

Strategic heterogeneity in the global mining industry *

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The mining industry is global in the sense that its largest companies come from a number of countries, including developing countries. The global nature of the industry raises the question as to whether such a geographically diverse set of firms make similar strategic choices, and what the consequences of these choices are for both firms and nations. In this study, we examine a sample of the twenty-six largest mining firms in the world in order to determine whether they adopt similar strategies. We find a relatively high degree of strategic homogeneity among the world's leading mining firms, but the presence of firms from developing countries contributes to heterogeneity. We also find that homogeneity is not necessarily associated with higher returns. Paradoxically, firms from developing countries contribute to strategic heterogeneity because they are less diversified, but they are also more profitable. At the same time, the industry continues to consolidate through a series of cross-border mergers and acquisitions. The continuing consolidation of the mining industry worldwide has the potential to further reduce strategic heterogeneity and increase the relative bargaining power of transnational corporations (TNCs). At the same time, the pressures for strategic homogeneity are likely to result in more cross-border acquisitions by mining companies from developing countries.

Key words: corporate strategy, mining, strategic heterogeneity, globalization, emerging markets

1. Introduction

The global mining industry is characterized by the fact that its largest companies come from a number of countries, both developed and developing.¹ This is, perhaps, not surprising given that economically viable mineral and metal ore deposits are distributed worldwide. As indicated in table 1, as of

* We thank Steven Globerman, Aidan Vining and three anonymous referees for helpful comments and suggestions.

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¹ We refer to the global mining industry because we examine the largest mining firms in the world. In this context, we do not use the term global to refer to the strategies of *individual* firms, which may in fact be regional, as defined by Rugman (2005).

Table 1. Major Global Mining Companies, Ranked by Sales (2003)

Company	Sales 2003 US\$ Millions	Net Income 2003 US\$ Millions	Country	Historical Date	Metal/Mineral Interests
Alcoa Inc. (Alcoa)	21,504.0	938.0	United States	1894	bauxite, specialty chemicals, and coal
Anglo American plc (Anglo)	18,637.0	1,592.0	United Kingdom	1917	gold, platinum, copper, zinc, nickel, diamonds, aggregates, and coal
BHP Billiton (BHP)	15,608.0	1,900.0	Australia	1885	bauxite, base metals, petroleum, and coal
Alcan Inc.(Alcan)	13,640.0	167.0	Canada	1902	bauxite and specialty chemicals
Rio Tinto Group (Rio)	9,228.0	1,508	Australia	1873	bauxite, copper, gold, iron ore, diamonds, industrial minerals, coal, and uranium
Companhia Vale do Rio Doce (CVRD)*	5,350.0	1,548	Brazil	1942	bauxite, copper, nickel, iron ore, kaolin, and potash
Mining and Metallurgical Company Norilsk Nickel (Norilsk)*	5,196.0	861.0	Russia	1935	gold, platinum, copper, nickel, palladium, and natural gas
Noranda Inc. (Noranda)	4,657.0	34.0	Canada	1922	bauxite, copper, zinc, and nickel
Phelps Dodge Corporation (Phelps Dodge)	4,142.7	94.8	United States	1834	copper and molybdenum
Codelco (Corporación Nacional del Cobre de Chile)*	3,781.8	89.2	Chile	1976	copper and molybdenum
Xstrata plc (Xstrata)	3,481.6	277.0	Switzerland	2001	copper, zinc, and coal
Mitsui Mining and Smelting Co. (Mitsui)	3,159.1	25.7	Japan	1950	zinc and lead
Newmont Mining Corporation	3,157.8	475.5	United States	1921	gold, copper, and zinc
Sumitomo Metal Mining Co. (Sumitomo)	2,964.1	(9.8)	Japan	1590	gold, silver, platinum, copper, zinc, nickel, and lead
Inco Limited (Inco)	2,474.0	137.0	Canada	1915	gold, silver, copper, nickel, and cobalt
Grupo Mexico, S.A. de C.C. (Grupo Mexico)*	2,456.3	(125.0)	Mexico		copper, zinc, silver, and gold
WMC Resources Ltd. (WMC)	2,258.2	184.8	Australia	1933	nickel, copper, molybdenum, gold, phosphate fertilizers, and uranium
Freeport-McMoRan Copper and Gold Inc. (Freeport-McMoRan)**	2,212.2	181.7	United States/ Indonesia Canada	1967	copper, gold, and silver
Falconbridge Limited (Falconbridge)	2,083.5	194.4	Canada	1928	copper, zinc, nickel, cobalt, and ferronickel
Barrick Gold Corporation (Barrick)	2,035.0	200.0	Canada	1983	gold, silver, and copper
AK "ALROSA" (Alrosa)*	1,939.8	330.3	Russia	1992	diamonds
Teck Cominco Limited (Teck)	1,861.5	115.1	Canada	1906	gold, copper, zinc, lead, indium, and germanium
Dowa Mining Co. (Dowa)	1,844.4	(21.9)	Japan	1884	gold, silver, platinum, palladium, rhodium, and copper
Placer Dome Inc.(Placer)	1,763.0	229.0	Canada	1910	gold, silver, and copper
Impala Platinum Holdings Inc. (Implats)*	1,581.0	457.3	South Africa	~ 1970s	platinum, nickel, copper, and cobalt
Lonmin plc (Lonmin)***	1,298.0	123.3	United Kingdom/ South Africa	1909	platinum, palladium, and rhodium

Source: Annual Reports, SEC Filings, Company Websites.

* Indicates a firm headquartered in an emerging or transition economy. Of these companies, Alrosa and Codelco are state-owned, while Norilsk and CVRD were privatized in the late 1990s.

** Freeport-McMoRan, while based in the United States derives almost all of its revenues from Indonesian operations.

***Lonmin, while based in the U.K, derives almost all of its revenues from South African operations.

2003, the 26 largest mining companies in the world came from ten different countries, of which five were developing countries. These five countries accounted for six of the largest twenty-six firms. At the same time, several firms whose headquarters were in developed countries essentially conducted all of their operations in developing countries.

As part of the natural resource sector, the mining industry has occupied a prominent role in both the development and international business literature. The natural resource sector, and mining in particular, was the background for perhaps the best-known model of relations between transnational corporations (TNCs) and host country governments, Vernon's (1971) obsolescing bargain model (OBM). In its original formulation, the OBM posited that the risk associated with natural resources, and the lack of skills and technology in the host country require that host countries offer substantial incentives to TNCs. The initial bargain therefore favours the TNC. However, once the TNC has incurred the sunk cost of exploration and extraction, relative bargaining power shifts to the host country government which use the TNC (sunk) assets as hostages to extract resource rents, including expropriation of assets (Vernon, 1971; Moran, 1974).² Although the OBM has been questioned over the years, its relevance has recently re-surfaced as commodity and oil prices have increased, with some evidence of increased tensions between TNCs and host countries (Gould and Winters, 2007; Sauvart, 2007).

The mining industry is also part of the "curse of natural resources" literature, which suggests that reliance on natural resources has adverse consequences for economic growth and development (Sachs and Warner, 1995, 1997, 2001). While there are many explanations for the resource curse phenomenon, much of the recent literature has focused on the impact that natural resource wealth has on political institutions and government policy. In particular, it is often argued that the availability of resource rents can encourage corruption, rent-seeking and weak governance by entrenched elites (Kronenberg, 2004; Stijns, 2006; Gould and Winters, 2007). These same factors could also contribute to increased political risk associated with threats to renegotiate contracts (Jakobsen, 2006).

In this article, we analyze strategic choices made by the world's largest mining firms. We do so from the perspective of the literature on strategic heterogeneity, that is, the degree to which a firm's strategy

² Recent surveys of the literature are found in Eden *et al.* (2005) and Jakobsen (2006).

matches or deviates from the strategies of competitors. This is of particular interest in the mining industry where the question arises as to whether such a geographically diverse set of firms make similar strategic choices, and whether these choices affect corporate performance. To our knowledge, such an analysis has not been undertaken for the mining industry.

In the literature review, we identify two broad schools of thought regarding how much strategic heterogeneity to expect in a given industry. One group of scholars holds that strategy is generic and largely determined by the environment, thus resulting in *more* strategic homogeneity (Seth and Thomas, 1994; DiMaggio and Powell, 1983; Dobbin and Baum, 2005). Proponents of the alternative view argue that strategy is unique and emanates from the skills or activities in which the firm excels, thus resulting in strategic heterogeneity (Geroski, 1991; Nelson, 1994).

Intra-industry firm heterogeneity studies have not attracted the interest of many researchers. Indeed, Capasso, Dagnino and Lanza (2005) observe that the concept of strategic heterogeneity is frequently overlooked or assumed to be a given in strategy research. Although some researchers have considered intra-industry heterogeneity from the perspective of firms in a single industry, they have done so in the context of one country. For example, Hatten and Schendel (1977) have studied market conduct as a source of intra-industry heterogeneity among firms in the United States brewing industry; Insead and Collins (2001), the evolution of intra-industry firm heterogeneity in the American telephone industry; Ferrier and Lee (2002), the degree to which a firm's sequence of competitive actions influenced stock market returns among a sample of United States firms; and D'Este (2005), the extent to which a firm's knowledge base affected intra-industry heterogeneity among Spanish pharmaceutical firms. The present research adds to this body of literature as it examines strategic heterogeneity among the major firms in a single industry from a multi-country perspective.

We argue that in the mining industry, forces exist for both strategic heterogeneity and strategic homogeneity. On the one hand, basic industry characteristics would suggest little heterogeneity: standardized technology, historically slow growth, little or no product differentiation, and international exchange-based pricing for many of its products. However, the diverse origins of industry competitors suggest that some degree of strategic heterogeneity may be observed because firm strategies (and performance) may be influenced by institutional

factors and local capabilities in their country of origin (Wan, 2005). We suggest that this is particularly true of firms from developing countries.³

Our results do in fact suggest that most large firms in the mining industry are converging on a common strategy that involves relatively high levels of product and geographic diversification. In addition to the implications for firm performance, the increased size and global presence of these firms raises questions regarding the balance of power between TNCs and developing host countries. At the same time, we find that large mining firms from developing countries have, for the most part, not followed the same strategies, and this raises questions regarding their future strategies.

The article is organized as follows. The next section reviews the literature on strategic heterogeneity. Second, the application of that literature to the mining industry is discussed. Then follows a description of the data and methodology, after which the results are reported. The article concludes with a discussion of the results and conclusions, with attention given to implications for strategic management, developing countries and avenues for future research.

2. Review of the literature

In this section, the basic theoretical underpinnings of the two dominant positions on strategic heterogeneity and prior studies that have considered the relationship between strategic variety and performance are examined.

2.1 Strategic homogeneity

Four theoretical explanations suggesting why the strategic behaviours of firms should be the same have been advanced. The first is drawn from the perfect competition model in neoclassical economics where homogeneity among firms in all aspects of production, except for scale, is assumed (Seth and Thomas, 1994). Given the standard set of assumptions about the environment in which the firm operates (many firms, identical products and technology, free entry and exit), the only

³ We focus on home country institutional differences as sources of strategic heterogeneity, but note that host country differences can matter as well. Indeed, it is argued that strategic choices can be the result of the interaction between advantages built on home country characteristics and advantages required by host country characteristics (Erdener and Shapiro, 2005; Buckley *et al.*, 2007).

choice left to the firm is to set an appropriate output quantity based on market price (Dobbin and Baum, 2005).

Industrial organization theory provides a second explanation. The basic tenet of this theory is that the structure of an industry dictates the conduct of the industry's buyers and sellers, which in turn determines the economic performance of the industry. Known as the Structure-Conduct-Performance (SCP) paradigm, the theory proposes that firms operating within the same market structure and facing the same basic conditions of supply and demand should realize the same economic results. Under these conditions, each firm, when faced with the same set of circumstances, makes an independent decision that is similar to that of other firms (Seth and Thomas, 1994).

Institutional theory suggests a third explanation. DiMaggio and Powell (1983) have argued that the interconnectedness of organizations facing similar environmental conditions results in the organizations becoming more similar over time in terms of their organizational structures, practices and strategic behaviours – a phenomenon known as organizational isomorphism. Most industries are characterized by ambiguity and uncertainty, two states which lead to hesitancy regarding the appropriate strategic response. As a consequence, organizations create norms of strategic behaviours, which tend to diffuse across an industry as (a) the strategies of successful firms are imitated by less successful firms, and (b) organizations learn about the norms through industry associations and their network of relationships (Deephouse, 1996). Firms that choose to adopt strategies which are radically different from those of their competitors are subject to legitimacy challenges which restrict their ability to acquire resources (Deephouse, 1999), a circumstance that reinforces the need to conform.⁴

Finally, strategic conformity can be explained using efficiency theory; that is, efficient strategies tend to diffuse across organizations (Dobbin and Baum, 2005). For the past two decades, according to Porter (1996), firms have been continuously benchmarking their activities against the activities of their competitors and adopting the technologies and management techniques of their rivals to improve operational effectiveness. The more firms benchmark each other, the more alike they become, the result being strategic convergence.

⁴ A variety of this argument rooted in the industrial organization literature is found in Knickerbocker (1973) where rivals imitate strategic location decisions.

2.2 Strategic heterogeneity

Three theoretical explanations, drawn from the fields of organizational ecology, evolutionary economics and the resource-based view of the firm, have been suggested for why the strategic behaviours of firms might be different (Durand, 2001). Organizational ecology theory, the first of these explanations, is built on two concepts: a population and a niche. A population is a collection of organizations with a common form; a niche is a collection of resources that can sustain a population (Geroski, 2001). Based on the characteristics they hold in common, organizations that share a common form share a similar set of survival risks and a similar set of strategic patterns (Freeman, 1995). Further, an organization exists in a resource space, or niche, where securing the resources needed to survive is a fundamental strategic issue. Firms that choose to be different by pursuing a niche strategy different from that of their competitors will face less competition for resources (Deephouse, 1999). The organizational heterogeneity that emerges reflects the fact that the environment favours some strategies and some resource allocations over others (Cockburn, Henderson and Stern, 2000).

In evolutionary economics theory, strategic variability among firms is to be expected. Organizational routines⁵, especially those associated with the ability to generate and gain from innovation, differentiate one firm from another (Nelson, 1994). These differences in routines are a result of the diverse decision-making strategies employed by the firm over time and are a source of durable, inimitable, differences among firms. When a new technology or innovation emerges, individual firms develop different strategies with respect to the technology, and some of these strategies will prove to be more acceptable to the marketplace than others (Nelson, 1994). The organizational heterogeneity that emerges reflects the fact that the marketplace selects certain strategies, companies and new technologies over others (Nelson, 1994).

The resource-based view (RBV) of the firm emphasizes that a firm is a heterogeneous bundle of resources (Wernerfelt, 1984; Grant, 1991), which can lead to different strategies. The basic premise of the resource-based view of the firm is that the resources and capabilities of the firm which are valuable, rare, inimitable and non-substitutable (Barney, 1991) and for which the firm is organized to exploit (Grant, 1991) create a uniqueness that allows the firm to appropriate rents

⁵ Organizational routines are the processes used by firms as part of their normal business activities (Nelson, 1994).

inaccessible to their competitors (Mahoney and Pandian, 1992). This view of the firm rests on two assumptions: 1) firms within an industry may possess strategically different skills and capabilities, and 2) these differences can persist (Rumelt, Schendel and Teece, 1994). Firms with strategically different skills and capabilities can be expected to exploit these advantages by implementing firm specific strategies that differ from those of their rivals.

In summary, each of the three perspectives on strategic heterogeneity focuses on uniqueness among firms. For organizational ecologists, uniqueness arises from a niche strategy that protects a firm against selection; for evolutionary economists, innovation is the means by which firms create uniqueness; and for the RBV of the firm theorists, the idiosyncratic capabilities and competencies of the firm create uniqueness.

2.3 Strategic groups

Strategic group scholars have suggested that firms within an industry converge to a limited number of strategic positions (Short *et al.*, 2007). Strategic groups are viewed as groups or subsets of firms within an industry pursuing similar strategies and having similar resources (Hatten and Hatten, 1987). While individual firms may differ in their strategies, such differences are not significant enough to prevent sorting the firms into homogenous groups (Thomas and Venkatraman, 1988). The notion of strategic groups was first introduced within the context of the industrial organization model which, as noted above, argues for strategic homogeneity (Hatten and Hatten, 1987). Thus, strategic groups allow for homogeneity within groups, but heterogeneity across them.

Strategic heterogeneity theorists also make use of the concept of strategic groups, but unlike the industrial organization theorists who group firms that resemble each other on the basis of structures, practices and behaviours, strategic heterogeneity theorists group firms with similar resources and competencies (Houthoofd and Heene, 2002). There is considerable debate as to how strategic groups are to be identified (Short *et al.*, 2007), and even whether they exist at all. Resource-based theorists, for example, consider each firm's control over resources and strategy development to be unique and, therefore, argue that strategic groups cannot exist (Houthoofd and Heene, 2002; Parnall, 2002). Recent evidence provided by Short *et al.* (2007) suggests that both firm and strategic group effects are important for performance, although the former is more important.

2.4 Strategic variety and performance

The precise relationship among strategic differentiation, competition and resulting performance has not been conclusively demonstrated (Deephouse, 1999). Miles, Snow and Sharfman (1993) found in their analysis of 12 industries that those industries with the greatest strategic variability were the most profitable. Cool and Dierickx (1993) found that over time, as the strategies pursued by firms within the same industry became more diverse, the average profitability of the entire industry fell. Gimeno and Woo (1996) in their study of the airline industry found that rivalry increased and financial performance (measured as revenue per passenger mile) declined when firms pursued similar strategies. Miller and Chen (1995) and Chen and Hambrick (1995) noted that non-conformity was associated with declines in performance. Dooley, Fowler and Miller (1996) found in their study of 61 manufacturing industries that very high levels of either heterogeneity or homogeneity are more likely to be associated with industry profitability. However, Deephouse (1999) in his study of commercial banks showed that moderately differentiated firms perform better than either highly conforming or highly differentiated firms. Gonzalez-Fidalgo and Ventura-Victoria (2005) surveyed a sample of Spanish manufacturing industries and found, like Dooley *et al.* (1996), that industries benefited from either high strategic homogeneity or high strategic heterogeneity.

When the analysis of performance differences moves from the level of the industry to that of the strategic group, there is evidence that strategic heterogeneity *within* the group gives rise to performance differences.⁶ McNamara, Deephouse and Luce (2002), in their study of strategic groups in the commercial banking industry, found that within a group, the secondary firms (firms that are loosely aligned with one another) outperform both the primary firms (firms that are tightly aligned with one another), as well as the solitary firms (firms that are pursuing unique strategies). This recent work is in keeping with the findings of earlier researchers (Lawless, Bergh and Wilsted, 1989; Cool and Schendel, 1988) who also noted within group performance differences. Lawless, Bergh and Wilsted (1989) found that the relationship between strategic group membership and performance among manufacturing firms was influenced by the characteristics of the individual firms; Cool

⁶ In the analysis of strategic groups, firms are sorted into groups based on both strategic choices and resources, but it is nevertheless true that individual firms within the group will still differ somewhat in their strategies (Thomas and Venkatraman, 1988; McNamara, Deephouse and Luce, 2002).

and Schendel (1988) showed that in the United States pharmaceutical industry, historical differences among group members may result in performance differences.

This review suggests that at the level of the industry, high or low levels of strategic heterogeneity may give rise to higher levels of performance, whereas, at the level of the firm, strategic heterogeneity among firms gives rise to performance differences.

3. Strategic heterogeneity in the mining industry

Based on the literature surveyed above, one could argue that the mining industry should demonstrate little strategic heterogeneity for a number of reasons. First, mining is a mature industry, and strategic heterogeneity has been found to decline as an industry matures (Miles, Snow and Sharfman, 1993). Second, the top ranking mining firms sell similar products mostly in the same markets as their competitors, suggesting there ought not to be significant differences in the strategies and behaviours of similar firms in different countries (Lindell and Karagozoglu, 1997). Third, while mining assets can be depleted, the core activities of mining (drilling, blasting, mucking, hauling, crushing, milling and refining) are stable. This stability puts mining on what McGahan (2004) called the *creative change trajectory* where change occurs when core assets are under threat, but core activities, including relationships with customers and suppliers, are generally stable. Fourth, Seth and Thomas (1994) have argued that industries with relatively simple group structures and high concentration are characterized by relatively homogenous firms. While the organizational form of mining companies can be fairly complex because of diverse jurisdictions in which they operate, mining companies at the level of the business unit are relatively straightforward. For example, Alcoa Inc., the largest mining company in the world, has five major business segments: engineered products, flat rolled products, primary metals, consumer packaging and alumina/chemicals. In addition, the mining industry is becoming increasingly more concentrated (PriceWaterhouseCoopers, 2005), the second criterion of Seth and Thomas (1994) for an industry with little heterogeneity.

However, such arguments ignore the fact that the largest mining companies originate in so many different countries, with different socio-economic environments and different resources. This suggests that some strategic heterogeneity might be expected, particularly for companies

from developing countries, where market and other institutions are weak, resulting in strategies that are designed to overcome market and institutional failures (Khanna and Palepu, 1997; Kock and Guillen, 2005; Wan, 2005).

In developed economies, with well-functioning external markets, the access by firms to critical resources, particularly capital, labour, and complementary assets, is achieved primarily through market-based transactions. These markets are supported by a governance infrastructure that protects property rights, including an independent judiciary, an efficient and relatively corruption-free government, and a transparent regulatory framework (Globerman and Shapiro, 2002). The reliance on external markets also provides incentives to enhance productivity and be internationally competitive.

On the other hand, in economies where external markets are not efficient, where property rights protection is weak, where contract enforcement is difficult and where corruption is widespread, firm scope, ownership and strategies may be driven by the need to fill the voids created by market failures and missing institutions (Khanna and Palepu, 1997). In particular, many of the largest and most successful companies in emerging markets are either family- or state-owned, and many belong to larger business groups (Khanna and Palepu, 1997; Morck, Wolfenzohn and Yeung, 2005). Although these firms can be large and successful at home, they may lack the resources and governance capabilities required to compete abroad (Globerman and Shapiro, 2006). Thus, both family- and state-owned firms in emerging markets may follow strategies that focus on their domestic markets and that reflect family- or state-defined priorities (Morck, Wolfenzohn and Yeung, 2005; Hoskinson *et al.*, 2005; Globerman and Shapiro, 2006).⁷

For example, family firms may rely on personal networks rather than contracts as the governance mechanism for transactions. To the extent that the competitive success of family-owned firms derives largely from network connections in the home country, they may be disinclined to invest abroad where different firm-specific advantages are pre-requisites for competitive success (Erdener and Shapiro, 2005). In addition, they may under-invest in resources required to compete

⁷ On the other hand, there is evidence that domestic market failures, particularly in capital markets, may provide firms with access to subsidized finance which can lead them to invest abroad (Buckley *et al.*, 2007). In addition, resource firms may be seen as an instrument of a domestic industrial policy and encouraged by the state to invest abroad.

abroad such as external managers and R&D in order to protect sunk investments in “relationships”. Likewise, state ownership leads to a substitution away from efficiency considerations as motivators of investment decisions in favour of other objectives, including access to resources. More generally, Hoskisson *et al.* (2005) suggest that government controlled business groups are the least likely to refocus in a way that promotes international competitiveness.

In summary, the nature of the business environment and the corporate governance features of emerging country firms suggest that they may follow distinctive strategies that are different from those of their global competitors from developed market economies. At the same time, the nature of the industry suggests that most mining firms may follow relatively homogenous strategies, while the theories that focus on firm heterogeneity would suggest otherwise. In the empirical section that follows, we examine the degree to which one can observe patterns of strategic heterogeneity (homogeneity) among the world’s top ranking mining firms, and if heterogeneity is observed, if it relates to whether the firm originates in an emerging or transition economy. Finally, we ask whether any strategic differences are reflected in differential performance.

4. The data and the methodology

4.1 Data Sources

Company websites, annual reports, press releases, and United States Security and Exchange Commission (SEC) filings were used to obtain data on the mining companies examined in this study. Other researchers have used company annual reports as a data source, recognizing that company annual reports and SEC filings, in spite of their known limitations, are often the only consistent source of comparable data (Bansal, 2005; Ferrier, 2001; Olusoga, Mokwa and Noble, 1995). All of the firms included in the study published annual reports, and over half had SEC filings. The Hoovers website (www.hoovers.com) had comparable financial information for all of the firms.

4.2 Selection of mining firms

A preliminary list of large mining firms was compiled from a report produced by PriceWaterhouseCoopers on the largest mining companies in the world (2005) and from a list of attendees at BMO

Nesbitt Burns' 2005 Global Resources Conference whose attendees represented the world's leading mining companies (BMO Nesbitt Burns, 2005). In order to be included in the study, the firm had to have over \$1 billion in revenues in 2003 (as reported on the Hoovers' website), have what is known as "hard rock" mining⁸ operations, and have mineral/metal interests. 26 firms met these criteria (see table 1). 14 of the firms were from the Americas, four from Europe and Africa, and eight from Asia and the Pacific. 11 of the firms were predominantly base metal producers, six were predominantly precious metal producers, two were base metal and precious metal producers, six were base metal producers with aluminum interests, and one was a diamond producer.⁹ Two of the firms were state-owned, and both were from emerging markets. These 26 firms represented over 80% of the market capitalization for mining in 2003.

4.3 Methodology

Characterizing the Strategies

The most common measures of corporate strategy are market diversification, product diversification, firm size, research and development (R&D) intensity, and capital intensity (Lee and Habte-Gioris, 2004). Four of these measures were selected for this study. The first two, geographic scope and product scope, were based on measures (described below) widely used by other researchers (Denis, Denis and Yost, 2002; Stabell and Fjeldstad, 1998; Hitt, Hoskisson and Kim, 1997; Dooley *et al.*, 1996; Olusoga, Mokwa and Noble, 1995; Miles *et al.*, 1993; Capon, Farley and Hoenig, 1990). Geographic scope is often defined as the percentage of firm sales per region, a measure employed here. An alternative measure of geographic scope, the number of countries in which the firms had business interests per region (i.e., where the firm had its producing assets as well as its exploration

⁸ Hard rock mining refers to the extraction of minerals or metals from the earth by means of open pits or underground rooms or stopes (Answers.Com, 2005).

⁹ Because metallic elements are often found together in nature, for example, silver and lead are often found together as are copper and gold, many firms are both base metal and precious metal producers. If the firm described itself or was known as a base metal producer (Teck Cominco Ltd. for example), it was classified as such even if it also produced precious metals. Similarly, if a firm described itself or was known as a precious metal producer (Barrick Gold Corporation, for example), it was classified as such even if it also had some base metal production. Freeport McMoran Copper and Gold Inc., a firm which produced both a base metal and a precious metal, was classified as a base metal producer as the bulk of its revenue came from copper.

assets), was included along with the more traditional measure, because geographic sales data only capture the destination of the product not the full geographic scope of a mining firm's activities.¹⁰ Product scope was defined as the percentage of sales per line of business.¹¹ These three measures were based on 2003 firm data and were calculated as Herfindahl indices¹². The calculations were as follows:

(a) Geographic scope

$$\text{Measure 1: } \sum (n_{ij} / n_i)^2 ,$$

where n_{ij} is the number of countries in region j in which firm i operates, and n_i is the total number of countries in which firm i operates.¹³

$$\text{Measure 2: } \sum (s_{ij} / s_i)^2 ,$$

where s_{ij} is the value of sales in region j by firm i , and s_i is the total sales of firm i .

(b) Product scope: $\sum (s_{ik} / s_i)^2 ,$

where s_{ik} is the value of sales in line of business k by firm i , and s_i is the total sales of firm i .¹⁴

In addition to these measures of corporate strategy (i.e. geographic and product scope), we employed two additional ratios, similar to those used by other researchers, as measures of strategic variety (Dooley *et*

¹⁰ The use of a counting methodology, used here in the count of countries, is well established in the literature (Capon *et al.*, 1990). We use five regions, the same as Rugman and Verbeke (2004): North America, South America, Europe, Africa, Asia/Pacific.

¹¹ Mining firms typically segment their business either by mineral/metal interest (e.g., coal, copper, gold), or by activity (e.g., smelting/refining, engineered products, freight handling). These define the product scope of the firm.

¹² The Herfindahl index, a measure of industry concentration calculated as the sum of the squares of the market shares of each individual firm, has been used by other researchers as a weighted measure of diversification (Wan and Hoskisson, 2003).

¹³ For example, Alcoa operates in 41 countries and all 5 regions (6 in North America; 7 in South America; 15 in Europe; 4 in Africa; and 9 in Asia Pacific). The share in each region was squared, and the sum is the measure of geographic diversification for Alcoa (which equals 0.24).

¹⁴ For example, Alcoa reports six business units with the following share of sales: alumina & chemicals (12%); primary metals (24%); flat rolled products (20%); engineered products (22%); packaging and consumer (12%); other (10%). Its product scope measure is 0.18.

al., 1996): (a) the ratio exploration plus R&D expenditures to sales, and (b) the dollar value of plant, property and equipment to employee (each measured for 2003). The first ratio (exploration/R&D intensity) was suggested by the work of Porter (1979), who argued that expenditures on R&D as a percentage of sales were a competitive decision variable, reflecting differences in the competitive strategies of firms. More recently, Short *et al.* (2007) use R&D to reflect the ability of a firm to find and pursue new opportunities. In our case, we created a combined ratio of exploration expenditures and R&D to reflect the nature of the mining industry. This ratio combined exploration expenditures (mining assets are depleting assets that must be replaced, and the level of exploration expenditures is a way of measuring the firm's investment in this activity) with R&D expenditures because some of the firms reported these two expenditures as one, and the two expenditures were highly correlated. Of the 26 firms, six did not report exploration or R&D expenditures as a separate line item in their financial statements; for those that did, 11 reported one of the elements, and nine reported both.

Finally, we employed a measure of capital intensity, plant and equipment expenditures per worker. Capital intensity is a key competitive factor measuring the firm's commitment to the industry (Miles *et al.*, 1993; Short *et al.*, 2007). In addition, this variable has been shown to positively affect firm performance (Capon *et al.*, 1990).

Measure of performance

Accounting profitability (ROA), calculated as the ratio of operating income, or earnings before interest and taxes (EBIT), to total assets, was chosen as the measure of performance for several reasons: (a) it represents a return on invested capital; (b) it captures operating performance, revenue growth, and market share; and (c) it reflects current and historic management capabilities (McGahan, 1999). Operating profit (the earnings measure used in calculating accounting profitability) is also considered appropriate in cross-country studies because of the differing tax rules and capital structures of firms from different countries (Wan and Hoskisson, 2003). Data for the years 2002 through 2004 were used to calculate a three year average operating profit. The 2002 results reflected the position of the firms prior to the year in which the strategy observations were made; the 2004 results the position of the firms one year after the observations were made. A three year average was used in recognition of the fact that the strategic

decisions reflected in the performance of the firms in the current period were made in the past.

Data analyses

Several methods were used to analyze the data. Descriptive statistics (minimum, maximum, mean, and standard deviation) and Pearson correlations were calculated for the strategic measures. Cluster analysis (using a within group clustering technique) was used to identify homogeneous subgroups, and scatter plots were produced to identify the outlier firms (defined here as plus or minus one standard deviation of the mean). Cluster analysis, in spite of its limitations¹⁵, is a valuable and important technique (Ketchen Jr. and Shook, 1996, p. 455) that continues to be used by strategy researchers for sorting observations into groups (Short *et al.*, 2007). To address certain of the limitations associated with the technique, the variables included in the analysis were established measures of strategy; they were standardized as part of the analysis, and none was highly correlated. An analysis of the outlier firms was included, because, as argued by Aharoni (1993), much can be learned from an examination of the particularly successful or unsuccessful organizations in a population of firms.

5. Results

We first examine the question of whether patterns of heterogeneity could be observed among the world's top ranking mining firms. Table 2 characterizes the cohort of firms based on the measures of strategy identified above. For geographic scope, the mean of the country measure of geographic scope was 0.43 (standard deviation 0.23), with a range from 0.22 to 1.00. A score of 0.22 represents high geographic diversification, whereas a score of 1.0 represents no diversification. 17(65%) of the firms had a Herfindahl index of between 0.22 and 0.39. In order to obtain a score in this range, the firm had to be active in three or more regions of the world. The five top ranking firms (with scores in the 0.22 to 0.27 range) had a presence in countries in all five regions. Three firms were active in just one country and all were from developing countries (the Chilean firm, Codelco; the Russian firm, Alrosa; and the South African firm, Implats). In addition, Codelco and Alrosa are state-owned. The mean of the sales measure of geographic

¹⁵ Cluster analysis does not have a test statistic that can be used to confirm between group differences, and is more reliable in large samples.

Table 2. Means, Standard Deviations, and Correlations

Variable	N	Range	Mean	Standard Deviation	1 (a)	1 (b)	2	3	4
1. Geographic Scope									
(a) Country	26	0.22 to 1	0.43	0.23	--				
(b) Sales	24	0.28 – 0.85	0.46	0.16		--			
2. Product Scope	26	0.16 to 1	0.55	0.33	0.422*	0.026	--		
3. Exploration / R & D Intensity	22	0.003 to 0.079	0.019	0.019	-0.228	0.203	0.484*	--	
4. Capital Intensity	22	0.031 to 0.975 (US\$ Millions)	0.336 (US\$ Millions)	0.249	-0.295	-0.273	-0.089	-0.192	--

Sources: Annual Reports, SEC Filings, Company Websites

* Correlation is significant at the 0.05 level of significance (two tailed test)

scope was 0.46 (standard deviation 0.16), with a range from 0.28 to 0.85. Based on this measure, fewer firms (11 or 45%) had a Herfindahl index of between 0.22 and 0.39 (the dominant category on the country measure of geographic scope), suggesting sales scope was less diverse than country scope.

In terms of product scope, the mean was 0.55 (standard deviation 0.33), with a range from 0.16 to 1.00 (a score of 0.16 represents high product diversification; a score of 1.0, no diversification). Nine firms had scores in the range of 0.1 to 0.2, suggesting they were well diversified by line of business, and eight firms had scores in the range of 0.9 to 1.00, suggesting limited diversification.

For the combined exploration/R&D intensity measure, the mean was 0.019 (standard deviation 0.019), indicating the top ranking mining firms expended approximately 2% of their sales revenue on exploration/R&D activities in 2003. This result is below the mean of 3.3% for non-manufacturing firms (Ho and Ong, 2005). The range of expenditure was from less than 1% to 8%. The two Canadian gold producers (Barrick and Placer) were at the upper range; these firms spent between 7% and 8% of their revenues on exploration/R&D activities in 2003.¹⁶ Although it might be expected that a higher percentage of sales would involve activities that included exploration, this behaviour was not observed, possibly reflecting the fact that the major mining

¹⁶ It is possible that exploration and R&D expenditures are not completely matters of strategic choice, but are dictated by the nature of the resource. For example, gold is found in irregular veins relative to coal, and thus may require higher exploration costs and more sophisticated technology. We are indebted to an anonymous referee for this point.

firms depend on the junior mining firms to do much of the industry's exploration work (MacDonald, 2002). Some firms also use their joint venture partners for exploration, with Lonmin being one example. In addition, PriceWaterhouseCoopers (2005) has noted that the ratio of exploration to acquisition spend has been declining among the major mining companies, because acquired reserves are more certain than those that have yet to be found.

For the capital-intensity measure, the mean was 0.336 (standard deviation 0.242), indicating the top ranking mining firms invested approximately \$336,000 per employee in plant, property and equipment in 2003. This result is comparable to that obtained by Dooley, Fowler and Miller (1996) for manufacturing. The range of expenditure per employee ranged from a low of \$31,000 for the South African platinum producer, Implats, to a high of \$975,000 for the Australian base metal producer, WMC. WMC's investment in plant, property and equipment per employee was more than double the amount of the other mining firms. More than half of WMC's workforce in 2003 was made up of contract employees (WMC Resources Ltd., 2003), and if these employees are included in the calculation, WMC's average capital investment per employee in plant property and equipment is more in keeping with that of other firms.

The strongest correlations were between (a) country geographic scope and product scope ($r = 0.422$) and (b) product scope and exploration/R&D expense ($r = 0.484$). The relationship between country geographic scope and product scope is understandable because the geology dictates where mineral/metals are found. For example, according to the Mineral Information Institute (2005), commercially viable gold deposits have been found in a limited number of countries (Australia, Brazil, Canada, China, Russia, South Africa and the United States). The relationship between product scope and exploration/R&D expense is also understandable as certain product lines (e.g. smelting and refining) are more amenable to the application of technology than others, and the reserves for certain commodities (e.g. platinum) are insufficient to meet future demand.

Table 3 presents the results obtained from a hierarchical cluster analysis of the firms based on country geographic scope, product scope, exploration/R&D intensity and capital intensity. Three clusters could be identified from the underlying dendrogram (available on request). The first cluster, with the large majority of firms, can be characterized as firms with moderate to high geographic and product scope, as well

as average capital and exploration/R&D intensity. The second cluster of six firms can be characterized as firms with low product and/or low country geographic scope, average exploration/R&D intensity, and average to below average capital intensity. The third cluster of two firms can be characterized as firms with high country geographic scope, low product scope, average capital intensity and high exploration/R&D intensity. Four firms were excluded from the cluster analysis because of missing data points. However, based on their geographic and product scope scores, they fit within the three clusters: Dowa, Grupo and Xstrata in cluster one; Norilsk in cluster two. The results of the cluster analysis provide evidence of strategic homogeneity as well as strategic heterogeneity: homogeneity, in that most firms appear to be pursuing a common strategy, and heterogeneity, in that there are some firms that do not. The cluster analysis using the alternative measure of geographic scope (i.e. the sales measure) produced similar results.

Importantly, the second largest cluster of six firms comprises five firms from developing countries (Alrosa, Codelco, Implats and Lonmin), and Norilsk would also be in this group if only product and geographic scope were considered. The remaining member of the group is Freeport, whose operations are mostly in Indonesia. Of the

Table 3. Cluster Analysis Results

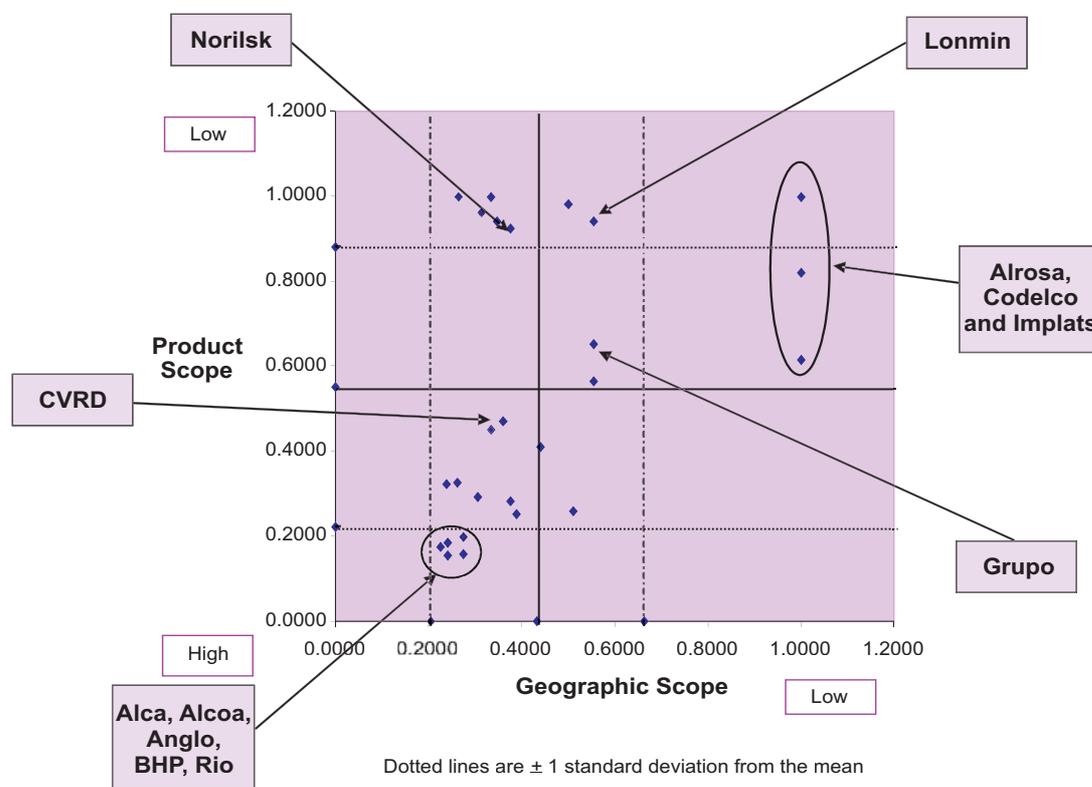
	Characteristics	Firms
Cluster 1	<ul style="list-style-type: none"> □ Moderate to high geographic and product scope □ Average capital and exploration/R&D intensity 	Alcan, Alcoa, Anglo, BHP, CVRD, Dowa, Grupo, Falconbridge, Inco, Mitsui, Newmont, Noranda, Phelps, Rio, Sumitomo, Teck, WMC, Xstrata
Cluster 2	<ul style="list-style-type: none"> □ Low geographic and product scope □ Average capital and exploration/R&D intensity 	Alrosa, Codelco, Freeport, Implats, Lonmin, Norilsk
Cluster 3	<ul style="list-style-type: none"> □ High geographic scope □ Low product scope □ Average capital intensity □ High exploration/R&D intensity 	Barrick, Placer

This Table presents results based on a cluster analysis of the strategic data. Cluster analysis was used to identify homogenous subgroups based on country geographic scope, product scope, capital intensity, and exploration/R&D intensity. The underlying dendrogram is available from the authors on request. We note that the number of observations is small, and this can make cluster analysis unreliable (Ketchen and Shook, 1996). Five of the six firms from emerging markets (Lonmin, Codelco, Alrosa, Norilsk and Implats) are all in the same cluster. All are above-average in terms of performance. Freeport, whose operations are mostly in Indonesia is also in this group. CVRD is grouped with the major firms from developed markets, and Grupo (omitted for lack of data) would likely fall into this category as well. However, CVRD also outperforms its group.

developing country firms, only CVRD is grouped with the major firms from developed markets, although Grupo would fall into this category as well if only product and geographic diversity were measured. Thus, the presence of firms from emerging markets clearly contributes to strategic heterogeneity.

Because of potential limitations of cluster analysis for such a small sample, we also analysed the data in a more direct fashion. For example, in figure 1 we plot country geographic scope against product scope for each of the firms. The results support the conclusions arrived at using cluster analysis. It is observed that 12 firms are positioned around highly diversified strategies, both in terms of geography and products (lower left quadrant). Of these, only CVRD is from a developing country. Within this group of twelve firms, five (Alcan, Alcoa, Anglo, BHP, and Rio) were particularly highly diversified by product. The high product diversification firms were all base metal producers with other mineral/metal interests. Of the seven firms that followed low diversification strategies (upper right quadrant), five were from developing countries. Three of these firms (Alrosa, Codelco and Implats) stand out by their lack of diversification. We note as well that five firms (Barrick, Inco, Newmont, Norilsk, Placer) were not highly diversified in terms of

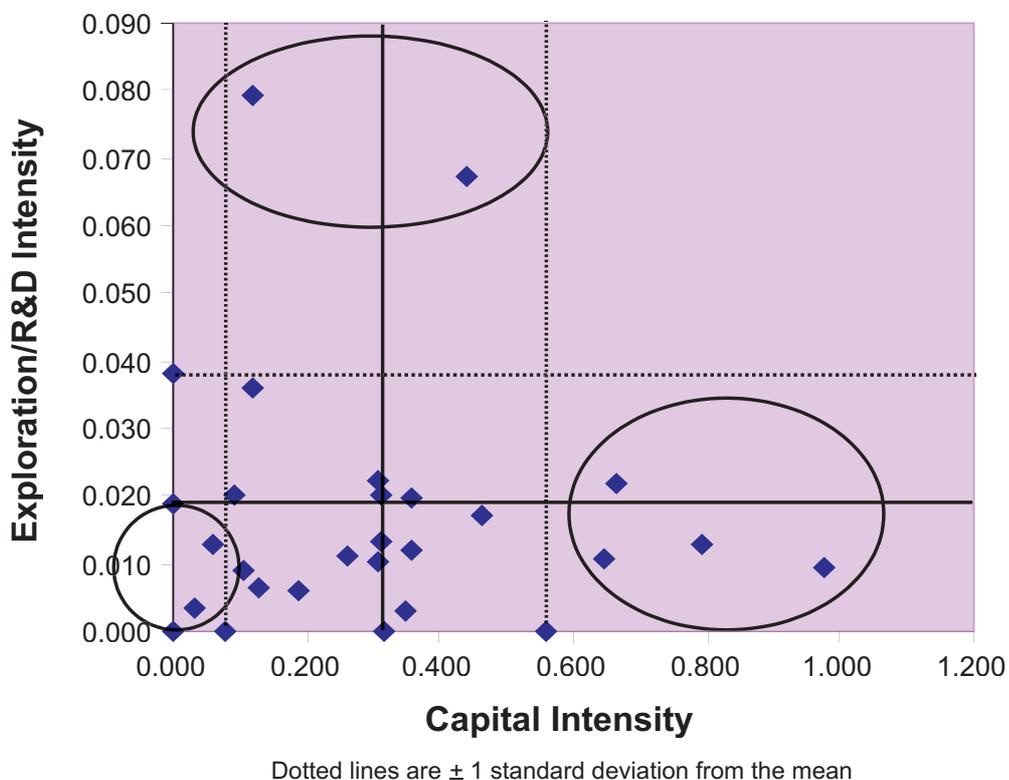
Figure 1. Product/country geographic scope



products in that they had no more than two lines of business, and one line represented more than 90% of their sales revenue.

Figure 2 plots capital intensity against exploration/R&D intensity. All of the firms for which there were data were within one standard deviation of both means, and these variables therefore contribute less to strategic heterogeneity. Two firms, Barrick and Placer, were outside one standard deviation for exploration/R&D intensity; six firms were outside one standard deviation for capital intensity. With all of the firms within one standard deviation of both means, there would appear to be a high degree of conformity with respect to strategic investments. Nevertheless, the fact that some of the firms were able to position themselves differently on one of the dimensions supports the results of the cluster analysis where both homogeneity and heterogeneity were observed. The firms that were positioned differently occupied an outlier position of (a) high investment in exploration and R&D activities (Barrick and Placer) (b) low investment in property, plant, and equipment per employee (Lonmin and Implats), or (c) high investment in property, plant and equipment per employee (Inco, Sumitomo, Rio and WMC). There is no particular evidence that firms from developing countries contribute to heterogeneity in these variables.

Figure 2. Exploration and R&D intensity/capital intensity



Based on these observations, we find a relatively high degree of commonality of strategic approach for most mining firms, coupled with distinctive patterns of heterogeneity for a minority of firms. Interestingly, the heterogeneous firms cluster at the extremes of product and geographic diversification, and many of these are from developing countries. Thus, it would appear that the presence of firms from developing countries contributes to strategic heterogeneity.

Finally, we asked whether differences in strategic choice were reflected in differential performance. The mean average ROA for the period 2002–2004 was 10% (standard deviation 7%), with a range from 3% to 32%. The results suggest that differences in strategic choice are associated with differences in performance. The average ROA of the firms in Cluster 1, the dominant strategic cluster, was approximately 8%; for the firms in Cluster 2, the first of the non-dominant clusters, approximately 20%; and for the firms in Cluster 3, the second of the non-dominant clusters, 4%. The six firms in Cluster 2 (including Norilsk) were firms with a limited number of lines of business in a limited number of geographic locations.

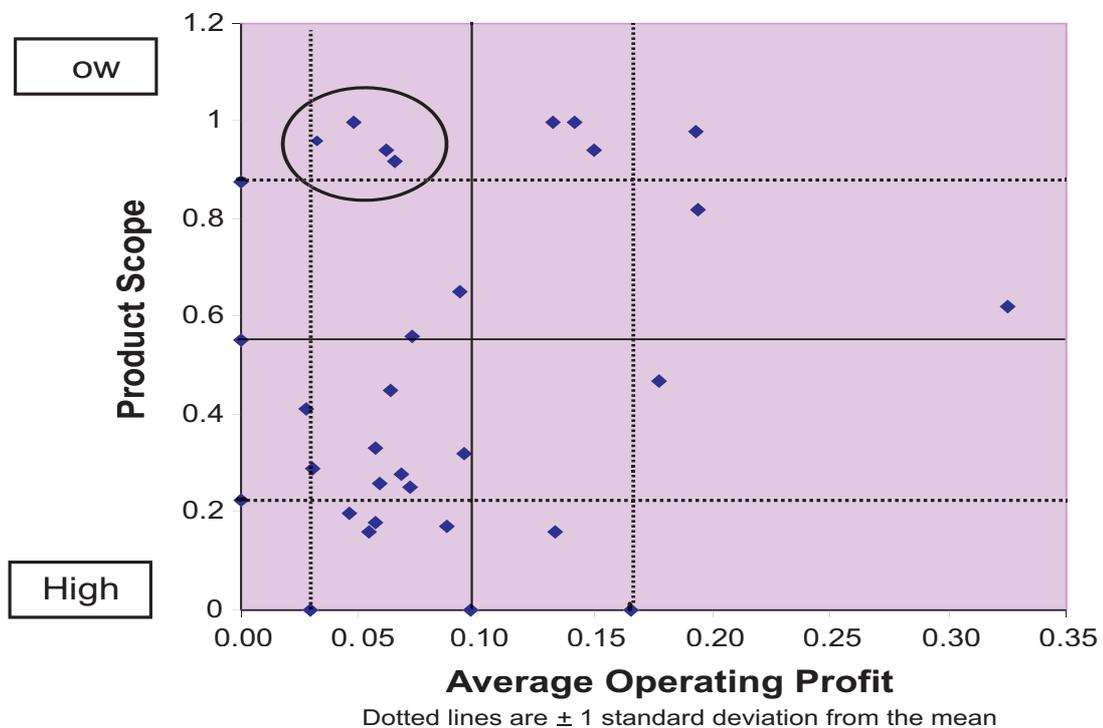
Eight firms in total were able to generate an ROA of more than 10% (the mean for the group), and four were from developing countries (Alrosa, Codelco, Implats and Norilsk). Six of the eight firms were in Cluster 2 and occupied outlier strategic positions related to diversification, either very low country geographic diversification, very low product diversification, or both (Alrosa, Codelco, Implats, Freeport, Lonmin and Norilsk). Only two of the above-average performers were associated with Cluster 1, the dominant strategic group (BHP and CVRD). Thus strategic heterogeneity associated with an outlier position appears to be associated with above-average performance.

That two firms out of fifteen in the same strategic position were able to achieve above-average performance suggests that other strategic factors were contributing to their success. In terms of mining operations, BHP shares a similar strategic position (high geographic and high product diversification) with four other firms (Alcoa, Alcan, Anglo and Rio). However, three of these firms (Alcoa, Anglo and Alcan) have diversified into non-mining lines of business such as packaging and engineered products, and this might explain their below-average performance. The remaining firm, Rio, had significantly fewer assets than BHP in 2003, \$41.4 billion for BHP versus \$24.7 billion for Rio in 2003 (BHP Billiton, 2003; Rio Tinto plc, 2003), which suggests that scale might be a factor in determining profitability. CVRD's moderate geographic and product diversification position was one adopted by

ten other firms, but here again the other competitors had significantly fewer assets. CVRD had \$16.3 billion in assets in 2003 compared to an average of \$6.4 billion for the other ten firms (Companhia Vale do Rio Doce , 2003). It would thus appear that a focus on mining at the corporate level and the ability to attain critical size are also important determinants of performance in this industry. It should also be noted that CVRD has recently expanded both its geographic and product scope through its acquisition of Inco.

In order to further examine the question of performance, we plot the three year average operating profit against product scope for each of the firms (figure 3).¹⁷ For the entire sample, there is very little correlation between product diversity and profitability. As noted above, eight firms enjoyed above-average profitability, and four were from emerging markets, all of them below average in product diversity. Interestingly, four firms (Barrick, Newmont, Inco and Placer) were also outliers in terms of product diversification (more than one standard deviation below the average level) yet were not able to generate an above-average operating profit. Placer, Barrick and Newmont produce gold, a

Figure 3. Product scope/average operating income



¹⁷ Product scope was chosen for this comparison for simplicity, but also because all but three of the firms, two of which are state owned, were within one standard deviation of the mean for geographic scope.

commodity that ranked 14th on the Porter-based attractive commodity scale of Garren, Bird and Sutton-Pratt's (2002)¹⁸. The remaining firm, the nickel producer, Inco, had significantly fewer assets in 2003 than Norilsk, the comparable outlier nickel producer (\$10.7 for Inco versus \$13.6 billion for Norilsk), and had diversified into nickel products (Inco Limited, 2003; Mining and Metallurgical Company Norilsk Nickel, 2003). This again suggests that occupying an outlier strategic position is not enough to ensure above-average performance; limited diversification outside of mining, size and commodity attractiveness also appear to be important factors.

Based on these observations, we conclude that for the most part, the firms that displayed the most common strategic position did not perform as well as those that displayed an outlier strategy of lower diversification. However, not all of the firms exhibiting an outlier strategy were among the above-average performers, suggesting other factors such as commodity choice, focus, and size among with strategic position were associated with the differential performance.

6. Discussion

The results suggest that even within an industry like mining where products are homogeneous and mature, and where technology is relatively slow-changing and diffused, a certain degree of strategic heterogeneity can be observed. In terms of strategic positioning, the dominant strategy among mining firms was to engage in both product and geographic diversification. These strategies were particularly apparent for firms from developed countries. In terms of strategic investments, we observe that the dominant strategy for most firms was to undertake similar investments in plant, property and equipment per employee and exploration/R&D.

Should these trends continue, the mining firms from developed countries will continue to grow in size and scope. The continuing consolidation in the industry, noted below, suggests that this is already occurring. From the perspective of host countries, this growth suggests a possible shift in bargaining power towards the TNCs, and a potential for deteriorating relations between TNCs and host countries. At the same time, rising commodities prices create more mineral rents, and host countries may well wish to increase their share (Sachs, 2007;

¹⁸ Attractiveness was based on the producers perceived ability to exert power over suppliers and buyers, resist threats from new entrants and substitutes, and to drive demand (Garren *et al.*, 2002).

Sauvant, 2007). In essence, the obsolescing bargaining problem may re-emerge.

Firms from developing countries, including those that are state-owned, contribute to heterogeneity. For the most part, the strategies of these companies were defined by lower levels of diversification, usually some combination of geographic and product diversification. Only one firm (Alrosa) could be clearly identified as pursuing both a very low geographic and a very low product diversification strategy, a strategy that would not be unexpected for a state-owned firm. State-owned enterprises are typically focused on their domestic market, providing these markets with a narrow range of products (Mascarenhas, 1989).

The results also suggest that differences in strategic choice are associated with differences in performance. The six firms in Cluster 2 with above-average profitability were firms with a limited number of lines of business in a limited number of geographic locations, and most were from developing countries. The presence of two state-owned firms from emerging markets in this group is unexpected, given the evidence from previous studies that government-owned firms are less profitable than privately owned firms (Deventer and Malatesta, 2001; Boardman and Vining, 1989). Low production costs may be a factor in the profitability of these two firms, but this seems unlikely given that many of the firms identified in other Clusters also operate in developing countries. Exceptions to the generalization that occupying a non-dominant strategic position is associated with above-average performance also suggest there are other factors besides strategic position associated with the performance of the companies from developing markets, particularly those that are state-owned. One possibility is that the companies are in fact, being subsidized as “national champions”, or are more generally being used as instruments of industrial policy.

To the extent that the large mining firms from developing countries, including those that are state-owned, follow the example of CVRD and adopt strategies that are similar to those adopted by firms in developed countries, it is likely that we will see an increase in acquisitions of developed country mining firms by firms from developing countries. To the extent that the acquirers are perceived to be instruments of national policy, these acquisitions may be resisted. In some countries, consideration is already being given to scrutinizing more carefully cross-border acquisitions by state-owned entities.

Although this discussion suggests a possible increase in tensions between TNCs and host countries, and between (developed) host

countries and (developing) home countries, there are more optimistic possibilities. As Sachs (2007) has argued with respect to energy investments, institutional structures are required to enhance cooperation between TNCs and host countries. Among his suggestions are that countries should be fully transparent regarding disclosure of contract terms, perhaps along the lines of the Extractive Industries Transparency Initiative, and that companies should consider adopting standards for corporate social responsibility, perhaps along the lines of the UN Global Compact. Similarly, Kolk and van Tulder (2005) suggest that the voluntary adoption of codes of conduct by TNCs may reflect the need to narrow the bargaining imbalance between TNCs and host countries by creating rules of conduct. In this regard, we note that only eight of our sample companies are signatories to the UN Global Compact, of which seven are from developed countries (the other is CVRD). A slightly larger number (13) are signatories to the Global Reporting Initiative (GRI), of which ten are from developed countries.

Thus, the movement towards international transparency and the adoption of codes of conduct may reduce political risk and limit the potential for an obsolescing bargain. This outcome will in turn foster FDI, which in turn may promote more liberalizing reform (Malesky, 2006). To the extent that inward FDI does in fact promote democratic reform, the obsolescing bargain problem will again be reduced (Jakobsen, 2006).

Our results are also relevant for the strategic choices facing all firms, and in particular those from developing countries. For developing country firms, the issue is whether they should, or can, adopt a conformist strategy of increased product and geographic diversification. The evidence provided in this article is not definitive in this regard. Although firms that pursue niche strategies appear to be more profitable, we have not been able to fully control for other factors that might influence firm profitability.¹⁹ Among other things, it could be the case that firms from developing countries hold entrenched domestic positions that lead to higher profitability (Morck, Wolfenzohn and Yeung, 2005), while at the same time lacking the incentive and capabilities to compete internationally (Globerman and Shapiro, 2006). In this regard, CVRD, the Brazilian company, is instructive since it

¹⁹ For example, platinum, diamonds and iron ore were the three top ranked commodities on Garren, Bird, and Sutton-Pratt's list of attractive commodities (2002), and the four firms that focused on the production of these commodities (Lonmin, Implats, Alrosa and CVRD) were among firms with an above-average ROA. Three are from developing countries.

follows the dominant strategy of diversification, but is also among the most profitable mining firms. Thus, we cannot state with any certainty that the low diversification strategy pursued by these firms is the source of their profitability.

Prior research on the relationship between diversification and performance is not totally helpful in this regard. There is no consensus in the literature regarding the relationship between geographic diversification and firm performance (Goerzen and Beamish, 2003; Hill, Hitt, and Hoskisson, 1992). Similarly, although many studies have shown that diversified firms are valued at a discount relative to single-segment firms and that the degree of industrial diversification has been decreasing over time (Denis *et al.*, 2002), other studies are more equivocal (Hill *et al.*, 1992; Laeven, 2001).

7. Conclusion

The empirical results obtained in this article support the following conclusions. First, within an industry that appears to be homogeneous, a certain degree of heterogeneity can be discerned when the focus of inquiry is on the individual firms. Second, firms from developing countries contribute in large measure to strategic heterogeneity. Third, performance differences appear to be associated with differences in strategic choice, but are also related in some degree to other factors, including the country of origin of the firm. In particular, the fact that developing country firms dominate one strategic cluster, and are more profitable, suggests that one cannot rule out the possibility that country-specific factors are also at work.

In addition, our discussion of these results suggests that the convergence of most developed country firms to a relatively common strategy of both product and geographic diversification may create a bargaining imbalance between TNCs and host countries, and may create conditions favouring an obsolescing bargaining outcome. To the extent that this occurs, tensions between mining TNCs and host countries may increase. Arguably, many of these forces have been augmented by the increasing consolidation in the mining industry which has occurred in the post-sample period. There have been a number of recent high-profile mergers and acquisitions among global mining firms, including BHP Billiton's \$9.2 billion takeover of WMC Resources Ltd in 2005, Barrick Gold Corporation's \$9.2 billion takeover of Placer Dome Inc. in 2005, and Xstrata's \$20 billion takeover of Falconbridge in 2006. Most recently Canada's Inco has been acquired by Companhia Vale do

Rio Doce of Brazil (CVRD) in a \$17 billion transaction. In addition, Goldcorp of Canada acquired Glamis Gold of the United States for \$7.6 billion, one of the largest cross-border acquisitions of 2007. Once again, CVRD stands as an outlier, with the remaining transactions all occurring between developed country firms. Thus, mining companies from the developed countries continue to consolidate, and this is likely to increase their relative bargaining power. None of the recent major acquisitions by developed country firms has involved a major firm from a developing country.

It appears that these cross-border acquisitions also contribute to the diffusion of relatively common strategic positions for all firms. Deephouse (1999) has suggested that firms need to be as different as their industry will legitimately allow, and it might yet be the case that the mining industry does not allow for much heterogeneity. If the continuing consolidation of the industry world-wide continues to further reduce strategic heterogeneity, such mergers may not generate improved returns to the shareholders.

Similarly, it is not yet clear whether a convergence to common strategies includes those related to the adoption of corporate codes of conduct and corporate social responsibility, and this remains a useful subject for future research. In addition, the issue of whether the adoption of such codes contributes to redressing power imbalances between TNCs and host countries also merits further research.

On the other hand, we have noted the possibility that in future, large mining firms from developing countries will begin to diversify geographically, most likely *via* acquisition. This possibility raises both public policy and strategic management issues. In terms of public policy, acquisitions by developing country mining companies would increase the concern already emerging in developed countries regarding such acquisitions in the energy sector. Such concerns may result in increased scrutiny of inward FDI flows from developed countries. However, it is not at all clear that developing country firms have the capabilities to move abroad in a significant way. Nevertheless, a company such as CVRD has clearly done so, and the factors that account for its success merit closer study.

We have noted the complex relationship among FDI flows, institutional reform, the resource curse and the obsolescing bargain problem. While recent research has tended to indicate that a virtuous cycle is possible, whereby FDI promotes institutional reform, thus both lowering the tendency to renege on *ex ante* agreements and limiting the

possibility of a resource curse, and hence promoting more FDI, more research on this issue is required.

This study has approached the question of strategic heterogeneity from a cross-sectional perspective. Future research should take a longer time frame, with specific emphasis on the effects of cross-border mergers and acquisitions, and the evolution of global mining firms from developing countries. In particular, it would be of interest to better understand the nature of “outlier” strategic positions in developing countries, and in particular, whether such firms will in future be able to compete successfully in global markets.

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