



Consolidation, fragmentation and the structure of the mining industry

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Synopsis

This paper discusses reasons for mining company mergers that have become the fashion, the role of the 'Juniors' and asks what the motives might really be. It examines changes in company concentration over the last 20 years in key mineral segments. Data at different stages of a project are examined to attempt to elucidate the role of the 'Juniors'. Areas for further research are suggested.

Introduction

Suppose that one large mining firm, among the very largest in the world, is attempting to take over another similar firm, in an unfriendly and contested way. The offer is, as such offers frequently are, based on the broad assumption that large cost savings can be achieved by merging operations. The target company has rejected the offer on the grounds that it is too low. Several important stakeholders have joined the fray by acquiring significant shareholdings in the target company and possibly also in the potential acquirer. The latter has claimed that the merger will allow significant synergies to be realized from properties in which both companies are already partners or which are adjacent to each other. However, before the issue could be resolved all these matters were rendered irrelevant by the deepening global financial crisis.

That proposed merger and others like it might have contributed to a higher degree of concentration among producers of a number of key minerals. This could lead to concerns about accumulation of market power in the hands of a few very large mining companies. The proposed and abandoned merger would follow others in the mining industry that has created the series of top firms that are much larger and with greater combined market shares than they had before. Examples within the last few years include the mergers between Xstrata and Falconbridge, Freeport McMoRan and Phelps Dodge, CVRD and Inco, and most recently Rio Tinto and Alcan.

While the trend at the top seems to suggest that larger firms are being created, a corresponding trend among smaller firms can most precisely be characterized as fragmentation. This covers the existence of a long established trend (Humphreys, 2001) towards new deposits being explored, discovered and moved towards a feasibility stage by companies that are sometimes labelled 'junior' or 'medium-sized'. Some projects eventually become mines and somewhere along the way a major mining firm may acquire the junior company that had developed the project or the portfolio of projects, to a point where it became an interesting proposition to the large mining firm.

The apparently very strong desire on the part of large mining companies to engage in mergers raises the question of motive. Research has shown that mergers are costly, in the sense that the acquiring firm has to pay a premium price for the shares of the target. Further, the mergers frequently (anywhere between 50% and 70% of them) fail to deliver the returns they were supposed to generate, the loss of shareholder value generally appearing within a month and persisting thereafter (King *et al.*, 2006). Various explanations have been offered for the persistence of mergers despite the evidence that they destroy value, including managerial egotism and perverse incentives for bankers to press for such transactions (Pfeffer and Sutton, 2006).

One of the most frequently suspected explanations for mergers is the desire to attain market power. No respectable company would ever use that explanation, since market power, and by extension, monopoly, is almost universally frowned upon. The high failure

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rates would tend to refute this effect. Nevertheless, 'consolidation' or 'restructuring' or 'top level' mergers are taking place in the mining industry. Assessing the degree of concentration, measured as the fraction of global production by top firms is a way of saying something meaningful about the real extent of this consolidation. The next section of this paper examines changes in concentration over the last 20 years in a number of key mineral segments (gold, copper, nickel, zinc, aluminium and iron ore).

While the level of concentration has increased some percentage points over the past two decades, the increase is not as large as might be expected from the rhetoric emanating from various regulators and downstream interests. One reason that concentration may not have increased as quickly as many seem to have feared, may be related to events at the other end of the supply chain. Even if mining firms do merge, the resulting entities are still being depleted by ongoing production, and reserves are augmented only to the extent that new deposits or prospects are acquired. These new deposits, however, are rarely discovered or even brought forward by major mining companies. It seems as if these firms enter the stage only by way of an acquisition or at least some sort of partnership arrangement when it is tolerably clear that the worst uncertainties have been overcome. This refers not just to the geological and technical uncertainties present everywhere, but also to institutional and regulatory uncertainties.

Furthermore, while there has been some agreement that 'junior' exploration firms are very active, little more is known about these companies, about why they undertake the upstream section of the deposit discovery and development stream, or about whether this is an efficient way to organize the mineral supply process in the first place. To shed a little bit of light on this part of the industry, this paper uses cross-sectional data of different stages of the project generation stage in combination with selected longitudinal case studies of individual deposit development histories.

Some possible motives for mergers or consolidation were briefly alluded to above. However, market power is an unpalatable explanation, at least when proponents of mergers try to gain support for their ideas. An expression widely used for promoting any merger in any industry is that certain 'synergies' will be realized. The synergies are sometimes specified as a precise monetary amount, for example savings to be made over a fixed period of time. Apart from

elimination of duplicate services, many of these expected synergies essentially refer to economies of scale and/or scope, but may also refer to improvements in efficiency that take place upon the installation of new management. However, it is not always clear that such gains will ensue or that their value will accrue to the acquiring form (as opposed to the seller). Further, there are legions of examples, as well as systematic research, which indicate the high risks associated with mergers (King *et al.*, 2004). There may, however, be additional reasons specific to the mining industry that can explain the ongoing fashion for big mergers. These issues are discussed later in this paper. Concluding remarks and suggestions for further research are also offered.

Consolidation among major mining companies

The hostile merger offer sketched in the introduction was to be just one of a number of such proposals. Some have been realized, others not. Some proposals have been received with great hostility; others have been accepted after protracted haggling over price. The outcome of these mergers has been slight increases in concentration levels in the industry.

Concentration can be measured in a number of ways. The simplest is possibly calculation of the fraction of market capitalization of the largest mining firms. This, however, obscures the fact that many of the largest mining firms are composed of a variety of businesses. Some firms are strong in just one commodity, as exemplified by Codelco of Chile, which dominates copper mining (and as a state company is not involved in the merger game). Therefore, measures of concentration based on the market value of firms are virtually meaningless.

A slightly more fine-grained approach is used here, with an emphasis placed on the combined market share of the 10 largest producers in copper, iron ore, aluminium, zinc, nickel and gold. These market shares are examined at the mining stage, regardless of any downstream processing.

The picture presented in Figure 1 is one of a gradual but not very strong and not sustained trend towards higher concentration ratios for the five metals examined. Even if the stages of production are not fully comparable, the trends are fairly clear: Despite a series of quite significant mergers among large firms in the industry, concentration has not risen much—or not at all. One possible explanation is that most of these mergers have taken place during a long period of high and rising metal prices. Under these conditions, total

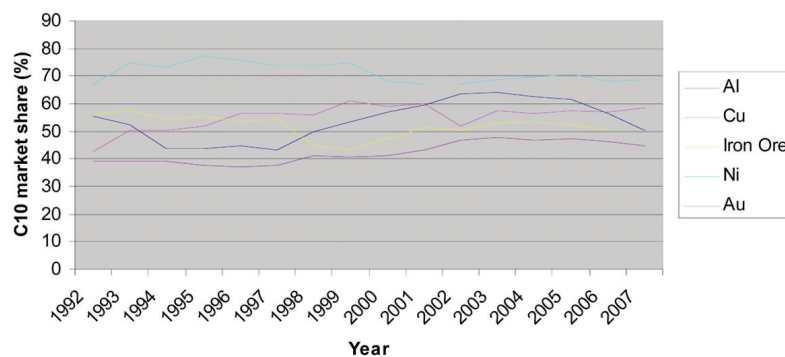
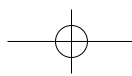


Figure 1—The market share for five important metals measured cumulatively for the top 10 producers in each metal. Based on data from Raw Materials Group



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production, not just that of the top firms, is likely to have risen. Indeed, assuming that the top firms apply conservative criteria when evaluating new projects, the additional production may in many cases have come from sources with high production costs that may overshadow the effect of mergers.

The trend in Figure 1 suggests that concerns over concentration may not at this time be warranted. However, if the assumption about production cost levels holds, then a downturn in metal prices may bring a higher degree of concentration, as the marginal producers close mines and delay production. Conversely, the larger firms may be quicker to reduce output during a recession.

While Figure 1 paints a fairly rosy picture of competition, more careful consideration of individual market segments or niches can change the picture. A merger between two top iron ore producers would have great impact in that segment of the iron ore industry that happens to be seaborne. Since iron ore shipping facilities tend to be large, those firms engaged in seaborne exports may come to hold a very strong market position. Even if the result is higher prices, this effect will last only as long as it takes to find new ways of bringing minerals to market.

Whether a very large merger justifies some form of intervention, either by regulators or by supply chain stakeholders, remains to be seen. However, the relentless impact of depletion means that even very large mining firms must either discover or acquire new deposits to keep up with the volumes being extracted and sold.

Fragmentation

One overall reason concentration and consolidation should not be taken too seriously is that the industry is very dynamic, in its own way. The essential characteristic is that individual deposits are depleted over time. Concerns about depletion have a long history, one that usually overlooks the limited incentives to acquire definitive data on the existence of stocks to be mined more than some 20 years into the future. However, even if the geological stocks are very large, various environmental concerns may be the biggest source of shortages, or, more precisely, of steeply rising costs. The time for such discussions is some time away and at the present time, the source of new deposits is our focus.

The question is not if they exist but who finds them. The very small numbers in Table I indicates that it is certainly not the top 10 mining firms that undertake any of the four stages involved, with the possible exception of Xstrata and to a lesser extent Freeport and Antafogasta. Indeed, some firms are curiously absent from the list or have very little going on. This suggests very different approaches to vertical integration and strategy generally. On the one hand, there are firms such as Xstrata that seems to be involved from a fairly early stage. On the other hand, several of the largest firms in the industry (Rio Tinto, BHPBilliton) are not involved directly in any of the stages identified in Table I.

To further explore the issue of fragmentation, consider the history of the Pebble project in Alaska. According to the Northern Dynasty website the original discovery was made by Cominco in 1997 but the property had gradually been transferred to Northern Dynasty between 2001 and 2005. Subsequently, a pair of very large low-grade orebodies has been discovered. Rio Tinto has acquired a 19.8% stake in the

company but Anglo American has been identified as the partner for developing the project. The history of the project, briefly sketched here, is one of major firms entering and exiting over a long period of time. Many similar paths can be identified for other projects.

To some degree this example of an acquisition path confirms the notion of fragmentation, but it also indicates an ongoing effort by the large mining companies to create networks of opportunities for themselves. Sometimes these efforts will lead to full control over a deposit, at other times the web fails or the major firm chooses not to pursue the opportunity. While the details surrounding the agreement about the Pebble deposits are limited in number, the fact that two of the largest mining firms have both been involved indicates that some form of bidding war has taken place, with Anglo as the winner.

Making sense of mining mergers

Mergers and acquisitions in this industry do not involve just the very large mergers such as those mentioned in the introduction. Most M&A activity in fact goes on at a far less glamorous level, where the focus is on individual projects. The latter are clearly pursued by producing mining firms, seemingly with the sole objective of replenishing the ever depleting portfolio of operating projects.

The larger mergers are a different matter altogether. The literature on post-merger financial performance is not encouraging (King *et al.*, 2004), in the sense that M&A activity does not create superior financial performance for the acquiring firms. The motives for engaging in M&A have been hinted at. Market power, synergies of an operational or financial kind, tax advantages, inefficient target management and managerial self-aggrandisement may all be motives that contribute to the decision about takeover offers (Capron and Pistre, 2002).

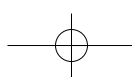
In cases where competing firms have adjacent operations and extensive infrastructure, the operational synergies may be obvious. Indeed this may be the principal driving force behind the offer BHPBilliton has made for Rio Tinto. Both companies have extensive presence in the iron ore industry in Western Australia. The synergies expected in such a case are likely to come from economies of scale, in this case in the transportation system related to bringing the ore to market.

Table I

Greenfield copper projects with the top 10 copper producers as of 2008

	Conceptual	Prefeasibility	Feasibility	Construction
Freeport	8	0	0	0
CODELCO	2	2	0	1
BHP	1	0	0	0
Xstrata	12	4	5	3
Rio Tinto	0	0	1	0
Grupo Mexico	0	1	3	0
Anglo	0	2	2	0
KGHM	0	0	0	0
Norilsk	3	1	0	0
Antofagasta	8	1	4	0
Total projects	288	86	93	37

Data from Raw Materials Group



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Realizing such economies of scale, however, does not depend on a merger taking place. The alternative to a full-scale merger, which on average is a fairly risky undertaking for the acquiring firm, is to realize the specific economies of scale through contracting solely in terms of where the improvements are expected to come from. If it is a matter of operating a joint rail transport system rather than building competing systems that overall are less efficient than a joint system, then contracting is certainly an alternative.

Since no firm will voluntarily claim that attaining market power is their goal, we can dismiss that explanation for large-scale merger activity. What remains are other synergies, tax advantages, poor management in the target company, and self-aggrandisement. The last option may always be involved and even if this is not the reason, top managers may commit themselves to such a path to such a degree that they cannot change their minds.

Financial synergies refer to the possibility that the merged firm may be able to obtain financing for its activities on better terms than they could before. However, since the firms involved are already among the largest in the industry, the improvement in cost of capital will probably be low.

Apart from scale benefits from adjacent operations, synergies are harder to identify. Economies of scale in mining are primarily dictated by deposit features and they are also to a considerable degree locked in during the mine design stage. Against this background it would be difficult to point to specific merger benefits. Economies of scope are a different matter. Scope economies are available when carrying out several activities at the same time leads to lower unit costs for both activities. However, while economies of scope may follow from the broader knowledge base in a merged company, realizing such benefits requires more than just a merger. These benefits can be obtained only if the collected resources of acquirer and target firms are integrated.

While large merges, of companies of roughly equal size, are not doomed to succeed, other mergers may still be a good idea. In an otherwise very acerbic commentary on poor

management, Jeff Pfeffer and Bob Sutton (2006) highlight the success of a company such as CISCO, which has grown much of the way by taking over much smaller firms

Concluding remarks

Very little is known about mining company profitability. Of course, the bottom line is published, as is the profits and losses of subsidiaries. Investigating the sources of profitability is, however, particularly difficult as the question invariably involves the matter of rent. Rent is the abnormal profits that accrue to firms as a result of the quality of a deposit. This type of profit is very specific to the extractive industries. All industries, however, may employ other resources and skills that competitors do not have and as a result generate abnormal rents. Separating the two is difficult, to say the least, but also contentious for any politician looking for money to spend.

Mergers may in fact be a way of dissipating rent. Mergers are very costly to implement. They take place on the basis of accumulated earnings. To the extent that merger-related costs can be deducted from operational revenues, the net result is that shareholders must forego profits that managers deem better spent on mergers.

Many questions remain unanswered. How does the junior mining sector work? How good is it at finding new deposits and what can we do about it? The list is quite long for anyone wishing to get started.

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