

Key Developments in the Ferroalloy Markets

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ABSTRACT

Major developments that are affecting the demand and supply of the bulk ferroalloys are discussed. The assessment of near-term and longer-term market fundamentals is followed by an analysis of the principal determinants of cost competitiveness, with particular emphasis on electricity. The impact of structural changes and the implications for ferroalloy producers, consumers and industry suppliers are assessed.

1. INTRODUCTION

More than a decade has passed since INFACON was last held in North America. At that time, in April 1989, prices for most ferroalloys were retreating from the cyclical peaks reached the previous year. (Manganese ferroalloy prices, which had been depressed for much of the decade, were still rising.)

Back in 1989, the US import price of 75% ferrosilicon averaged \$774/tonne (46.9 ¢/lb). The average US spot price of silicon metal was about \$1,262/tonne (57.8 ¢/lb), while the average US import price of 50-55% high-carbon ferrochrome was 75.7 ¢/lb.

Twelve years later, the prices of all of the major ferroalloys are substantially lower in nominal terms, let alone on an inflation-adjusted basis. The amount of price erosion differs considerably from market to market and from one product to another. Specific circumstances aside, most of the decline in ferroalloy prices reflects protracted oversupply combined with steadily declining costs of production. Costs have declined due to a gradual shift in production from higher-cost to lower-cost locations and also because of improved operating efficiencies.

Will these trends continue? What are the prospects for the ferroalloy markets between now and the next INFACON and beyond?

2. DEMAND

The demand for ferroalloys principally is determined by developments within the iron and steel industry. The close link between steel and ferroalloys is clearly demonstrated by Figure 1, which compares the benchmark CRU steel price index to a weighted index of silicomanganese prices in the three major Western markets, i.e., the USA, Europe and Japan. A similar close correlation exists between steel prices and those of high-carbon ferromanganese and ferrosilicon.

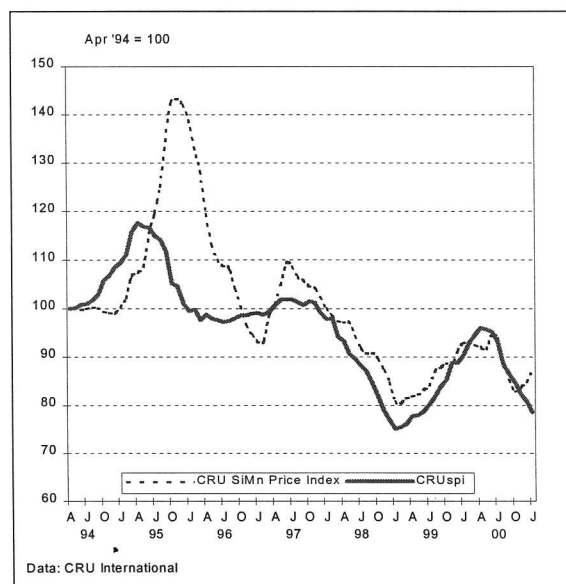


Figure 1: Relationship Between CRU Steel Price Index and Silicomanganese Prices.

Steel prices provide a good indication of future changes in crude steel production and consequently in the demand for ferroalloys. Preliminary figures show that global crude steel production reached about 845 million tonnes in 2000, representing a year-on-year increase of

more than 7%, as output rose in all major steel producing countries. One of the most significant developments over the past two years has been the strong recovery in steel production within the CIS.

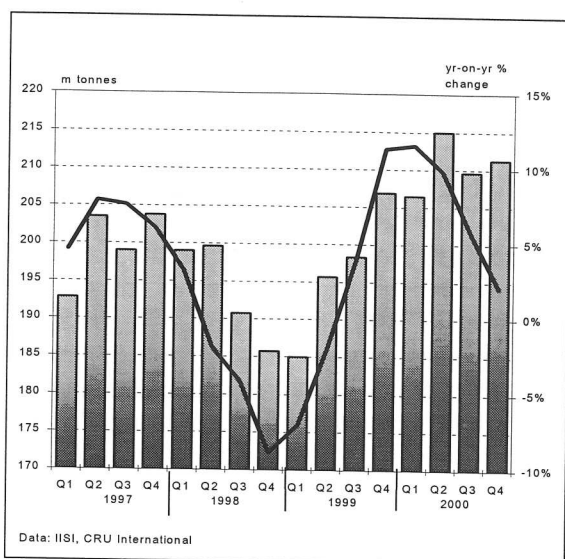


Figure 2: Quarterly Crude Steel Production 1997-2000.

The growth in crude steel production during 2000 mainly reflected strong gains in the first half of the year as shown in Figure 2. However, with the exception of the USA, output generally held firm through the latter part of last year.

Barring a serious economic downturn extending beyond the United States, total crude steel production is expected to recover from late 2001 onwards, reaching a cyclical peak of about 905 million tonnes in 2004.

By all indications, the stainless steel sector will continue to substantially outperform most other segments of the steel industry in terms of consumption and production growth. Since 1990, stainless steel production has increased at an average rate of over 5% per annum. Following below-trend growth in 2001, world stainless steel production is projected to rise more rapidly towards mid-decade, exceeding 23.4 million tonnes by 2005.

Over the past decade, total silicon metal demand has advanced at an average rate of about 4.6%

per annum, led by strong gains in chemical-related consumption. As a result, Western silicon demand exceeded one million tonnes for the first time in 2000.

The underlying growth in aggregate silicon consumption is not expected to slow materially for at least the next 5 years. Based on announced expansion programs by the major consumers of chemical-grade silicon metal, most of the increase in future consumption initially will occur in the European Union, shifting gradually to Asia.

3. SUPPLY

The geographical distribution of ferroalloy production differs considerably from product to product, as highlighted by Table 1.

MnFe	FeCr	FeSi	Si-Metal
China	RSA	China	China
RSA	Kazakhstan	Russia	USA
Ukraine	India	Norway	Norway
France	Finland	Ukraine	Brazil
Norway	Zimbabwe	USA	France

Table 1: Leading Ferroalloy Producing Countries in 2000.

These differences reflect a combination of resource and market-related factors. Access to low-cost ore has a major influence on ferrochrome and manganese ferroalloys manufacture, while the price and availability of electric power historically has played a key role in the location of plants engaged in the production of silicon-based alloys.

Mirroring the growth in demand, the biggest rise in production capacity has occurred in high-carbon ferrochrome and silicon metal. In both industries, total Western world capacity rose by almost 40% between 1994 and 2000. Virtually all of the net increase in ferrochrome capacity over this period was due to expansions in South Africa, while silicon metal capacity grew substantially in a number of countries, foremost Norway and Brazil.

Nearly 60% of the new Western silicon metal capacity completed between 1994 and 2000 was

derived from ferrosilicon furnace conversions. Largely because of such conversions, total Western ferrosilicon capacity fell considerably during the second half of the 1990s, in spite of significant capacity expansions at some plants in Northern Europe. For different reasons, aggregate Western manganese ferroalloy capacity also has contracted substantially in recent years, mainly due to plant closures.

Less complete information is available on capacity changes in the former East Bloc countries. However, it is evident that part of the recent growth in ferroalloy output in China and the CIS stems from capacity expansions. A large share of the additional production has been exported to the West.

All of the ferroalloy markets have experienced a rise in combined net exports from China and the CIS over the past two years. The biggest jump in exports has occurred in ferrosilicon and silicon metal.

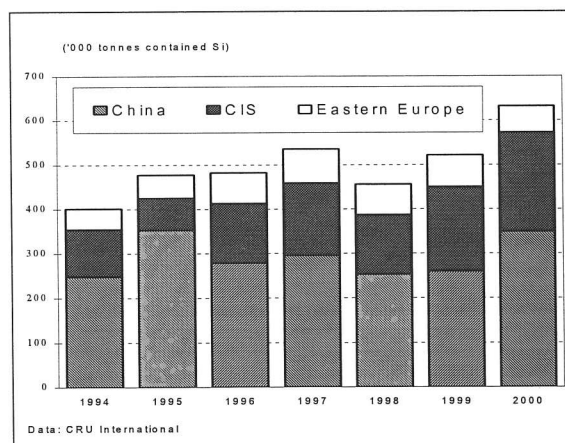


Figure 3: Net East Bloc Ferrosilicon Exports to Western World 1994-2000.

Non-Western producers currently meet more than one third of Western ferrosilicon demand. In the case of silicon metal and that of silicomanganese, the proportion is about 25%. It is considerably lower for high-carbon ferrochrome (just over 16%) and, especially, for ferromanganese (around 7%).

China is the world's biggest consumer and producer of ferroalloys and also is a leading overall exporter of ferroalloys principally based

on its trade position in silicon metal, ferrosilicon and silicomanganese. Countries within the former Soviet Union also are major suppliers of ferrosilicon and other ferroalloys. Kazakhstan ranks as the second largest ferrochrome producer and exporter behind South Africa, while Ukraine is a leading supplier of silicomanganese.

3. PRICES

At the beginning of 2001, ferroalloy prices generally remained under pressure from falling demand and excess supply. Since the growth in steel production started to abate during the second half of last year, high-carbon ferromanganese prices have fared somewhat better than prices for silicomanganese and for high-carbon ferrochrome, as declining demand has been offset by curtailments in supply.

Ferrosilicon prices already have been at extremely low levels for quite some time, as the rise in demand during the first half of last year was negated by a big jump in supply, primarily due to a substantial increase in total exports from China, Russia and Ukraine.

Silicon metal prices have been mixed. European prices for metallurgical grade silicon have benefited from firm demand and have been supported by exchange rate movements. However, there have been no net gains in US dollar denominated silicon metal prices over the past twelve months.

In view of current supply and demand fundamentals, prospects for a significant near-term increase in ferroalloy prices appear slim. Predicated on a burgeoning recovery in steel production during the second half of this year, ferroalloy prices are expected to respond to a gradual pick-up in demand, gaining momentum in 2002.

Supply side developments will play a major role in determining the magnitude and duration of this recovery. The most critical factors will be the level of net ferroalloy exports from the former East Bloc countries and the operating decisions made by Western producers, which

will be influenced by recent and pending capacity additions and other considerations.

A projected capacity overhang will limit the recovery in ferrochrome prices through 2003, while other ferroalloys likely will experience somewhat more rapid recoveries in capacity utilization and in prices.

The future status of trade restrictions will have a substantial impact on the total level of exports from China and the CIS, especially affecting the markets for silicon metal, ferrosilicon and silicomanganese.

In the long run, underlying production costs will be a major determinant of ferroalloy prices. As previously discussed, a substantial part of the decline in real ferroalloy prices over the past decade can be attributed to a fall in inflation-adjusted production costs.

4. COST COMPETITIVENESS

Since 1990, average production-weighted operating costs for the silicon metal plants included in CRU International's modelling system have declined by almost 30%, as highlighted in Figure 4.

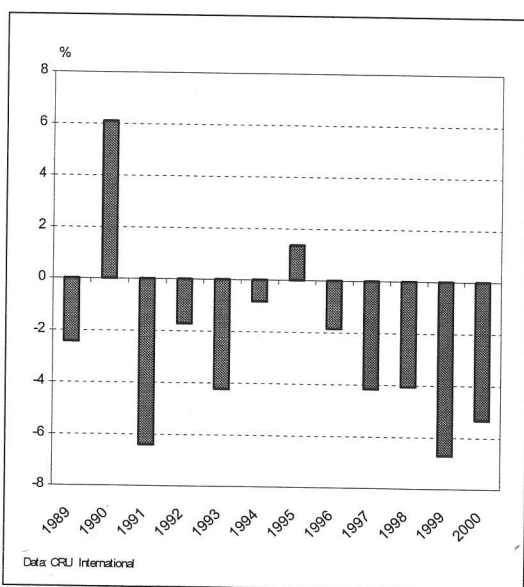


Figure 4: Annual % Change in Real Production-Weighted Average Silicon Metal Operating Costs 1989-2000.

The main reason for this drop is a steady improvement in manufacturing efficiencies combined with declining real prices for most inputs, especially electricity and raw materials. In the case of silicon metal, significant gains in unit electricity consumption and also in labor productivity have been compounded by advances in electrode technology. Differences in the annual rate of change in operating costs mainly can be attributed to exchange rate movements.

Electricity is a major determinant of the cost competitiveness of most ferroalloy plants. Electric power represents by far the largest single cost element in the production of silicon-based ferroalloys, typically constituting in the order of 20-25% of net operating costs. Electricity, together with ore, also is a key component of silicomanganese and high-carbon ferrochrome/charge chrome production costs, while ore is the principal cost factor in the production of high-carbon ferromanganese.

Some of the differences in electricity costs among individual plants can be attributed to process variations, especially in the case of manganese and chromium ferroalloys. However, much of the variance observed in total power costs reflects differences in the unit price of electricity.

The price of electric power to the ferroalloys industry largely is set in local currencies. Thus, exchange rate fluctuations are an important determinant of power costs in absolute as well as in relative terms. Over the past several years, exchange rate movements have lowered the production costs in US dollar equivalent terms for virtually all Western silicon metal producers that are located outside the United States.

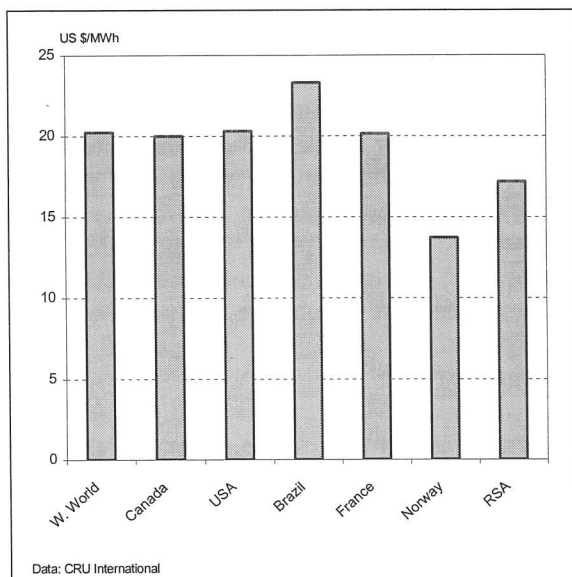


Figure 5: Average Electricity Rates Silicon Metal 2000.

Norway was one of the first countries to open its electricity market to competition. Still, the Norwegian ferroalloy industry continues to obtain a large share of its power supply under long-term government contracts. Moreover, certain plants also benefit from access to low-cost captive hydro generation.

In the wake of deregulation, electricity prices to some ferroalloy plants in the European Union have dropped significantly, while other plants are facing higher rates. A current surplus of generation also has made it more economically attractive to maintain a higher level of ferroalloy production during the winter months.

In spite of a weak Euro, many ferroalloy producers within the European Union are facing electricity prices that still are relatively high by international standards.

For a number of years, Eskom's electricity rates have increased by less than South African consumer price inflation. Moreover, new tariff options have provided additional savings for consumers that can curtail power demand at certain times. At the present rate to US dollar exchange rate, South African power prices are significantly below the world average. It should be noted that South Africa has a relatively high

incidence of variable rate tariffs, whereby the price of power is linked to product prices.

Because of differences in the timing and the amount of tariff adjustments, the price of contracted firm power now varies considerably within Brazil. Notably, electricity rates currently are higher in the key ferroalloy producing state of Minas Gerais than in some other areas of Brazil.

North America is characterized by wide variations in electricity rates. The cheapest power available to the local ferroalloys industry is tied to captive hydroelectric generation and to special contracts in upstate New York. The highest power prices in the region currently are paid by ferroalloy producers in the Southeastern United States.

5. IMPLICATIONS AND CONCLUSIONS

Crude and stainless steel production is expected to increase at an underlying rate of around 2% and 5% per annum, respectively. In tonnage terms, most of the future gains in crude steel production will occur in Asia (outside of Japan) and in the CIS. However, significant increases in output are expected in most regions by mid-decade, with the notable exception of Western Europe. Future growth in stainless steel production will be much more broad-based, with output expected to rise in all major producing areas thorough 2005.

As a result of widespread consolidation, consumption of most ferroalloys is becoming increasingly concentrated among a limited number of large companies. The three leading consumers of chemical-grade silicon together account for almost one third of aggregate Western silicon metal demand. The consumption of metallurgical grade silicon is becoming increasingly concentrated as well in the wake of a series of mergers and acquisitions within the aluminum industry. The stainless steel industry also is dominated by a limited number of companies. In 1999, five companies together accounted for more than half of global slab equivalent production.

Western ferroalloy production also has undergone substantial consolidation, a trend that is likely to continue. Nevertheless, most segments of the ferroalloys industry will remain susceptible to extended periods of oversupply. Barriers to entry generally are low, and it is noteworthy that the products experiencing the fastest rate of consumption growth, i.e., silicon metal and high-carbon ferrochrome, have been no less affected by oversupply than other ferroalloys.

Developments over the past several years suggest that Western ferroalloy producers will continue to face major challenges from producers in the CIS and China, increasingly also outside of the traditional realm of commodity grade products.

Significant variations currently exist in the technical performance of individual ferroalloy plants. Considering the potential for further process improvements and efficiency gains, operating costs likely will continue to trend lower in inflation-adjusted terms over the next decade. However, future cost reductions eventually may be offset by the expenses necessary to comply with more stringent environmental standards. Depending on how any new regulations are applied, the cost

competitiveness of ferroalloy plants in some countries could be adversely affected.

Increased competition in many cases at least initially will result in lower electricity prices, but power costs fundamentally remain dependent on the underlying characteristics of the power supply system, such as capacity reserve margins and fuel costs. However, where sufficient transmission capacity exists, market forces will lead to a convergence of electricity prices. Nevertheless, pockets of relatively low-cost power are likely to remain available in some locations, either because of physical barriers to electricity trade or through government intervention.

Ongoing changes within the electricity sector are but one of many developments that are presenting participants in the ferroalloys industry with new opportunities as well as a host of new challenges.

6. ACKNOWLEDGEMENTS

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