Learning From Competing Partners:
The Market Share Impact of Scale and Link Alliances in the Global Auto Industry

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Abstract

We extend previous arguments that have linked the outcomes and durations of strategic alliances to inter-partner learning in scale and link alliances. Scale alliances are partnerships in which the partner firms contribute similar resources, and link alliances are agreements in which the partners contribute complementary resources. We investigate how greater inter-partner learning in link alliances leads to greater changes in the competitive positions of the involved partner firms. We conduct a longitudinal study assessing 135 strategic alliances formed by competing firms in the global automotive industry from 1966 to 1995. This study reveals that the relative market share of the partners varies significantly more in link alliances than it does in scale alliances.

Key words
- Inter-partner learning
- Resource transfers
- Change of competitive position
- Automobile industry
- Alliances between competitors
- Scale alliances
- Link alliances
- Market Share
- Alliance outcomes
- Alliance dynamics
Learning From Competing Partners: The Market Share Impact of Scale and Link Alliances in the Global Auto Industry

This study investigates how inter-partner learning in alliances affects the relative market shares of the partner firms. The study builds on arguments that have found significant differences in the outcomes and durations of scale and link alliances (Dussauge, Garrette and Mitchell, 2000). These arguments suggest that link alliances, to which partner firms make complementary contributions, offer greater opportunities for inter-partner learning than do scale alliances. Empirical evidence shows that partners tend to reorganize link alliances both earlier and more often than scale alliances. Reorganization, which involves changes in the allocation of tasks among the partners, denotes that the complementarity of skills between the allies has shifted since the formation of the alliance, because of learning made possible by partner interaction. Evidence also shows that link alliances tend to end in takeover by one partner more frequently and earlier than scale alliances. Takeover supports the view that the acquiring partner has internalized new capabilities initially held by the other partner. In contrast, scale alliances, to which partners contribute similar resources, are more likely to continue without reorganization or takeover for longer periods, suggesting less change in the respective capabilities of the partner firms. These results support the proposition that different opportunities for learning, created by different alliance types, lead to different alliance outcomes.

The current study complements the previous arguments by examining to what extent partner firms are able to enhance their relative competitive positions as a result of an alliance. The analysis focuses on changes in relative market share that occur as a consequence of collaboration. We assume that changes in relative competitive position reflect changes in the resource endowments of the allied firms and that learning that occurs during alliance activities influences such shifts. Consistent with the argument that link alliances are more conducive to inter-partner learning, we expect significant changes in relative market share to be more prevalent in link alliances than in scale alliances. The analysis examines 135 alliances among competing firms in the global automobile industry, from 1966 to 1995.
**Prior Research and Hypothesis**

While collaboration offers potential advantages for all partner firms involved, collaboration may also create favorable conditions for inter-partner learning and may allow one partner to appropriate and internalize resources that another partner contributed (Balakrishnan and Koza, 1993; Nakamura, Shaver and Yeung, 1996; Lane and Lubatkin, 1998; Kumar and Nti, 1998). Such appropriation is a critical issue when alliances associate competing firms. When the partner firms in an alliance are also competitors in a product market, there will be many opportunities for inter-partner learning and major competitive consequences of such learning (Pucik, 1988; Hamel, Doz and Prahalad, 1989; Hamel, 1991; Kale, Singh, Perlmutter, 2000). Alliances between competitors can lead to the loss of critical proprietary knowledge, as well as to increased dependence of one partner vis-à-vis the other (Bleeke and Ernst, 1995). Distinguishing between alliances that are likely to contribute to all partners and alliances that will tend to favor some partners is conceptually and managerially important (Hennart, Roehl and Zietlow, 1999).

Khanna, Gulati and Nohria (1998) argued that the incentive for partners to internalize valuable skills is affected by the extent to which they can implement these skills profitably in their own operations outside the alliance. They conclude that a higher ratio of private to common benefits leads to more competitive, rather than cooperative, behaviors on the part of the partner firms. They define this ratio on the basis of the "relative scope" of the alliance, i.e., the extent to which the alliance activities overlap with a partner's overall business.

Dussauge, Garrette and Mitchell (2000) show that the extent to which the resources contributed by the various partners to an alliance overlap or differ influences the evolution and outcome of alliances. They argue that link alliances, in which the partners contribute asymmetric knowledge, tend to favor skill transfers, and that scale alliances, in which the partners contribute similar knowledge, are more likely to continue without substantial skill transfer. They interpret the observed differences in alliance evolution and outcome as consequences of differing levels of inter-partner learning in scale and link alliances. They show that link alliances lead to more asymmetric outcomes (alliance reorganization or alliance takeover) than do scale alliances.

Dussauge, Garrette and Mitchell's (2000) argument is consistent with the view offered by Khanna, Gulati and Nohria (1998) on the dynamics of learning alliances. Skill transfers in link
alliances create a potential for firms involved in such alliances to implement these newly acquired skills outside the scope of the alliance. By contrast, the limited extent of learning in scale alliances implies that most of the benefits of collaboration originate within the alliance itself. In Khanna, Gulati and Nohria's terms, link alliances offer greater opportunities of creating private benefits than do scale alliances, *ceteris paribus*. The private benefits, in turn, imply that link alliances will favor a more competitive behavior on the part of the partner firms, while scale alliances will favor a more cooperative behavior. Dussauge, Garrette and Mitchell's results support this implication by showing that link alliances lead to more asymmetric outcomes.

Khanna, Gulati and Nohria's logic suggests that link alliances should also have a more asymmetric impact on the partner firms themselves. Indeed, a firm involved in a link alliance will tend to adopt a more competitive behavior, will more aggressively pursue the implementation of newly acquired skills in its own operations, and therefore is more likely to unilaterally enhance its competitive position. In addition, as the relative scope of an alliance, as defined by Khanna, Gulati and Nohria (1998), is specific to each partner firm in the alliance, not all partners will have the same incentive to learn and not all partners will adopt an equally competitive or cooperative behavior. In other words, the benefits that accrue to each partner as a result of the "race to learn" favored by link alliances are asymmetric. Hence the following hypothesis:

*Hypothesis:* The relative competitive positions of the partner competitors will change more over time in the case of link alliances than in the case of scale alliances.

**Data and variables**

We focus on one industry setting, the automobile industry, in order to assess the market share impact of alliances. We tested our hypothesis on a set of alliances associating automobile manufacturers originating from North America, Europe, or Asia (Japan and Korea). All the alliances involved operations in one of these three zones. We excluded agreements with purely local purposes, where none of the partners' main markets was involved (e.g., we did not consider agreements such as the Australian General Motors-Toyota joint venture, or the Autolatina alliance that Ford and Volkswagen formed to jointly operate in Brazil and Argentina). We also excluded the supply of components and sub-assemblies (e.g., engines and transmissions) from one manufacturer to another, because the exchanges are closer to market transactions than to strategic
alliances. In addition, we excluded government-sponsored research consortia, associating numerous participating firms, such as those set up by the European Union. We separated other multiple partner alliances into a set of bilateral partnerships involving each possible pair of allies. Our definition of alliances includes both equity joint ventures (Killing, 1983) and contractual alliances that do not involve freestanding alliance facilities.

The data has the following characteristics. Each data point corresponds to an agreement between two partners, covering one of the following four business areas: cars, trucks, parts and sub-assemblies, and research. Each agreement operates in at least one of three geographic zones: Europe, North America, or Asia. In this approach, an alliance between an American and a Japanese automaker by which they each agree to market one of the other's models in their respective home markets would be broken down into two cases: one for the marketing of the American car by the Japanese partner in Japan, the second for the marketing of the Japanese car by the American partner in North America. We did not consider renewed alliances between the same partners in the same business and geographic areas as different data points.

We gathered the data from secondary sources, supplemented by corporate interviews. Examples include industry reports, manufacturer associations' publications, and journals specializing in the automotive industry (such as Automotive News). An annual survey issued by the French Automobile Manufacturers' Association (Comité des Constructeurs Français d'Automobiles) on the evolution of alliances formed by automobile producers throughout the world provided longitudinal data on all alliances in the industry.

Table 1 reports summary statistics for the variables. Our focal independent variable, the type of alliance (LINK ALLIANCE), is a dummy variable taking on the value 1 in the case of link alliances and 0 in that of scale alliances. Three different coders, including two authors and an industry expert, independently coded the variable. In this process, three cases were dropped because of conflicting coding from the coders.

********** Table 1 about here **********

The analysis includes several control variables. The relative market share of the partner firms in the business area covered by the alliance, the year the alliance was formed (RELATIVE COMPETITIVE POSITION WHEN FORMED = RCP₀), is the volume output of the smaller
partner divided by the volume output of the larger partner. In this formula, the volume output of cars, trucks, or all vehicles was considered according to whether the alliance was for cars, trucks, or research, respectively. In the case of parts and sub-assemblies, a case-by-case decision was made, depending on the type of component involved.

We also controlled for the relative geographic presence of the partners, differentiating between the origin of the smaller partner. CROSS-CONTINENT ALLIANCE: SMALL PARTNER IS HOST denotes whether the alliance was formed to operate in the home market of the smaller of the partner-firms. CROSS-CONTINENT ALLIANCE: SMALL PARTNER IS ENTRANT denotes whether the alliance was formed to operate in the home market of the larger of the partner-firms. SAME-CONTINENT ALLIANCE denotes cases in which both partners originate from the same continent. For the analysis, we converted these three 0-1 cases to mean effects dummy variables, such that the coefficients of the three variables will sum to zero. We identified the geographic status of the smaller partner because we want to determine whether small hosts tend to lose ground to larger entrants or, conversely, whether smaller entrants gain at the expense of their larger hosts.

Several other variables control for temporal, geographic, and product-market effects. The year in which the alliance was formed (FOUNDING YEAR) controls for changes in the environment (e.g., increasing economies of scale, globalization of the automobile industry) that might influence both alliance formation and changes in market shares. The geographic zone in which the alliance is formed (ZONE: EU) distinguishes alliances operating in Europe from others; the fragmented nature of the European market has been argued to influence alliance formation patterns (Nohria and Garcia-Pont, 1991; Burgers, Hill and Kim, 1993; Dussauge and Garrette, 1995). The business in which the alliance was formed (TRUCKS) is a dummy variable taking the value of 1 for alliances formed in the truck business and 0 otherwise. TRUCKS controls for peculiarities of the truck business (e.g., lesser concentration and globalization, smaller output levels, less economies of scale) that might affect both the type of alliances formed and the variations in volume output.

To test the hypothesis, we conducted a two-stage analysis. We first estimated a probit equation for survival of the alliance after three, seven and ten years, in order to control for a
possible alliance survival bias in the competitive position estimates. We then estimated multivariate least square regressions on three dependent variables: 3-year, 7-year, and 10-year changes in relative competitive positions, taking into account the selection variable (lambda) derived from the survival model. \( dRCP_3, dRCP_7 \) and \( dRCP_{10} \) record the absolute variation in relative market share three, seven and ten years after the alliance was formed.

\[
\begin{align*}
  dRCP_3 &= \frac{|RCP_3 - RCP_0|}{RCP_0} \\
  dRCP_7 &= \frac{|RCP_7 - RCP_0|}{RCP_0} \\
  dRCP_{10} &= \frac{|RCP_{10} - RCP_0|}{RCP_0}
\end{align*}
\]

In these formulas, \( RCP_3, RCP_7 \) and \( RCP_{10} \) are calculated in the same way as \( RCP_0 \), using volume outputs of the partners in the third, seventh and tenth year after the alliance formation date. The variables can be easily interpreted since they correspond to the percent growth or decline in relative market share following formation of the alliance.

We chose the three periods in order to examine short-term and longer-term influences on competitive positions. Specifically, three years is less than the average time it takes in the automobile industry to develop a new model, whereas seven years is more than the average development time, and ten years is more than the maximum commercial life of a given model. Thus, measuring after three years makes it possible to observe changes in relative market share that occur holding constant the partner-firms' product lines: new products introduced during a three year time frame will incorporate only limited new knowledge acquired through the alliance; therefore, new knowledge implemented by each partner during the three year period is more likely to relate to marketing and sales than to technology and new product development. After seven years, in contrast, partners can begin to incorporate skills acquired through the alliance into new products. After ten years, it is likely that product lines will have been substantially renewed and most opportunities for implementing skills acquired in the alliance will have been explored. In addition, as learning is a timely process and a cumulative phenomenon (Cohen and Levinthal, 1990), its competitive impact can be expected to increase over time. Therefore, we expect greater change in relative competitive position after seven years and ten years than after three years.
Results

Table 2 presents the probit selection models for survival to year 3, year 7, and year 10. To address the major selection issue, we modeled the effects of alliance type (link vs. scale) on alliance survival, while adding other factors that might affect survival (the results were robust to adding other independent variables to the selection equation). The results show that survival tendencies of scale and link alliances change over time. Link alliances are more likely than scale alliances to survive to three years, but less likely to survive to seven years. The two types of alliances are equally likely to survive at least ten years. An interpretation of these results is that link alliances have short-term survival advantages because partners need time to undertake the learning opportunities that the alliances present; in contrast, scale alliances may be less likely to survive three years because difficulties in achieving the anticipated economies of scale can lead to early dissolution. By seven years, however, surviving scale alliances have achieved adequate economies of scale and are likely to survive for an entire product life cycle. In link alliances, the firms have obtained the major learning opportunities within the seven years time frame and many link alliances may thus end. Beyond seven years, such as our ten-year horizon, issues other than learning opportunities or scale benefits associated with the scale-link distinction then determine alliance survival. In addition, the results show that EU alliances tend to have short-term (3-year) survival advantages and mid-term (7-year) survival disadvantages, possibly stemming from the more fragmented, and hence less turbulent, nature of the European automobile market. Indeed, the major European automakers are "national champions" that have a high level of control over their domestic market; in addition, government intervention and protectionist policies have traditionally sheltered the European market from global competition. The greater stability of this environment allows for longer initial survival of alliances.

********** Table 2 about here **********

Table 3 presents the estimates of change in relative market share, taking into account the survival selection effect. These results support the hypothesis that link alliances lead to greater changes in relative competitive position, at least in the longer term: link alliances produce more significant changes in relative market share than do scale alliances, both seven and ten years after alliance formation (models 3 and 4). In contrast, three years after alliance formation, no
significant effect of alliance type on changes in relative market share arises, provided that the survivor bias for link alliances is taken into account (model 1). It is interesting to note that the selection variable lambda is weakly significant in the three year model, suggesting that it is necessary to correct for the survivor bias. Indeed, if this selection variable is omitted (model 2), the effect of alliance type is significant, which could lead to an undeserved support of the hypothesis in the three year measure. After seven and ten years, no significant impact of the selection variable arises, so that we do not report models that omit the selection effect (we estimated those models in sensitivity analyses, finding no material differences).

********** Table 3 about here **********

The results in Table 3 reveal interesting influences of several control variables. In cross-continent alliances, the three-year impact of the smaller partner being the entrant is negative and significant, i.e., relative competitive position tends to remain more stable. The seven-year impact however is positive and significant, suggesting that relative competitive position varies extensively. This reversed effect after three and seven years suggests that when the small partner enters the larger partner's home market through the alliance, the learning that takes place cannot be implemented in the short term, but produces stronger changes in relative competitive positions after some time. This suggests that, in such contexts, most of the learning related to technology and new product development skills materializes in relative competitive position only after longer periods of time. When the smaller partner is the host, no significant impact is noted after three years, whereas relative market shares tend to remain highly stable after seven and ten years. This suggests that small partners derive few private benefits from alliances operating in their own home market. In particular, small partners seem unable to implement the technology contributed by their larger partner in a way that significantly modifies the long-term relative competitive position. Conversely, meanwhile, the larger partner does not appear to take advantage of the alliance to substantially expand its presence in the small partner’s home market.

Table 3 also provides results concerning temporal, geographic, and competitive effects. First, alliances formed in more recent years have a stronger short-term competitive impact and a weaker long-term competitive impact than alliances formed earlier. This is consistent with the conventional view that the automobile industry, like many others, has become more turbulent in
recent years. Second, European alliances are relatively stable in their early years (model 1), but
reach average stability by years 7 and 10 (models 3 and 4). Third, the more equal the relative
competitive position at the time of alliance foundation (i.e., the closer the unity the relative
market shares of the partners), the less the market shares change in the short-to-mid term (3 and 7
years, in models 1 and 3). This suggests that equal partners can either protect against partner
learning or, perhaps more likely, learn from each other at similar rates.

**Discussion and conclusion**

Our findings contribute to the understanding of alliance dynamics. We empirically support
the theoretical distinction, suggested in the literature but rarely tested, between scale and link
alliances. We show that the competitive positions of the partners vis-à-vis one another tend to
change more significantly over time in link alliances than in scale alliances. This result suggests
that capability transfers occur to a greater extent in link alliances than in scale alliances. By
establishing the existence of a strong relationship between alliance type and changes in relative
competitive position, this study extends previous arguments concerning the dynamics of scale and
link alliances (Dussauge, Garrette and Mitchell, 2000).

The findings of this study should be interpreted with some care. The fact that two
competitors have formed a link alliance does not, in itself, fully explain the variation in relative
market share we observed. Other strategic factors, such as the pursuit of an aggressive growth and
expansion strategy, which may be linked to the firm's decision to cooperate, are likely to influence
variations in relative market shares. In this perspective, our results can be interpreted as indicating
that link alliances are one of the means firms can use to pursue aggressive market penetration
strategies, while the rationale behind scale alliances is based more on efficiency considerations.
Another limitation of our study is that we offer relatively simple motivations for firms to enter
into either scale or link alliances. Instead, scale economies and skill appropriation objectives may
coexist within the same alliance. One reason for such dual motivations is that the goals of both
partners are not necessarily symmetric. A second reason is that firms sometimes can pursue scale
and skill objectives concurrently. The relative weight of these motivations will then influence the
selected type of alliance. Finally, our interpretations concerning the influence of some of the
control variables are somewhat speculative. Nonetheless, the study complements previous research on strategic alliances and suggests interesting potential generalizations.

The study sheds light on the underlying ambiguity that has made it difficult to gain a clear understanding of strategic alliances set up by competing firms and of their either competitive or anti-competitive impact. Some analysts have argued that alliances formed by rival firms are a means for one of the partners to strengthen its own position, while weakening that of its ally, through capturing skills and valuable resources. Another, opposing, view of alliances between competitors is that they are a modern form of coalition that mutually benefit the partner firms but hurt outside competitors and that, unlike traditional cartels, create value and benefit for consumers (Berg and Friedman, 1978, 1981; Berg, Duncan and Friedman, 1982). What our findings suggest is that alliances between rival firms as a whole are neither coalitions nor Trojan Horses. Instead, alliances fall into two categories. Link alliances, on the one hand, appear to be closer to the Trojan Horse view because of the opportunities for capability appropriation that they provide. Scale alliances, on the other hand, are closer to coalitions because, by increasing economies of scale, they strengthen the group of allied firms relative to other competitors.

Endnotes

1 Mean effects dummies are appropriate when there is no conceptually-motivated base case to compare the other case to. Empirically, the procedure involves three steps. First, define a set of exhaustive and mutually exclusive 0-1 dummy variables, as in the more common approach to dummy variable analysis. Second, determine which case will be omitted from the estimates (in our estimates, we initially omitted “Cross-continent alliance: Smaller partner is host” from the analysis. Third, for cases in which the omitted variable equals 1, reset the values of the other cases to -1, rather than 0 (i.e., in our analysis, set “Smaller partner is entrant” and “Same continent alliance” to -1 when “Smaller partner is host” is 1). One can repeat this procedure with a different omitted variable in order to obtain standard errors for the initially omitted variable. This has the effect of obtaining estimates such that the sum of the coefficients of exhaustive and mutually exclusive mean effects dummy variables equals 0. The conceptual value of this approach is that the statistical test determines whether the effect of a variable differs significantly from the mean of the set of variables, rather than from a single omitted base case variable.

References


Table 1. Descriptive statistics

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Table 2. Probit selection equation for survival to year 3, 7, or 10

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<td>Zone: EU</td>
<td>1.41 0.34 **</td>
<td>-1.25 0.64 **</td>
<td>0.33 0.40</td>
</tr>
<tr>
<td>Founding year (a)</td>
<td>-0.58 0.11 **</td>
<td>-0.21 0.03 **</td>
<td></td>
</tr>
<tr>
<td>Model loglikelihood</td>
<td>-51.1</td>
<td>-18.8</td>
<td>-36.6</td>
</tr>
<tr>
<td>Model loglikelihood ratio (df)</td>
<td>22.9 (3) **</td>
<td>141.6 (4) **</td>
<td>104.6 (4) **</td>
</tr>
<tr>
<td>Cases (Survived to analysis year)</td>
<td>132 (108)</td>
<td>132 (77)</td>
<td>132 (53)</td>
</tr>
</tbody>
</table>

* p<.10, ** p<.05 (one-tailed)
(a) The 3-year model would not converge with the "Founding year" variable
Table 3. OLS estimates of change in relative market share, with selection estimates for survival to measurement year

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>3-year share</td>
<td>3-year share</td>
<td>7-year share</td>
<td>10-year share</td>
</tr>
<tr>
<td></td>
<td>(w/ selection)</td>
<td>(w/o selection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link alliance (hypothesis: +)</td>
<td>-0.07</td>
<td>0.14</td>
<td>0.10</td>
<td>0.07 *</td>
</tr>
<tr>
<td>Cross-continent alliance: Smaller partner is entrant (a)</td>
<td>-0.09</td>
<td>0.05 **</td>
<td>-0.09</td>
<td>0.05 **</td>
</tr>
<tr>
<td>Cross-continent alliance: Smaller partner is host (a)</td>
<td>0.03</td>
<td>0.05</td>
<td>0.04</td>
<td>0.05</td>
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<tr>
<td>Same-continent alliance (a)</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
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<tr>
<td>Founding year</td>
<td>0.007</td>
<td>0.004 **</td>
<td>0.006</td>
<td>0.004 *</td>
</tr>
<tr>
<td>Zone: EU</td>
<td>-0.36</td>
<td>0.21 **</td>
<td>-0.07</td>
<td>0.06</td>
</tr>
<tr>
<td>Relative competitive position when formed</td>
<td>-0.20</td>
<td>0.12 **</td>
<td>-0.10</td>
<td>0.09</td>
</tr>
<tr>
<td>Trucks</td>
<td>0.02</td>
<td>0.06</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Lambda (selection equation)</td>
<td>-0.62</td>
<td>0.43 *</td>
<td>-0.18</td>
<td>0.18</td>
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<tr>
<td>Intercept</td>
<td>0.10</td>
<td>0.42</td>
<td>-0.23</td>
<td>0.36</td>
</tr>
<tr>
<td>R-square</td>
<td>0.13</td>
<td>0.11</td>
<td>0.26</td>
<td>0.33</td>
</tr>
<tr>
<td>Cases</td>
<td>108</td>
<td>108</td>
<td>77</td>
<td>53</td>
</tr>
</tbody>
</table>

* p<.10, ** p<.05 (one-tailed)
(a) Mean effects dummies (i.e., the coefficients sum to zero)