Power Imbalance, Mutual Dependence, and Constraint Absorption: A Closer Look at Resource Dependence Theory

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Despite ubiquitous references to Pfeffer and Salancik's classic volume, *The External Control of Organizations,* resource dependence theory is more of an appealing metaphor than a foundation for testable empirical research. We argue that several ambiguities in the resource dependence model account in part for this and propose a reformulation of resource dependence theory that addresses these ambiguities, yields novel predictions and findings, and reconciles them with seemingly contradictory empirical evidence from past studies. We identify two distinct theoretical dimensions of resource dependence, power imbalance and mutual dependence, which in the original theory were combined in the construct of interdependence and yet have opposite effects on an organization's ability to reduce dependencies by absorbing sources of external constraint. Results from a study of interindustry mergers and acquisitions among U.S. public companies in the period 1985–2000 indicate that, while mutual dependence is a key driver of mergers and acquisitions, power imbalance acts as an obstacle to their formation. We conclude that our reformulation of the resource dependence model contributes to realizing the potential of resource dependency as a powerful explanation of interorganizational action.●

Resource dependence theory marked a watershed in organizational research by offering a unified theory of power at the organizational level of analysis. Nearly three decades after the publication of Pfeffer and Salancik's (1978) classic volume, resource dependence theory is still widely cited by organizational scholars. As of the spring of 2002, there had been 2,321 citations of the book, 58 percent in the most recent ten years (Pfeffer and Salancik, 2003: xvi). As these ubiquitous references attest, the notions of power, dependence, autonomy, and constraint are inescapable in organizational research. Despite the evident appeal of the resource dependence imagery, however, "there is a limited amount of empirical work explicitly extending and testing resource dependence theory and its central tenets" (Pfeffer and Salancik, 2003: xvi). Consequently, resource dependence theory has acquired the status of a powerful general metaphor, but it has been marginalized as an engine for theoretical advancement and a basis for testable empirical research.

Why has such a foundational theoretical framework become a ghost in organizational discourse, a lingering presence without empirical substance? Part of the answer may lie in ambiguities in the resource dependence model that undermine the plausibility of some of the theory's most distinctive predictions and empirical findings. The theory's central proposition is that organizational survival hinges on the ability to procure critical resources from the external environment. To reduce uncertainty in the flow of needed resources, organizations will try to restructure their dependencies with a variety of tactics. Certain tactics are unilateral, in that they bypass the source of constraint by reducing the interest in valued resources, cultivating alternative sources of supply, or forming coalitions. Other tactics restructure dependencies by aiming directly at the constraining party in the relationship. Through cooptation, for instance, the dependent organization

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stabilizes the flow of valued resources by socializing members of the constraining organization or through the exchange of other valuable goods, such as status, friendship, or information.

Whereas these tactics featured centrally in Selznick's (1949) institutional theory and Emerson's (1962) exchange theory, Pfeffer and Salancik (1978) uniquely theorized about organizational responses to constraint that had not received explicit attention before. Of these, the most prominent is constraint absorption. Absorbing constraint entails giving the rights to control the resources that create dependencies to the dependent actor. Organizations can absorb constraint completely through mergers and acquisitions (Pfeffer, 1972; Pfeffer and Salancik, 1978). Partial constraint absorption can be achieved through formal long-term contracts, such as joint ventures (Pfeffer and Leong, 1977). Constraint absorption differs significantly from other responses to resource dependencies in that it is the only tactic that gives the dependent organization direct control over valued resources. In contrast, with tactics like cooptation, the more powerful organization obtains another valuable resource, such as a seat on the board of directors of the dependent company, while continuing to maintain direct control over resources critical to the dependent organization.

Despite the apparent difference between constraint absorption and other methods of restructuring dependence relations, resource dependence theory predicts that the association between dependence and constraint absorption is analogous to the link between dependence and other tactics, namely, organizations characterized by a high degree of dependence on others are more likely to absorb the sources of their dependence (Pfeffer, 1972; Pfeffer and Novak, 1976; Pfeffer and Salancik, 1978: 109–110). This prediction is puzzling if one considers the motivation of the constraining party to agree to a restructuring of the dependence relationship. Given that constraint absorption essentially gives the less powerful party the right to control the resource, agreeing to a constraint absorption operation is equivalent to relinquishing one's power and the favorable exchange conditions that accompany it. This puzzle is further complicated by empirical tests of resource dependence theory that have found support for a positive association between an organization's dependence and its ability to absorb the organization that imposes the constraint, despite the seeming absence of incentives for the dominant organization (Pfeffer, 1972; Pfeffer and Novak, 1976; Burt, 1983; Finkelstein, 1997).

We identify four sources of ambiguity in the resource dependence model that may account for these perplexing predictions and findings with respect to constraint absorption and propose a reformulation of resource dependence theory that addresses these ambiguities. First, the original discussion of constraint absorption did not clearly discriminate between the two dyadic power constructs that emerge from Emerson's (1962) exchange theory, which yields two distinct theoretical dimensions of resource dependence: power imbalance, or the power differential between two organizations, and mutual dependence, or the sum of their dependencies. In the origi-

nal formulation of resource dependence, these were combined in the concept of interdependence.

Second, resource dependence is both a normative and a positive theory, in which prescriptions are often confounded with predictions. Yet what an organization should do to absorb its constraints and what it actually can do to absorb them often differ dramatically, in that an organization's motivation to manage external dependencies does not necessarily coincide with its ability to do so. A critical determinant of such ability is the extent to which the dependence to be managed is mutual or imbalanced. Mutual dependence creates both the incentive and the ability to absorb constraint successfully. Hence, attempts to absorb constraint become increasingly successful as the mutual dependence between two organizations increases. Conversely, under conditions of power imbalance, the dependent organization is likely to be more motivated but less able to absorb constraint. Thus, in contrast with the predictions advanced in the original formulation of resource dependence theory, power imbalance should actually act as an obstacle to constraint absorption.

Third, the scope conditions of the resource dependence model are ambiguous. We specify the boundary conditions for the contrasting effects of power imbalance and mutual dependence by distinguishing among constraint absorption, other interorganizational operations aimed at restructuring dependencies, and operations aimed at using power given the dependence structure.

Finally, although resource dependence theory is dyadic, empirical tests of constraint absorption have largely focused on the dependence of one actor on the other without considering the reciprocal dependency. Because tests of the effect of power imbalance require simultaneous consideration of dependence and its reciprocal in a single construct, prior tests have not appropriately tested the effect of power imbalance on constraint absorption. In fact, as we explain theoretically and show empirically, prior tests have generally captured the positive effect of mutual dependence, rather than the effect of power imbalance, on constraint absorption. In contrast, our empirical implementation of the hypotheses maintains the dyadic nature of resource dependence theory and explicitly employs the constructs of power imbalance and mutual dependence. We provide a critical test of our predictions with an empirical analysis of interindustry mergers and acquisitions among U.S. public companies during the period 1985–2000 using data on 468 industries constituting the entire American economy. In doing so, we expand considerably the scope and detail of prior empirical tests of resource dependence.

A REVISED MODEL OF CONSTRAINT ABSORPTION

Power Imbalance and Mutual Dependence

The building blocks of organizational treatments of power and dependence (Thompson, 1967; Jacobs, 1974; Pfeffer and Salancik, 1978; Burt, 1983) can be traced to Emerson's (1962) theory of power-dependence relations. In Emerson's exchange framework, the power capability of actor j in rela-

tion to actor i is the inverse of i's dependence on j. In turn, dependence is a function of resource criticality and the availability of alternative providers of critical resources. An actor i, therefore, is dependent upon actor j (1) in proportion to i's need for resources that j can provide and (2) in inverse proportion to the availability of alternative actors capable of providing the same resources to i. Conversely, the dependence of actor j on actor i varies (1) in proportion to j's need for resources that i can provide and (2) inversely with the availability of alternative actors capable of providing the same resources to j.

Central to Emerson's theory is the notion that "power is a property of the social relation; it is not an attribute of the actor" (Emerson, 1962: 32). This premise implies that an accurate portrayal of power relations in a dyad calls for the simultaneous consideration of the power capability of i in relation to j and the power capability of j in relation to i. This dyadic approach to resource dependence yields two distinct dimensions of power in a dyad: power imbalance and mutual dependence. Power imbalance captures the difference in the power of each actor over the other. Formally, this construct can be defined as the difference between two actors' dependencies, or the ratio of the power of the more powerful actor to that of the less powerful actor (Lawler and Yoon, 1996). The second dimension of dyadic power, mutual dependence, captures the existence of bilateral dependencies in the dyad, regardless of whether the two actors' dependencies are balanced or imbalanced. Formally, this measure can be defined as the sum, or the average of actor i's dependence on actor j and actor j's dependence on actor i (Bacharach and Lawler, 1981). Power imbalance and mutual dependence need to be considered simultaneously in order to produce a theoretically exhaustive portrayal of the power-dependence structure in a dyad. This is because, for any value of power imbalance, a power-dependence relation can be characterized by varying levels of mutual dependence. Conversely, for any given level of mutual dependence, there can be different levels of power imbalance in the dyad.

Figure 1 illustrates this point. Given three possible levels of dependence of each actor on the other, dyads shown in shaded boxes on the diagonal depict power-balanced relationships. Dyads in unshaded boxes are power-imbalanced, and the levels of power imbalance are symmetric around the diagonal. Above the diagonal, power imbalance favors actor j; below the diagonal, power imbalance favors actor i. Although equal levels of power imbalance characterize many of the dyads, different levels of mutual dependence distinguish them. For example, both Configurations 1 and 9 on the shaded diagonal are power-balanced, but Configuration 9 exhibits higher mutual dependence than Configuration 1. In Configuration 1, actors i and j exert minimal power over each other, either because they do not depend on each other for resources critical to their survival or because both actors have numerous alternative providers of needed resources. In Configuration 9, both actors exert significant power over each other because they depend on one another for critical resources or have few alternative providers of needed

Figure 1. Configurations of power imbalance and mutual dependence.

i's Dependence on j	j's Dependence on i: Low (1)	Medium (2)	High (3)
High (3)	Configuration 7: Power imbalance: 2 Mutual dependence: 4	Configuration 8: Power imbalance: 1 Mutual dependence: 5	Configuration 9: Power imbalance: 0 Mutual dependence: 6
Medium (2)	Configuration 4: Power imbalance: 1 Mutual dependence: 3	Configuration 5: Power imbalance: 0 Mutual dependence: 4	Configuration 6: Power imbalance: 1 Mutual dependence: 5
Low (1)	Configuration 1: Power imbalance: 0 Mutual dependence: 2	Configuration 2: Power imbalance: 1 Mutual dependence: 3	Configuration 3: Power imbalance: 2 Mutual dependence: 4

resources. Finally, the existence of mutual dependence is not restricted to power-balanced dyads. As illustrated in Configurations 4 and 8, for example, two dyads can be characterized by different levels of mutual dependence but identical levels of power imbalance.

Figure 1 highlights two further important points. First, power needs to be considered dyadically by taking into account each actor's dependence on the other. Accounts of power dynamics that consider only the dependence of actor i on actor j cannot capture power imbalance, because a given change in i's dependence on j can either increase or decrease power imbalance. For example, if actor i is more dependent on actor j than j is on i, an increase in the dependence of i on j increases the power imbalance in the dyad. This can be exemplified by a shift from Configuration 4 to Configuration 7. If, however, actor i is less dependent on actor j than j is on i, the same increase in actor i's dependence on actor j actually reduces power imbalance in the dyad, as exemplified by a shift from Configuration 3 to Configuration 6.

The second important point is that changing one dimension of dyadic power while keeping the other constant requires altering the dependencies of both actors on each other. In contrast, changes in one actor's dependence, holding the other actor's dependency constant, bring about a change in both power imbalance and mutual dependence (see shift from Configuration 4 to Configuration 7). For this reason, analyses that consider power dynamics dyadically, but employ individual-level measures of dependence rather than the dyadic measures, cannot separate the effect of changes in power imbalance from that of changes in mutual dependence. Power imbalance and mutual dependence determine the structural conditions under which an actor will not only be motivated but will also be capable of restructuring dependencies by absorbing constraint.

Power Imbalance, Mutual Dependence, and the Absorption of Constraint

Power imbalance. All off-diagonal configurations in figure 1 are power-imbalanced to varying degrees. In Configuration 3, for instance, actor i is less dependent on actor j than j is on i,

either because alternative exchange partners are more available to i or because j provides fewer critical resources to i. Consequently, should the exchange between i and j fail, actor j would face greater uncertainty and worse exchange conditions than actor i because few alternative actors can provide resources that are critical to j, and the next best alternative is less desirable than i. As a result, actor i will find it easier than j to dictate the terms of the relationship by threatening to withdraw from the exchange. The most likely result of this power imbalance is that i will appropriate a larger portion of the overall benefits accruing from the exchange (Friedkin, 1986; Piskorski and Casciaro, 2004). As the power imbalance increases, j faces increasingly undesirable exchange conditions and higher levels of uncertainty than i.

To obtain more favorable exchange conditions and reduce uncertainty in the procurement of needed resources, the more dependent actor in a power-imbalanced dyad will attempt to restructure its dependency by engaging in constraint absorption operations with the power-advantaged organization. A constraint absorption operation reduces uncertainty for the less powerful organization by granting it stable access to the resources on which it is dependent. The desire of the dependent organization to absorb the source of constraint, however, is not equivalent to its ability to do so. By stipulating a long-term contract, entering a joint venture, or, at the extreme, merging with the dependent organization, the dominant party would lose part or all of its discretion over the allocation of its critical resource to the dependent party. For the dominant organization, this is equivalent to foregoing its bargaining power and the advantageous exchange conditions that accompany it (Gargiulo, 1993). The higher-power organization is therefore likely to resist the lower-power organization's attempt at constraint absorption. The less powerful organization is unlikely to overcome the resistance of the dominant organization, which is, by definition, in a better position to impose its will on the power-disadvantaged party. It follows that the power-disadvantaged organization's attempts to absorb constraint are unlikely to succeed.

Although the more powerful actor is likely to resist the less powerful actor's attempts at constraint absorption, it could be argued that the process is not symmetric, in that power imbalance could prompt the more powerful organization to exercise its power over the less powerful organization and absorb it. Similar reasoning has been put forward to explain the process of infiltration through board interlocks (Pfeffer and Salancik, 1978). There is a fundamental difference, however, between infiltration and constraint absorption. The exercise of power through infiltration does not eradicate the structural power imbalance between the organizations. In contrast, the use of power through constraint absorption undermines the more powerful actor's advantaged position.

To illustrate this argument, consider the two possible scenarios that could occur if a power-advantaged organization acquired the less powerful organization in the dyad. In the first scenario, the pre-merger dominant organization commits to exchanging with the pre-merger less powerful organization, even if better choices are available from alternative

providers. Therefore, the pre-merger dominant organization eradicates its own bargaining power to the benefit of the pre-merger dependent organization. In the second scenario, the pre-merger dominant organization chooses to exchange with the best available partner, thus maintaining its bargaining power. If that best available partner is outside the merged entity, however, the pre-merger dependent organization will not be able to procure critical resources from the pre-merger dominant organization. Consequently, the pre-merger dependent organization will need to secure critical resources from the external environment and will therefore face the same uncertainty that it faced before the merger. Before the merger, it was the responsibility of the less powerful organization to secure these exchanges; now that the more powerful organization has acquired the less powerful organization, it is also the responsibility of the more powerful organization to secure these exchanges. To the extent that managing the uncertain exchanges of the less powerful organization is costly, constraint absorption would entail substantial losses for the more powerful organization. In contrast, infiltration through a board interlock would not result in such costs, because the success of the less powerful organization in securing its resources does not directly affect the power-advantaged organization. These two scenarios suggest that by absorbing the less powerful organization, the more powerful organization suffers one of two sets of negative consequences: it either loses its bargaining power over the less powerful organization or it incurs the costs of managing the uncertainty faced by the less powerful organization. For these reasons, the dominant organization is unlikely to enter a constraint absorption operation with the dependent party because the resources that the less powerful organization has to offer are not sufficiently scarce or critical to the dominant organization to overcome the losses it would suffer from a constraint absorption operation.

Given that the more powerful organization is both unwilling to absorb the less powerful organization and resists the power-disadvantaged organization's attempts to absorb constraint, we hypothesize that constraint absorption operations are unlikely under conditions of power imbalance.

Hypothesis 1: The greater the power imbalance between two organizations, the lower the likelihood of constraint absorption operations between them.

Mutual dependence. The effect of changes in mutual dependence on the likelihood of successful constraint absorption are best described through a comparison of a lower-mutual-dependence dyad, like Configuration 1 in figure 1, with a higher-mutual-dependence dyad, like Configuration 9. In both cases, power is balanced, implying that a failure of exchange damages both actors equally, in that they face equal uncertainty in the procurement of resources critical to their survival. In the lower-mutual-dependence configuration, if i and j do not exchange with each other, they can still procure resources from other actors on only slightly worse terms. As a consequence, when mutual dependence is low, there is no scope for negotiation between actors. If one actor makes excessive demands on the other, the target of the

excessive demands can quickly identify an alternative exchange partner who is capable of providing similar resources.

In the higher-mutual-dependence configuration, however, if actors i and j do not exchange with each other, they face greater uncertainty and worse exchange conditions than do actors in the lower-mutual-dependence configuration because the resources they exchange are more critical to their survival, and fewer alternative sources exist. Although high mutual dependence creates substantial incentives for actors to exchange with each other, it also opens up significant scope for negotiations. If one actor, say i, makes excessive demands on actor j, j has to enter into negotiations with i because j cannot easily find an alternative exchange partner who is capable of providing similar resources. But j can also make its own demands, aware that i will find it difficult to locate an alternative exchange partner. Because actors i and j are in a power-balanced situation, no clear pattern of domination will emerge, potentially leading to a lengthy and uncertain bargaining process (Emerson, 1962: 33–34). Because both organizations depend on each other to provide critical resources, this uncertainty has a substantial cost to both of them.[1]

The uncertainty and potential costs associated with recurrent negotiated exchanges under conditions of mutual dependence suggest the use of long-term contracts such as joint ventures or permanent interorganizational arrangements such as mergers and acquisitions as tactics for both organizations to ensure stable flows of the critical resources they can provide to each other. Mergers, in particular, entirely eliminate the need to renegotiate the terms of the exchange repeatedly and the uncertainty about resource procurement. For these reasons, we hypothesize a positive association between mutual dependence and constraint absorption operations:

Hypothesis 2: The greater the mutual dependence between two organizations, the higher the likelihood of constraint absorption operations between them.

Power imbalance and mutual dependence. So far, we have discussed the distinct effects of power imbalance and mutual dependence on the likelihood of constraint absorption operations, but as off-diagonal configurations in figure 1 illustrate, power imbalance can exist under different levels of mutual dependence. The simultaneous presence of power imbalance and high mutual dependence exerts two competing forces on the relationship. On the one hand, the higher-power actor is reluctant to agree to constraint absorption because doing so would eliminate its power advantage. On the other hand, the higher-power actor is still substantially dependent on the lower-power actor and is therefore motivated, to some extent, to stabilize the flow of resources provided by the power-disadvantaged party.

When mutual dependence is high, however, power imbalance has an additional effect: it creates obstacles to the successful negotiation of exchanges in the dyad. Extensive micro-sociological and psychological research documents the difficulty of negotiated exchange under conditions of unequal

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The notion of mutual dependence employed in this paper has significant similarities with the concept of bilateral dependence associated with asset specificity discussed in transaction cost economics (Williamson, 1975). But resource dependence theory focuses on ex-ante mutual dependence that arises due to structural restrictions on exchange, while transaction cost economics usually assumes that two parties are initially independent but develop bilateral dependence over the course of the relationship as they invest in relationship-specific assets. Because resource dependence theory focuses on ex-ante mutual dependence, while transaction cost economics focuses on ex-post bilateral dependence, the two theories are not incompatible, however, explicit comparison of their predictions and mechanisms is beyond the scope of this paper.

power. In general, power imbalance reduces the frequency of exchange among social actors by hindering conflict resolution (Lawler and Yoon, 1996). Under conditions of power imbalance, it is difficult for potential exchange partners to foster the information flow that is a precondition for the successful negotiation of an exchange (Giebels, De Dreu, and van de Vliert, 1998). Even when information is available, higher-power parties do not attend to it as closely as lower-power parties (Erber and Fiske, 1984; Keltner and Robinson, 1997). The lack of "domain consensus" (Levine and White, 1961) induced by such obstacles to information exchange increases the frequency of confrontational behaviors within unequal-power relationships, such as the tendency to make more demands of, make fewer concessions to, and use coercive tactics against the potential exchange partner (Lawler and Bacharach, 1987). Those with power advantages tend to argue for agreements that favor themselves, whereas disadvantaged actors tend to argue for agreements that equalize benefits. Unequal power thus introduces issues of legitimacy and fairness concerning the distribution of payoffs from the exchange, complicating the bargaining agenda and diverting attention from the structural dependencies the exchange is supposed to address (Lawler and Yoon, 1996). Taken together, these arguments suggest that actors are less likely to develop mutually satisfactory exchange relationships under conditions of unequal power (Bacharach and Lawler, 1981; Hegtvedt and Cook, 1987; Lawler and Yoon, 1996).

When mutual dependence is low, the obstacles to negotiated exchange generated by power imbalance are of little concern to the power-advantaged actor, who does not depend on the power-disadvantaged organization for critical resources easily procured from alternatives suppliers. When mutual dependence is high, by contrast, the obstacles to negotiated exchange induced by power imbalance expose both actors, not just the power-disadvantaged party, to losses of exchange benefits and the risk of failing to come to an agreement at all. These potential costs encourage both exchange partners to stipulate long-term contracts or to enter into permanent organizational arrangements to avoid repeated exposure to problematic negotiated exchanges. But the confrontational bargaining environment that the exchange partners are trying to avoid is precisely what undermines their ability to successfully negotiate mutually satisfactory long-term agreements. As a consequence, the increased incentive to stabilize the relationship generated by the confluence of power imbalance and mutual dependence may be insufficient to offset the decreased likelihood that the trading partners will be able to engage each other productively. In fact, the obstacles to negotiated exchange created by power imbalance may be particularly severe under conditions of mutual dependence, when both actors aspire to appropriate the surplus from the exchange, and the power-disadvantaged actor becomes therefore particularly intolerant of the demands of the higher-power actor.

Thus, a priori, there are no theoretical bases to predict whether the countervailing forces induced by power imbalance and mutual dependence will result in a positive, nega-

tive, or insignificant interaction effect between the two dimensions of resource dependence and the likelihood of successful absorption of constraint. We tackle this question empirically in the context of our study.

Comparison with the Original Constraint Absorption Hypothesis

Figure 2 summarizes the main similarities with and differences between our model and the original specification of the constraint-absorption hypothesis proposed by Pfeffer and Salancik (1978). Both begin with the same assumption: the power of actor i over actor j is the inverse of j's dependence on resources provided by i, and vice versa. On the basis of this definition, both models then proceed in largely similar fashion to treat power as a dyadic phenomenon. Our construct of power imbalance mirrors the original discussion of power asymmetry, which arises when "the dependent organization lacks sources of countervailing power to control the attempts at influence of the power-advantaged organization" (Pfeffer and Salancik, 1978: 52–53). Although Pfeffer and Salancik did not explicitly address the construct of mutual dependence, their discussion of balanced dependencies captures the possibility that power-balanced dyads can be characterized by different levels of mutual dependence (such as Configurations 1, 5, and 9 in figure 1). Because they considered mutual dependence only in relation to power-balanced dyads, however, the coexistence of power imbalance and mutual dependence in a dyad did not receive theoretical consideration.

Beyond the definitional similarities, the two models diverge in numerous ways. First, they differ significantly in their application of the dyadic power constructs to the discussion of constraint absorption. The model proposed here examines the relationships between each of two dimensions of dyadic

Figure 2. Comparison of original and revised constraint-absorption hypothesis.

<table>
<tr><th></th><th>Original specification</th><th>Revised specification</th></tr>
<tr><td colspan="3">Assumptions</td></tr>
<tr><td>Power of actor i over actor j is the inverse of j's dependence on i</td><td>Yes</td><td>Yes</td></tr>
<tr><td colspan="3">Constructs</td></tr>
<tr><td>Power imbalance</td><td rowspan="2">Integrated into a single construct, interdependence</td><td>Yes</td></tr>
<tr><td>Mutual dependence</td><td>Yes</td></tr>
<tr><td colspan="3">Hypotheses</td></tr>
<tr><td>Effect of power imbalance on the likelihood of successful constraint absorption</td><td>Positive</td><td>Negative</td></tr>
<tr><td>Effect of mutual dependence on the likelihood of successful constraint absorption</td><td>Positive</td><td>Positive</td></tr>
<tr><td colspan="3">Empirical implementation</td></tr>
<tr><td>Power asymmetry</td><td>No</td><td>Yes</td></tr>
<tr><td>Mutual dependence</td><td>No</td><td>Yes</td></tr>
</table>

power and constraint absorption separately. In contrast, in the original discussion of the constraint absorption hypothesis, there is no explicit distinction between power imbalance and mutual dependence. Instead, the theory revolves around the notion of interdependence, which, in Pfeffer and Salancik's (1978: 41) words, is "not necessarily symmetric or balanced" but, rather, "can be asymmetric." Because the concept of interdependence encompasses both asymmetric and symmetric forms of dependence, the two dimensions of dyadic power, mutual dependence and power imbalance, are effectively conflated in a single construct.

The differences in the conceptualization of the main theoretical constructs translate into different empirical predictions. We hypothesize that constraint absorption is negatively related to power imbalance but positively related to mutual dependence. In contrast, the original specification of the constraint absorption hypothesis examined constraint absorption "as a correlate of organizational interdependence" (Pfeffer, 1972: 387), without distinguishing between its constituent parts, power imbalance and mutual dependence. For instance, Pfeffer and Salancik (1978: 115–116) predicted, "If organizations merge to control interdependence, then they should acquire organizations in areas with which they exchange resources. Moreover, they should make such acquisitions more often when the exchanges are problematic." Similarly, in a study of joint ventures, Pfeffer and Novak (1976: 403) hypothesized, "Patterns of joint venture activity will correspond to patterns of transactions interdependence; to the extent an organization in industry A is more interdependent with organizations in industry B, a higher proportion of its joint venture activities should be with firms in that industry." In this view, interdependence, whether symmetric or asymmetric, creates uncertainty, and organizations manage this uncertainty by increasing their coordination and mutual control through constraint absorption. That is, in the original specification, the existence of either power imbalance or mutual dependence was hypothesized to increase the likelihood of constraint absorption. Therefore, although both specifications agree that higher levels of mutual dependence lead to a greater likelihood of constraint absorption, they offer competing predictions with respect to the effect of power imbalance.

The combination of power imbalance and mutual dependence within a single construct is not the only reason for this discrepancy in predictions about the effect of power imbalance on constraint absorption. There is another fundamental difference between the two formulations of the resource dependence model. Whereas the revised resource dependence model offers a purely descriptive account of organizational responses to resource dependencies, the original specification is both a positive and a normative theory. It has elements of a descriptive theory of power relations; however, in its predictions and empirical implementation, it offers a set of prescriptive statements focusing on the motivations of the less powerful actor, without considering the motivations of the more powerful one. From a prescriptive viewpoint, the less powerful organization should absorb the constraint in

order to reduce the uncertainty in procuring needed resources, but from a descriptive point of view that considers the motivations of both actors in the dyad, the same increase in power imbalance should actually reduce the incidence of such actions.

The focus on the motivations of the less powerful actor, without considering those of the more powerful one, is particularly salient in the empirical tests of the original constraint absorption hypothesis. For example, Burt (1980: 919–920) concluded from his analysis of constraint absorption at the industry level, "If firms in industry j suffer a constraint to their structural autonomy from firms in industry i . . . the odds of a significant merger relation . . . more than double. . . . If firms in industry j suffer negligible constraint from firms in industry i, the odds are nine to one there will be no significant merger relations from j to i." Though the extent of j's dependence on i was analyzed in detail, no mention was made of the extent to which i is constrained by j. The analysis revolved entirely around the focal actor j, under the implicit assumption that j's motivation to manage its dependence on i would be sufficient to induce a disproportionate number of mergers and acquisitions between industry j and industry i. Other tests of merger as a response to constraint have similarly focused on j's dependence on i, without taking into consideration the extent to which i is in turn dependent on j (Pfeffer, 1972; Finkelstein, 1997).

Such an empirical approach embodies a substantial disconnect between the theoretical framework and the empirical analyses. The theoretical framework suggested a relationship between dyadic interdependence, comprising both power imbalance and mutual dependence, and constraint absorption. The empirical analyses, however, considered only the dependence of actor j on actor i, without considering the reciprocal dependence. As a consequence, these analyses did not test the effect of either mutual dependence or power imbalance. At first sight, the finding that the dependence of actor j on actor i is positively related to constraint absorption could be taken as evidence supporting the hypothesis that power imbalance is positively related to constraint absorption, yet dependence and power imbalance are two distinct concepts. Power imbalance requires both the dependence of actor j on actor i and the dependence of i on j. As we explained above, the effect of power imbalance cannot be estimated using only the dependence of one actor on the other without considering its reciprocal.

So what does the positive relationship between the dependence of actor j on actor i and constraint absorption actually test? Under a set of reasonable assumptions, it can be shown that the positive effect of one actor's dependence on another actually attests to the positive effect of mutual dependence, rather than power imbalance, on the likelihood of constraint absorption. This counterintuitive claim can be easily understood by considering the relationship between the dependence of one actor on another and the two dimensions of dyadic power, as outlined in figure 1. First, an increase in dependence of one firm, say i, on another, j, can either increase or decrease power imbalance, depending on

j's dependence on i. Because this increase has both a positive and a negative effect, the two effects essentially cancel out in a regression. Second, an increase in dependence of firm i on firm j, holding constant the dependence of firm j on firm i, always increases mutual dependence. Because the effect on power imbalance of changes in i's dependence on j is canceled out, but their effect on mutual dependence is always present, the estimated effect of changes in i's dependence on j is the effect of mutual dependence. A detailed explication is provided in Appendix A.

Scope Conditions

Resource dependence theory provides predictions about a wide range of actions that organizations take in response to resource dependencies. These actions can be classified in two broad categories: power use operations, which exercise the power that accrues to an organization given the extant power-dependence structure, and power restructuring operations, which aim at changing the power-dependence structure. Restructuring operations can, in turn, be unilateral or bilateral. Unilateral restructuring operations aim at changing the power-dependence structure by acting on elements outside the focal dyadic relationship, namely, reducing the interest in a given resource, cultivating alternative providers of the resource of interest, or forming coalitions. In contrast, bilateral restructuring operations restructure dependencies by aiming directly at the other party in the dyad. Bilateral restructuring operations can take two forms: cooptation and constraint absorption. Below, we discuss the mechanisms through which power imbalance and mutual dependence affect the likelihood of different interorganizational operations. This discussion points to the uniqueness of constraint absorption among all resource dependence predictions.

Power use. Resource dependence accounts of power use in interorganizational relations have broadly posited that power imbalance enables the dominant actor to influence the power-disadvantaged actor and to extract a higher share of the exchange surplus. Empirical studies, most of which explicitly measure power imbalance, have provided broad empirical support for this hypothesis (Van de Ven, Delbecq, and Koenig, 1976; Pfeffer and Leong, 1977; Provan, Beyer, and Kruytbosch, 1980; Burt, 1983). Additional evidence for the power-use hypothesis has also been provided by studies of certain types of interorganizational relations, such as corporate board interlocks. Specifically, the infiltration model of board interlocks suggests that dominant organizations are likely to seek seats on boards of less powerful organizations, with the intent of influencing the decision making of the dependent organizations to the dominant organization's benefit (Pfeffer and Salancik, 1978: 164–165).

This brief examination of the effect of power imbalance on power use provides an important contrast to the revised constraint absorption model. First, whereas an increase in power imbalance increases the likelihood of establishing an interorganizational relation motivated by power use, it decreases the likelihood of relations motivated by constraint absorption. The second point of difference lies in the empirical imple-

mentation of the key constructs of dyadic power. Most tests of the power-use hypothesis have used the construct of power imbalance. In contrast, existing empirical tests of the constraint absorption hypothesis have only focused on the dependence of actor i on actor j without considering the reciprocal.

Although power imbalance has received substantial attention, very few studies have attempted to specify theoretically and test empirically the effect of mutual dependence on power use. Perhaps the only exception to this general pattern is Mizruchi (1989), who simultaneously considered both power imbalance and mutual dependence in the context of intercorporate influence. Mizruchi hypothesized that in a power-imbalanced dyad, the dominant organization is likely to use its position to influence the behavior of the less powerful organization. Similarly, in a mutual dependence situation, both organizations can use their positions to shape the behavior of their counterpart. This suggests that patterns of influence should be positively related to both power imbalance and mutual dependence. Mizruchi's findings supported these claims in the context of contributions to political action committees. This analysis suggests a substantial overlap between constraint absorption and power use with regard to mutual dependence: in both cases, the effect of mutual dependence on the likelihood of interorganizational action is positive.

Unilateral restructuring operations. Because dyadic dependencies can result in substantial interorganizational influence, organizations are likely to attempt to increase their autonomy by restructuring their dependencies (Emerson, 1962; Blau, 1964). One set of possible actions involves unilateral operations. The overarching hypothesis relating power imbalance to the likelihood of restructuring power imbalances by unilateral means again contrasts with the revised constraint-absorption model. Constraint-absorption operations require the consent of both parties to restructure the dependencies. Because the more powerful party is likely to resist power-restructuring operations, power imbalance should be negatively related to constraint absorption. Unilateral restructuring operations, by contrast, do not require the consent of the more powerful party, thus the less powerful party can successfully engage in such operations. Of course, the more powerful party can respond to these actions by pursuing the same strategies vis-à-vis the less powerful actor, thereby neutralizing the latter's attempts to balance the relationship. But because the power-advantaged organization cannot directly prevent the power-disadvantaged organization from seeking to restructure the dependency, power imbalance should still have a positive effect on the likelihood of undertaking such operations. Similar reasoning applies to the effect of mutual dependence. To the extent that mutual dependence constrains both firms, it can be expected that both will want to engage in unilateral restructuring operations. Consequently, as with constraint absorption, the likelihood of unilateral restructuring of dependencies should increase with mutual dependence.

Bilateral restructuring operations. Although unilateral restructuring operations allow organizations to change their dependencies without involving the other party, there can be strong environmental limits on the extent to which they can change their interest in a resource, cultivate alternative sources of supply, or organize a coalition. As a consequence, organizations will often have to engage in bilateral restructuring of dependencies. Bilateral operations can be differentiated into cooptation and constraint absorption. Although both are bilateral, power imbalance has opposite predicted effects on the likelihood of cooptation and constraint absorption. In cooptation, the less powerful actor offers the more powerful actor another resource of value, such as information, friendship, or status, in the hope that the more powerful actor will choose not to exercise its power (Emerson, 1962: 39). The more powerful organization is likely to acquiesce to such cooptation, as long as the value of the additional resource offered by the less powerful actor compensates it for not using its power. In contrast to cooptation, constraint absorption is not advantageous to the dominant organization in a power-imbalanced dyad. Thus power imbalance has opposite effects on the likelihood of cooptation and constraint absorption. As with unilateral restructuring operations, studies of cooptation have not explicitly theorized about or empirically tested the relationship between mutual dependence and cooptation.

Our comparison of the revised constraint-absorption hypothesis with other predictions stemming from resource dependence theory reveals two important points. First, the revised constraint-absorption hypothesis makes predictions regarding the effect of power imbalance that are directly at odds with the other predictions of resource dependence theory. Our model leads us to hypothesize a negative relationship between power imbalance and constraint absorption, whereas prior work predicts a positive relationship between power imbalance and the likelihood of power use and other power-restructuring operations. Second, in contrast to power imbalance, the effect of mutual dependence on constraint absorption is identical to its effect on other phenomena of interest to resource dependence theorists. Although prior work has very seldom explicitly considered the effect of mutual dependence, simple extensions of resource dependence theory suggest that the effect of mutual dependence is uniformly positive across power use, unilateral restructuring operations, and both types of bilateral restructuring operations. Overall, this comparison of power use and unilateral and bilateral methods of restructuring dependence provides a strong set of boundary conditions for the negative effect of power imbalance advocated here and allows us to reconcile past theoretical treatments and empirical studies of resource dependence with the revised model we propose.

METHODS

Setting, Data, and Sample

Mergers and acquisitions have been among the primary domains of interorganizational action to be analyzed from a resource dependence perspective (Perrow, 1970; Pfeffer,

1972; Burt, 1983; Galbraith and Stiles, 1984; Palmer et al., 1995; Finkelstein, 1997). Mergers and acquisitions constitute the purest form of constraint absorption. Through merger or acquisition (M&A), two organizations lose their status as distinct social actors, and the rights to control resources that generate dependencies are transferred to the merged entity. For this reason, mergers and acquisitions represent an ideal domain in which to test our revised model of constraint absorption. To provide a direct comparison with the original formulation of resource dependence theory, we tested our hypotheses following the tradition established in past research, which investigated the effect of resource dependence on merger formation at the industry level of analysis (Pfeffer, 1972; Burt, 1983; Finkelstein, 1997). These studies associated industry-level patterns of input-output transactions to the incidence of mergers and acquisitions among firms operating within different industries in an economic system.

We drew the M&A data from Securities Data Corporation's (SDC) Mergers and Acquisitions database. We searched the database for mergers formed among all companies traded on the U.S. stock exchange in every year between 1985 and 2000. The search resulted in 8,249 reported deals. Of these, 3,686 were internal operations such as self-tenders and repurchases and thus were excluded from the analysis. We also excluded mergers and acquisitions involving companies operating within the same industry because the competitive dynamics that contribute specifically to the formation of intra-industry mergers may produce spurious results in tests of resource dependence (Pfeffer, 1972; Finkelstein, 1997). The final sample consisted of 1,907 interindustry deals, 61 of which were hostile takeovers.

We relied on Burt's (1980, 1983) seminal formulation of constraint to operationalize the notion of dependence between firms in different industries based on input-output patterns of transactions across economic sectors. Data on interindustry transaction patterns came from the Benchmark Input-Output (I-O) accounts for the U.S. economy developed by the Bureau of Economic Analysis (BEA). To insure a fine-grained definition of industry boundaries, and thus reduce the incidence of intra-industry deals in our analysis, we defined industries using six-digit I-O codes. Because SDC classifies M&A deals by the four-digit Standard Industrial Classification (SIC) codes of the companies involved, we matched SIC codes to I-O codes based on matching criteria provided by the Bureau of Economic Analysis in its *Survey of Current Business*. The use of six-digit I-O codes allowed us to identify 468 distinct industries, compared with the 51-industry classifications used in the most fine-grained past study (Finkelstein, 1997). We gathered data on industry concentration in manufacturing from the concentration ratios published by the Census Bureau of the U.S. Department of Commerce. With the BEA's *Survey of Current Business* mapping of SIC categories to input-output sectors, we identified the four largest firms in each sector, summed their sales, and divided the sum by the total volume of sales for the sector reported in the input-output table. Both the Bureau of Economic Analysis and the Census Bureau release I-O accounts and concentration ratios every

five years. To obtain annual measures of exchanges between industries for the period 1985–2000, we linearly extrapolated the measures over the four available accounts for 1982, 1987, 1992, and 1997. Given that the input-output and concentration data change very little over any five-year period (Burt, 1983), differences in the assumptions about the extrapolation did not significantly affect either the annual measures or the regression results. In addition, concentration ratios for agriculture, mining, construction, government enterprises, and special industries were not available in all time periods. To avoid a sizable loss of observations, we linearly extrapolated the available concentration ratios across the missing time periods. Our findings did not significantly change whether we included or excluded these extrapolated observations.

Finally, we obtained historical data on the financial characteristics of these industries, such as size and debt structure, from COMPUSTAT by constructing industry averages of firm-level data on all U.S. public companies operating in the industries of interest. The financial information available from COMPUSTAT to measure these variables is specified at an SIC level that does not always correspond directly to six-digit I-O codes. In all ambiguous cases, we converted SIC codes to I-O codes according to a variety of criteria to assess the sensitivity of our results to different approaches to variable construction. The results proved to be robust across all measures. Another issue was the time structure of the financial data. The historical file in COMPUSTAT provides financial information starting in 1987, so we collected these data on a yearly basis for the period beginning in 1987 and ending in 2000. To calculate financial measures for 1985 and 1986, we linearly extrapolated the data available for 1987–2000. As with input-output and concentration data, performing the extrapolation using varying assumptions did not change the results. Because of the intrinsically discretionary component of extrapolation, however, we also ran all regressions excluding 1985 and 1986. The results were not affected by this alternative time structure of the data set. Given the robustness of the findings, we chose to report results for the entire 1985–2000 period, to capitalize on all the available data.

Measures

Dependent variable. The dependent variable was merger frequency, defined as the proportion of the total number of mergers and acquisitions formed by business units in industry i that involved business units in industry j. Business units in industry i and industry j were, respectively, M&A acquirers and targets.

Independent variables. The general concept of dependence as the result of an interaction between resource criticality and the existence of alternative providers of such resources has a direct manifestation at the level of a business unit in an industry (Burt, 1982, 1983). The measures of dependence of business units in industry i on business units in industry j were constructed in a three-step process. We began with measures of interindustry flows, z_{ij}, expressed as the total dollar value of goods and services sold by industry i to industry j. Subsequently, we derived dependence of industry i on

industry j, which is high to the extent that industry i sells a significant proportion of its goods and services to industry j, s_{ij}, or it buys a significant proportion of its goods and services from industry j, p_{ij}. To convert the measure of dependence of industry i on industry j to dependence of business units in industry i on business units in industry j, we multiplied the dependence measure by four-firm concentration ratios in industry j, O_j. Following Burt (1983), we formally define this measure of dependence of business units in industry i on business units in industry j, as $C_{j\to i}$:[2]

$$C_{j\to i} = (p_{ij} + s_{ij})\, O_j$$

$$\text{where } p_{ij} = \left(\frac{z_{ji}}{\sum_q z_{qi}}\right) \text{ and } s_{ij} = \left(\frac{z_{ij}}{\sum_q z_{iq}}\right)$$

This measure is consistent with the notion that dependence is determined by the joint effect of motivational investment in an exchange and availability of alternatives, and not by observed patterns of exchange (Emerson, 1962; Marsden, 1983). This argument implies that the use of industry-level data to measure the dependence of one business unit on another has sounder theoretical bases than the use of firm-to-firm transactions. Consider the following scenario involving industry i and industry j. Industry i purchases 30 percent of its inputs from industry j, while industry j purchases none of its inputs from industry i. Only two business units operate in each of the two industries. Business units A and B operate in industry i, and business units C and D operate in industry j. Business unit A purchases 30 percent of its inputs from business unit C and 0 percent from D, while B purchases 10 percent of its input from C and 20 percent of its input from D. To infer from this specific allocation of purchases and sales between firm-dyads that business unit A is more dependent on business unit C than on D, or that B is less dependent on C than A, is wrong. All that matters for the definition of A's and B's dependence structure is that both business units need 30 percent of their input from industry j and that only two firms, C and D, can provide those inputs. In spite of their different patterns of purchases from C and D, therefore, there is no difference in the degree of dependence of firms A and B on C and D. Put differently, absorbing C or D would have exactly the same effect on A's and B's dependence structure. Pfeffer (1987: 44) captured this notion when he noted that "resource interdependence exists and is defined primarily in terms of intersectoral, rather than interfirm, transactions."[3]

The unit of analysis for this measure of constraint is individual business units in an industry. When the unit of analysis is shifted to a dyad of business units in industries i and j, the dyad can be characterized by two constraint measures $C_{j\to i}$ and $C_{i\to j}$, defined as:

$$C_{j\to i} = (p_{ij} + s_{ij})\, O_j$$

2
We also ran our analyses using the constraint measure defined as $C_{j\to i} = (p_{ij}^2 + s_{ij}^2)\, O_j$. Burt (1982) used this functional form in his analysis of the relationship between dependence and profit. Our results are insensitive to the functional form employed.

3
In contrast, constraint absorption exists and is defined at the level of interfirm transactions. Consider the example of the automotive industry and its dependence on the tire industry. The fact that tire manufacturers and auto manufacturers might merge to manage their dependence on each other only implies that these merged companies have successfully restructured their own dependence on a given industry at the firm level. This does not change the fact that, at the industry level, tires are still needed to make automobiles and therefore business units in the automotive and tire industries will have to transact with one another, with these transaction patterns defining the underlying dependence structure between occupants of the tire and automotive industries. In our model, that is, the power-dependence structure is exogenous, and merger behavior is endogenous.

$$C_{i \to j} = (p_{ji} + s_{ji})\, O_i$$

Because the measure of constraint is directional, the constraint of a business unit in industry i on a business unit in industry j does not have to be the same as the constraint of a business unit in industry j on a business unit in industry i. Based on the directional measures of constraint, we constructed a dyadic measure of power imbalance between business units in industry i and business units in industry j, $PI_{i \leftrightarrow j}$, as:

$$PI_{i \leftrightarrow j} = \left| C_{j \to i} - C_{i \to j} \right|$$

We used the absolute value of the constraint difference because, according to our model of resource dependence, the direction of power imbalance is theoretically inconsequential for the hypothesized effect of power imbalance on the likelihood of mergers. Because this measure of constraint is not distributed normally, we used Stata's lnskew0 function, which computes the natural logarithm of the original variable choosing the exponent so that the skewness of the transformed variable equals zero. An alternative measure of power imbalance is the ratio of the directional measures of constraints. In this context, however, the use of the ratio was precluded by the large number of cases in which either $C_{j \to i}$ or $C_{i \to j}$ equaled zero. Adding a constant to the ratio variable to address this issue would have defeated the purpose, because doing so removes the ratio character of the measure.

The two measures of constraint, $C_{j \to i}$ and $C_{i \to j}$, can also capture the mutual dependence between business units in industries i and j. Business units in industry i and j are mutually dependent to the extent that the constraint of business units in industry i on business units in industry j is high and simultaneously the constraint of business units in industry j on business units in industry i is high. Formally, this mutual dependence is measured as:[4]

$$MD_{i \leftrightarrow j} = C_{j \to i} + C_{i \to j}$$

As with power imbalance, mutual dependence, as we define it, is not distributed normally. To address this issue, we again used Stata's lnskew0 function to obtain a zero-skewness transformed variable.

Control variables. The bulk of the literature on mergers and acquisitions has focused on the price of purchase or on post-acquisition performance as primary objects of inquiry (e.g., Hayward and Hambrick, 1997; Haleblian and Finkelstein, 1999). The few studies that have investigated the antecedents of M&A formation have generally done so at the firm level of analysis (e.g., Haunschild, 1993). Of the factors emerging from this literature as explanations for M&A formation, three general classes of firm characteristics can be ana-

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Although the additive specification of mutual dependence flows directly from the theoretical framework advanced here, it may lead us to conclude that mutual dependence (MD) exists in a dyad, when in reality it does not. For example, if a dyad is characterized by $C_{j \to i} = 0$ and $C_{i \to j} = 0.2$, the additive specification of mutual dependence yields MD = 0.2. Yet it may be argued that because one of the actors is not dependent on the other, such a dyad should be properly classified as featuring no mutual dependence. To account for this possibility, we also constructed $MD_{i \leftrightarrow j} = C_{j \to i} * C_{i \to j}$. According to this specification, mutual dependence is greater than zero only if both $C_{j \to i}$ and $C_{i \to j}$ are larger than zero. The empirical results were not affected by this change in functional form.

lyzed meaningfully at the industry level of analysis: profitability, size, and debt level. Industry profitability is an alternative explanation for the formation of mergers to the extent that firms in profitable industries are likely to be attractive acquisition targets. We controlled for the profitability of both industries involved in the merger. To operationalize industry profitability, we followed Collins and Preston (1968), who introduced the idea of measuring average profits within an industry as a price-cost margin for the purpose of making comparisons across industries. The dollar total of sales by business units in an industry is the value of shipments for the industry (VS_i). This figure corresponds to the sum of the elements in one row of an input-output table. The sum of elements in a column of the table is the total cost of producing the commodities sold to obtain the value of shipments. The difference between the value of an industry's shipments and the sum of direct costs, including materials, supplies, fuel, electric energy, cost of re-sales, and contract work done by others, is the industry's value added (VA_i). This is the amount of income above and beyond the direct costs that business units in the industry obtained from the sales they made. Money paid to employees as wages and salaries for labor is considered part of the value added by an industry (L_i). The total net income for an industry can thus be computed as the difference between dollars of value added and dollars given to labor costs. The price-cost margin for industry i (pcm_i) is the ratio of this net income over the value of shipments as the gross industry income:

$$pcm_i = \frac{VA_i - L_i}{VS_i}$$

The industry price-cost margin is therefore a measure of the proportion of an average dollar of sales that can be treated as profit.

Industry profitability is the only alternative explanation for M&A formation examined in previous resource dependence studies of mergers and acquisitions (Pfeffer, 1972; Finkelstein, 1997). We included additional controls for factors known or expected to affect acquisition activity, namely, acquirer's free cash flow, acquirer-target size difference, and target's debt. The expected impact of free cash flow on M&A activity is based on Jensen's (1987) agency theory, according to which managers have incentives to invest excess cash flow in negative net present value operations, instead of paying dividends to shareholders. We measured industry i's free cash flow as the average ratio of debt (specifically, long-term debt plus debt in current liabilities) to equity across business units in the industry, weighted by industry assets. As for size, acquiring companies tend to be larger than target companies. We controlled for size as the difference between industry i's and industry j's average total assets. Finally, because heavily indebted firms tend to be undesirable acquisition targets, we controlled for the target's indebtedness with industry j's average debt (long-term and short-term) over total assets. To account for industry-level variation, we also included controls

for the industry-level standard deviation of free cash flow, size, and debt variables.

Board interlocks are another potential confound, as they can be argued to operate as substitutes for constraint absorption. Theoretically, however, the omission of board interlocks is unlikely to undermine our findings, as explicated in Appendix B. Methodologically, controlling for the presence of board interlocks would be exceedingly data-intensive. Board interlock studies are generally based on samples of, at most, a few hundred companies. One of the richest studies of board interlocks (Haunschild, 1993) used a one-year cross section of interlock data for 949 companies. Our sample would require us to collect interlock data for over 10,000 companies over a 15-year period—a monumental data collection effort for one control variable without solid theoretical justification.

Modeling Approach

To account for variations of the intercept across the N cross-sectional units and the T time periods, and to address problems of heteroskedasticity induced by the use of a proportion as the dependent variable, we tested our hypotheses using generalized estimating equations (GEE) to fit grouped logistic panel-data models of the form

$$\text{logit}(p_{ijt}) = \alpha_{ij} + \mathbf{x}_{ijt}\boldsymbol{\beta}, \text{ with } n_{ijt} \sim \text{Binomial } (N_{it}, p_{ijt})$$

where n_{ijt} is the number of mergers formed between industry i and industry j, N_{it} is the total number of mergers formed by industry i with any industry, and p_{ijt} is the proportion of those mergers that industry i formed with industry j (for a thorough introduction to GEE in the estimation of GLM, see Hardin and Hilbe, 2003). An alternative correction for heteroskedasticity entails performing an arcsine transformation of the proportion, p, defined as 2 arcsin $(\sqrt{p})$ (Cohen and Cohen, 1983). This approach is less desirable than the use of grouped logistic generalized linear models, however, because it does not adjust for the frequency of the event (i.e., the denominator in the proportion). Finally, we tested these models with the multivariate application of the quadratic assignment procedure (MRQAP). Compared with alternative regression techniques, MRQAP is robust to all forms of misspecification of the autocorrelation structure of dyadic data (Krackhardt, 1988) and therefore accounts for unobserved heterogeneity (e.g., bandwagon effects) at the level of individual industries, industry dyads, industry triads, and any other possible combination of industries. In fact, MRQAP provides a conservative test of the hypotheses because it also controls for very unlikely forms of autocorrelation, such as merger behavior in the semiconductor industry being influenced by merger behavior in the chewing gum industry and the poultry and eggs industry. In our results, we report the significance levels derived from the MRQAP procedure. We performed these statistical analyses using Stata's GEE function for the estimation of generalized linear models, in conjunction with Simpson's (2002) implementation of MRQAP for Stata.

An additional modeling choice concerned the time structure of the panel. All the constraint-based predictors of merger behavior in the sample were time-invariant over a five-year period, as input-output data were only available for the years 1982, 1987, 1992, and 1997. Furthermore, the use of a proportion as the dependent variable, combined with the sparseness of merger observations in each of the 468*468 industry-dyads, implied that shortening the time structure of the panel would inflate the number of times the denominator in the proportion equaled zero. Because binomial GLM models cannot estimate likelihoods for observations in which the denominator is zero, excessively short time windows would have increased the noise in the model. To minimize both aggregation bias and noise, we aimed therefore to match the structure of the panel as closely as possible to the structure of the measurements. To that end, we fit the regression models on a panel composed of three time periods: 1985–1990, 1991–1995, and 1996–2000. This time structure mirrors the one adopted by Finkelstein (1997).

To insure the robustness of the results, we also performed two sensitivity analyses. The first concerned the time structure of the panels. We ran the GEE grouped logistic panel-data regression using both eight-year and four-year panels, as well as a five-year moving-average panel. The results of these supplemental analyses were consistent with those obtained using a fixed three-period panel, which we report below. The second sensitivity analysis concerned the risk set, that is, the definition of industry-dyads that were at risk of entering mergers or acquisitions. The risk set can be defined in three ways. In the most restrictive approach, the risk set includes only dyads in which both industries entered into one or more M&A deals with any industry during the time period considered. A second approach includes dyads in which at least one industry entered into one or more M&A deals during the time period considered. The last and most inclusive approach allows all industry-dyads into the risk set. We performed our analyses using all three approaches and obtained largely comparable results. The only exception was the interaction between power imbalance and mutual dependence, which was positive and statistically significant in some models but not in others. We report the findings based on the second approach to specification of the risk set.

RESULTS

Table 1 presents descriptive statistics and correlation values for all variables. Table 2a reports the results from the QAP GEE grouped logistic generalized linear panel models. The regression coefficients reported are unstandardized. Standard errors are noted in parentheses. Because the quadratic assignment procedure produces a non-parametric test of significance, coefficients in our models can be non-significant even when standard tests would indicate statistical significance.

Model 1 includes all control variables. We found no evidence for the effect of industry profitability on the probability of mergers, consistent with prior studies (Pfeffer, 1972; Finkelstein, 1997). We also found no support for other financial and

Table 1

Mean, Standard Deviation, and Correlation of Variables

Variable	Mean	S.D.	1	2	3	4	5	6	7
1. Frequency of mergers of industry i with industry j	0.01	0.16							
2. Power imbalance (normalized)	2.94	4.04	–.01						
3. Mutual dependence (normalized)	–0.35	0.52	.07	.03					
4. Power imbalance × Mutual dependence	–0.96	3.04	.03	–.68	.58				
5. Constraint of industry j over industry i (normalized)	–7.57	7.38	.03	–.15	.39	.32			
6. Profitability of industry i	0.15	0.10	–.01	–.01	.04	.04	.06		
7. Profitability of industry j	0.15	0.10	.00	–.01	.04	.04	.05	–.01	
8. Free cash flow of industry i	0.15	20.45	.01	.00	.00	–.01	.00	–.04	.00
9. S.D. of free cash flow of industry i	0.25	16.89	.01	.01	.00	–.01	.00	–.04	.00
10. Size difference of industry i and industry j	0.00	5.94	.00	.00	.00	.00	.04	–.06	.06
11. S.D. of industry i's size	2.54	6.44	.04	.01	.07	.03	.09	–.09	–.01
12. S.D. of industry j's size	2.54	6.44	.04	.01	.07	.03	.02	–.01	–.09
13. Debt of industry j	0.32	0.12	.00	.02	.01	.00	–.05	.00	.02
14. S.D. of debt of industry j	0.31	0.12	.00	.02	.02	.01	–.05	.00	.02
15. 1991–1995 period	0.29	0.46	.00	–.05	.02	.04	.01	.00	.00
16. 1996–2000 period	0.36	0.48	.01	.02	–.01	–.01	–.05	–.01	–.01

Variable	8	9	10	11	12	13	14	15
9. S.D. of free cash flow of industry i	.99							
10. Size difference of industry i and industry j	.04	.04						
11. S.D. of industry i's size	.05	.05	.65					
12. S.D. of industry j's size	–.01	.00	–.65	.00				
13. Debt of industry j	.00	.00	.03	.00	–.06			
14. S.D. of debt of industry j	.00	.00	.04	.01	–.06	.97		
15. 1991–1995 period	–.02	–.02	.00	–.02	–.02	–.06	–.06	
16. 1996–2000 period	.00	.00	.00	.13	.13	.02	.05	–.48

managerial agency explanations for M&A formation. In light of past support for such factors at the firm level of analysis, these results suggests that financial and managerial agency theories of M&A formation may not be meaningfully studied at the industry level of analysis. This pattern contrasts sharply with the significant effect of variables measuring the power-dependence structure, which indicates that the industry level of analysis is at least appropriate, if not desirable in this context. Specifically, in model 2, the negative and significant coefficient for power imbalance lends support to hypothesis 1, which predicted a negative association between the power difference between potential partners and the likelihood of a merger. Model 3 tests the positive association between mutual dependence and the probability of merger formation predicted in hypothesis 2. The positive and significant coefficient for mutual dependence supports this hypothesis. The effects of power imbalance and mutual dependence remain significant when both variables are included in the same model (see model 4). In model 5, we introduce the interaction term and find no evidence for the moderating effect of power imbalance on mutual dependence.

In model 6, we pit power imbalance and mutual dependence directly against the traditional operationalization of power dependence. Unlike the coefficients for power imbalance and mutual dependence, the effect for the constraint of industry j on industry i is not significant. When tested in the absence of power imbalance and mutual dependence (model 7), however, the effect of the constraint of industry j on industry i is significant, suggesting that past evidence for constraint mea-

Table 2a

QAP GEE Estimation of GLM Panel Models on Proportion of Number of Mergers Formed by Industry i with Industry j (N = 250,234)*

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Power imbalance		–0.30•••		–0.41•••	–0.36•••	–0.43•••	
		(0.02)		(0.02)	(0.02)	(0.02)	
Mutual dependence			0.96•••	1.11•••	1.20•••	0.90•••	
			(0.02)	(0.02)	(0.03)	(0.03)	
Power imbalance × Mutual dependence					–0.06		
					(0.01)		
Constraint of industry j over industry i						0.10	0.37•••
						(0.02)	(0.01)
Profitability of industry i	0.79	1.11	0.17	0.56	0.56	0.32	–0.59
	(0.26)	(0.26)	(0.25)	(0.25)	(0.25)	(0.24)	(0.24)
Profitability of industry j	0.93	1.16	0.47	0.75	0.78	0.68	0.51
	(0.24)	(0.24)	(0.23)	(0.22)	(0.23)	(0.21)	(0.24)
Free cash flow of industry i	0.03	0.04	0.06	0.04	0.04	0.04	0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
S.D. of free cash flow of industry i	–0.02	–0.02	–0.06	–0.03	–0.03	–0.03	–0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Size difference of industry i and industry j	0.0018	0.0023	0.0024	0.0028	0.0029	0.0016	0.0028
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
S.D. of industry i's size/1000	0.02	0.02	0.02	0.01	0.01	0.01	0.01
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
S.D. of industry j's size/1000	0.02	0.03	0.02	0.01	0.01	0.01	0.03
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Debt of industry j	–2.94	–4.22	–2.89	–3.98	–3.57	–3.68	–2.91
	(1.06)	(1.03)	(1.10)	(1.01)	(1.03)	(0.98)	(1.05)
S.D. of debt of industry j	2.59	3.70	2.51	3.59	3.24	3.38	2.62
	(1.04)	(1.00)	(1.07)	(0.98)	(1.00)	(0.95)	(1.03)
1991–1995 period	–0.10	–0.16	–0.08	–0.03	–0.02	–0.05	–0.14
	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.07)
1996–2000 period	–0.35	–0.33	–0.34	–0.18	–0.16	–0.14	–0.26
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Constant	–7.05•••	–6.45•••	–6.96•••	–6.13•••	–6.22•••	–5.67•••	–5.64•••
	(0.11)	(0.12)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)
Wald χ^2	232	555	1,999	3,742	3,679	3,795	1,066

• $p < .05$; •• $p < .01$; ••• $p < .001$; two-tailed quadratic assignment procedure significance levels.
* Standard errors are in parentheses. Because the quadratic assignment procedure yields a non-parametric test of significance, coefficients in our models can be non-significant even if standard tests would indicate statistical significance.

sured at the individual level of analysis may have been an artifact of conflating power imbalance and mutual dependence. In addition, power imbalance and mutual dependence yield a sizable improvement of fit over model 7, suggesting that a dyadic specification of the mechanisms through which environmental constraints affect merger behavior enhances the predictive ability of resource dependence.[5]

To ascertain whether power imbalance has a negative effect on the likelihood of constraint absorption irrespective of the direction of imbalance, we ran models 8 though 13. Models 8, 9, and 10 included only observations in which the constraint of industry i over industry j was greater than the constraint of industry j over industry i; models 11, 12, and 13 include only observations in which the constraint of industry j over industry i was greater than the constraint of industry i over industry j.[6] As shown in table 2b, in either set of models, the coefficients for power imbalance and mutual dependence are, respectively, positive and negative, consistent with the results obtained using the entire sample. This finding supports the notion that the greater the power imbalance in a dyad, the less likely it is that the dominant organization

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In supplemental models, we added controls for the concentration ratios of both industry i and industry j. The coefficients for both controls were negative and significant across all models but did not change either the sign or significance of the coefficients for mutual dependence or power imbalance.

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In these models, we excluded dyads in which the constraint of industry i on industry j was identical to the constraint of industry j on industry i. Including these 22,558 dyads did not change the results.

Table 2b

QAP GEE Estimation of GLM Panel Models on Proportion of Number of Mergers Formed by Industry i with Industry j (N = 113,838)*

Variable	Model 8 $C_{i\to j} > C_{j\to i}$	Model 9 $C_{i\to j} > C_{j\to i}$	Model 10 $C_{i\to j} > C_{j\to i}$	Model 11 $C_{i\to j} < C_{j\to i}$	Model 12 $C_{i\to j} < C_{j\to i}$	Model 13 $C_{i\to j} < C_{j\to i}$
Power imbalance	–0.25••		–0.36•••	–0.34••		–0.46•••
	(0.03)		(0.02)	(0.03)		(0.03)
Mutual dependence		0.86•••	1.00•••		0.94•••	1.09•••
		(0.03)	(0.03)		(0.03)	(0.03)
Profitability of industry i	0.37	0.17	0.13	1.31	0.42	0.85
	(0.41)	(0.40)	(0.39)	(0.31)	(0.31)	(0.30)
Profitability of industry j	1.33	0.82	1.05	–0.12	–0.27	–0.20
	(0.30)	(0.29)	(0.29)	(0.39)	(0.38)	(0.34)
Free cash flow of industry i	0.09	0.09	0.08	–0.03	0.07	–0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
S.D. of free cash flow of industry i	–0.07	–0.08	–0.07	0.03	–0.08	0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Size difference of industry i and industry j	–0.0114	0.0009	–0.0017	0.0238	0.0159	0.0213
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
S.D. of industry i's size/1000	0.05•	0.04•	0.03	0.00	–0.01	–0.01
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
S.D. of industry j's size/1000	0.002	0.000	0.000	0.052•	0.046•	0.033
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Debt of industry j	–3.78	–3.10	–4.17	–4.98	–4.21	–3.25
	(1.43)	(1.59)	(1.47)	(1.50)	(1.56)	(1.47)
S.D. of debt of industry j	2.61	1.50	2.96	5.07	4.40	3.55
	(1.40)	(1.55)	(1.44)	(1.44)	(1.50)	(1.42)
1991–1995 period	–0.09	–0.06	–0.02	–0.10	–0.04	0.00
	(0.10)	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)
1996–2000 period	–0.31	–0.39	–0.23	–0.15	–0.18	–0.03
	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)	(0.11)
Constant	–6.11•••	–6.44•••	–5.78•••	–6.38•••	–7.06•••	–6.16•••
	(0.16)	(0.16)	(0.16)	(0.17)	(0.16)	(0.16)
Wald χ^2	708	1,333	1,861	562	1,262	1,934

• $p < .05$; •• $p < .01$; ••• $p < .001$; two-tailed quadratic assignment procedure significance levels.
* Standard errors are in parentheses. Because the quadratic assignment procedure yields a non-parametric test of significance, coefficients in our models can be non-significant even if standard tests would indicate statistical significance.

will acquire the dependent organization or that the dependent organization will successfully acquire the dominant organization.

Finally, to shed light on the magnitude of the effects of the main variables in our model, we performed an analysis of predicted changes in the probability of a merger induced by mutual dependence and power imbalance. For power imbalance, the predicted probability of a merger at the median of the distribution is 0.0014. At one standard deviation from the median, the probability is 0.00075, indicating that a one-standard-deviation increase away from the median in power imbalance reduces the probability of a merger by 53 percent. For mutual dependence, the predicted probability of a merger at the median of the distribution is 0.0015. At one standard deviation from the median, it is 0.0021, indicating that a one-standard-deviation increase away from the median in mutual dependence increases the probability of a merger by 42 percent.

DISCUSSION AND CONCLUSION

In this study, we aimed to tap the unrealized potential of resource dependency as a powerful explanation of interfirm relationships. We were motivated by the expectation that the

explicit recognition of power as an inherently dyadic phenomenon would allow us to resolve several conceptual ambiguities in the resource dependence model and to reconcile past theoretical developments and empirical findings within a coherent framework. The study offers two distinct theoretical contributions to resource dependence accounts of interorganizational action. First, the revised resource dependence model demonstrates that both power imbalance and mutual dependence are necessary constructs in producing a thorough theoretical account of power and dependence at the dyadic level. Merely considering the reciprocal dependencies of two actors is, in and of itself, insufficient to represent the power-dependence structure in a dyad. The dependence of i on j and the dependence of j on i are building blocks of the two theoretically relevant dyadic constructs of power imbalance and mutual dependence. Similarly, considering only one of the two dyadic constructs is also insufficient, because power imbalance and mutual dependence shape interorganizational action according to distinct mechanisms.

Second, the revised resource dependence model specifies the theoretical scope of the distinct effects of mutual dependence and power imbalance. We classified interorganizational action into operations aimed at restructuring dependencies unilaterally and bilaterally and operations aimed at using power while leaving the dependence structure unaltered. Drawing clear boundary conditions for the revised resource dependence model has two important implications. First, it allows us to resolve the seeming contradiction between the findings of this study and those stemming from prior tests of resource dependence. Second, it makes the revised model applicable across a wide spectrum of interorganizational responses to resource dependencies.

Based on these theoretical advancements, the revised resource dependence model addresses the puzzling question, arising from the original version of the theory, concerning how and why the more powerful organization would enter into constraint-absorption operations with the dependent organization and thus surrender its power and the advantageous exchange conditions it yields. This puzzle emerged from individual-level analyses of constraint absorption that did not recognize the distinction between different configurations of power imbalance and mutual dependence. These analyses found that an increase in the constraint suffered by firms increased their tendency to absorb firms in the constraining industry. A fully specified dyadic model of dependence demonstrates, instead, that constraint-absorption operations are significantly less likely as the power difference between potential partners increases and significantly more likely between firms in mutually dependent industries. In this sense, we amend the notion that constraint-absorption operations, such as mergers and acquisitions or joint ventures, are fruits of dependence and its converse, power. The critical underlying driver of constraint absorption is mutual dependence; in fact, unbalanced power hinders constraint absorption.

Seen as such, the concept of mutual dependence equips us to understand why firms seek long-term agreements and

when attempts to form such ties succeed. The concept of power imbalance helps us to understand the flip side of the conventional questions: that is, why do firms resist certain interorganizational actions, and when do attempts to pursue such actions fail? Furthermore, compared with the traditional operationalization of constraint at the individual level that characterizes most studies, our results based on two distinct measures of power imbalance and mutual dependence add substantial explanatory power to resource dependence theories of constraint absorption.

Limitations and Future Research

Despite the theoretical contributions of this study, the empirical analysis employed here is subject to limitations. The measures of constraint we adopted in this study suffer from the same problems that have plagued past investigations of dependence in interfirm behavior (Pfeffer, 1972; Burt, 1983; Finkelstein, 1997). Although we used a more fine-grained definition of industry boundaries than previous studies did, we still followed the approach of scholars who preceded us by classifying merger partners according to the primary industry in which they operate. Our measure, therefore, is not sensitive to the fact that most leading U.S. firms are diversified, and it is inaccurate to think of their behavior in their primary industry without reference to how they are situated in other markets. Although following the approach adopted in previous research allowed for a direct comparison with past studies that tested the conventional formulation of resource dependence theory, the measurement error stemming from this methodological choice might have prevented us from fully appreciating our companies' sources of attractiveness as merger partners. While greater nuance in the measurement of resource dependence is quite challenging, future research will be able to thoroughly clarify the role of constraint in interfirm behavior only by attending to these methodological issues.

Another interesting direction for future work concerns the relationship between resource dependence theories and theories of the embeddedness of economic exchanges in social relations, a phenomenon of demonstrated importance in interfirm behavior (Granovetter, 1985; Uzzi, 1996, 1997). The revised resource dependence model suggests that actors in high mutual dependence dyads are on average more likely to face uncertainty than actors in low mutual dependence dyads. Consequently, actors in high mutual dependence dyads are more likely to merge. The embeddedness view suggests that, to the extent that actors develop trusting relations, they will be able to overcome problems of uncertainty and opportunistic bargaining. Those successful actors will reduce uncertainty in the flow of needed resources by relying on social norms of cooperation and reciprocity and hence should rely less on formal long-term contractual arrangements. This notion suggests a testable hypothesis according to which the effects of embeddedness should be strongest under conditions of high mutual dependence. In this sense, embeddedness does not exclude but, rather, complements resource dependence mechanisms for interfirm action. Though the industry level of analysis employed here is not

appropriate for the study of embeddedness of personal relationships, future research at the firm level can fruitfully address this hypothesis.[7] Indeed, past interorganizational research conducted at the firm level of analysis—where the role of embedded personal relations can be analyzed meaningfully—suggests that both resource dependencies and social-structural factors help to explain patterns of interorganizational exchanges. Although the inclusion of social-structural mechanisms does not diminish the explanatory power of the resource dependence determinants of interfirm behavior (Gulati, 1995), further research addressing the interaction between the two is needed (Piskorski and Anand, 2004).

Resource dependence theory is also highly complementary with transaction cost economics, particularly with respect to the bilateral dependence associated with asset specificity (see footnote 1). An integrated look at resource dependence and transaction costs would allow us to explore the role of ex-ante power imbalance on the ways in which firms seek to protect their ex-post specific investments. Specifically, we suspect that firms with ex-ante power may resist integration efforts designed to protect specific assets. Even though the powerful actor would benefit from integration in order to reap the benefits of asset-specific investments, such integration would also prevent the actor that is more powerful ex-ante from exploiting the less powerful one. To the extent that the benefits of integration are smaller than the losses associated with the inability to exploit, we should expect that actors with ex-ante power will seek to avoid such agreements, even though such actions are inefficient from the point of view of the dyad. Future research should examine whether this hypothesis is borne out with data.

The dyadic approach adopted in this study can also be applied to the analysis of triads of power relations. In an interesting extension of resource dependence theory, Gargiulo (1993) showed that when obstacles exist to the formation of a direct tie with the constraining party, the constrained actor can reduce uncertainty in the procurement of needed resources by building a cooptive relationship with a third player that controls the constraining party, thus using two-step leverage. The support we provide for the negative effect of power imbalance on the ability to leverage mergers as a response to environmental dependencies points to two-step merger strategies as a potential tool to pursue desirable but reluctant merger partners. Specifically, for a merger to be a viable option, organizations in a position of dependence may increase their attractiveness as merger partners by acquiring a third-party organization that provides critical resources to the targeted organization. Such a two-step strategy may help reduce the power asymmetry that constitutes a sizable obstacle to the viability of mergers and acquisitions as instruments for reducing uncertainty in procuring critical resources. Future research documenting empirically the actual use or the potential effectiveness of such indirect power strategies could usher in a new set of tactics of intercorporate integration.

Our analysis of power dependence is not necessarily restricted to the study of firm dyads. The results of this investigation

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One of the reviewers suggested using geographic distance between industries as a proxy for social mechanisms behind M&A behavior. From the COMPUSTAT database, we retrieved zip codes for all firms across the 468 industries in our dataset. We then obtained the latitude and longitude for each of the firms and used them to calculate the distance between every firm in each of the 109,278 industry dyads. The distances between every possible combination of firms in each industry dyad were averaged in the variable "mean distance." Including this control for interindustry geographic distance did not change the coefficients of other variables in any of the models we considered. In addition, the regression coefficient for mean distance was positive, contrary to what the theory of embeddedness postulates. This odd result concerning interindustry geographic distance is a further indication that embeddedness—like financial and managerial agency explanations for M&A formation—may not be meaningful at the industry level of analysis.

invite us in particular to extend our understanding of the relationship between dependency and economic action to network positions. Two or more actors jointly occupy the same network position when they have similar relations with each actor in the network. The power of joint occupants of network positions is therefore a function of all dyadic ties that link one position to all other positions in the network. Progressing from the dyadic to the positional level of analysis can extend the applicability of power imbalance and mutual dependence constructs to a variety of phenomena, such as industry profitability, which has been a primary arena for the application of power-dependence notions to the macro study of structural inequality in economic systems (Burt, 1983). Past research has traditionally conceptualized industry profitability as a function of the constraint suffered by an industry vis-à-vis all other industries in an economic system, without taking into account the reciprocal constraint that the focal industry imposes on all others. In a study of price-cost margins in the American economy, however, Piskorski and Casciaro (2004) provided support for the distinct positive and negative effects of power imbalance and mutual dependence, respectively, on industry performance. Such findings further encourage the adoption of a dyadic conceptualization of constraint to illuminate behavior and outcomes of both dyads and network positions.

Resource dependence theory rightfully stands as a classic contribution to organizational discourse. Pfeffer and Salancik (1978) offered one of the richest, most comprehensive accounts of organizational life. Not only did they provide a comprehensive theoretical statement of power at the organizational level, they also brought it to life with nuanced descriptions of an array of tactics through which organizations manage the external environment. It is wasteful to relegate such foundational work to the margins of theoretical development and empirical research. It is therefore the responsibility of organizational scholars to develop an increasingly precise, theoretically sound, and empirically viable statement of the resource dependence model to ensure its continued relevance. The reformulation advanced in this paper solidifies the theoretical and empirical bases on which to reinstate resource dependency explanations of interfirm action at the core of organizational research.

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APPENDIX A: Interpretation of Prior Tests of Constraint Absorption

Let $y_{i\to j}$ be the likelihood of firm i entering a constraint absorption operation with firm j, $C_{j\to i}$ a measure of dependence of firm i on firm j, and $C_{i\to j}$ a measure of firm j's dependence on firm i. According to the theory proposed in this paper, $y_{i\to j}$ should be empirically modeled as

$$y_{i\to j} = \alpha\left(\left|C_{j\to i} - C_{i\to j}\right|\right) + \beta\left(C_{j\to i} + C_{i\to j}\right)$$

We now seek to rewrite the equation in terms of the two variables $C_{i\to j}$ and $C_{j\to i}$. Because the equation contains an absolute value term, it has to be rewritten into two equations: one when $C_{j\to I} > C_{i\to j}$ and one when $C_{j\to I} < C_{i\to j}$. This separation yields:

for $C_{j\to i} > C_{i\to j}$

$$y_{i\to j} = \alpha\left(C_{j\to i} - C_{i\to j}\right) + \beta\left(C_{j\to i} + C_{i\to j}\right)$$

$$y_{i\to j} = \alpha C_{j\to_i} - \alpha C_{i\to j} + \beta C_{j\to i} + \beta C_{i\to j}$$

$$y_{i\to j} = (\alpha + \beta)C_{j\to i} + (\beta - \alpha)\, C_{i\to j}$$

for $C_{j\to i} < C_{i\to j}$

$$y_{i\to j} = \alpha\left(C_{i\to j} - C_{j\to i}\right) + \beta\left(C_{j\to i} + C_{i\to j}\right)$$

$$y_{i\to j} = \alpha C_{i\to j} - \alpha C_{j\to i} + \beta C_{j\to i} + \beta C_{i\to j}$$

$$y_{i\to j} = (\beta - \alpha)C_{j\to i} + (\alpha + \beta)C_{i\to j}$$

When the two equations are considered in a single equation, regardless of the levels of imbalance between i and j, they are essentially summed together. This summation yields:

$$y = (\alpha + \beta)C_{j\to i} + (\beta - \alpha)C_{i\to j}$$

$$y = (\beta - \alpha)C_{j\to i} + (\alpha + \beta)C_{i\to j}$$

$$y = 2\beta C_{j\to i} + 2\beta C_{i\to j}$$

This implies that when the underlying equation is estimated using the constituent dependencies $C_{i\to j}$ and $C_{j\to i}$, the coefficient estimates essentially capture the causal effect of mutual dependence (given by β) and not of power imbalance.

APPENDIX B: Board Interlocks and Constraint Absorption

If interlocks are substitutes for constraint absorption, their omission from the model affects our findings, as illustrated in figures B.1, B.2, and B.3. In all figures, the interlock entails i having a seat on j's board, and constraint absorption entails i acquiring j. It is assumed that the relationship between power imbalance and the probability of i having a seat on j's board is positive if i is more powerful than j, and negative if i is less powerful than j.

Figure B.1 illustrates how the positive coefficient of mutual dependence as a predictor of constraint absorption is underestimated if interlocks are omitted. Similarly, figure B.2 shows that the negative impact of power imbalance favoring j on the likelihood of i acquiring j would also be underestimated if interlocks were omitted. Figure B.3 illustrates, instead, how the negative impact of power imbalance favoring i on the likelihood of i acquiring j would be overestimated if interlocks were omitted. That is, most of our findings (models 1–7 and 11–13) are actually conservative if one assumes that interlocks are substitutes for constraint absorption. The only results that might be overestimated are those in which the power imbalance favors the potential acquirer (models 8–10). But because we find consistently negative coefficients whether power imbalance favors the acquirer or the target, and the theory suggests a negative relationship with constraint absorption regardless of the direction of the power imbalance, it is difficult to argue that the support for H1 is an artifact of interlocks being omitted from the analyses.

Figure B.1. Mutual dependence, board interlocks, and constraint absorption.

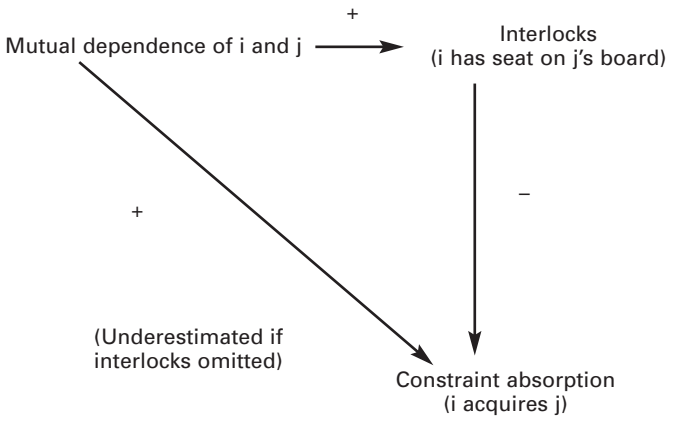

Figure B.2. Power imbalance favoring target j, board interlocks, and constraint absorption.

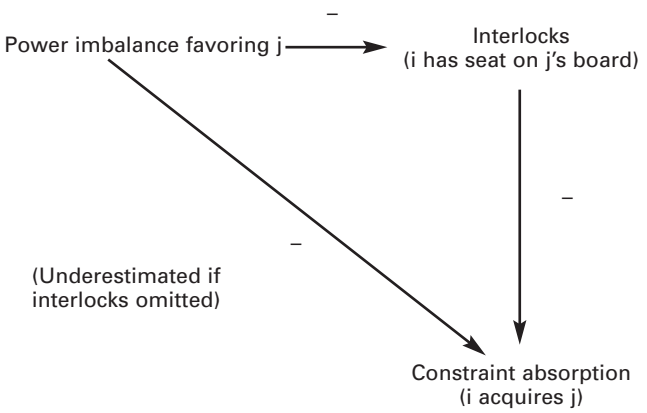

Figure B.3. Power imbalance favoring acquirer i, board interlocks, and constraint absorption.