Ownership of the iron ore industry in the 1990s

by Magnus Ericsson, Kristina Rosén and Andreas Tegen

In 1975 the three leading iron ore companies, CVRD, USX and LKAB controlled 19 per cent of Western world production. In 1993 this figure had increased to 34 per cent and CVRD was still to find at the top followed by BHP and RTZ. This is a unique trend of increasing corporate concentration. In most major non-ferrous minerals and metals a deconcentration has taken place during the same period.
This paper surveys the corporate structure of the iron ore industry during the last 20 years. Present changes in ownership and control are discussed and possible future trends are identified.

The authors are from the Raw Materials Group, PO Box 90103, S-120 21 Stockholm, Sweden.

Two concepts are of basic importance when discussing structural changes, *ownership* and *control*. Ownership refers to the holding of shares in a company and is easy to define and to measure. In principle the ownership figures are to be found in the share register. Control is more difficult to define and to measure accurately. The following definition will be used:

"To be in control is to have the possibility to act decisively on strategically important issues rather than to have day-to-day influence over a company. Such issues include the broad policies of a company, decisions on large investments, buying or selling of subsidiaries and authority to appoint or dismiss top management."

Control can be exercised through many means, of which ownership is the most common and important one. Other ways are for example through administrative and technical management, long term contracts, market knowledge, proprietary technology, financing, personal links and vertical integration.

In this study ownership and management is used to measure control.

All figures on corporate ownership and production presented in this paper are obtained from *Raw Materials Data* [1].

Historical trends

Trends of development over the last 20 years for five aspects of the corporate structure of the industry are highlighted:

* Corporate concentration
* State control
* Steel company control
* Locus of control
* Foreign control

Corporate concentration

Corporate concentration is a measure of the strength of the largest companies in a market. High corporate concentration means that the major producers can have a significant market impact. The level of corporate concentration in the iron ore industry is given in Tables 1 and 2.

The three largest companies control over 30 per cent of Western world iron ore production. The ten largest together reach almost 60 per cent. Compared to other minerals industries concentration in the iron ore industry is at a medium level, similar to for example copper and bauxite. The concentration is lower than in nickel and tin which are the most concentrated of the major metals.

The wind of change since 1975 is however unique in the iron ore industry: A continuous and steady increase in corporate concentration. The pace of concentration has also increased considerably over the last decade. The share of Western world iron ore production controlled by the ten largest companies grew with a meager 4 per cent between 1975 and 1984 but sky rocketed with 30 per cent from 1984 to 1993. Other major metals such as bauxite, copper and gold exhibit a declining trend over the last decade.

Several factors each give a part of the explanation for this:

• The size of industry output, total production of iron ore is approximately 900 Mt/year which is roughly ten times higher than the next metal, bauxite. The total value of the iron ore production in the Western world almost equals that of gold and and is six times higher than that of bauxite.

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Table 1
Corporate concentration in iron ore mining
(% of Western world production)

Year/ Rank	Top 3	Top 5	Top 10
1975	19.2	27.0	42.7
1984	24.2	31.6	44.2
1993	34.2	43.3	57.7

Source: Raw Materials Data 1994.

Table 2
Corporate control in metal mining in 1993.
Iron ore mining

Controlling company/state, (% control) controlled producers		Country of incorp. or production	Producer's total prod. Mt	Controlled share Mt	Share of total world prod %
1. State of Brazil		**Brazil**	–	**87.38**	**9.3**
100%	Cia Vale do Rio Doce	Brazil	74.40	74.40	8.0
51%	Minas da Serra Geral SA	Brazil	9.90	5.01	0.5
67%	NIBRASCO	Brazil	7.20	4.81	0.5
51%	Cia Italo-Brasileira de Pelot	Brazil	3.10	1.58	0.2
51%	Cia Hispano-Brasileira Peloti	Brazil	3.10	1.58	0.2
2. Broken Hill Pty Co Ltd		**Australia**	–	**53.74**	**5.7**
100%	Mount Newman Mining Co Pty Lt	Australia	31.32s	31.32s	3.3
100%	Yandi Iron Ore Mine	Australia	7.77s	7.77s	0.8
100%	Goldsworthy Mining Ltd	Australia	5.35s	5.35s	0.6
49%	Samarco Mineracao SA	Brazil	7.30	3.58	0.4
100%	Whyalla Iron Ore Mine	Australia	2.89s	2.89s	0.3
100%	Koolan Island (Yampi Sound) I	Australia	2.80s	2.80s	0.3
3. RTZ Corporation PLC		**UK**	–	**48.35**	**5.2**
100%	Hamersley Holdings Ltd	Australia	44.14	44.14	4.7
60%	Channar Iron Ore Mine	Australia	6.13	3.68	0.4
100%	Mineracao Corumbaense Reunida Brazil	0.44	0.44	0.0	
58%	Palabora Mining Co Ltd	South Africa	0.15	0.09	0.0
4. Caemi		**Brazil**	–	**26.98**	**2.9**
100%	Mineracoes Brasileiras Reunid	Brazil	23.30s	23.30s	2.5
25%	Quebec Cartier Mining Co	Canada	14.70	3.68	0.4
5. Iscor Ltd		**South Africa**	–	**23.47s**	**2.5**
6. State of Sweden		**Sweden**	–	**18.73**	**2.0**
100%	Luossavaara Kirunavaara AB	Sweden	18.73	18.73	2.0
7. State of Venezuela (CVG and FIV)		**Venezuela**	–	**17.48**	**1.9**
100%	CVG Ferrominera Orinoco CA	Venezuela	17.48	17.48	1.9

Controlling company/state, (% control) controlled producers	Country of incorp. or production	Producer's total prod. Mt	Controlled share Mt	Share of total world prod %
8. State of India (federal and regional)	**India**	–	**16.29e**	**1.7**
100% National Mineral Development	India	10.00e	10.00e	1.1
100% Kudremukh Iron Ore Co Ltd	India	6.29s	6.29s	0.7
9. USX Corp	**USA**	–	**14.40**	**1.5**
100% Minntac Iron Ore Mine	USA	14.40s	14.40s	1.5
10. Bethlehem Steel Corp	**USA**	–	**12.85**	**1.4**
100% Hibbing Taconite Co	USA	8.16s	8.16s	0.9
35% Iron Ore Co of	Canada	13.60s	4.69s	0.5
11. North Broken Hill Peko Ltd	**Australia**	–	**10.99**	**1.2**
53% Robe River Iron Associates	Australia	20.73	10.99	1.2
12. LTV Corp	**USA**	–	**10.58**	**1.1**
100% LTV Steel Mining Co	USA	7.87s	7.87s	0.8
25% Empire Iron Mining Partnership	USA	7.41s	1.85s	0.2
17% Wabush Iron Ore Mines	Canada	4.94	0.86	0.1
13. Mitsui & Co Ltd	**Japan**	–	**10.31**	**1.1**
32% Robe River Iron Associates	Australia	20.73	6.63	0.7
25% Quebec Cartier Mining Co	Canada	14.70	3.68	0.4
14. Dofasco Inc	**Canada**	–	**10.28**	**1.1**
50% Quebec Cartier Mining Co	Canada	14.70	7.35	0.8
100% Algoma Steel Inc	Canada	1.16	1.16	0.1
18% Wabush Iron Ore Mines	Canada	4.94	0.90	0.1
6% Iron Ore Co of Canada	Canada	13.60s	0.87s	0.1
15. State of Mauritania	**Mauritania**	–	**9.19**	**1.0**
100% Sté Nationale Industr. et Minière	Mauritania	9.20	9.19	1.19
16. State of Luxemburg	**Luxembourg**	–	**8.51**	**0.9**
63% SA Mineracao de Trindade	Brazil	6.25	3.94	0.4
32% Samarco Mineracao SA	Brazil	7.30	2.35	0.3
63% Arbed France	France	3.50	2.21	0.2

Controlling company/state, (% control) controlled producers		Country of incorp. or production	Producer's total prod. Mt	Controlled share Mt	Share of total world prod %
17. State of China		**China**	–	**7.97**	**0.9**
100%	Empresa Minera del Hierro del	Peru	5.52	5.52	0.6
40%	Channar Iron Ore Mine	Australia	6.13	2.45	0.3
18. State of Iran		**Iran**	–	**7.20e**	**0.8**
100%	National Iranian Steel Co	Iran	7.20e	7.20e	0.8
19. Cyprus Amax Minerals Co		**USA**	–	**6.17**	**0.7**
100%	Babbit/Silver Bay Iron Ore Mi	USA	3.32s	3.32s	0.4
50%	Tilden Iron Ore Partnership	USA	5.67s	2.84s	0.3
20. Inland Steel Industries Inc		**USA**	–	**6.14**	**0.7**
40%	Empire Iron Mining Partnershi	USA	7.41s	2.96s	0.3
100%	Inland Steel Co	USA	2.61	2.61	0.3
11%	Wabush Iron Ore Mines	Canada	4.94	0.56	0.1

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• Extreme economies of scale, which are more important in iron ore production than in most other minerals.

• The introduction of giant intercontinental freight vessels, that decreases transport costs and makes it possible to export iron ore all over the world.

• A geological situation where there is a shift towards higher grade, huge deposits as opposed to the reversed trend in many non-ferrous metals.

• Low grade, smaller deposits that have been mined over a long period have been gradually closing down as in France and the US.

• High financial barriers to entry due to the large scale of an iron ore project.

• High concentration on the consumer side with the Japanese buyers' group as a prime example.

However even with these factors in mind it is difficult to satisfactorily explain the high and increasing concentration in the iron ore industry.

State control

State control is in this study defined in the same way as corporate control ie only the influence of the state through share holdings in iron ore producing companies is measured. Actual state control might be larger when considering that a government also has power over legislation, taxation etc, but this has not been taken into account.

In 1993 total state control amounted to 33 per cent of Western world iron ore production. This is the highest level among all major non-fuel minerals, in no other metal is state control over 30 per cent. See Table 3.

Since 1984 there has been a slow decline from 35 per cent. This is in line with the trend for most other metals. The decrease is lower than in copper but on the same level as in for example bauxite and nickel.

During the last few years privatisations have been in focus in both market economies and the former centrally planned economies. Against this background it is surprising how small changes have actually taken place in the iron ore industries of the Western world. South African Iscor (1989), Brazilian Cia Siderurgica Nacional (1993) and Peruvian Empresa Minera del Hierro del Peru (1992) are the major privatisations that have taken place. Together these three producers control 6.3 per cent of Western world production in 1993. Ironically however the Peruvian company was bought by the Chinese state owned Shougang and is thus still under state control. The shut down of state controlled iron ore mines as in France is another reason for diminishing state control during the same period.

Some of the world's most successful iron ore mining companies are still state controlled such as Brazilian CVRD and Swedish LKAB. CVRD seems to be

firmly under Brazilian state control in spite of permanent rumours and discussion about privatisation during the last 20 years. In recent privatisations of the Brazilian steel industry CVRD has even been bidding for steel producers that are being privatised. LKAB has been on the privatisation list but the new Swedish government, elected in September 1994, will most likely not pursue these plans both of ideological reasons and of the simple reason that it is difficult to find a buyer willing to pay an acceptable price for the company. In India and Venezuela discussions about privatisations are active but so far no actual changes have taken place.

It is probable that plans like these, which are also supported by international financing agencies including the World Bank, will decrease government or state control further in the mid 1990s. Some financially ailing state controlled iron ore producers might also be shut down further decreasing state controlled share of total production. However the speed of privatisation will probably tail off and the state sector will undoubtedly continue to play an important role in the international iron ore industry also in the long term perspective. The nationalisations of the late 1960s and the early 1970s will not be completely reversed.

Steel company control – vertical integration

Mining companies integrating into metal refining is an important feature of several mineral industries. In, for example, the aluminium industry bauxite mining companies take control over alumina plants and also aluminium smelters. This phenomena is known as vertical integration. In the iron and steel industries it includes the control of iron ore mines by steel companies and vice versa. A high level of vertical integration indicates stronger corporate control than if there were different actors in mining and metal refining (iron- and steel production). Among the top ten iron ore mining companies in 1975 were five steel companies with captive mines: US Steel (presently USX) and Kaiser Steel from the USA, European Arbed and Sacilor and Australian BHP. Further the nationalisation in Venezuela was quite recent and there are reasons to believe that Ferrominera Orinoco to a large extent was still operating as a captive US Steel mine. Together these six companies controlled around 16 per cent of the Western world production of iron ore. In 1993 the importance of steel companies had diminished and there were only 4 steel companies among the

Table 3

State control in iron ore mining (% of Western world production)

Country	1975	1984	1993
Brazil			
Mainly CVRD	10.0	13.3	15.8
Sweden			
LKAB	4.5	3.5	3.4
Venezuela			
Ferrominera Orinoco	4.1	2.6	3.2
India			
NMD, Kudremukh	1.1	2.3	2.9
Mauretania			
SNIM	1.5	1.9	1.7
Luxemburg			
Arbed, Samarco	–	1.7	1.5
China			
Hierro del Peru, Channar	–	–	0.9
Iran			
Nisco	0.1	0.3	1.3
Italy			
Mainly Sesa Goa, Itabrasco	0.1	0.2	1.0
Turkey			
Mainly Turk Demir	0.1	0.3	0.8
South Africa			
Iscor	1.1	3.7	–
Liberia			
Lamco, NIOC, Bong	1.7	1.9	0
France			
Mainly Sacilor	–	1.7	0
Chile			
CAP	1.9	1.5	–
Angola	0.9	0	0
Yugoslavia	0.9	0.6	0
Total state control	**25.8**	**35.1**	**33.0**

Source: Raw Materials Data 1994.

Table 4
Locus of control and production of iron ore mining (% total world production)

Year	1975		1984		1993	
Area	Contr	Prod	Contr	Prod	Contr	Prod
Africa	5.5	7.1	5.5	6.3	4.3	4.6
Asia	9.2	11.7	19.6	20.6	33.3	32.0
Australia & New Zealand	4.5	11.2	4.2	10.4	7.3	13.1
CIS & Eastern Europe	27.7	27.7	29.3	29.3	17.1	17.1
Europe	17.5	12.8	13.2	6.3	12.0	3.6
North America	17.4	14.2	11.0	10.5	8.4	9.3
Latin America	12.9	15.4	13.3	16.6	16.7	21.1

Source: Raw Materials Data 1994.

top ten. Iscor from South Africa, USX and Bethlehem Steel from the US and Australian BHP together controlling 11 per cent of total world production. It seems as if earlier stronger domination by the steel companies over the iron ore industry has gradually weakened and that a new type of iron ore company focusing primarily on the mining stage has developed.

Geographical shifts in locus of control

The geographical locus of control over iron ore mining has shifted considerably during the last 20 years. In Table 4 controlling companies are grouped according to region of incorporation of the controlling company. As an example Brazilian Caemi's 25 per cent share of Canadian producer Quebec Cartier is considered to be under Latin American control since Caemi is based in Brazil. North American company control has been cut into half from 17 per cent in 1975 to 8 per cent of total world production in 1993. A similar decrease is found for the European controlling companies but not quite as steep. It is the Australian controlled producers and the Latin American ones that have increased their control over the last two decades from 5 to 7 per cent and from 13 to 17 respectively. These trends of increasing importance of Latin American companies and a decrease for the North American, mainly US ones, are not unique to the iron ore industry but constitutes a general trend which can be found also in other minerals and metals industries. The North American influence over the primary industries is clearly declining.

To some extent these shifts in locus of control reflect the geographical shifts in production of iron ore that have taken place during the last two decades. However it is important to underline that the relocation of control over production does not automatically follow relocation of physical production. In Europe the imbalance between control and production is most obvious, 12 per cent of the total world iron ore production is controlled by West European companies but only 4 per cent of the iron ore is actually produced in Europe. In Australia the situation is the opposite, only roughly half of the iron ore production is controlled by Australian companies.

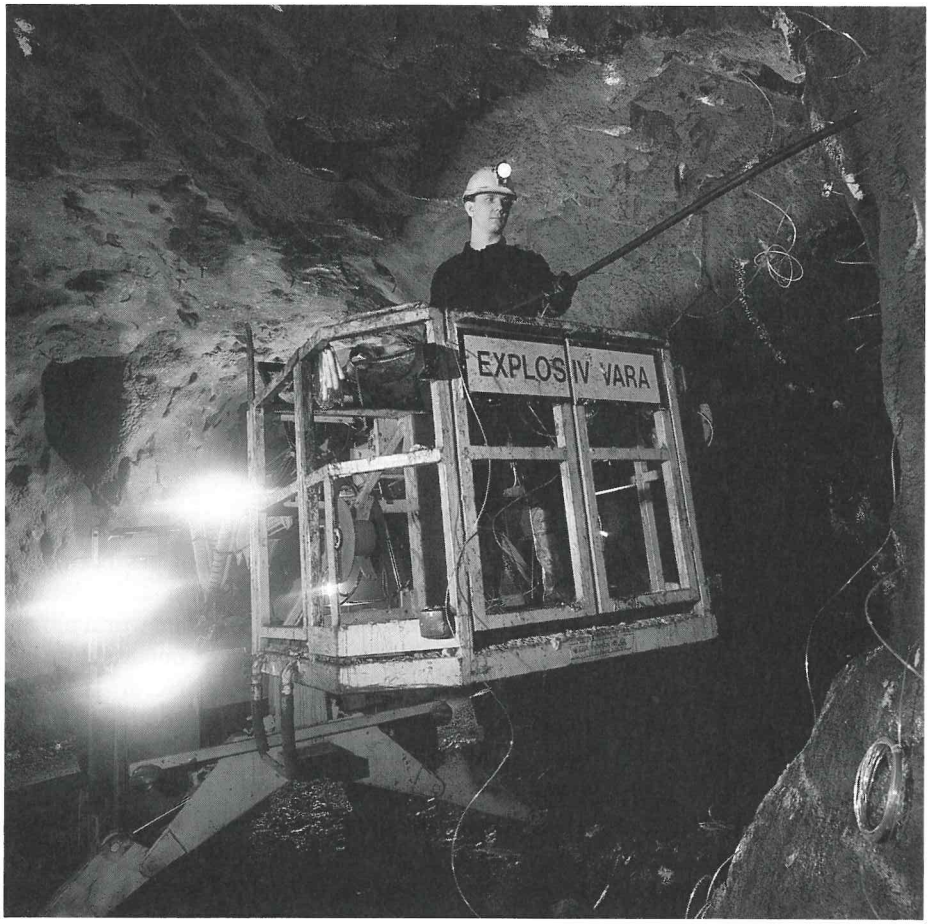
Foreign control

The total foreign control in the iron ore industry is summarised in Table 5. The level of foreign control has been fairly constant over the last two decades, around 15 per cent of total world production. In 1975 the most important owners internationally were North American based, together they controlled 7 per cent. European companies were at almost the same level while international control by companies from other regions was of little importance. In 1993 the North American interests had dwindled to just above 1 per cent. European companies control abroad had increased to around 9 per cent and Japanese/Chinese control had increased to 4 per cent. African iron ore mining had became completely locally controlled in the period with the closing down of Liberian mining. Foreign control over North American and European producing companies have also declined. Instead foreign interests have been concentrated to Australian and South American iron ore producers.

Third world developments

The developments in locus and nationality of control are complex to disentangle. In brief it is obvious that the expectations and hopes of the developing countries in the early 1970s for a resource based economic and social development have not been met with. However in the iron ore industry the success of the developing countries in taking over control of the industry and harvesting a larger share of the benefits has been more obvious than in other minerals industries such as copper and bauxite.

Given the present privatization trend and the lack of national capital in most developing countries, the share of foreign controlled iron ore production is set



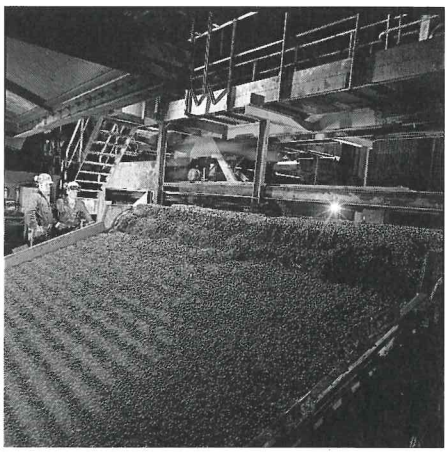
The Swedish state owned LKAB is number eight among the largest iron ore mining companies in the world: underground mining in Gällivare/ Malmberget and Kiruna, pelletizing, train transport to the harbour in Narvik, Norway.

to increase in the next few years. It is possible that the most difficult years of contradictions between developing country governments and transnational mining industry as experienced in the mid and late 1970 are over. There will, however always be a source of tension in the fact that production of minerals in the developing countries is continuously growing but control over these minerals to a large extent remains in the industrialised countries.

Western world

Apart from the privatisations discussed earlier only a few minor ownership changes have taken place in the iron ore industry during the early 1990s. This is perhaps a bit unexpected considering the difficult years in terms of low prices and profits that the industry has been going through. It seems as if the present structure which developed after the profound changes taking place in the early 1970 is relatively stable.

Among the most active players during the early 1990s are the Chinese taking a direct owner's role in the Australian iron ore industry. There are signs that this expansion will continue and that the Chinese will become even more important internationally. Anshan, the largest iron ore producer in China and one of the leading steel mills, has formed a 60:40 joint venture with Portming mining of Perth to open the Koolyanobbing deposit.



Most of the production increases that have taken place in the two last decades and planned future expansions take place within the existing corporate structures. There are no completely new mega projects in the iron ore industry as is for example the case in copper mining.

Traditionally Japanese iron and steel companies have secured their iron input by long term contracts through the trading houses. Iron ore is one of the few metal industries where Japanese companies have for a long time had a fairly strong direct ownership in mining operations. Mitsui, Nippon Steel and NKK (previously Nippon Kokan) and other Japanese companies together control more than 4 per cent of total Western world production of iron ore. This might not seem to be an important holding but compared to Japanese direct investment in other mineral and metals it is considerable. At present the Japanese are reconsidering their strategy to secure a stable supply of non-ferrous metals and are opting for a more active role not only as buyers but also as owners of non-ferrous mining companies. Against this background it would not be surprising if the direct investments into iron ore mining would also increase.

The former centrally planned economies

The member states of the CIS were still in 1991 the world's largest iron ore producers. Russian, Kazakh and Ukrainian iron ore producers are however quickly being integrated into the world market and their production levels have been cut down from a total of 200 Mt in 1991 to 150 Mt two years later. But there are no signs of a quick integration of the iron ore industries of these countries into the network of the dominating international mining groups. There are several com-

plex reasons for this. Firstly it will be very difficult to find buyers to the often inefficient and polluting mines, sometimes based on low grade deposits. Secondly there are important benefits for the new governments in retaining state control.

In the former centrally planned economies there is pressure on the present governments to keep at least a majority of the ownership and hence control of the most important mining companies:

* State control over minerals was one of the foundations of the centrally planned economical system. In spite of recent market reforms there is still support for these ideas. There are strong conservative/nationalist groups in most of the former centrally planned countries that also oppose privatisations. The management of the mining companies also fight hard to stay in power.

* Many of the major mining companies have formed huge conglomerates that are virtually hub of the whole society in that area. The mining company operates the farms providing food for the local community, it operates the school system from nurseries up to university level and it is often also responsible for hospitals and old age homes. No private owners could take over these responsibilities in a market economy. To privatise these conglomerates means that these functions have to be cut off and at present or in the near future there are no state funds to support these functions vital for the survival of the local communities.

Table 5
Foreign control of iron ore mining (% of total world production)

Area	1975	1984	1993
Africa in			
Australia	0.5	0.2	–
Asia in			
Australia	0.7	1.1	1.4
North America	–	0.8	1.0
Latin America	–	–	1.6
Australia in			
Europe	–	–	0.1
Latin America	–	0.4	0.4
Europe in			
Africa	0.9	0.7	–
Asia	0.1	0.1	0.4
Australia	2.7	4.1	5.1
Europe	1.1	0.5	0.3
North America	0.2	0.1	–
Latin America	1.2	3.6	3.0
North America in			
Africa	0.3	0.1	–
Australia	2.8	1.4	0.2
North America	3.3	2.6	1.2
Latin America	0.7	0.6	–
Latin America in			
North America	–	–	0.4
TOTAL	14.5	16.3	15.1

Source: Raw Materials Data 1994.

In the medium term perspective it does not seem likely that any of the CIS iron ore companies will be sold to foreign investors. The necessity to increase productivity and to import new technology as well as to stop the serious environmental damages caused by some of the present mining and metallurgical plants however is a strong counterforce and acts in favour of increased foreign ownership and control.

Gradually company based information is becoming available from the former Soviet Union and also from China. A preliminary list of the major iron ore producing companies in the world in 1992 incorporating also CIS and the PRC is shown in Table 6.

Among the top twenty companies three are Chinese, three Russian, two Ukrainian and one Kazakh. Corporate concentration decreases when the producers in the former Soviet Union and China are included. To make a comparison possible the figures before including these new producers are related to Western world production and the figures after to total world production.

At the top 5 level from 43 per cent of Western world production to 25 per cent of total world production and at the top

Table 6

Corporate control in iron ore mining 1992 (Mt)

1.	CVRD	Brazil	80.9
2.	RTZ	UK	48.3
3.	BHP	Australia	45.7
4.	Anshan	China	26.3
5.	Caemi	Brazil	25.8
6.	Iscor	South Africa	22.5
7.	Shougang[1]	China	22.3
8.	LKAB	Sweden	19.0
9.	Ferrominera Orinoco	Venezuela	18.1
10.	Yuzhny	Ukraine	18.0 e
11.	Severny	Ukraine	16.0 e
12.	Lebedinsky	Russia	15.6
13.	USX	USA	13.3
14.	Bethlehem Steel	USA	12.8
15.	Uralruda	Russia	12.8
16.	Benxi Iron and Steel	China	12.6
17.	North Broken Hill	Australia	11.9
18.	Mikhailovsky	Russia	11.7
19.	Sokolovo-Sarbaysky	Kazakhstan	10.8
20.	Mitsui	Japan	10.7
TOTAL			455.1

Note: 1. Including Hierro del Peru.
Source: Raw Materials Data 1994.

10 level from 59 per cent of Western world production to 36 per cent of total world production. This decline is a reflection of the relatively small size of iron ore mining companies in both the CIS member states and in China as compared to the large iron ore mining companies in the Western world.

These companies will become even more important on the world market when loss making producers in the market economic sense in the CIS and perhaps in the longer run also in China are gradually closed down.

The integration of the mining and metallurgical industries of the formerly centrally planned economies into the world market will initially further increase the state controlled sector of the international iron ore mining industry. Of total production controlled by the global top twenty companies a little less than 60 per cent is state controlled. The same figure for the top twenty companies in the Western world is 40 per cent. Over the next few years this figure is however likely to decrease when more production capacity is closed down in the CIS countries.

Conclusions

The largest iron ore companies are likely to become more important and powerful in the mid and late 1990s. The general trend over the last 15–20 years seems to be continuing.

Apart from corporate strategies and micro economics a number of external factors exert major influence on the pattern of ownership and corporate control in the iron ore industry. The average grade of iron ore mined around the world is gradually increasing. Low grade mines are being shut down and by using modern bulk transport technologies ores from high grade deposits are transported over longer and longer distances. These factors support the long term trend towards an increasing corporate concentration. In general production technologies under development and the present state of the art technology are large scale technologies demanding large amounts of capital for investment and often also a highly skilled work force. These technological changes in general favour higher concentration and larger companies.

It is difficult to determine whether this corporate concentration process will reach a stage where it could in any decisive way impact price formation or other market conditions. However in an industry with high barriers to entry, where the ten largest companies control almost 60 per cent per cent of Western world production it is obvious that in a future market situation with higher demand than today this could easily be the case. Future structural changes in the iron ore industry clearly merit continuous attention.

Notes

1. *Raw Materials Data*, the database on ownership and production in the world's mineral industries, compiled and updated by Raw Materials Group, Stockholm 1994. ■