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MOBILITY BARRIERS AND STRATEGIC GROUPS

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A procedure for identifying strategic groups based on mobility barriers is recommended and illustrated. The strategic groups identified were observed to exhibit group membership stability and differences in profitability.

The concept of a strategic group of competitors has attracted a plethora of conceptual writings and empirical efforts (McGee, 1985; McGee and Thomas, 1986, Cool and Schendel, 1987) for good reason. It has the potential to be a valuable theoretical tool for strategy researchers and be a practical aid for managers who must analyze competitors, make strategic investment decisions, and develop successful strategies.

One of the difficulties in applying the concept, however, lies in the fundamental issue of how to define groups. One review of the literature (McGee, 1985) concluded that group definition has been ad hoc. If there is a pattern, it is a focus on 'similar or common strategies'. 'Strategies' in this context means what you do, activities. It includes functional-level strategies, positioning strategies, manufacturing strategies, pricing strategies, targeting (of sub-markets) strategies, and distribution strategies. Many writers cite Porter, who defined a strategic group as a 'group of firms in an industry following the same or a similar strategy along the strategic dimensions. An industry could have only one strategic group if all the firms followed essentially the same strategy' (Porter, 1980: 129).

One objective of this paper is to argue that for two reasons the group definition task should be driven by mobility barriers, exit and entry barriers between strategic groups, rather than

strategies. First, mobility barriers represent the theoretical core of the concept (Porter, 1979: 216). Caves and Porter noted that mobility barriers 'between groups rest on the same structural features as barriers to entry into any group from outside the industry' (1977: 250). Second, an important potential use of the strategic group concept is to make strategic judgements about (1) the attractiveness of each group and (2) the assets and skills needed to compete successfully over time within each group. Caves and Porter (1977: 253) observe that 'firms' investments in entry barriers play a role in defining and differentiating the groups' and that, for example, 'A firm endowed with distinctive skills in production technology may direct its barrier investments toward that area'. Unless groupings involve mobility barriers, the concept's utility in improving these judgements will be very limited.

A strategic group is thus here defined as a grouping of businesses within an industry that is separated from other groupings of businesses by mobility barriers, barriers to entry and exit. Mobility barriers deter movement between groups because of substantial cost, a significant lapse of time, or uncertainty about the outcome (McGee and Thomas, 1986).

Barriers to entry can be assets such as a brand name, loyal customer base, distribution channels,

or an automated factory. They can also be skills such as the ability to design simple products that are reliable and inexpensive. Assets and skills are entry barriers because they are usually difficult to acquire or neutralize. In contrast, what a business does, the way you compete, is usually easily imitated. Anyone can decide to distribute cereal or detergent through supermarkets, but few have the clout to do it as effectively as a General Mills or Procter and Gamble. Firms in a strategic group will have similar assets and skills.

Exit barriers include specialized assets, long-term contracts with suppliers or labor, customer or distributor commitments, and managerial pride. Thus, mobility barriers are much more 'who you are' or resource dependent than 'what you do' or action-dependent, and provide a very different conceptual focus than a common strategy conceptualization of strategic groups.

A strategy can be based upon, and thus closely associated with, a set of assets and skills but such a linkage does not always exist. For example, an emphasis on personal selling may be an element of a firm's strategy but where there are no long-standing personal relationships with customers, or where salespersons can be readily hired away, there are no impediments to imitation. Similarly, a heavy-advertising strategy may be more easily imitated if it does not draw upon an asset such as a strong, developed name or image, like the Pillsbury Dough Boy, The Jolly Green Giant, or the Wells Fargo Stage Coach. A set of brands can be similarly positioned as a fast IBM clone, a tasty hamburger, or a heavy-duty pick-up truck. But if the 'strategy' is not supported by a unique asset or skill then it can be easily duplicated because mobility barriers and competitive advantages will be lacking.

A focus upon mobility barriers raises several issues that have rarely been addressed in empirical work. A natural concern about any grouping is whether substantial mobility is observed between groups. If there is substantial mobility one can question whether mobility barriers exist between groups, and whether strategic groups have in fact been identified. Out of all the empirical studies, however, only Oster (1982), Cool (1985), and Cool and Schendel (1987) checked for group membership stability over time.

Another concern should be the differences in profitability across groups. Few studies have

examined and attempted to understand profitability differences between strategic groups. These studies have largely observed no differences in performance between groups, but these results are inconclusive due to the arbitrary way that groups have been identified (Cool and Schendel, 1987: 1105). One motivation for understanding mobility barriers is that group profitability potential may be directly affected by the size of mobility barriers. Bain (1956), Stigler (1963), and Oster (1982) have hypothesized that profitability is positively related to the size of the entry barrier.

Some implications of a focus upon mobility barriers

There are several implications to recognizing that mobility barriers drive the development of strategic groups:

1. Since mobility barriers are usually driven by firm skills and assets, skills and assets should be a primary consideration in identifying groups. If a firm would like to enter into a strategic group, the key consideration usually is whether the necessary skills and assets exist or can (and should be) developed. Approaches to the identification of relevant skills and assets are discussed by Aaker (1988: 80–87 and 1989). For example, one approach would focus upon what skills and assets could be responsible for both chronic high performance and low performance within an industry. Another would examine key customer motivations and the skills and assets that would be required to be responsive to them.

2. Strategies are relevant to strategic group definition primarily by helping to identify what are relevant skills and assets. Some skills and assets exist only in the context of particular strategies. For example, a strong R&D capability may not be a relevant asset if the firm's strategy is to be a low-cost follower. Thus, it may be necessary to consider interactions of strategies and skills and assets. Further, strategies can sometimes involve investment in product differentiation, distribution, or in other areas that create skills and assets that are mobility barriers. In that sense an analysis of strategies may help understand the dynamics of an industry and strategic group composition. However, strategies

per se will in general be an inadequate basis for strategic group definition.

3. Since mobility barriers are logically and empirically unique to industry settings, it is important to identify group-defining variables appropriate to an industry. If group-defining variables are idiosyncratic to an industry, an in-depth knowledge of an industry will be required to generate valid strategic group-defining variables.

4. Any strategic group scheme should be checked for group membership stability. If mobility rates are high, the presence of mobility barriers can be questioned, and the validity of the groups should be examined. It is possible for firms to overcome mobility barriers especially if they accept risk and make an entry investment. However, in the absence of such activity, excessive mobility should be evidence that valid strategic groupings have not been identified. Out of all the empirical studies only Oster (1982), Cool (1985), and Cool and Schendel (1987) checked for group membership stability over time.

5. One motivation for understanding mobility barriers is that group profitability may be directly affected by the size of mobility barriers. Stigler (1963) and Oster (1982) have hypothesized that the profitability of a strategic group is positively related to the size of the entry barrier. Thus, the profitability differences between groups should be examined, and an effort made to determine the underlying forces affecting current and future profitability and the influence of mobility barriers and other group-specific factors. The few studies which have considered across-group profitability differences have largely observed no differences in performance across groups, but these studies are not conclusive due to the arbitrary way that groups have been defined (Cool and Schendel, 1987: 1105).

Research questions

The balance of this article presents a strategic group study of an industrial service industry — oil-well drilling. The purpose of the study is to address four research questions.

Question 1: Can we develop credible and useful strategic groups using mobility barriers as the driving concept? An attempt will be made to identify strategic groups using mobility barriers

that are industry-relevant, and that are based on the input of industry participants with an in-depth understanding of the industry.

Question 2: What are the mobility rates among the resulting strategic groups? If mobility rates are high one can question the presence of mobility barriers and, in fact, the strategic group identification process.

Question 3: Are there differences in profitability across the strategic groups? Most people would think that the more protected groups would have the highest profitability, although there may be other factors affecting profitability such as differences in ability to exploit assets and skills, differences in bargaining power with buyers and suppliers, and insulation from other groups and substitute products.

Question 4: If profitability differences exist across groups, what causes them? These causes can help to develop a deeper understanding of the industry context.

The oil-drilling industry

The oil-drilling industry is composed of firms with drilling rigs that are contracted to oil companies or governments. The demand for oil-drilling services is affected by the world oil price and government restrictions, such as on acreage availability for exploration and development. The industry is fragmented and oil-drilling is a commodity-like capital-intensive business, subject to economics of supply, demand, and capacity expansion. During the period studied, 1973 to 1982, there was a boom for the most part between 1973 and 1981 with generally rising oil prices. In 1982, however, a downturn occurred with a drop in oil prices.

STRATEGIC GROUP IDENTIFICATION

The first research question centered on the possibility of identifying strategic groups based on mobility barriers. Using the procedure detailed next, three groups were identified:

1. domestic, onshore, shallow drillers, labeled 'shallow';
2. domestic, onshore, deep drillers, labeled 'deep-land';
3. international, offshore, deep drillers, labeled 'intoff'.

Identifying mobility barriers

Personal interviews were held with top executives of ten drilling firms, with financial analysts specializing in the industry at five brokerage houses, with officials of the industry trade organization, and with an independent industry consultant. These interviews, which ranged from one to two hours each, included in-depth discussions of alternative strategies, key success factor, assets and skills, and mobility barriers inhibiting movement into and within the industry.

These discussions clearly revealed the presence of mobility barriers along three dominant dimensions: depth, offshore versus onshore, and domestic versus international operations. Other sources of potential mobility barriers discussed in the literature, such as ownership, R&D, and distribution channel characteristics, were also considered but did not emerge in interviews as meaningful mobility barriers in this industry.

From the three dimensions, the following group-defining variables were defined for each firm:

1. *Depth*—proportion of fleet rigs which are deep—having a depth capability greater than 16,000 feet as the technology changes dramatically at this depth.
2. *Offshore*—proportion of fleet rigs that are offshore.
3. *International*—proportion of fleet rigs that are non-domestic.

Table 1 details the mobility barriers that inhibit movement from shallow to deep, from onshore to offshore, and from domestic to international drilling. There may, of course, be some mobility barriers that deter movement in the other directions as well. In particular, specialized know-how and capital expenditures for specialized equipment may also be exit barriers. For example, drilling equipment that is efficient for drilling at 20,000 feet may be inefficient for drilling at 12,000 feet. Thus, these group-defining variables may capture both entry and exit barriers. For example, the depth variable captures entry barriers into deep drilling, as well as exit barriers from deep to shallow drilling. Further, shallow drilling may be viewed as less glamorous than deep drilling, creating a prestige barrier to moving from deep to shallow drilling but not the other way. In this context the prestige barrier to moving

Table 1. Depth, offshore, and international mobility barriers in oil-drilling industry¹

Mobility barriers that deter movement from shallow to deep drilling

1. Special knowhow regarding:
 - (a) Higher pressures and temperatures associated with deeper drilling.
 - (b) More stringent safety regulations and inspection procedures.
 - (c) How to adapt to different equipment and operations.
2. Higher capital requirements for larger, more reliable equipment needed.

Mobility barriers that deter movement from onshore to offshore drilling

1. Special knowhow regarding:
 - (a) Platform design and sea-bed.
 - (b) Wind and waves movement.
 - (c) Corrosion resistance.
 - (d) Mooring and anchoring of rigs.
 - (e) Underwater diving, repairs, and inspection operations.
 - (f) Operations under more stringent safety measures—i.e. evacuation and rescue requirements.
 - (g) On-board sheltering without shore support.
2. Higher capital requirements for more expensive equipment.

Mobility barriers that deter movement from domestic to international drilling

1. Special knowhow regarding:
 - (a) Rig designs that are decomposable and transportable to foreign locations.
 - (b) Operations in diverse, hostile environments—i.e., North Sea, Arabian desert.
 - (c) Recruiting, sheltering, and transporting internationally oriented personnel.
 - (d) How to quickly address problems in an overseas field.
 - (e) The prompt repairing and servicing of equipment overseas to avoid down-time despite communication and control difficulties.
 - (f) How to adapt to different government equipment specifications.
 - (g) Agent selection with connections in government to obtain contract.
2. Higher capital requirements for more reliable equipment, greater inventories, and for financing some customers with balance of payments problems.

¹ Source: Personal interviews with industry officials.

from deep to shallow drilling is also captured by the depth variable.

There is no reason why mobility barriers should be symmetric. Each strategic group is distinctive

and should be expected to have unique entry and exit barriers. Oster (1982) suggested, for example, that the group-defining variable used, the advertising-to-sales ratio, reflected entry barriers for those with low ratio moving into high advertising intensity, but not for those with a high ratio moving into low advertising intensity. In our context, however, the group-defining variables may represent exit as well as entry barriers which affect mobility in multiple directions, although not, of course, with equal impact.

Clustering firms into strategic groups

Information on firms on these key variables were then obtained using *Petroleum Engineer International's World Rig Locator*, which claims to include all industry firms. The 1982 edition lists the location, ownership, depth capability, and rig type (offshore/land) of 5651 industry rigs owned by 679 firms.

The 679 firms were then cluster-analyzed on the three variables—depth, offshore, and international—using the nearest centroid sorting procedures (Anderberg, 1973), efficient for use

with large data sets. Although there is no method for determining the optimal number of clusters (Everitt, 1980), a peaking of the cubic clustering criterion, an approximation to minimizing the within-cluster sum of squared distance, is considered a useful indicator. The cubic clustering criterion peaked at three clusters, suggesting relatively tight clusters at this level.

The top half of Table 2 details the statistics for the three strategic groups for the industry. Clearly, there were sharp differences between the groups with respect to the three defining variables. The *F*-statistics are all significant at the 0.0001 level. Using Tukey's test in multiple comparison of means for unequal cell sizes, the between-group differences are significant at the 0.01 level for all differences for the depth variable and for the differences between the 'intoff' group and the other two groups for the offshore and international variables. (Of course, the statistical tests must be interpreted in the context that the groups were generated through a cluster analysis.) Table 2 also shows that the groups differ with respect to the average number of rigs per firm, a difference significant at the 0.0001 level.

Table 2. Characteristics of the three strategic groups in the industry and in the sample for 1982—means and standard deviations (in parentheses)

Industry	Group 1: Domestic, shallow, onshore	Group 2: Domestic, deep, onshore	Group 3: International deep offshore	Test for Inter-group difference (<i>F</i> value, d.f., level of significance)
No. of firms = 679				
No. of rigs = 5651	434	169	76	
Proportion of total rigs that are:	2756	1797	1098	
deep	0.06 (0.11)	0.72 (0.21)	0.88 (0.21)	(1717.48, 676, 0.0001)
foreign	0.10 (0.29)	0.03 (0.13)	0.63 (0.42)	(134.25, 676, 0.0001)
offshore	0.01 (0.06)	0.03 (0.10)	0.86 (0.30)	(1640.06, 676, 0.0001)
Average no. of rigs	6.35 (9.03)	14.45 (21.29)	10.63 (13.32)	(22.39, 676, 0.0001)
<i>Sample</i>				
No. of firms = 33	10	14	9	
No. of rigs = 940	193	372	375	
Proportion of total rigs that are:				
deep	0.18 (0.13)	0.60 (0.19)	0.99 (0.30)	(77.89, 30, 0.0001)
foreign	0.00 (0.00)	0.14 (0.19)	0.70 (0.24)	(42.47, 30, 0.0001)
offshore	0.00 (0.00)	0.10 (0.16)	0.94 (0.15)	(149.49, 30, 0.0001)
Average no. of rigs	19.30 (11.54)	41.64 (35.07)	26.56 (10.83)	(2.59, 30, 0.0917)

Profitability data

To examine group profitability, more detailed data were needed than were available in the *World Rig Locator*. In particular, data on profitability over time were required. Accordingly, through listings in trade journals, Compu-stat, and brokerage houses, 33 publicly traded companies were identified for which the required data were available from annual reports and 10-K statements. For these firms it was possible to obtain from the introductory description of their business in annual reports and 10-Ks a listing of rig characteristics (depth, location, offshore/land mix). For 1982, information on rigs was available, therefore, from two sources: the annual reports and the *World Rig Locator*. The Pearson correlations for the depth, offshore and international variables between the two sources were respectively 0.93, 0.98, and 0.97.

A serious problem in empirical research, as noted by Oster (1982), is that data sources covering publicly traded diversified firms such as Compustat attribute all financial information to a firm's primary industry. Financial information by business area, however, is often available in annual reports and 10-Ks in the note to the financial statements on by-segment reporting, but the note does not always contain the desired breakdown of information. Fortunately, the problem of inadequate breakdown was not severe

with the firms examined in the oil-drilling industry. Although around half the firms were involved in other activities besides oil-drilling, most notably oil-production, the by-segment disclosure note to their financial statements often clearly detailed financial data about their drilling activities. Thus, information on drilling activities, such as on drilling revenue, drilling assets, drilling expenses, and drilling income, was available even for these diversified firms. (Five additional publicly traded firms were excluded from the analyses because adequately detailed disclosure was not available.)

Table 3 lists the 33 publicly traded firms, their strategic group membership in 1982, and the number of years of financial data that were available for each firm. Efforts were made to obtain data back to 1973. However, some of the firms were not public for the entire period.

The bottom of Table 2 summarizes the characteristics of the 33 publicly traded firms. The pattern of means across groups for the three group-defining variables is very similar to that obtained using all industry firms. The sample means for the key mobility barrier variables are not significantly different from the industry population means at the 0.05 level using Tukey's test. The average number of rigs is larger, as would be expected (although only in the 'deep-land' group is the difference significant at the 0.05 level) but, again, the pattern across

Table 3. Firms in the three strategic groups

Group 1: Domestic, shallow, onshore	Group 2: Domestic, deep, onshore	Group 3: Foreign, deep, offshore
Astro (3)	Anglo Energy (5)	Atwood Oceanics (10)
Drillers (3)	Blocker (4)	Buttes Oil and gas (5)
Sage Energy (4)	Bonray (3)	Global Marine (6)
South Texas (3)	Helmerich and Payne (5)	ODECO (8)
Tom Brown (9)	Matagorda (3)	Reading and Bates (5)
Transcontinental (6)	MGF Oil (5)	Rowan (10)
Tucker (3)	Midland S. W. (4)	SEDCO (6)
Unit (8)	Moran Energy (10)	Western Co. of N.A. (7)
Sage Drilling (3)	Nicklos (5)	Zapata (6)
Verna (3)	Noble (8)	
	Parker Drilling (5)	
	Ratliff (7)	
	Rio Grande (1)	
	Santa Fe (4)	

Note: The number of years for which financial data are available for the firm is shown in parentheses.

groups is similar and the data analysis involves inter-group comparisons among the samples which control for public ownership.

Asset size and group identification

There is a relationship between drilling assets size and strategic groups in this industry. The mean drilling assets values for the publicly traded firms for the 'shallow', 'deep-land', and 'intoff' groups were, respectively, \$27 million, \$114 million, and \$314 million, significantly different from each other at the 0.01 level using the *F* and Tukey's multiple comparison of means tests ($F = 56.08$, d.f. 176). Among the multiple-industry studies, Porter's (1979) use of sales size to define groups, for example, would capture these strategic group differences. However, he was attempting to capture a strategic group pursuing the economies of scale strategies with the size variable. Moreover, the use of only size as a surrogate variable for group definition would not provide detailed insights on how strategies differed across the groups identified. In oil-drilling, a fragmented service industry with limited economies of scale, for example, the drilling assets size variable is related to strategies of deep, international and offshore drilling.

OBSERVED MOBILITY

The second research question focused upon the mobility rates among groups. It was expected that group membership would be stable over time. In order to check for mobility each firm needs to be assigned to a strategic group each year. To develop objective, operational group definitions, a multiple discriminant analysis was performed on the 1982 industry data using the three independent variables: depth, international, and offshore proportions. The discriminant analysis, which classified 637 out of the 679 firms into the correct strategic group, develops a classification rule using the three variables. This classification rule was then used to assign the 33 firms to one of the three groups for each of the years (142 firm-years) that data were available for the period 1973–81.

The discriminant analysis procedure may be valuable when data availability varies over time,

or when data collection resources are limited. Of course, the procedure assumes that the classification rule, and thus the relevant variables and their importance, do not change during the period. Even though there was no indication from interviews of such changes during the period studied, mostly a growth period, this assumption should be made clear.

Given the data available, there were 109 observable occasions (142–33) in which firms could change strategic groups, but there were only two changes. Anglo Energy moved from the 'shallow' to 'deep-land' group by acquiring drilling firms having rigs with a deeper drilling capability. The acquisition mode of entry reduced the need for internal development of the requisite skills and assets for the new group but also involved a leap into a less-known area. Sage Energy moved from the 'deep-land' to the 'shallow' group by focusing its investments over time on shallow depth capability rigs. Both cases involved movement between adjacent groups.

Oster (1982) observed an overall average mobility rate of 0.07 in her study of consumer industries, and felt that such a rate was indicative of strategic group membership stability. Thus, the observation in this study of an even lower mobility rate suggests that group membership was largely stable over time.

FINANCIAL PERFORMANCE OF DIFFERENT STRATEGIC GROUPS

The third research question concerned the possible existence of performance differences across strategic groups. Performance was measured by return on drilling assets (RDA) defined as:

$$\frac{(\text{Drilling revenue} - \text{Drilling expenses})}{\text{Drilling assets}}$$

where:

drilling revenue includes all revenues associated with drilling operations;
drilling expenses include all expenses associated with drilling operations;
drilling assets are measured by the book value of all assets relating to drilling operations including working capital, inventories, buildings and equipment.

Executives pointed out in interviews that RDA was the best available measure of financial performance for the drilling business. In using accounting data, however, there is always the concern that firms may be using different accounting methods. Further, RDA is sensitive to the age of assets. Other measures of performance that were also mentioned by executives were return on assets, return on equity, cash flow returns, stock market returns, equipment down-time, footage drilled, and number of wells drilled. Return on assets, return on equity, and stock market returns were not used because they involved confounding the oil-drilling business operations, most notably with oil-producing operations. For example, because it was not generally possible to identify that portion of equity or depreciation attributable to the drilling operations, measures such as return on equity or cash flow were inappropriate. Similarly, stock market-based measures also involved confounding. For example, an oil strike by the oil-producing operation of a company could have a substantial effect on the stock price. Executives also mentioned that the stock market's reaction to energy stocks during the period was 'highly emotional', and that stock market returns would therefore be of questionable reliability or validity. Operational measures of performance such as equipment down-time, footage drilled, or number of wells drilled were not available, and were not comparable across firms drilling under different conditions.

Table 4 shows the average RDA and its standard deviation for each strategic group for each of the ten years.

Higher entry barriers associated with lower profitability

Strategic group differences were expected with respect to financial performance. The average RDA and standard deviation of RDA for each group was computed over time. Clearly the expected differences are observed. The average RDA over time of the three groups are significantly different at the 0.0001 level ($F=17.78$, d.f. 176). Using the Tukey test in multiple comparisons of means, the 'shallow' group is significantly different from the 'deep-land' and 'intoff' groups at the 0.01 level and the 'deep-land' group is significantly different from the 'intoff' group at the 0.07 level. The group averages of firm standard deviations of RDA over time (respectively, 0.12, 0.08, 0.07) were not significantly different from one another, ($F=2.17$, d.f. 29; level= 0.13). The coefficients of relative dispersion, which adjust for the different mean levels by dividing the standard deviation by the mean, were also not significantly different between groups (0.51, 0.46, and 0.48; $F=0.07$, d.f. 29, $p=0.93$).

It was expected that strategic group financial performance should vary with the size of its associated entry barrier. Entry barriers may reduce competition and protect those with higher returns from others within and outside the industry. Thus, the 'intoff' group was expected to have the highest return followed by the 'deep-land' group and finally the 'shallow' group. But, in contrast, the 'deep-land' group has a significantly higher average return than the 'intoff' group and, in fact, has a higher return than the 'intoff' group in all years except 1982. Further, the 'shallow' group firms, expected to have the lowest RDA levels, in fact have the highest (significant at the 0.01 level) overall levels and also the highest RDA in all years except 1982 where they trail the 'intoff' group by a small margin. Thus, the evidence is not consistent with the expectation that protected groups would have higher profitability.

Of concern was the possibility that the results were due to differences in depreciation methods. An examination of the depreciation method used for each firm-year in Note 1 to the financial statements revealed that the straight-line method

Table 4. Performance by strategic group (mean RDA, n = number of observations, S.D. = standard deviation)

Year	Group 1			Group 2			Group 3		
	Mean	n	S.D.	Mean	n	S.D.	Mean	n	S.D.
1973	—	—	—	0.087	1	—	0.056	2	0.01
1974	0.242	1	—	0.184	1	—	0.098	2	0.06
1975	0.476	2	0.31	0.218	2	0.02	0.112	3	0.05
1976	0.732	2	0.50	0.221	3	0.05	0.131	3	0.06
1977	0.496	3	0.37	0.222	5	0.13	0.100	8	0.07
1978	0.427	4	0.26	0.252	9	0.11	0.114	9	0.04
1979	0.285	6	0.25	0.187	11	0.09	0.134	9	0.05
1980	0.260	10	0.13	0.226	13	0.13	0.185	9	0.06
1981	0.330	10	0.15	0.231	12	0.08	0.217	9	0.07
1982	0.204	10	0.23	0.140	11	0.14	0.239	9	0.09
Aggregate data set	0.323	48	0.23	0.208	68	0.11	0.156	63	0.08

was used in 160 firm-years and the unit-of-production method (whereby a rig is depreciated according to the proportion of the year it is working) was used in 19 firm-years. The results did not materially change when the analysis was restricted to the firm-years involving the straight-line method. Nor did the results materially change when the analysis was restricted to the 1978–82 period which contained most of the data.

EXPLAINING THE FINANCIAL PERFORMANCE DIFFERENCES

The fourth research question investigated the underlying causes of profitability differences across groups. Why did the more protected groups exhibit lower profitability? If the protected groups exhibited lower profitability, then why did not firms from the ‘deep-land’ and ‘intoff’ groups move into the ‘shallow’ group? Did the barriers to entry into ‘deep-land’ and ‘intoff’ groups which serve as defenses against competitive entry also serve as traps, deterring exit?

To answer these questions, twelve executives with extensive industry experience from both private and publicly traded firms, and from all three strategic groups, were then re-interviewed to determine plausible explanations. Executives were also asked to comment on groups other than their own to detect possible biases. Executives readily related to the strategic groups identified. Executive comments such as: ‘We are clearly a firm in the “shallow” group’ suggested face validity for the groups identified. They pointed out that the results were not an artifact of the dependent variable employed, but did indeed reflect and corroborate their understanding of the industry.

There was little support for the hypothesis that profit differences were related to differences in risk, that the domestic, onshore, shallow firms were being rewarded for accepting higher risk levels. First, as already noted, the standard deviations of return were not significantly different among the three groups. Second, some industry participants did feel that the international, deep, offshore firms could control risk because they quoted in ‘day-rates’ rather than in ‘foot-rates’ and because the large oil firms for whom they worked carefully monitored their exposure when investing overseas. On the other hand, others felt that the inherent risks of

international, deep, offshore drilling were substantially higher than domestic, onshore, shallow drilling. On balance, differences in risk do not seem to be a meaningful explanation for the profitability difference.

Three factors did emerge as the most likely reasons for the profitability differences: the power of customers, the new equipment ordered for more difficult drilling jobs, and, to a lesser extent, the fact that there were barriers to movement to the onshore, shallow, domestic group. That these three factors emerged repeatedly as causes for the profitability differences suggests that group profitability is affected by multiple forces acting jointly.

The power of customers

The lower returns in the ‘deep-land’ and ‘intoff’ groups are felt to be caused by severe competitive pressures exerted by stronger customers. In comparison to the shallow wells, deep, offshore, or international wells are more costly and are often undertaken by larger customers. The customers of firms in the ‘intoff’ group, for example, are mostly national governments and large oil companies. These customers often have their own drilling operations (giving them an intimate knowledge of costs), are in a position to influence regulations regarding environmental protection and employment of local nations, and are skilled bargainers with excellent contacts with alternative drillers who have to bid for business. Firms in the ‘shallow’ group, by contrast, have personal relationships with many of their clients that may help to reduce competition. This explanation supports the hypothesis that strong customers may exert downward pressures on profits (Porter, 1980).

Supplier focus on expensive rigs

Industry executives pointed out that in general the profitability of each group was influenced by the interplay between equipment costs and rental rates. During the period, ‘deep-land’ and ‘intoff’ firms, expecting that oil prices would continue to rise and would encourage more difficult exploration, over-ordered rigs, the oversupply of which depressed their rental rates. At the same time, rig manufacturers used their limited capacity in the oil-drilling boom to produce the expensive, high-margin rigs and raised the costs of the

delivered equipment. This delivered equipment was also financed by high interest rates during the period. 'Shallow' group firms might have experienced higher costs of new equipment as well, but relatively less capacity was used to produce their rigs. Further, it also meant that excess demand existed for their drilling services, increasing their profitability.

Mobility barriers protecting the 'shallow' group existed

Table 1 details the substantial barriers inhibiting firms from moving from shallow to deep, domestic to international, and land to offshore drilling. There also exist barriers inhibiting firms from moving into domestic, shallow, onshore drilling, although these barriers are much less substantial and obvious. These barriers are a factor in explaining the profit patterns, although less so than the first two explanations.

New equipment with no meaningful technological advances would have been required to move into shallow, land drilling as deep, land rigs would have been relatively inefficient. Thus, firms moving into shallow drilling would have found it difficult to obtain equipment, and would have been at a cost disadvantage against existing firms with depreciated equipment. Further, the domestic, deep firms and international, offshore firms tended to be highly centralized and bureaucratic, with a focus on technology problems. Their organization and management systems were not well-suited to managing the domestic, shallow drilling business where labor-management was a key needed skill and scale economies were not present. 'Shallow' group firms were also smaller and often had owner-managers making decisions with a large portion of their wealth tied to the firm's performance. Finally, there was a visible pride factor: executives in 'deep-land' and 'intoff' group firms were generally not interested in moving 'backwards' to the shallow or domestic area from where they had once grown out of.

DISCUSSION

This study was based on the premise that group identification should be based on mobility barriers. Mobility barriers are at the conceptual heart of the strategic group concept and reveal

the assets and skills that separate groups and form the bases of competitive advantage. The identification of mobility barriers and group-defining variables that reflect them requires a reorientation from a description of firm activities—what we do—towards firm assets and skills—what we are. Clearly, not all 'strategies' or firm activities such as heavy advertising or offshore manufacturing result in competitive advantages or barriers to entry or exit.

There are several conclusions that emerge from the study.

First, taken together, the results suggest credibility for the strategic group concept motivated by mobility barriers in the oil-well drilling industry. Drawing upon industry participants, a set of mobility barriers were identified and were used to cluster 679 firms into three distinct strategic groups. A high degree of group stability was observed, only two out of a potential 109 moves occurred, indicating that mobility barriers did exist and that the strategic groups were stable.

Second, this study suggests that the selection of strategic group-defining variables can be idiosyncratic to an industry. Thus studies of strategic groups covering multiple industries should be concerned with the validity of their group-defining variables. There was some evidence that asset size may be a surrogate for the mobility barrier dimensions in this industry. Additional industry-specific studies may also reveal surrogates that have broad relevance. Knowledge of such surrogates, in turn, could facilitate strategic group studies covering multiple industries.

Third, strategic group theorists have posited that more protected groups will have higher profitability. This pattern of return or risk-adjusted return across groups was not observed, however. In fact, the more protected groups exhibited lower profitability, providing insights about the relationship of mobility barriers with profitability. It illustrates that the profitability of a protected group can be shaped by multiple factors acting jointly (Cool and Schendel, 1988) such as the power of customers and aggressive investment policies when equipment costs and interest rates were high, and suggests that strong exit barriers can trap firms within a group, further depressing their profitability in weak economic conditions. The findings also suggest that groups

with apparently little protection may have barriers such as management style and assets (in particular depreciated equipment) that are not as easy to imitate as may seem.

A similar finding emerged in Bailey and Williams's study (1988) of the deregulated airline industry, where the group of large national carriers exhibited lower profitability than the group of smaller regional carriers. This profitability difference existed in part due to the higher union wages and restrictions faced by the large carriers. Further, similar to the oil-drilling industry, the large-carrier group faced impediments to entry into the small-carrier group because their existing assets (aircraft) were unsuitable for short-haul routes and because they would have been at a disadvantage had they bought newer, more expensive short-haul aircraft to compete with the low-cost, depreciated fleet of the smaller, regional carriers. Thus, the profitability finding of this study is not unique to the oil-drilling industry. The reasons for the profitability differences, however, may vary across industries.

Finally, the point that mobility barriers may be asymmetrical with respect to groups (Hatten and Hatten, 1987) was illustrated in this industry. The challenge for strategists is to create entry barriers into one's group while reducing exit barriers, and to recognize that different barriers may be needed to keep out potential competitors from differentially positioned groups. It seems clear that this asymmetry is important to understanding and influencing competition in the industry.

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