

Rating Methodology by Sector

Nonferrous Metals

The nonferrous industry includes smelters handling copper, zinc, lead, nickel, and other industrial metals; aluminum processing companies (plate manufacturing, extrusion manufacturing, and foil manufacturing); and the manufacturers of electric wire and other materials. The following concerns smelter business.

1. Business base

In the upstream nonferrous industry, ore, the raw material, is under the control of major nonferrous companies that own well-established mines through their reorganization and oligopoly. On the downstream side, growth in domestic demand for metals is unlikely, due to a slowdown in population growth and an increase in the overseas relocation of production facilities. This makes it important to stabilize ore supply by investing in mines, receiving profit from mines, and improving cost-competitiveness to compete against the new smelters being built one after another in emerging countries. JCR also considers that strengthening diversified businesses related to products associated with smelting business, including electronics, automotive, and those connected to the environment and recycling, and diversifying the income will lead to stable earnings, and this is recognized in assigning a credit rating.

(1) Characteristics of the industry

(i) Market size

Copper is processed into electric wires, wrought copper and copper alloy products used in construction, electrical equipment, industrial machinery, automobiles, and other products. Zinc is processed into galvanized steel sheets, brass, and zinc die cast alloys and used in construction, automobiles, and other products. Lead is used in the electrodes of lead storage batteries, radiation shields, soundproofing materials, and other products. Nickel is used in plating, stainless steel, nickel-hydrogen cells for hybrid cars, crude oil well pipes for drilling, LNG tanks, and other products.

Copper, which is used widely and for great many purposes, boasts the highest consumption globally, followed by zinc, lead, and nickel. Although demand for any of these metals is affected by business fluctuations, the medium- and long-term trends are upward. While market growth in Japan and other developed countries tends to be slow, consumption in emerging countries, such as China and India, has been increasing. In particular, China's weight in global consumption has grown significantly larger, in contrast with Japan, which only accounts for a small percentage. In Japan, domestic production exceeds domestic consumption, and it exports metals to China and other East

Asian regions that are unable to meet demand with their own production.

Market prices are announced by the London Metal Exchange (LME), and refined metals are traded based on the LME prices. Warehouses designated by the LME are located around the world, and inventory fluctuations reflect supply and demand at each location and have an influence on LME pricing. Nevertheless, it should be noted that prices are not determined by supply and demand alone; they can be significantly influenced by an inflow of speculative funds. An upsurge in metal prices may cause substitutions by other metals in the manufacture of products, such as a shift from gold to copper for bonding wires or from nickel to chromium for stainless steel.

(ii) Competitive situation

Large nonferrous smelters maintain their own smelters or operate a smelting business by investing in a joint smelting company. The metals processed vary slightly among them. Smelters are often located in coastal areas, particularly along the Inland Sea, convenient for importing ore and shipping metals. Those located inland maintain their competitiveness by using recycled raw materials, such as electronic circuit boards from waste household appliances, rather than ore.

Smelters in Japan are located in a consuming region, and they are largely custom smelters that use imported ore as a raw material. China is a consuming region in which some domestic ore production is also carried out. In recent years, new custom smelters have rapidly increased, which have steadily been gaining competitiveness by increasing their size and improving their efficiency through low-cost, abundant labor. India is in a similar situation. Considering the demand in China and India not met on their own and the future weeding out of small and medium-sized smelters due to environmental controls, competition with smelters in other parts of Asia is unlikely in the near future. In the long-term, on the other hand, a concentration of large smelters and the further enhancement of capabilities may well cause the competition to intensify. This makes it important to maintain competitiveness against smelters in China and other Asian countries.

(iii) Cost structure

The ore price paid by smelters to mining companies is the amount after subtracting the cost of processing ($TC/RC = \text{cost of smelting} / \text{cost of refining}$) from the LME price. In the past, the amount after subtracting the cost of processing from the base price was paid as the ore price, and the price participation clause was commonly applied to the portion of the LME price exceeding the base price, which was shared by the mining company and the refining company at a certain ratio (90% for the mining company and 10% for the refining company). Mergers and the restructuring of large nonferrous companies, however, made the market more oligopolistic, the price participation clause was abandoned, and any benefits from an increase in the LME price are now enjoyed by mining companies. Meanwhile, the metal price charged by refining companies to consumers is the amount after adding a premium reflecting the cost of transportation and regional supply and demand to the

LME price. The income of a refining company, therefore, is the sum of the cost of processing and the premium converted into yen, which is added to income from such byproducts as sulfuric acid, copper slag, and precious metals. For this reason, the trends in the mid-year and year-end negotiations on custom ore conditions held by mining and refining companies have a significant effect on the companies' earnings.

Although the processes vary slightly, depending on the metals to smelt and the smelting methods, smelters are equipped with furnaces and other large facilities, regularly require repair, and require investment in capacity and efficiency improvement. They, therefore, incur substantial amounts of depreciation and other fixed costs.

As overseas mines become deeper, ore quality declines, and such impurities as arsenic and bismuth tend to increase. The quality of ore imported to Japan is also declining, which adds to the upward pressure on the cost of refining. JCR, therefore, surveys the percentage of supply from certain contracted mines, details of contracts, quality, and efficiency of the refining process.

(2) Key factors in market position and competitiveness

(i) Market position

Generally for smelters, the larger the scale of production, the more cost-competitive they are. Whether near growth regions, such as emerging countries and East Asian regions, particularly China, and whether a system that allows a stable supply of high-quality products to these regions in a short delivery time has been established are also important. Some Japanese refining companies have subsidiary smelters in East Asia in addition to those in Japan or are investing in refining companies in that region, and their comprehensive supply capacity as a group is also considered in a credit rating.

(ii) Upstream development

The oligopolistic market of large nonferrous companies and rapid increase of custom smelters in China and other emerging regions have made ore supply less stable than in the past. Development into mining, the upstream business of refining, therefore, is increasingly important. Increasing the percentage of supply from mines invested in by the company itself in the total amount of ore supply (ratio of a company's own mines) allows the company to ensure stable supply routes and include profit from mines in the financial results.

If a mine already in operation is to be invested in, the business risk is low, but the purchase price of the rights to the mine becomes high. On the other hand, if the company begins from the prospecting stage, while the amount invested becomes relatively smaller, the business risk becomes higher due to the long period of time required before commercialization and the differences in the assumptions based on the results of prospecting and actual minable amounts or the cost of prospecting after commercialization as well as the additional investment required for environmental protection.

In investment in a mine, therefore, JCR monitors at all times the business risk, including country

risk, total amount invested and period of return, progress of projects, and changes in the ratio of a mine held by the company after the mine is in operation as well as after acquisition of the rights to the mine.

(iii) Technical strengths

In the refining business, the effective use of technology to improve productivity amid the declining ore quality, to efficiently use energy in the smelter to reduce costs, and to recover, in addition to the major metals, as many types of precious metals as possible at the highest rate possible all have become important.

In such countries as China, environmental pollution caused by smoke and wastewater from smelters has become a social issue. Smelters in Japan, meanwhile, have advantages in their use of technology to prevent such pollution.

Amid the worsening of business conditions and ore quality, hydrometallurgy has been drawing attention. While pyrometallurgy—the major method in current use—involves smelting and refining ore in large facilities, hydrometallurgy employs the spraying of sulfuric acid onto piled up ore to leach out metals. Hydrometallurgy enables low-quality ore processing that requires less capital and production cost than pyrometallurgy. The practical application and technological development of this technology are being monitored.

In many cases in the mining business, ore is supplied by investing in overseas mines with minority shares and purchased according to the corresponding rights. If, in the future, investment with majority shares is made, and the company manages and operates the mine as an operator, whether it has the expertise and engineers who have been managing and operating their company's own mine or a mine of a major invested company becomes important.

(iv) Business structure

The weight of refining and mining businesses on the net sales and operating income of large refining companies varies. Refining and mining are major businesses for some companies while they are only some of a number of businesses for other companies. More specifically, some companies engage in various businesses derived from refining, including metal processing businesses, such as wrought copper and copper alloy products; electronic material businesses, such as semiconductor materials and functional materials; and environmental and recycling businesses, such as metal recycling and waste disposal. Some other companies handle auto parts, machinery, tools, cement, aluminum, and other products. JCR makes its assessment in view of the differences in the business composition of various companies, market size and growth potential of each business, market shares and competition, and other factors.

(v) Diversification

For electronics-related businesses, such advantages as new product development that is always ahead of the competition and low-cost production are subjects of focus because of the rapid product commoditization and swift catch-up of Asian competitors, including South Korea, Taiwan, and mainland China. For automotive-related businesses, due to unlikely growth in domestic auto production and strong calls by automakers and parts manufacturers for lighter materials and lower costs, JCR considers a company's capacity to develop products that meet consumer needs and to reduce costs using overseas production bases. For the environmental and recycling-related businesses, JCR examines a company's systems of collecting recycled raw materials and waste in Japan as well as the development of overseas collection systems associated with a shift of electronic component and other manufacturers to overseas production.

2. Financial base

(1) Earnings strength

Since the earnings of refining businesses are considerably affected by fluctuations in the LME metal prices and exchange rates, JCR observes the status of negotiations on business conditions, sensitivity of each company's earnings to changes in the LME prices and exchange rates, and hedging strategies. Changes in the earnings of mining businesses are the opposite of those of refining businesses, which, thus, contributes to the overall stability of earnings. As a consequence, the income size of a mining business is examined in combination with the earnings of any equity method company. Diversified businesses include those with substantially variable earnings, such as electronics, and those with relatively stable earnings, such as automotive and environmental and recycling businesses. Because of this, JCR takes into account the weight of operating income in each business segment in the entire company, the ratio of operating profit to net sales, and past fluctuation ranges.

Key financial indicators:

- Operating income and ordinary income
- Investment profit (loss) on equity method
- Return on assets

(2) Cash flow

Large investment is often required for periodical repair of smelters, for increasing production, for the acquisition of rights to overseas mines, for overseas development, and for business diversification. While knowing the timing and price beforehand is difficult in acquiring the rights to mines, JCR attempts to obtain a knowledge of the schedules and amounts of investment required each year for periodical repairs and overseas mine development projects as much as possible. While a temporary increase in interest-bearing debt is inevitable in acquiring the rights to mines, JCR examines whether the ability to generate cash flow is adequate for restoring the conventional financial composition within about three years.

Key financial indicators:

- Cash flow from operating activities
- Cash flow from investing activities
- Ratio of interest-bearing debt to EBITDA

(3) Safety

Differences in metals refined, in business composition, and in the amount of losses on disposal of unprofitable business in the past, among other factors, have already caused disparities in the financial positions of large refining companies. In the future, too, equity capital may be impaired by a sharp decline in the LME prices, accidents or disasters at mines or smelters, and the formation and disposal of unprofitable businesses, and the strength of a company's financial position is likely to affect future growth strategies.

Key financial indicators:

- Interest-bearing debt
- Shareholders' equity and Equity ratio
- Debt equity ratio

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