More than Just a Tie: The Role of Content and Context in Firm Alliance Networks

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More than Just a Tie:  
The Role of Content and Context in Firm Alliance Networks

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Abstract

Researchers often rely on social network theory to understand both the structural antecedents and outcomes of strategic alliances. However, many alliance studies only emphasize the existence of a tie and rarely theorize further about their efficacy. This failure to consider the role and variation of *content* in alliance ties (e.g. resource commitment, trust, information exchange) may hinder the application of various network theories at the interorganizational level. Further, interorganizational network studies have largely neglected the role of the external environment, or *context*, in interfirm collaboration and often fail to consider how the external environment shapes firm network actions and outcomes. Thus, interorganizational network research should consider both tie *content*—the type of tie(s) formed between firms—and tie *context*—the external environment as a network level exogenous factor—in interorganizational network research theory building. In chapter 1, I introduce and test a multilevel, environmental contingency approach to strategic alliance networks that integrates both tie content and context to explain how optimal network structure develops over time and how firms can expect to derive network benefits. In doing so, I show that organizations must carefully consider both the nature of their ties and the competitive context in which these firms reside. I test this framework in a series of two studies in chapters 2 and 3. In chapter 2, I explore how key network exogenous factors, namely institutional context and the task environment, influence alliance partner selection strategies. In chapter 3, I integrate tie content, strategic alliance governance structure and status asymmetry, to explore how these two factors jointly interact with the external environment to influence the legitimacy outcomes of firms. I show that both alliance partner selection strategies and whole network level external factors largely influence potential firm partnering outcomes. In doing so, this study introduces an integrated environmental contingency
and tie context-centric approach to network theory, answering calls in the literature for a more fine-grained approach to social networks in the interorganizational context.
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I. Introduction

Researchers often rely on social network theory to understand both the structural antecedents and outcomes of interfirm collaboration and competition. This perspective is particularly useful in the context of firm strategic alliances. However, some challenges may exist when applied to the interorganizational context. First, many alliance studies only emphasize the existence of a tie and rarely theorize further about their efficacy. This failure to consider the role and variation of content in alliance ties (e.g. resource commitment, trust, information exchange) may significantly hinder the application of various network theories at the interorganizational level. Second, interorganizational network studies have largely neglected the role of the external environment, or context, in interfirm collaboration. Studies that do take into consideration key network exogenous factors largely source these from the organizational level and often fail to consider how the external environment may shape firm network actions and outcomes. Taken together, these key concerns in the interorganizational networking literature may be responsible for many disparate findings across studies. Thus, it is important that interorganizational network research considers both tie content—the type of tie(s) formed between firms—and tie context—the external environment as a network level exogenous factor—in interorganizational network research theory building. In this dissertation, I tease out these two considerations in a three chapter study.

In Chapter 1 I introduce and a multilevel, environmental contingency approach to strategic alliance networks. I draw from the sociology literature and present a modified Coleman’s boat framework that integrates both tie content and context to explain how firms can expect to derive network benefits and how optimal network structure develops over time. In doing so, I show that organizations must carefully consider both the nature of their ties and
the competitive context in which these firms reside, rather than simply focusing on forming ties with other firms and expecting to derive similar network benefits across industry environments. I introduce a micro to macro relational model that emphasizes the role of the external environment in driving firm motivations which in turn translates into specific industry-wide networking behaviors and actions that aggregate to network level change over time. Specifically, I investigate how shifts in the external environment lead to changes in risk perceptions of alliances which can inform firm motivations for forming alliances in the first place. I argue that firms then modify their alliancing strategies and networking behaviors based upon their motivations for forming alliances and these networking behaviors aggregated to the intra-industry network level results in shifts in the overarching alliance network itself. I conclude chapter 1 with a discussion of the firm performance implications that result from the firm’s networking behaviors in the context of their global network structures.

In Chapter 2, I focus on the front end of the model presented in chapter 1 by investigating the role of the external environment in influencing alliance network actions. I test my hypotheses on a sample of firms in the biotech industry spanning from 2008 to 2018. In this study, using temporal exponential random graph models, I explore how key network environmental factors, namely the institutional context and the external task environment, work to shape the context of alliance network formation and thus lead to shifts in both the structure of the interorganizational network itself and to alliance partner selection strategies that firms seek to pursue. I find that munificence, dynamism, and institutional strength all have significant direct effects on the likelihood of tie formation in the biotech industry. Moreover, while status asymmetry between alliance partners does not appear to be a key
driver of alliance formation, I do observe that the interaction between status asymmetric partnering the external environment does drive the propensity for tie formation in the biotech industry. Taken together, these findings suggest that the external environment plays an important role in shaping alliance networks and firm alliancing behaviors.

In chapter 3, I shift to the second half of the model presented in chapter 1 to explore the consequences of alliance tie formation in the biotech industry. Specifically, I focus on legitimacy-based outcomes as legitimacy is an important, but often neglected, consequence of alliance formation. I actively focus on integrating tie content, namely alliance governance form, into the network contingency framework introduced in chapter 1 in order to explore how both external environment and tie-content specific factors jointly influence firm level alliance performance with respect to legitimacy. Utilizing media sentiment of firms as a proxy for normative legitimacy, I show that both status asymmetric partnering strategies and whole network level external environmental factors largely influence potential firm partnering outcomes and can lead to higher levels of firm competitiveness through enhanced legitimacy. However, my findings also indicate that the resource dependence perspective, a commonly utilized framework in the alliance literature, may not fully explain the relationship between the external environment and alliance outcomes. Rather, it may be more appropriate to utilize an institutional lens when evaluating the efficacy of strategic alliances with respect to legitimacy outcomes.

In summary, this dissertation introduces a framework for an integrated environmental contingency and tie content-centric approach to network theory in predicting both the formation and outcomes of strategic alliance networks. Chapter 1 proposes a multilevel environmental contingency framework that will allows researchers to synthesize the
underlying mechanisms that encompass the antecedents, structuring process, and the consequences of alliance formation. Chapter 2 tests the front end of this framework by examining how the external environment drives alliance formation tendencies in the biotech industry. Finally, chapter 3 examines the implications of both alliance formation context and content on the legitimacy outcomes of alliances. In doing so, I answer calls in the literature for a more fine-grained approach to social networks in the interorganizational context.
II. Chapter 1: More than Just a Tie: The Role of Content and Context in Firm Alliance Networks

A. Abstract

Firms often seek partnerships to gain a competitive advantage. However, little is understood about what partner selection strategies lead to a successful alliance. Many studies only emphasize the existence of a tie and rarely theorize about the nature of the alliance itself. Additionally, research has largely neglected the role of the external environment in interfirm collaboration. Taken together, these concerns lead to just a partial picture of how firms can leverage their external relationships. In this dissertation, I explore the role of both tie content—the type of alliance tie(s)—and tie context—the external environment—in interorganizational alliance networks. I explore how firm managers gain access to important social capital benefits that result from alliances and that they must carefully consider both alliance form and the competitive context in which their firms reside rather than simply focus on forming ties with other firms and expecting to derive similar benefits across industry environments. In doing so, this study introduces theory for an integrated environmental contingency and tie content-centric approach to strategic alliances, answering calls for a more fine-grained application of social networks in the interorganizational context.

Keywords:
Strategic alliances; network theory; interorganizational networks
B. Introduction

Firms are often faced with the challenge of understanding when and how they should partner with other firms. Organizational scholars have long recognized strategic alliances, “firms entering into voluntary arrangements that involve exchange, sharing, or codevelopment of products, technologies, or services (Gulati, 1998: 148), as important tools for the development and implementation of firm strategies (e.g. Gulati, Nohria & Zaheer, 2000; Provan, Fish & Sydow, 2007). Over the last two decades, theory and empirical findings related to why firms choose to enter into alliances with other firms (e.g. Rosenkopf & Padula, 2008), when they choose to end them (e.g. Polidoro, Ahuja & Mitchell, 2011) and the manner in which they influence firm performance (e.g. Sytch & Tatarynowicz, 2014) have greatly improved our understanding of strategic alliances. As firms engage in partnerships with one another, complex interorganizational networks have developed as a result. Network theory has been particularly helpful in understanding both the structural antecedents and consequences of interfirm collaboration and competition (e.g. Gulati, 1998; Gulati, Nohria & Zaheer, 2000; Provan, Fish & Sydow, 2007). Complementing a wide variety of theoretical frameworks such as resource dependence theory (Hillman, Withers & Collins, 2009; Pfeffer & Salancik, 1978), agency theory (Eisenhardt, 1989; Jensen & Meckling, 1976), and institutional theory (DiMaggio & Powell, 1983), the network perspective has facilitated researcher’s understanding of how firms interact and manage relationships with other firms in their external environments. Scholars have explored how both positional network attributes such as centrality influence firm behaviors and outcomes (e.g. Ahuja, 2000a; Gulati, 1995; Koka & Prescott, 2008; Macaulay, Richard, Peng & Hasenhuttl, 2018; Shipilov, 2009; Zaheer & Bell, 2005) and how firms act as independent social actors capable of unilaterally and actively modifying their relationships and influencing their
networks (e.g., Gulati, & Srivastava, 2014; Lipparini, Lorenzoni & Ferriani, 2014), These distinct research streams indicate that network effects are inherently multilevel with firms both being influenced by and directly influencing their overarching global networks (Contractor, Wasserman & Faust, 2006; Kim, Oh & Swaminathan, 2006).

Despite major progress in the alliance literature, several challenges still exist in tying firm actions and responses to global network structure. More specifically, the majority of strategic alliance network studies have approached from the “top-down” perspective whereby researchers investigate how the overarching network structure influences firm actions and responses or from the “bottom-up” perspective whereby cumulative firm actions and responses aggregate to the network level to illicit shifts in network structure over time. While these independent literature streams are well developed, the literature has generally neglected to account for the fact that both the “bottom-up” and “top-down” perspective likely occurs iteratively over time. Thus, we have limited understanding of how these micro and macro level linkages occur in alliance networks and how they inform specific firm actions and responses with regard to alliance structuring decisions. This lack of understanding surrounding the intricacies of individual firm action in the context of their overarching strategic alliance networks is concerning because it prevents scholars from developing a comprehensive understanding of how firms modify their individual behaviors in order to manage their respective alliance networks. This shortcoming is even more deeply highlighted by the fact that recent advancements in network analytical approaches have allowed for the simultaneous testing of empirical relationships across multiple network levels of analysis (e.g. Kim, Howard, Cox Pahnke & Boeker, 2016). In this paper, I argue that we can develop a more complete understanding of the micro and macro linkages of alliance network
structures by developing an integrated framework that takes into consideration two key
understudied mechanisms of network development.

First, the basis of tie formation often varies markedly from one research context to the
next with few studies taking into consideration the environmental context in which
interorganizational tie formation occurs. (for an exception: Tatarynowicz, Sytch & Gulati,
2016). The overarching environmental context that firms reside in refers to traits and
characteristics of their industry environment that largely drive firm actions and responses to
uncertainty and risk. Traditionally, network researchers have studied variables of importance that
stem from the factors external to the network (exogenous) or from the network itself
(endogenous). However, the network perspective often assumes that key network exogenous
factors are largely sourced from firm level node attributes such as type, size or location and not
at the whole network level (Monge & Contractor, 2003; Contractor, Wasserman & Faust, 2006).
Thus, researchers have often accounted for only the attributes of the organizations themselves
and not on the overarching characteristics of the external environment that firms are situated in
when examining strategic alliance network development. The role of the external environment,
such as the institutional (DiMaggio & Powell, 1983) and task environment (Dess & Beard, 1984)
in network development still remains underexamined. This omission risks inconsistencies in the
application of network principles across interorganizational networks.

Second, while prior research offers valuable insights into the underlying mechanisms that
form interorganizational networks, research has rarely moved beyond examining the mere
presence or absence of ties in networks (Shipilov & Li, 2014). Moreover, interorganizational
network ties have been measured in a number of ways, largely inconsistently throughout the

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1 Network studies have just begun to more actively integrate environmental factors into firm networking behaviors (e.g. Tatarynowicz, Sytch & Gulati, 2016)
interorganizational network literature (Shipilov & Li, 2014). For example, while researchers have begun to recognize that network “frictions” such as knowledge complexity, differing node motivations, or embeddedness may hinder the exchange of information between firms (Ghosh & Rosenkopf, 2014) and that some network types may be more predictive of organizational outcomes of interest than others (Shipilov, 2012), studies often fail to theoretically justify the manner in which they expect network exchanges (e.g., information exchange) to occur. Some studies may even neglect to distinguish between network ties that function as “pipes” of resource exchanges or flows in which information is transferred between firms and those that function as “prisms” of status and legitimacy in which mere affiliation leads to spillover effects that may not necessarily include the bidirectional exchange of information (Podolny, 2001). Failure to account for tie content can significantly hinder the efficacy of network theory in the context of interorganizational network research, leading to ambivalent or even conflicting conclusions.

These oversights represent a significant challenge in interorganizational network research. It is not always valid to treat organizations simply as individual actors residing within a network, as tie formation mechanisms often considered at the individual level may not be prevalent across environmental contexts (Ghosh & Rosenkopf, 2014). Accordingly, researchers have called for more nuanced approaches to network theorizing by suggesting that research should more carefully consider the complex nature of network ties on firm outcomes (Shipilov, 2012). Thus, in this paper, I develop a multilevel contingency perspective of alliance tie formation and network evolution that actively integrates both micro and macro level linkages and processes by integrating theorizing about environmental context and tie content.

Building on prior research, I utilize a sociological “Coleman’s Boat” perspective (Coleman, 1990) to examine the antecedents of interorganizational network relationships and
explore how dyadic- and whole network-level analyses interact with one another. In his seminal work, Coleman (1990) introduced a simplified model that explains how macro level factors inform micro level actions and behaviors which in turn lead to shifts in macro-level phenomena. The main premise of my theory is that network level exogenous factors such as institutional pressure (DiMaggio & Powell, 1983) and the task environment (Dess & Beard, 1984) serve as important contextual drivers in influencing firms’ motivations to form strategic alliances. Firm alliance motivations, in turn, determine individual firm strategic alliancing behaviors in terms of both the type of alliance partners they prefer as well as the form of alliance firms engage in. Finally, dyad level firm actions aggregated to the global network level will influence the development of the interorganizational network over time and lead to differential performance outcomes for firms who follow optimal alliance partnering strategies compared to firms that do not. I bring together these ideas in a multilevel framework of interorganizational alliance formation and network evolution that is rooted in the sociology literature and that takes into consideration both network level exogenous context factors and dyadic level tie content factors.

While organizational researchers have demonstrated that successful organizations must form and manage external ties in order to obtain and maintain competitive advantage (e.g. Das & Teng, 2000; Mowery, Oxley & Silverman, 1996), I argue that these organizations must also carefully consider both the nature of these ties and the competitive context in which these firms reside. In doing so, this framework makes several key contributions to both the strategic alliance and network literature. First, this study contributes to the strategic alliance literature by explicitly linking contextual factors in the firm’s environment to firm networking behaviors. Although studies in the past have begun to explore the role of environmental factors (Koka, Madhavan & Prescott, 2006; Koka & Prescott, 2008; Tatarynowicz, Sytch & Gulati, 2016), I expand upon this
by introducing theory that explores the underlying mechanisms, namely motivations, that link the external environment to strategic alliancing behaviors. In utilizing this approach, I present a cohesive framework that effectively combines resource dependence and institutional logics to explain how firms both influence and are influenced by their respective social networks. Thus, this paper serves an important purpose in linking the external environment to firm networking motivations and behaviors.

Second, beyond environmental context, this study also theorizes about the content of alliance ties as well. Because the external environment allows us to better understand the underlying motivations for alliance formation, we can more reliably predict the specific alliance structuring and partner selection strategies that firms are likely to employ. While networks have long been recognized to function as both “pipes” of information exchange and “prisms” of status and reputation spillovers, few studies have theorized and distinguished between these two purposes in the alliance literature. By examining motivations, we can more effectively predict the distinct alliancing behaviors in terms of both alliance structuring decisions and partner selection strategies as firms pursue different alliance goals. Thus, this framework allows us to not only understand when alliance ties are expected to form, but also how firms are expected to utilize their respective alliance tie networks.

Finally, this multilevel framework also introduces a contingency perspective to alliancing outcomes which may assist in better understanding when and how we can expect network dynamics to influence important firm outcomes. While previous studies have alluded to observed inconsistencies in the influence of networks on firm actions and outcomes (e.g. Gosh & Rosenkopf, 2014), this paper provides theoretical support for the importance of “fit” between networks, networking behaviors, and firm performance outcomes. In so doing, this study lays
important groundwork for further empirical evaluation and helps to explain some of the inconsistencies in alliance network studies.

In the following sections, I begin with a review of strategic alliances in the network context. I then introduce the Coleman Boat model as a framework for understanding and linking the overarching environment to micro level firm alliancing actions. I conclude with a discussion on alliance performance implications and present a path for future research directions.

Background

Alliances are “an interorganizational relationship where two (or more) organizations pool their resources to achieve some common objective through formal or informal coordination (Shipilov & Gawer, 2020: 95).” Generally, research on strategic alliances have been approached from the resource dependence perspective whereby firms are motivated to seek external ties with other firms who have access to complementary resources in order to facilitate the development of private synergies between alliance partners (Drees & Heugens, 2013; Gulati, 1995; Hillman, Withers & Collins, 2009; Pfeffer & Salancik, 1978). As these firms become more effective in gaining access to external resources, they accrue power and competitive benefits relative to other firms in their environment (Drees & Heugens, 2013; Gulati, 1995; Pfeffer & Salancik, 1978).

Several distinct streams of research have developed in the strategic alliance literature. The first stream of research investigates factors that are generally considered the antecedents of alliance formation (e.g. Eisenhardt & Schoonhoven, 1996; Gulati, 1995; Ranganathan, Gosh & Rosenkopf, 2018; Stern, Duckerich & Zajac, 2014) including firm motivations for forming alliances (e.g., Oliver, 1990; Dacin, Oliver & Roy, 2007) and strategic partner selection (e.g. Bierley & Gallagher, 2007; Shah & Swaminathan, 2008). The bulk of studies that investigate this area have utilized the resource dependence and transaction cost economic perspectives to
understand why firms choose to form alliances and who they choose to partner with (Chen & Chen, 2003; Hillman, Withers & Collins, 2009; Inkpen, 2005).

The second stream of research focuses on the outcomes of strategic alliances whereby researchers investigate outcomes such as firm performance (Goerzen, 2007; Lavie, 2007; Lee, 2007), innovativeness (Joshi & Nerkar, 2011; Stuart, 2000), or successful market entry (García-Canal, Duarte, Criado & Llaneza, 2002). While this literature stream appears to have received the bulk of attention from researchers, many of these findings are limited as it is difficult to link strategic alliance outcomes to data readily available from archival sources and the definition of alliance success can vary across contexts (Lunnan & Haugland, 2008). Thus, many alliance studies often rely on survey methods in order to collect richer qualitative data (e.g., Ariño, 2003; Li, Jiang, Pei & Jiang, 2017).

The network theory lens has been particularly helpful in bridging these two approaches to strategic alliances by allowing researchers to better understand why firms enter alliances (Rosenkopf & Padula, 2008), when they choose to end them (Polidoro, Ahuja & Mitchell, 2011), and their influence on firm performance (Sytch & Tatarynowicz, 2014). Networks in the context of strategic alliance have been investigate as both the drivers of firm outcomes (i.e. Network Theory; Borgatti & Halgin, 2011) and as the primary outcome of interest (i.e. Theory of Networks; Lipparini et al.,2014; Gulati, & Srivastava, 2014). Network theory has important implications for strategic alliance formation and outcomes as it has allowed researchers to show that interorganizational networks operate as both sources of opportunity (Uzzi, 1996) and constraint (Kim, Oh & Swaminathan, 2006). While networks facilitate the identification of compatible resources and complementary markets (Mitsuhashi & Greve, 2009), network embeddedness may also limit partnering opportunities or ready access to non-local resources.
(e.g. Granovetter, 1985). However, one key challenge that this perspective fails to address is the contingent nature of network effects. Additionally, it fails to take into consideration that firms may engage in different networking strategies based upon their own perceptions of risk (Das & Teng, 2001) or alliance motivations (Dacin, Oliver & Roy, 2007; Oliver, 1990). Knoben and colleagues (2019) found that firms in the same network may engage in different strategic alliancing strategies based upon factors such as network accuracy (i.e., having a clear understanding of what their networks look like) or where they source information from and that optimal networking strategies may vary from firm to firm. Moreover, networking behavior has also been associated with negative consequences for firms as interorganizational partnerships also carry the risk of knowledge spillover and appropriation (Lavie, 2006) or free riding issues (Gulati & Singh, 1998; Meuleman, Lockett, Manigart & Wright, 2010).

While the literature on the structural antecedents and consequences of networks is relatively well developed in the strategic alliance literature, few studies have attempted to take a more dynamic approach that considers how firms are both shaped by and actively shape their respective external networks (for an exception, see Tatarynowicz, Sytch & Gulati, 2016). Moreover, it is also important to consider how the external environment – the context in which firms and their interorganizational networks form – may influence optimal strategic alliance partnering strategies. For example, Tatarynowicz and colleagues (2016) find that technological dynamism in an industry can radically influence firm actions, responses, and overarching network structures over time above and beyond organizational attributes and suggest that an environmental contingency perspective of interorganizational network evolution may be appropriate. The authors’ findings suggest that high levels of technological dynamism lead firms to pursue more open ego networks which in turn enhance network connectedness whereas lower
levels of technological dynamism lead to more conservative partnering strategies and weaker network connectedness. Using a similar theoretical perspective, Koka and colleagues (2006) suggest that an individual firm’s propensity for tie formation may shift in response to changes in environmental uncertainty and munificence. Thus, factors in the overarching external environment are likely to guide shifts in the interorganizational alliance network over time.

Beyond the external environment, it is also important to consider the nature of the ties that firms choose to utilize. Strategic alliances encompass a broad range of interorganizational partnerships that may range from non-equity based agreements (e.g., Li, Eden, Hitt & Ireland, 2011; Oxley & Sampson, 2004; Sampson, 2007) to equity based joint ventures (e.g. Polidoro, Ahuja & Mitchell, 2011). The levels of resource and time commitment – and the richness of information exchange – between alliance partners can vary drastically as a function of the type of alliance firms choose to enter. While many studies generally identify a specific form of alliance tie (e.g. studies develop networks based upon a more narrowly defined tie form), few studies theoretically distinguish and justify the expected amount of resources and information exchange that these ties are likely to convey between partners. For example, firms that seek to minimize appropriation risks may prefer to utilize arm’s length, non-equity-based alliances of limited scope which in turn lead to much lower levels of information exchange between partners (Li, et al., 2008). Alternatively, Transaction Cost Economics approaches suggest that firms may, in fact, prefer to develop strong, equity-based alliances in order to reduce knowledge appropriation risks (Chen & Chen, 2003). Some studies have also begun to explore the role of network ties as important tools to signal status or legitimacy (e.g. Dacin, Oliver & Roy, 2007; Hubbard, Pollock, Pfarrer & Rindova, 2018), thus reducing the need for information exchange between firms. The relative network positions of potential strategic alliance network partners may also have much to
offer in terms of understanding the depth and types of information exchange that are likely to occur between alliance partners (Lin, Yang & Arya, 2009; Shipilov, Li & Greve, 2011). Thus, in this paper I seek to explain how the external environment serves as an important determining factor of firm actions and responses and interorganizational network evolution. In doing so, we can better understand how individual firms respond to perceived shifts in their external environment and modify their partner selection strategies which in turn leads to overarching shifts in industry level network structures over time.

C. Dimensions of Interorganizational Alliance Network Evolution

I present a multilevel model that takes into consideration the role of the environmental context, tie content, and resulting overarching shifts in the external environment utilizing a slightly modified variation of Coleman’s boat (also referred to by some scholars as the Coleman’s bathtub; Coleman, 1990; Ramström, 2018; Raub & Voss, 2017). Coleman (1990) introduced the boat diagram in order to better understand the underlying mechanisms that link macro- and micro-level sociological phenomena. As demonstrated in Figure 1, Coleman’s diagram encompasses two levels of analysis (the macro and the micro) and suggests that macro level relations (A to D relations in Figure 1) occur as a function of micro level processes (A to B, B to C, and C to D relations in Figure 1).

***Insert Figure 1 about here***

Coleman introduced his model as a framework to explain fundamental challenges in the sociology literature in understanding how macro level environmental changes occur in a society. In his model, he proposed that these shifts happen as a result of an aggregation of micro level actor behaviors and responses. In his book, Coleman applied his model to social revolutions to explain how improving social conditions lead to revolutions. He explained that loosening social
freedoms on a population may create a scenario of *relative frustration* whereby individuals who begin to gain access to new freedoms become frustrated as they recognize the extent of their previous deprivations (e.g. individuals enter node B in figure 1 where their perceptions and attitudes change). This in turn leads to growing discontent whereby individuals act upon their frustrations by engaging in increasingly disobedient behavior (node C in figure 1) which eventually aggregates to large-scale actions such as revolutions or riots (node D in figure 1).

In the organizational context, scholars have often treated the strategic actions of individual firms as micro level processes that aggregate to macro level industry or societal phenomena and effects. Coleman considered organizations themselves to be important social actors at the individual level due to the role they played in society and their ability to act as social actors and bring about large scale social change (Coleman, 1990; Ylikoski, 2016). Thus, the Coleman boat model is particularly well suited to explain how overarching industry level factors – namely the external environment – lead to shifts in the structure of interorganizational strategic alliance networks by way of aggregated organizational actions and responses. Finally, I also discuss firm performance implications as another important, firm level outcome that is primarily driven by both the specific partnering strategies firms pursue as well as the overarching structure of the interorganizational network that firms occupy.

***Insert Figure 2 about here***

The Coleman boat model adapted to the study of interorganizational network evolution is presented above in Figure 2. The overarching phenomena that this model explores is to identify the way in which the external environment – treated as a network level exogenous variable – influences the development of strategic alliance networks over time and leads to differential firm
performance outcomes as they seek to gain and maintain strategic competitiveness in a given industry.

The *external environment* (corresponding to node A in figure 1) is an important contextual factor that shapes firm perceptions about resource access, expected interdependencies, and risks and uncertainties associated with doing business in a given industry. Favorable external environments have been linked to higher levels of industry performance (Castrogiovanni, 1991; Rosenbusch, Rauch & Bausch, 2013), greater access to resources (Dess & Beard, 1984; Pfeffer & Salancik, 1978), and lower levels of competitive rivalry (Hambrick, 1983; Porter, 1980). In contrast, unfavorable environments give rise to higher levels of uncertainty, poorly performing industries, and greater risk for firm insolvency. It is likely that the firm’s perception of the external environment will serve as an important guiding factor in shaping their alliancing preferences and behaviors at the firm level. Several studies (Brouthers, Brouthers & Werner, 2002; Das & Teng, 1996; 1998; 2001, Delerue, 2004) have already shown that the external environment may enhance or mitigate perceptions of performance and reputational risk. Thus, I expect that the state of the external environment will be a major driving factor of eventual shifts in interorganizational network structure at the macro level and firm preferences, strategic actions and responses, and firm performance at the micro level.

Moving to the micro level, I identify three important dimensions. First, I recognize the role of *strategic alliancing motivations* (corresponding to node B in Figure 1) and argue that the external environment likely shapes the preferences and motivations of firms who choose to engage in strategic alliances. Resource dependence theory suggests that firms are often motivated to engage in alliances in order to secure their competitive positioning in a given industry and better manage resource dependencies (Pfeffer & Salancik, 1978). However, while
firms may be primarily focused on securing resources in order to maintain their competitiveness, they are often faced with unique environmental contingencies that can lead to differing motivations for alliance formation and, thus, different overarching alliance strategies. Drawing from the literature on motives for interorganizational partnerships (e.g., Hagedoorn, 2002; Oliver, 1990; Tsang, 1998), I recognize two general motivations in forming alliances. The first, resource acquisition motives, consists of motivations related to the bidirectional exchange of knowledge resources, capabilities, and core competencies that result in enhanced levels of competitive advantage. The bulk of the literature on strategic alliances generally assumes that firms often engage in alliances for resource acquisition motives. For example, firms may seek to enter alliances with other firms in order to develop gain access to resources possessed by other firms (Das & Teng, 1998) or to capitalize on expected synergies (Nielsen, 2005; Panico, 2017). In these circumstances, strategic alliance network ties likely function as “pipes” whereby knowledge and information resources are bidirectionally exchanged by alliance participants (Podolny, 2001).

However, researchers have also found that firms may engage in strategic alliances without the intent of exchanging knowledge and information resources (Dacin, Oliver & Roy, 2007). Rather, firms may choose to engage in strategic alliances in order to establish or improve their legitimacy in a given industry or market (Hubbard, Pollock, Pfarrer, & Rindova, 2018). In such cases, these firms may pursue legitimacy acquisition motives. In other words, firms may simply engage in strategic alliances to signal to important stakeholders that they are legitimate. When firms pursue legitimacy motivations, their network ties will likely function as prisms whereby bidirectional exchange is not required to occur for firms to achieve their alliancing goals (Podolny, 2001). Alliancing motivations can serve as an important mechanism for
distinguishing between ties that may be more inclined to transfer knowledge or resources, as we may expect with resource acquisition motivations, as opposed to ties that may more directly rely on status or reputational spillover effects in order to gain the desired effect, as one may expect with legitimacy acquisition motivations. Thus, motivations for forming alliance ties may provide additional insight into whether firms seek to utilize their network ties as sources of information flow as opposed to ties as sources of status or legitimacy (Podolny, 2001).

By introducing this mechanism of firm motivations that serve as a mediator between macro level external environment factors and firm actions and behaviors, we are better equipped to understand how firms may choose to utilize their external networks. Firm alliancing motivations are likely to drive specific strategic alliance behaviors (corresponding to node C in Figure 1).

I identify two important firm-level strategic alliancing strategies that are likely to result in shifts in overarching network structure at the industry level. One key decision driven by a firm’s alliancing motivation is partner selection. Many studies have examined partner-specific factors that influence partner selection, including resource complementarities and compatibility (Chung, Singh & Lee, 2000; Rothearmel & Boeker, 2008), geographical proximity (Reuer & Lahiri, 2014), and partner similarity (e.g. Chung, Singh & Lee, 2000). However, scholars have recognized that firms also take into consideration alliance network-specific factors, including structural (common third party ties, structural holes; Shipilov, Li & Greve, 2011), relational (repeating past ties, propensity to maintain existing ties; Gulati, 1998), and positional embeddedness (centrality; Gulati & Gargiulo, 1999; Ahuja, 2000a).

In this paper, I focus on the role of positional embeddedness in strategic partner selection. To date, scholars have established that more central firms are generally considered to be more
desirable alliance partners who are more likely to provide performance benefits from strategic alliancing activity (Ahuja, 2000b; Gulati, Nohria & Zaheer, 2000). However, ties that form among central partners may also give rise to appropriation concerns or power asymmetries (Ahuja, Polidoro & Mitchell, 2009) that hinder the effectiveness of alliancing activity, particularly when centrality asymmetries exist (Polidoro, Ahuja & Mitchell, 2011). Thus, it is also important to consider that some firms may not choose to seek out central network partners. Indeed, Knoben and colleagues (2019) found that firms may choose to engage in differing partner selection strategies within the same industry alliance network. Thus, comparative centrality of alliance partners is an important strategic choice that firms must decide upon when engaging in strategic alliances.

Beyond partner selection, strategic alliance governance form is one such important strategy that firms must decide upon when engaging with their external environments (Albers, Wohlgezogen & Zajac, 2016; Das & Teng, 2001). The governance structure of the alliance that firms choose to engage in plays an important role in understanding the richness of information exchange and expected resource commitments between firms in a given strategic alliance. Thus, the structure of the alliance itself speaks to the information content that is exchanged through network ties. Although there are numerous forms of alliance governance forms that have received attention in the broader strategic alliance literature [e.g. R&D partnerships (e.g., Hagedoorn, 2002), joint ventures (e.g., Inkpen & Currall, 2004), buyer-supplier relations (e.g., Carr & Pearson, 1999, Villena, Revilla & Choi, 2011)], I will limit my theorizing to equity versus non-equity alliance governance types. Equity-based alliance forms require specified financial commitments from all partner firms whereas non-equity-based alliances do not require financial resource commitments from alliance partners (Das & Teng, 2000). Equity commitment
(or lack of) is an important characteristic for evaluating perceived risk (Das & Teng, 2001), trust (Gulati, 1995), longevity (Rahman & Korn, 2014), and performance (Osborn & Baughn, 1990) of a given alliance.

Taken together, the comparative centralities of strategic partners and alliance tie structuring will jointly lead to topological network shifts (Corresponding to node D in Figure 1) of the strategic alliance interorganizational network over time.

Finally, at the micro level, individual firm performance is an important factor that allows us to better understand how shifts in the external environment that lead to overarching structural changes in network topology may both directly and indirectly influence firm performance over time. I further discuss how firm performance outcomes from alliances function as a result of partner selection and strategic alliance structuring strategies that complement the overarching topological structure of the interorganizational networks that they reside in. Or, more simply put, firms that engage in partner selection and alliance structuring strategies under certain network level topological conditions are more likely to perform better over time relative to firms that do not demonstrate such alignment. In the following sections, I expand upon the relationships outlined in the model above and introduce propositions that lay the groundwork for future empirical inquiry into these multilevel relationships.

D. Theory Development

The External Environment and Firm Alliance Motivations

Numerous studies have evaluated the strategic alliance structuring process (e.g. Das & Teng, 1998; 2001; Parkhe, 1993). Researchers have investigated motivations and goals of firms as both an antecedent of strategic alliances themselves as well as the strategic alliancing structuring choices that firms choose to engage in (Lin & Darnall, 2015; Teng & Das, 2008). Firms have
been shown to form ties with other firms in order to pursue objectives related to independence, uncertainty reduction, and to enhance efficiency (Baker, 1990). In her influential study, Oliver (1990) identified six general motivations that drive firms to engage in interorganizational partnerships. For the purpose of this paper, I limit the application of her framework to strategic alliances.

In Oliver’s (1990) typology, *necessity* indicates that firms form interorganizational ties in order to meet legal or regulatory requirements. For example, in some industry sectors, foreign firms looking to enter into the Chinese market were required to form joint ventures with Chinese partners who maintain majority ownership (Lorange & Contractor, 1988; Shane, 2018, Xia, Tan & Tan, 2008). These joint ventures allow firms to gain access to required resources (Oliver, 1990). Alternatively, interorganizational relationships may be formed for *asymmetry* reasons whereby firms form relationships with other firms in order to exercise power or control over the partner firm or their industry. Firms may also choose to engage in partnerships with other firms for *reciprocity* motivations (Oliver, 1990). In such cases, both firms involved in the partnership are motivated to pursue cooperation, collaboration, and coordination. Firms that are motivated to improve or streamline their own internal operations may be motivated by *efficiency* reasons whereby they seek to improve their internal operations and are less concerned with joint reciprocal benefits or drive to maintain power and control (Oliver, 1990). Taken together, necessity, asymmetry, reciprocity, and efficiency broadly represent the firm’s desire to gain access to resources or markets in their quest for competitive advantage. Thus, in this framework, I classify these more broadly as *resource building* motivations.

However, organizations may also seek to pursue interorganizational relationships for *stability* or *legitimacy* reasons (Oliver, 1990). In such cases, firms are simply responding to
uncertainty in the case of stability concerns or seeking to increase their respective status or legitimacy in cases of legitimacy motivations (e.g. Baum & Oliver, 1991). While the first four motivations are primarily concerned with producing resources or outcomes, stability and legitimacy are based primarily upon maintaining status without necessarily the intention of producing or enhancing existing resources, capabilities and competencies. While the majority of alliance studies have emphasized the role of resource building motivations in strategic alliance formation, recent studies have also suggested that firms may also form alliances for legitimacy reasons as well (Dacin, Oliver & Roy, 2007; Hubbard, Pollock, Pfarrer & Rindova, 2018). In such cases, alliances serve an important legitimizing role in which alliance networks may be perceived as “prisms” of reputation and status rather than as “pipes” of information and resource exchange (Podolny, 2001). Indeed, studies have suggested that firms may enter alliances in order to develop soft power as a mechanism for influencing their external environments rather than addressing external resource dependencies (Santos & Eisenhardt, 2009).

Firm alliancing actions and strategies are likely to vary as a function of their motivations for forming an alliance in the first place. While there is a relatively well-developed stream of literature that examines alliancing behaviors for resource building motivations, theory related to legitimacy building motivations is relatively underdeveloped. Moreover, few studies have investigated why or how firm alliance motivations may vary. For example, the resource dependence theory perspective argues that firms may be more inclined to form ties in environments that they perceive to be less predictable or more tumultuous (Pfeffer & Salancik, 1978) and yet other studies have indicated that tie formation in a network may increase as environments become more munificent (Koka et al., 2006).
Firms often face complex competitive environments and are subjected to varying levels of resource access (Hillman, Withers & Collins, 2009). The resource dependence framework assumes that firms are endowed with different varieties and levels of important resources which better positions them to compete in some markets than others (Cui, Yang & Vertinsky, 2018; Drees & Heugens, 2013; Gulati, 1995; Gulati & Singh, 1998; Pfeffer & Salancik, 1978). Further, resources tend to be relatively immobile which makes it difficult for some firms to develop capabilities or competencies purely in-house (Pfeffer & Salancik, 1978). Thus, firms must look externally in order to gain access to the resources that they need.

Because firms must look to the external environment in order to satisfy resource needs, shifts in the external environment may have a strong influence on the specific motivations firms have to form alliances in the first place. More specifically, both the external task environment and the institutional environment are likely to be two primary drivers of differing firm strategic alliance motivations. In the following section, I link components of the task and institutional environment to alliancing motivations to show that firm motivations for entering interorganizational partnerships are likely to vary as a function of their external environments.

**The Task Environment**

The task environment refers to the overarching conditions of the environment in which firms reside with regard to resource availability and access (e.g. munificence; Aldrich, 1979; Dess & Beard, 1984; Pfeffer & Salancik, 1978), uncertainty and unpredictability of future environmental conditions (e.g. dynamism; Thompson, 1976; Rosenbusch et al., 2013), and the “amount and diversity of information, knowledge, resources, and capabilities needed to successfully operate in an industry” (e.g. complexity; Rosenbusch et al., 2013: 638). Munificence measures the ability of the task environment to support sustained growth in an industry (Aldrich, 1979; Nielsen &
Nielsen, 2013) and has been widely utilized by researchers at both the global and individual firm level to explore the extent to which tie formation and network density is likely to change in response to changes in munificence (Koka, Madhaven & Prescott, 2006).

Munificent environments have been linked to higher occurrences of external partnering strategies among firms (Koka et al., 2006) which in turn lead to denser networks. However resource dependence logic suggests that firms may be less inclined to engage in alliance formation in munificent environments because the resources they need tend to be readily available and firms have more options for developing them (Castrogiovanni, 1991), thus reducing their need to form strategic alliances in order to access them (Park & Mezias, 2005). Tying environmental munificence to firm alliancing motivations, it is likely that firms will feel less pressured to form strategic alliances in response to resource building motivations.

At the same time, legitimacy building motivations may become more salient in munificent environments as the number of competitors in a given environment is likely to be higher (Porter, 1980) and firms may feel more pressure to cement their respective positions in the competitive environment by focusing on forming alliances to satisfy legitimacy based needs since resource acquisition is relatively easily accomplished without the need to form alliances. Because legitimacy is often transferred from one entity to the next and requires endorsements from important evaluators in the environment, alliance partnerships are likely to be important sources of legitimacy for firms (Dacin, Oliver & Roy, 2007). In more competitive environments that may result from higher levels of munificence, legitimacy is a key prerequisite of competitiveness and a lack of legitimacy may lead to significant disadvantages to firms. Thus, while firms may be less inclined to form alliance ties for resource access needs, the need for enhanced legitimacy may become more salient as legitimacy is a resource that cannot be easily
obtained singularly and often requires endorsements from important stakeholders in the external environment.

*Proposition 1: Environmental Munificence is a) negatively related to resource building motivations of alliance formation and b) positively related to legitimacy building motivations of alliance formation.*

To date, few studies have investigated how the other factors of the task environment, namely complexity and dynamism, influence firm strategic decision making. Environmental complexity refers to the extent to which organizations face a heterogeneous environment (Mintzberg, 1979). Complex environments demand higher levels of coordination and can make it more difficult to develop strategic decisions that bring consistent results (Child, 1972). Environmental complexity tends to increase based upon new technological advancements or when new substitutes or complementary goods enter the market leading to increased heterogeneity of competitors (Castrogiovanni, 2002). Firms that deal with a wide variety of suppliers or consumers occupy more complex environments than those that do not (Dess & Beard, 1984). Complex environments also imply that firms are more likely to face resource dependency challenges that require seeking and developing capabilities outside of organizational boundaries, leading to higher levels of interdependence among firms (Pfeffer & Salancik, 1978). This is primarily due to the added challenges that are introduced from interaction with a more heterogenous collection of suppliers, buyers, and even competitors which requires the firm to constantly develop and build upon their existing resource stores in order to adapt to the constantly changing and increasingly complex markets that they operate in. Accordingly, complex environments tend to place higher demands on firms to pursue differentiation strategies and constantly seek to reconfigure and add to their existing resource stores in order to maintain
their competitiveness (Rosenbusch et al., 2013). As a result, firms may feel pressured to engage in strategic alliances in order to satisfy resource building concerns. Studies have found that forming ties, particularly with high status actors (e.g. Provan, Beyer & Kruytbosch, 1980), can be an effective strategy in managing complex external environments (Wry, Cobb & Aldrich, 2013). In cases of high environmental complexity, firms may be more inclined to form alliances in order to secure access to important external resources.

In contrast, forming alliances based on legitimacy building motivations may be less of a concern in particularly complex environments. Complex environments introduce an additional degree of uncertainty and difficulty in identifying the best path forward for gaining or enhancing legitimacy in an industry. In complex environments, satisfying legitimacy building motivations can be difficult to accomplish because “both the organization and the legitimating environment may lack the information and the cognitive structure required to understand, interpret, and evaluate each other” (Kostova & Zaheer, 1999: pg. 67), thus making it more difficult for firms to effectively carry out legitimacy building motivations in complex environments.

Proposition 2: Environmental complexity is a) positively related to resource building motivations of alliance formation and b) negatively related to legitimacy building motivations of alliance formation.

The final component of the task environment is dynamism. Environmental dynamism captures both the rate and unpredictability of environmental change (Dess & Beard, 1984; Rosenbusch, Rauch & Bausch, 2013) and shifts in dynamism often complement shifts in environmental complexity (Castrogiovanni, 2002). Firms that operate in unpredictable or rapidly changing environments are more likely to seek stability by forming ties with other firms (Pfeffer & Salancik, 1978). By frequently forming new ties, firms are better equipped to extract
important network resources from increasingly unpredictable external environments. Thus, firms are likely to increase their alliancing activities for resource building motivations.

However, because dynamic environments introduce higher levels of uncertainty to firms (Wang, Choi & Li, 2008), firms may be less inclined to form alliances for legitimacy building reasons. Indeed, some literature has suggested that firms in uncertain environments may be less inclined to form ties, particularly when trust is an important determining factor of alliance success (Beckman, Haunschild & Phillips, 2004; Koka et al., 2006). Krishnan, Geyskens and Steenkamp (2016) found that firms were more inclined to employ stronger alliance governance forms under conditions of moderate to high levels environmental uncertainty and low to moderate levels of behavioral uncertainty. Performance was worst when both forms of uncertainty were high or low. Thus, these findings indicate that firms who enter alliances in uncertain environments often face greater challenges in ensuring alliance success. While firms enter alliances for resource building reasons in dynamic environments under conditions of necessity, they may be less motivated to form ties for legitimacy building reasons.

As described above, dynamic environments reduce the efficacy of trust-based alliance governance and encourage firms to enter into more structured agreements with one another. Because resource building motivations are likely to be a key concern in dynamic environments, I anticipate that resource building motivations are likely to be the dominant whereas legitimacy building motivations will be less prevalent in dynamic environments due to enhanced perceptions of uncertainty and risk. Following the logic discussed previously, legitimacy building motivations require that firms know enough about the environment that they can reasonably determine a path for achieving legitimacy outcomes through strategic alliances.

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2 Behavioral uncertainty refers to uncertainty surrounding the expected behaviors of alliance partners. This has also been broadly referred to as relational risk in the alliance literature (Das & Teng, 2001).
Because dynamic environments are both unpredictable and turbulent, firms are likely to perceive resource building motives as more salient in order to maintain their competitiveness rather than legitimacy building motives.

*Proposition 3: Environmental dynamism is a) positively related to resource building motivations of alliance formation and b) negatively related to legitimacy motivations of alliance formation.*

**The Moderating Role of the Institutional Environment**

Thus far, I have discussed a firm’s preferences for resource building motivations over legitimacy building motivations in pursuing strategic alliances in complex or dynamic environments. However, it is important to note that perceived legitimacy is of paramount importance when competing in a given industry, and that firms in increasingly complex and dynamic environments often face enhanced legitimacy concerns, despite their preference for pursuing resource motivations over legitimacy motivations in their partnering strategies. One such factor that will likely moderate this relationship between the task environment and firm alliancing motivations is the institutional environment that firms coexist in. The institutional environment refers to the overarching rules of the game that all firms in an industry are subject to (Scott, 1995). The strength of the institutional environment has been shown to influence a variety of firm decisions related to factors ranging from international market entry mode (Davis, Desai & Francis, 2000; Ferreira, Dan & Jang, 2007) to specific ownership strategies (Arslan, 2012). Institutions play an important role in influencing firm decision making because they set forth a system of norms, rules, and justifications that outline the environment for firms (Hoffman, 1999). Firms often engage in activities or strategies that follow and reinforce institutional norms because this legitimates their own activities and allows them to survive (DiMaggio & Powell, 1983; Vermeulen, Van Den Bosch & Volberda, 2007; Wooten and Hoffman, 2008). In doing so,
firms often find themselves subject to institutional pressures to engage in behaviors that broadly represent the status quo.

Institutions can represent a broad array of entities including governments, agencies, professions, interest groups, and even public opinion (Oliver, 1991). Institutional strength, or the overarching pressures firms face to conform to institutionalized norms and expectations in an industry environment, is sourced from these external institutions. In order to build upon the concept of institutional strength, I draw from the political science literature. Levitsky and Murillo (2009) recognize weak institutions are those that inadequately or inconsistently apply rules, regulations, and norms and conceptualize institutional strength across two dimensions. Enforcement, the first dimension, refers to the extent to which rules and norms are followed by the actors in the environment. Enforcement is likely to be higher when firms actively comply with rules and regulations or when the punishments for not doing so are high. The second dimension, durability, refers to the extent to which institutions are stable and time enduring. Durability is particularly important as it introduces an element of predictability to the environment that allows managers to more accurately gauge whether or not strategies will have the intended consequences. Accordingly, the strongest institutional environments are those that have high levels of both enforcement and durability whereas weak institutions lack both enforcement and durability.

Drawing parallels to the management literature, I expect that these two dimensions strongly influence the levels of isomorphic pressures present in an industry. Firms that operate in environments characterized by weak institutions tend to be subject to lower levels of legal and regulatory pressures (e.g. coercive isomorphism) due to lack of enforcement, and may also feel less pressure to pursue strategies of conformity in order to gain legitimacy (e.g. mimetic
isomorphism) due to lack of durability. Finally, firm managers may also be less likely to follow
normative paths of career progression and training (e.g. normative isomorphism; DiMaggio &
Powell, 1983) due to lack of durability of institutions as well.

Scholars have found that the institutional environments largely influence how firms
change over time because of isomorphic pressures that drive perceptions of both political and
institutional legitimacy (Mizruchi & Fein, 1999). While strong institutional environments may
constrain firm action in a way that requires the firm to abide by institutional norms and
expectations (Othman, Darus & Arshad, 2011), they also allow firms to more clearly assess the
norms and expectations within an industry and more accurately predict the outcomes of strategic
actions.

I expect that institutional strength will positively influence the firm’s propensity to form
alliances for legitimacy building for two reasons. First, strong institutions will likely reduce the
surrounding the legitimating mechanisms that exist in the firm’s external environment. This is
likely to be particularly influential in environments characterized by high levels of complexity or
dynamism because it allows firms to better understand how they can effectively implement the
more risky legitimacy building alliances in the presence of strong institutions that serve as
important legitimacy grantors. Second, strong institutional environments also make the need for
legitimacy through conforming more salient. Neo-Institutional theory has long recognized that
legitimacy is the key to survival for organizations and that firms often act as social actors to
actively gain and maintain legitimacy as a key resource (DiMaggio & Powell, 1983). Strong
institutional environments are likely to enhance the firm’s perceived need for legitimacy and lead
to stronger isomorphic pressures that firms must conform to in order to survive. Thus, strong
institutional environments will strengthen the positive relationship between environmental
munificence and legitimacy building motives and weaken or reverse the negative relationship of environmental dynamism and complexity with legitimacy building motives.

Proposition 4a: Strong institutional environments will strengthen the positive relationship between environmental munificence and legitimacy building motivations.

Proposition 4b: Strong institutional environments will weaken or reverse the negative relationship between environmental complexity and dynamism on legitimacy building motivations.

Alliance Motivations and Strategic Alliance Partner Selection Strategies

Prior research has extensively examined how firms engage in strategic partner selection in alliances. For example, researchers have shown that partner selection is strongly driven by alliance motivations (Das & Teng, 2001), geographic proximity (Reuer & Lahiri, 2014; Sorenson & Stuart, 2001), levels of perceived managerial and relational trust (Das & Teng, 2001), and expected synergies or complementarities (Ahuja, Polidoro & Mitchell, 2009; Mindruta, Moeen & Agarwal, 2016; Parmigiani & Mitchell, 2009; Shah & Swaminathan, 2008). In addition to the factors mentioned above, interorganizational networks may also serve as an important tool in understanding strategic partner selection.

Interorganizational networks affect a multitude of strategic alliance outcomes. For example, firms primarily concerned with forming strategic alliances in order to further develop and build upon existing products and services are more likely to form ties with firms that have similar resource bases, configurations of ties, and product markets because these firms are better equipped to exploit existing knowledge (e.g. Lavie & Rosenkopf, 2006; Rothaermel & Deeds, 2004). In contrast, firms that tend to develop strong exploration-based outcomes tend to do so by partnering with dissimilar firms (Lavie & Rosenkopf, 2006). Beyond similarity/dissimilarity of
network ties, firms also commonly seek out prominent partners, or those “central” to the network in order to attain legitimacy or status benefits (Dacin, Oliver & Roy, 2007; Lin, Yang & Arya, 2009; Shipilov, Li & Greve, 2011).

To date, two different types of generalized partnering strategies based upon relative centrality have been observed by social network researchers. The first is the concept of preferential attachment (Barabási, 2009; Barabási & Albert, 1999; Newman, 2001), which occurs when actors in a network seek out ties to the most prominent (e.g., central) actors. In this way, centrality begets centrality such that central nodes become more central as less central nodes seek to establish ties with central actors in order to derive greater network benefits, leading to a “Matthew effect”\(^3\) of status and information access (Azoulay, Stuart & Wang, 2013; Merton, 1968). Firms that utilize a strategy of preferential attachment are more likely to benefit from signaling and legitimacy spillover effects (e.g. Lin, Yang & Arya, 2009), but are often subjected to higher threats of power and information asymmetries (Muthusamy & White, 2005).

Alternatively, some firms may prefer to follow a strategy of assortative mixing (Newman, 2002). When assortative mixing is prevalent in a network, central firms will tend to form alliances with similarly central firms while less central firms will tend to form ties with similarly decentral firms. While this pattern of partner selection may be less likely to lead to significant status or legitimacy spillover effects, it also greatly reduces the risks associated with status and power asymmetries that one would expect to observe more frequently in preferential attachment scenarios. In turn, this enhances trust and reciprocity between firms and will be more likely to facilitate the rich exchange of information. Studies of alliance formation have found that firms

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\(^3\) The Matthew Effect of Accumulated Advantage recognizes that high status actors will continue to gain prestige at an exponential rate compared to lower status or new entrant actors. The saying “The rich get richer and the poor get poorer” is a commonly utilized adage in reference to the Matthew Effect. The Matthew effect’s name was inspired by the parable of the talents where it appears in the New Testament (Matthew 25: 14-30).
tend to prefer to ally with other firms who have similar levels of centrality (Gulati & Gargiulo, 1999).

Partner selection strategies are likely to change based upon the motivations of the firms that enter alliances. With regard to resource building motivations, firms are primarily concerned with gaining access to important resources that allow them to cement their competitive positions within a given industry. While resource building motivations are more likely to result in equity-based alliance structures, it is also likely that firms may aim to partner with specific types of firms. As described earlier, key risks associated with alliances include appropriation concerns (Gulati & Singh, 1998; Lavie, 2006, Chen & Chen, 2003) and power asymmetries (Ahuja, Polidoro & Mitchell, 2009), which may hinder alliance success.

With respect to relative network positions, partnerships with firms of equal status or centrality within the network may be preferred by firms over partnering with firms that are much more or much less central. By selecting similarly central firms, appropriation concerns (Ahuja, Polidoro & Mitchell, 2009; Chung, Singh & Lee, 2000; Podolny, 1994) and issues that arise from power asymmetries are less likely to occur, thus enhancing the probability of alliance success. Moreover, firms that are positionally similar to one another are more likely to enter the alliance on a relatively co-equal basis, thus reducing potential relational risks. Assortative mixing captures this partnering preference. This partner selection strategy will have several key advantages for firms who are motivated to acquire resources over the course of their alliance. First, it reduces risk perceptions that stem from power asymmetries, which will likely lead to firms being more willing to engage in richer information and knowledge transfer over the course of the alliance, enhancing the likelihood of alliance success (Gulati & Garguilo, 1999).
Second, assortative mixing also implies that firms will likely prefer to partner with other firms that occupy structurally similar positions. This preference towards homophily also aligns with the literature with regard to firms being more motivated to form alliances to obtain complementary resources as firms are more likely to prefer to seek out “similar” partners in cases of dealing with uncertainty that stem from environmental dynamism or complexity (Ahuja, Polidoro & Mitchell, 2009; Gulati & Garguilo, 1999). In other words, firms that choose to engage in strategic alliances for resource access motivations may be more likely to perceive that other similarly central firms will have higher levels of resource complementarities, thus enhancing the probability of reaching resource synergies. Thus, firms primarily driven by resource building motivations will be more inclined to utilize strategies of assortative mixing when choosing strategic alliance partners.

*Proposition 5: Firms primarily driven by resource building motivations are more likely to utilize assortative mixing partnering strategies.*

In contrast, firms that are driven to form alliances to satisfy legitimacy needs are not subjected to the same concerns that occur in alliances formed to ensure access to resources. In such cases, proprietary knowledge and information transfer and joint resource development are not the priorities of firms who seek to enhance their legitimacy. Thus, risks related to unintended knowledge appropriation or power asymmetries are less likely to hinder alliance success.

Importantly, strategic alliances can serve as important signals of legitimacy in various markets, improving stakeholder perception of the firm, and eventually allowing firms to more easily gain access to markets or additional customers in the future (Dacin, Oliver & Roy, 2007).

In order to maximize legitimacy benefits from strategic alliances, firms will likely seek out other, high status actors to partner with. Because legitimacy can be transferred from one
entity to the other (Pfeffer & Salancik, 1978), firms will seek to maximize legitimacy returns by partnering with high status actors. From a network partner selection perspective, this likely means that firms will target other central, high status firms in order to gain maximum legitimacy returns. Central actors in a network are recognized as possessing higher levels of status and reputation which greatly facilitates external perceptions of legitimacy from external stakeholders. Thus, preferential attachment is likely to be an important driver behind strategic partner selection as central actors in a network are best equipped to bestow legitimacy benefits.

Moreover, strategic alliances formed to enhance legitimacy do not carry as many risks associated with status-dissimilar partnerships. While knowledge appropriation and power asymmetries may be key concerns that lead to partnerships with similar-status partners, this is likely to be less of a concern for legitimacy seeking alliances as network ties function as prisms of status exchange in order to be successful rather than as pipes of bidirectional information and knowledge flow (Podolny, 2001). Thus, firms may perceive less risk when legitimacy enhancing motivations drive alliance formation.

Thus, firms that form ties with other firms in order to satisfy legitimacy building needs will be less concerned with potential knowledge appropriation or power asymmetries that may hinder the success of the alliance and more concerned with forming ties with higher status actors in order to benefit from status spillover effects and maximize legitimacy-based outcomes.

**Proposition 6:** Firms primarily driven by legitimacy building motivations are more likely to utilize preferential attachment partnering strategies

Alliance Motivations and Firm Alliancing Structuring Strategies

Beyond partner selection, I now investigate how differing firm motivations will lead to specific firm alliancing actions. Specifically, I investigate strategic alliance governance forms
and partner selection as two important consequences of alliancing motivations that are driven by shifts in the external environment.

Strategic alliance governance forms are often identified as a dichotomy whereby alliances can be broken down into two broad categorizations based upon partner firm resource commitments (Teng & Das, 2008; Dacin et al., 2007). The first category, equity-based alliances, encompasses agreements between firms that involve financial commitments from both firms. Equity-based alliances commonly include strategic partnerships such as joint ventures and minority equity alliances (e.g. Das & Teng, 1996; 2001). Such partnerships tend to have higher levels of interdependence and are often employed as a way to reduce opportunism by requiring relationship-specific investments from both parties (Pisano, 1989). These alliance forms have been tied more strongly to individual firm and dyad level alliance outcomes, but also involve higher levels of risk and greater demands for collaboration between actors in order to be successful (Das & Teng, 1998, 2001; Casciaro, 2003). Alternatively, firms may engage in non-equity-based alliances, which are cooperative agreements between firms that do not involve resource commitments or equity exchanges. Such arm’s length (Gulati, 1998) alliance governance forms tend to allow for greater flexibility and pose lower levels of risk (Osborn & Baughn, 1990). Research and development contracts or licensing agreements are examples of non-equity-based strategic alliances (Das & Teng, 2001).

As described in the previous sections, alliance formation may be driven by resource access or legitimacy building motivations. The formation of an alliance for resource access concerns implies that firms are actively utilizing these ties they form to gain access to important information and resources in order to acquire or maintain their competitiveness in a given market. In such cases, equity-based ties may be more likely to occur among firms motivated gain
access to resources as the success of these relations relies on the efficacy of the bidirectional exchange of information and integration of knowledge between alliance partners (Kale, Dyer & Singh, 2002). Thus, alliance success in this context is dependent upon firms successfully transferring information, knowledge, and competencies to one another over the lifespan of the alliance. This means that rich channels of information exchange, trust, and reciprocity are all important for alliance success (Hagedoorn & Narula, 1996). In order to achieve these results, firms will be more likely to engage in equity-based alliances. Equity-based alliances are more likely to ensure that both parties are motivated to produce the desired outcome and requires buy in from both alliance partners. Thus, it is likely that alliances formed for resource building purposes will be more likely to be equity alliances.

Proposition 7: Firms that are primarily driven by resource building motivations when pursuing collaborative relationships with other firms are more likely to develop equity-based alliances that underscore strong and long-term commitments in interfirm partnerships.

Beyond resource building motivations, researchers have also recognized that legitimacy concerns also have much to offer in understanding why firms seek to form alliances (e.g. Hubbard et al., 2018). Legitimacy is a vital component of organizational success and legitimacy seeking often drives firm behaviors and strategies (Deeplouse, 1996; DiMaggio & Powell, 1984; Johnson, Dowd & Ridgeway, 2006). In recent decades, researchers have recognized that firms seek to form ties with other firms that are not only rich in valuable and unique resources, but also better equipped to convey legitimacy benefits (Podolny, 1994). Studies have shown that strategic alliances serve an important function as a legitimating mechanism for firms (e.g. Hubbard et al., 2018; Dacin, Oliver & Roy, 2007). Generally, firms seek out alliances to fulfill legitimacy needs
when they need to enhance their reputation, survival chances, and to gain competitive advantage (Dacin, Oliver & Roy, 2007). In such instances, firms may be less interested in jointly developing new capabilities or competencies through resource exchange but rather more focused on gaining legitimacy. Forming ties with other high-status firms leads to numerous organizational benefits including higher levels of organizational legitimacy of both the firm (Wiewel & Hunter, 1985) and the industry itself (Sharfman, Gray & Yan, 1991). Moreover, firms that partner with other high-status firms tend to survive longer than those that do not (Uzzi, 1996).

Firms that pursue legitimacy building alliances may be less concerned with the rich transfer of information in the alliance. Whereas some strategic alliance network ties may be perceived as “pipes” from the perspective of the resource dependence theory, others may serve roles as “prisms” from the perspective of institutional theory (Podolny, 2001). While equity alliances resemble a much tighter coupling of firms and greater sharing of information, they are also time and resource intensive relationships that are more difficult to implement, maintain, and terminate (Gulati, 1995). Non-equity alliances, in contrast, require less resource commitment, less risk, and are much easier to terminate. When firms are simply concerned with enhancing their own legitimacy and deriving reputational benefits, they will be less concerned with forming equity-based ties.

**Proposition 8:** Firms that are primarily driven by legitimacy building motivations when pursuing collaborative relationships with other firms are more likely to develop non-equity-based alliances that underscore weak and short-term commitments in interfirm partnerships.
Firm Strategic Alliencing Strategies & Interorganizational Network Change

Shifting focus back to the industry level of analysis, firm alliencing actions aggregated to the whole network level will lead to shifts in the overarching network structure over time. Although research on network evolution is a relatively new area in organizational scholarship, some studies have indicated that network topologies are likely to shift over time in response to changes in the external environment (e.g. Koka et al., 2006; Tatarynowicz et al., 2016). In their recent study, Tatarynowicz and colleagues (2016) noted that shifts in technological dynamism would result in more cohesive, dense network structures over time as firms modify their networking strategies and propensities in response to more dynamic environmental factors.

Specific firm level actions, such as prevalence of equity or non-equity tie formation and strategic partner selection, will jointly work to influence the overarching network topologies of their respective networks. In turn, these network topologies will also influence firm performance over time, leading to higher instances of firms engaging in networking behaviors that will be more likely to optimize their networking strategies. In this section, I link aggregated firm strategic behaviors to two specific network topological factors – namely network centralization and network clustering.

Network centralization refers to the extent to which a single node tends to be more central than all other nodes in the network (Freeman, 1978). Centralized networks exhibit a lack of dispersion, variability, or spread in the way ties are distributed among nodes (Wasserman & Faust, 1994). In the context of interfirm networks, a clear hierarchy system is likely to present itself in the network in which central actors tend to hold higher levels of perceived prominence and status within the network. Centralized networks introduce several potential benefits and drawbacks to information exchange in a network. First, high status actors tend to be more easily
identifiable in centralized networks (Ibarra & Andrews, 1993; Krackhardt, 1990). Thus, can more easily identify optimal network partners, particularly if they are pursuing preferential attachment partner selection strategies. Second, decision making in a centralized network tends to be more streamlined, with actors having a more accurate perception of norms and expectations which radiate from the central parts of the network. Finally, centralized networks equip collectives of firms to better address industry wide threats such as more restrictive regulations as it allows them to jointly shift and align their competitive focus to deal with external threats to the industry (e.g. Holburn & Vanden Bergh, 2008; Kim & Singal, 1993; Shaffer, 1995).

However, centralized networks can also introduce challenges – particularly for actors who occupy the periphery of the network. Generally, information exchange happens at greater rates within the center of the network, with the periphery of the network gaining access last. Moreover, some studies have indicated that innovation development in centralized alliance networks may actually be hindered in the short term (Schilling & Phelps, 2007), indicating that while enforcement of norms is easier to achieve in centralized networks, it comes at the cost of not introducing new and innovative information to the entire network. Finally, centralized network structures have been shown to make cooperative ties more difficult to manage as centralized networks facilitate unidirectional relationships with lower levels of interdependence (Sparrowe, Liden, Wayne & Kraimer, 2001).

With respect to firm networking strategies, it is likely that strategic partner selection, namely relative centrality of preferred alliance partners will result in distinct network topologies over time. For example, firms that seek to form ties with other, similarly central firms, will lead to lower levels of network centralization over time as firms will be more inclined to form ties with other similarly central firms. These strategies of assortative mixing will lead to decentralized
networks over time in which firms exhibit preferences towards partnering with other firms that are of similar status to themselves. In contrast, firms’ pursuit of strategies of preferential attachment (e.g. forming ties with other firms that are more central than themselves) will result in higher levels of network centralization over time. This is due to underlying Matthew effect in which central firms continue to gain prominence and centrality as more firms continue to seek them out as alliance partners.

*Proposition 9a: Prevalence of assortative mixing will be negatively related to alliance network centralization.*

*Proposition 9b: Prevalence of preferential attachment will be positively related to alliance network centralization.*

Beyond network centralization, network clustering is also an important topological characteristic that is likely to change over time as firms utilize different alliance network strategies. Network clustering refers to network actors’ propensity to seek out local ties (i.e. partners in close proximity) in a given subgroup as opposed to bridging ties (i.e. partners that occupy distant locations) and it “captures the degree to which the overall network contains localized pockets of dense connectivity” (Schilling & Phelps, 2007: pg. 1118). In other words, firms may be more inclined to form ties with other firms that occupy a similar structural position in the network in which they are more likely to have higher incidences of shared ties as opposed to seeking out ties with other nodes outside of their respective network communities who lack shared ties. Network actor’s propensity towards clustering leads to network topologies characterized by collections of dense, interconnected communities that are only loosely tied to one another. Because factors such as partner similarity and complementarities are important determinants used in selecting alliance partners, strategic alliance networks tend to be densely
clustered (Schilling & Phelps, 2007) with networks typically exhibiting multiple dense, interconnected communities in a given alliance network.

Clustered networks are associated with several benefits and drawbacks. First, dense interconnected communities within clustered networks provide unique capabilities and access to resources that firms outside of the cluster do not have access to including greater richness and ease of knowledge transfer (Phelps, 2010), and trust and reciprocity norms which can reduce perceived risks in alliances and enhance the probability of successful alliance outcomes (Granovetter, 1992; Gulati, Nohria & Zaheer, 2000; Kale, Singh & Perlmutter, 2000; Phelps, 2010). Moreover, these norms of trust-based knowledge exchange can also greatly increase the perceived scope, uniqueness, and value of knowledge and information network resources that are available (Uzzi, 1996). In clustered networks, firms will be better equipped to assess resource complementarities of potential partners that occupy the same network cluster and members of a cluster are more likely to engage in collective problem-solving and establish richer information channels to facilitate decision making and innovation (Powell & Smith-Doerr, 1994). Thus, clustered networks provide unique advantages to the firms that occupy such clusters and promote higher levels of information exchange between members, thus likely leading to more desirable alliance outcomes.

However, clustered networks can also introduce challenges. While ease of information transfer is a characteristic within clusters, clustered network communities can hinder information access and exchange between clusters (Shipilov, Li & Greve, 2011). This can be particularly challenging when firms seek to develop skills or competencies that are not native to their respective clusters as resources or knowledge is more difficult to access if it resides outside of the network cluster. Moreover, dense clusters also require higher coordination costs as firms
densely interconnected with one another often possess complex, interconnected resource and knowledge pools (Provan, Fish & Sydow, 2007). These network structures may also reduce the potential unique value that can be derived from a given alliance partner as there are likely to be a higher number of alternative partners with similar resources available to firms in clustered networks.

I argue that the overall propensity to form equity- or non-equity-based ties will influence the level of clustering expected to occur in an alliance network. While alliance networks trend towards clustering in general (e.g. Schilling & Phelps, 2007), this may be strongly dependent upon the forms or types of alliances that are prevalent in a network. More specifically, I argue that prevalence towards equity-based alliance ties will be more likely to aggregate into a more clustered network than non-equity ties. This preference towards forming ties with close neighbors will be particularly high among equity ties for two reasons. First, equity ties require higher levels of resource commitment and bidirectional exchange of information between firms in order to be successful (Das & Teng, 2001). Thus, firms will be more inclined to seek out local partners when they choose to form equity-based ties as information and knowledge asymmetries are likely to be lower when firms partner with network neighbors. Second, close network neighbors are more likely to possess complementary resources, norms of reciprocity, and relational trust than far distant partners (Powell & Smith-Doerr, 1994). Thus, because equity based ties tend to be riskier than non-equity based alliances, firms will be more likely to seek out local network neighbors in order to minimize these risks and ensure that the alliance will be successful. In doing so, trust is more likely to develop between firms and they will be less inclined to perceive high levels of relational risk (Das & Teng, 2001). This is likely to be
particularly salient for firms that seek to form equity-based ties as these tend to be riskier and require long term investment from all parties involved (Das & Teng, 2001).

One risk of overly cohesive networks is that the information within those networks may be redundant, thus making the development of new and innovative knowledge more difficult to achieve (Burt, 1992). Thus, firms may be less inclined to exclusively look within their network clusters to find potential alliance partners. This is especially likely to be the case when firms pursue non-equity ties, as they may perceive the relational or performance risks of these arms-length alliances to be much less of a detriment. As firms may perceive that they have less to lose if the partnership does not work out, they may be more inclined to seek out the novel and unique resources available from distant firms. Because non-equity based ties are easier to end if they are not as effective (Das & Tang, 2001), firms may be less risk adverse. Moreover, as previously described, legitimacy motivations are predicted to be strong drivers of non-equity based tie formation. Because legitimacy enhancing alliances rely primarily on the networks as prisms effect (Podolny, 2001), firms may be more inclined to seek out non-local, higher status partners in order to enhance legitimacy returns. Thus, alliance governance structure, or the prevalence for equity and non-equity based tie formation, is likely to drive the overall tendencies towards clustering in a network.

*Proposition 10a:* Prevalence of equity-based tie formation will be positively related to alliance network clustering.

*Proposition 10b:* Prevalence of non-equity-based tie formation will be negatively related to alliance network clustering.
E. Alliance Performance Implications

Based on the theory developed so far, I have linked macro level environmental factors to micro level firm actions and behaviors specific to strategic alliances. Moreover, I have also introduced how these actions and behaviors aggregate back to the whole network level and lead to change to the overarching topologies of interorganizational strategic alliance networks. Specifically, I focus on network centralization and network clustering as two central components of alliance networks that are expected to change over time as firms adapt to their changing environments. However, it is also important to investigate the specific firm performance implications that alliancing strategies may have on alliance performance. In the next section, I introduce a contingency perspective on how alliance outcomes, specifically how they relate to firm performance, will shift in response to specific firm strategic alliance actions in the context of their overarching alliance networks.

Strategic alliance outcomes. Strategic alliances have been linked to a myriad of firm, alliance, and industry level outcomes. Generally, research on the consequences of strategic alliances have focused on measuring outcomes that may include stock market reactions (e.g., Kale, Dyer & Singh, 2002), managerial evaluations of success (e.g. Kale & Singh, 2007), and of the performance of the firm more broadly (Jiang, Tao & Santoro, 2010; Mitsuhashi & Greve, 2009). Thus, it is important to understand which outcomes matter when determining the success of a strategic alliance, particularly when firm motivations that drive alliance formation may lead to differing preferred outcomes. For example, a young start up in the tech industry may enter into a technology transfer agreement with Facebook not with the intention to gain access to Facebook’s market share and technologies but to signal to important stakeholders that they have been endorsed by an industry leader. Thus, while measuring alliance success using traditional
financial ratios (e.g. ROA) may provide some insight into the success of such an alliance, it fails to capture the full motivation behind the young tech company’s goal of forming an alliance with Facebook. Instead, this may be better captured by the number of “buy” ratings issued by market analysts or the subsequent status and reputational perceptions of the smaller firm by the media or institutional investors.

Thus, I argue that it is important to take into consideration motivations for forming strategic alliances in order to adequately gauge their resulting performance outcomes. Specifically, I expect that the two general motivations for forming alliances, resource and legitimacy building, require that researchers take into consideration how these motivations uniquely influence strategic alliancing behaviors and thus likely lead to differing alliance outcomes.

Alliance success and eventual firm performance consequences that stem from strategic alliances are likely to result from both the dominant networking strategies employed by firms and the overarching structural characteristics of the networks themselves. Thus far, I have investigated how the external environment influences firm alliance formation motivations and how it plays a role in determining alliance governance and partner selection preferences of firms. At the firm level, firm motivations driven by the external environment influence firm preferences for equity-based versus non-equity-based alliances along with the relative network positions of partners who will ultimately lead to alliance success. Further, I also indicate how individual firm strategic alliancing actions aggregate to the industry level to lead to eventual shifts in the topographies of strategic alliance networks. However, it is also important to understand why shifts in alliance networks matter and what types of long term performance implications may result. In this section, the focus will be on identifying the underlying mechanisms that link
alliencing strategies in the context of the overarching alliance network structure to firm alliance performance outcomes. As Figure 3 demonstrates, the framework presented thus far results in strategic alliance networks that can be roughly divided into four different quadrants.

***Insert Figure 3 About Here***

*Alliance Performance Implications in Clustered, Decentralized Networks*

Beginning in the upper left quadrant of figure 3, Clustered, decentralized networks exhibit tendencies towards community formation without a core periphery structure. Tying together the framework introduced above, I expect this network topology to form when the task environment is generally unfavorable\(^4\) coupled with a weak institutional environment. In such environments, supply chains are relatively complicated and industry performance is unpredictable, indicating that high levels of complexity and uncertainty exist. Environmental munificence is weak, making resources more difficult to develop. Finally, the institutional environment is also weak, reducing the need for firms to feel pressured to form alliance ties for legitimacy reasons. Firms that are driven by resource building motivations are more likely to pursue equity ties with other network partners who occupy similar positions to one another in terms of centrality. Aggregating these preferences to the industry level, this is likely to lead to clustered, decentralized networks over time. Clustered networks also facilitate information transfer, thereby reducing uncertainty and encouraging more active tie formation (Nematzadeh,

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\(^4\) In this context, unfavorable task environments may generally consist of low levels of munificence coupled with high levels of complexity and dynamism. It is important to note here that these three factors may not always be strongly correlated and that prior literature has cautioned against mingling task environment dimensions as they may have unique effects (Davis, Eisenhardt & Bingham, 2009; Eisenhardt, 1989; Pisano, 1994). For example, low levels of munificence may also be present in task environments with low levels of complexity and dynamism as is often the case in many commodity-based industries. Firm perceptions and unique characteristics of the industry may more broadly influence whether or not this would be categorized as a “favorable” vs “unfavorable” task environment. Thus, while I broadly categorize task environments into favorable vs unfavorable for theoretical parsimony, future empirical work should take these potential unique dynamics into consideration.
Further, cohesive clusters can predict the rate and extent to which information diffuses within a network (Yamaguchi, 1994).

Decentralized networks that result from weak institutional pressures may also encourage firms to form ties with other, structurally similar firms in order to reduce the potential for negative alliance outcomes that stem from power asymmetries (Colombo, 2003; Tallman & Phene, 2006). Thus, assortative mixing as an alliance partnering strategy may be lead to more beneficial alliance outcomes in dense, decentralized networks because ties with other similarly central actors reduce the probability of opportunistic behavior and information access issues are less likely to be encountered in dense networks. This will likely be the case for equity-based ties in particular if they are primarily driven by the firm’s need to acquire resources since power and information asymmetries between alliance partners can significantly challenge the success of an alliance (Muthusamy & White, 2005). Resource building performance outcomes will yield maximal performance in clustered, decentralized networks, particularly when firms utilize strategies of assortative mixing and equity-based alliancing structuring.

On the other hand, legitimacy building outcomes may be more difficult to achieve. While clustering may facilitate within group trust and reciprocity norms, the lack of a centralized network structure makes it harder for firms to identify high status firms who are most likely to provide higher levels of reputational and status spillover effects. Firms who seek to engage in preferential attachment strategies may have greater difficulty in successfully establishing an alliance as high-status partners are fewer in number. Further, non-equity based ties are less likely to engender desired effects in cohesive networks as these networks are more likely to exhibit tendencies towards stronger, equity based tie formation. Thus, legitimacy based outcomes are
likely only weakly related to strategic alliance performance outcomes in dense, decentralized networks.

Alliance Performance Implications in Clustered, Centralized Network Structures

Shifting focus to the upper left quadrant, clustered, centralized networks exhibit a stronger tendency towards a core periphery structure where there is a clear trend towards centralization and a handful of firms are likely to occupy the most central positions in the networks. While a clustered, decentralized network may lead to the strongest performance outcomes for resource building motivations, clustered, decentralized networks are likely to be moderately tied to both resource and legitimacy building motivation, thus resulting in a wider variety of alliancing strategies in a given industry.

Clustered, centralized network structures likely represent an industry that provides both an unfavorable task environment and a strong institutional environment. In such cases, equity-based ties will be linked more closely to alliance performance outcomes than in clustered, decentralized network structures, as institutional environments better outline the rules of the game with respect to what the norms and expectations are within an industry. Moreover, firms may feel more confident in engaging in strategies of preferential attachment in these industries as well because a) the risks implied by power and information asymmetries are likely to be weakened in clustered network environments where information access is more easily attainable thus reducing uncertainty (Schilling & Phelps, 2009), and b) higher institutional needs for legitimacy will encourage firms to engage with higher status firms in order to satisfy legitimacy pressures in strong institutional environments (Dacin et al., 2007).

Resource building outcomes in clustered, centralized networks will be moderately to strongly related to alliancing activities, particularly when equity-based alliance strategies are
utilized. As previously described, clustered networks allow for the opportunity of richer information exchange between firms (Nematzadeh, et al, 2014) and promote bilateral exchange between alliance partners. However, one risk that stems from centralized networks is the greater propensity for status-asymmetric tie formation which may lead to appropriate concerns for the lower-status partner. However, if the institutional environment is strong, as would be expected of centralized network structures, this risk is likely to be mitigated. Thus, firms who engage in resource building alliances in these network environments will see their alliancing activities moderately to strongly related to resource building alliance outcomes.

Alternatively, firms may also seek to pursue alliances for legitimacy based reasons. In contrast to clustered, decentralized networks, legitimacy building outcomes are likely to be much more easily achieved in clustered, centralized networks as it is less difficult to identify who the high status and reputation actors are in the network which better enables firms to engage in strategies of preferential attachment. Thus, it is likely that legitimacy building outcomes will be more strongly related to strategic alliancing activities in these networks, especially when firms engage in strategies of assortative mixing. As a result, it is likely that clustered centralized networks broadly represent the ideal network environments for ensuring that firm alliancing activities will be most strongly linked to firm alliancing outcomes in terms of both legitimacy and resource building motivations.

Alliance Performance Implications in Unclustered, Centralized Network Structures

Unclustered, centralized networks are described in the lower left quadrant of figure 3. This network form is likely driven by favorable task environments and strong institutional environments. As previously described, favorable task environment have distinct implications for firms who seek to engage in strategic alliances for resource building reasons. While high levels
of complexity and dynamism greatly enhance uncertainty and often cause firms to seek out alliances as a way to anchor themselves in their respective networks (Pfeffer & Salancik, 1978), favorabl task environments are characterized by low levels of complexity and dynamism which may reduce the firm’s perception that they must engage in strategic alliances in order to better manage environmental uncertainties. Further, high levels of munificence that may be exhibited in favorable task environments may reinforce this belief that alliance are not necessary to gain access to important external resources.

In terms of network dynamics in unclustered, centralized networks, resource building alliance outcomes may be more weakly tied to alliancing activities. First, unclustered networks indicate that network actors are weakly tied to one another which may hinder information and knowledge transfer between alliance partners and make alliance network resources less valuable. Unclustered networks hinder the exchange of information in the network and give rise to higher incidences of structural holes (Burt, 1992; 2004) which may make resource building motivations more difficult to satisfy. Additionally, the power asymmetries introduced in centralized network structures may also hinder the success of resource access motivated alliances as power asymmetries may introduce higher levels of relational uncertainty (Gulati & Gargiulo, 1999).

Coupled with favorable task environments that are likely to undergird these networks, firms may be less inclined to utilize strategic alliances as a way to satisfy resource needs. Thus, resource building alliance goals will be particularly difficult to achieve in unclustered, centralized networks and will result in resource building outcomes only weakly tied to alliance activities.

However, unclustered, centralized networks may be ideal for legitimacy building outcomes of strategic alliances. Studies at the individual level have generally found that high status actors are relatively easy to identify by other actors in the network (Krackhardt, 1990;
Ibarra & Andrews, 1993). Moreover, status has been shown to be a stronger driver for tie selection than homophily in centralized networks (Lazega, Mounier, Snijders & Tubaro, 2012). Executives of high performing, central firms have been shown to consider their firms’ positions in a given interorganizational network in the context of the entire network and not just as a series of ties, thus giving them a holistic understanding of interdependencies between industry players and a richer cognitive view of the industry as a whole (Ozcan & Eisenhardt, 2009). Finally, the bidirectional exchange of knowledge and information may be less of a priority for firms that are motivated to form alliances in order to gain legitimacy. Thus, unclustered, centralized networks will generate strong legitimacy building outcomes, particularly when firms utilize alliance partner selection strategies of preferential attachment and non-equity alliance governance structures.

Alliance Performance Implications in Unclustered, Decentralized Networks.

Finally, the lower left quadrant in figure 3 describes unclustered, decentralized networks. These networks are characterized by having favorable task environment (high in munificence, low in complexity and dynamism) coupled with a weak institutional environment. Generally, I expect that this network structure to be the least favorable in supporting alliance performance outcomes. The primary differentiator of this network structure is that firms may be less motivated to form strategic alliances in general as favorable task environments may not require strategic alliance partnering in order to gain access to required resources (Park & Mezias, 2005). More specifically, firms that occupy these favorable task environments will be able to achieve their resource building goals through other means beyond forming strategic alliances. Further, unclustered, decentralized networks are likely to provide less valuable network resources as lack of clustering makes information more difficult to obtain and less reliable.
Weak institutional environments will also make it more difficult for firms to gauge the extent to which legitimacy enhancing alliances will be successful (Kostova & Zaheer, 1999). Because there are no clear legitimating mechanisms in place and it is difficult for firms to identify high status actors in decentralized networks, legitimacy outcomes will similarly be weakly related to strategic alliance activities. Thus, unclustered, decentralized network structures represent the least favorable network structure for firms to engage in alliances and it is likely that both resource access and legitimacy building outcomes will only be weakly tied to strategic alliance activities.

F. Discussion

In this study, I identified two issues that pertain to the current state of the interorganizational network literature. First, while identification of an alliance tie is important in predicting key firm or alliance outcomes, it is equally important that scholars gain a better understanding of how tie content influences firm partnering strategies and outcomes and why firm managers may pursue different network tie types with different network goals in mind. Relationships between firms often represent a multitude of meanings ranging from (and often including a combination of) signals of legitimacy to important conduits of information exchange (Gulati & Gargiulo, 1999; Provan, Fish & Sydow, 2007). While interorganizational research scholars have begun to recognize that the varied goals and functions of firm alliance ties should be taken into consideration (Ghosh, Ranganathan & Rosenkopf, 2016), few studies have sought to examine why some forms of alliance ties are more prevalent than others. Moreover, alliance ties may carry with them varying levels of “friction” that promote or prohibit the exchange of information among firms (Ghosh & Rosenkopf, 2014). In order to better understand the types of ties and strategic partners that firms seek out in interorganizational networks, it is important to
consider how firms may seek to form specific types of interorganizational ties over others and how these ties may have varying levels of efficacy in achieving desired firm outcomes. By advancing theory on the nature of alliance network ties, we can better understand how underlying network mechanisms are more or less likely to play out in the interorganizational context.

In this paper, I introduced a multilevel contingency perspective to firm strategic network development. Utilizing the dual lens of the resource dependence perspective and institutional theory, I explored how firms’ strategic alliancing strategies vary as a function of their alliance motivations and the external environment. I drew on network theory concepts to examine strategic alliances at various levels and to explain how the overarching patterns of relationships at the organizational field level influence firm’s decision making with regard to optimal strategic alliance configurations and partner selection strategies. In so doing, I discussed how strategic partner selection and alliancing structures vary as a function of not only firm motivations for entering alliances, but also the overarching external environment.

This paper makes several key contributions to the literature. First, it introduces an integrative and cohesive framework of strategic alliance strategies that takes into consideration both resource access motivations and legitimacy building motivations for alliance formation and applies it to a multilevel context. To date, alliance research has typically emphasized the role that alliances play that allow firms to gain access to important resources external to the firm. However, studies have also begun to recognize that firms may also pursue strategic alliances for legitimacy-based reasons as well. Thus, the framework proposed in this study brings together these two streams of literature utilizing network theory as a tool to identifying and understanding the underlying linkages that bring these perspectives together.
While the majority of network applications in the interorganizational context have focused primarily on global- or dyad-level effects independently, my framework combines these levels by considering how the external environment affects global-, dyad-, and node-level actions. Moreover, I offer a better understanding of how overarching network structural characteristics and exogenous environmental level factors influence the propensity of firms to form alliances and the form of alliance governance they choose when developing such collaborative relationships.

The theoretical framework developed in this paper examines two important factors in interorganizational alliance development and governance. First, it evaluates the role of the external context in interorganizational network evolution and firm networking behaviors. I advance the external task environment and institutional context as important network level exogenous factors that independently and jointly influence the development of social networks over time. Second, this paper also introduces theory about network tie content. By actively theorizing not only about the prevalence of ties in the interfirm network context but also the type of ties, future research can introduce more nuanced insights and theoretical development about the role of network analysis in the content of interorganizational network.

This framework sets the foundation for other approaches to network applications in the interorganizational context. For example, it indicates that network theoretic concepts may have varying degrees of explanatory and predictive power under different environmental contexts. It also suggests that the efficacy of a particular network strategy in one industry environment may not translate into desirable firm level outcomes in other industry environment. Thus, future research may focus on identifying when certain network positions are optimal in different environmental or institutional contexts. Furthermore, this framework also suggests that the
network structure matters to a certain degree in ensuring that network benefits are realized. The content of a firm’s network ties can also determine the direction and magnitude of the relationship between the structure of a firm’s nexus of interorganizational ties and the firm’s ability to achieve desired outcomes. Thus, future research can simultaneously consider the presence/absence of network ties and the content of these ties.

Although this paper theorizes about the efficacy of certain networking strategies and tie content types under different environmental contexts, it would be helpful to broaden our focus to evaluate the performance implications of such partnerships at dyadic and industry-levels of analysis. In doing so, we can better understand the contingent nature of network relationships and network resources in the context of interorganizational alliances.

In summary, this paper sought to introduce a multi-level framework that actively integrate multiple levels of analysis in order to understand how firms simultaneously influence and are influenced by their respective alliance networks. In doing so, I synthesize resource dependence and institutional theoretic perspectives on alliances and expand the boundaries of these theories by drawing on network theory to tie these two independent research streams together.
G. References


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H. Figures & Tables

Macro Level

Micro Level

Figure 1. Coleman Boat Model

Adapted from Coleman (1990)
Figure 2. Model of Interorganizational Network Evolution
Figure 3. Optimal Networking Strategies
III. Chapter 2: Opposites Attract? Uncovering the Network Antecedents of Strategic Alliance Partner Selection.

A. Abstract

Strategic alliances have been recognized as important tools for gaining access to and developing new resource stores. However, few studies have investigated the utility of alliances in the context of the overarching external environment. In this chapter, I utilize Temporal Exponential Random Graph models to investigate the role of the external environment in driving interorganizational tie formation in the biotech industry. Moreover, I investigate how status asymmetric partnering strategies also drive alliance network formation. Utilizing Temporal Exponential Random Graph models, I find that the external environment plays an important role in shaping both interorganizational alliance networks and alliance partner selection. I find that environmental munificence and institutional strength both enhance the propensity for intraindustry alliance tie formation in the biotech industry. Moreover, I also observe that the tendency to engage in status asymmetric partnering is also influence by overarching trends in the external environment. These findings suggest that alliancing activity is largely driven by overarching trends in the external environment.

Keywords: Strategic alliances; Social Networks; Alliance Governance; Status
B. Introduction

Strategic alliances are defined as “interorganizational relationship[s] where two (or more) firms pool their resources to achieve some common objective through formal or informal coordination” (Shipilov & Gawer, 2020, p.95). Alliances represent a popular collaborative strategy that help associated firms achieve a variety of goals, including entering new markets (García-Canal, Duarte, Criado & Llaneza, 2002) and establishing legitimacy (Dacin, Oliver & Roy, 2007). Research has also demonstrated that alliances are associated with such organizational outcomes as innovativeness (Joshi & Nerkar, 2011) and firm performance (Goerzen, 2007; Lavie, 2007). Moreover, several factors have been linked to firms’ partner selection preferences, including proximity (Reuer & Lahiri, 2014), expected synergies and complementarity of resources (Ahuja, Polidoro & Mitchell, 2009), and motivations/goals (Das & Teng, 2001a).

Resource dependence theory, which views alliances as an important tool for firms to manage their external environmental constraints (Pfeffer & Salancik, 1978), is one of the frequently used theoretical lenses in the analysis of strategic alliances. More contemporary research on alliances has also begun to investigate alliance activity using the institutional theory lens, conceptualizing alliances as important legitimating mechanisms (Hubbard, Pollock, Pfarrer, & Rindova, 2018). Researchers have developed a prolific research stream that integrates institutional and resource dependence theories in order to gain a better understanding of how strategic action takes place in ever increasingly complex environments. For example, in their meta-analysis, Drees and Heugens (2013) demonstrate that interorganizational relations are linked to enhanced organizational legitimacy and autonomy which in turn may lead to positive firm performance outcomes. Further, related research streams have similarly integrated resource
dependence and institutional frameworks to understand the relationship of boards of directors with firm performance (Hillman & Dalziel, 2003), corporate venturing logics (Biniari, Simmons, Monsen & Moreno, 2015), and responsiveness to work-family issues (Ingram & Simons, 1995). However, integration of the institutional and resource dependence framework introduces several key challenges to the alliancing literature as the underlying mechanisms and motivations for forming alliances can vary substantially based upon these two perspectives. While the institutional perspective emphasizes embeddedness and how organizations are shaped by their external environment (Baum & Oliver, 1992; Scott, 1995), the resource dependence perspective emphasizes how organizations actively influence and shape their environments in order to achieve competitive advantage (Hillman, Withers & Collins, 2009; Pfeffer & Salancik, 1978). Thus, this introduces a compelling challenge to understand why firms may choose to engage in alliancing activities and what their underlying goals and motivations may be. One such tool that may allow for the integration of the resource dependence and institutional perspective with respect to alliance formation is network theory.

Network theory has proven to be a valuable lens in understanding how firms simultaneously influence and are influenced by their external relationships. This research stream focuses on understanding when firms choose to enter alliances and with whom they choose to partner (e.g. Ranganathan, Gosh & Rosenkopf, 2018; Stern, Duckerich & Zajac, 2014). From the network perspective, factors such as previous ties (Gulati, 1995; 1998), shared third party ties (Shipilov, Li & Greve, 2011), and advantageous network positions (Gulati & Gargiulo, 1999) have been hypothesized to predict strategic alliance formation. Recent studies have also begun to integrate network theory concepts into research on partner selection in strategic alliances (Knoben, Gilsing & Krijkamp, 2019). These predictors of strategic alliance formation have been
largely focused on both the individual level (e.g. centrality and constraint; Ahuja, 2000) or the
network level (e.g. centralization, density, or cohesion) characteristics to predict strategic
alliance tie formation. In this study, I develop and utilize an integrated resource dependence and
institutional framework utilizing tenants from network theory to examine the antecedents of
strategic alliance network partner selection. Specifically, I investigate how firms may utilize their
respective networks when choosing who to form alliance ties with.

The interorganizational networks that firms are embedded in play an important role in
guiding firm behaviors as a firm’s position within the network helps to determine the type and
level of information and resources available (Dyer & Singh, 1998). In this paper, I focus on the
contingent nature of the external environment as a driver of the efficacy of a firm’s
interorganizational network. These overarching characteristics of the external environment,
Identified as network exogenous factors, are traits external to the network itself that still work to
drive firm behaviors. I contend that factors external to the network are important to consider
when examining the propensity for tie formation in interorganizational networks and allow us to
gain a better understanding of when organizations and networks reciprocally affect one another.
Unlike network endogenous factors, which are characteristics of the network itself that drives
network outcomes, network exogenous factors may serve as important drivers of the efficacy of
networks in general. The key premise of my study is that network exogenous factors will both
independently and jointly influence both relational and performance risk of strategic alliances
and in turn provide insight into the firms’ propensity to form alliances as well as with whom they
may choose to form these ties. I examine the task (e.g. Dess & Beard, 1984) and institutional
(DiMaggio & Powell, 1983) environments of firms as related but distinct network level
exogenous factors that drive both intra-industry strategic alliance formation and partner selection.

I propose that intra-industry alliance networks exhibit different tendencies of partner selection and tie formation depending upon the nature of the forces that characterize the task environment and institutional context. More specifically, I expect that firms may be more or less inclined to seek out status-asymmetric partners based upon the overarching forces in the external environment. Network status asymmetry, which refers to the partnering of firms of differing positional rankings within their networks, has been identified as an important driver of alliance performance outcomes, particularly for the lower status firm (e.g., Lin, Yang & Arya, 2009; Zhelyazkov & Tatarynowicz, 2020). I test my hypotheses on a panel network dataset of public firms in the biotech industry between 2008 and 2018. Because the key dependent variable in this study is tie formation, I apply exponential random graph models (ERGM) to empirically test the hypotheses (Kim, Howard, Cox Pahnke & Boeker, 2016). In so doing, I demonstrate that network advantages may vary as a result of factors exogenous to the network and that firms embedded in these networks adjust their partnering strategies accordingly. Thus, in utilizing network theory, my research uncovers how the external environment interacts with alliance partnering strategies to drive intra-industry alliance formation and makes important contributions to literature on cooperative strategy and network tie formation.

C. Literature Review

Strategic alliances represent a popular strategy utilized by firms in order to gain access to resources external to the organization’s boundaries. While alliance outcomes have received the bulk of the attention in the literature (e.g., Das & Teng, 2000; Mowery, Oxley, & Silverman, 1996), alliance scholars have suggested that the relationship between alliance formation and firm
performance is not always clear with weak or conflicting relationships being observed between strategic alliancing activity and important firm performance outcomes of interest (Das & Teng, 2003; Jiang & Li, 2008). Thus, some studies have focused on more proximal outcomes of strategic alliance formation such as acquisitions of past alliance partners (Yang, Lin & Peng, 2011; Zollo & Reuer, 2010) or patenting activity and new product innovations that result from alliance R&D partnerships (Hottenrott & Lopes-Bento, 2015; Joshi & Nerkar, 2011).

Other, less researched areas in the strategic alliance literature include the antecedents of alliance formation along with the alliance structuring process itself (Das & Teng, 1998; 2001a; 2002; Parkhe, 1993). In this research stream, scholars have also investigated motivations and how they inform strategic alliance behaviors (e.g., Oliver, 1990).

Scholars have approached strategic alliance formation motivations to be primarily driven by resource dependence concerns where firms seek to form alliances in order to gain access to important resources that reside outside of the organization’s boundaries (Eisenhardt & Schoonhoven, 1996; Pfeffer & Salancik, 1978). Thus, resource access motivations represent a strong driver of strategic alliance formation. In this research stream, scholars have emphasized various antecedents to strategic alliance formation including access to complementary resources that enhance the development of private synergies (Harrison, Hitt, Hoskisson & Ireland, 2001), past ties between partners that facilitate trust and thus richer exchange of information, and homophily (i.e. similarity between firms across various dimensions; Luo & Deng, 2009; McPherson, Smith-Lovin & Cook, 2001) which allows firms to relate to one another and enhance trust and reciprocity by virtue of their similarity to one another.

However, strategic alliances may also be formed in order to satisfy legitimacy-based motivations (Dacin, Oliver & Roy, 2007; Oliver, 1990). In this literature stream, studies have
found that firms benefit from strategic alliances because they can help engender endorsements or approval from important external stakeholders and third party evaluators of the firm. In so doing, firms benefit from legitimacy effects which make it possible for them to develop reputational and status-based resources (Ahuja, Polidoro & Mitchell, 2009; Dacin, Oliver & Roy, 2007). Legitimacy is an important resource that is vital for firm success and has been linked to important outcomes such as viability (Human & Provan, 2000), IPO valuations (Gulati & Higgins, 2003; Reuer & Tong, 2010), and firm performance (Barreto & Baden-Fuller, 2006).

Thus, firms often face both resource access and legitimacy motivations when considering strategic alliance formation. Moreover, the literature suggests that firm partnering strategies in some contexts may be less productive than they are in other contexts. For example, while status asymmetry may lead to appropriation or other opportunistic behaviors in alliances formed in order to satisfy resource access concerns (e.g. Ahuja, Polidoro & Mitchell, 2009; Chen & Chen, 2003), status asymmetries may have beneficial outcomes for firms that engage in strategic alliances in order to enhance their perceived legitimacy (e.g. Shipilov, Li & Greve, 2011).

Underlying managerial perceptions of risk and uncertainty are likely to be strong drivers of alliance formation motivations. In their work on risk perception’s influence on alliance structuring, Das and Teng (1996, 2001a, 2001b) recognize both relational risk and performance risk as key drivers of alliances. Relational risk refers to challenges that occur due to the partner firm not being committed to the alliance (Das & Teng, 2001b). This includes opportunistic behaviors and other nefarious actions by alliance partners that hinder alliance success (Parkhe, 1993). Oftentimes, these behaviors occur when high levels of power or knowledge asymmetry exists between alliance partners, putting one at a disadvantage compared to the other. Thus, the literature often suggests that partnering with similar firms in terms of capabilities, size, status or
demographics will be more likely to lead to alliance success (Chung, Singh & Lee, 2000; Rothaermel & Boeker, 2008; Shi & Tang, 2015). However, partnerships with similar firms may reduce the level of private synergies that can be achieved through them and make it more difficult to engage in radical innovation. Accordingly, the literature has shown that partnerships driven by product similarity tend to be less successful when firms seek to develop new or innovative products (Lu Jin, Zhou & Wang, 2016). Strategic alliances may also be subjected to performance risk whereby strategic objectives of the alliance are not met despite all parties cooperating in pursuing these objectives (Das & Teng, 2001b). While relational risk is more of a dyadic risk factor between alliance partners, performance risk is largely driven by factors in the external environment. Performance risk is often considered secondary to relational risk whereby relational risk must be minimized before performance risk significantly alters the outcomes of the alliance (Das & Teng, 2001b).

While Das and Teng (2001a) introduce important theory in understanding how the strategic alliance structuring process varies on the basis of risk perceptions, the authors do not investigate how these risk perceptions influence who firms choose to partner with. In this study, I introduce two important network exogenous factors – namely the task environment and the institutional environment – to examine the specific partner selection strategies that firms employ as they manage their resource dependencies and perceptions of relational and performance risk. The task environment refers to components of the overarching external environment that facilitate or hinder competitiveness at the industry level. Specifically, I rely on Dess & Beard’s (1984) conceptualization of the task environment which is comprised of three components

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5 Private synergy refers to the unique skills and capabilities that partner firms can create in a strategic alliance that can not be replicated on their own or with other potential partners. Scholars have suggested that private synergies can be maximized when firms successfully combine heterogenous and unique resources (Harrison, Hitt, Hoskisson & Ireland, 2001)
including munificence, complexity, and dynamism. Munificence refers to the availability and accessibility of resources external to the firm and is generally associated with more favorable environments. Dynamism refers to the rate and unpredictability of change in a given industry while complexity refers to the heterogeneity and variety of industry players in terms of suppliers, consumers, and competitors. Both complexity and dynamism are generally associated with higher levels of uncertainty and thus represent less favorable environments (Castrogiovanni, 2002). Additionally, I also recognize institutional strength as another key network exogenous factor that may drive interorganizational network evolution. Institutional strength refers to the overarching magnitude of the institutional environment whereby strong institutional environments are associated with stronger institutions, higher levels of enforcement (e.g. clearly outlined rules and regulations), and greater durability (e.g. predictability and consistency of institutional entities) (Levitsky and Murillo, 2009).

In the context of interorganizational relationships, network concepts and methods have served as an invaluable tool in better understanding strategic alliance partner selection, social capital benefits, and strategic alliance outcomes (e.g., Aggarwal, 2019; Beckman, Haunschild & Phillips, 2004; Goerzen, 2007; Koka & Prescott, 2008). The network literature has recognized that social networks can influence various outcomes in two important ways. First, social networks may function as channels of information flow in which valuable knowledge and information travels from one node to the next via network connections. In this literature stream, researchers have demonstrated that some network positions are more advantageous for gaining access to information than others (Burt, 1992; Powell, 1990). Moreover, researchers have also studied other network level variables such as density and cohesion in order to understand how
quickly information is exchanged in the network and the extent to which that information is valued by network participants (Owen-Smith & Powell, 2004).

Second, network actors may also serve as “prisms” of status, norms, and reputation (Podolny, 2001). This perspective outlines that network ties are more than just conduits of information flow and that ties to prestigious network actors may lead to reputation and status signaling effects that introduce network benefits without necessarily requiring information exchange between actors. Simply affiliating with a high status actor can lead to spillover status effects to the lower status actor (Rossman, Esparza & Bonacich, 2010; Yu & Lester, 2008).

Building on this literature, I suggest that alliance networks often reflect both paths. For example, resource dependence motivations may more closely reflect the network as pipes concept where successful strategic alliance outcomes rely on the bidirectional exchange of knowledge and information through network ties. In addition, alliance network ties may also act as prisms when firms are pursuing legitimacy enhancing motivations in which simply forming and announcing alliances to the market will lead to desired third party endorsements and enhanced legitimacy.

Despite the wealth of information and insight that the network perspective brings, there are still unanswered questions and challenges that this perspective introduces when applied to the interorganizational context. To date, network researchers have often relied upon individual organizational attributes (individual exogenous) and structural attributes (network endogenous) to predict and explain firm behaviors and outcomes (Contractor, Wasserman & Faust, 2006; Monge & Contractor, 2003). However, this approach largely fails to take into consideration the role of the environment firms operate in (network exogenous) on firm network actions and outcomes. To date, few interorganizational network studies have actively taken into
considered the role of the external environment in differentially shaping the development of interorganizational networks (see Tatarynowicz, Sytch & Gulati, 2016 for an exception). However, these studies often stop short of considering how the external environment may influence who firms may seek to partner with. Thus, it is important to consider how shifts in the external environment may influence partner selection strategies.

Moreover, lessons learned at the individual level may not be as easily applicable to interorganizational networks. While prior network research has established that some positions in a network are more beneficial than others to the occupants of those positions at the individual level (e.g. network “bridgers”, Burt, 2004, 2007; centrality, Ibarra & Andrews, 1993), these relationships do not always hold when brought to the interorganizational level of analysis. For example, the relationship between network structural position and firm performance is not always clear (Gulati, 1998). Conflicting empirical evidence suggests that merely observing structural characteristics of the network and the actors within it may not be enough to predict network related outcomes (Singh & Mitchell 1996; 2005). Thus, I argue that identification of advantageous network partners may depend largely on overarching external environmental factors.

In this study, I introduce theory on an environmental contingency approach to intraorganizational network partner selection (Donaldson, 2001). In doing so, I utilize network theory to bring together the relatively disparate research streams of resource dependence theory and institutional theory under a contingency model. To date, researchers have demonstrated that successful organizations must form and manage external ties to other firms in order to obtain and maintain competitive advantage (e.g. Das & Teng, 2000; Mowery, Oxley & Silverman, 1996). However, firms must also constantly grapple with the importance of gaining and maintaining
legitimacy through their alliancing activities (Dacin, Oliver & Roy, 2007). Moreover, beyond simply forming ties with other firms, these organizations must also carefully consider both the nature of these ties and the competitive context in which these firms reside. In order to gain a better understanding of how firms interact and form ties with one another, I develop and test a multilevel model that explores how key external environmental factors – namely institutional context (DiMaggio & Powell, 1983) and the task environment (Dess & Beard, 1984) - influence both the structure of the interorganizational network itself and alliance partner selection strategies that firms seek to pursue. Thus, in this paper, I investigate how strategic alliance networks develop over time as firms engage with their external environment and modify their partner selection strategies. In the following sections, I investigate how status asymmetry and characteristics of the external environment influence intraindustry alliance tie formation.

D. Hypothesis Development

Status Asymmetry and Strategic Partner Selection

Resource dependence theory suggests that firms are endowed with different levels of resources and must look externally if they wish to complement their existing resources with new ones (Pfeffer & Salancik, 1978). When selecting partners, firms may be concerned with managing resource-based uncertainties or securing access to new knowledge or capital, for instance, to enter new markets. However, risk perceptions also play a key role in a firm’s decision to form an alliance (Das & Teng, 2001).

As previously discussed, scholars have outlined two primary types of risk that may undermine strategic alliance success. The first type, called relational risk, refers to the risk associated with the relationship that strategic alliance partners forge. The second type of alliance risk is called performance risk and refers to the risk associated with accomplishing the goals of
the alliance itself despite the best efforts of all partners involved (Das & Teng, 2001b). Thus far, I have discussed how the external environment has an influence on performance risk. However, it is also important to note that relational risk minimization is often a prerequisite for reducing performance risk (Das & Teng, 2001b). Thus, specific partnering strategies may be implemented by firms in order to reduce relational risk.

To expand on this view, I draw on network theory, and discuss the two general partnering tendencies that may be prevalent in an alliance network. These tendencies help to determine the extent to which firms are exposed to relational risk. The first, *preferential attachment*, refers to the tendency of firms to seek to form ties with central firms in networks (Barabási & Albert, 1999), thus leading to status-asymmetric partnerships. There are many definitions of centrality in network research - for simplicity, central firms can be perceived as those that are most connected (e.g., engaged in many alliances) in their respective networks. Preferential attachment is an important underlying driver of network formation and is generally responsible for the network’s tendency to evolve into a core-periphery structure over time (Albert & Barabási, 2002; Yang, Zhang, Sen, Ju & Guo, 2018). Across contexts, ranging from neuroscience to animal behavior studies, scholars have found ample evidence for trends toward preferential attachment in social networks (Akbas, Brust, Turgut & Ribeiro, 2015; Newman, 2001). Work on venture capital syndicates has also indicated found that these interorganizational networks tend to exhibit tendencies towards preferential attachment in that central firms tend to collect additional funders at higher rates than less central firms (Lerner, 1994).

In the context of alliance networks, forming ties with higher status firms has several advantages including greater access to information (Azoulay, Stuart & Wang, 2013) and legitimacy spillover effects (Lin, Yang & Arya, 2009) which in turn help to reduce performance
risk. Centrality has often been recognized as an indicator of status whereby central firms possess higher levels of status and non-central firms possess lower levels of status (Bonacich, 1987; 2007; Freeman, 1978). Thus, partnering with central firms offers status and legitimacy spillover effects such that it signals to external stakeholders that the firm occupies an important role in the intra-industry network structure. Moreover, higher status firms have also been shown to benefit from alliances with lower status firms as lower status firms are more likely to be committed to alliance success due to the benefits they receive from affiliation with the higher status firm (Castellucci & Ertug, 2010).

However, status asymmetric partnerships are not without their risks. Because higher levels of power and information asymmetries exist between high status and low status firms (Ahuja, Polidoro & Mitchell, 2009), the latter are at a greater risk if ties between them are severed by the former (Hagedoorn & Schakenraad, 1994). These power imbalances are likely to lead to greater levels of mistrust and higher probabilities of exploitative actions such as knowledge appropriation or opportunistic behavior by the central node and failure of the strategic alliance (Lavie, 2007). Thus, less central firms may be less inclined to form alliances with central firms, particularly in cases where status or legitimacy enhancement is not a primary objective of the firm.

Second, central firms may not want to risk their high status by affiliating with lower status firms and being forced to face legitimacy discounts (Shipilov, Li & Greve, 2011). Accordingly, these actors may perceive that they have more to lose in terms of reputation or perceived legitimacy should they find themselves affiliating with a lower status actor (Bitektine, 2011). Central firms may be motivated to maintain their prestige within the network by associating with other firms that are reputationally similar and actively disassociating from firms
with lower reputations or status, as one would expect to observe of less central firms (Moscatelli, Albarello, Prati & Rubini, 2014). Additionally, central firms are likely to have greater access to knowledge and resources than non-central firms, which may also make them less inclined to form ties with non-central firms. Taken together, partner selection strategies that involve asymmetric partnering are likely to represent a riskier avenue. Thus, I expect that intraindustry alliance tie formation will be more prevalent among status-symmetric partners.

Hypothesis 1: Status asymmetric partnering is negatively related to intra-industry strategic alliance tie formation.

The Task Environment and Strategic Alliances

Several literature streams have recognized that the external task environment plays an important role in predicting both firm behaviors and the outcomes of their strategic actions (e.g., Rosenbusch, Rauch & Bausch, 2013; Schilke, 2014; Tatarynowicz, Sytch & Gulati, 2016; Terjesen, Patel & Covin, 2011). Dess and Beard (1984) first introduced the three components of the task environment that can influence firm strategies and success. In their conceptualization, environmental munificence refers to the extent to which resources are readily available and easily accessible to firms. In munificent environments, competitive rivalry tends to be lower (Porter, 1980), and firms may feel less pressured to form external ties in order to gain access to external resources as they are more readily accessible (Park & Mezias, 2005). Environmental munificence has been linked to a variety of important firm behaviors including risk taking (Palmer & Wiseman, 1999; Tang & Tang, 2007), exploration and exploitation activities (Li, Wei, Zhao, Zhang & Liu, 2013; Raisch & Hotz, 2010), and involvement in illegal activity (Staw & Szwajkowski, 1975).
Using the resource dependence perspective, findings that link munificence to the propensity of firms to form strategic relationships have been equivocal. In their paper, Koka and colleagues (2006) explore how interfirm networks evolve over time and are shaped by their external environments. The authors suggest that increases in munificence lead to network conditions of expansion and strengthening whereby tie creation expands and tie deletions are less likely to occur in a given network. Thus, the authors suggest that tie formation in munificent environments are likely to occur at higher rates. In a similar vein, performance risk, one of the key risk factors considered by firms when entering into strategic alliances (Das & Teng, 1999; 2001b), is also likely to be lower in munificent environments as partnering firms should face less difficulty in gaining access to the resources that they need.

Despite these seemingly favorable conditions for alliance formation, one of the key premises behind resource dependence logic dictates that firms seek to form alliance ties in order to manage their own dependencies to important resources that are outside of the organization’s boundaries (Auster, 1994; Hillman, Withers & Collins, 2009; Pfeffer & Salancik, 1978). In munificent environments, external resource dependencies are likely to be less of a threat, thus decreasing the propensity for firms to form alliances in the first place. Munificence is characterized by ample access to resources in the external environment whereby firms can easily access and integrate these resources into their existing resource stores (Castrogiovanni, 1991; Dess & Beard, 1984). Similarly, firms in less munificent environments may feel more inclined to form alliances with competitors in order to reduce competitive pressures (Yasai-Ardekami, 1989).

Although strategic alliances are a commonly utilized competitive strategy, they also tend to carry risk since success rates are low (Inkpen, 2001) and rarely generate strong objective financial returns (e.g. ROA) to members (Das, Sen & Sengupta, 1998). Moreover, while
performance risk factors are likely to be reduced, high levels of environmental munificence are unlikely to have a strong effect on relational risk which is another key risk consideration of firms who enter strategic alliances (Das & Teng, 2001b). Because of the inherent uncertainty associated with strategic alliances, firms may be less inclined to enter into strategic alliances when they are not required to gain easy access to external resources. Thus, environmental munificence, while it generally indicates more favorable external environments, may not facilitate strategic alliance tie formation as the literature has previously suggested (e.g. see Koka, Madhavan & Prescott, 2006). Indeed, scholars have found that stock market reactions to alliance formation tend to be higher in less munificent environments, indicating that alliance formation in such conditions may be more important (Park & Mezias, 2005). Thus, the literature provides conflicting suggestions with respect to the role of munificence in alliance formation. However, because resource dependence theoretic principles are believed to be key drivers behind alliance formation, I argue that in general, munificence will be negatively related to alliance tie formation in a given industry.

*Hypothesis 2. Environmental munificence is negatively related to intra-industry strategic alliance tie formation.*

In addition to munificence, Dess and Beard (1984) recognized that complexity and dynamism also make up key components of the external environment. While high levels of munificence generally lead to favorable external environments, high levels of complexity and dynamism tend to create unfavorable environments for firms. Changes in environmental complexity and dynamism tend to complement one another as increasingly complex environments also tend to become more dynamic as well (Castrogiovanni, 2002).
Environmental complexity refers to the extent to which a firm is part of an intricate and heterogenous environment (Mintzberg, 1979). Firms that operate in complex environments often manage relations with a wide variety of customers and suppliers and compete with a multitude of competitors and substitute products (Castrogiovanni, 2002). Environmental dynamism relates to the unpredictability and rate of change in an industry. In industries characterized by dynamic environments, competitive advantages tend to be short lived (Child, 1972) and firms feel more pressure to innovate and build on their existing resources in order to better manage the increased uncertainty associated with dynamic environments (Rosenbusch, Rauch & Bausch, 2013).

While complex and dynamic environments are likely to influence the levels of performance risk perceived by firms, strategic alliancing activities are also more likely to be considered necessary in order to maintain competitiveness. Firms often manage complex and dynamic environments by seeking out external ties to better manage their resource dependencies (Pfeffer & Salancik, 1978). Indeed, Schneider and colleagues (2017) argue that firms often respond to increasingly complex environments by engaging in higher levels of collaborative complexity through strategic alliances. In a similar vein, Schilling (2015) also found that alliance formation occurs at a higher rate following technological shocks. Further, resource dependence theory suggests that firms may be more inclined to form ties in unpredictable environments characterized by high levels of uncertainty and complexity in order to cement themselves in the competitive environment. In other words, firms manage the inherent complexity of dealing with multiple players in complex environments by parsing out their own positions in the industry by partnering with other firms. Further, industries with complex supply

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6 Schneider and colleagues (2017) suggest that firms often respond to increasingly complex environments by enhancing their own levels of internal complexity through more integrated internal processes and controls and collaborative complexity by engaging in more elaborate relationships with external entities such as other firms, agencies, or organizations.
chains, such as the tech industry, often enter into exclusivity agreements with suppliers and buyers. For example, Apple often enters into long term exclusivity agreements with suppliers in the cell phone industry in order to ensure that their supply needs will be met (Nellis, 2019).

Dynamic environments are also likely to lead to enhanced alliancing activities by firms. In dynamic industries firm returns tend to be volatile and unpredictable technological, market, and competitive change occurring at high rates (Duncan, 1972; Sarkar, Echambadi & Harrison, 2001). Accordingly, firms in dynamic environments face higher levels of uncertainty with respect to their competitive positioning in the industry. Uncertainty can influence strategic alliancing activities such that firms in uncertain environments are more likely to form strategic alliances in order to better manage uncertainties and prevent themselves from being adversely impacted through unexpected external shocks (Pfeffer & Salancik, 1978). In such cases, firms may constantly feel the threat of losing core competencies or relevance in an industry and may seek out external ties in order to continuously build upon and develop resource stores (Hagedoorn, 1993). Indeed, scholars have argued that in industries characterized by high levels of technological dynamism (e.g. R&D intensive industries), firms are expected to seek out a wider variety of resources and pursue open ego-network structures (Tatarynowicz, Sytch, and Gulati, 2016). In less dynamic industries, Tatarynowicz and colleagues (2016) found that firms may be more focused on forming fewer, more interconnected network communities within the overarching network whereby firms are generally less connected to one another and alliance ties occur at lower frequencies.

Consistent with resource dependence theory, at the industry network level, I predict that firms will engage in networking behaviors that complement their external environments to obtain the best returns from their strategic alliancing activities. Environments higher in levels of
complexity and dynamism will likely be associated with higher levels of intra-industry tie formation as firms seek to form strategic alliance ties at higher rates in order to better manage the uncertainty that stems from these unpredictable environments (Pfeffer & Salancik, 1978). Thus, while favorable external environments characterized by high levels of munificence may decrease firm propensities to form strategy alliances, the uncertainty introduced by unfavorable environments characterized by high levels of uncertainty and dynamism will likely result in firms feeling more urgency to form strategic alliances as a way to cement their positions in the competitive environment.

**Hypothesis 3a. Environmental complexity is positively related to intra-industry strategic alliance tie formation.**

**Hypothesis 3b. Environmental dynamism is positively related to intra-industry strategic alliance tie formation.**

*Status Asymmetry and Environmental Munificence*

Beyond the direct effect of munificence on alliance tie formation, I also expect that the level of munificence in an industry will also moderate the relationship between status asymmetric partnering and intraindustry tie formation. While status-asymmetric partnerships represent a riskier partner selection strategy as a whole (Shipilov, Li & Greve, 2011), I expect that the risks associated with status-asymmetric partnerships may be mitigated in munificent environments, thus enhancing the probability of tie formation. In other words, munificence in an industry increases, the negative relationship between status asymmetric partnering and alliance tie formation in a given industry weakens or even reverses. With respect to environmental munificence, overall risk perceptions that stem from status asymmetries will be weaker as resources are more readily accessible in the external environment. Thus, as one would expect in
munificent environments, both reputational and performance risks are likely to be less of a concern for firms, thus encouraging them to engage in status-asymmetric partnering strategies.

While I previously predicted that strategic alliances in general will occur at lower levels in munificent environments, firms may view strategic alliances as important tools to signal legitimacy (Dacin, Oliver & Roy, 2011), particularly through affiliation with higher status firms or entities (Khoury, Junkunc & Deeds, 2013). When pursuing legitimacy outcomes, asymmetric partnering may be particularly important to firms of lower status (Khoury et al., 2013). Environmental munificence may reduce performance risks of strategic alliance formation and may encourage firms to engage in more risky status-asymmetric partnerships due to the high potential rewards for both parties which are associated with status-asymmetric partnering strategies. Further, studies have also indicated that status-asymmetric ties are more likely to occur when the lower status firm has a history of high performance (Hallen, 2008) or in less mature, rapidly growing markets (Podolny, 1994), which indicates that they likely exist with higher frequency in more munificent environments. In a similar vein, research in venture capital syndicates has found that market heat, an external contextual factor that indicates optimistic investors, easily attainable capital, and swiftly growing valuations, has also been linked to higher tendencies for both upward and downward status asymmetric ties among venture firms (Zhelyazkov & Tatarynowicz, 2020).

Thus, I expect that munificence moderates the relationship between status asymmetry and tie formation propensity in a given industry such that munificence will weaken or reverse the negative relationship between status asymmetric partnering and alliance formation. In other words, I expect that status asymmetric partnering will become more prevalent as munificence increases.
Hypothesis 4: Munificence moderates the relationship between status asymmetry and alliance formation such that ties between status asymmetric partners are more likely to occur as munificence increases

Status Asymmetry and Complexity

However, I expect to observe that status asymmetry is a weaker driver of strategic alliance formation when task environments are less favorable. Strategic alliance networks do not always exhibit the strong centralized structures one might expect to result from preferential attachment forces. Instead, these networks often exhibit topologies rich in structural holes (areas of sparseness within the network) (Schilling & Phelps, 2007).

Rather, status symmetric partnering may be more prevalent in complex and dynamic industries as firms seek out partnerships with other, similar status firms in order to mitigate risks associated with alliances. In terms of network evolution, this indicates a trend towards assortative mixing which occurs when firms form ties with other firms that have similar levels of centrality and thus develop status-symmetric partnerships (Newman, 2002). From a resource dependence perspective, power and status asymmetries are less likely to hinder the success of a strategic alliance when firms of similar status partner with one another (Ma, Rhee & Yang, 2013) as strategies of assortative mixing may be preferable because power asymmetries are lower among status-symmetric partners, thus facilitating richer, bidirectional exchanges of information between partner firms (Kale, Dyer & Singh, 2002).

In status symmetric partnerships, firms are likely to be similar to one another in terms of information access and reachability. Indeed, the literature suggests that firms often pursue partner selection strategies that will reflect a preference towards homophily or similarity (e.g. Ahuja, Polidoro & Mitchell, 2009; Powell, White, Koput & Owen-Smith, 2005; Shipilov, Li &
Greve, 2011). Beyond network-based status similarities, studies have also indicated that firms are more likely to form alliance ties with other firms that exhibit similarities across key strategic dimensions including geographic proximity, industry similarity, and technical experience and knowledge (Carroll & Swaminathan, 1992; Darr & Kurtzberg, 2000; Luo & Deng, 2009; Rosenkopf & Almeida, 2003). Thus, similarity of firms’ positions in the network is also likely to be a key predictor of strategic alliance tie formation, particularly when task environments are characterized by high levels of uncertainty. Indeed, assortative mixing represents a lower risk strategy as similar status firms may be less likely to engage in opportunistic behaviors that result from status asymmetries (Ma, Rhee & Yang, 2013). Additionally, coordination costs may be lower among similar firms which will allow them to generate knowledge more quickly and thus reduce performance risks of the alliance (Kraatz, 1998; March, 1988).

Environmental complexity can affect firm performance based upon how the firm manages its environment (Rosenbusch, Bausch & Gallander, 2007). While complex environments have high information processing demands and higher coordination costs that may hurt performance (Kohli & Jaworski, 1990; Narver & Slater, 1990), complexity may also lead to increased performance of incumbent firms in some circumstances as it enhances market entry barriers, generates more diverse knowledge, and provides more potential resources to firms from a wider variety of sources (Rosenbusch, Bausch & Gallander, 2007). Indeed, studies have shown that firms with entrepreneurial orientations enjoy enhanced performance in complex environments (Rosenbusch, Rauch & Bausch, 2013).

Environmental complexity introduces several unique challenges that firms must address when engaging in strategic alliancing activities. First, complexity makes it more difficult to manage relationships as firms will be expected to maintain a wider variety and number of
relationships in complex environments (Child, 1972; Schneider, Wickert & Marti, 2017). Thus, firms may be constrained in their ability to perform due diligence because so many different entities external to the firm demand their attention.

In addition to greater requirements in terms of the number of relationships that firms must manage (Aldrich, 1979; Cannon & St. John, 2007; Duncan, 1972; Tung, 1979), uncertainty in complex environments is also enhanced. Because so many players are present in the industry, firms may neglect to respond to new entrants or adequately address challenges introduced in complex environments due to having a wider variety of factors that demand their attention. Indeed, recent scholarship has developed around the Attention Based View in which firms must selectively manage certain relationships and ignore others in order to maintain their competitiveness (Ocasio, 1997; Ocasio, Laamanen & Vaara, 2018; Rhee & Leonardi, 2018). Thus, complex environments introduce an additional level of uncertainty because firms are not equipped to effectively collect and manage all knowledge and information available to them from the external environment. Thus, environmental complexity increases performance risk perceptions of firms.

Status-symmetric partnering may be particularly beneficial in complex environments as firms can utilize knowledge and resources from similar status partners in order to better manage uncertainties. It is likely that asymmetric partnering will become less prevalent in complex environments as it reduces the likelihood that the partner firm will take advantage of the focal firm while also reinforcing important information channel access to salient knowledge that firms need to be competitive in complex environments.
Hypothesis 5: Complexity moderates the relationship between status asymmetry and alliance formation such that ties between status asymmetric partners are less likely to occur as complexity increases.

Status Asymmetry and Dynamism

Shifting focus to the moderating effect of dynamism on the relationship between status asymmetry and alliance formation, I expect to find a similar effect on firm’s strategic partner selection strategies. However, it is important to note that the underlying mechanisms that drive firm’s decision making in these contexts are different.

In complex environments, firms must manage many relationships in a heterogenous industry, leading to the possibility that they may dismiss or miss completely important information external to the firm. While firms can often manage complex environments through internal modifications and controls, dynamic environments capture environmental uncertainty that is more widely applied at an industry level and shifts in dynamism are more difficult to predict and respond to. Generally, firms can manage increasingly complex environments by creating more internal structures and processes or through initiating alliances to develop common standards (Schneider, Wickert & Marti, 2017) In dynamic environments, change occurs at faster rates and firms are often ill prepared to adapt to rapidly changing environments (Rosenzweig, 2009). In other words, dynamism causes shifts in the overall uncertainty that is associated with an entire industry and is more difficult to manage than the uncertainties associated with environmental complexity (Azadegan, Patel, Zangoueinezhd & Linderman, 2013; González-Benito, Rocha & Queiruga, 2010).

Dynamism makes it more difficult for firms to assess the effectiveness of their strategies (Patel, Azadegan & Ellram, 2013). Accordingly, it highlights the risks associated with strategic
alliance partnering with status asymmetric partners as lower status firms will face greater risks related to power asymmetries and higher status firms will also be less inclined to partner with lower status firms because such partnership outcomes will be even less predictable in dynamic environments.

Accordingly, status asymmetric partnerships will likely enhance these perceptions of risk associated with power asymmetries and appropriation concerns that may threaten the success of the alliance and lead to higher levels of distrust between partners (Ahuja, Polidoro & Mitchell, 2009). These effects may be particularly salient in dynamic environments due to heightened levels of uncertainty as firms may seek more predictable alliance partners. Because uncertainty heightens sensitivity to risk (Ellsberg, 1961; Segal, 1987), firms may feel more inclined to engage in status-symmetric alliances as doing so reduces the probability of opportunistic behaviors among alliance partners. Indeed, studies have shown that trust-based alliance governance forms are most effective under conditions of low environmental uncertainty (Krishnan, Geyskens & Steenkamp, 2016). Thus, I expect that as dynamism increases, the relationship between status asymmetric partnering and alliance formation will decrease.

Hypothesis 6: Dynamism moderates the relationship between status asymmetry and alliance formation such that ties between status asymmetric partners are less likely to occur as dynamism increases

The Institutional Environment and Strategic Alliances

Institutions are defined as “cognitive, normative and regulative structures and activities that provide stability and meaning to social behavior” (Scott, 1995, pg. 33). Institutional environments set the rules of the game for competition, cooperation, and strategy development in a given industry and therefore have important implications for tie formation in alliance networks.
When institutional environments are well developed, and thus have strong pressures for conformity, normative behaviors are easily distinguished and taken into consideration as firms develop and implement new strategies (Scott, 1995). In contrast, when institutional environments are underdeveloped, and have weaker pressures to conform, social norms and expectations may be more difficult to pinpoint, and firms may feel less pressure to adopt normative behaviors in an industry. Taken together, the overarching institutional environment both enables and constrains firm action (Giddens, 1984; Powell & Colyvas, 2008)

Strategic alliances are recognized as broadly accepted strategies that firms can utilize in order to develop new resources and thus generally represent adherence to industry norms, particularly in the biotech industry where strategic alliances are relatively common (Oliver, 2001; Robinson & Stuart, 2007). Indeed, some have identified strategic alliances as social facts whereby alliances not only serve to gain access to important resources, but also serve as important legitimating mechanisms that have social, political, and historical implications (De Rond & Huff, 2003). Thus, it is important to consider how the institutional environment influences the development of strategic alliances. While firms may seek to form alliances for legitimacy-based reasons, this can be more difficult to accomplish in weak institutional environments as legitimating mechanisms are undefined or weakly structured. Moreover, weak institutions coupled with complex and uncertain external environments can lead to further challenges as “both the organization and the legitimating environment may lack the information and the cognitive structure required to understand, interpret, and evaluate each other” (Kostova & Zaheer, 1999, pg. 67), thus making alliances more difficult to achieve. Strong institutional environments introduce several important mechanisms that may reduce various forms of strategic alliance risks.
Specifically, I expect that the institutional environment plays an important role in influencing perceptions of reputational risk in alliances. Weak institutional environments may highlight the salience of relational risk as a threat to alliance success whereas strong institutional environments may mitigate this risk. Thus, firms may be more inclined to engage in strategic alliances in strong institutional environments.

Strong institutional environments engender higher levels of trust and standardized norms among industry participants (Scott, 1995). Strong institutions set the rules of the game for what behaviors are expected and allow firms to make strategic decisions that have more predictable outcomes. This likely leads to higher levels of trust and reciprocal relationships that enhance the utility of strategic alliances.

Second, strong institutional environments also provide more avenues of restitution to firms who are taken advantage of in an alliance. In other words, firms that fail to abide by industry norms or that engage in opportunistic behavior are more likely to be sanctioned by their respective institutional environments. This includes both informal sanctions (e.g. media disapproval; Hovav, 2017) from other industry participants as well as formal sanctions (e.g. courts and the legal system; Kamei, Putterman & Tyran, 2015). Thus, the institutional environment plays an instrumental role in enhancing trust and reducing perceptions of relational risk in strategic alliance formation. Accordingly, I expect to find that as the institutional environment strengthens, firms will be more inclined to form strategic alliances.

Hypothesis 7: Institutional strength is positively related to intra-industry strategic alliance tie formation.

Status Asymmetry and Institutional Strength
I also expect to observe that the institutional environment will influence specific strategic alliance partnering strategies. That is, strong institutional environments may reduce perceived relational risks, enhance legitimacy and status spillover effects, and encourage firms to engage in status-asymmetric relationships.

As previously described, status-asymmetric alliances represent a riskier strategic alliance partner selection behavior with enhanced reputational and performance risks. However, strong institutional environments will likely minimize relational risk as strong institutions are more likely to present clearer guidelines and rules to play by for all industry participants. The risks associated with opportunistic behaviors of alliance partners are also weaker since mechanisms are in place to prevent these behaviors or firms have avenues for legal recourse if alliance partners engage in opportunistic behaviors such as knowledge appropriation. Indeed, strong institutional environments exhibit more stable rules and regulatory outcomes, compliance by industry actors, and higher levels of economic growth (Spiller & Tommasi, 2007; Gonzáles & King 2004). Thus, while status-asymmetric partner selection strategies represent a strategic alliancing strategy with higher levels of risk in general, relational risk is likely to be much lower as both firms know that there are mechanisms in place to deter opportunistic behaviors.

Moreover, institutions play an important role in legitimating both the industry and the firms that exist within it (Scott, 1995). Thus, strong institutional environments may enhance the legitimacy and status spillover effects of strategic alliance formation. Legitimacy seeking motivations have been recognized as important drivers of strategic alliance formation (e.g. Dacin, Oliver & Roy, 2007; Oliver, 1990; Shipilov, Li & Greve, 2011). While strategic alliances represent a commonly utilized strategy in the biotech industry that likely signals legitimacy to important external stakeholders, engaging in status-asymmetric partnering will likely exemplify
this relationship, thus further encouraging firms to engage in alliance formation. In such cases, forming alliance ties with higher status alters will likely allow firms to utilize these ties as network “prisms” that maximize signaling effects and allow firms to achieve higher levels of legitimacy (Podolny, 2001).

**Hypothesis 8:** Institutional strength moderates the relationship between status asymmetry and alliance formation such that ties between status asymmetric partners are more likely to occur as institutional strength increases.

### E. Data and Methods

**Sample and Method**

I test my hypotheses using a panel network dataset of publicly traded firms in the biotech industry between 2008 and 2018. Strategic alliance data was collected from the Thompson Reuters SDC Platinum database. According to Schilling (2009), the SDC database represents the most complete data source of strategic alliances available and is commonly utilized by researchers (e.g., Cui, Yang & Vertinsky, 2018; Jha, Baxamusa & Datta, 2020). In order to be included in the sample, both firms (or at least two firms in multiple-party alliances) must have shared the same two digit SIC industry code designation as defined by their ultimate parent CUSIP code at the 6 digit level. While the SDC dataset represents the most comprehensive alliance database available, alliance end dates are rarely recorded. While others have used as many as five years (e.g., Ghosh, et al., 2016), the general lifespan of an alliance is believed to be closer to three years on average (Phelps, 2003; Rosenkopf and Schilling 2007). Thus, I constructed alliance network formation variables using a three-year moving window. This sample resulted in a total of 366 alliances (1028 alliance-year observations) between 403 unique participant firms.
Because the key dependent variable in this study is tie formation at the intra-industry network level, I use temporal exponential random graph models (TERGMs; Leifeld, Cranmer & Desmarais, 2018), a form of analysis in the Exponential Random Graph Modeling (ERGM) family, to test the hypotheses. ERGMs are parametric network models that predict tie dissolution and formation based on network structural characteristics and actor attributes (Snijers, Van de Bunt & Steglich, 2010). These network models are superior to conventional regression analyses because they take into consideration the inherent interdependent nature of network data and allows for the evaluation at both the dyadic and whole network level of analysis (Ghosh, Ranganathan & Rosenkopf, 2016). Network researchers often build theory on both the interdependence of network actors and how the attributes of these actors influence resulting network structures (e.g. Berardo & Scholz, 2010; Ghosh et al., 2016). In this way, ERGMs are a far superior method compared to linear regression because they take into account the inherent interdependent nature of networks in predicting resulting network ties (Cranmer & Desmarais, 2011; Cranmer, Leifeld, McClurg & Rolfe, 2017) whereas traditional regression methods must assume that all actors are independent of one another (Berry, 1993). TERGMs differ slightly from ERGMS in that they allow for the analysis of longitudinal networks rather than cross sectional slices (Leifeld, Cranmer & Desmarais, 2018).

My objective is to investigate how tie formation patterns vary as a result of exogenous environmental factors and whether firms’ selection of partnering strategies are influenced by the characteristics of their environments. These network level exogenous factors are treated as dyadic tie covariates when specifying the parameters of the ERGM (Lusher, Koskinen & Robins, 2012). I utilized the xergm package in R to run the analysis (Leifeld, Cranmer, and Desmarais,

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7 Traditional regression methods assume that all observations are independent of one another. However, network data is inherently interdependent and thus violates the independence assumption of regression analysis.
2018a, Leifeld et al., 2018b). Although this package is less commonly used than other temporal network packages such as stergm (Dietrich, 2017; Krivitsky & Goodreau, 2019), the xergm package is capable of accounting for changes in network composition (e.g. node entry and exit) over time whereas other temporal network modeling packages require more stable networks with minimal changes in network composition.

*Model Specification and Measures.*

Following Boyd’s (1990) measures of external resource dependence, I operationalize industry *munificence* as the growth in industry sales over the preceding five-year period. Industry munificence refers to the environment’s ability to sustain additional entrants without resource scarcity. Higher levels of growth indicate a more munificent environment. Industry *dynamism* is operationalized as the variability in the industry sales growth rate for the same five-year period. Dynamic industries are unpredictable and more likely to have higher levels of sales variation year-over-year. In calculating these variables, I regressed the prior five years of sale on each year and retained the regression coefficient as the measure of munificence and the standard errors as the measure of dynamism. Finally, industry *complexity* is measured using the Herfindahl Index (George, 2005). The Herfindahl index measures the level of concentration within an industry and is operationalized as the sum of the squared market shares of each firm in the industry. Higher levels of concentration indicate higher levels of complexity. Each of these industry measures were standardized and recorded as network attributes of each participant firm.

*Coercive isomorphic* pressures are operationalized as the level of regulation in an industry using data provided by the Mercatus Center (McLaughlin & Sherouse, 2017), which provides year over year data of industry specific US Federal Regulation from 1970 to 2017. In order to calculate the level of regulation, the Mercatus utilizes machine learning algorithms and
text analyses that analyze and quantify the level of restrictive language in federal regulation texts. Regulation in an industry is then calculated by the level of restrictive language published in a federal regulation that is weighted based on relevance to that industry and the total word count of the regulatory texts. To measure the level of mimetic isomorphism in the industry, I measure homogeneity of competitors by examining their strategic characteristics. Industries with limited variance in terms of accounting measures across firms are said to be homogeneous (Ramaswamy, 1997). I utilize Finkelstein and Hambrick’s (1990) six strategic dimensions to create a composite score for industry wide homogeneity. These dimensions include advertising intensity, R&D intensity, plant and equipment newness, non-production overhead, inventory levels, and financial leverage. I mean centered R&D and Advertising expenditures at 0 and missing values for Research and Development and Advertising intensity were replaced with 0. In order to compute the ratios discussed above, I added .0001 to all sales figures reported in Compustat in order to prevent any undefined ratios. This composite variable was then standardized and summed to calculate the level of homogeneity in an industry. To measure normative isomorphism, I compiled data on the educational institutions of both the CEO and the Board of Directors. Educational institutions serve as the foundation for socializing students into acceptable business practices and strategies (Schein, 1968). Following extant literature (Useem & Karabel, 1986), I use a list of 37 elite institutions to determine which boards have been subjected to normative isomorphic pressures. I then calculated an elite ratio for each firm that is based on the proportion of elite directors who served on the board. This data is then aggregated to the industry level to determine elite representation on an industry-wide basis. Finally, I computed a measure of institutional strength that is the standardized and summed measures of the three isomorphic pressures described above. Because each of the external environment
measures are treated as dyadic covariates in the TERGM analysis, I constructed four separate covariate matrices that recorded the sum of each possible pairing for each year in the dataset. These matrices were then inputted as edge covariate parameters in the TERGM analysis (Ghosh, Ranganathan & Rosenkopf, 2016).

Status Asymmetry was calculated as the absolute difference in standardized eigenvector centrality between each dyad in the network utilizing a moving three year window of intra-industry alliance formation. Eigenvector centrality is a commonly utilized measure of status (Shipilov, Li & Greve, 2011) that account for not only the centrality of the focal node, but also the relative centrality of its alters. Firms that engage in status asymmetric partnerships are likely to form ties with alters of considerably higher or lower status. Accordingly, I utilized the ERGM term absdiff as the parameter term in the TERGM in order to capture status asymmetric partnerships.

I also control for several firm level parameters including firm performance, as stronger performing firms may be more inclined to engage in alliancing activities. Firm performance was measured as return on assets. Additionally, I controlled for firm size based on the number of employees employed by the firm standardized and mean centered at zero. Firms that engage in higher levels of research and development also tend to engage in more alliances. Thus, I controlled for R&D expenses. Alliance Experience was also utilized as a control to account for the relative experience of the firms engaging in strategic alliancing activities as firms more experienced in alliancing may be more likely to form subsequent alliances. In order to account for structural elements of the network, I included the gwesp and gwdsp network parameters which have been used by network scholars to model structural embeddedness or networks tendencies towards transitivity and triadic closure (Ghosh et al., 2016). The gwesp network
parameter fits a distribution of the number of triangles in the network whereas the \emph{gwdsp} network parameter accounts for the amount of shared partner firms by otherwise unconnected firms. Taken together, these parameters account for the effect of structural embeddedness in the network (Robins, Pattison and Wang, 2009). Finally, I also included a \emph{time covariate} that captures potential linear time trends to indicate if alliancing activity increased or decreased over time (Leifeld, Cranmer & Desmarais, 2018a).

One key drawback of the TERGM analysis is that it cannot handle any missing node attribute data and models will not converge if attribute data for any participating node is missing. Thus, nodes with missing data must either be removed from the analysis completely or NAs should be replaced with a modal value of 0 (Leifeld, Cranmer & Desmarais, 2018a). In this analysis, I chose to mean center firm performance, size & R&D expenses at 0 and replace all missing values with 0. However, these results, particularly with respect to firm level attributes of performance, size, and R&D expenses should be interpreted with some caution due to the potential for some bias in the results.

**F. Results**

***Insert Table 1 About Here***

Descriptive network statistics for each year are provided in Table 1. Interestingly, a large amount of variation in firm participation is observed over the course of the data time period. Alliance network size drops rapidly after 2009 before stabilizing and then rapidly rising again in 2017. The sudden drop in alliance participation following 2009 is unsurprising given the global recession that gripped the world in 2008 and 2009. However, the driving forces of the sudden increase in alliancing activity in 2017 and 2018 have not yet been empirically investigated and is likely to be an important question to address in the future. Generally, the alliance networks are
relatively sparse although I do observe a U-shaped trajectory of network density with density peaking in 2011 and then gradually dropping over time. Interestingly, this U-shaped relationship also appears to generally align with changes in dynamism with 2011 corresponding with the lowest level of reported dynamism. Munificence exhibits a generally downward trend with the external environment generally becoming less munificent over time. Complexity, on the other hand, remains relatively stable over the time period. Finally, I also observe a general downward trajectory of institutional strength, indicating that the institutional environment becomes considerably weaker over time.

***Insert Table 2 About Here***

The results of the TERGM analysis is reported in Table 2. Model 1 lists the controls only. Model 2 adds the direct effects of status asymmetry, munificence, complexity, dynamism, and institutional strength to test Hypotheses 1, 2, 3, 4 and 7. Model 3 includes the interaction effects of status asymmetry and tests hypotheses 5, 6, and 8. Beginning with the controls and structural parameters, I observe a positive and significant effect of R&D expenditures on alliance formation (marginal effect = 0.09, p<0.01) which aligns with the literature that suggests firms who engage in higher levels of R&D development are more likely to form alliances (Mowery, Oxley & Silverman, 1996). Additionally, alliance experience is a positive and significant predictor of subsequent alliance formation (marginal effect = 0.17, p<0.01) in that firms who have previous experience in forming alliances are more likely to form subsequent alliances. Finally, the time covariate is also positive and significant (marginal effect = 0.047, p<.01), indicating that over time, participants in the network are more likely to form alliances.

Beginning with hypothesis one, I predicted that status asymmetry would be negatively related to alliance tie formation. However, I failed to find support for the direct effect of status
asymmetry on intraindustry alliance formation in model 2. Thus, hypothesis 1 is not supported. The results of Hypothesis 2 are reported in Model 2. I predicted that as environments become more munificent, firms will be less inclined to form intra-industry ties. Surprisingly, I observe the opposite effect (marginal effect = 0.11, p<.01), demonstrating that firms are more inclined to form intra-industry ties as environments become more munificent. Thus, hypothesis 2 is not supported. This finding is interesting because while resources are readily available in the external environment, firms are still more inclined to engage in strategic alliances. I discuss the implications of these findings further in the discussion.

Hypotheses 3a and 3b predicted that complexity and dynamism would have a positive effect on alliance tie formation, respectively. The direct effect of complexity on alliance tie formation is not significant. Surprisingly, I observe a significant negative direct effect of dynamism on alliance tie formation in model 2, indicating that as dynamism increases in an industry, firms are less likely to form alliance ties. Thus, Hypotheses 3a and 3b are not supported.

***Insert Figures 1,2,3 and 4 About Here***

Shifting to the task environment moderation hypotheses in model 3, I observe a positive and significant interaction effect of munificence with status asymmetry (marginal effect = 0.31, p<.01). The interaction plot displayed in figure 1 demonstrates that in general, status asymmetric ties are less likely to occur. However, in conditions of high munificence, status asymmetric ties do become more prevalent compared to conditions of low munificence. Thus, hypothesis 4 finds some support in that partnering becomes somewhat more prevalent among status asymmetric partners as munificence increases. Hypothesis 5 predicted that complexity would moderate the relationship between status asymmetry and alliance tie formation. This hypothesis finds some
support as the interaction coefficient between complexity and status asymmetry is negative and significant (marginal effect = -0.89, p<.01), upon plotting the interaction in figure 2, I observe that under conditions of low complexity, status asymmetric tries are more likely to occur whereas higher levels of complexity are more likely to involve status symmetric ties. Hypothesis 6 predicts that status asymmetric ties are less likely to occur as dynamism increases. Contrary to expectations, I observe a positive interaction effect that indicates that status asymmetric ties actually increase as firms enter more dynamic environments (marginal effect = 0.22, p<.05). Thus, Hypothesis 6 is not supported. As figure 3 shows, while status asymmetric partnerships are rarer in general, they are slightly more prevalent under conditions of higher dynamism. These results are interesting as they indicate that status and signaling effects may become more important as firms enter more dynamic environments.

Shifting attention back to model 2, hypothesis 7 predicted that institutional strength would enhance the likelihood of alliance tie formation. This hypothesis receives support (marginal effect = 0.42, p<.01), indicating that as institutional strength increases, intra-industry alliance tie formation is more likely to occur. Hypothesis 8 predicts a positive interaction between the institutional environment and status asymmetric partnering. Model 3 demonstrates a negative interaction, suggesting that as institutional strength increases, tie formation becomes less prevalent among status asymmetric partners (marginal effect = -0.09, p<.05). The interaction plot outlined in figure 4 demonstrates that overall, tie formation is more prevalent among status asymmetric partners but that this effect becomes marginally weaker as institutional strength increases. Thus, Hypothesis 8 is not supported.

*Goodness of Fit*
In evaluating goodness of fit, I checked model degeneracy utilizing the `checkdegeneracy` function in R which creates graphical representations of goodness of fit in order to better visualize the difference between predicted and observed networks (Kim et al., 2015; Goodreau, Kitts & Morris, 2009). I also checked goodness of fit using the `gof` function in R which simulates 100 networks using the coefficients developed in the model and then compares them to the actual observed model. Appendix A demonstrates that model 1 has poor goodness of fit based upon the erratic burn in plots (Figure 2) as well as the individual and joint p-values displayed in Figure 1. However, the `gof` plots do appear to exhibit reasonable fit with the exception of an underestimation of degree 1 in the degree plot. This indicates that the models consistently underestimated the prevalence of nodes with only one tie in the network. This issue likely stems from the relative sparseness of the alliance network over the data collection time period.

Appendix B lists the trace plots and `gof` evaluation for model 2 that evaluates the hypotheses concerning direct effects (H1, H2, H3 and H7). These plots displayed in Figure 2 allow us to determine if the MCMC sample is significantly different from the target population and if the sample size is sufficient. Ideally, trace plots should exhibit low levels of serial correlation with limited burn in (Krivitsky, Handcock & Morris, 2011; Schweinberger, 2011). The trace plots generally demonstrate that serial correlation is low with minimal burn in.

Additionally, goodness of fit burn-in diagnostics are reported in Appendix B, Figure 1. These diagnostics are generally favorable with the exception of munificence with a joint p-value of 0.024. This indicates that burn in may be an issue with regard to munificence and that these findings should be interpreted with caution until potentially more representative samples can be collected. The joint p-value of the degeneracy model totals to 0.25 which suggests that the model
is relatively well fit\(^8\). Moreover, the gof plots outlined in Appendix B, Figures 3-6 indicate that the model is slightly better fit compared to model 1 with the box plots exhibiting lower levels of variance. However, it is important to note that degree is still underestimated at 1.

Appendix C lists the trace plots for model 3 which evaluates the interaction effects outlined in Hypotheses 4, 5, and 8. While the trace plots appear acceptable, they do appear to exhibit higher levels of autocorrelation and some burn in similar to what was observed in model 1. This is further supported by the joint p-values reported in the goodness of fit diagnostics as the majority of the joint p-values of the interaction terms are below .05. However, the degeneracy model itself exhibits acceptable fit with a p value of .30. Thus, the interaction results reported in model 3 should be interpreted with caution as the initial trace plots and goodness of fit burn-in diagnostics indicate weak model fit.

In order to further evaluate these models, I also conduct an out-of-sample goodness of fit assessment which simulates 100 networks using the model 3 specifications for 2008 to 2017 (t=1 to t=11) and then compares them to the network in 2018 (t=11) (e.g. Leifeld, Cranmer & Desmarais, 2018a). These results are reported in Appendix C, Figure 3. I report the distribution of both the observed and simulated networks (Hunter, Goodreau & Handcock, 2008). Generally, the goodness of fit measurements appear to be acceptable, with the majority of confidence intervals being relatively stable. One exception is the simulated versus actual degree distributions. The confidence intervals capture a wider range of frequencies, however these confidence intervals reflect acceptable ranges when compared to previous studies that have utilized this method (e.g. Leifeld et al., 2018a, Kim et al, 2015).

\(^{8}\) p values greater than .05 are desirable when assessing model fit.
Due to potential model degeneracy concerns identified in model three, I reran the temporal analysis again and report the results in Appendix D using the btergm function which reports confidence intervals instead of p values and differs slightly from the Markov chain Monte Carlo (MCMC-MLE) estimation used in the primary analysis. Namely, the btergm utilizes maximum bootstrap methods with confidence intervals and estimates through maximum pseudolikelihood estimation (MPLE) (Desmarais and Cranmer, 2012; Leifeld, Cranmer & Desmarais, 2018). The key difference between the two methods is that btergm does not require simulations like the mtergm method, and thus, is much less computationally demanding. Accordingly, MPLE methods are becoming more popular, particularly as networks become larger and more complex (Desmarais and Cranmer, 2012). Moreover, MPLE methods are also less subjected to model degeneracy issues (Leifeld, Cranmer & Desmarais, 2018). It is important to note that MPLE methods are slightly less accurate with sparse networks or networks that cover limited time periods. While this alliance sample covers adequate time periods, the networks are very sparse, which may contribute to model misspecification issues (Leifeld, Cranmer & Desmarais, 2018).

Appendix D, Figure 1 displays the results of the analysis utilizing MPLE methods. Model 1 results are relatively consistent with the MCMC-MLE estimation with network structural terms. For instance, R&D expenditures and alliance experience are significant predictors of alliance tie formation. Shifting to the direct effects in model 2, only munificence and institutional strength are significant predictors of alliance tie formation. Both dynamism and complexity exhibit a negative relationship and are just over 0 at the 97.5% confidence interval. Model 3 displays the results of the interaction effects. The hypotheses that were previously supported are not supported in model 3 as the interaction effects are much weaker in the MPLE approach when
compared to the MCMC-MLE approach and all include 0 in the confidence intervals. These findings suggest that there may indeed be model degeneracy concerns in the third model reported in Table 2 above and that these results should be interpreted with great caution.

G. Discussion

In this paper, I investigated the factors that lead to alliance tie formation in the biotechnology industry. Utilizing the dual lens of resource dependence and institutional theory and linking the two with network theory, I introduced an integrated framework of alliance tie formation that takes into consideration both the relative status of firms in an industry along with overarching shifts in the external environment to predict alliance formation. I argue that characteristics of the external environment, namely the task environment and the institutional environment, influence intra industry alliance tie formation due to shifting perceptions of performance and relational risk (Das & Teng, 2001). Moreover, I also investigate how status asymmetric partnering influenced these relationships as well. Finally, I investigated the interaction effects of the external environment and status asymmetric partnering on intraindustry tie formation.

Contrary to my initial expectations, environmental munificence was positively related to intra-industry tie formation. While this finding aligns with prior research that suggests firms enhance alliancing activities in munificent environments (e.g. Koka, et al., 2006), it is contrary to what one would expect from a resource dependence perspective. Munificence indicates that resources are relatively easy to obtain and that environments are favorable (Dess & Beard, 1984). Thus, one would expect that resource access motivations are weaker in munificent environments as firms have enhanced abilities to obtain and develop resources themselves without having to rely on other firms to gain access to important resources. This introduces an interesting puzzle to the alliance literature because it suggests that firms are more inclined to form alliances despite
favorable conditions that are more conducive to in-house resource development. One possible explanation for this is that resource access motivations may not be the key underlying motivations for forming alliances in munificent environments. Rather, we may observe that as it becomes easier for firms to gain access to resources external to their boundaries, they may seek to form alliance ties for legitimacy reasons (Dacin, Oliver & Roy, 2007). Alternatively, munificent environments may also greatly reduce managerial perceptions of both performance and relational risk as well (Das & Teng, 2001). Thus, while firms may have less to gain from alliances in munificent environments, they also have much less to lose. Finally, firms may be more inclined to engage in different types of alliances in munificent environments. For example, firms may engage in alliances for exploration reasons to develop new products in munificent environments rather than to exploitation reasons (e.g., Rothaermel & Deeds, 2004; Yang, Zheng & Zhao, 2014).

In order to achieve a stronger understanding of the relationship between munificence and alliance formation, future research should consider not only the propensity for tie formation and partner selection decisions, but also the content of the tie itself. For example, while alliances occur more frequently in munificent environments, the proportion of equity-based alliance agreements may decrease as firms may be less inclined to devote substantial resources to partnerships when it is relatively easy for them to develop new capabilities in house.

Similarly, I also observed surprising results in dynamism being negatively related to alliance formation. These findings warrant additional explanation as they are contrary to what one would expect from the resource dependence perspective. Generally, the literature has suggested that firms are more motivated to form alliances in complex and dynamic environments due the higher levels of unpredictability and uncertainty (Pfeffer & Salancik, 1978). However,
my analysis of the biotech industry proved the opposite. As environments became increasingly
dynamic, firms were less inclined to form alliance ties. One potential explanation for this
surprising finding may be that firms are less inclined to seek out intra-industry ties in dynamic
environments and more inclined to seek out more distant, interindustry ties. For example,
scholars have suggested that firms who occupy environments characterized by high levels of
technological uncertainty are more likely to pursue distant ties with dissimilar firms than they are
to pursue proximal network ties (Beckman, Haunschild & Phillips, 2014; Hagedoorn, Letterie,
Palm, 2011; Rowley, Behrens & Krackhardt, 2000)

Taken together, these unexpected findings show that while the task environment plays an
important role in intra-industry alliance formation, more nuanced or alternative theoretical
perspectives are required if we are to fully understand the underlying dynamics of the task
environment in relation to alliance formation. The results of this study do not provide support for
the resource dependence perspective in the context of interindustry alliance formation, at least in
a sample of biotech industry firms. Researchers may consider approaching strategic alliance
motivations from the institutional perspective in understanding how alliances not only contribute
to resource access motivations, but may also serve as vehicles for enhancing legitimacy as well.

In line with my predictions, I found that the strength of the institutional environment has
a strong, positive effect on alliance formation propensities in the biotech industry. Indeed, these
findings suggest that as institutional environments become more structured, firms may perceive
lower levels of risk associated with alliance formation and are more inclined to form alliance ties
as a whole. Despite the literature that suggests that firms primarily form alliances for resource
access motivations (Gulati, 1998), these findings suggest that firms are particularly risk adverse
when making alliance decisions and that strong institutional environments are likely a
requirement for alliance formation in the first place as outcomes are more easily predictable and stronger protections are in place to safeguard against malfeasant behaviors.

Shifting to network partner selection, I find general support for prevalence towards tie formation between status asymmetric partners in increasingly munificent environments which generally supports my arguments that firms become less concerned with potential performance risks as the environment becomes more favorable. I also observe a similar pattern with complexity, with the results suggesting that status-symmetric partnering becomes more prevalent as the external environment becomes increasingly complex.

However, this trend towards status symmetric partnering does not hold with regard to dynamism as the results suggest that status asymmetric partnerships actually becomes more prevalent as dynamism increases. This finding is of particular interest as the literature often assumes that dynamism and complexity have similar effects on the firm with respect to increased risk, greater uncertainty, and more pressing needs to anchor the firm in the interorganizational network (Castrogiovanni, 1991). Thus, future research should further consider the nuances that may exist when jointly examining the role of complexity and dynamism in strategic alliance formation.

Finally, although alliances occurred more frequently in strong institutional environments, there was only a very weak negative interaction with status asymmetry as status symmetric partnerships were marginally more prevalent in strong institutional environments.

The study makes several contributions to the existing alliance literature. First, I utilize a relatively new empirical technique of TERGMs which provides a more nuanced understanding of how strategic alliancing activities are not only determined by attributes of the firm and its environment but also from the structural properties of the network itself. The usage of ERGMs
allows researchers to better account for important network endogenous factors such as clustering and shared ties of partners which are likely to influence alliance partner selection (Robins et al., 2007).

Additionally, I introduce an integrated perspective to alliance formation that extends beyond resource access motivations to understand the conditions in which firms may also benefit from legitimacy outcomes of alliance formation (e.g. Dacin, Oliver & Roy, 2006). Indeed, the results suggest that firms may be less likely to utilize alliances in unfavorable task environments, contrary to what one would expect from a resource dependence perspective. However, when taking into consideration the role of status-asymmetry in alliance formation, we can see that legitimacy outcomes may be an important underlying driver of alliance formation, particularly in favorable institutional environments or in environments in which firms face higher levels of uncertainty (e.g. higher dynamism).

However, this study is not without limitations. While ERGMs have distinct advantages over traditional regression techniques, they also have several shortfalls. First and foremost, the TERGMs utilized in this study can only account for tie formation and dissolution and cannot assist in making predictions about the characteristics of the ties themselves. Thus, ERGMs do not currently have the ability to allow us to predict tie characteristics such as alliance governance form. This represents an important area of future research as firms often modify alliance governance forms (e.g. equity vs non-equity alliances) in response to perceived risk (Das & Teng, 2001). Future research may consider modeling independent networks of equity and non-equity based alliance networks.

Additionally, due to the nature of the TERGM analysis in evaluating the network as a whole in predicting tie formation, any missing attribute values will also cause model
convergence issues (Leifeld, Cranmer & Desmarais, 2018a). Missing values must either be replaced using an accepted method such as group mean replacement, transforming the variables into categorical form, or the nodes must be removed entirely (for a detailed discussion of missing edge value imputation methods, see Handcock and Gile, 2010 and Koskinen, Robins, Wang & Pattison, 2013). None of these alternatives are ideal as they can bias the results due to measurement error. However, it is very difficult to collect full and complete data on firms when utilizing archival sources over extended periods of time.

Finally, ERGMs also tend to suffer from model degeneracy issues as the Geweke burn-in diagnostic test of model 3 suggests. Although further goodness of fit evaluations indicate that the model exhibited reasonable fit, the status-asymmetry interaction results should be interpreted with caution – particularly due to the fact that the interactions themselves are weak. In order to remedy this potential concern, this analysis should be replicated on a more comprehensive alliance dataset that includes more than just the biotech industry.
H. References


Castrogiovanni, G. J. (2002). Organization task environments: have they changed fundamentally over time?. *Journal of Management, 28*(2), 129-150.


Monge, P. R., & Contractor, N. S. (2003). *Theories of communication networks*. Oxford University Press, USA.


### Table 1. Network Descriptive Statistics

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*standardized in network analysis
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*standardized in network analysis
Table 2. TERGM Results for the Biotech Industry, 2008-2018

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<td><strong>Institutional Strength X Status Asymmetry</strong></td>
<td>-0.091</td>
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*** = p<0.001, **= p<0.01, *=p<0.05
Figure 1. Munificence Moderation Effect

Figure 2. Complexity Moderation Effect
Figure 3 Dynamism Moderation Effect

Figure 4. Institutional Strength Moderation Effect
APPENDIX A – Goodness of Fit Model 1

The figure above demonstrates poor model fit as the individual p values are below .05 and the Joint p-value of the model is also below .05. The burn-in diagnostic assesses the representability of the data given the parameters outlined above. These results indicate that the model is lacking explanatory power. In order to see which variables may be causing the issues, we can examine the burn-in plots displayed below in figure 2.
Figure 2. Model 1 Burn-in diagnostic plots
Overall, these appear to be somewhat ill fit as many of the covariates display erratic burn in plots and skewed distributions. The one exception is edgecov.timecov1 which appears to show burn in centered around 0 and a normal distribution. Thus, model 1 is acceptable in terms of fit, but there is room for improvement.

Next, I run goodness of fit diagnostics (gof) which simulate 100 networks and then compare to the observed networks in the data. These generate graphs with box plots that evaluate how similar the simulated networks are to the actual network.

![Dyad-wise shared partners](image)

**Figure 3. Model 1 Dyad-wise Shared Partners Simulation**
Figure 4. Model 1 Edge-wise Shared Partners Simulation

Figure 5. Model 1 Degree Simulation
Figure 6. Model 1 Geodesic Distances Simulation

Generally, model 1 fit appears to be low. We can see in the degree plot that it appears to underestimate 1 degree ties (firms that have only 1 tie in the network).
APPENDIX B – Goodness of Fit Model 2

Model 2 adds the external environment direct effects (munificence, complexity, dynamism, and institutional strength). As demonstrated in the figure below, model fit is significantly improved, although munificence falls below the .05 cutoff value. This indicates that the model would be stronger if munificence were dropped.

Figure 1. Model 2 Burn In Diagnostics
Figure 2. Model 2 Burn In Plots
Figure 2. Model 2 Burn In Plots (continued)
Based upon these burn-in statistics and plots, model 2 fit is a significant improvement from model 1. I observe that the plots are less erratic, through munificence does appear to show more variability than the other external environment variables. However, this appears to still be in acceptable ranges.

Next, I run goodness of fit diagnostics to compare simulated networks from model 2 to the actual network in model 2. We can observe that there appears to be slightly better model fit as the box plots are slightly condensed, indicating that there is slightly less variance in the simulated networks. However, we can observe that there is still underprediction of degree = 1 in the simulated networks.

Figure 3. Model 2 Dyad-wise Shared Partners Simulation
Figure 4. Model 2 Edge-wise Shared Partners Simulation

Figure 5. Model 2 Degree Simulation
Figure 6. Model 2 Geodesic Distances Simulation
APPENDIX C – Goodness of Fit Model 3

Model three tests the interaction effects with status asymmetry. In model three, the joint p value of the model increases to .30, indicating that the model fits slightly better than model 2 as a whole. However, we also observe individual p values that are below .05, which also indicates model degeneracy issues.

Figure 1. Model 3 Burn In Diagnostics
Figure 2. Model 3 Burn In Plots
Figure 2. Model 3 Burn In Plots (continued)
Figure 3. Model 3 simulation comparison to actual network comparison at t=11
### Table 2. TERGM Results for the Biotech Industry, 2008-2018

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<th>Model 1</th>
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<td>97.50%</td>
<td>Estimate</td>
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IV. Chapter 3: The Road to El Dorado – Strategic Alliances as a Tool for Enhancing Firm Legitimacy

A. Abstract

Strategic alliances have long been recognized as important tools that firms can utilize to enhance their competitiveness. However, much of the literature has emphasized the resource dependence perspective whereby firms partner with one another in order to codevelop new resources and competencies. However, the literature has also begun to recognize that firms may form alliances for reasons beyond resource access. Legitimacy represents an important, yet understudied, consequence of alliance formation. In this paper, I investigate the legitimacy outcomes of strategic alliance formation. I find that an inverted-U relationship exists between the number of alliances formed and normative legitimacy as measured by media perceptions. I also show that status asymmetry along with the overarching environmental context of alliance formation itself also serve as important moderators of the alliance formation and legitimacy relationship. In conducting this study, I expand upon the institutional perspective of alliance formation and contribute to the broader alliance literature by examining the legitimacy-based outcomes of alliance formation.

Keywords: Strategic Alliances; Legitimacy; Social Networks; Status Asymmetry; Alliance Governance
B. Introduction

Strategic alliances have long been recognized as an important tool for gaining access and developing resources with partners that the firms themselves could not achieve on their own (e.g., Gulati, Nohria, and Zaheer, 2000; Inkpen, 2001; Shipilov & Gawer, 2019). Defined as cooperative agreements between firms to pursue the codevelopment of important resources, capabilities, or competencies (Gulati, 1998), alliancing activity is associated with numerous important outcomes including firm performance (Goerzen, 2007; Lavie, 2007), innovativeness (Joshi & Nerkar, 2011), and new market entry (Garcia-Canal, Duarte, Criado & Llaneza, 2002). However, studies have also indicated that strategic alliances also often fail to codevelop new products and services (e.g., Inkpen & Beamish, 1997; Kale, Dyer, and Singh, 2002), leading researchers to question the efficacy of strategic alliances despite their popularity.

Generally, studies have approached alliance formation and outcomes from the perspective of resource dependency theory whereby firms form strategic alliances in order to gain access to resources external to the organization and to better cement their competitive positions (Pfeffer & Salancik, 1978). This literature stream emphasizes the importance of strategic fit, in which complementary firms are more likely to be successful in achieving synergies vital for alliance success and eventual enhanced firm performance (Child, Faulkner, & Tallman, 2005; Das & Teng, 1997; Lin, Yang & Demirkan, 2007). Firms that share similarities across key dimensions such as resource similarity are more likely to achieve alliance success (Ahuja, Polidoro & Mitchell, 2009; Mowery, Oxley & Silverman, 1996) and less likely to engage in opportunistic behaviors (Polidoro, Ahuja & Mitchell, 2011). Indeed, scholars suggest that external resource access is a key driver of strategic alliance formation (Oliver, 1990; Das & Teng, 2001).
However, institutional theorists have also argued that external resource acquisitions may not always be the primary driver of strategic alliances (e.g., Dacin, Oliver & Roy, 2007). Instead, strategic alliances may serve as invaluable tools for establishing or enhancing legitimacy in a given industry. Indeed, studies have begun to emphasize the signaling effects of relative status in driving strategic alliance success and failures (e.g., Lin, Yang & Arya, 2009; Shipilov, Li & Greve, 2011). While building legitimacy appears to be an important consideration in alliance partner selection, past empirical studies have fallen short in directly evaluating the legitimacy outcomes of alliance formation. While several different motivations have been identified as drivers of strategic alliance formation, acquiring legitimacy “has been largely overlooked as a specific benefit of alliance formation.” (Dacin, Oliver & Roy, 2007: pg. 169). Moreover, studies on legitimacy have largely focused on it in terms of an important determinant of the governance structure and partnering preferences of firms (e.g., Dacin, Oliver & Roy, 2007) with limited attention paid to specifically theorizing about and measuring the legitimacy outcomes of strategic alliance formation. The reliance on resource dependence mechanisms to explain strategic alliancing behaviors and outcomes has largely led to a deficiency in the literature when it comes to explaining legitimacy based outcomes for forming alliances when power asymmetric partnerships may actually be beneficial in some cases due to status signaling effects (e.g., Shipilov, Li & Greve, 2011). One key challenge of strategic alliances that are motivated by resource access needs is that they require levels of mutual interdependence that often leads to one alliance partner being more vulnerable than the other (Parkhe, 1993) and enhances concerns related to knowledge appropriation or power asymmetries that can threaten the success of the alliance (Gulati & Singh, 1998; Lavie, 2006, Chen & Chen, 2003; Ahuja, Polidoro & Mitchell,
Accordingly, alliances often require high levels of resource commitment, coordination costs, and complex governance mechanisms to reduce these risks (Inkpen, 2001).

In this study, I explore how strategic alliancing activities influence media perceptions of the firm. Media perceptions have been recognized as an important indicator of normative legitimacy (Abrahamson & Fombrun, 1992; Deephouse & Suchman, 2008; Desai, 2011). Utilizing an institutional lens and taking into consideration the role of environmental contingencies, I hypothesize and show that firms use strategic alliances not only as important tools for managing resource dependencies but also as legitimating mechanisms as well.

In doing so, I make several key contributions to the literature. First, I advance an alternative theoretical perspective in understanding how firms utilize strategic alliances in their quests for legitimacy. While scholars have listed legitimacy motives as an important determinant of interorganizational relationships (e.g., Oliver, 1990), few studies have explored how legitimacy outcomes are actually influenced by alliancing activities. This represents a key shortcoming in the alliance literature as scholars have recognized that legitimacy is a key mediator in the relationship between alliance formation and firm performance (Dacin, Oliver & Roy, 2007), suggesting that legitimacy outcomes may be an important, and more proximal, outcome of strategic alliance formation. Thus, in this study, I focus on uncovering how alliancing activity influences the legitimacy of firms.

Further, I examine the boundary conditions that may facilitate or hinder the relationship between strategic alliances and firm legitimacy. First, I build upon the existing organizational status literature to explore how relative status of alliance partners can influence firm legitimacy returns. I also introduce theorizing about the nature of the alliance itself by positing that some alliance governance forms are more closely related to legitimacy returns than others. Finally, I
examine the role of environmental contingencies – specifically the strength of the institutional environment and task environment – in influencing the relationship between alliance formation and legitimacy outcomes.

I test my hypotheses using a sample of 450 firms in the biotech industry between 2008 and 2018. The results show that strategic alliances play an important role not only in gaining access to important resources, but also in achieving important legitimacy outcomes.

**Strategic alliances.**

Until the 1980s, the majority of research on alliances focused upon equity joint ventures (Inkpen, 2001). In recent decades, the term strategic alliance has been used to refer to a wide array of collaborative and cooperative relationships between firms, with the majority of studies broadly classifying these relationships based upon resource commitments (equity vs. non equity) and contractual structuring (bilateral vs. unilateral relationships (e.g., Das & Teng, 2001; Inkpen, 2001). I draw on Gulati’s (1998) definition, which describes alliances as documented, cooperative agreements between two firms in which they seek to jointly develop new resources, skills, or competencies. This encompasses a wide variety of alliance forms ranging from collaborative value chain activities to joint ventures. Indeed, research documents that strategic alliances are utilized for multiple purposes, including entering new markets (Garcia-Canal et al., 2002), developing new competencies and capabilities (Gerwin & Ferris, 2004; Kotabe & Scott Swan, 1995), and gaining competitive advantage (Eisenhardt & Schoonhoven, 1996; Lavie, 2006).

To date, the alliance literature has developed along three general streams (Inkpen, 2001). The first stream addresses the antecedents of alliance formation. Studies in this stream of research investigate factors that influence firms to form alliances, such as firms’ motivations.
Firms choose to form alliances for a myriad of reasons ranging from resource access and
development needs to satisfying legitimacy-based concerns (Dacin, Oliver & Roy, 2007; Oliver,
1990). Various factors such as firm network position, geographic proximity, the external
environment, and complementary resources have all been shown to influence firm propensity to
form strategic alliances (e.g., Ahuja, Polidoro & Mitchell, 2009; Koka, Madhavan & Prescott,
2006; Reuer & Lahiri, 2014; Stuart, 1998).

The second stream of research focuses on the strategic alliance process itself. In this
stream, scholars examine the processes that firms engage in when structuring their alliances.
Generally, scholars have focused on traits of the alliances themselves in which they examine the
factors that influence alliance governance forms (Das & Teng, 2001; Hoetker & Mellewigt,
2009), contractual complexity (Faems, Janssens, Madhok & Looy, 2008; Reuer & Ariño, 2007),
and strategic organizational design (Albers, Wohlgezogen & Zajac, 2016). These studies suggest
that factors such as trust (Das & Teng, 2001), relational and performance risk (Das & Teng,
1996; 1999), and the nature of assets being exchanged (e.g., knowledge vs property based assets,
Hoetker & Mellewigt, 2009) may all influence the form and type of alliances that firms choose to
engage in.

A third stream of research focuses on the consequences of strategic alliances at the firm,
dyad, and industry levels. Although it can be difficult to tie strategic alliance activity directly to
more distal performance outcomes, strategic alliances have generally been shown to influence
specific firm performance measures such as firm valuation (Das, Sen & Sengupta, 1998), firm
growth (Stuart, 2000), and ROA (Lin, Yang & Arya, 2009). Researchers have also evaluated
more proximal outcomes such as patenting and innovation activity between alliance partners in
R&D partnerships (Kotabe & Scott Swan, 1995; Sampson, 2007) and organizational learning
(Hamel, 1991). Studies have also relied on other proxies of alliance success such as alliance duration, unplanned termination, and subsequent acquisitions of alliance partners (Bakker, 2016; Hagedoorn & Sadowski, 1999; McCutchen, Swamidass & Teng, 2008).

The resource dependence perspective remains a dominant theoretical lens in the study of strategic alliances across the three research streams identified above. This theory suggests that alliances allow firms to gain access to needed resources in the external environment, and firms can better manage external power dynamics and facilitate the development of higher levels of competitiveness through alliances (Pfeffer & Salancik, 1978). However, scholars have also acknowledged that firms may not only form alliances for resource dependence needs, but that alliances may serve as important legitimating mechanisms as well (Hubbard, Pollock, Pfarrer & Rindova, 2018). Accordingly, researchers have noted that “the acquisition or enhancement of legitimacy has been largely overlooked as a specific benefit of alliance formation” (Dacin, Oliver & Roy, 2007: pg. 169).

While legitimacy itself may not be the sole contributor to competitive advantage, it is often a prerequisite for firms to have the ability to compete effectively and gain competitive advantage as it allows firms to more easily gain access to important resources and markets (Aldrich & Fiol, 1994; Zucker, 1987). Thus, in this study, I investigate the role of strategic alliances in facilitating the legitimacy-based outcomes of organizations.

Legitimacy.

Legitimacy refers to the “the social acceptance of organizations and their actions ” (Etter Colleoni, Illia, Meggiorin & D’Eugenio, 2018:61) and often involves an extensive process of legitimation wherein firms are evaluated for their actions based on public validation and endorsement (Dacin, Oliver & Roy, 2007; Kumar & Das, 2007; Suddeby, Bitektine & Haack,
2017). Oftentimes, these actions and responses are evaluated against a “socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995: 574) and firms often seek legitimacy by pursuing strategies that are more broadly favored by key entities in their external environment. Thus, firms’ quest for legitimacy often result in increased homogenization of industry players as they seek to gain favorable perceptions from key external environment stakeholders (DiMaggio & Powell, 1983). Further, legitimacy is essential for firm survival (Human & Provan, 2000). Studies have also shown that low levels of legitimacy deter both customers and suppliers from doing business with illegitimate firms and can also lead to higher levels of scrutiny from regulatory agencies (Siomkos & Shrivastava, 1993).

Legitimacy, like many other resources, can be both unilaterally and bidirectionally exchanged between firms (Pfeffer & Salancik, 1978), and legitimacy needs are often driven by the characteristics of the organization as well as its external environment. Legitimacy is an important resource to firms, and the strategic alliance literature recognizes that desires for enhanced legitimacy may be an important motivating force in strategic alliance formation (Oliver, 1990). Indeed, fledging literature on entrepreneurial venture success has recognized that the status-signaling effects of affiliation with high status venture capital firms is considered vital for firm success (Ma, Rhee & Yeang, 2013). However, scholars have also noted that “the existing literature has not adequately dealt with the issue of legitimacy in alliances” (Kumar & Das, 2007:pg. 1423) and while legitimacy is often cited as a key motivator for forming alliances, no studies to my knowledge have empirically evaluated the legitimacy outcomes of firms who engage in strategic alliances.

To date, much of the existing literature on strategic alliances that builds upon theorizing surrounding legitimacy primarily focuses on the antecedents of alliance formation or the alliance
structuring process itself. For example, several studies have found that firms often seek out high status partners when engaging in strategic alliances as high status firms are more likely to lead to a certification effect of the lower status firm (e.g., Shipilov, Li & Greve, 2007). A related stream in this area has placed particular emphasis on young, entrepreneurial firms’ prioritization of high-status partners in order to enhance IPO valuations and performance (Gulati & Higgins, 2003; Reuer & Tong, 2010). Legitimacy studies often focus on how new ventures gain or maintain legitimacy when dealing with multiple external stakeholders and that legitimacy criteria are likely to vary across audiences (e.g., Fisher, Kuratko, Bloodgood & Hornsby, 2017).

Moreover, Dacin, Oliver and Roy (2007) theorize that the desire for legitimacy building often drives firms to engage in equity-based alliance ties, which in turn lead to enhanced firm performance. However, it is also important to note that status, like prestige and reputation, is a distinct construct from legitimacy. Legitimacy is more broadly defined and “pertains to the extent to which a firm’s structures and activities appear to conform with social norms, values, and expectations of the firm’s economic and social environment” (Dacin, Oliver & Roy, 2007: 171). On the other hand, constructs such as status, reputation and prestige are more narrowly defined and are often applied by comparing a collection of firms to one another and distinguishing across a set of criteria that may vary across contexts (Deephouse & Carter, 2005). For example, studies often rely on rankings published in business journals such as Fortune’s “Most Admired Corporations” as proxies of reputation or status (e.g., Lin, Yang & Arya, 2009). Thus, while legitimacy evaluations are made without comparison to others, constructs such as reputation or status are often developed in comparison to others. While legitimacy is likely a prerequisite to success, legitimate firms may vary in their levels of status, reputation, or prestige relative to their comparison groups (Dacin, Oliver & Roy, 2007).
Legitimacy can be broadly divided into three different categories including cognitive, regulative, and normative legitimacy (Desai, 2008; Zimmerman & Zeitz, 2002). Cognitive legitimacy refers to the “taken for granted character of the organization” (Kumar & Das, 2007: 1434) and often implies that firms in an industry have a similar cognitive reference framing. Scholars have argued that cognitive legitimacy is often assessed at the industry level and applies to the same degree across organizations as their practices and structures become more uniform (Desai, 2008; Meyer & Rowan, 1977). Regulative legitimacy refers to the extent to which organizations follow and abide by laws and regulations (Scott, 1995). Regulative legitimacy can be operationalized by evaluating “consistency with laws, filing articles of incorporation, registration with the SEC and obtaining professional certification[s]” (Zimmerman & Zeitz, 2002: 418). Unlike cognitive legitimacy, regulative legitimacy can vary across organizations as it is dependent upon their individual compliance with laws and regulations (Reuf and Scott, 1998).

Normative legitimacy refers to compliance with the norms and values of the overarching environment that the firm operates in (Desai, 2008). Normative legitimacy has been recognized as a particularly salient factor in understanding how firms can gain access to important resources and enhance competitiveness (Deephouse, 1999). As such, studies often emphasize normative legitimacy attainment as a key goal of firm legitimacy seeking behaviors (e.g., Desai, 2008). While firms may be similar across multiple strategic dimensions, it is not uncommon for normative legitimacy to vary greatly between them as normative legitimacy is evaluated by a wider variety of external stakeholders who may vary in their individual legitimacy evaluations of the firm (Desai, 2008; Suchman, 1995).

Normative legitimacy is often measured in terms of endorsements, which consist of favorable opinions of important entities towards the focal organization. (Stuart, Hoang & Hybels,
A variety of entities can provide endorsements and thus contribute to perceptions of normative legitimacy. The first, and arguably the most frequently studied entity, is the media (Abrahamson & Fombrun, 1992; Deephouse & Suchman, 2008; Desai, 2011). Traditionally, the press has been recognized as an important third party evaluator or watch dog of firms, and favorable evaluations from the media are often considered to signal legitimacy (Bednar, 2012; Carroll & McCombs, 2003; Zimmerman & Zeitz, 2002). The news media have been very important endorsers of legitimacy (e.g., Bansal & Clelland, 2004; Deephouse, 1996; Desai, 2008; Vergne, 2011). Media outlets provide ratings of both actions and outcomes and generally focus on identifying both responsible and irresponsible behaviors by firms (Lee & Caroll, 2011), and favorable coverage by news outlets provides a type of “media legitimacy” (Bitekine, 2011: 154) that often spills over into other domains. However, the media has also been criticized for pursuing their own agendas in evaluating firms (McCombs, 2013; Shoemaker & Reese, 2013) and often being selective in the types of opinions that are approved for publication (Pollock & Rindova, 2003).

I expect that normative legitimacy will be influenced by the strategic actions that firms employ. Alliances can serve as an important source of organizational legitimacy (Dacin, Oliver & Roy, 2007; Oliver, 1990) and enhanced legitimacy perceptions may also function as a means to achieve competitive advantage as “legitimacy itself is a strategic resource with the potential to yield significant economic and competitive (i.e., technical) benefits for firms” (Dacin, Oliver & Roy, 2007: Pg. 170). Thus, achieving legitimacy is an important strategic goal for firms. Specifically, I focus on the role of the media as an endorser of normative legitimacy. In the following sections, I develop and test theory that examines the legitimacy-based outcomes of strategic alliances.
C. Hypotheses Development

*Strategic alliances and firm legitimacy.*

Because strategic alliances are widely accepted and commonly utilized strategies employed by firms in order to enter new markets, develop products, or to circumvent entry barriers, they are likely to be seen as a legitimate strategy that firms can employ. While strategic alliances are not always successful, they tend to require significantly fewer resources than acquisitions and mergers and often employ multiple forms of structuring agreements that can vary from loosely coupled, non-equity agreements to tightly coupled, resource intensive joint ventures (Das & Teng, 2000a; 2000b; Inkpen, 2001). Further, strategic alliances have also been shown to enhance stakeholder’s perceptions of a firm’s ability to develop important capabilities and competencies (Park & Mezias, 2005) and strategic alliance formation has been linked to enhanced legitimacy at the population level (Baum & Oliver, 1992).

For example, Baum and Oliver (1992) found that legitimacy of firms in the childcare industry and both founding and failure rates vary as a function of both relational (e.g., prevalence of tie formation in an industry) and population density whereby firms who engaged in alliances with other firms were more likely to survive than firms who do not. Firms who participated in site-sharing agreements also displayed lower levels of failure rates than firms that did not, although failure rates in general decreased as site-sharing agreements became more prevalent overall (Baum & Oliver, 1992). Thus, as strategic alliances themselves are recognized as a socially justified and generally accepted practice, it is likely that engagement in a strategic alliance will enhance a firm’s legitimacy.

However, it is also important to note that a diminishing returns effect may also exist with relation to alliance formation. While alliances may be considered less risky than other activities
such as mergers and acquisitions, these collaborative agreements also represent resource commitments that firms must adhere to. Thus, the formation of multiple alliances in a given year may also send a negative signal to external stakeholders since alliances are rarely considered to be “successful” in terms of firm performance (Harrigan, 1988; Kumar, 2012). Indeed, while alliance scholars generally consider alliances to be important tools in enhancing firm competitiveness, some studies have also suggested that excessive alliancing activity in an industry may actually lead to lower levels of competitive intensity in an industry over time, leading to stagnant growth and lower levels of innovation (Katz 1986; Katz & Ordover, 1990). This may lead to enhanced scrutiny from the media and reduced legitimacy perceptions as too many alliances may send negative signals. Thus, I expect that the relationship between alliance formation and legitimacy will weaken and reverse as firms form more alliances.

Accordingly:

Hypothesis 1: An inverted U-shaped relationship exists between the number of alliances formed and firm legitimacy.

Partner Status Asymmetries

Characteristics of the alliance itself may also influence a firm’s legitimacy outcomes. Specifically, I expect that the relative status of partner firms and alliance governance choice will each influence the relationship between alliance formation and legitimacy.

One key factor that may influence perceived legitimacy is the status or reputation of the firms that a given organization chooses to partner with. While legitimacy and status may be similar in some ways, it is important to note that these constructs are still quite distinct from one another. Status refers to an “organization’s position in an industry’s hierarchy and influences judgements of its quality (Benjamin & Podolny, 1999)” (Shipilov, Li & Greve, 2011: 1418). This
leads to industries that are “stratified into groups comprising of firms of high, medium, and low status” (Shipilov, Li & Greve, 2011: pg. 1418.)

The literature has argued that that firms tend to seek out other firms of similar status, develop alliance networks that are comprised of status homophilic ties, and thus create interorganizational networks that facilitate trust and cooperation between partners (e.g., Chung, Singh & Lee, 2000; Gulati & Garguilo, 1999; Powell, White, Koput & Owen-Smith, 2005). However, other scholars suggest that some firms prefer to initiate status asymmetric ties when uncertainty is lower (Podolny, 1993; 1994) and that both parties may benefit from forming status asymmetric ties (Castellucci & Ertug, 2010). Moreover, Shipilov, Li and Greve (2011) demonstrated that status asymmetric ties are more likely to be initiated when firms occupy brokerage positions (e.g., they are connected to otherwise disconnected partners), or when they have a history of under or overperforming.

I argue that the firm’s relative status compared to their alliance partners will likely moderate the relationship between alliance formation and legitimacy. I expect that status asymmetric ties will enhance the relationship between alliance formation and legitimacy for the lower status firm and weaken the alliance formation and legitimacy relationship for the higher status firm. In this respect, lower status firms that affiliate with higher status firms are more likely to benefit from status spillover effects that engender enhanced legitimacy perceptions (Shipilov, Li & Greve, 2011). However, higher status firms may face legitimacy discounts when partnering with lower status firms as status heterophilic ties are generally signals of non-conformity, which may hinder legitimacy evaluations of the higher status firm and lead to negative spillover effects. Thus, I expect relative status to moderate the relationship between strategic alliances such that status asymmetric ties in the upward direction will enhance
legitimacy while status asymmetric ties in the downward direction will weaken or reverse the
positive relationship between strategic alliance formation and legitimacy. In other words, I
expect that firms who engage in alliances with higher status firms will shift the U-shaped
relationship upwards while firms who engage in alliances with lower status firms will
experience a downward shift in their alliance formation – legitimacy curve.

Hypothesis 2: Status asymmetry between alliance partners will moderate the relationship
between strategic alliance formation and legitimacy. As firms engage with firms of higher
status, the inverted U-shaped curve will shift upwards. As firms engage with firms of
lower status, the inverted U-shaped curve will shift downwards.

Strategic Alliance Governance Form

Typologies of strategic alliances have been developed by many scholars utilizing
different methods with the majority of approaches discerning between the diverse forms of
strategic alliances based upon contractual distinctions (e.g., Das & Teng, 2001; Teng & Das,
2008). Following these approaches, I broadly distinguish strategic alliance forms based upon
such contractual based distinctions. More specifically, I distinguish between alliance types based
on equity contributions of alliance partners by classifying alliances as either equity or non-equity
based. Strategic alliances can vary widely based upon the levels of commitment expected
between partner firms with minimal resource commitment being required from non-equity-based
alliances and substantial resource commitment being required from equity-based alliances
(Pisano, 1989). Non-equity-based alliances do not require firms to commit resources or financial
assets to the alliances, whereas equity-based alliances require that partner firms commit financial
resources to the partnership (Das & Teng, 1996; Osborn & Baughn, 1990).
Non-equity-based alliances typically involve arm’s length approaches to partnerships and tend to hold lower risk by participants and can be ended more quickly than equity-based alliances. These alliance forms tend to be shorter in duration and may precede more involved partnerships as they are utilized to test for potential synergies between firms without involving substantial commitment from the partners (Gulati, 1998). Non-equity-based alliances involve agreements such as R&D agreements or technology partnerships where a new equity-based structure is not developed and each firm continues to maintain ownership of their respective contributions to the partnership (Das & Teng, 2001). Accordingly, non-equity based alliance governance forms tend to represent lower risk profiles than equity-based alliances.

Alternatively, firms may choose to enter equity-based alliances wherein partner firms are contractually obligated to contribute resources and equity ownership to the alliance itself. The most studied form of equity-based alliances are joint ventures in which two or more firms choose to pool their resources in order to create a third entity on a relatively co-equal basis (Das & Teng, 1996; 2001). Joint ventures tend to be associated with higher levels of risk and are more difficult to end if they do not proceed favorably. Other forms of equity-based alliances include minority acquisitions and other similar agreements in which firms agree to contribute equity jointly to the alliance. Equity-based alliances have several distinct advantages compared to non-equity-based alliances. First, empirical evidence suggests that equity-based alliances have been linked more closely to firm performance outcomes and alliance success (Das & Teng, 1999). Moreover, equity-based alliances also tend to have more explicitly outlined processes, deliverables, and desired outcomes than non-equity-based alliances which may help to reduce potential information asymmetries between partners (Sampson, 2007). Opportunism by alliance partners is also less likely to occur among equity alliance partners than non-equity alliance partners as firms
may have more to lose if the alliance breaks down (Das & Teng, 2001). In a similar vein, resource commitment may also encourage firms to be more devoted to alliance success since they require investment from both partners at the onset.

I expect to find that equity-based alliances will strengthen the relationship between alliance formation and legitimacy. Endorsers of legitimacy such as the media are more likely to pay more attention and positively endorse equity-based alliances than non-equity-based alliances. Equity-based alliances often require higher levels of resource commitment and assign greater levels of risk to participants. Alliances are important signaling tools and they send stronger signals when it is clear that the firm is accruing costs and commitments (Milgrom & Roberts, 1986; Spence, 1974). On the other hand, non-equity-based alliances tend to represent more arm’s length approaches to collaboration that do not require significant resource commitment from either party. Accordingly, the media is more likely to respond favorably to equity-based alliance agreements when compared to non-equity-based alliance agreements.

**Hypothesis 3:** Alliance governance between alliance partners will moderate the relationship between strategic alliance formation and legitimacy. As firms engage in more equity-based alliances, the U-shaped curve will shift upwards. As firms engage more non-equity based alliances, the U-shaped curve will shift downwards.

**The External Environment.**

In this section, I shift my focus to the external environment in order to better understand how legitimacy outcomes may result not only from characteristics of the alliances themselves but also based on overarching traits of the external environment. The external environment has been shown to be an important driver of firm outcomes with favorable external environments enhancing firm competitiveness (Goll & Rasheed, 2004), lifespan (Aldrich, 1979;
Castrogiovanni, 1991), and various strategic actions and orientations including acquisitiveness (Wan & Yiu, 2009), entrepreneurial orientation (Rosenbusch, Rauch & Bausch, 2013), and risk-taking propensity (Tang & Tang, 2007). Further, factors of the external environment, such as environmental munificence, have also been tied to alliance formation wherein firms are more inclined to form alliance ties in munificent environments (Park & Mezias, 2005). More importantly, scholars have also found that behavioral norms, and thus perceptions of legitimacy and legitimate behavior, are often driven by the external environment (Suchman, 1995).

*Environmental munificence.* Environmental munificence refers to the extent to which resources are readily available and accessible in a given industry (Dess & Beard, 1984). Munificence enables firms to develop higher levels of slack which promotes internal development and other important strategic activities (e.g., Wan & Hoskisson, 2003). However, low levels of munificence introduce many additional challenges to firms, including increased competitiveness (Porter, 1980; Park & Mezias, 2005), and may even make some firms more inclined to commit illegal acts (Staw & Szwajkowski, 1975).

Environmental munificence influences interfirm strategies as well (e.g. Goll & Rasheed, 2004; Park & Mezias, 2005). Firms in munificent environments may be less inclined to form alliances as resources are readily available in the external environment and partnering is less likely to be a requirement in gaining access to such resources. Thus, strategic alliances in munificent environments may send weaker legitimacy signals to important external stakeholders as it is assumed that firms should be better equipped to gain access to important resources without requiring partnerships with other firms.

However, in less munificent environments, strategic alliances likely represent an important tool in gaining access to external resources as firms will be more pressured to form
alliances in order to better develop important capabilities. Thus, while strategic alliance partnering may send negative signals to external monitors (Park & Mezias, 2005), engaging in strategic alliances in less munificent environments is more likely to be representative of normative behavior and engender favorable responses from external constituents. For instance, stock market reactions to alliance formation tend to be more favorable in less munificent environments (Park & Mezias, 2005). Moreover, firms are also likely to be more committed to the success of alliances in less munificent environments (Luo, 2001) which will likely lead to more favorable evaluations from the media. Thus, I expect to find that lower levels of environmental munificence will likely enhance the relationship between strategic alliance formation and legitimacy. Thus:

Hypothesis 4: Environmental munificence will moderate the relationship between strategic alliance formation and legitimacy. As munificence decreases, the inverted U-shaped curve will shift upwards. As munificence increases, the inverted U-shaped curve will shift downwards.

Environmental Complexity and Dynamism. Dess and Beard (1984) recognized complexity and dynamism as two other important components of the task environment that are likely to influence the strategic decision making of firms. While munificence identifies the amount and ease of access of resources and thus captures the favorability of the environment (Castrogiovanni, 1991), environmental complexity and dynamism identify the level of unpredictability that firms are subjected to (Castrogiovanni, 2002) and often make the external environment more difficult to compete in.

Environmental complexity refers to the variety and heterogeneity of important elements in the environment (Castrogiovanni, 2002; Child, 1972; Randolph & Dess, 1984). Prior research
has conceptualized environmental complexity as the number and extent of interdependent relationships that firms often rely on, while dynamism has traditionally referred to the “degree, frequency, and unpredictability of change among environmental elements” (Castrogiovanni, 2002: pg. 132). More complex environments make it more difficult for firms to compete as they are tasked with simultaneously managing numerous relationships across competitive spheres. For instance, the more involved the supply chain (e.g. the number of suppliers), the wider the variety and type of consumers, and the more competitors that exist in an industry, the more complex the industry is. Environmental complexity often leads to a higher prevalence of alliance tie formation as firms seek to cement their positions in an industry (Pfeffer & Salancik, 1978).

Environmental dynamism refers to the rate and unpredictability of change in an industry. As industries become more established (Castrogiovanni, 2002), interdependence among firms increases (Emery & Trist, 1965), and knowledge accumulates (Toffler, 1970), industry environments tend to become more dynamic. For example, Rosenkopf and Schilling (2007) found that as technological dynamism increased in an industry, intraindustry alliance tie formation became more prevalent. Indeed, alliances may become much more important in rapidly changing industries as it allows firms to access new capabilities much quicker than developing these in house (Liebeskind, Oliver, Zucker & Brewer, 1996; Schilling and Steensma, 2001). Further, alliances may represent strategies of strategic flexibility because “they provide considerable flexibility compared to in-house integration of activities” which allows firms to more easily pivot if industry trends shift (Rosenkopf & Schilling, 2007: pg. 199).

Because strategic alliancing activities are argued to be more prevalent in complex and dynamic environments (Pfeffer & Salancik, 1978; Rosenkopf & Schilling, 2007; Zheng & Yang, 2015), and thus represent the norm, it is likely that engaging in strategic alliances in such
environments will further enhance firm legitimacy as strategic alliancing activity is recognized as an important strategy in turbulent industries (Pfeffer & Salancik, 1978). Thus, while complex and dynamic environments may make it more difficult to compete, the relationship between strategic alliances and enhanced legitimacy returns is likely to be stronger under these conditions. Thus, I expect to find:

**Hypothesis 5:** Environmental a) complexity and b) dynamism will moderate the relationship between strategic alliance formation and legitimacy. As complexity/dynamism increases, the inverted U-shaped curve will shift upwards. As complexity/dynamism decreases, the inverted U-shaped curve will shift downwards.

The Institutional Environment. Beyond characteristics of the task environment, the institutional environment will likely influence legitimacy outcomes of strategic alliance formation. The institutional environment refers to the *rules of the game* that exist in a given organizational field (North, 1990; Scott, 1995). Strong institutional environments are characterized by strongly and consistently regulated rules and procedures, transparency of actions by industry players, and strong institutional governance systems (e.g., governments; Levitsky & Murillo, 2005; 2009). Weak institutional environments are characterized by weak bureaucratic systems which hinders the institution’s ability to effectively monitor and govern (Gonzáles & King 2004). Accordingly, strong institutional environments greatly reduce uncertainty and enhance the predictability of strategic actions and may generally lead to enhanced levels of economic growth (Spiller & Tommasi 2007).

As institutional environments become stronger, isomorphic pressures, or forces that constrain actors to imitate or replicate others in an institutional environment (Hawley, 1968), are likely to increase (DiMaggio & Powell, 1983). Because legitimacy is often related to social
approval and acceptance (Etter, et al., 2018), strong institutional environments that favor isomorphic behaviors are likely to facilitate this outcome as it allows firms to more easily determine which strategies will be most likely to lead to perceptions of social approval.

The institutional environment pressures organizations to present themselves as legitimate providers of outputs and to engage in justified strategic actions (DiMaggio & Powell, 1983), and strong institutional environments often favor firms who engage in actions that largely represent normative behavior (Oliver, 1997). Thus, organizations often seek to justify themselves to the institutional environment by conforming and embracing institutional norms, expectations, and regulations in order to enhance their legitimacy (Dacin, 1997; Deephouse & Suchman, 2008; Miller, Breton-Miller & Lester, 2013; Scott, 1995).

I expect strategic alliances to engender more favorable legitimacy returns in strong institutional environments for two reasons. First, as previously described, strategic alliances represent a commonly utilized and accepted strategy that firms can employ (Gulati, 1998; Inkpen, 2001). As institutional environments strengthen, it is likely that firms will face greater pressure to conform, even if conforming strategies have a negative effect on firm performance (Barreto & Baden-Fuller, 2006). Thus, strategic alliancing behavior is likely to signal to the external environment that the firm is conforming to norms and expectations by utilizing alliances to manage external dependencies.

Second, strong institutional environments allow firms to more easily identify what actions may be seen as legitimate and predict how those actions will influence subsequent legitimacy appraisals. In weak institutional environments, firms often wrangle with uncertainties about the outcomes of various strategic actions (Kostova & Zaheer, 1999), and important third-party evaluators such as the media may lack access to clear or consistent criteria upon which to
Base their normative evaluations of the firm. Thus, weak institutional environments may weaken the relationships between alliance formation and legitimacy evaluations by the media. However, in strong institutional environments, it is likely that the relationship between strategic alliance formation and firm legitimacy will be stronger as greater clarity exists between the firm and endorsers such as the media on what the norms and expectations are in the industry. For example, in industries characterized by high levels of coercive isomorphism, one of the three institutional pillars identified by DiMaggio and Powell (1983), both the firm and the media have access to rules and regulations that should drive firm actions and behaviors. Thus, more accurate evaluations of legitimacy can be made. In a similar vein, mimetic isomorphism, or the tendency towards homogenous actions and responses in an industry, may also reduce information asymmetries that exist between the firm and third party endorsers such as the industry as firm strategic actions that are considered acceptable are likely to be replicated throughout the industry.

Thus:

_Hypothesis 6: Institutional strength will moderate the relationship between strategic alliance formation and legitimacy. As institutional strength increases, the U-shaped curve will shift upwards. As institutional strength decreases, the U-shaped curve will shift downwards._

**D. Methods and Analyses**

*Data and Sample*

Following recent studies, data on strategic alliance announcements was collected from the Thompson Reuters SDC Platinum database of strategic alliances and joint ventures (e.g., Aggarwal, 2019; Cui, Yang & Vertinsky, 2018). The SDC database has been recognized as the
most complete database of strategic alliances, both domestic and abroad, with the most complete
data beginning in 1990 and ranging to present (Schilling, 2009). I collected strategic alliance
announcement data ranging from 2008 to 2018 of firms in the biotech industry. The biotech
industry represents a knowledge intensive industry in which strategic alliancing activities are
considered normative. Indeed, many alliance studies have utilized samples from the biotech
industry (e.g., Al-Laham, Amburgey & Bates, 2008; Bae, Wezel & Koo, 2011; Ozmel, Reuer &
Gulati, 2013) This may be due to the fact that alliance data on the biotech industry tends to be
more complete and reliable across data sources compared to other industries (Schilling, 2009).
This resulted in a sample of 2,112 strategic alliances. Beyond the alliance database, data was also
collected from BoardEx, Compustat, and Ravenpack. After accounting for missing data, the final
dataset included 467 firms and 2,278 firm-year observations. Because the status asymmetry and
alliance governance moderation hypotheses could only be tested on firms that engaged in an
alliance in a given year, the dataset was reduced to 254 firms and 458 firm-year observations for
those analyses.

Measurement

Dependent Variables. My key dependent variable, legitimacy, is measured following
extant literature (Bansal & Clelland, 2004; Desai, 2018; Deephouse, 1996) by utilizing media
endorsements to gauge the extent to which firms are perceived to hold normative legitimacy.
Using data from Ravenpack news analytics, media perception is measured as an Event Sentiment
Score on a scale between 0 to 100, with zero indicating negative media sentiment (i.e. lack of
normative legitimacy), 50 representing neutral media sentiment, and 100 representing positive
media sentiment (i.e. fulfillment of normative legitimacy). Ravenpack collects and quantifies
articles from a variety of sources including industry and business publications, national news,
local news, and blogs and conducts a sentiment analysis based upon the content of these articles. These articles are cross referenced to identify all of the organizations, countries, and other entities involved and are assigned a relevance score which identifies the extent to which the contents of the article apply to each entity. For example, the news heading “Apple Forms Exclusivity Agreement with Corningware for New Iphones” would result in a relevance score of at least 90 for both Apple and Corningware as these firms are identified as the prominent participants in the article headline. However, if a non-related competitor was listed in the third paragraph of this article, for example “This agreement will likely push Google to find a comparable supplier for the glass on their pixel phones,” Google would be assigned a much lower relevance score due to it appearing later in the article at a lower frequency. The Ravenpack data states that any entity with a relevance score greater than 75 is significant. Thus, I limited legitimacy observations to those with relevance scores greater than 75.

Next, I summed the articles that fit this criteria to calculate an aggregate Event Sentiment Score. As previously described, Ravenpack assigns an Event Sentiment Score to each news article which ranges from 0 to 100. Ravenpack has developed a content analysis algorithm that automatically analyzes and assigns an event sentiment score based upon the information presented in the article ranging from emotional factors (e.g., the grouping of words and phrases that indicate emotional magnitude) to comparison factors (e.g., numerical difference between actual and estimated revenues and other financial factors). Thus, legitimacy is measured as the average event sentiment score each year as reported by the Ravenpack database.

Independent Variables. Alliance count, the key independent variable in this study, was calculated based upon the number of alliances initiated each year that included the focal firm. Following prior research, alliance governance form is operationalized dichotomously as equity or non-
equity alliances forms (e.g., Das & Teng, 2001). Equity alliances are coded as 1 and non-equity alliances are coded as 0. This data was collected from the Thompson Reuters SDC database. Alliances were coded as equity-based if they were classified as joint ventures, equity stakes purchases, equity transfers, funding agreements, or spinouts. Non-equity-based agreements were coded as such if they were classified in the SDC database as exclusive licensing agreements, licensing agreements, marketing agreements, R&D agreements, or supply agreements. In cases where data on the specific alliance agreement was not available, I read the alliance summary to determine if the alliance was equity or non-equity based.

Strategic alliance partner status asymmetry is measured utilizing a network approach. Because I am interested in uncovering the certifying effect of partnering with high-status, similar status, or low status firms, I utilize social network analytic tools to gauge this in the context of strategic alliance networks. More specifically, I construct a baseline social network of alliance ties of firms in the industry which consists of alliance ties announced in the previous three years. Moving forward, I create a three-year moving window of the strategic alliance network which corresponds to existing social network studies (e.g., Phelps, 2003; Rosenkopf & Schilling 2007).

In order to measure status, I utilized the Bonacich (1987; 2007) centrality measure. Network centrality has been linked to several constructs including activity (degree centrality), power and control (betweenness centrality), and information access (closeness centrality; Freeman, 1978). Bonacich’s (1987) centrality measure, also identified as eigenvector centrality, varies from other network centrality measures because it not only takes into consideration the centrality of the focal actor of interest, but also the centrality of the focal actor’s alters. Thus, nodes connected to other central nodes will have higher levels of eigenvector centrality than
those who are connected to less central actors. Eigenvector centrality has been a particularly useful measure of status (e.g., Shipilov, Li & Greve, 2011).

To compute status asymmetry of firms, I mean centered centrality measures and subtracted the alter firm’s eigenvector centrality from the focal firm’s eigenvector centrality. Values greater than 1 indicated that the firm formed an alliance with a lower status firm and were coded as 1. Values less than 1 but greater than -1 indicated that the firm formed an alliance with a status symmetric firm and were coded as 2. Values less than -1 indicated that the firm formed an alliance with a higher status firm and were coded as 3. These status asymmetry measures were summed and averaged in instances where firms formed multiple alliances in a given year.

Following the measures proposed by Boyd (1990), munificence is measured as the growth of industry sales over the previous five years. Complexity is measured by computing the concentration level of the industry using the Herfindahl Index (George, 2005), specifically by summing the squared market shares of each firm. Finally, dynamism is measured as the variability in industry sales growth rate in the last five years. These task environment variables were calculated at the 4 digit SIC level which ensured adequate variability across firms in the sample.

Institutional Strength operationalized to reflect the three components identified by DiMaggio and Powell (1984). The first force, coercive isomorphism, is calculated using industry level regulation data provided by the Mercatus Center (McLaughlin & Sherouse, 2017). The Mercatus Center publishes the RegData data on industry regulation utilizing text analyses and machine learning algorithms. Specifically, the dataset quantifies the level of words or phrases that indicate restrictive language published in U.S. Federal Regulations. Mimetic isomorphism is measured by examining the homogeneity of competitors across six key strategic dimensions
(Finkelstein & Hambrick, 1990) including advertising intensity, R&D intensity, plant and equipment newness, non-production overhead, inventory level, and financial leverage. Finally, normative pressure is compiled from the education data of the board of directors as education at elite institutions has been shown to provide students with socialization opportunities into established and desired business practices (Schein, 1968). Using a list of 37 elite institutions (derived from Useem & Karabel’s 1986 study), I aggregate elite education data to the industry level to determine the extent to which industries are subjected to normative isomorphic pressures. The board of directors is used in this case because they are not only considered proximal evaluators of firm actions but also as important resource provisioners who are tasked with providing executives with guidance when necessary and whose influence is likely to drive the strategic trajectory of firms. Furthermore, elite education data on boards is more widely available compared to the TMT. Institutional strength is calculated as the standardized and summed measure of each of the isomorphic pressure variables previously described.

**Control variables.** In my analysis, I include several control variables. At the firm level, I controlled for *alliance experience* as firms who enter alliances may experience lower legitimacy returns than firms who had not previously entered an alliance (Lin, Yang & Arya, 2009). I also controlled for *firm size*, measured as the log of gross yearly revenues, because larger firms may be subjected to higher levels of media attention in general (Rindova et al., 2006). In a similar vein, I controlled for *firm performance*, measured as the log of Tobin’s Q (Chung & Pruitt, 1994), because stronger performing firms are likely to garner more favorable evaluations for endorsers. I controlled for *firm age*, calculated as the number of years since the IPO date, because the need for legitimacy may fluctuate across the organization’s lifecycle and older, more established firms are likely to be seen as legitimate (Bakker & Josefy, 2018; Lu & Xu, 2006;
Singh, Tucker & House, 1986; Zimmerman & Zeitz, 2002). In addition to firm level variables, I also controlled for *media coverage*, measured as the number of articles published about the firm each year as reported by the Ravenpack database, in order to account for potential biases that may occur due to some firms being of greater media interest than others.

Finally, because firms who enter alliances in the first place may be subjected to different norms with respect to legitimacy, I constructed a two stage heckman model to account for potential sample selection bias (Certo, Busenbark, Woo & Semadeni, 2016; Wooldridge, 2010). I conducted a first stage probit regression that predicted alliance tie formation using firm and industry level indicators and then utilized the resulting *inverse mills ratio* as a control in the second stage model. The results of the first stage model are presented in the Appendix. The variables utilized to predict alliance tie formation include industry, firm size, firm performance, R&D intensity, capital intensity, leverage (debt-equity), annual industry sales, and the number of competitors in the industry. The inverse mills ratio analysis indicates that larger (0.15, \( p < .001 \)) and stronger performing (0.10, \( p = .007 \)) firms are more likely to form alliance ties. Furthermore, industry does have a significant effect on alliance tie formation as well (0.17, \( p = .043 \)). Interestingly, R&D intensity is not observed to have a significant effect on a firm’s likelihood of forming an alliance.

**Analysis**

Following related studies (e.g. Jiang, Tao & Santoro, 2010), I utilized a random-effects GLS regression\(^9\) to test the hypotheses. In order to determine if the random effects model was appropriate, I conducted a Hausman test. The Hausman test indicated that the coefficient

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\(^9\) GLS methods are superior to OLS methods in instances when the data is heteroscedastic. We can check for heteroskedasticity by plotting the residual-versus-fitted plot in stata (rvfplot). Any type of pattern indicates that the data is heteroskedastic.
estimates between a fixed effects and random effects model was not significant ($X^2=5.57$, $p=.134$), thus indicating that a random effects model was a more appropriate test.

**E. Results**

Table 1 displays the descriptive statistics and correlations while Tables 2 and 3 displays the results of the regression analysis. In total, 411 firm-year observations were observed where firms formed at least one alliance. Of these observations, 282 formed one alliance with the highest number of observed alliances being 15. The average number of alliances formed in a given year among firms that participated in alliancing activity was 1.7.

***Insert Tables 1 and 2 About Here***

Model 1 includes only the control variables while Model 2 adds the external environment moderators. Model 3 adds the linear effect of alliance formation while model 4 presents the quadratic effect of alliance formation and tests hypothesis 1. Model four shows that the direct effect of alliances on legitimacy is positive and significant ($0.37$, $p = 0.01$) while the squared effect is negative and significant ($-0.04$, $p <.01$). This indicates that an inverted-U shape relationship exists, suggesting that the effect of alliances on legitimacy weakens as firms enter more alliance agreements and thus supports hypotheses 1 (Haans, Pieters & He, 2016).

Additionally, I also tested for the presence of an inverted U-shaped relationship utilizing the utest command in Stata. The overall test for the presence of an inverse u-shape was significant ($p = .006$, lower bound slope = 0.367, upper bound slope -1.016), indicating that an inverse U shape is observed (Lind & Mehlum, 2010).

***Insert Figures 1,2,3 and 4 About Here***

Hypothesis 2 predicts that status asymmetry positively moderates the curvilinear relationship between alliance formation and legitimacy. I observed a significant interaction effect
Upon evaluation of the interaction plot in Figure 1, these findings indicate that firms who form ties with higher status firms (coded as 3 in the data) enjoy higher legitimacy returns compared to firms who form ties with lower status firms (coded as 1 in the data). However, I also observed that this effect weakens as the number of alliances increases. In fact, the inverted-U shaped relationship observed between alliance formation and legitimacy actually flips to a U shaped relationship when firms form ties with lower status firms. This finding indicates that while forming ties with lower status firms may initially hinder legitimacy returns, this effect weakens and eventually becomes positive as firms enter alliances with great frequency. Model 6 tests the interaction effect of alliance governance form proposed in Hypothesis 3. This effect was not significant. Thus, Hypothesis 3 is not supported.

Shifting to the external environment variables, Hypothesis 4 predicted that munificence would negatively moderate the relationship between alliance formation and legitimacy. This interaction effect was negative and significant (-0.04, p=.02). However, contrary to my expectations, I observed that higher levels of munificence had a positive effect on the relationship between alliance formation and legitimacy. As Figure 2 demonstrates, firms in munificent environments benefit from higher legitimacy returns in general compared to firms in less munificent environments. Thus, Hypothesis 4 is not supported. I discuss the implications of these findings further in the discussion section. Hypotheses 5a and 5b test results are presented in models 8 and 9 in Table 3. Hypothesis 5a predicted that environmental complexity would positively moderate the relationship between alliance formation and legitimacy. The interaction effect is significant (-0.05, p=.09). However, Figure 3 demonstrates that complexity weakens the effect of alliance formation on legitimacy, thus Hypothesis 5a is not supported. Hypothesis 5b
predicted a similar moderating effect of dynamism on the relationship between alliance formation and legitimacy. However, this interaction effect was not significant. Thus, Hypothesis 5b was not supported.

Finally, Hypothesis 6 tests the moderating effect of institutional strength on the relationship between alliance formation and legitimacy in model 10. I observe a significant interaction effect (-0.01, p=.04). Surprisingly, the interaction plot shows that the relationship between alliance formation and legitimacy is stronger when the institutional environment is weak, contrary to my expectations. Thus, Hypothesis 6 is not supported. I discuss the implications of these findings further in the discussion.

F. Discussion

This paper sought to investigate the role of strategic alliances in enhancing firm legitimacy outcomes. While strategic alliances represent a rich research stream that has generated valuable insights, few studies have directly theorized about and empirically tested the legitimacy outcomes of strategic alliances. Thus, this paper represents an important addition to the alliance literature in order to better understand more proximal outcomes to alliance formation. Indeed, scholars have suggested that legitimacy may be a key mediator in the alliance and firm performance relationship (Dacin, Oliver & Roy, 2007).

Moreover, the dominant theoretical lens of alliance studies to date has generally been resource dependence theory (Pfeffer & Salancik, 1978). However, the empirical findings in this study suggest that an institutional approach to alliance outcomes is also appropriate whereby alliances are viewed as important tools for gaining and enhancing firm legitimacy in addition to their role in providing access to tangible resources and capabilities that lead to enhanced competitiveness. Thus, this paper makes an important contribution to the alliance literature by
broadening our theoretical perspective with respect to strategic alliances and recognizes that these may serve as important tools for legitimacy.

Indeed, my findings suggest that firms enjoy higher levels of legitimacy following alliance formation. However, I also find that these effects diminish as the firm enters into more alliances. Thus, while firms should seek out to form alliances in order to be seen as more legitimate, it is also important that they do not stretch themselves too thin with respect to alliance formation as too many alliances may actually lead to a negative effect with respect to legitimacy.

Additionally, these findings also demonstrate that who firms partner with also has a strong effect on the relationship between alliance formation and legitimacy. Specifically, I observe that partnerships with lower status firms tend to generate lower legitimacy returns than partnerships with higher status firms. However, interestingly enough, I also observe that this effect weakens over time and that partnering with lower status firms may have a stronger positive effect on firm legitimacy as the number of alliances formed increases. These findings are interesting because they indicate that while firms may initially face a legitimacy discount when partnering with lower status firms as previous literature suggests (Shipilov, Li & Greve, 2011), this effect weakens and even reverses when firms engage in higher levels of alliancing activity overall.

In my analysis of the moderating role of the external environment, I observed evidence of influence with respect to the role of environmental munificence and complexity on the relationship between alliance tie formation and legitimacy, although not in the direction I expected. While I proposed that environmental munificence would weaken the relationship between alliance formation and legitimacy, empirical evidence suggests the opposite. Rather, munificence positively moderates the relationship between alliance formation and legitimacy returns such that firms tend to enjoy higher levels of legitimacy in more munificent environments.
in general. This finding suggests that legitimacy may be more obtainable in munificent environments where resources are relatively easy to access and firms experience lower levels of competitive intensity.

Moreover, I also observe opposite effects compared to what was predicted with respect to environmental complexity. Specifically, while I argue that higher levels of complexity enhance the relationship between alliance formation and legitimacy, the results instead suggest that environmental complexity weakens the relationship between alliance formation and legitimacy such that more complex environments are associated with lower levels of legitimacy overall. This finding may suggest that higher levels of complexity likely enhances information complexity and knowledge asymmetries that exist between firms and endorsers of legitimacy such as the media. Accordingly, this makes it more difficult for media outlets to generate accurate evaluations of legitimacy. Thus, legitimacy evaluations may be lower overall when firms operate in complex environments where they are likely to engage in strategies or actions that do not represent the norm.

Taken together, these surprising results may suggest that resource dependence theory, a dominant analytic framework utilized to study alliance formation and outcomes (Pfeffer & Salancik, 1978), may be open to new theory development with respect to alliances. My findings suggest that firms may utilize alliances as a tool to gain another important resource – legitimacy. Rather, firms will enjoy higher levels of legitimacy that result from alliance formation when they operate in munificent, less complex environments. Thus, while strategic alliances formed with the intent to gain access to resources and develop important capabilities may be more important in less favorable environments, alliance formation may be viewed less favorably by important endorsers of the firm such as the media in these contexts.
Shifting focus to the institutional environment, I observe a similar effect. While I predicted that strong institutional environments would bolster the relationship between alliance formation and legitimacy, I observe the opposite. Rather, strong institutional environments lead to firms experiencing lower levels of legitimacy overall in relation to alliance formation. This finding is interesting as the underlying mechanisms that may drive this relationship are not immediately apparent. It is possible that strong institutional environments may be necessary in industries that tend to be seen as less legitimate. For example, highly regulated industries may be in this position because the firms in these industries fail to self-regulate, thus hurting the overall perceptions of legitimacy in these environments. Because one of the components of institutional strength is mimetic isomorphism, it may be possible that shifts in preferences towards strategic nonconformity may be more broadly accepted than in the past (Deephouse, 1999).

It should be noted that these unexpected results may also be the result of the sample utilized in the empirical analysis. The biotech industry is noted for its volatility and hypercompetitiveness where norms and expectations are constantly changing (Narayanan & O’Connor, 2015). Thus, it is possible that perceptions of legitimacy may be significantly different in this industry compared to others. While the biotech industry is a commonly utilized sample in the alliance literature, it is also appropriate to ensure that these findings may be generalizable to other contexts. Thus, future research may consider replicating this study on a broader sample representing a greater number of industries in order to determine if these relationships observed in the biotech sample are generalizable across research contexts.

While this study makes key contributions to the alliance literature with respect to legitimacy outcomes, there are still important shortcomings that may be addressed in future research. First, this study measured legitimacy utilizing media perceptions. While several studies
have relied on media perceptions as proxies for legitimacy, some have suggested that the media is no longer a reliable source of objective evaluation (e.g., Pollock & Rindova, 2003). Furthermore, media perceptions only capture the normative component of legitimacy (Abrahamson & Fombrun, 1992; Deephouse & Suchman, 2008; Desai, 2011). Thus, future research may consider how studies can also evaluate regulatory and cognitive legitimacy with respect to alliance formation. One such strategy to measure regulatory legitimacy may be through the usage of SEC comment letters. SEC comments are correspondence letters between the SEC and the firm in which SEC officials request additional information or amendments to financial statements in order to satisfy SEC reporting requirements. Thus, comment letter exchanges may serve as adequate proxies for regulatory legitimacy.

Future research may also consider measuring normative legitimacy utilizing alternative sources instead of the media. More recently, scholars have also turned to reputation surveys (e.g., Fombrun, 2007) and social media (e.g., Etter et al., 2018) as potential sources of normative legitimacy. Surveys, such as Fortune's Most Admired Companies or RepTrack, provide annually updated listings of firms who survey respondents have recognized across broad environmental criteria (Wartick, 2002). However, it is important to note that surveys are often conducted on an annual basis and may not capture smaller shifts in legitimacy. Moreover, some surveys also include rankings as well which may make these sources more indicative of more narrowly defined constructs such as status or prestige rather than legitimacy. Finally, social media represents a new, and relatively understudied, source of normative legitimacy. Researchers have only just begun to utilize data derived from social media platforms as a source of normative legitimacy (e.g., Etter et al., 2018). However, social media data can be difficult to utilize as data
is often messy and scholars have also drawn attention to potential validity and reliability concerns with social media data (Van Iddekinge, Lanivich, Roth & Junco, 2016).

Finally, while this study recognizes that legitimacy is likely to be a more proximal outcome of alliance formation than firm performance, I do not evaluate the ultimate firm performance implications of alliance formation. While the firm performance outcomes of alliance formation have been covered quite thoroughly in the existing literature, future research may consider directly testing the circumstances under which enhanced legitimacy that stems from alliance formation leads to improved firm performance outcomes. Because legitimation is a necessary prerequisite to firm performance, it is likely that legitimacy serves as a key mediator of the alliance–firm performance relationship.

In summary, this paper investigated the legitimacy-based outcomes of strategic alliance formation. Although strategic alliances represent a robust area of research in the strategy literature, few scholars have commented on the legitimacy implications of alliance formation and many have approached alliance research from the resource dependence perspective. This study demonstrates that legitimacy is an important outcome of alliance formation and that the resource dependence perspective may limit our understanding of alliance outcomes with respect to legitimacy. Rather, these findings suggest that firms may benefit from alliance formation through enhanced legitimacy in environmental contexts that may have traditionally been thought to be unfavorable from a resource dependence lens. Thus, this study broadens our understanding of strategic alliances by emphasizing the important role that alliances may play as vehicles of legitimacy.
G. References


### Table 1. Descriptive Statistics

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Robust standard errors in parentheses

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### Table 3. Alliance Formation Effect on Firm Legitimacy

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<td>524.25</td>
<td>567.34</td>
</tr>
<tr>
<td></td>
<td>[0.40]</td>
<td>[0.46]</td>
<td>[0.45]</td>
<td>[0.42]</td>
</tr>
<tr>
<td></td>
<td>(691.32)</td>
<td>(699.26)</td>
<td>(696.59)</td>
<td>(697.36)</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>176.96</td>
<td>191.95</td>
<td>153.75</td>
<td>163.87</td>
</tr>
<tr>
<td>R^2 within</td>
<td>0.04</td>
<td>0.04</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>R^2 between</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>R^2 overall</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
</tr>
</tbody>
</table>

1. Robust standard errors in parentheses
2. *** p<0.01, ** p<0.05, * p<0.1
3. Number of observations = 1,954; number of firms = 450
Figure 1. Status Asymmetry Interaction Effect

Figure 2. Munificence Interaction Effect
Figure 3. Complexity Interaction Effect

Figure 4. Institutional Strength Interaction Effect
## I. Appendices

Appendix A. Inverse Mills Ratio

### Inverse Mills Ratio

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>0.17** [0.04]</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
</tr>
<tr>
<td>Firm Size</td>
<td>0.15*** [0.00]</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
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<tr>
<td>R&amp;D Intensity</td>
<td>0.00 [0.98]</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
</tr>
<tr>
<td>Capital Intensity</td>
<td>0.04 [0.43]</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
</tr>
<tr>
<td>Firm Performance</td>
<td>0.10*** [0.01]</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
</tr>
<tr>
<td>Debt to Equity</td>
<td>0.01* [0.10]</td>
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<tr>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>Industry Firm Count</td>
<td>-0.00 [0.79]</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>Industry Sales</td>
<td>0.00* [0.08]</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>Constant</td>
<td>-474.76** [0.04]</td>
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<td></td>
<td>(234.37)</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>-1698.43</td>
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<td>Observations</td>
<td>3,694</td>
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</table>

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
V. Conclusion

In this dissertation, I sought to develop a cohesive framework that takes into consideration how the external environment influences alliance formation, structuring processes, and outcomes. I presented and environmental contingency framework that combines resource dependence and institutional theoretic approaches linked together with network theory. I tested my hypotheses on a sample of firms in the biotech industry between 2008 and 2018. In the second chapter, I investigated how the external environment influences firm partner selection decisions and the propensity for intraindustry alliance formation. In the third chapter, I investigated the legitimacy-based outcomes of alliance formation and how these outcomes are influenced by both specific alliancing strategies undertaken by firms and the external environment as a whole. Broadly, my findings indicate that the external environment plays an important role in strategic alliances, although not necessarily in the way that resource dependence theory would suggest. Instead, these findings indicate that firms may engage in alliances not only for developing new competencies, but also to send positive signals to important external stakeholders. Taken together, these findings suggest that an institutional perspective towards alliance formation may be more applicable – particularly in relation to how firms respond to shifts in their external environment.