

**Do Pre-Acquisition Alliances Help in Post-Acquisition Coordination: An
Experimental Approach***

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Do Pre-Acquisition Alliances Help in Post-Acquisition Coordination: An Experimental Approach

Abstract

Previous research suggests that acquisitions preceded by alliances between acquired and acquiring firms generate superior coordination relative to outright acquisitions. To address research gaps related to both the underlying theoretical drivers and empirical evidence on the issue, we use an experimental methodology to investigate this question. We find that when selection effects are controlled for, prior resource interdependence in pre-acquisition alliances may actually have a detrimental effect on the degree of post-acquisition coordination, due to the development and transference of scripts from the pre-acquisition stage that may be inappropriate post-acquisition. Coordination can, however, be improved by communication and prior social contact during the alliance setting, enabling the overcoming of scripts that are no longer appropriate.

Is it good to ally with another firm before acquiring it? Recent research in strategy has seen a surge of studies on sequential governance modes made by firms in pursuit of new capabilities or markets. In addition to studies that suggest a link between alliance and acquisition strategies (McGahan and Villalonga, 2003, 2004; Zollo and Reuer, 2003), several studies highlight alliances between firms that are followed by an acquisition of one partner by another¹. Further, when deciding between making, buying or allying, organizations have to choose appropriate governance modes, with trust (Gulati, 1995; Gulati and Nickerson, 2003) being an important determining factor. The transaction costs perspective has described alliances as an “intermediate” form of governance, with characteristics of both markets and hierarchies. (Williamson, 1985; Parkhe, 1993), and alliances may be viewed as a potential first step in moving from market-based changes to hierarchical governance.

While studies on such sequential strategies have provided us with some understanding of the phenomena, significant research gaps still exist in both theory and empirical results. First, the empirical evidence on the issue is scant, and inconclusive due to endogeneity and selection problems. In particular, it is difficult using field data to tease apart the effect of the underlying mechanisms related to alliance activity from the selection issues related to unobserved heterogeneity of the partners who seek to ally with each other, or proceed to the post-alliance acquisition stage. Second, the existing literature can provide several explanations for the underlying theoretical drivers for the expected gains or losses from following an acquisition-after-alliance strategy e.g., social capital (Gulati, 1995), learning (Argote, 1999), and routines (Zollo, Reuer and Singh, 2002) among others. We currently lack an understanding of the relative weight of each of these causal mechanisms, and the degree to which they explain potential value

¹ See for instance, Reich and Mankin, 1984; Doz, Hamel and Prahalad, 1986; Haspeslagh and Jemison, 1991; Kogut, 1991; Balakrishnan and Koza, 1993; Bleeke and Ernst, 1995; Chang, 1995; Hagedoorn and Sadowski, 1999; Chang and Rosenzweig, 2001)

creation. We address these research gaps by developing theoretically-motivated hypotheses and employing experimental methodology to control for selection and isolating the effect of these theoretical drivers.

Relying on existing literature, we develop hypotheses related to the two causal mechanisms that may be at play in the context of pre-acquisition alliances: previous resource interdependence and previous social contact between firms. In terms of prior resource interdependence, learning-by-doing arguments suggest positive effects of pre-acquisition alliances on acquisition coordination (Arrow, 1962; Argote, 1999). On the other hand, if the routines formed in the alliance stage are inappropriate for the post-acquisition stage, yet sticky (Nelson and Winter, 1982; Zollo, Reuer and Singh, 2002), prior resource interdependence could have a negative effect on post-acquisition coordination. In particular, routines that may develop in the alliance phase among partners as they compete for appropriating value (Hamel, 1991; Das and Teng, 2000), if persistent, can hamper post-acquisition coordination.

The effect of prior social contact is also very important in such settings (Gulati, 1995; Marks and Mirvis, 1998). Previous social contact achieved through exposure and communication can help align goals and facilitate the development of trust and empathy (Allport, 1954; Gulati, 1995; Brewer and Brown, 1998). Thus, the effect of prior social contact is hypothesized to be always positive in enabling post-acquisition coordination. Further, prior social contact may have an additional moderating role in alleviating the potential transfer of negative routines, generating an interaction effect.

In order to test these alternative mechanisms, we adopt an experimental methodology rather than using empirical data for several reasons. First, since our focus in this study is on *causal* mechanisms, we need to explicitly control for selection effects and potential endogeneity. Additionally, competing causes of possible gains from pre-acquisition alliances (prior resource interdependence and prior social contact), while distinct theoretically, are often confounded in the field. The laboratory experimental

setting allows for the separation of the competing causes (theoretical drivers) in a manner not possible with field data, and thus permits much cleaner measures of the independent variables. Similarly, performance and outcome data from the field are typically available only at the aggregate level (e.g. stock returns of acquired or acquiring firms) and may not reflect accurate changes in valuations as a result of specific approaches in undertaking acquisitions. More importantly, it is difficult to tease out what information the market is responding to, and what has already been factored in. In studies of sequential strategies over time, this is a key limitation. While surveys and interviews aimed at addressing these issues yield important insights, the responses may suffer from recollection, attribution and post-construction biases. The experimental methodology enables an explicit measurement of post-acquisition coordination and thus we obtain cleaner measures of our dependent variable as well. Consequently, while cognizant of the limitations of experimental methodology (as discussed in greater detail in the empirical section of the paper), we believe that it is an important complement to existing studies, and appropriate for our purposes. As Schweiger and Goulet (2000) suggest for acquisition research: "Such studies...provide us with a better understanding of causality...with regard to the integration process."

THEORY AND HYPOTHESES

Post-acquisition Coordination

Acquisition performance is determined by many factors: the underlying reasons for the strategy, the capabilities of the firms and their synergies, the price paid for target firm, and the post-acquisition integration of the firms (Haspeslagh and Jemison, 1991). In this study we focus on post-acquisition integration or coordination, given prior research highlighting its importance (Nahavandi and Malekzadeh, 1988; Haspeslagh and Jemison, 1991; Marks and Mirvis, 1998; Lubatkin et al, 1998, Schweiger and Goulet, 2000) and since it is the most likely variable to be affected by a pre-acquisition alliance.

Post-acquisition coordination between acquired and existing divisions is an important issue, with conceptual as well as practical significance. Conceptually, this phenomenon represents a natural experiment in dissolution of firm boundaries. When coordination is 'complete', it implies that two previously autonomous firms now behave as a single economic and social entity, thus, having removed their inter-firm boundary. It is thus a good context to provide insights into the theory of the firm. In terms of practical significance, poor coordination has been identified as a frequent culprit behind poor acquisition performance (e.g., Schweiger and Walsh, 1990). While firms with successful integration can reap benefits of M&A transactions, other firms may suffer from managerial turnover, poor decision making, and internal feuds, all leading to financial losses. A recent survey of Fortune 500 CEOs (Schmidt, 1999) found that four of the top ten reasons for merger failure were related to post-M&A integration and coordination.

We focus on the nature of pre-acquisition interaction between firms and its effect on post-acquisition coordination. We define coordination in terms of the resource allocation decisions made by the merged firm. The acquired and acquiring firms are said to have achieved coordination if and when their resource allocation decisions lead to the jointly optimal use of their resources and enable reaping of synergistic benefits.

Potential Effects of Pre-Acquisition Alliances on Post-Acquisition Coordination

Previous research suggests that post-acquisition coordination may be enhanced by the existence of pre-acquisition alliance activity (Reich and Mankin, 1984; Doz, Hamel and Prahalad, 1986; Haspeslagh and Jemison, 1991; Bleeke and Ernst, 1995; Hagedoorn and Sadowski, 1999). Our objectives are to analyze the effects of pre-acquisition alliance on post-acquisition coordination and to examine underlying causes that are related to the alliance experience, while controlling for selection effects.

Pre-acquisition alliances may serve as an important screening mechanism for potential targets, as is argued in the real options and related literatures (Kogut, 1991; Adner and Levinthal, 2004). If only a 'selected' group of alliances lead to acquisitions,

one may observe a positive relationship between sequential strategies and performance without the existence of a causal link between them. Aside from these selection processes, however, there may exist distinct developmental processes that aid in solving the post-acquisition coordination problem. We discriminate between two distinct and orthogonal causal linkages from pre-acquisition alliances to post-acquisition coordination: effects of prior resource dependence and effects of prior social contact. We discuss each of these potential effects in turn.

Prior Resource Interdependence: Both alliances and acquisitions provide firms the opportunity to synergistically combine their resources (Teece, 1986; Singh and Montgomery, 1987; Parkhe, 1991; Harrison et al, 1991). These combinations are difficult to achieve through market mechanisms or internal development, and can potentially lead to substantial value creation. Thus, there is interdependence between the firms involved in such combinations in both the alliance and acquisition modes, though it may be managed differently under these two governance modes. Under both the modes, firms manage their resource interdependence by attempting coordination that enables them to obtain synergies. For example, firms in an alliance or divisions of the merged firm need to decide between allocating resources to the combined activities (which benefit the alliance or firm as a whole), or to individual activities (which help their own bottom line). When a firm is acquired by its alliance partner, the firms already have some experience in such coordination in managing this interdependence. In this section, we use economics- and psychology-based approaches to predict whether this previous experience should help or hurt post-acquisition coordination.

Positive Effects of Prior Resource Interdependence: It has been shown that firms often learn with experience in a wide variety of settings and activities (Arrow, 1962; Argote, 1999). This learning-by-doing leads to identification of successful heuristics and greater efficiency in conducting operations. Anand and Khanna (2000) argue that such learning is relevant in the context of inter-firm interactions. In this perspective, post-

acquisition coordination is facilitated by the opportunity that the two firms have had to learn about how best to use each other's resources and obtain potential value-creating combinations in the alliance phase. Therefore, the alliance provides an opportunity to discover the best coordination processes between the resources, analogous to what Pisano (1994) refers to as "learning before doing."

Evolutionary theory (Cyert and March, 1963; Nelson and Winter, 1982) posits that firms often undertake actions without comprehensive analysis and judgments, but rather as 'routines.' Such organizational routines consist of institutionalized patterns of repeated interactions that are undertaken in the absence of calculus and rationale. It has been argued that firms interacting through alliances also develop inter-organizational routines (Zollo et al, 2002). These routines can potentially enhance the performance of future interactions between these partners, by making the coordination outcomes predictable and efficient. Literature on positive transfer effect in psychology also emphasizes that participants well versed in a similar prior task are able to outperform participants who do not have this prior exposure in related tasks (Gick and Holyoak, 1987; Cohen and Bacdayan, 1994). Thus, this perspective provides a causal rationale for a positive effect of alliances on later acquisitions.

H1a: Prior resource interdependence between the acquiring and acquired firms will be positively related to post-acquisition coordination.

We note that the logic underlying the above hypothesis could be also used to hypothesize a simple learning effect within the post-acquisition phase, i.e., post-acquisition coordination will improve with time. Since this is not directly related to our research question on pre-acquisition alliances, we do not state this hypothesis explicitly, though we will be able to test for any improvement in coordination over time.

Negative Effects of Prior Resource Interdependence: Are there any disadvantages to pre-acquisition interactions? The previous section has argued that interaction among decision makers from firms will help post-acquisition coordination.

Several strands of thinking from evolutionary theory and psychology suggest that there may also be a dark side to these previous interactions.

While interaction between firms in an alliance can facilitate the development of coordination routines, these routines may not be appropriate for the post-acquisition phase. Alliances are characterized by several seemingly contradictory goals along the dimensions of cooperation-competition, efficiency-equity, rigidity-flexibility and short term-long term orientation (Hamel, 1991; Ring and Van de Ven, 1994; Anand and Khanna, 2000; Das and Teng, 2000). In game-theoretic language, alliances represent mixed-motive tasks. Similarly, the coordination routines in alliances respond to issues related to the assumption of a fixed pie on the part of the firms, their reluctance to part with important information, and their distinct interests (Bazerman, Moore and Gillespie, 1999). Therefore, alliances are an inter-firm arrangement that contain shades of cooperation and well as competition (Khanna, Gulati and Nohria, 1998). While firms can cooperate in order to generate value, they may compete in order to appropriate this value.

These elements of competition and opportunism in the routinized interactions between alliance partners are not necessarily present, or at least are substantially lower, in strictly intra-firm settings, representing joint-maximization problems. But once these routines are set up between alliance partners, they may continue to be present (owing to their stickiness) even after the acquisition has dissolved the inter-firm boundaries and the alliance partner has been internalized.

Further, the literature in psychology on 'transfer effects' posits that learning from one problem may often be applied to other problems that are superficially similar but substantively distinct (Gick and Holyoak, 1987; Cohen and Bacdayan, 1994). Halebian and Finkelstein (1999) showed that firms can over-generalize the applicability of lessons learnt in early experiences in acquisitions. Similarly, the 'lessons' learnt and routines in the alliance stage can be mistakenly applied to the post-acquisition stage, resulting in negative transfer. All these arguments suggest that pre-acquisitions alliances may have a

negative impact on post-acquisition coordination due to stickiness, inertia and consistency of coordination routines over time. This leads to a competing hypothesis:

H1b: Prior resource interdependence between the acquiring and acquired firms will be negatively related to post-acquisition coordination.

The above contrasting hypotheses represent the positions that different perspectives have provided on the effect of pre-acquisition resource interdependence. Depending on the extent of similarity in the coordination in alliance and post-acquisition stages, one of these effects will dominate over the other; an empirical question which we address in our experiment. We now turn to another dimension of pre-acquisition interactions; social contact.

Prior Social Contact: Resource interdependence captures the prior interaction that firms might have had in conducting economic transactions with each other in order to achieve synergistic outcomes. Orthogonal to such economic exchanges between firms is whether they have had social interaction with each other (March and Simon, 1958; Arrow, 1974; Gulati, 1995). Such prior social contact can have important independent effects on post-acquisition behavior and outcomes.

Previous research reveals that alliances can provide a context for achieving social contact. For example, pre-acquisition alliances represent an opportunity for the firms to work together, communicate more openly than otherwise possible, and develop a nuanced understanding of each other's cultures, values and mindsets (Marks and Mirvis, 1998). When the two teams of managers belonging to the respective firms are aware of each other's orientation and positions on issues, coordination is easier to achieve due to timely conflict resolution and a close correspondence between expected and actual behaviors. The articulation of common goals and sharing of positions on issues helps in identifying and pursuing the best course. It also reduces the possibility of surprises by helping to form more accurate expectations. The role of communication between acquiring and acquired firms in achieving post-acquisition coordination has been

particularly noted (Shanley, 1988; Napier, 1989; Schweiger and DeNisi, 1991; Larsson and Finkelstein, 1999).

Why do pre-acquisition social contact and communication promote coordination? The 'contact hypothesis' in social psychology helps explain how contact reduces tension between social groups (Allport, 1954; Pettigrew, 1971; Brewer and Brown, 1998). This long-lived and well supported idea suggests that bringing groups together into closer social proximity promotes social harmony under certain conditions. When members of these groups depend on each other for the development of a jointly desired objective, they have reasons to develop friendlier relations with each other, so the effect of this contact is further enhanced. We note that this condition is especially pertinent in the context of a post-acquisition combination. Laboratory studies have consistently supported the impact of discussion on the development of inter-group cooperation and reduction in in-group bias (Brown, 1988). Communication, contact and interaction among groups also promote learning and cooperative seeking of common objectives (Johnson, Johnson and Maruyama, 1984).

The contact hypothesis is also consistent with the principles of cognitive dissonance theory (Festinger, 1957). Dissonance theory predicts that when group members with competitive attitudes towards other groups find themselves in positive social contact with one another, they are likely to change their attitudes to be more cooperative and friendly. The contact hypothesis is also consistent with the effects of acquiring new and more accurate information about other groups (Pettigrew, 1971). Such information can help reject negative impressions held about other groups.

Further, the predictions of the contact hypothesis are reinforced by theories of inter-firm trust and social capital. Inter-firm trust can develop in this pre-acquisition interaction and play an important part in determining the level of inter-firm coordination (Williamson, 1975; Barney and Hansen, 1994; Zaheer, McEvily and Perone, 1998). Mutual trust helps mitigate opportunism and suspicion while promoting coordination in

pursuing synergistic outcomes. The sociologically oriented works of Goffman (1959) and Simmel (1955) are also consistent with the association between social contact achieved through inter-group communication and achievement of inter-group cooperative goals. Similar results have been found in economics; as social distance decreases cooperative and coordination behavior increases (Hoffman et al. 1996).

Thus, we hypothesize that prior social contact between transacting parties will have a positive effect over and above the effect of transactional experience captured through prior resource interdependence. Therefore, we propose the following hypotheses:

H2: Pre-acquisition social contact will be associated with better post-acquisition coordination.

Interaction Effects: It should be noted that prior interactions between firms solely on the basis of resource interdependence may not be sufficient for the development of social contact. For example, a recent study (Malhotra and Murnighan, 2002) showed that parties interacting under contracts can fail to develop social relations and trust. Further, the literature on the contact hypothesis suggests that the competitive nature of interaction based on resource interdependence does not lead to a reduction in inter-group prejudice (Allport, 1954; Sherif, 1966, Brown, 1988). The resource interdependence based interaction also lacks “acquaintance potential” (Cook, 1978: p 97), a necessary condition for the development of meaningful positive relations between groups. On the other hand, meaningful social contact is fostered when there is direct, frequent and close communication between groups, which is what we implement in our experiment.

We thus believe that we have identified two distinct dimensions of prior alliance experience: resource interdependence and social contact. Are the effects of these two dimensions additive or is there an interaction effect between the two? In this section we argue that there is indeed an interaction between these two dimensions. Specifically, pre-acquisition social contact can help overcome any inappropriate routine development or

further enhance the effect of the positive routines developed due to the prior resource interdependence.

We had argued earlier that inter-firm alliances contain a competitive element that is less salient in intra-firm exchanges. Due to this competitive element, we may observe the development of attitudes, routines and patterns of behavior that are not compatible with cooperative seeking of collective goals. The replacement of these somewhat competitive routines with more cooperative ones may be difficult and costly to achieve. Prior social contact can serve as a mechanism that may help with this. Otherwise, the stickiness of competitive routines may lead to negative consequences of pre-acquisition alliances on post-acquisition coordination.

When firms are also exposed to each other through direct social contact, it offers them the opportunity to share information and readjust their behavior and routines post-acquisition towards more cooperation. The greater is the negative effect of previous competition based routines and behaviors, the greater is the opportunity afforded by direct communication to mitigate this problem. Social contact can facilitate the shared appreciation of the change in context from alliance to intra-firm interaction, recognize and share win-win opportunities, harmonize the collective actions and lay ground for promotion of trust, all of which promote post-acquisition coordination. Therefore, we propose:

H3: If there is a negative effect of pre-acquisition resource interdependence on post-acquisition coordination, it will be reduced in the presence of pre-acquisition social contact.

EMPIRICAL ANALYSIS

Experiments as a Research Method

Since the above hypotheses address the separate effects of resource interdependence and social contact prior to the acquisition, our empirical methodology needs to cleanly isolate these individual effects, while controlling for selection effects

and also obtaining clear dependent measures of post-acquisition coordination. We rely on experiments to do so, and now turn to describing their appropriateness for our setting, followed by details regarding the procedure used in our study.

Experiments have been used for many generations in psychology, sociology, and management and, more recently, economics to distinguish between competing theories, testbed possible policies and explore anomalies in the field (Anand, Croson and Agarwal, 2003 provide reviews and methodological discussion). In management, experiments have been used to investigate issues as diverse as agency contracts (e.g. Tosi et al. 1997, Parks and Conlon 1995, Conlon and Parks 1990), compensation and allocation decisions (e.g. Freedman 1978, London and Oldham 1977, Fossum 1979) and negotiating behavior (e.g. Tenbrunsel 1998, Neale and Bazerman 1985, Bhappu, Griffith and Northcraft 1997; Thomas-Hunt, Ogden and Neale 2003). To the best of our knowledge, we are the first to use experiments to investigate alliances and acquisitions.

The use of experimental methodology is particularly valuable in situations where competing theories offer alternative explanations for an observed effect. Strategy researchers often assimilate theories across different source disciplines to develop new theories that integrate these multiple perspectives. Testing competing and integrative theories require data that control for many factors, and experimental methodology is especially well suited for such endeavors. In a laboratory experiment, a theory can be tested directly by controlling for extraneous factors, much as a physics experiment might control air pressure in measuring an atomic reaction. In this setting, our use of experiments enables us to control for selection effects while investigating the developmental processes as potential causes of the observed relationship between pre-acquisition alliance activity and post-acquisition coordination. Such endogeneity is not easy to control with the use of field data (Hamilton and Nickerson, 2003). In our experimental setting, partners are randomly assigned to each other, and importantly, there is no choice about the acquisition undertaking. The alliance partners for all groups, rather

than a selection of groups, are acquired. This enables us to focus on the decisions in the alliance stage as a causal driver of post-acquisition coordination.

A second advantage of the experimental methodology is that it allows us to separate alternate theories and predictions that might not otherwise be separable (or even observed) with naturally occurring data. In our setting, this enables us to untangle the confound between resource interdependence and social contact that is present in the field and tease apart the competing causal explanations for post-acquisition coordination. Thus, we can obtain clean measures of our independent variables. Similarly, the use of experiments permits a clear measure of our dependent variable of interest: post-acquisition coordination, without relying on noisy or possibly biased data like stock market returns. Finally, since experiments are replicable, other researchers can reproduce the experiment and verify the findings independently.

While experiments provide the above advantages, they have limitations as well.² These include primarily an abstraction from reality, and the reliance on subjects whose incentives may not reflect those of real-world actors. We accommodate these limitations by ensuring that the relevant factors from the field are captured in the experimental design. In particular, we ensure that the experimental participants' incentives match as closely as possible the incentives of the real-world actors. Similarly, the task assigned to the participants capture important aspects of post-integration coordination, while retaining the simplicity needed to provide a clean outcome measure for analysis. Finally, we rely on subjects that have managerial experience to reflect real world decision makers.

²Critics of experiments argue that since the laboratory situation is necessarily abstract and unrealistic (in that it contains fewer considerations, dimensions and confounds than the real-world situation), no results from the lab can be used to predict behavior in the world. We disagree. Zelditch (1961) discusses this issue in depth, in his amusingly-titled article "Can You Really Study an Army in the Laboratory?" His argument acknowledges that the laboratory setting is different than any naturally-occurring, real-world setting one is likely to find. However, he argues, the bridge between the lab and the real world is the theory being developed to explain real-world behavior and being tested in the laboratory design. Theories are developed to predict and explain real-world observations. These theories should also predict and explain behavior in laboratory settings. If they do not, it is not the fault of the experiment, but a lack in the theory. This argument is also made by Plott (1991) in the context of market experiments. He argues that the theory of market equilibrium, if true, should predict behavior in a laboratory market just as it should predict behavior on the London Stock Exchange. In fact, it should perform *better* in the lab, since confounding factors not incorporated in the theory are absent in that setting. If the theory doesn't predict in the clean, uncomplicated environment of the lab, how likely is it to predict in the cluttered, confounded environment of the field?

Participants: Our experiment involved 213 participants, all of whom were MBA students at a major business school and had prior work experience. Additionally, some of the experiments were conducted using subjects from the Executive MBA classes—these subjects represent people with current managerial experience in a variety of corporate settings. There was no significant difference in the results across the regular MBA and executive MBA pool.

In order to induce participants to take their tasks seriously, we used the *induced valuation* methodology of experimental economics (Smith, 1982). This involves paying participants in cash based on the profits they earn in the experiments. The important dimension of this payment is that it is responsive to the decisions that participants (and their counterparts) make in the exercise. We designed the incentives to reflect realistic pre- and post-integration payoffs of managers in the field, and participants were (privately) paid those incentives in cash at the end of the experiment. When the experiment ended, participants were debriefed and dismissed. The experiment involved no deception, thus contamination effects are not a major concern. Nonetheless, participants were asked not to discuss the experiment with others. The data was collected in three sessions scheduled over three days.

Design: Participants were told that they would play the role of managers who could allocate resources toward enhancing their own division's production, or joint production (combined activities) with other divisions/firms (which could be conceptualized as joint production, R&D, technology transfer or marketing). In our experimental setting, there are two divisions of a single firm that interact with each other. The two divisions share profits. There is also a second firm who is a potential target of acquisition and who earns its own (independent) profits. When the experiment begins, the second firm is involved (or not involved) in an alliance with the two divisions of the first firm. After a few initial quarters, the second firm is acquired and becomes a third division. This third division's profits are now also shared among the other divisions.

Our experimental design manipulates pre-acquisition status to test if post-acquisition coordination is enhanced by the existence of any pre-acquisition alliance activity. We also distinguish between the competing causes of hypothesized differences: (resource interdependence and social contact). Our 2x2 design manipulates the pre-acquisition relationship between the two divisions of the first firm and the second (independent) firm. The two dimensions of the design are Prior Resource Interdependence (Yes, No) and Prior Social Contact (Yes, No)

Insert figure 1 here

The four cells of matrix represented in Figure 1 represent the combinations of the two dimensions. The diagonal cells represent situations most often observed in the real world. In the first cell, the *Complete Alliance*, the two divisions of the first firm and the second firm interact completely with each other, i.e. they have both prior resource interdependence and prior social contact before the acquisition occurs. The diagonally-opposite case represents that of an *Outright Acquisition*, in which the target firm has had neither prior resource interdependence nor prior social contact with the two divisions of the first firm. The non-diagonal cells represent different types of interactions, those not typically found in the field. These treatments enable us to distinguish between the competing reasons suggested for outcome differences. In the *Silent Treatment* cell, the two divisions and the second firm have prior resource interdependence, however only the two divisions of the firm engage in prior social contact (via communication). In the *Discussion Only* cell, the opposite is true; while the second firm can benefit from prior social contact, there is no prior resource interdependence.

Post-acquisition, the experience is the same for all participants in all four treatments. The three divisions have the opportunity to allocate resources toward (and reap benefits from) combined activities. The success achieved in this post-acquisition combined activity is used to gauge performance. Note that all groups experience an

acquisition, even those who have had unsuccessful pre-acquisition alliances. This eliminates the selection endogeneity present in field data.

Procedure: Participants are randomly assigned to treatment and role within the treatment. When they arrive at the lab, they are shown to a computer terminal, they read and sign a consent form, and are given a copy of role-specific instructions to read. Once everyone has arrived, a composite version of the instructions is read aloud (see Technical Appendix for the composite version). After the instructions, but before the experiment begins, participants complete a quiz to ensure that they understand the decisions they are asked to make, and the resulting payoffs. The entire experiment is computerized, run via the web using a Java application; participants input their allocation decisions, and are given feedback entirely electronically. After the experiment ends, participants complete an exit questionnaire describing their experiences.

The main task facing the managers is the allocation of the resources they control to either individual or combined production activities. The participants have a choice of allocating any amount (from zero to all) of the resources they control towards production in their own division/firm, which would generate profits privately to them. Alternately, they can allocate these resources toward combined activities, described as firm (or alliance) production. To capture synergistic gains from these combined activities, their success requires a minimum amount of resources. If this threshold of resources are allocated toward combined activities, then the project is successful and each party earns additional profit (note that this profit is shared when the parties are part of the same firm). If the resources allocated toward combined activities fail to meet the threshold level, the project fails and those resources are lost. The design of the experiment ensures that the threshold requires more resources than are controlled by any one manager, thus adhering to the principle that successful combined activities require the participation of multiple divisions and/or firms.

The particular parameters are chosen to induce a set of efficient and stable outcomes (equilibria) in which combined activities are successful. First, the resource allocation is efficient; the sum of the profits which result from successful combined activities is larger than the cost of foregone profits from private production. Second, each individual's bonus is sufficiently large so as to induce allocation of resources toward the combined activities, *given that they believe that others will do so as well*. Thus this setting translates into an Assurance Game (Sen 1967; also called a stag-hunt game), where individuals want to cooperate if and only if they expect others to cooperate. Note that this task differs from the traditional prisoners' dilemma or social dilemma in which each firm has an incentive to defect (retain resources for private production) regardless of the allocation of the other firms. Instead, this is a setting of coordination; if others are contributing then the target firm would like to contribute as well, while if others are not then they do not. We believe that this coordination setting appropriately captures the coordination involved in post-acquisition integration (and in pre-acquisition alliances).

This game has been previously studied experimentally in different contexts, including Marks and Croson (1998), Croson and Marks (1998); however we are the first to investigate behavior in the alliance / acquisition framework. Technical Appendix 2 describes the parameters used for the treatments, both pre- and post-acquisition and the resulting theoretical predictions.

Participants engage in multiple rounds of interaction (described as financial quarters). Participants are not told the exact number of quarters that they will play; instead they are informed that after each quarter there is an 80% chance that the game will progress to the next quarter (and a 20% chance that it will end). This implements an infinite game in the laboratory (with a discount rate of 0.8), avoiding endgame effects and implementing the unknown-endpoint feature of the real-world alliance and acquisition setting. The continuation probabilities are indeed as described; no deception is used in this experiment.

The first manipulation (prior resource interdependence) is implemented based on whether the second firm is engaged in an alliance in the pre-acquisition quarters. During the first three quarters, either the two divisions of the first firm only (in the cells where there is no prior resource interdependence) or the two divisions and the outside firm (in the cells where there is prior resource interdependence) engage in the resource allocation decision. After the third quarter, participants are told that the first firm has acquired the second firm. New parameters are introduced (as described in Technical Appendix 2) to represent payoffs consistent with the post-acquisition setting; in particular the second firm now represents a division that engages in profit sharing with the other two divisions. However, the task of resource allocation remains the same.

The second manipulation (prior social contact) is implemented via a chat box. In the treatments without prior social contact, only the two divisions within the firm can discuss the situation and their decisions. This is the equivalent of inter-office communication. In the treatments with prior social contact, the second firm can observe and participate in these discussions.

Variable Definitions

Dependent Variables: We measure post-acquisition coordination in a number of ways. These variables are related to each other, and include both dichotomous and continuous measures in a post-acquisition quarter. The first measure—*Success*—is based on whether the collective resource allocations of the divisions is greater than or equal to the threshold amount required for synergistic profits from combined activities. It is coded as 1 if the threshold value is met in the particular quarter, and is 0 otherwise. The second measure—*Profits*—is computed as the sum of the profits received by all three divisions. The combined profits are higher if the combined activity was a success, since each division then receives profits additional to those accrued due to individual production. But if too many resources are allocated toward the combined activity, combined profits will decrease as well. Thus there is an interior optimum on which the divisions must

coordinate. The third measure—*Total resources*—represents the sum of the three divisional resource allocations to the combined activity. The fourth measure—*Absolute distance from threshold*—is calculated as the absolute value of the difference between the threshold and the total resources allocated. Since there are no additional profits from allocating more than the threshold value, this measure captures the loss to total productivity due to either an under or over-investment in combined activities.

Explanatory Variables: The two main explanatory variables of interest are *Prior resource interdependence*—which takes the value of 1 if the treatment allows for the second firm to make decisions in the pre-acquisition stage (resource interdependence), and *Prior social contact*—which takes the value of 1 if the treatment allows for the second firm to engage in communication in the pre-acquisition stage (social contact). Among the controls, we include *Quarter*—which denotes the quarter in which the decision is being made. Since the data are the result of repeated interactions, we control for group-specific effects in our analysis. Finally, in additional analysis in the treatments that included prior resource interdependence, we include the variable *Prior Success*, which takes the value of 1 if the threshold value was met in the pre-acquisition stage.

RESULTS

We present summary statistics regarding the average success rates in the first and all quarters in Table 1. In the first quarter after acquisition, the success rates for a *complete alliance* are 60 percent, and across all quarters, the success rates increase to 83 percent. In contrast, while *outright acquisitions* start off with a 50 percent success rate in the first quarter, the success rates across all quarters ends up being similar to the complete alliances at 84 percent. Among the off-diagonal cells, the *silent treatment* cell (prior resource interdependence without prior social contact) starts off at the same success rate as outright acquisitions, but the success rates across all quarters is only 70 percent, below that of outright acquisitions. In the *discussion only* treatment, the success rates in the first

quarter is the highest at 75 percent, and while the difference attenuates, remains the highest across all quarters at 88 percent.

Table 1 about here

We now turn to the formal analysis of the various measures of coordination in Table 2. Controlling for selection effects, we find that prior resource interdependence has an adverse effect on all four measures of post-acquisition coordination. The probability of success is significantly lower in the presence of prior resource interdependence, as are the total earnings and total resource allocations. Further, the absolute deviation from the threshold value is higher, implying a loss in productivity. All these coefficients are significant at the 5 percent level or better. Thus, we find support for H1b, which posited negative transfer effects from prior resource interdependence experience in an alliance setting to the acquisition setting.

On the other hand, prior social contact has a beneficial impact on all four measures of coordination. The probability of success, total earnings and total resource allocations are all higher in the presence of prior social contact, while the absolute deviation from the threshold value is lower; all coefficients are once again significant at the 5 percent level or better. This provides support for H2, which posited that prior social contact would improve post-acquisition coordination.

Table 2 about here

To test hypothesis 3, we conduct a sub-group analysis for the effect of prior resource interdependence in the presence or absence of prior social contact.³ As can be seen from Table 3, the adverse effects of prior resource interdependence on all the measures of performance are significant *only* in the absence of prior social contact. Thus, we find support for Hypothesis 3, which posited that prior social contact will reduce or

³ The results of the sub-group analysis are consistent with a model that includes an interaction term of prior resource interdependence and prior social contact. We include the sub-group analysis results here since the results are easier to interpret, and the sub-group analysis, unlike the interaction model, requires no assumption of equality of the error variance across the different treatments (Gujarati, 1988).

eliminate negative effects of prior resource interdependence. This result suggests that the negative routines which develop in prior resource interdependence situations can be mitigated through the use of communication.

Table 3 about here

Finally, it is worth noting that both in Table 2 and Table 3, repeated interactions in the post-acquisition setting have a beneficial effect on coordination. Consistent with the summary statistics in Table 1, the effect of Quarter is positive and significant for the first three dependent variables, and negative and significant for the last variable.

DISCUSSION AND CONCLUSIONS

This research project addresses a deceptively simple set of questions: does pre-acquisition alliance activity *cause* superior post-acquisition coordination, and if so, why? Existing research provides important clues, yet does not answer this question completely. Theoretically, this is because many alternative mechanisms have been proposed (Reich and Mankin, 1984; Doz, Hamel and Prahalad, 1986; Haspeslagh and Jemison, 1991; Kogut, 1991; Balakrishnan and Koza, 1993; Bleeke and Ernst, 1995; Hagedoorn and Sadowski, 1999; Chang and Rosenzweig, 2001), and empirical evidence is unable to distinguish between competing causes of coordination differences that are observed. Further, the empirical data examined suffer from selection effects; only successful alliances are transformed into acquisitions. In this paper, we develop theoretical hypotheses that integrate the alternative mechanisms, and use the experimental approach to provide some clarity in an otherwise complex and inter-related set of explanations.

Controlling for selection effects, we find that prior resource interdependence in an alliance setting reduces rather than enhances post-acquisition coordination. The principal explanation of this counterintuitive result relies on the interactive routines between the managers that are developed in the mixed-motive environment of an alliance. Our results indicate that even in simple task settings, it is more difficult to replace routines once

formed than it is to create appropriate new routines in cases where there has been no previous resource interdependence. The effect of prior social contact, however, is unambiguously positive, as predicted by existing theory (Gulati, 1995). Further, we find support for the additional benefits of prior social contact in mitigating the negative transfer effects due to prior resource interdependence. When managers communicate before the acquisition, they have the opportunity to share individual positions and can develop a mechanism for understanding each others' positions. This leads to greater post-acquisition coordination. As expected, coordination performance also improves with experience.

These results complement those of previous studies and help to refine previous findings. Previous research indicates that inter-firm learning may help in coordination, but that competitive or confrontational routines might hurt in alliances (Das and Teng, 2000; Zollo et al, 2002). Further, some previous work (Cohen and Bacdayan, 1994; Haleblian and Finkelstein, 1999) has noted the problems of applying an inappropriate past routine to new situations, though in a different context than ours. Our research adds to these findings by showing that confrontational routines that develop in an alliance setting may have adverse transfer effects when the alliance partners decide to dissolve the inter-organizational boundaries. To further investigate this question in some post-hoc analysis, we focused on the *complete alliance* treatment, and explored the variation in performance among those groups that were successful in coordinating during the alliance and those that were not. These results are reported in Table 4. Prior success in the alliance setting results in a uniformly beneficial effect on post-acquisition coordination; thus providing support for the notion that successful alliance partners are more likely to have a successful post-acquisition integration. Thus the selection that is likely to occur in the field (successful alliances being targeted for acquisition) appears to be profit-maximizing.

Table 4 about here

As mentioned earlier, post M&A integration may be seen as a natural experiment in the dissolution of firm boundaries. Therefore, it can be an important context to test issues related to theory of the firm. For example, what kinds of decisions are made differently by divisions within a firm versus autonomous divisions? What kinds of factors cause the inter-firm boundaries to dissolve effectively? Our research reveals the complementary role of "soft" issues like social contact (Schweiger and Goulet, 2000) and the "hard" issues like resource interdependence (Ghosh and Ruland, 1998). By examining the effect of variance in soft as well as hard factors, we can identify the contribution of each set of factors, and more importantly, the interactions among them. As per previous research (Kogut and Zander, 1996; Conner and Prahalad, 1996), our research shows both the complementary and interactive role of these factors.

In terms of implications for practice, this research enhances our understanding of acquisition integration, and the actual mechanisms that may drive successful integration. Our study illustrates that negative routines develop even in simple settings—rather than the complex settings of the field, the only change in our experimental task between pre- and post-acquisition was in the incentive structure or the profit-sharing rule (representing a shift from an alliance to acquisition setting). Thus, it appraises managers to weigh the positive and negative effects of sequential strategies when they design their corporate development efforts. Specifically, it points out that in pre-acquisition alliances, managers should mitigate the formation of competitive routines, and that managers should try to communicate widely and openly both before and after the acquisition. Finally, it provides implications for a better understanding of the concepts of acquisition and alliance capabilities.

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Table 1a: Average Success Rates in First Quarter after Acquisition

	Prior Social Contact	No Prior Social Contact
Prior Resource Interdependence	0.60 (0.50)	0.50 (0.51)
No Prior Resource Interdependence	0.75 (0.45)	0.50 (0.51)

Standard deviation in parentheses

Table 1b: Average Success Rates in All Quarters After Acquisition

	Prior Social Contact	No Prior Social Contact
Prior Resource Interdependence	0.83 (0.38)	0.70 (0.46)
No Prior Resource Interdependence	0.88 (0.33)	0.84 (0.37)

Standard deviation in parentheses

Table 2: Effects of Prior Resource Interdependence and Prior Social Contact on Post-Acquisition Coordination

	Success (Logistic)	Total Earnings	Total Allocations	Abs Dev Threshold
Intercept	0.471 0.366	22487.720 ** 711.137	11.898 ** 0.430	3.543 ** 0.415
Prior Resource Interdependence	-0.337 ** 0.120	-512.549 * 216.440	-0.422 ** 0.131	0.312 * 0.126
Prior Social Contact	0.319 ** 0.118	581.809 ** 215.578	0.317 * 0.130	-0.283 * 0.126
Quarter	0.285 ** 0.053	531.858 ** 90.642	0.260 ** 0.055	-0.287 ** 0.053
Group Dummies	No	Yes	Yes	Yes
Number Obs.	568	568	568	568
Chi-Sq./F-Stat.	44.0910	2.4572	3.0072	3.1762
p-value	0.0001	0.0001	0.0001	0.0001
(Pseudo) R ²	0.0806	0.2571	0.2975	0.3091

* p<.05 ** p<.01

Table 3: Interaction of Prior Social Contact and Prior Resource Interdependence on Post-Acquisition Coordination

	Success (Logistic) no contact	Success (Logistic) with contact	Total Earnings no contact	Total Earnings with contact	Total Allocations no contact	Total Allocations with contact	Abs Dev Threshold no contact	Abs Dev Threshold with contact
Intercept	1.103 * 0.511	0.009 0.056	21099.895 ** 1112.566	23610.023 ** 905.167	10.886 ** 0.656	12.807 ** 0.564	4.685 ** 0.620	2.555 ** 0.555
Prior Resource Interdependence	-0.440 ** 0.156	-0.187 0.184	-898.214 ** 329.794	-120.833 280.793	-0.513 ** 0.195	-0.329 0.175	0.477 ** 0.184	0.145 0.172
Quarter	0.318 ** 0.073	0.249 ** 0.076	630.252 ** 141.675	441.441 ** 114.735	0.350 ** 0.084	0.176 * 0.072	-0.398 ** 0.079	-0.185 ** 0.070
Group Dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number Obs.	272	296	272	296	272	296	272	296
Chi-Sq./F-Stat.	28.888	12.674	2.312	2.581	3.0118	2.9773	3.6119	2.7496
p-value	0.0001	0.0018	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
(Pseudo) R ²	0.1006	0.0496	0.2491	0.2702	0.3017	0.2961	0.3418	0.2828

* p<.05 ** p<.01

Table 4: Effect of Success in Alliance Setting on Post-Acquisition Coordination: Complete Alliance Only

	Success (Logistic)	Total Earnings	Total Allocations	Abs Dev Threshold
Intercept	0.902 0.672	22330.952 ** 1133.459	11.449 ** 0.735	3.585 ** 0.724
Prior Success	0.755 ** 0.211	1166.667 ** 337.397	0.792 ** 0.219	-0.804 ** 0.216
Quarter	0.361 ** 0.099	564.762 ** 144.277	0.292 ** 0.093	-0.282 ** 0.092
Number Obs.	200	200	200	200
Chi-Sq./F-Stat.	28.2218	13.6397	11.4213	11.6244
p-value	0.0001	0.0001	0.0001	0.0001
(Pseudo) R ²	0.1548	0.1216	0.1039	0.1056

* p<.05 ** p<.01

Figure 1: Pre-Acquisition Treatments

		Prior Social Contact	
		Yes	No
Prior Resource Interdependence	Yes	Complete Alliance	Silent Treatment
	No	Discussion Only	Outright Acquisition