described in Table B-1. In the absence of data and model limitations, it is

TABLE B-1. PROJECTED PRICES IN THE UNMANAGED CBO MODEL (In dollars per ton)

	1985	1986	1987	1988	1989
Base Case					
Import Price	449	503	555	584	608
Domestic Price	580	613	643	674	701
Composite Price	549	588	623	653	679
H.R. 5081					
Import Price	659	716	776	845	907
Domestic Price	589	631	661	694	724
Composite Price	600	644	678	717	752

likely that the increase in import prices in response to the quota would be much smaller than described in Table B-1 while the domestic price increase would be greater. That, in fact, is the result imposed on the model through CBO's assumption that import prices can reach but not exceed domestic prices.

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1. See Robert Crandall, The U.S. Steel Industry in Recurrent Crisis (The Brookings Institution, 1981), p. 130 and Federal Trade Commission, "Prehearing Brief for Carbon and Certain Alloy Steel Products, Investigation No. TA-201-51 before the International Trade Commission" (May 1984), Appendix A, p. 7.

If one were to assume that the existing differential between import and domestic prices was maintained after the quota was imposed, then this would imply that domestic prices would be higher than described in Chapter IV, while import prices would be lower. This would tend to increase the income transfer to domestic steel firms and decrease the income transfer to foreign steel companies. Conversely, if one were to assume that the import price could exceed the domestic price--as has occasionally occurred (in 1974, for instance)--the opposite adjustments to CBO's analysis would be appropriate.

The CBO model is presented below. In addition, the variables used in the model are described, as well as the source used to construct each data series. In cases where CBO is listed as a source, this generally means that CBO projections were used for the simulation period.

STEEL MODEL EQUATIONS

1. $COST = (-128789) - 0.057(QSDOM) + 3.87\ (10^{-6})\ (QSDOM)^2 + 778781(PL) - 99730(PO + PC) - 8462(TECH) - 0.402(TECH)(QSDOM) + 0.887\ (PC + PO)(QSDOM) + 3.982(K) + 23.156\ (PL)(QSDOM).$

   Industry variable costs are specified as a function of output, the prices of labor, ore, and coal, a proxy for technological change, and the industry's capital stock. The prices of ore and coal are added to form a "price of materials" variable to reduce multicollinearity in the regression. The price of labor, price of materials, and technology variables are also added in interactive form with the output variable.

2. $PS = (-0.057) + 7.79(10^{-6})(QSDOM) - 0.402(TECH) + 0.887(PC + PO) + 23.156(PL) + 0.543\ \ QSDOM(-1)/QMAX(-1)\ ^2 - 0.0151(PDUM)$

   The price of domestic output is based on its marginal cost. The first four expressions on the right hand side of this equation are an expression for marginal cost obtained by taking the derivative of Equation 1 with respect to domestic output. The fifth argument captures increases in costs associated with approaching the industry's capacity constraint. The final argument in a dummy variable that captures the effects of 1971-1972 wage-price controls.

3. $QDD = 1871972 + 208.23\ \{\ I72(-1)\ \} + 5686(IMPP) + 170.5(AUTOS) -2424.3(PS) - 932.6(TIME) - 36.991(TIME)^2.$

   The demand for domestic output is a function of fixed investment in the previous year, automobile production, the prices of domestic and foreign steel, and two time terms that capture declining steel intensity.

4. $QUOTA = 109.84 + 76.305\ \{I72(-1)\}\ - 10595.6(IMPP) + 63.607(AUTOS) + 5686(PS) + 1739.5(CONTRACT).$

   The demand for foreign steel is a function of the same arguments as in Equation 3. The time terms have been omitted, however, since the demand for foreign steel has the character of a residual in the domestic market. In addition, a dummy variable for years of contract negotiation has been included, since demand for steel imports has tended to surge in such years as a hedge against strike-related disruptions of domestic production.

5. EXPORTS = 1091.23 - 2144.16(PS) + 61.64(CU) - 34.463(EXRATE) + 3582.71(XDUM) + 3067.43(WRLDP)

U.S. steel exports are determined by the price of domestic steel, foreign capacity utilization, exchange rates, a dummy variable reflecting an unexplained export surge in 1971-1972, and the world price level.

6. IMPP = -4.418 + 0.04 (CU) + 0.863(FC) + 4.504 (10^{-7})(IMPORTS) + 1.078(PS)

This equation depicts the supply of imported steel. The price of imported steel is given as a function of foreign capacity utilization, foreign costs, the quantity of imported steel sold, and the price of domestic steel (since foreign producers will allocate a larger share of their production to the U.S. market given higher U.S. prices, all else being equal).

7. QDUS = = QDD + QUOTA.

This identity equates the total U.S. demand for steel with the sum of domestic production for the domestic market plus the demand for imports.

8. QSDOM = = QDD + EXPORTS.

This identity equates total U.S. steel production with the domestic demand for domestic steel plus exports.

9. EMPL = 11293.6 + 0.003(QSDOM) - 5.477(TIME) - 5967.22(PL/PS)

Employment in the steel industry is determined by steel output, the price of labor relative to the price of steel, and a time term that captures productivity gains. This equation, which is estimated outside the simultaneous equation system, is benchmarked to 1983 employment levels for projection purposes.

10. QUOTA = = IF IMPORTS LT (0.15) x QDUS THEN IMPORTS ELSE (0.15) x QDUS.

When a quota is imposed in the simulation, imports are constrained to 15 percent of the domestic demand for steel.

11. CP = = SH x IMPP + (1-SH) x PS.

The composite price of steel purchased in the U.S. market is obtained by taking a quantity-weighted average of domestic and imported prices, where SH = IMPORTS/QDUS. In the case of a 15 percent import quota, however, the price of imports is constrained to be equal to this value; the price variable is managed outside the model to obtain this result.

INDEX OF VARIABLES

NAME	VARIABLE	SOURCE [a]
	ENDOGENOUS	
COST	Real Total Industry Expenditures for Basic Operating Costs (Cold-Rolled Sheet) (in thousands of dollars) [1]	Crandall, World Steel Dynamics (WSD), and Congressional Budget Office (CBO)
CP	Weighted Average Real Price Index [1]	Generated by Model
EMPL	Total Steel Industry Employment (Basic Steel Products) (in thousands)	Bureau of Labor Statistics
EXPORTS	Volume of Steel Exports (in thousands of tons)	American Iron and Steel Institute (AISI)
IMPORTS	Volume of Steel Imports (in thousands of tons)	Department of Commerce
IMPP	Estimated Real Landed Import Price Index [1]	Department of Commerce, Crandall, and CBO
PS	Real Price Index of Domestically Produced Steel [1]	Department of Commerce (Census Reports MA-33B)
QDD	Domestic Production Consumed in U.S. (in thousands of tons)	AISI

(Continued)

a. See Bibliography.

1. Nominal values are transformed into real values by dividing by the GNP implicit price deflator (1972 = 100), except K, for which the implicit price deflator for nonresidential fixed investment is used.

INDEX OF VARIABLES Continued

NAME	VARIABLE	SOURCE a/
QDUS	Total U.S. Apparent Consumption (in thousands of tons)	AISI
QSDOM	Total U.S. Shipments (Including Exports) (in thousands of tons)	AISI
QUOTA	Import Share Given Restraint (in percent)	Generated by Model
	EXOGENOUS	
AUTOS	Index of Automobile Production	Data Resources, Inc. (DRI)
CONTRACT	Dummy Variable for Years of Contract Negotiations	CBO
CU	Capacity Utilization Outside the U.S.	WSD
EXRATE	Weighted Exchange Rate Index	CBO and DRI
FC	Real Unit Japanese Costs for Cold-Rolled Sheet (Average of Current and Last Year) (in dollars) 1/	FTC, Crandall, WSD, and Barnett and Schorsch

(Continued)

a. See Bibliography.

1. Nominal values are transformed into real values by dividing by the GNP implicit price deflator (1972 = 100), except K, for which the implicit price deflator for nonresidential fixed investment is used.

INDEX OF VARIABLES Continued

NAME	VARIABLE	SOURCE a/
I72(-1)	Real Fixed Investment in Previous Year (in billions of dollars)	CBO and DRI
K	Real Value of Productive Capital Stock (in billions of dollars) 1/	Barnett and CBO
PC	Real Price of Metallurgical Coal (in dollars per ton) 1/	FTC, Crandall, and WSD
PDUM	Dummy Variable for Price Controls	CBO
PL	Real Hourly Employment Cost (in dollars) 2/	AISI
PO	Real Price of Iron Ore (in dollars per ton) 1/	FTC, Crandall, and WSD
QMAX(-1)	Maximum Shipments Capacity in Previous Year	AISI and CBO
TECH	Index of Technical Change; Electric-Furnace Share of U.S. Production	AISI
TIME	Year	
WRLDP	Proxy for World Steel Price 1/	Same as IMPP in Base Case

a. See Bibliography.

1. Nominal values are transformed into real values by dividing by the GNP implicit price deflator (1972 = 100), except K, for which the implicit price deflator for nonresidential fixed investment is used.

INDEX OF VARIABLES Continued

NAME	VARIABLE	SOURCE a/
XDUM	Dummy Variable for Export Surge in 1971-1972	CBO

a. See Bibliography.

a. See Bibliography.

1. Nominal values are transformed into real values by dividing by the GNP implicit price deflator (1972 = 100), except K, for which the implicit price deflator for nonresidential fixed investment is used.

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