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Competitive Development of the Japanese Steel Industry

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Introduction

The brilliant success of Japan’s steel industry is frequently attributed to, in varying combinations, cheap labor, unfair price competition, and government assistance. In fact, these alleged factors have had little or no impact on the Japanese steel industry’s recent performance. Japanese unit labor costs have dropped relative to the United States steadily since 1965, yet Japanese steelmakers’ wages have increased three times faster. The unfair pricing hypothesis has never been satisfactorily documented, and under voluntary steel export quotas Japanese steel prices in the United States have become artificially high. The government did provide significant financial assistance and incentives during the industry’s postwar redevelopment. As this report will suggest, however, government’s cooperation with industry over the last decade has been neither economically decisive nor operationally mysterious. It is easy to overestimate the government’s impact on Japan’s competitive position.

A more accurate explanation of Japan’s success would emphasize a modern physical steelmaking capacity resulting from the highest investment levels per ton in the developed world, application of highly effective raw material acquisition and logistics systems, and productivity gains which overcome rapidly rising labor wages and lowered actual unit labor costs over the 1960s. In a context of rapid growth in the domestic market and a supportive national government policy, Japan has become the low-cost broad line steel producer in the world. This paper describes the historical development and competitive economics of this remarkable performance.

Industry Evolution

Prewar Pattern

Steel is traditionally the sine qua non of industrial development and military adventure. Japan’s sustained and rapid rate of industrialization and her periodic military episodes created large, often sudden demands on steel production. The
country, however, has little iron ore and only limited coal deposits; hence domestic production has required from the beginning the import of basic materials. The small production scale and the logistics of raw material acquisition made early Japanese steelmaking decidedly uncompetitive. Private capital was not attracted in significant amounts to steelmaking until the twentieth century. The Japanese government, in order to ensure an adequate steel supply, directly or indirectly controlled the industry for nearly the entire period from the Meiji Restoration through the Second World War.

At the turn of the century, the government established Japan’s first large modern mill. The Yawata Mill dominated production, the remainder of which was shared among older state-owned and scattered private mills. The mill was built on the northern coast of Kyushu to eliminate the overland haul of ore and coal from mainland China. Finished steel imports exacerbated the chronic foreign exchange problem, so the government subsidized the Yawata mill for ten years until its operations were reasonably competitive with imports.

World War I launched the steel industry in Japan as requirements rose dramatically and imports of finished steel from Europe diminished. All of today’s major private firms including Fuji (later merged with Yawata into Japan Steel), Sumitomo, Kobe, Kawasaki, and Nihon Kokan were established in the first fifteen years of the century. Production was stimulated by special wartime tax exemptions.

Overcapacity, which plagued the industry during the 1920s, became critical during the depression of the early 1930s. The government responded with the Important Industry Law of 1931, conferring on government the authority to organize production and allocate markets. In 1934, the Japan Steel Company was organized by consolidating Yawata with the six largest private steel companies. The state was directly responsible for its creation and, through Yawata, owned 70 percent of the consolidated firm. War with China in 1937 enlarged the role of the state’s bureaucracy in the industry. The Ministry of Commerce and Industry, MITI’s predecessor, both allocated production among steelmakers and rationed output to end-users during the military buildup of the late 1930s. In 1941 full operating control passed to the government and remained there throughout the war.

The prewar pattern, then, was not one of simply close cooperations but of frequent direct control. The management of steel producers were accustomed to reporting alternately to shareholders and government officials. The necessity which Japan faced of rapidly expanding wartime production and allocating imported raw materials among producers drew government into the industry’s operations. The practice of placing former vice ministers of government on the boards of large manufacturing firms had its origins in the immediate prewar period, and the steel industry was the leading practitioner. Until its dissolution at the war’s end, Japan Steel Company was effectively an extension of the Japanese government.
Postwar Recovery

Steel was identified early in the postwar period as an absolutely critical redevelopment priority. In August 1945 only three of Japan's thirty-five wartime blast furnaces were in operation. Significantly, the decline in production had resulted more from disruption of raw material supplies into Japan than from destruction of the plants. Japan's industry had been turned off at the port. Consequently, the problem was not to rebuild the nation's steel capacity but to restore them to production.

One of the first major postwar joint economic policies of the Japanese Cabinet and the General Headquarters of the Allied Powers was to designate steel, coal, electric power generation, and chemical fertilizer as the key recovery industries.

Funds for steel industry rehabilitation came from two broad sources: government subsidies and a mixture of government and private borrowings. The postwar production cost of steel exceeded both the prewar level and, more importantly, the economically desirable level for supplying the critical basic material in Japan's reconstruction. Consequently, subsidies were provided at both the steel resale price level and the imported raw material level. The critical subsidy was the former: from 1947 through 1950, cumulative price of steel to end-users was reduced by over one-quarter of a billion dollars from producer cost levels. This sum represented nearly 30 percent of all price subsidies awarded to strategic postwar industries including coal, fertilizer, power, and food. Coal price subsidies, which accrued indirectly to steel producers, accounted for an additional 15 percent.

Renovation of existing capacity was financed by a mixture of debt instruments. The Reconstruction Finance Bank, a government financial institution, responded to the Cabinet's designation of priorities and became the single major creditor of the industry during the immediate postwar period. The commercial banks themselves loaned roughly $14 million to the industry from 1947 to 1950. Private bank capital was scarce, and Tokyo's city banks responded to the administrative guidance of the Bank of Japan in directing funds to the economy's various sectors. A strong, almost tacit consensus existed on the necessity to completely restore production in the vital industries.

There was a distinction, however, between restoring capacity and expanding capacity, and it was this issue which occasioned the first visible policy disagreement over the recovery strategy for the steel industry. The postwar inflation caused the government in 1949 to cut back the economy's recovery program. As a result, the steel industry which by 1949 had roughly recovered its 1935 production level of 4.7 million crude metric tons experienced reduced price and import subsidies, causing the cost of steel to rise and the demand to fall. Yataro Nishiyama, president of Kawasaki Steel, which was and remains an aggressive firm, announced his intention to build a major new steel plant, the
first substantial capacity increase since the war. The Bank of Japan, under the
direction of Hisato Ichimada who was nicknamed "The Pope" in light of the
bank's powerful influence at the time, had helped to initiate, and strongly
supported, the deflationary economic policy. The Bank discouraged the expan-
sion, pointing out its inflationary effect and the existing unutilized industry
capacity. Kawasaki, seeking to gain market share, argued that domestic demand
would rapidly increase after the temporary countercyclical policy expired and
that adequate construction lead time recommended Kawasaki's plan. Kawasaki
did build its plant. The Bank of Japan continued to advise against it but did not
attempt to impose its position on Kawasaki's banks, and the plant was financed
domestically. Kawasaki emerged prophetic when shortly after, in June 1950, the
North Korean Army entered South Korea and steel demand rose sharply.

Subsequently, a First Rationalization Plan was announced by MITI. The
plan's objectives were to increase the productivity of existing plants and
stimulate the building of new ones over the period 1951-55. Assistance by
government was in two categories: broad tax and duty exemptions and loans
from government financial institutions. The tax and duty measures were enacted
in 1952 and provided:

1. Import duty exemption on designated steelmaking equipment. (Sixty
   percent of such equipment was imported at that time.)
2. Fifty percent increase in depreciation base allowed on designated equip-
   ment.
3. Reserve for price changes in inventories and securities established as
tax-free contingency measure.
4. Revaluation of assets permitted, effectively increasing the depreciation
   base.
5. Additional bad debt reserves permitted.

The effect of these measures was to increase the funds from operations
available for reinvestment and, in particular, toward specific types of invest-
ments. Over the five-year period (1951-55) when steel output doubled from 4.8
to 9.6 million tons, internal funds generation accounted for one-quarter of the
$145 million capital expenditures in the industry. Another 10 percent was
financed through new equity issue while the remaining two-thirds was through
debt instruments. It is evident that Japan's steel industry, now well-known
outside Japan for its aggressive high-debt financial policies, was forced to accept
high debt levels at an early postwar date in order to finance its growth.

The borrowings from government financial institutions during this period
were characteristically large in amount and further leveragable with private
commercial banks. The Japan Development Bank, the Industrial Bank of Japan,
and the Long Term Credit Bank—all governmental or quasi-governmental
banks—lent to the steel industry and accounted for roughly half of the $95
million in debt undertaken during this period. Commercial banks were encouraged to finance the steel expansion, and the Ministry of Finance permitted $11 million of foreign exchange loans to the industry.

The First Appearance of Overcapacity

Steel remained an industry of critical policy interest, and a Second Rationalization Plan for 1955-60 was developed by MITI and the industry. It was during this period that Japan's steel industry began to develop its modern, efficient steelmaking capability. Capacity more than doubled over the five years. Moreover, Japan's investment per ton produced was easily the highest in the world over the period and nearly twice that of the United States.

The late 1950s are also notable for the first postwar appearance of temporary overcapacity and the resulting creation of one of the oldest cooperative arrangements in the industry called the public sales system. The mild recession of 1957, when Japan's economic growth rate receded in the midst of the steel capacity boom, created a serious overcapacity situation. Because Japan's steelmakers operate with exceptionally high fixed financial and labor costs, and because rapid trend growth was encouraging larger regular increments to capacity, the cash-flow crisis resulting from substantial underutilization was severe. Prices became extremely flexible downward in an attempt to restore normal operating ratios. As the crisis deepened, severe price-cutting began to appear.

Self-motivated collusion among firms to restrict production and stabilize prices would have violated the Anti-Monopoly Act, the antitrust legacy of the occupation. MITI held informal consultations with industry management in search of a solution, and the public sales system emerged. Under this arrangement, steel producers reported their scheduled monthly production levels to MITI along with price schedules. Prices were made public, and the industry's entire monthly output was to be sold at the announced prices. Production limits and price levels were not made unilaterally by MITI; lengthy discussions usually preceded shifts in the announced levels. The system has survived in one form or another since 1958 and has dampened but not eliminated the spread between announced and actual prices. More serious overcapacity situations have led to MITI-sanctioned price cartels.

Artificial price agreements, however, do not at all accurately describe the competitive environment in steel. The essential fact about Japanese steel prices is not their cyclical instability but rather their long-run trend of sustained decline. The prices of both crude and specialty steels have decreased steadily (in both current and constant yen) since the middle 1950s as scale improvements, rapid productivity gains in excess of wage increases, integrated basic oxygen furnace installations, and progress in raw material logistics have significantly reduced the
cost of making steel in Japan. Price competition has been intense. In Figure 8-1, the industry real price index is plotted (double logarithmically) against total industry accumulated production in tons. The evidence indicates a strong functional relationship between the two.

![Graph showing price index against industry accumulation volume](image)

**Figure 8-1.** Crude Steel: Post-Reconstruction Japan.

*The Politics of Capacity Additions*

Since the postwar recovery period, it has been obvious to both ministries of government and management of steelmakers that a joint determination of the rate of capacity additions was in the interests of both. The macroeconomic impact of steel expansion’s massive financial requirements and of any imbalance in demand and supply of steel dictated that the government influence the growth rate of capacity. On the other hand, the cash flow crises and price instability which follow overbuilding usually persuade the steelmakers to cooperate among themselves and with MITI. There remains a general, although not always unanimous, feeling among producers that consensus with government on capacity decisions is desirable and prudent.

The process, although it has shifted somewhat over time, generally begins with representatives of the privately-owned steel producers gathering within the Japan Iron and Steel Federation tentatively to present and discuss investment
intentions for the coming year. Nothing is decided at this meeting or series of
meetings, but the producers’ plans are evaluated in view of the demand outlook
for the industry and the existing pattern of market shares. Often these
representatives, usually managing directors, are MITI alumni. Subsequent to
these meetings and informal discussions among management and officials of the
Iron and Steel Section of MITI’s Heavy Industries Bureau, the presidents of the
steel producers will seriously discuss and seek consensus on the rate and timing
of individual producers’ major investments. MITI will participate ex officio in
these meetings, bringing its point of view to bear. The periodic frequency of
consensus meetings at both levels varies with the complexity of the problem.
After a consensus is reached a report is traditionally issued by MITI recom-
mending a course of action to the industry.

This process should not be viewed in terms of the Western public-versus-
private dichotomy. The government neither plans nor dictates the rate of
capacity expansion. The officials and advisory councils within MITI do not
unilaterally and formally accept or reject the industry’s consensus, but rather
evaluate it in view of Japan’s wider economic objectives. Some observers of the
industry suggest that no application for a capacity increment from a major firm
has ever been flatly rejected, although some have been delayed. This, of course,
is the mechanism of the consensus process; the expanding firm is either
persuaded to delay his application or is persuaded to accept a delayed approval.
When this persuasion doesn’t materialize, consensus is frustrated.

The government’s sources of authority in this process are both official and
traditional. Among official instruments of policy, MITI’s control of imported
basic materials has been critical. Japan imports 98 percent of her iron ore and 84
percent of her coal needs. MITI directly controlled the importation and
allocation of these materials through foreign exchange import quotas. Ore
quotas were liberalized in 1965 and coal imports were essentially freed in 1971.
Historically, this has been MITI’s most immediate control. Foreign exchange
control also permits the Bank of Japan to limit steel producers’ borrowing from
foreign banks. Foreign capital financed 8 percent of Japanese steelmakers’
capital budgets during the 1950s and remains an important source. The Bank of
Japan establishes queuing rules for access to these funds and limits the rate of
lending by individual foreign banks.

The Bank of Japan and the Ministry of Finance bring a macroeconomic and
international payments balance perspective to the discussions regarding financing
of steel expansions. While MITI’s international perspective focuses on the
relative competitiveness and growth of Japanese steel, the financial authorities
share broader concerns. Hence, in 1970 the bank denied requests for increased
foreign borrowings in order to avoid undermining its domestic deflationary
policy and depress the rate of increase in dollar reserves. This forced the delay of
capacity additions, some of which will be further delayed through 1972 in view
of continuing soft demand.
The influence of the steel industry’s traditional relationship with the bureaucracy and with the broader economic policy-making community in and out of government should not be overlooked. Their mutual recognition of Japan’s dependence on steel is well founded. Early in 1970, steelmakers’ preliminary capital budgets for the next five years indicated that a full 10 percent of the Japanese economy’s total capital investment for the period would be in steel capacity. The industry has been easily the most critical element in Japan’s remarkable postwar economic phenomenon. Its impact on the international competitiveness of Japanese ships, autos, bearings, and machinery has been profound. It is at once one of Japan’s biggest importers and exporters. It dominates the domestic capital markets. Recognition of its critical position has been strong. If the thesis that Japan’s leaders of business and government share common perceptions of Japan’s national interest has any validity, it must apply to Japan’s traditional steelmakers.

Current Situation

The current situation among elements of government and the steel industry is a predictable extension of the historical relationship. MITI and the industry continue to confer on capacity, production, and export issues, and the consensus system retains its central position. The exercise of direct controls such as MITI’s allocation of imported coal and the Ministry of Finance’s strict control of foreign exchange lending to steel is either dormant or infrequent.

In June of 1971, the Bureau of Heavy Industries obtained approval from the Industrial Structure Council of a new program to rationalize and modernize existing steel capacity. The plan, which was formulated with the assistance of the steelmakers, would make it mandatory to idle smaller, obsolescent furnaces as larger modern furnaces became operational. This plan is partially a response to the projected waning of steel demand growth in the intermediate term and partially an effort to retain Japan’s position as the most competitive producer overall of steel internationally.

The FTC immediately announced its opposition to this plan, claiming that it is a government-authorized “production adjustment cartel running counter to the Anti-Monopoly Law.” A negotiation followed, and after limited concessions from MITI, the FTC accepted the plan.

The major question facing the industry in 1971-72 was steel demand, both long and short run. Earlier estimates of a 150 million ton business by 1975—roughly a 60 percent increase over current levels—have become highly improbable as Japan’s recovery from the current recession has failed to materialize.

The short-run implication of the 1971 recession has been overproduction. The persistence of the downturn necessitated a 10 percent reduction in output.
through midyear which was established by the industry on the basis of self-restraint. The New Economic Policy of the United States in the fall of 1971 prompted the industry to ask MITI to organize a “depression cartel” which would monitor production levels of individual manufacturers. MITI responded by organizing the cartel and negotiating approval of its operation with the Fair Trade Commission.

There are precedents for temporary, MITI-enforced production cartels. In both 1962 and 1965, selected products were cartelized in periods of weak demand. The Anti-Monopoly Law permits such actions when the market price of any product has declined below production cost and rationalization actions by producers do not prove effective remedies. This provision reflects Japan’s flexible attitude toward officially-sanctioned market organization and an awareness of the potentially destructive recession economics of high fixed cost operations and intense competition for market share.

**Industry Economics**

Underlying the institutional dynamics described above has been a systematic improvement of Japan’s cost structure and market share relative to the rest of the world. The following section traces the economics of the Japanese steel industry, concentrating on the elements of cost improvement and continued international competitiveness.

The conclusions of the analyses which follow are clear. Japanese steel producers have an absolute advantage over their U.S. counterparts in all three major factor cost categories: labor, raw material, and capital costs.

**Labor Costs**

Since 1965 Japanese steel labor wages have increased 17.2 percent per year, 3.5 times the U.S. annual rate of increase of 4.9 percent (Table 8-1). Naive commentators have extrapolated from these trends that Japanese wage rates will equal U.S. rates by 1981, penalizing Japanese producers. This comparison is meaningless in that it fails to consider the other side of the coin—productivity.

The Japanese made astounding labor productivity gains in the 1960s. Table 8-2 shows that output more than doubled between 1965 and 1970, while the input of man hours rose almost imperceptibly. The result was that physical output per man hour increased 125 percent in Japan during the past five years. The comparable U.S. statistic rose only 4 percent in the same period.

Only unit labor costs (labor dollars per ton) are relevant in international trade. The trend in this index can be obtained by dividing the wage index (labor dollars per hour) by the productivity index (tons per hour). Table 8-3 shows that
Table 8-1
Steel Labor Costs, Inclusive ($/Hour), 1965-1970

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>4.48</td>
<td>0.82</td>
</tr>
<tr>
<td>1966</td>
<td>4.63</td>
<td>0.97</td>
</tr>
<tr>
<td>1967</td>
<td>4.76</td>
<td>1.10</td>
</tr>
<tr>
<td>1968</td>
<td>5.03</td>
<td>1.26</td>
</tr>
<tr>
<td>1969</td>
<td>5.38</td>
<td>1.50</td>
</tr>
<tr>
<td>1970</td>
<td>5.68</td>
<td>1.80</td>
</tr>
</tbody>
</table>

Compound rate of annual increase: 4.9% for U.S.; 17.2% for Japan.

Source: American Iron and Steel Institute (AISI); Japan Iron and Steel Federation (JISF)

Table 8-2
Steel Labor Productivity (Index: 1965 = 100), 1965-1970

<table>
<thead>
<tr>
<th>Year</th>
<th>Japanese Output Index (A)</th>
<th>Japanese Input Index (B)</th>
<th>Labor Productivity Index for Japan (A/B)</th>
<th>Labor Productivity Index for U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1966</td>
<td>115.6</td>
<td>96.2</td>
<td>120.1</td>
<td>102.6</td>
</tr>
<tr>
<td>1967</td>
<td>149.6</td>
<td>101.3</td>
<td>147.7</td>
<td>101.3</td>
</tr>
<tr>
<td>1968</td>
<td>168.4</td>
<td>102.8</td>
<td>163.8</td>
<td>106.0</td>
</tr>
<tr>
<td>1969</td>
<td>202.9</td>
<td>102.6</td>
<td>197.6</td>
<td>106.3</td>
</tr>
<tr>
<td>1970</td>
<td>230.9</td>
<td>102.6</td>
<td>225.2</td>
<td>104.1</td>
</tr>
</tbody>
</table>

aBased on total output of steel products weighted by value added.
bTotal man-days worked.

Source: Japan Productivity Center.

Table 8-3
Unit Labor Costs, 1965-1970

<table>
<thead>
<tr>
<th>Year</th>
<th>Unit Labor Cost (1965 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Wage Index/Productivity Index)</td>
</tr>
<tr>
<td></td>
<td>U.S.</td>
</tr>
<tr>
<td>1965</td>
<td>100.0</td>
</tr>
<tr>
<td>1966</td>
<td>100.9</td>
</tr>
<tr>
<td>1967</td>
<td>104.9</td>
</tr>
<tr>
<td>1968</td>
<td>106.1</td>
</tr>
<tr>
<td>1969</td>
<td>113.1</td>
</tr>
<tr>
<td>1970</td>
<td>122.1</td>
</tr>
</tbody>
</table>
Japanese productivity gains have overshadowed wage increases with the result that unit labor costs actually declined from 1965-70, as compared to a 22 percent increase in the United States.

Comparing absolute labor productivity levels (tons per man hour) between countries is extremely difficult because of differing statistical definitions. However, recent Japanese and U.S. studies of the subject indicate that labor productivity levels in the two countries' steel industries are equivalent today. The American Iron and Steel Institute calculates that in 1970 U.S. crude tons per man hour was .086 and Japan was .083 on a comparable basis. Japan Iron and Steel Federation data indicates that in 1968 U.S. productivity levels were 130.5 percent of Japan's. Applying the differential percentage changes since (Table 8-2) implies a productivity parity reached in 1970.

The conclusions of this analysis are clear.

- The Japanese steelworker has achieved U.S. productivity levels.
- His wages remain at one-third of U.S. levels.
- The unit labor cost gap (in labor dollars per ton of steel) is widening rather than narrowing.

The implications are equally obvious.

- Even if Japanese steelworkers were paid U.S. wages while Japanese and U.S. productivity increases continued at their present rates, unit labor costs in Japan would never exceed U.S. levels.
- Alternatively, even if Japanese productivity increases fell to the U.S. rate while Japanese wages continued to rise at their current rate, Japanese unit labor costs would not exceed the U.S. level for ten years.

If the advantage of the Japanese steel industry is traceable to "cheap labor," it is not the result of illiterate surplus labor used intensively and paid subsistence wages. It stems instead from massive capital investment supporting a highly skilled work force whose large pay increases can be justified by the productivity gains made possible by the capital improvements.

Material Cost

Raw materials account for more than 60 percent of the factory sales price of a ton of Japanese steel, and over 90 percent of the raw materials value is imported. The economics of mining, loading, transporting, and offloading basic materials has been of critical importance to the Japanese. Over the 1960s, the landed cost of iron ore, coking coal, and principal ferroalloys actually decreased in current dollars. 1970 landed costs were lower than 1960s. This was a result largely of
major Japanese commitments on long-term supply contracts which insulated Japan from the basic materials inflation of the late 1960s and the unprecedented developments in ocean logistics for bulk handling and conveying.

Table 8-4 indicates the savings resulting from the use of larger bulk carriers alone. Table 8-5 shows the extent to which the Japanese are striving to take advantage of these potential cost savings. The low average tonnage per ship indicates that many logistics cost savings are yet to be realized.

**Table 8-4**

**Savings from Use of Bulk Carrier**

<table>
<thead>
<tr>
<th>Bulk Carrier</th>
<th>5,000 Miles</th>
<th>10,000 Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,000 DWT</td>
<td>$6.00</td>
<td>$10.00</td>
</tr>
<tr>
<td>100,000 DWT</td>
<td>$3.50</td>
<td>$ 5.50</td>
</tr>
<tr>
<td>200,000 DWT</td>
<td>$2.90</td>
<td>$ 4.50</td>
</tr>
</tbody>
</table>

**Table 8-5**

**Japanese Ore Carrier Fleet**

<table>
<thead>
<tr>
<th></th>
<th>Number of Ships</th>
<th>Total Tonnage</th>
<th>Average Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Fleet</td>
<td>159</td>
<td>9,130,000</td>
<td>52,400</td>
</tr>
<tr>
<td>Under Construction</td>
<td>9</td>
<td>1,170,000</td>
<td>130,000</td>
</tr>
</tbody>
</table>


The implications of the logistics revolution were extraordinary for Japan:

- Seaborne trade in iron ore increased from 101 to 215 million tons between 1960 and 1969. Japan purchased 60 percent of this increase and in 1969, purchased 39 percent of all iron ore in seaborne trade.
- Coking coal in seaborne trade increased from 46 to 80 million tons in this period. Japan purchased 97 percent of this increment. In 1969, it bought 50 percent of all coking coal in seaborne trade.

Japan's paucity of iron ore and coal deposits forced the steel industry at an early date to search out long-term overseas sources of supply. Assistance from the government has been limited. There is direct financing of imports from government banks, primarily from the Export-Import Bank and the Overseas Economic Cooperation Fund. These institutions provided the assurance of long-term financing necessary in order to enter into supply agreements with
overseas mining operations, some of whose total output was for Japan. In
addition to providing long-term source of funds, the government designates iron
ore and coal as priority import categories and ensures that foreign exchange is
allocated to them. Currently, with Japan’s surplus of foreign exchange, this
designation is irrelevant, but for 20 postwar years this was a highly important
provision to steel industry management.

In addition to financing imports, the government has assisted steelmakers in
undertaking direct overseas resource development investment. Special sources of
funds are designated by the Ministry of Finance in its annual budget in
accordance with a standing policy to favor overseas investment for this purpose.
Once again this provision is less critical now that the Ministry has relaxed its
control of capital exports. During the 1950s and 1960s when Japan’s currently
productive resource development projects were undertaken, however, capital
exports of scarce foreign exchange were authorized first for ore, coal, and
petroleum exploration and mining ventures. Resource development accounted
for 30 percent of total cumulative Japanese foreign investment through 1970.

A third form of government financial assistance has been tax incentives and
insurance against development losses. A contingency reserve for possible losses
and thorough development-loss insurance facilities are available to overseas
ventures. The impact of these is slight, particularly when compared to depletion
allowances.

*Capital Costs*

Many pages could be devoted to this subject; however, Japan’s steadfast
emphasis on large-scale plant investments and swift adoption of new technol-
gies has been thoroughly documented in technical journals and need not be
reproduced here.

A few statistics will serve to highlight the Japanese steel industry’s accom-
plishments in this regard.

- Of the ten largest blast furnaces in the world, as of end of 1971, nine are
  in Japan.
- The largest, the Fukuyama #4 of Nippon Kokan, has a daily production
capacity of 10,000 tons.
- This furnace raises Fukuyama’s annual capacity to 12 million tons, the
  largest in the world for a single mill.
- In 1960 the daily production of pig iron per blast furnace was almost
equal in the United States and Japan at 970 tons. By 1969, the figures
were 2,723 for Japan, 1,465 for the United States, 1,644 for the USSR,
1,039 for West Germany, 845 in the United Kingdom, and 672 in France.
- In August 1969, Japan had as many continuous casting units (33) as the
United States. By the end of 1970 the Japanese total had increased to 40.
The adoption of Linz-Donawitz converters by the Japanese industry deserves special mention. The L-D converter is less expensive to construct and produces crude steel approximately six times faster under normal operating conditions than an open hearth furnace (thus reducing labor and fuel costs). Since its perfection in the mid-1950s, it has been recognized as superior. However, as shown in Table 8-6, its adoption has proceeded more rapidly per tonnage in Japan than in the United States.

Because of the apparent slowness of the U.S. industry in moving to the L-D converter, it has been frequently criticized for failure to recognize and adopt a superior new technology. However, the statistics displayed in Table 8-6 belie this criticism. In fact, a recent study indicates that in the 1956-64 period, L-D additions in the United States comprised a higher percentage of total capacity additions than in any other country. The U.S. industry actually added almost 30 percent more L-D capacity than its total net capacity additions during this period because large increments of Bessemer and open hearth capacity were scrapped.

The problem is traceable not to slow adoption by the U.S. industry but to the effects of relatively slower growth. As Table 8-6 shows, Japanese steel capacity increased 258 percent from 1956-64 versus only 10 percent in the United States. Therefore, even Japan’s lower adoption rate enabled it to achieve a higher share of its capacity in L-D converters than the slower growing U.S. industry over an equal time period.

Table 8-6
Steel Capacity by Type: United States and Japan, 1956-1969

<table>
<thead>
<tr>
<th></th>
<th>Percentage of Capacity Stock</th>
<th>Percentage of Additions by Type 1959-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-D Converter</td>
<td>—%</td>
<td>73%</td>
</tr>
<tr>
<td>Open Hearth</td>
<td>84</td>
<td>13</td>
</tr>
<tr>
<td>Electric</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Bessemer</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Total % addition to capacity 1956-64:</td>
<td>258%</td>
<td></td>
</tr>
</tbody>
</table>


Increasing Strength in Specialty Steel

In response to a voluntary tonnage quota in the United States and increasing competition among the 70 nations which produce carbon steel, the Japanese industry has increasingly emphasized specialty steel production and export.

As with carbon steel, the development of Japan’s specialty steel capability did not take place in a competitive vacuum. It corresponded to a serious deteriora-
tion in the U.S. position in world stainless steel production. Table 8-7 shows the differential growth rates which have more than halved the U.S. industry’s world market share since 1955.

Figure 8-2 plots real domestic price per ton of American and Japanese comparable stainless sheet against the total accumulated industry production tonnage of each country. The plot is on double logarithm paper, showing the percentage change in price against the percentage change in accumulated production experience. (Prices are real prices, deflated by GNP indices. In both cases the deflator base is 1968.) The data indicates that Japanese domestic prices in constant yen consistently decreased on trend by 20 percent each time accumulated production experience doubled. The sparse data for prewar U.S. prices indicates a similar rate of real price decline. Since the late 1940s, however, real prices have failed to decline in the United States until 1958 when the “price umbrella” was broken by imports. It is not coincidental that Japanese stainless imports into the United States began at about this time. Falling Japanese prices reached U.S. levels in 1958.

The period since 1958 illustrates the chronic disadvantage of the U.S. specialty steel industry today. The Japanese price has continued down, preserving the industry’s customary margins. On the other hand, the U.S. industry has reacted aggressively, but too late to be successful, in meeting the import threat. The rapid U.S. price decline since 1958 is obviously steeper than could have been justified by cost declines; however, even the margin reduction which accompanies this price deterioration could not suffice to bring U.S. prices down as fast as Japanese prices due to Japan’s higher growth rate (25 percent versus 2.3 percent annually).

The dilemma is evident. Without achieving faster production growth than Japanese competitors, the U.S. industry cannot achieve equivalent cost declines. And the U.S. industry cannot achieve sufficient production increases because Japanese competitors enjoy the powerful combination of lower prices, at least comparable (to us) cash-flow margins, and a strong foothold in the world’s fastest growing markets—Asia, Africa, and Latin America. It is thus doubtful whether at this late date U.S. producers in specialty, as well as in carbon steels, can recover competitive equilibrium.

Table 8-7

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Production Index</td>
<td>100</td>
<td>125</td>
<td>2%</td>
</tr>
<tr>
<td>World Production Index</td>
<td>100</td>
<td>600</td>
<td>15%</td>
</tr>
<tr>
<td>U.S. Share of World Production</td>
<td>65%</td>
<td>28%</td>
<td></td>
</tr>
</tbody>
</table>

Source: International Nickel.
Figure 8-2. Comparative Experience Curve for Stainless Steel Sheets.
Conclusion: Future Japanese Competitive Strategy

The current competitive situation raises serious policy questions for the United States since quotas or other protection for the U.S. steel producers make large steel users less competitive relative to their foreign competition, as is already apparent in appliances and automobiles. On the other hand, one might argue that the Japanese industry will decline just as its textile industry is currently doing and this will give U.S. producers an opportunity to recover. This latter competitive evolution is extremely unlikely, however. Although it is true that the growth in crude steel production in Japan is levelling off, this does not spell the phasing out of major Japanese steel companies. Rather, it argues that they will shift their resources more and more into the specialty and high quality steels. They will diversify into other metals, plastics, and prefabricated construction as is already apparent from their recent actions and announced moves. In addition, they will increasingly move crude metal production offshore, in response not only to their own economics but also to pressures from their resource locations such as Australia and the Philippines. Hence more Japanese pig iron production will be at the mine head. The major steel companies will also continue to step up their exports of plant and equipment to the LDCs. All in all, these companies will move with the product cycle evolution of their industry and will benefit from it. And because the companies are profitable and because the industry has been rationalized, they have the resources and capability to carry it out. It is also apparent that the government will encourage and facilitate these developments.

This trend will manifest itself over the next ten to fifteen years and will be somewhat accelerated by continuous appreciation of the yen. But due to the high proportion of imported raw material content in the cost of finished steel, the Japanese can be expected to remain highly competitive even in carbon steel.
Appendix: Three Statistical Tables

Table 8A-1
Japan’s Crude Steel Production, 1900-1970

<table>
<thead>
<tr>
<th>Year</th>
<th>(Thousand Metric Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>1.1</td>
</tr>
<tr>
<td>1905</td>
<td>106.7</td>
</tr>
<tr>
<td>1910</td>
<td>251.9</td>
</tr>
<tr>
<td>1915</td>
<td>514.3</td>
</tr>
<tr>
<td>1920</td>
<td>810.8</td>
</tr>
<tr>
<td>1925</td>
<td>1,300.2</td>
</tr>
<tr>
<td>1930</td>
<td>2,289.3</td>
</tr>
<tr>
<td>1935</td>
<td>4,704.5</td>
</tr>
<tr>
<td>1940</td>
<td>5,855.7</td>
</tr>
<tr>
<td>1945</td>
<td>1,963.8</td>
</tr>
<tr>
<td>1950</td>
<td>4,838.5</td>
</tr>
<tr>
<td>1955</td>
<td>9,407.7</td>
</tr>
<tr>
<td>1960</td>
<td>22,138.4</td>
</tr>
<tr>
<td>1965</td>
<td>41,161.1</td>
</tr>
<tr>
<td>1969</td>
<td>82,166.2</td>
</tr>
<tr>
<td>1970</td>
<td>93,332.0</td>
</tr>
</tbody>
</table>

Table 8A-2
Profiles of Japan’s Major Steel Producers (Data for Year Ended March 31, 1971)

<table>
<thead>
<tr>
<th></th>
<th>Nippon Steel</th>
<th>Nippon Kokan</th>
<th>Sumitomo Metal</th>
<th>Kawasaki Steel</th>
<th>Kobe Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate sales</td>
<td>$3,602M</td>
<td>1,631</td>
<td>1,281</td>
<td>1,144</td>
<td>1,090</td>
</tr>
<tr>
<td>Total assets</td>
<td>4,904</td>
<td>2,331</td>
<td>1,627</td>
<td>1,636</td>
<td>1,394</td>
</tr>
<tr>
<td>Profit after tax</td>
<td>72</td>
<td>31</td>
<td>26</td>
<td>39</td>
<td>25</td>
</tr>
<tr>
<td>Employees</td>
<td>82,046</td>
<td>42,102</td>
<td>31,525</td>
<td>37,834</td>
<td>32,747</td>
</tr>
<tr>
<td>Paid-in capital</td>
<td>637M</td>
<td>212</td>
<td>230</td>
<td>248</td>
<td>212</td>
</tr>
<tr>
<td>Profit as % Sales</td>
<td>2.0%</td>
<td>1.9%</td>
<td>2.1%</td>
<td>3.5%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Annual growth 5-yr. average</td>
<td>18.9%</td>
<td>22.0%</td>
<td>21.8%</td>
<td>20.2%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Market share</td>
<td>36%</td>
<td>14%</td>
<td>12%</td>
<td>12%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Table SA-3
Crude Steel Production, 1960-1970 (MM Metric Tons)

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>USA</th>
<th>USSR</th>
<th>W. Germany</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>22.1</td>
<td>90.1</td>
<td>65.3</td>
<td>34.1</td>
<td>24.7</td>
</tr>
<tr>
<td>1965</td>
<td>41.2</td>
<td>119.3</td>
<td>91.0</td>
<td>36.8</td>
<td>27.4</td>
</tr>
<tr>
<td>1970</td>
<td>93.3</td>
<td>119.4</td>
<td>116.0</td>
<td>45.0</td>
<td>28.3</td>
</tr>
</tbody>
</table>