

Part Two

Industry and Market Structure

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Chapter 2

The Current Status of the World Copper Industry

The Current Status of the World Copper Industry

THE WORLD COPPER MARKET

In 1981, the world copper industry appeared to be thriving. Production levels were strong and employment was high. The scarcity mentality of the 1970s had left many believing that copper, as a natural resource, would always be in short supply; that development in Third World countries would continue to drive demand growth; and that the market imbalance would keep prices strong. Projections of continuing demand growth, combined with high prices, led the world copper industry to focus more on increasing capacity and less on reducing production costs.

Instead of the anticipated growth and prosperity, the world copper industry received a severe jolt. The recession of 1982-83 stunted economic growth and development in most parts of the world. World demand for copper declined more than 6 percent during 1982. Copper consumption dropped in the United States—the primary market for domestic producers—even more sharply, falling 18 percent in 1982.

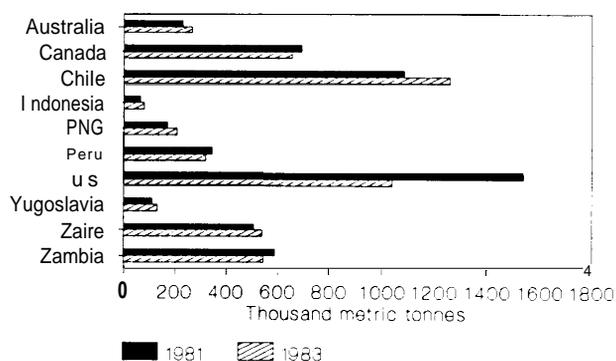
While demand waned, world copper production capacity continued to grow due to the ambitious expansion plans formulated during the late 1970s. The leadtime for a new or expanded copper operation is often several years or longer. When the mines initiated in the late 1970s finally came on line, they entered a market already plagued by mounting inventories. Subsequently, prices plummeted—falling over 50 percent from 1980 to 1984.

Despite high inventories and low prices, more than half of the copper-producing nations either increased or maintained production in 1982-83. Mine production outside North America increased almost 8 percent from 1981 to 1983. These were the countries with low production costs, or those whose output is more sensitive to

social goals (such as maintaining employment or foreign exchange) than to profits. The Intergovernmental Council of Copper Exporting Countries (CIPEC) continued to support its policy of maintaining production in spite of falling prices. The eight CIPEC members—Australia, Chile, Indonesia, Papua New Guinea, Peru, Yugoslavia, Zaire, and Zambia—accounted for 41 percent of world production in 1982, compared to 38 percent in 1981 (see fig. 2-1).¹ Chile alone increased its output 15 percent in 1982, becoming the world leader in copper mine production. In more profit-conscious countries—especially the United States and Canada—production dropped precipitously. In the United States, mine production decreased 26 percent in 1982; more than 28 mines closed, either temporarily or permanently, between March 1981 and January 1983.

¹Mine capacity in Peru increased over this period, but actual production declined due to labor and other operational problems. By 1984, production had increased 3 percent over 1981; by 1985 it was 14 percent higher relative to 1981.

Figure 2-1.—Mine Production in Major Copper-Producing Countries, 1981-83



SOURCE U.S. Bureau of Mines data

STATUS OF THE U.S. COPPER INDUSTRY: 1980-86

Due to the continued oversupply, the world copper market remained depressed for several years after signs of recovery had appeared in other economic sectors. These conditions hit the domestic copper industry especially hard. In 1981, U.S. copper mine production had exceeded 1.5 million tonnes,² but over the next 2 years domestic output fell nearly one-third to just over 1 million tonnes, and remained below 1.2 million tonnes through 1987. Output from domestic copper smelters and refineries also declined after 1980, in part in response to market conditions, but also due to the closure of older smelters that would be too expensive to upgrade to comply with air quality regulations. U.S. primary and secondary copper smelter production fell from a strong 1981 level of nearly 1.4 million tonnes to about 1 million tonnes in 1983, and then increased to 1.2 million tonnes by 1986.³ While the United States remained the world's leading supplier of refined copper, domestic production in 1986 (1.6 million tonnes) was more than 20 percent lower than the peak level of 1981.

The domestic employment impacts of the changing market structure have been severe. In 1979, the U.S. copper industry employed over 44,000 people in mines, mills, smelters, and refineries, and over **46,000** at fabricators. By the end of 1983, direct employment in the domestic industry that mines and processes copper had fallen by 41 percent. The impact on regional economies extends beyond the jobs lost in the mining and minerals processing industry. In Arizona, for example, the Bureau of Mines estimates that for each 10 jobs in the primary metals industry, an additional 14 jobs are created in the businesses that supply goods and services to the industry and their employees (e. g., equipment suppliers and retail establishments).⁴

²All figures in this report are in metric tonnes unless stated otherwise. One metric tonne = 0.907 short tons = 2,204 pounds.

³Primary smelters process new copper, mostly in the form of concentrates. Secondary smelters process copper scrap.

⁴The figures given include mining, smelting, and refining of all primary metals, including copper, gold, silver, molybdenum, and lead. However, because the copper mining and processing industry represented 74 percent of the total value of Arizona minerals production in 1986, the impacts are considered representative of copper.

U.S. copper producers' struggle to survive in a more competitive market has brought about an emphasis on more efficient, less labor-intensive technologies. While improved productivity has been an important step in maintaining a viable domestic copper industry, many jobs have been eliminated as a result. For example, in 1980 the Bingham Canyon mine in Utah employed 7,000 workers to produce around 182,000 tonnes of copper. These operations made Kennecott, now BP Minerals America, Utah's largest private employers Bingham closed in 1985 due to market conditions and pending management decisions about modernization. Employment fell to 240 maintenance and security personnel. Subsequently, around \$400 million was invested in modernization of the mine, mill, and ancillary facilities. When Bingham Canyon reopened in 1987, employment, including construction workers for modernization efforts, was only 2,371. Full production of 200,000 tonnes is expected in mid-1988 with 1,800 employees. This represents a 75 percent reduction in labor requirements as a result of the more efficient operations.

The increased competition for markets has focused attention on copper supply levels and production costs. **The domestic copper industry has several cost-related disadvantages to overcome in order to be competitive in the world market (see ch. 9).** These include low ore grades, high labor costs, and stringent environmental and health and safety regulations. The first two have affected domestic production costs throughout the history of the industry, but have become more important over the last 10 years as a larger share of world copper capacity shifted to less developed countries.

The nature of U.S. resources places the domestic industry at an immediate disadvantage. The average ore grade of domestic copper reserves is about 0.62 percent copper—more than 30 percent lower than the world average. This means that U.S. operations must mine and mill about 30 percent more ore than the average com-

⁵Personal communication to OTA from Frank Fisher of BP Minerals America.

petitor in order to recover the same amount of copper (see ch. 5).

While highly productive, U.S. workers are paid wages four or five times higher than those at most foreign operations. **Despite our higher productivity, the net result of the lower ore grades and higher wages is that labor costs per pound of copper in the United States are well above the world average.**

THE STRUGGLE FOR COMPETITIVENESS

For the most part, **the domestic industry met the challenge to compete in the world copper marketplace head-on. They developed and implemented ambitious strategies aimed at cost reductions at all stages of copper production.** In general, the overall strategies formulated by most domestic producers contained the same major components: 1) reduced labor and other costs; 2) capital investment in more efficient equipment and technologies, particularly expansion of leaching and SX-EW facilities; 3) revised mining strategies; and 4) corporate and debt restructuring (see ch. 10).

The cost of labor to the U.S. copper mining industry has dropped considerably in the last few years as a result of wage and benefit concessions and productivity gains. Workers accepted 20 to 30 percent reductions in the 1986 contract negotiations. In return, they receive incentives for productivity increases. Bonuses tied to increases in copper prices also assure labor of a share of the profits when market conditions are good.⁶ Other efforts to reduce labor and administration costs have included redefining jobs at all levels to reduce overhead and increase staff flexibility; eliminating several corporate levels to reduce personnel requirements and improve communications; and relocating executive and administrative offices closer to company operations to cut office expenses and travel. Non-labor costs such

Another important cost component for domestic producers is compliance with environmental and health and safety regulations. A

1985 industry estimate of the cost to U.S. copper producers for compliance with these regulations was around 10 to 15 cents/lb. While there is some evidence of growing consciousness in developing countries of the environmental impacts of mining and smelting, the degree of pollution control in these areas is much lower (see ch. 8).

as transportation and energy charges also have been reduced through the renegotiation of contracts.

The expanded use of solution mining, or leaching, methods in the domestic copper industry also has played a crucial role in the industry's renewed competitiveness. Solution mining offers a means by which the vast amount of low-grade ore in mine waste dumps can be processed economically (see ch. 6). The costs of mining the waste ore have already been taken from the books. As a result, producing copper using leaching, followed by solvent extraction and electrowinning, costs only about 30 cents/lb.

In-pit conveyors and automated truck dispatching systems also have improved productivity and decreased costs. Mill efficiency has been improved through computerized onstream analysis and flow control. Other technological milling improvements include new materials for ball mill linings, larger tumbling mills and flotation cells, using chunks of ore rather than steel balls in tumbling mills, and column cells. The Asarco Mission Mine complex reduced their cash cost of producing 1 pound of copper in concentrates about 28 percent between 1981 and 1984—largely by modernizing their truck fleet and flotation cells. Smelter and refinery efficiencies have been improved primarily through automated controls and computer monitoring, and reduced energy consumption.

Closure of many high-cost operations was necessary to achieve the lower average cost of domestic production. In addition, many companies

⁶As a result of the sudden rise in copper prices in 1987, 4,100 of the **9,500** copper workers in Arizona received bonuses totaling more than \$10.4 million in January 1988.

revised their mining plans by raising the ore cut-off grade, lowering the waste-ore stripping ratio, steepening pit slopes, or closing low-grade sections of underground mines. These changes im-

proved productivity and further reduced costs. At some mines, however, these improvements may reduce long-term capacity.

1987—THE RETURN TO PROFITABILITY

When copper prices soared to over \$1/lb in 1987, with spot prices reaching \$1.50/lb near the end of the year, the domestic copper industry was ready to reap the benefits. Cost-cutting measures implemented in the industry had brought domestic average copper production costs down to \$0.55/lb in 1986 as compared with \$0.79/lb in 1981. When combined with the increase in prices, this meant the return to profitability for an industry that had suffered enormous losses earlier in the decade.

Of the six major U.S. copper-producing companies, four operated throughout 1987 and all four reported net profits, ranging from \$279 million at Asarco to \$26 million at Cyprus. Kennecott and Magma are expected to report net profits for

1988, when they resume full production after major modernization efforts.

While the domestic industry is enjoying its current prosperity, it is not entirely sanguine about the future. The industry is still contracting, as evidenced by the sale of Inspiration Consolidated Copper Company's domestic operations to Cyprus Minerals in 1988. Moreover, **most copper company executives anticipate that the conditions that prevailed during the first half of this decade will be repeated during the next recession. Because most companies have already taken advantage of available cost-reducing technological innovations, they are concerned that they will have few options for further cost reductions without major technological breakthroughs.**