THE STEEL INDUSTRY IN TRANSITION

Staff Working Paper

The Congress of the United States
Congressional Budget Office

March 18, 1982

INTRODUCTION

The domestic steel industry is in a period of transition. The centralized, fully integrated industry is changing to one that is more decentralized, diversified, and competitive. This transition has already been marked by a decline of the large, integrated producers in terms of market share, profitability, and employment. Their place in the market has been taken by smaller, nonintegrated domestic steelmakers and by imports.

The purpose of this paper is to present a general overview of these events and to describe the prospects of the industry over the coming decade. This paper summarizes background research undertaken for the Subcommittee on Oversight and Investigations of the House Energy and Commerce Committee. Its contents include:

- o A description of the recent performance of the integrated steel producers;
- o An examination of the factors affecting that performance;
- o A summary of the current federal role in the steel industry; and
- o Projections regarding the performance of the steel industry over the coming decade if current federal policies and industry conditions remain unchanged.

The domestic steel industry includes seven corporations with annual sales in excess of $1.5 billion, and another 30 or so smaller firms. All of the large firms and several of the small firms are known as integrated producers--they are involved in all steps of the steel production process from iron ore and coal to steel plates, coils, bars, or tubes. The rest of the firms, the nonintegrated steelmakers, typically do not refine steel from iron. Rather, their source of raw material is scrap steel, which they melt and reprocess. Some small firms use modern highly productive technologies to fabricate steel into basic products for regional markets. Other firms manufacture specialty steels such as stainless steel, grain-oriented steel, tool steel, and special alloys.

This paper focuses on the large, integrated producers of carbon steel--U.S. Steel, Bethlehem, National, Armco, Inland, LTV, and Republic--because the future of the integrated steel industry is the subject of most of the current policy debate, and is the sector with the most problems. If current federal policies and industry conditions continue, the 1980s are

likely to witness a steady, though not dramatic, erosion of the market share, profits, and labor force of the integrated steel firms, which in 1981 provided 72 percent of the nation's supply of steel. By contrast, importers and nonintegrated domestic steelmakers are likely to increase their market share during this transition. Accordingly, increases in employment and investment by nonintegrated producers will, to a degree, compensate for the decline of the integrated sector.

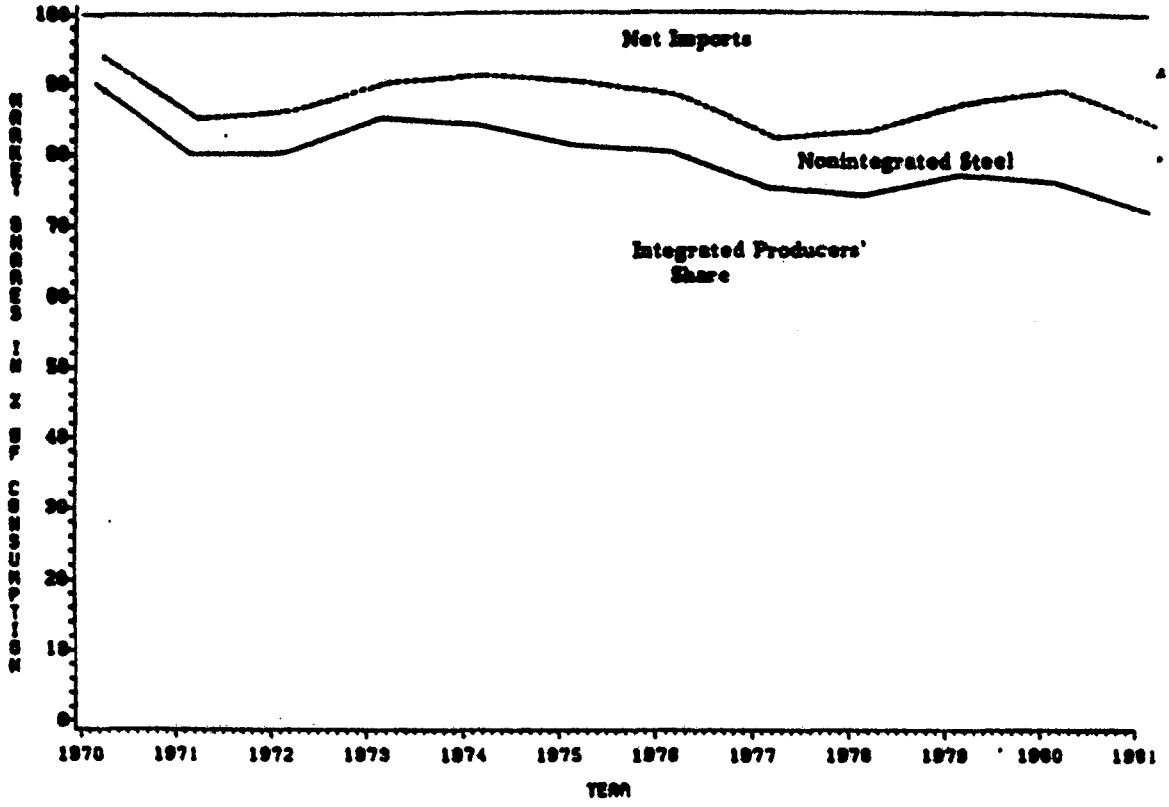
THE DECLINE OF THE INTEGRATED STEEL PRODUCERS

The domestic integrated iron and steel industry is slowly but steadily contracting. Total demand for steel products in the United States did not increase during the 1970s, and domestic integrated producers lost markets to domestic nonintegrated producers and to imports. The integrated producers held roughly 83 percent of the domestic market from 1970 through 1975, but their share fell to about 72 percent by 1981, as shown in Figure 1. To some extent, the decline of the integrated producers has been counterbalanced by the growth of the nonintegrated firms. Shipments from nonintegrated producers tripled during the 1970s, and attained a market share in 1981 of 12 percent. 1/ The nonintegrated producers cannot, however, by the nature of their technology, expand into a majority of the markets and product lines. About two-thirds of all steel consumed are flat-rolled products requiring large rolling mills. It would not be economic for small nonintegrated firms to enter such markets.

More important than the shift of market share has been the effect of intense price competition from abroad. Excess capacity in international markets has led to low profit margins for virtually all products and all producers--integrated and nonintegrated alike. U.S. integrated producers' combined annual real income after taxes, from 1975 through 1980, has been about 50 percent of what it was during the decade of 1965 to 1975.

The steel industry is highly cyclical, and this characteristic, shown in Figure 2, often masks long-term trends until they are far advanced. The industry depends on substantial profits in good years to compensate for low profits during off years of the business cycle. In the most recent upswing, however, profits did not recover, and some firms in the industry may be financially unable to survive the lean years ahead. Its cyclical nature also injects an element of risk into the steel industry that reduces its overall attractiveness to the investment community. The stock market has not been slow to notice this risk, and the decline in profitability; so a typical share of steel company stock today sells for less than 40 percent of its book value.

FIGURE 1. MARKET SHARES OF IMPORTS, INTEGRATED AND NONINTEGRATED FIRMS



SOURCES: American Iron and Steel Institute, Annual Statistical Report (1980).

Joseph Wyman, Steel Mini-Mills (Shearson Loeb Rhodes, Inc., 1980).

CBO estimates.

FIGURE 2. REAL NET INCOME FROM INTEGRATED STEEL PRODUCTION
(In millions of 1980 dollars)

SOURCES: American Iron and Steel Institute, Annual Statistical Report (1980).

Annual reports of individual companies.

"Steel Profits Rebound in 1981," Iron Age (February 19, 1982).

This financial decline has been accompanied by a low rate of investment in basic steelmaking. If a firm loses profitability, it also loses the ability to generate funds to invest, and thereby finds it more difficult to be profitable in the future. Domestic steel producers have fallen into this downward spiral. Figure 3 illustrates how the integrated steel industry has fallen short of other industries, such as paper and wood products, in generating internal "cash flow" for investment. As a percentage of sales, cash flow for the steel industry has averaged 7.7 percent since 1970, compared with 9.3 percent for all industry. 2/ The industry can also generate investment funds externally by selling stock, or acquiring more debt. But the steel industry has not been aggressive in pursuing external financing, in part because prospective investors recognize the poor cash flow and profitability, and place a high risk premium on steel company investments. Since 1970, aggregate return on invested capital has averaged 6.8 percent for steel firms compared with 14.6 percent for all domestic manufacturing industries. When income from non-steel subsidiaries is excluded, return on invested capital in steel is between 3 and 6 percent, compared with a cost of capital of 15 to 18 percent. 3/ Until recent years, the industry was also reluctant to sell assets (such as coal reserves) or to use capital generated by non-steel operations to provide investment capital.

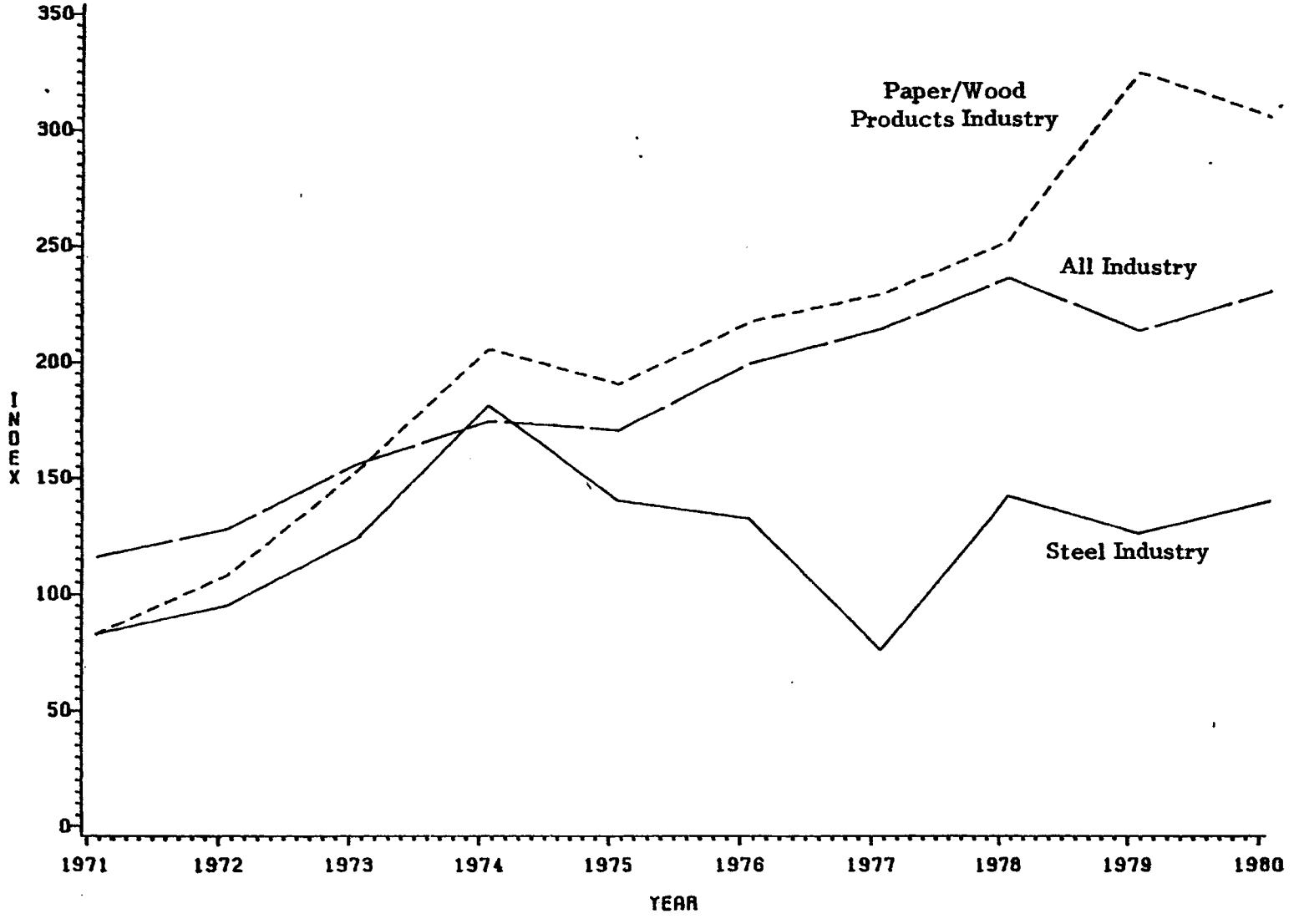
Just to maintain facilities—or to replace them as they physically depreciate on a 25-year cycle--requires capital expenditures in steelmaking of between $4 billion and $5 billion per year, by the industry's estimate. 4/ Because of poor prospective returns from investment the integrated industry has not attained this level of investment since 1970.

The decline of the integrated steel industry has led to reduced employment. In the decade before 1974, employment in the industry varied between 500,000 and 550,000. But since 1974 it has fallen to about 391,000, a drop of about 3.8 percent per year since 1974. The decline in employment has resulted as much from increases in productivity as from lack of growth. By contrast, employment by nonintegrated producers has increased to about 30,000 due to expansion of capacity, as shown in Figure 4.

CAUSES OF THE DECLINE

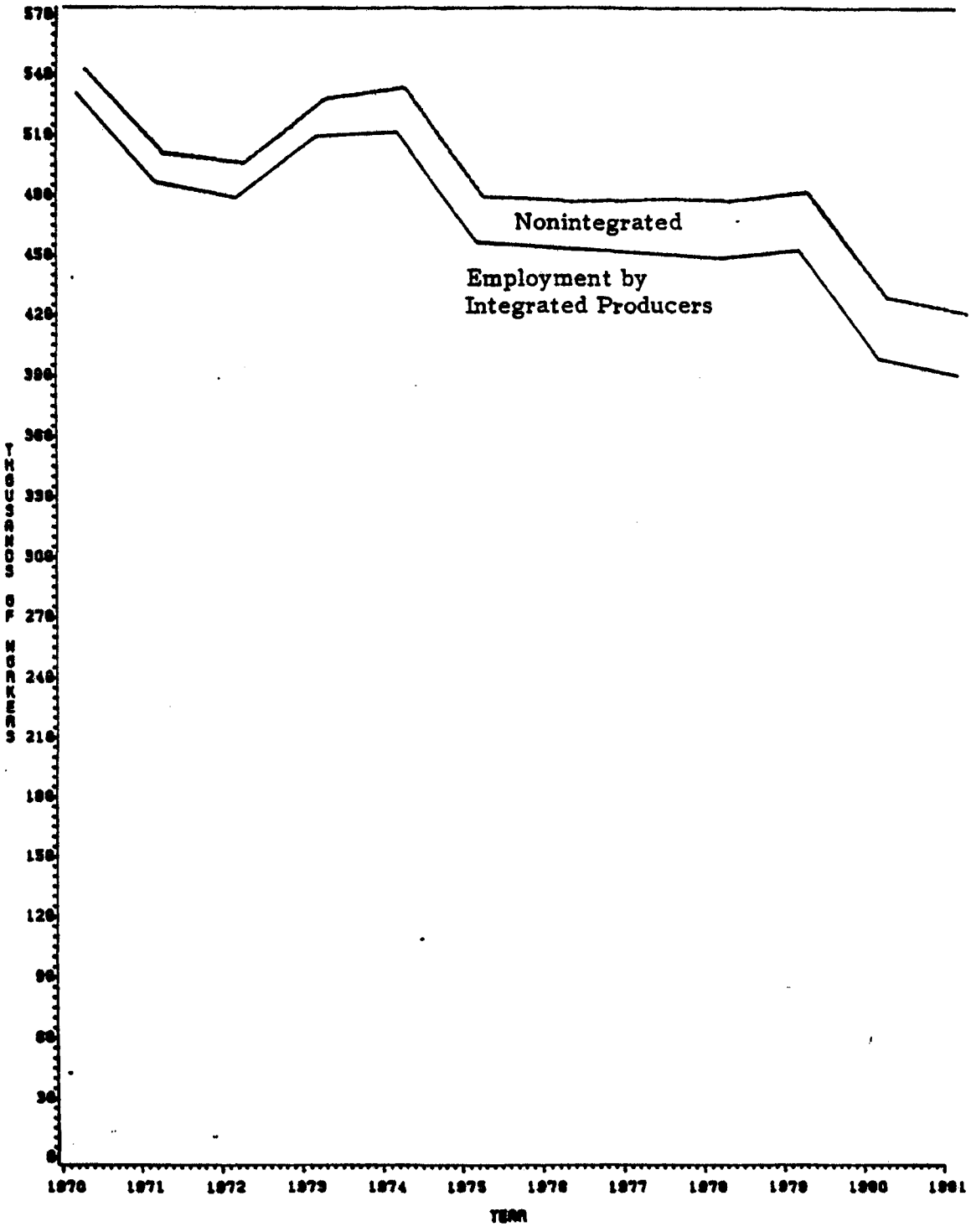
The decline of the integrated producers during the past decade has its roots in several factors. First, the demand for steel has been stagnant, not only in the United States but in the rest of the non-Communist world as well, accompanied by significant overcapacity worldwide. Second, competition from foreign producers and nonintegrated domestic firms has depressed prices and eroded the market share and profitability of the integrated steel companies. Third, the rate of change of labor costs has exceeded produc-

FIGURE 3. COMPARISON OF CASH FLOW



SOURCES: Steel-Coal, Basic Analysis (Standard and Poor's Industry Surveys, October 30, 1980).

FIGURE 4. EMPLOYMENT IN THE STEEL INDUSTRY



SOURCES: American Iron and Steel Institute, Annual Statistical Report (1980).

Annual reports of individual companies.

CBO estimates.

tivity gains, thus reducing the ability of the integrated firms to compete on the basis of price. And finally, other factors including management, lack of innovation, environmental regulations, and tax policy have also figured in the situation of the integrated steelmakers. In what follows, each of these factors is addressed separately.

The Demand for Steel

The United States is affected by the world steel market because supply and demand conditions in foreign countries exert a strong influence on domestic prices. World demand since 1974 has been stagnant because of slow economic activity, price increases, and the substitution of other products for steel. Steel use in developed nations has declined relative to real GNP by about 21 percent between 1970 and 1981. Most producers did not foresee this decline and continued to expand capacity during the period. As a result, the free world's aggregate capacity utilization rate (operating rate) has not exceeded 75 percent since 1974. Because many producers cannot operate profitably at such low rates, competition has been intense, and most producers have been cutting prices in order to increase their sales.

Competition in Steel Production

The salient condition affecting world steel markets is overcapacity. In 1981, raw steel production capacity in the free world was 665 million tons, but only 455 million tons were produced. 5/ Because of this, many foreign producers sell steel in the United States at prices below their average cost. At the same time the nonintegrated domestic producers, with their inherent cost advantages, compete more successfully in regional U.S. markets. The result is lower profitability and reduced market share for the domestic integrated steelmakers.

Foreign Competition. In recent years, the steel-producing nations that compete with the United States have evolved into three groups: high-technology, high-cost producers, including most European nations; low-technology, low-cost producers, including most developing nations; and high-technology low-cost producers, primarily Japan and Canada. Each of these groups has unique advantages and disadvantages in the American market. Table 1 shows the principal steel-producing nations and their exports to the United States.

The overcapacity problem is most acute in Europe because European demand is depressed, and steelmakers there have lost many traditional export markets in developing countries to new producers in those nations.

TABLE 1. MAJOR COMPETITOR NATIONS: STEEL CAPACITY, PRODUCTION, AND EXPORTS TO THE UNITED STATES

	1981 Steel Shipment Capacity (millions of tons per year)	1981 Shipments (million of tons per year)	1981 Exports to U.S. (thousands of tons)	Percent of Production Exported to U.S.
United States	115	84	---	---
High-Technology, High-Cost Producers				
West Germany	56	37	2,165	7
France	26	19	1,290	8
Belgium-Luxembourg	23	15	1,110	9
Italy	29	20	768	6
United Kingdom	24	17	575	4
High-Technology, Low-Cost Producers				
Japan	124	79	6,220	8
Canada	15	12	2,900	25
Low-Technology, Low-Cost Producers				
South Korea	7	6	1,220	24
Spain	12	10	730	8
Brazil	12	11	550	6
South Africa	8	7	370	7

SOURCES: AISI, Annual Statistical Report (1980), and Imports of Iron and Steel Products (1981).

Charles Bradford in Steel Industry Quarterly (Merrill Lynch, February 1980), p. 32.

International Iron and Steel Institute, Map of World Steel Production and Consumption (1981).

NOTE: For clarity, the statistics for capacity and production are measured on the basis of tonnage shipped from mills, not on the more common basis of raw steel produced.

As a result, the United States has become the Europeans' largest export market.

Most European steelmakers have been unprofitable in every year since 1974, primarily because of overcapacity. They have poor access to markets and raw materials, as well as high labor costs and low productivity. Much evidence suggests that the price of European steel landed at United States ports has been below the average cost of European producers. In many cases, it appears that the European producers have cut prices of exports below their production costs in order to sell their products and maintain employment in their mills.

Subsidies in various forms have become increasingly important in the last eight to ten years, and tend to preserve the ability of European steelmakers to sell exports below cost. These subsidies are a continual element of public and political debate in Europe. 6/ Since 1976, European countries have spent the equivalent of about $14 billion in steel subsidies—or $46 per ton produced. 7/ For example, in February 1982, the European Economic Community approved a coordinated subsidy program by its member governments worth an additional $1.4 billion during 1982. 8/

High-technology, low-cost producers such as Japan and Canada find that they too must operate at low rates because of the depressed market. Except for high-value specialty products such as seamless pipes, they too are losing profits to producers selling below production cost. Low-cost, low-technology producers have less flexibility in adjusting product lines to meet markets, so they are also affected by the price cutting. Although their production costs are low, both Brazil and Spain have had suits brought against them by U.S. steelmakers charging that they have sold below cost in order to meet competition.

International Cost Comparisons. It will be helpful to make some broad comparisons of production costs in order to determine whether the U.S. industry can expect in the long run to compete profitably with imports. In this paper, production costs are defined as the weighted average costs for all carbon steel produced within a nation.

International cost comparisons must be used with caution. Considerable ambiguity surrounds the cost data for foreign producers, and fluctuations in exchange rates and operating rates can shift apparent costs markedly. Nevertheless, some general conclusions can still be drawn. First, the historic advantage of the United States in raw materials costs no longer exists. As Table 2 suggests, material costs for U.S. steelmakers are somewhat higher than those in West Germany and Japan, due primarily to German and Japanese exploitation of new ore reserves and to lower shipping

TABLE 2. COST COMPONENTS FOR WEST GERMANY, JAPAN, AND THE UNITED STATES IN 1981, ACCORDING TO SEVERAL SOURCES

	West Germany (dollars per ton)			Japan (dollars per ton)			USA (dollars per ton)
	a/	b/	d/	a/	c/	d/	d/
Production Costs							
Materials			274		252	294	326
Labor			143		107	111	184
Financial			56		109	104	43
Total		521	473		468	509	553
Transportation Costs	71		71	81	110	81	—
Total Cost			544		578	590	553
Operation Rate (percent)		62			58		75
Exchange Rate (per dollar)		2.29			222		—

NOTE: Estimates have been adjusted in order to be comparable.

SOURCES:

a/ Council on Wage and Price Stability, Prices and Costs in the United States Steel Industry (October 1977), p. 74.

b/ U.S. Steel, Petition for Relief: West Germany (1981).

c/ Department of Commerce, reported by Charles Bradford in Steel Industry Quarterly (Merrill Lynch, February 1982), pp. 36-37.

d/ Peter Marcus, World Steel Dynamics: Core Q (Paine, Webber, Mitchell, and Hutchins, Inc., September 1981).

costs. Second, foreign producers have lower labor costs than domestic steelmakers. Although labor input per ton produced in West Germany and Japan is similar to that in the United States, the wage rates for steelworkers are lower in those countries. Third, U.S. steelmakers remain competitive in domestic markets because of lower financing costs and because they pay no transportation charges to reach the United States. The low finance costs are due to relatively low debt levels of domestic producers, and to low levels of capital investment.

Relative advantages in production costs fluctuate markedly with operating rates and exchange rates. With regard to operating rates, the United States' apparent cost advantage over Japan in 1981 was due in large part to much higher operating rates in this country during the first three quarters of the year. This advantage disappeared entirely during the last quarter when both nations' steel producers operated at similar rates. Table 3 illustrates U.S. landed production costs for several countries at different operating rates. The table shows that a relatively higher operating rate is one reason for the favorable U.S. cost position in 1981. If business conditions change so that U.S. producers' operating rate is similar to that of Japan or West Germany, this advantage could erode.

Exchange rate fluctuations can also alter apparent relative costs very quickly. For example, the West German cost advantage in 1981 was primarily a result of the depreciation of the mark by 26 percent against the dollar. Apparent German production costs changed from a relative disadvantage of $64 per ton in 1980 to an advantage of $9 per ton in 1981. These factors illustrate the volatility of relative cost advantages, and also suggest that domestic steel could be quite capable of competing with imports if the imports were priced at their apparent average production cost plus transportation. However, there is some evidence to suggest that they are not.

Many analysts have argued that some, but not all, foreign steelmakers sell in U.S. markets at prices lower than average production costs. For example, Figure 5, drawn from data by Peter Marcus of Paine Webber and by a Petition for Relief filed by U.S. Steel, compares aggregate production costs per ton for French and German producers with the revenues realized for their exports to the United States. (The Germans have typically been the most efficient of the European producers, while the French have been about average.) These data indicate that the average cost of producing a ton of steel in West Germany and France substantially exceeds the revenue received for the steel in United States markets. One result of this price competition has been to keep U.S. steel prices low enough to discourage investment in new capacity.

TABLE 3. LANDED PRODUCTION COSTS OF SELECTED COUNTRIES AT DIFFERENT OPERATING RATES IN 1981 (In dollars per ton)

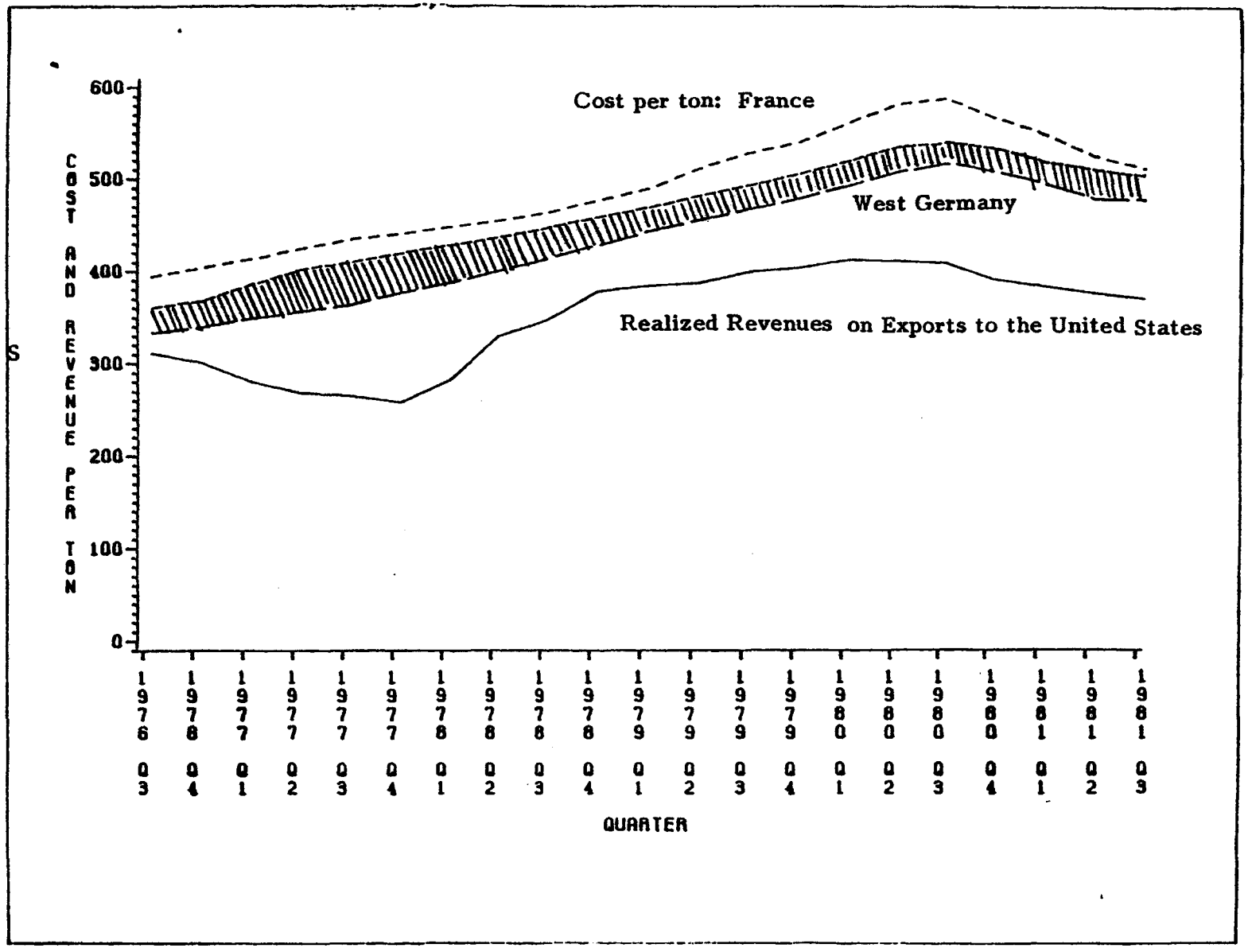
	USA	Japan	West Germany	France	Great Britain
Operating at 70 Percent of Capacity	562	569	534	585	689
Actual Conditions (Operating Rate)	553 (75.0)	590 (58.0)	544 (62.1)	581 (74.6)	706 (61.3)
Operating at 90 Percent of Capacity	534	508	489	545	621

SOURCES: Council on Wage and Price Stability, Prices and Costs in the United States Steel Industry (October 1977), p. 74.

Peter Marcus, The Steel Strategist #4 (Paine, Webber, Mitchell, and Hutchins, Inc., September, 1981).

NOTE: Production costs include freight charges and duties to the port of entry into the United States.

FIGURE 5. COMPOSITE PRODUCTION COSTS AND REALIZED REVENUES PER TON FROM EXPORTS



NOTE: Production costs for France and a range of costs for West Germany are shown. Realized revenues per ton are the same for both nations.

SOURCES: U.S. Steel, Petition for Relief: West Germany (1981).

Peter Marcus, World Steel Dynamics: Core Q and Core S (Paine, Webber, Mitchell, and Hutchins, Inc., September 1981).

Nevertheless, the U.S. steel industry has generally shown a profit, with the exception of net losses in 1977 and 1980, while the European industry has consistently shown operating losses (see Table 4). Foreign producers that export below their production costs apparently do so in order to maintain employment and perhaps also to maintain capacity in the event that demand for steel rises in the future. With this as their goal rather than profits, and with government subsidies to sustain them, European steelmakers appear capable of stiff price competition with the U. S. industry for the foreseeable future.

Domestic Competitors. Imports have not been the only source of competition; in addition, many smaller, nonintegrated domestic steelmakers have prospered at the expense of the integrated firms.

The conventional approach to making steel through an integrated process has been avoided by a number of companies that buy scrap iron and remelt it in electric furnaces to make steel. While the integrated process is highly energy-intensive and reflects the costs of iron ore and coking coal, the nonintegrated process uses much less energy and reflects mostly the cost of scrap. During most of the 1970s, the costs of integrated processes have exceeded those based on scrap steel. The integrated producers expected that scrap prices would increase faster than the equivalent costs of iron ore and coal, but this did not happen. As a result, the nonintegrated producers have thrived and have tripled their production levels since 1970. 9/

The nonintegrated mills have seized the opportunity provided by low-cost raw materials. They have built new facilities in regions where (1) scrap was available, (2) demand for basic products (such as construction materials) was growing, (3) no integrated mills existed, and (4) electricity and labor rates were low. Most of these facilities used nonunion construction and operating personnel and installed highly efficient but flexible processes to produce steel for growing regional markets—particularly those in the South and Southwest. Several of the integrated producers have recognized these advantages and have converted some mills into electric furnace operations. Nonintegrated mills succeeded in capturing markets for certain products from both integrated mills and imports. Table 5 shows how nonintegrated producers have penetrated certain markets--such as wires and bars--and it also shows that the nonintegrated firms cannot compete in markets for about 65 percent of domestic steel products.

The advantages of the nonintegrated firms are low labor and material costs. Some new nonintegrated mills require only 1.5 to 2.5 man-hours per ton shipped. The average for nonintegrated firms is between 4 and 6 man-hours per ton, compared to 8 to 9 man-hours for the average integrated firm

TABLE 4. OPERATING PROFITS AND LOSSES IN DOLLARS PER TON

	United States	Japan	West Germany	France	Great Britain
1981	15	---	(43)	(50)	(75)
1980	(18)	24	(13)	(79)	(218)
1979	35	47	10	(48)	(48)
1978	30	10	(16)	(42)	(67)
1977	(6)	(15)	(46)	(83)	(52)
1976	3	(17)	(18)	(56)	(34)
1975	7	(10)	(26)	(69)	(68)
1974	26	18	39	1	(1)
Average Profit (or Loss) per ton 1/	16	10	(9)	(53)	(59)

SOURCE: Annual reports and preliminary quarterly reports of major operating companies.

Peter Marcus, World Steel Dynamics, Core Q (Paine, Webber, Mitchell, and Hutchins, Inc., September 1981).

1/ Average price per ton was about $300.