

Steel fights back

George Cloos

Since 1982, the American steel industry has been struggling back, haltingly, from near disaster. With the industry beset by shrunken markets, intense foreign competition, technological change, large indebtedness, and heavy financial losses, doubts were expressed in 1982 and 1983 as to whether survival would be possible without massive government aid, perhaps nationalization, a course that has been followed in several foreign countries. Drastic measures to cut costs, including retirement of obsolescent plants, large reductions in staff, and divestiture of money-losing subsidiaries, together with a revival in shipments, restored several producers to profitability in the first half of 1984, but most dropped back into the red as imports surged in the second half of the year.

United States mills shipped 73 million tons of finished steel in 1984, up from 68 million in 1983, and 62 million in 1982. The peak for steel shipments was reached in 1973 at 111 million tons. Over 100 million tons were shipped in 1979, the last good year. In 1984, steel shipments were about 5 million tons short of projections made early in the year, mainly because of a surprising surge in imports from several "less developed" countries. Consumption of about 93 million tons in 1984 at least equaled expectations expressed early last year.

With an expected further rise in demand for steel in 1985 and a round of government negotiations to scale back imports, the industry's vital signs seem to be improving. However, steel still faces an uncertain future. The Midwest, with its industrial concentration on durable goods made of steel, and with almost 30 percent of the steel industry located in Illinois, Indiana, and Michigan, has a heavy stake in steel's comeback.

This article outlines the history of the American steel industry, describes the developments that led to its recent crisis, and examines steps being taken to restore its health.

Fluctuations and fixed costs

Prehistory is divided into a Stone Age, a Bronze age, and an Iron Age—each marking an advance in man's control over his environ-

ment. Prior to 1860 only small amounts of steel—iron modified to increase strength and versatility—had been produced expensively in small batches. But in the mid-19th century, the Steel Age began with the introduction of the Bessemer converter, which was soon followed by the open hearth steel furnace. For many decades, growth in steel usage paralleled and supported rapid strides in productivity and human welfare.

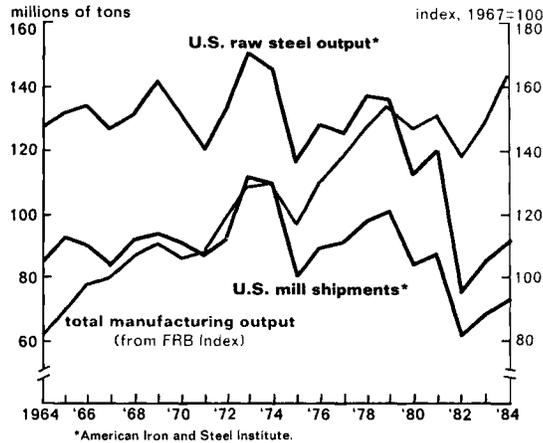
Despite the growing role played by chemicals and electronics in recent decades, we are still in the Steel Age. Steel, relatively cheap and versatile, is by far the most widely used material in the manufacture of vehicles, ships, business equipment, defense equipment, structures, and a host of other items. Steel is still an essential ingredient of modern civilization. It is disturbing to many people, therefore, that the United States, long-time leader in steel output and technology, now receives over one-fourth of its requirements from foreign sources.

A large share, perhaps over 50 percent, of all steel goes into the manufacture of business equipment and structures, sectors which rise and fall proportionately more than total business activity during expansions and recessions. Another characteristic of the steel industry is its large fixed-capital base relative to annual sales. Large investments are required for producing basic materials (iron ore, coking coal, and limestone). Blast furnaces are needed to turn iron ore into molten iron, steel furnaces to convert iron to steel, continuous casters, rolling mills, and other facilities to produce finished steel products. Heavy fixed-capital investments relative to sales in any industry mean large fixed costs, mainly depreciation of facilities and interest on debt.

Like other industries under collective bargaining, steel firms also have a heavy burden of "past service" liabilities for pensions and medical care for retirees and current employees. Fixed-costs, as opposed to variable costs, continue unabated, and may even increase, in years when revenues decline. A large decline

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Steel output far below peaks



in revenues can result in huge deficits such as those incurred in the 1930s and in the 1982-84 period.

At high operating rates, industries with a heavy fixed-capital investment can be very profitable. When demand presses against capacity, new facilities cannot be created overnight. In 1974, with steel output at near record levels, and its operating rates at 92 percent of capacity, the industry earned a 17 percent net profit on equity. In 1982, operating at 48 percent of capacity, the steel industry posted a collective deficit equal to 18 percent of equity.

An all-new, "greenfields" integrated steel mill constructed today would be much more efficient than any existing complex. However, the cost of construction would be prohibitive, many times the stock market value of existing facilities. None is contemplated. Only two integrated mills have been built in the United States since World War II: United States Steel's Fairless Works in Pennsylvania, built in the early 1950s, and Bethlehem's Burns Harbor Works in Indiana, established in the mid-1960s. The Fairless Works is now relatively antiquated. The Burns Harbor Works, expanded and renovated in subsequent years, remains one of the lowest cost facilities anywhere in the world.

The domestic industry's principal rival, Japan, built virtually all of its steel facilities after World War II, mostly since the mid-1960s. Most of its prewar industry had been severely damaged in air raids; but it had been small by today's standards, in any case.

Industry problems

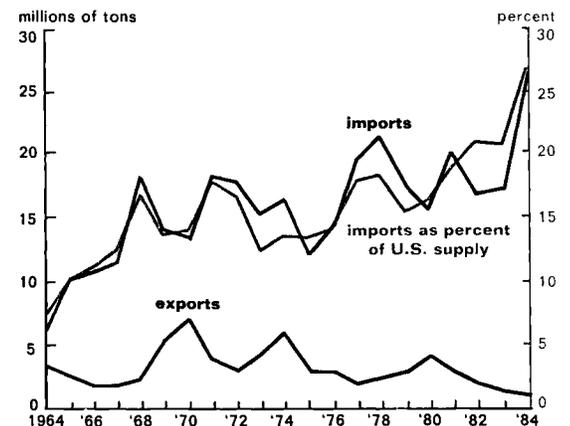
Difficult times for the U.S. steel industry in recent years in large part reflect depressed markets for durable goods, world-wide, starting in 1979. Moreover, energy considerations have led to lighter vehicles, thereby shrinking a major market for steel. Rapid growth of steel-making capacity around the globe in the 1960s and 1970s, which continued after over-supply problems became apparent, has caused cut-throat competition for a smaller market. Downward price pressures have been constant and powerful. Many foreign steel producers are government-financed and controlled, and steel exports, perhaps sold below cost of production, an illegal form of marketing called dumping, provide a means to acquire vitally needed foreign exchange.

Finally, the high value of the dollar has hit our domestic steel industry doubly hard, by affecting markets for both steel and products made principally of steel. From 1980 to February 1985 the value of the dollar rose 81 percent relative to 10 leading foreign currencies. This means that, on average, U.S. products cost 81 percent more abroad, while foreign products were 45 percent cheaper here, other things equal.

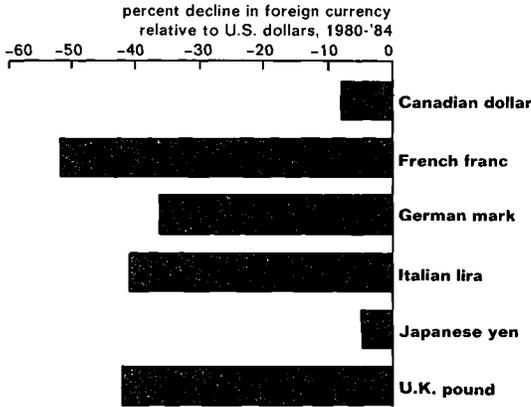
Less steel needed

Steel demand has declined partly because of a shift away from durable goods made principally of steel to nondurables and electronic equipment, which use relatively little steel. In 1984, manufacturing output in the United

Steel imports surge to record level



Foreign steel cheaper as value of dollar rises



States, in physical units, was at a record high, 7 percent above the level of 1979. But steel consumption at about 93 million tons, including imports, was almost 20 percent below the usage of 1979, which may hold the record for many years to come.

The lower level of output in some important steel-using industries is readily observed in changes in pertinent components of the Industrial Production Index. In 1984, when total manufacturing was 7 percent above the level of 1979, output of farm tractors was down 65 percent, tracklaying tractors down 55 percent, and railroad equipment down 80 percent. Meanwhile, output of computers and electronic components was 50 percent higher than in 1979. Electronic items require steel, but in relatively small amounts.

The motor vehicle, machinery, and construction industries are the leading consumers of finished steel. In 1978, motor vehicles took 21 percent of U.S. mill shipments; last year, only 17 percent. In terms of pounds of steel per vehicle, domestic mill shipments to the auto industry dropped from 3,300 pounds in 1978 to 2,300 last year. Partly this reflected increased imports. The Big Three automakers do not buy much foreign steel directly, but they are incorporating a growing share of foreign-made components.

Most of the drop in steel usage by the vehicle industry reflects downsizing of cars and trucks to improve fuel economy, a trend still underway. But motor vehicles are still primarily steel machines. Despite some substitution of aluminum and plastics for steel between 1976 and 1984, the proportion of iron and steel

to total weight in the average vehicle declined only from 74 percent to 70 percent. The main reduction in steel usage reflected a 14 percent drop in average total vehicle weight.

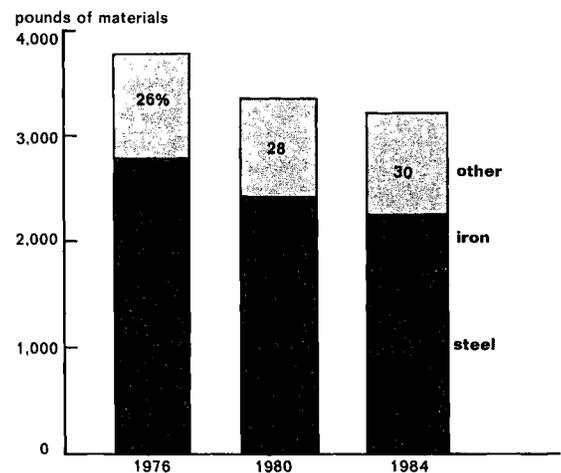
World growth in steel

In 1964, U.S. raw steel production was 26 percent of the world total of 438 million metric tons. In 1979, the United States produced 17 percent of a record world total output of 746 million metric tons. Last year, with production below past peaks in most non-Communist countries, the United States produced only 12 percent of the world's steel.

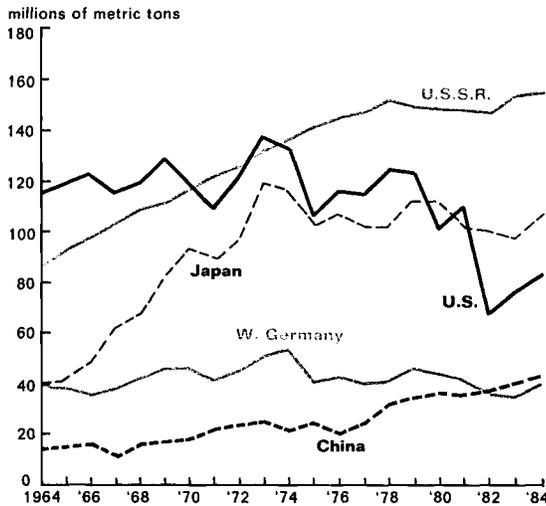
Under current conditions, most of this nation's steel requirements could be satisfied from surplus capacity available abroad, although there would be some problems with specifications and quality. Analysts estimate that the world's excess steel capacity exceeds 200 million tons. Heavy capital investments continued even after the surplus problem emerged, partly because of national pride.

Through 1970, the United States had been the world's number one steel maker. In 1971, it was passed by Russia, which in recent years has been producing twice as much as the United States. Since 1981, the United States has been surpassed also by Japan. Other important producers (although not close to Russia, Japan, and the United States) include West Germany, China, France, Italy, Poland, Canada, Belgium, Czechoslovakia, Brazil, South Korea, the United Kingdom, Rumania,

Steel in average car declines 20%, 1976-'84



Russia leads world in steel output



Spain, and India, each with capacity of over 10 million metric tons and each trying to capture a larger share of the world market. As a result, world prices have been kept below the cost of production for most mills.

The reduction in steel output in most western nations and in Japan partly reflects their "mature" economies. Population growth has slowed or stabilized and infrastructures—roads, public works, and buildings—are largely in place. Developing countries such as Brazil, China, Korea, India, Mexico, Spain, and the Soviet Union still have a long way to go to match the living standards of more industrialized nations. In 1984, steel output set new highs in China, South Korea, the Soviet Union, and Spain, according to the International Iron and Steel Institute.

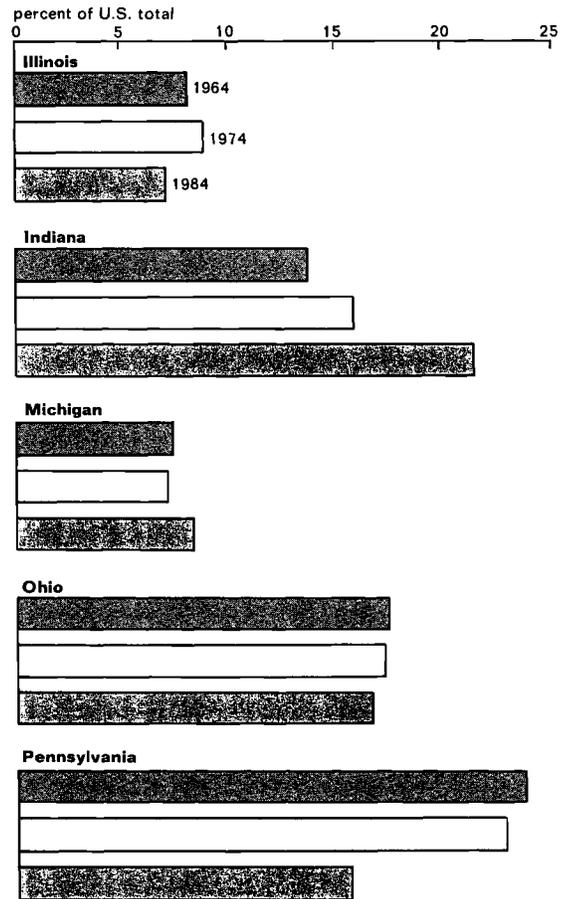
Seventh District steel

The Chicago area has been the nation's leading steel producer for a third of a century, having surpassed Pittsburgh in the early 1950s. The Chicago area now produces more than twice as much steel as Pittsburgh. As the domestic steel industry has contracted in recent years, Chicago's lead has widened. Some steel plants are located in South Chicago (a section of the City of Chicago), but a much larger concentration of steel production is in adjacent Lake and Porter counties in Indiana, with ports on Lake Michigan to receive raw materials.

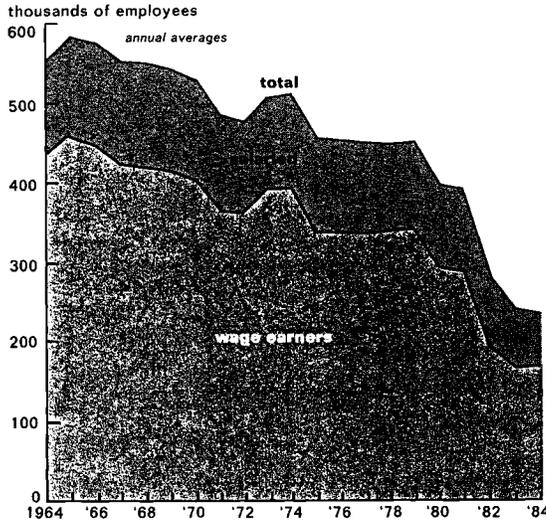
These counties contain the leading integrated facilities of U.S. Steel (Gary Works), Bethlehem Steel (Burns Harbor), LTV (plant acquired from Youngstown), and Inland Steel (Indiana Harbor). Collectively, these mills comprise the strongest element in the American steel industry. Illinois also has several important steel production facilities downstate. Michigan's steel plants are concentrated in the Detroit metropolitan area, primarily to serve the motor vehicle industry.

In 1965, Pennsylvania was the leading steel producer with 24 percent of the total, followed by Ohio with 17 percent, and Indiana with 13 percent. Partly because of the growth of the Burns Harbor Works and partly because of the closing of facilities elsewhere, Indiana was the leading steel producing state in 1983 with 24 percent of the total, followed by Ohio with 17 percent, and Pennsylvania with 15

Indiana leads in steel output



Steel industry employment hits new low



percent. Michigan had 8.5 percent in 1983 and Illinois 6.5 percent. While almost all other states increased output, Indiana produced less raw steel in 1984 than in 1983, mainly because of the realignment of programs of a principal producer with facilities in other regions. Indiana's proportion of the nation's raw steel output dropped to 22 percent in 1984, but it still led second place Ohio (17 percent) by a comfortable margin.

The factors that led the steel industry to concentrate almost 30 percent of its raw steel capacity in the Chicago area are still viable. They include availability of cheap water transport for iron ore, limestone, and coal (steel's basic raw materials); excellent rail and truck transport; proximity to markets; and relatively less competition from imports because of the region's greater distance from ocean ports.

Steel jobs at new low

Total employment in the U.S. steel industry averaged 236,000 in 1984, according to the American Iron and Steel Institute (AISI), the lowest level since records were first compiled in 1933 at the depth of the great Depression. In the prosperous year 1974, steel employment averaged over 510,000, more than double the recent number. About 28 percent of all steel workers are in Indiana, Illinois, and Michigan. Since 1979, many displaced steel

workers have remained unemployed—some for years—following their release from the only jobs they had held as mature workers.

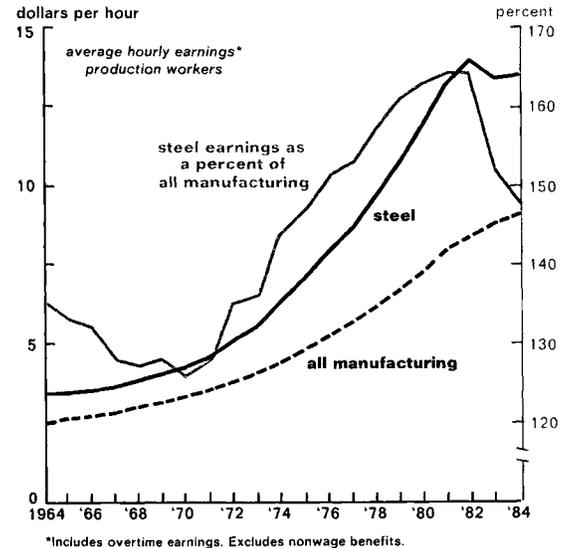
Steel industry employment continued to decline in 1983 and 1984, despite the rise in production, because of increased automation and drastic cost-cutting by industry managers. Both hourly paid and salaried workers have been affected. Staff reduction efforts continue, as permitted by union rules and EEO mandates, with severe cuts in all divisions and departments that do not directly contribute to output and potential profitability.

Employment costs high

In 1983, average hourly employment costs, wages and benefits, for production workers in the U.S. steel industry were over \$22. This compared with estimates of about \$12 per hour in Japan, West Germany, and France, and only \$8 in the United Kingdom. However, AISI spokesmen insist that all or most of this differential is offset by the higher productivity of U.S. workers and by the costs of transporting foreign steel to domestic markets.

Hourly earnings of steel workers averaged \$13.50 in 1984, about 60 percent of total employment cost. Non-wage benefits are relatively high in the steel industry. Hourly earnings in steel exceeded the 1984 average of

Steel workers earnings exceed manufacturing average



\$9.17 in all manufacturing by 47 percent. The differential in favor of steel workers was 28 percent 15 years ago. It hit a high of 64 percent in 1981-82, before declining after concessions were agreed to by steel unions.

Company deficits pared

Return on equity of large steel companies has been well below the average for all manufacturers for many years. In the late 1960s, steel earnings as a percent of equity averaged 4.5 percent below the manufacturing average. Since then steel did better than the average only in 1974. Poor earnings forced greater use of debt financing for needed investments, thereby increasing financial instability.

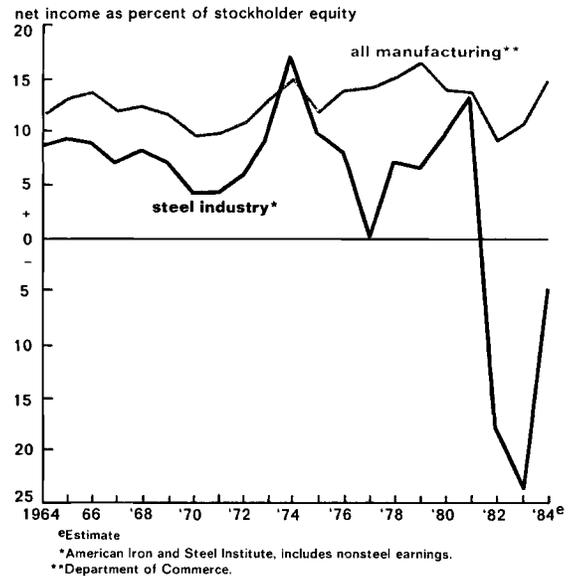
Steel industry deficits totaled \$6 billion in 1982 and 1983. In these years, despite a lackluster general economy, all manufacturing companies earned a net return of 10 percent on equity. Last year, despite economies, most steel firms still ran deficits, but much smaller than in 1982-83. There are hopes for moderate profits in 1985 if operating rates significantly exceed 70 percent.

The evaluation of earnings of steel firms is complicated by their ownership of non-steel making operations. The most prominent of these is United States Steel's ownership of Marathon Oil, purchased in 1981. Also, reported earnings or losses in steel have been affected by methods of charging off abandoned plant and by methods of calculating contributions to pension funds.

Much publicity has been given to the growth of low-cost "mini-mills" in the past decade. These enterprises, usually independently owned, generally confine their operations to simple products such as bars, rods, and wire made from scrap melted in electric furnaces. They have captured about 16 percent of the total steel market, but appear to have peaked because they cannot broaden their product lines without making heavy investments in both capital equipment and research and development.

The steel industry is dominated, as for many years past, by giant firms. United States Steel (U.S.S.), which had 65 percent of the nation's capacity when it was formed in 1901, was down to 28 percent in 1950, and about 16 percent in 1984 after closing major facilities. A proposed merger with National Steel was

Steel industry reports huge deficits



withdrawn last year after federal opposition. LTV has become the second largest firm, and may be close to U.S.S., by adding Republic to its previous acquisitions of Jones & Laughlin and Youngstown. Bethlehem, long in second place, is now third, with 13 percent of industry shipments in 1984. Inland and National each have about 7 percent of the industry. Armco follows with 6 percent.

Foreign companies, mainly Japanese, have acquired some U.S. steel facilities, but they are still not a large factor. Some large proposed deals were not consummated, e.g., the sale of Ford's Rouge Plant.

Steel capital expenditures rise

Despite heavy losses that started in 1982 and have continued into early 1985, the domestic steel industry is planning to spend, according to the government's April survey, a record \$4 billion on new plant and equipment this year, up 13 percent from 1984, which, in turn, was up 8 percent from 1983. All of this spending is to improve efficiency and assure quality of product.

A large share of capital spending by the steel industry is to expand continuous casting operations, which bypass the ingot stage of steel making and provide a higher yield of finished steel per ton of raw steel. According to an

AISI survey, construction is underway on eight large continuous casters with a capacity of over 10 million tons per year to be ready by late 1987. In the past three years, 16 such machines with a capacity of 16 million tons were installed, almost doubling continuous casting capacity. Machines in place have been operating virtually at full tilt even in depressed times. They provided 38 percent of all raw steel last year. (Some 85 percent of Japan's steel is continuously cast.) Other capital outlays in the industry are for improved rolling facilities, computerization, energy conservation, and pollution abatement.

Far from adding to total capacity, the domestic steel industry has been reducing capacity, defined as "capability to produce raw steel for a sustained full order book." From a peak of 160 million tons in 1977, capacity has declined to 136 million tons currently. Nevertheless, the industry operated at only 55 percent of capacity in late 1984, and at only 65 percent in February 1985. Even with severe cost reduction programs, break-even points are probably at about 70 percent for most companies. Further cutbacks in capacity are anticipated. In recent years, many high-cost, labor-intensive, integrated mills, some in facilities dating back to the 19th century, have been closed and demolished, including plants in Ohio, New York, Pennsylvania, the South, and on the West Coast. The largest fatality in the Seventh District was the medium-sized Wis-

consin Steel Works in South Chicago formerly owned by International Harvester and closed in 1980. However, the South Works of U.S. Steel in South Chicago is down to a few hundred workers from 10,000 a decade ago. Concern that the Ford Motor Co. would close its Rouge Steel plant in Dearborn was stilled when a plan to renovate the mill was announced last year, following a failure to sell it to a Japanese company.

Farewell to the open hearth

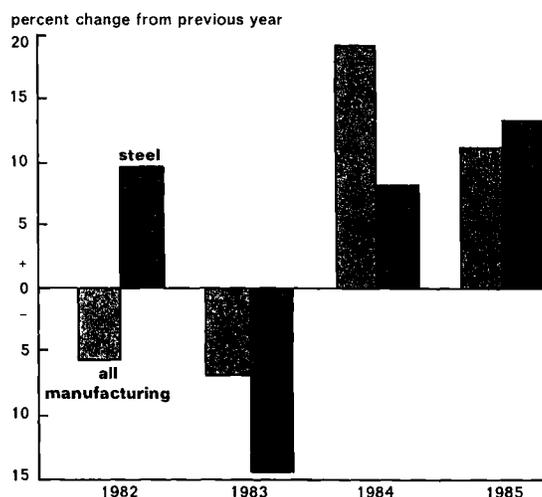
In the late 19th century, almost 90 percent of U.S. steel was produced in Bessemer converters and 10 percent in open hearth furnaces—a superior method for controlling quality. The foundation was laid for this nation's strides to leadership in steel in the early 20th century. By 1930, this ratio had shifted to 86 percent open hearth, 12 percent Bessemer, and 2 percent electric. In the 1950s, the basic oxygen furnace, a much faster process, was introduced and electric furnace usage continued to rise. In the 1970s, first the basic oxygen and then the electric furnace passed the open hearth. In 1984, the shares were: basic oxygen 58 percent, electric 33 percent, and open hearth 9 percent. Chicago-area mills have been among the leaders in utilizing new techniques.

While basic steel quality has continued to improve, there also has been a trend to special steels—alloys, stainless, heat-resisting, high strength, and coated. Because all special steels tend to reduce weight and improve durability and longevity, a relatively smaller tonnage of raw steel is required to produce the same functional quality.

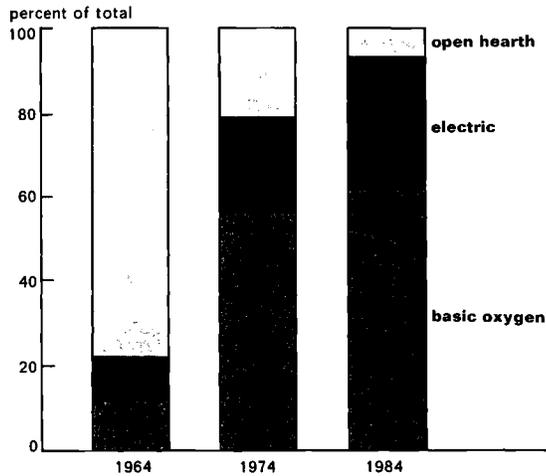
Drive to slow steel imports

Until the late 1950s, U.S. exports of steel exceeded imports. However, in those years the two-way trade did not loom as a major factor affecting the domestic industry. In 1959, aided by a 116-day, industry-wide strike that took out 90 percent of U.S. steel capacity, steel imports exceeded exports by almost three million tons. (No industry-wide steel strike has occurred since 1959.) Imports dropped back in 1960, but still slightly exceeded exports. Since then imports have exceeded exports every year, usually by an increasing margin.

Despite financial woes, steel companies boost capital investment



Basic oxygen and electric furnaces supplant open hearth



On a number of occasions in the past 20 years, U.S. steel industry leaders have expressed hopes that the import threat had been reversed or at least contained. By 1965, steel imports accounted for 10 percent of U.S. supplies. In 1978, this proportion peaked temporarily at 18 percent, but it subsequently rose further. Despite various agreements to restrict imports, the total surged to an all-time high of 26.2 million tons in 1984, while exports fell to a post-war low of 1.0 million tons. Imports accounted for 26.6 percent of U.S. supplies last year, far exceeding any previous year. In addition, large quantities of steel are being imported in the form of finished goods or components.

In the early 1960s, foreign steel producers were hampered in their attempts to enter U.S. markets by problems in meeting specifications and by lack of an adequate distribution network. Quality problems have long since been overcome by the best foreign producers. Also, in recent years, foreign producers have acquired control over a substantial portion of the nation's steel service centers (steel warehouses) through which a major share of imported steel is sold to U.S. manufacturers and construction firms. In addition, some foreign fabricators of construction steel have bid successfully on contracts for large buildings, bridges, and other structures.

Domestic steel producers have complained for years that much foreign competi-

tion is unfair, aided by heavy government subsidies, while imports of U.S. steel into foreign countries are restricted or even forbidden. A large volume of imports, they charge, have been in violation of U.S. anti-dumping laws enacted to prevent sales of foreign products here at lower prices than in home markets.

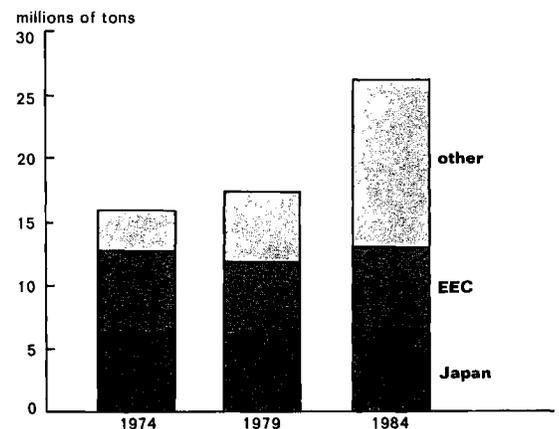
Last summer the International Trade Commission (ITC) recommended a package of tariffs and quotas to protect the domestic steel industry. They point out that U.S. steel users have become heavily dependent on foreign supplies, potentially a dangerous situation in case of war or other disruptions to sea lanes. Many steel users strongly protest any new restrictions, stating that resulting higher prices would injure their competitive positions at home and abroad.

On September 19, 1984, President Reagan rejected the ITC's recommendation in favor of voluntary arrangements with individual foreign exporting countries. Various such arrangements are expected to limit imports to 18.5 percent of the U.S. market, 6 percent for Japan.

On November 28, 1984, as a result of special studies, steel pipe and tube imports from the European Economic Community (EEC) were embargoed through December 31, because of alleged violations. An agreement was reached on this problem in January.

Through 1982, about 80 percent of U.S. steel imports came from Japan, the EEC, and Canada, but recently other nations, including Brazil, South Korea, Spain, and Mexico have become increasingly important. Last year over 10 million tons of steel imports, 38 percent of

Import share from Japan and EEC has declined



the total, came from "others." Formal agreements on imports of steel from the EEC, and informal agreements with Japan, have been in place for years. Negotiations with the "other" steel exporters, often "Third World" nations, may be more difficult.

Negotiations critical

In late March 1985, the Administration announced that it would not ask the Japanese to extend their limit on exports of passenger cars to the United States after the expiration of the existing ceiling on April 1. Such a "free market" solution is not contemplated for steel. On the contrary, the Administration is moving deliberately to reduce, and then limit, the market penetration of foreign steel producers in U.S. markets.

The program to control steel imports will involve complicated negotiations with numerous countries. No single announcement will write "finis" to the effort. Adequate monitoring and implementation of enforcement measures can be expected to continue for years. The skill and determination of U.S. negotiators will be severely tested.

Outlook still somber

As a result of plant closings, mergers, and heavy capital outlays, a leaner, more modern domestic steel industry has emerged, determined to remain a vital sector in the American economy. With imports restrained by voluntary agreements, some analysts believe total mill shipments could exceed 78 million tons in 1985, 27 percent above the 1982 low, but still far below the average for the last 20 years. Given a prosperous American economy, further advances are likely in the remainder of the decade.

The federal government has the ability, and apparently the determination, to impose meaningful restrictions on steel imports which threatened the viability of the domestic industry in 1984. With financial stability restored, U.S. steel producers can intensify their efforts to exploit new technology. Steel will continue to be the basic material for the manufacture of

The "Keyworth Initiative"

During 1984, four task force groups composed of steel industry scientists and researchers from Argonne and Oak Ridge National Laboratories and the National Bureau of Standards evaluated new methods of steelmaking, casting, product development, and control engineering. Such "leapfrog" technologies may aid the steel industry's recovery and long-term survival.

The joint program, called the "Keyworth Initiative," after George A. Keyworth, Science Adviser to the President, is an attempt to focus the research capabilities of the great National Laboratories on the specific needs of a vital and basic U.S. industry. Says Howard M. Lowe, a member of the Presidential Committee on Industrial Competitiveness, "By seeking a technological solution, we are building upon our national strengths. We can't compete with the third world on the cost of labor.... The one thing we have in our favor is the best science and technological base in the world."

The use of National Laboratory resources would greatly increase the steel industry's research capabilities. Industry and national laboratory scientists working together will help to focus on the research and aid the effective transfer of the results from lab to mill. The cost of this public-private effort will be shared by government and industry. A major task of the Keyworth Initiative in 1985 will be to develop specific research projects in the most promising of the new technologies.

durable goods. Therefore, domestic steel production can be expected to expand with the general economy, particularly with output of motor vehicles, machinery, transportation equipment, and heavy construction. Midwest steel producers are suitably located and equipped to maintain or expand their share of the national market.