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Creating and Appropriating Alliance Value Through Customer-Centric Structures

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Report Summary

Business practitioners have long recognized that their partners' organizational structures affect their alliance success, yet little is known about how allying with a customer-centric partner contributes to business and alliance performance.

In two studies, Ju-Yeon Lee and Robert Palmatier examine the effects of partners' customer-centric structure on both alliance and firm performance, analyzing secondary, multi-source data of *Fortune* 1000 firms over a 17-year period.

Study 1 adopts an event study methodology and shows that when two firms enter into an alliance, structural asymmetry—an alliance between two firms with different structures (such as between customer- and product-centric firms)—affects their ability to pool and integrate relational resources, such that asymmetry improves value creation in marketing alliances but undermines it in R&D alliances. They also find that firms with customer-centric structures appropriate a greater share of the created value than their product-centric partners. The effects are enhanced or suppressed by two relational factors, temporal relational overlap and spatial relational overlap.

Study 2 takes a portfolio approach and offers some guidance regarding how product-centric firms should construct their alliance portfolios to overcome strategic vulnerability in terms of appropriation of alliance value, relative to their customer-centric partners in an alliance. The findings reveal that a product-centric firm can enhance its performance by increasing the share of customer-centric partners in its alliance portfolio.

Overall, the studies reveal that a customer-centric structure enables firms not only to cultivate relational market-based resources but also to leverage those resources in alliances. Specifically, the study provides the following managerial implications:

Structural asymmetry increases the pie in marketing (but not R&D) alliances. In marketing alliances, the value created through structural asymmetry is almost four times greater than that achieved with structural symmetry. In contrast, in R&D alliances, the value created through structural symmetry is nearly three times greater than that resulting from structural asymmetry.

Firms with customer-centric structures capture more of the pie. On average, customer-centric firms capture almost three times more of the alliance value than their product-centric partners. This implies that product-centric firms pay a price to gain access to the relational resources possessed by customer-centric partners.

Customer-centric alliance portfolios only benefit product-centric firms. On average, a 1% increase in the share of customer-centric partners in an alliance portfolio increases a product-centric firm's ROA by 18%. Yet, the effect is negative for a customer-centric firm, with a 17% decrease in its ROA. Thus, having more customer-centric partners in the alliance portfolio is only beneficial for product-centric firms (i.e., hurts customer-centric firms).

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Interfirm strategic alliances are gaining in popularity. Many *Fortune* 100 giants, such as IBM and AT&T, have hundreds of strategic alliances that grant them access to alliance partners' resources and promise superior performance (*The Economist* 2009). Strategic alliances involve collaborative arrangements, leading most extant research to investigate the impact of alignment or fit between alliance partners—in terms of their organizational cultures, norms, or management procedures—on alliance success (Albers, Wohlgezogen, and Zajac 2013). Yet we know little about how alignment in *customer-centric structures* might affect alliance outcomes and improve firm performance. This gap is surprising; a customer-centric structure offers a powerful marketing strategy for improving customer relationships (Lee, Sridhar, and Palmatier 2015) and can generate intangible marketing assets that underlie alliance prosperity. But marketing scholars still lack any clear understanding of the implications of partnering with a customer-centric firm, even as business practitioners specify that achieving alliance success "requires a clear understanding of each partner's organizational structure" (Hughes and Weiss 2007, p. 123). To address this gap, we seek to understand *the effect of alliance partners' customer-centric structures on alliance and firm performance*.

Marketing literature explains that organizing a firm's business units around customer groups instead of product groups (i.e., customer-centric structure) improves responsiveness, fosters commitment to customers, and establishes strong customer relationships (Day 2006; Lee et al. 2015). Customer centricity may provide other benefits as well, such that firms can not only cultivate customer-based relational resources but also leverage these resources in alliance partner relationships (Srivastava, Shervani, and Fahey 1998) and thereby create and appropriate value from interfirm alliances. With these insights, we consider three main research questions:

(1) What effect does a customer-centric structure have on *alliance value creation*?
(2) What effect does a customer-centric structure have on *alliance value appropriation*?
(3) What effect does *the structural composition of a firm's alliance portfolio* have on *its performance*?

To address these questions, we develop a conceptual framework to evaluate the effects of organizational structure on dyadic alliance performance and firm performance (Figure 1). When two firms ally, the fit between their structures influences the ways they pool and integrate customer-based resources. Differences in the organizational focus between the two firms' structures constitutes *structural asymmetry*; we illustrate how this structural asymmetry affects

collective alliance value (Study 1a). We also address how a firm's customer-centric structure might affect the appropriation of this created value between alliance partners (Study 1b). Beyond individual dyadic alliances, we study the net effect of the *alliance portfolio's structural composition* on firm performance. In so doing, we offer recommendations for how a product-centric firm should design its portfolio of network partners (Study 2).

To establish this comprehensive portrait of the role of customer-centric structure on alliance performance, we test our conceptual model empirically with a set of non-equity strategic alliances formed by *Fortune* 1000 firms over a 17-year period (1998 to 2014). Using longitudinal data from multiple secondary sources (SDC Platinum, Center for Research in Security Prices, COMPUSTAT, 10-Ks, 10-Qs), our two studies focus on different analysis levels, namely, alliance and firm. In Study 1, we assess value creation and value appropriation as two aspects of dyadic alliance performance. We first use event studies to test the effect of structural asymmetry on value creation, measured as the combined abnormal returns from two collaborating firms; the effects vary across 251 marketing and 245 R&D alliances. We then examine how an individual firm's customer-centric structure affects value appropriation, or the distribution of abnormal returns between two firms, within dyadic relationships. In Study 2, we analyze 193 firms to understand the effects of the alliance portfolio's structural composition, measured as the percentage of customer-centric partners in the portfolio, on firm performance.

In turn, we provide four main contributions. First, to the best of our knowledge, this study is the first to investigate how a customer-centric structure contributes to *alliance value creation*. In line with the resource-based view (RBV), we contend that structural asymmetry (partnership of customer-centric and product-centric firms) yields diverse resource pools, with unique complementary knowledge, but it also hinders the integration of each firm's resources. Contingent on the relative importance of these forms of diversity versus integration, structural asymmetry exerts differential effects on alliance value creation, across alliance types (marketing and R&D alliances). Specifically, we find that *asymmetry improves overall marketing alliance value creation* because the success of these *exploitative* alliances depends on ready access to unique, non-redundant knowledge about customers and products (marketing alliances value was 3.76 times greater in asymmetric vs. symmetric structural alliances). In contrast, *asymmetry undermines overall R&D alliance value creation* because these *explorative* alliances depend on the seamless use and coordination of resources to succeed (R&D alliances value was 2.60 times

greater in symmetric vs. asymmetric structural alliances).

Second, we explain how the customer-centric structure of each firm determines the amount of alliance value it can *appropriate* from an alliance. In the presence of asymmetry, firms with *customer-centric structures retain a greater share of value than product-centric partners, across both marketing and R&D alliances* (customer-centric firms claimed a 2.64 times higher share on average). In line with the RBV, the strong customer relationships maintained by a customer-centric firm serve as valuable, scarce resources for the alliance, with many benefits (e.g., loyalty, responsiveness, superior market-sensing capability) that are hard to imitate or substitute (Binder and Hanssens 2015; Lee, Sridhar, and Palmatier 2015). Thus, customer-centric firms have greater bargaining power and retain more of the value created in the alliance. In other words, customer-based resources generated from a customer-centric structure lead to competitive advantages in strategic alliances.

Third, we identify two relational factors, *temporal relational overlap* (repeated relationships between alliance partners) and *spatial relational overlap* (alliance partners operate in the same market), that influence an alliance partner's ability to create and appropriate value from its customer-centric structure. In value creation, these two relational factors operate in opposite directions; temporal overlap promotes trust, but spatial overlap undermines it. The positive effect of structural asymmetry on overall marketing alliance value thus gets undermined by *temporal overlap* but enhanced by *spatial overlap.* The negative effect of asymmetry on overall R&D alliance value also is suppressed by temporal overlap. In value appropriation, these relational factors instead operate in the same direction: Both erode the incremental value of the customer-centric structure to the alliance. Therefore, temporal overlap undermines the positive effect of a customer-centric structure on a firm's share of marketing alliance value, and spatial overlap suppresses its positive effect on the share of R&D alliance value.

Fourth, we offer guidance with regard to how product-centric firms should manage their alliance portfolio to improve business outcomes. Even if a product-centric firm retains a smaller share of the value created by allying with a customer-centric firm in a specific alliance, they still create more total value, which improves the product-centric firm's performance over a series of alliances. A product-centric firm can improve its performance by increasing the percentage of customer-centric partners in its alliance portfolio, whereas such a strategy would harm a customer-centric firm. On average, a 1% increase in the share of customer-centric partners in an

alliance portfolio leads to an 18% *improvement* in a product-centric firm's performance, but a 17% *decline* in a customer-centric firm's performance. The positive interaction effect of a product-centric structure and this structural composition on performance also gets enhanced if the firm exhibits a higher share of marketing rather than R&D alliances. Our research thus identifies means for product-centric firms to leverage customer-based resources available in their alliance portfolios while circumventing the challenges of implementing a customer-centric structure themselves (Gulati 2007; Lee et al. 2015).

Understanding the Role of Structure in Strategic Alliances

A customer-centric structure is a key marketing strategy for building *customer-based relational resources* (Shah et al. 2006). Each organizational unit focuses on distinct customer segments, instead of product lines, such that the firm offers greater responsiveness to changing customer needs and can better capture unique knowledge about each targeted customer group, which enhances its customer relationships (Rust, Moorman, and Bhalla 2010). Because strong bonds with customers are rare resources, not easily substituted or duplicated (Srivastava, Shervani, and Fahey 1998), in line with the RBV, firms with customer-centric structures tend to outperform their product-centric peers (Day 2006).

In the context of strategic alliances, in which two firms combine their resources and assets, firms that possess unique customer-relational resources also may be able to create and appropriate value better than their alliance partners. According to the RBV, alliance success depends primarily on how effectively the pair of collaborating firms *pool and integrate* their resources (Das and Teng 2000; Kozlenkova, Samaha, and Palmatier 2014). This resource combination and integration process features asymmetry (or dissimilarity or complementarity) between each firm and its alliance partner (Cui 2013; Kalaignanam, Shankar, and Varadarajan 2007; Robson, Katsikeas, and Bello 2008).

That is, *structural asymmetry* refers to the different organizational focus reflected in alliance partners' structures, such that one partner is customer-centric and the other is product-centric, rather than both partners adopting a symmetrical alignment. For example, both Computer Sciences Corporation and Symantec Corporation adopt customer-centric structures, so their alliance is structurally *symmetric*, but Computer Sciences Corporation's alliance with the product-centric firm Motorola Solutions is structurally *asymmetric*. With structural asymmetry,

the complementarity between the alliance partners produces a rich, broad pool of knowledge and skills, which may be unrelated to each partner's routine businesses (Cui 2013). For example, the customer-based resources maintained by a customer-centric firm (e.g., superior ability to identify customer needs, unique customer knowledge) may be disseminated across a product-centric firm that enjoys efficient back-end functional operations and expansive product knowledge. While structural asymmetry builds a rich resource pool, it also thwarts integration of resources between alliance participants. Specifically, structural asymmetry exacerbates differences in how each partner operates, such that it can hinder the development of routine processes, impede interfirm adaptation (Park and Ungson 1997), and disrupt interfirm learning (Lane and Lubatkin 1998; Parkhe 1991).

Due to these trade-offs, the net effect of structural asymmetry is contingent on the relative magnitude of the benefits to the costs. In turn, two alliance characteristics might determine its overall impact: the type of alliance (marketing vs. R&D) and the partners' relationship. First, in *marketing alliances*, firms pool their resources and knowledge to achieve downstream value chain objectives, such as distribution, cobranding, and joint marketing, so their performance relies on the *exploitation of existing resources* (Lavie and Rosenkopf 2006; Swaminathan and Moorman 2009). When Starbucks and Kraft allied, Starbucks accelerated its coffee sales through Kraft's extensive shelf space in major supermarket chains; Kraft benefited from customer desire for premium brand coffee. In contrast, in *R&D alliances*, firms pool their resources and skills to achieve upstream value chain objectives, such as product innovation and technological development, and their performance relies on the *exploration of new resources* (Kalaignanam, Shankar, and Varadarajan 2007). Thus Microsoft and IBM formed an R&D alliance to collectively develop technologies for the point-of-service platform and self-service kiosks. In general, exploitation requires a wide range of diverse resources, but exploration outcomes improve when partners build routines to integrate their resources better (Lavie and Rosenkopf 2006). Despite these differences, few marketing studies consider the different types of alliances, as Table 1 illustrates.

Second, the *relationship* between the two firms reflects their temporal and spatial overlaps. A *temporal overlap* arises from repeated relationships between the two partners in the past; their prior collaboration history promotes mutual interfirm trust (Thomaz and Swaminathan 2015; Wuyts, Dutta, and Stremersch 2004). *Spatial overlap* instead implies the degree to which

two firms operate in the same market, and it often undermines trust by intensifying interfirm competition (Fang et al. 2016). Despite their differences, both types of overlap can reduce the incremental benefits of resources drawn from an alliance.

—Tables follow References—

Study 1: Creating and Appropriating Value through Customer-Centric Structures

Alliance success depends on two major components: value creation and each firm's share of the created value (appropriation). Because value creation is a joint effort, we examine the structural combinations that can increase overall alliance value, then examine how each firm's structure affects its appropriation of this created value. In both cases, we include temporal and spatial overlaps as moderators that may influence the resource combinations and the alliance firms' ability to integrate their resources effectively.

Study 1a: conceptual model and hypotheses

Effect of asymmetry on marketing alliance value. Marketing alliances seek to increase sales of the firms' existing products by gaining access to new markets; participants often focus on "using existing technologies or employing complementary partner capabilities" (Lavie and Rosenkopf 2006, p. 799). Because both collaborating firms engage in exploitation and conduct proximate searches, instead of creating new knowledge, aligning non-redundant resources should maximize the value of a marketing alliance. That is, structural asymmetry enhances the diversity of resources, and combining product- and customer-based resources should enhance total alliance value, whereas symmetric alliances of two customer-centric or two product-centric firms would feature similar skills and know-how and limited resource diversity. For example, a customer-centric firm with strong relationships can readily expand the alliance's market reach by commercializing products already manufactured by a product-centric firm. Although structural asymmetry may engender some resource coordination challenges, such negative effects are not very salient in resource-leveraging, exploitative marketing alliances (Gulati and Singh 1998). In turn, the benefits of asymmetry (rich pool of resources, including customer and product knowledge) exceed its costs (difficulty of integrating resources) in marketing alliances, with positive effects on alliance value creation (Figure 1, Panel a).

—Figures follow References —

Effect of asymmetry on R&D alliance value. In contrast, the costs of asymmetry likely

exceed its benefits in R&D alliances, which seek to discover and experiment with new technologies, such that participants focus on long-term value creation through exploration. Transferring technological know-how across interfirm boundaries over time is an arduous process for many firms (Das, Sen, and Sengupta 1998), especially when their dissimilar organizational structures makes interfirm resource integration more difficult, because a customer-centric firm prioritizes customer relationships, while the product-centric partner prioritizes products. Accordingly, "partnerships among dissimilar organizations are more risky than those among similar organizations" (Albers, Wohlgezogen, and Zajac 2013, p. 24). A symmetrical structure instead helps both partners integrate their resources, using their similar priorities and processes. As such, we propose that structural asymmetry has a negative impact on alliance value creation in R&D alliances.

H_1: Structural asymmetry (a) positively affects marketing alliance value and (b) negatively affects R&D alliance value.

Moderating effects of temporal and spatial overlaps. Alliance participants' ability to capitalize on the benefits of structural asymmetry also depends on their *relationship*. As temporal overlap (repeated relationships between the two partners in the past) increases, alliance participants gain a common understanding of their partner's operational routines, which fosters mutual trust, lowers barriers to interfirm adjustment, and mitigates the costs of coordination, which is especially essential in generating new knowledge. Yet it also can undermine the benefits of complementarity due to structural asymmetry. That is, in repeated alliances, customer relationships already have been exploited, so it becomes more difficulty for alliance participants to apply or exploit new, nonredundant knowledge (Fang et al. 2008). These alliances add less unique and diverse knowledge to the resource pool with each successive partnership, which lowers value creation. Thus *temporal overlap* should dampen the positive effect of structural asymmetry on marketing alliance value because less diverse resources are available, but it likely alleviates the negative effect on R&D alliance value by creating more mutual trust.

H_2: Temporal relational overlap suppresses (a) the positive effect of structural asymmetry on marketing alliance value and (b) the negative effect of structural asymmetry on R&D alliance value.

Spatial overlap instead undermines trust, because firms compete in the same markets and are rivals for similar resources, which can erode trust or prompt knowledge leakage or opportunistic behavior, thereby inhibiting interfirm learning and coordination (Cui 2013; Luo,

Rindfleisch, and Tse 2007). In R&D alliances, tight resource integration is critical, and the development of new technology takes a long time, so spatial overlap might aggravate interfirm coordination challenges and suppress each firm's willingness to transfer knowledge, thereby exacerbating the negative effect of structural asymmetry on value creation. Yet spatial overlap also enhances the benefits relative to costs; an alliance with a firm in the same market enhances each firm's ability to leverage its partner's existing complementary resources (Luo, Rindfleisch, and Tse 2007), so firms can more readily commercialize and deploy their nonredundant knowledge. If the two firms with distinct structures instead operate in distant markets, they must expend more time and effort to convert customer and product resources into sales. That is, as spatial overlap increases, the positive effect of structural asymmetry on marketing alliance value increases, through more commercially viable offerings. Moreover, the negative effect of structural asymmetry on R&D alliance value gets aggravated, through less mutual trust.

H_3: Spatial relational overlap magnifies (a) the positive effect of structural asymmetry on marketing alliance value and (b) the negative effect of structural asymmetry on R&D alliance value.

Study 1b: conceptual model and hypotheses

Effect of customer-centric structure on alliance value appropriation. Firms entering into alliances want to create value, and this aspect is the focus of most prior research (Boyd and Spekman 2008; Bucklin and Sengupta 1993). But firms also want to capture a larger share of this value (Figure 1, Panel b), and in this effort, the firms' structure may have a pertinent effect. In particular, a customer-centric structure generates customer-based resources: It increases the firm's ability to identify customer needs, enhances customer-specific knowledge, and promotes commitment to customers (Day 2006; Lee, Sridhar, and Palmatier 2015). Because this relationship-building competency is hard to copy (Srivastava, Shervani, and Fahey 1998), a firm with a customer-centric organization possesses valuable resources, which grants it negotiation and bargaining power. Product-centric firms instead depend on the customer-centric firms for customer-specific knowledge. As customer-centric firms likely enjoy greater bargaining ability in the dyadic alliance, they may appropriate a larger share of the value created.

In addition, because customer relationship are more valuable than brands or trademarks (Binder and Hanssens 2015), firms that partner with customer-centric firms must pay a premium to be able to tap into this unique, hard-to-duplicate, customer-specific knowledge. For example, a "firm with fewer alternative alliances relative to partners in its alliance portfolio enjoys less

bargaining power and consequently weaker appropriation capacity" (Lavie 2007, p. 1193). In an alliance, a symmetric structure should have no impact on value appropriation; neither firm has any unique, structural source of bargaining power. But with asymmetric structures, the customer-centric firm likely can retain more of the alliance value than its product-centric counterparts, in both marketing and R&D alliances.

H_4: In an alliance with structural asymmetry, firms with customer-centric structures appropriate a greater share of the value created in (a) marketing and (b) R&D alliances than firms with product-centric structures.

Moderating effects of temporal and spatial overlap. Relational overlaps diminish the marginal benefits of customer relationships, so customer-centric firms generate less bargaining power from their customer-based resources. Specifically, as temporal overlap increases, the value created already has been extracted in previous interactions, and partners have absorbed some of the unique knowledge. Repeated exchanges give the product-centric firm even more opportunities to access customer-specific knowledge, so the added value of customer resources owned by the customer-centric firm diminishes. As its knowledge and resources become less valuable and novel, the customer-centric firm's bargaining power also diminishes.

H_5: Temporal overlap suppresses the positive effect of a firm's customer-centric structure on the share of the value created through (a) marketing and (b) R&D alliances.

When spatial overlap increases, the customer-centric firm also may have less bargaining power, because its customer relationships may be easier to duplicate than relationships in another industry would be (Wang and Zajac 2007). That is, some customer-specific knowledge and market-sensing capabilities are not novel to product-centric firms if they operate in the same market as the customer-centric firms. If they operate in different markets, this customer relationship information is harder to duplicate, so the product-centric firms continue to pay premiums, by giving up a greater share of the created alliance value.

H_6: Spatial overlap suppresses the positive effect of a firm's customer-centric structure on the share of the value created through (a) marketing and (b) R&D alliances.

Methodology: event study approach

In line with prior strategic alliance research (Fang, Lee, and Yang 2015; Swaminathan and Moorman 2009), we adopt an event study approach and draw on the efficient market hypothesis. That is, changes in stock returns should reflect new, unexpected information available in the market. As forward-looking measures, stock market returns represent investors'

expectations of the overall performance effects of an event. We use abnormal stock returns following alliance announcements to evaluate how the customer-centric structure affects the value-creating and value-appropriating mechanisms in strategic alliances. Accordingly, we develop two separate models, for value creation (Study 1a) and value appropriation (Study 1b). The value creation model involves inter-alliance comparisons (i.e., which alliance pair creates more value); the value appropriation model involves intra-alliance comparisons (i.e., which alliance partner within each pair appropriates more value).

Data. We test our hypotheses with a data set featuring *Fortune* 1000 firms and their alliance partners. The *Fortune* 1000 represents more than 70% of the U.S. economy and covers a diverse range of industries, so these findings are highly generalizable. We identified the alliance partners by using the Joint Ventures/Strategic Alliances database on SDC Platinum, then complemented these data with further information from multiple archival sources, including the Center for Research in Security Prices (CRSP), COMPUSTAT Industrial Annual database, COMPUSTAT Business Segments database, and annual and quarterly financial reports (i.e., Forms 10-K, 10-Q) that firms file with the U.S. Securities and Exchange Commission (SEC).

We used three criteria to define the final sample. First, it consists of *Fortune* 1000 firms that formed marketing or R&D alliances between 1998 and 2014. This time frame was largely determined by the Statement of Financial Accounting Standards (SFAS) No. 131, which became effective in 1998 and mandates that all U.S. public firms disclose information about their operating units, corresponding to their internal organizational structure, in their Forms 10-K and 10-Q (Financial Accounting Standards Board 1997). We use this information to develop our measures of structural asymmetry and customer-centric structure. Second, considering our operationalization of structural asymmetry, we limited our sample to non-equity alliances (i.e., no shared equity ownership) that involve two parties (i.e., dyadic relationships). Third, both alliance participants were publicly traded, U.S. firms, a requirement that aligns with extant studies of asymmetry in alliances (e.g., Kalaignanam, Shankar, and Varadarajan 2007).

We initially identified 678 dyadic relationships from SDC Platinum, then eliminated those firms for which we could not gather complete data from COMPUSTAT and CRSP, resulting in 268 marketing alliances and 277 R&D alliances. To avoid any confounding results from inaccurate announcement date information, we searched Lexis-Nexis databases and other online sources (e.g., company websites, press releases, SEC filings) and removed 49 events.

Therefore, Study 1a includes 251 marketing and 245 R&D alliances. For Study 1b, we seek to understand which firm in each dyad appropriated more value, so only alliances featuring structural asymmetry were pertinent. We obtained 82 firm-day observations for marketing alliances and 102 firm-day observations for R&D alliances in this appropriation model.

Measures and operationalization. In Study 1, stock returns refer to the cumulative abnormal returns (CAR) (see Web Appendix A). We measured joint alliance value by adding the CAR of the two participants in the alliance (Gulati and Sytch 2007). Specifically, for alliance k between the firm (i = 1) and its partner (i = 2) at time t, $\text{value created}_{\text{kt}} = \sum_{i=1}^{N=2} \text{CAR}_{\text{ikt}}$. Then to measure value appropriation (Adegbesan and Higgins 2011) or the relative share of value obtained (Hamel 1991), we assessed each firm's CAR divided by the sum of the CAR of both alliance participants after the strategic alliance announcement. That is, $\text{value appropriated}_{\text{ikt}} = \text{CAR}_{\text{ikt}} / |\sum_{i=1}^{N=2} \text{CAR}_{\text{ikt}}|$. By using the absolute value in the denominator, we avoid a case in which the nominator and denominator are both negative and imply that the final value is positive.

To measure structural asymmetry, we coded each firm's customer-centric structure using the unit operating segment information in its annual and quarterly financial reports (Forms 10-K, 10-Q), then paired firms using the information from SDC (Day 2006; Gulati 2007; Lee et al. 2015). As mandated by SFAS No. 131, the forms provide information about firms' structure. Two experts in organizational design independently reviewed each firm's 10-K and 10-Q information and classified its structure as customer- or product-centric (see Web Appendix B). Disagreement between these two researchers occurred less than 4% of the time and was resolved with discussion.

Temporal overlap reflects the number of alliances the participants had established in the five-year period prior to the alliance announcement (Fang, Lee, and Yang 2015). Following extant literature (Wang and Zajac 2007), we assigned spatial overlap scores of 1 if the first four digits of the two firms' standard industrial classification (SIC) were identical, .75 if the first three digits were identical, .5 if the first two digits of their SIC were identical, .25 if the first digit of was identical, and 0 if the first digit of the two firms' SIC was different.

Finally, we controlled for firm-level factors on the firm and partner sides. Firm size reflected the natural log of the book value of total assets. Alliance experience was operationalized as the number of alliances the focal firm has formed since 1985 (Cui and O'Connor 2012). For marketing intensity, we measured the ratio of advertising expenditures to

total assets; for R&D intensity, we used the ratio of R&D expenditures to total assets. To determine business scope, we counted the number of distinct four-digit SICs in which the firm operates. We summarize the constructs, definitions, measurements, and data sources in Table 2; the descriptive statistics and correlations are in Table 3.

—Tables follow References—

Model specification

To understand the effect of structural asymmetry on joint alliance value, we specify the following model for marketing and R&D alliances (Study 1a):

(1) $\text{Value created}_{kt} = \beta_0 + \beta_1\text{Structural asymmetry}_{kt} + \beta_2\text{Structural asymmetry}_{kt} \times \text{Temporal overlap}_{kt} + \beta_3\text{Structural asymmetry}_{kt} \times \text{Spatial overlap}_{kt} + \beta_4\text{Temporal overlap}_{kt} + \beta_5\text{Spatial overlap}_{kt} + \beta_6\text{Control Variables} + \varepsilon^1_{kt}$.

To evaluate the degree to which a partner appropriated value, we specify the model at the firm-alliance level (Study 1b). Because our goal is to evaluate which structural type appropriates more value, this estimation only includes sample firms with structural asymmetry:

(2) $\text{Value appropriated}_{ikt} = \alpha_o + \alpha_1\text{Customer-Centric Structure}_{ikt} + \alpha_2\text{Customer-Centric Structure}_{ikt} \times \text{Temporal overlap}_{kt} + \alpha_3\text{Customer-Centric Structure}_{ikt} \times \text{Spatial overlap}_{kt} + \alpha_4\text{Temporal overlap}_{kt} + \alpha_5\text{Spatial overlap}_{kt} + \alpha_6\text{Control Variables} + \varepsilon^2_{ikt}$.

To correct for potential selection bias, we applied Heckman's two-stage self-selection model. Since a firm's decision to participate in strategic alliances may be determined by unobserved factors, the sample of strategic alliance announcements may not be randomly selected. Both partners could self-select into strategic alliance activities, so the failure to control for this effect might lead to biased estimation results. We accordingly controlled for the participants' propensity to enter strategic alliances due to their specific firm characteristics. In the first stage of the value creation estimation, we estimated a probit selection model to the full sample of 8,166 alliance-year observations for marketing alliances and 6,769 alliance-year observations for R&D alliances to estimate the probability that two firms would engage in strategic alliances in that year (Wiles, Morgan, and Rego 2012). We then calculated the inverse Mills ratio and included it as a control variable in Equations 1 and 2 (Fang, Lee, and Yang 2015). Similarly, in the first stage of the value appropriation estimation, we applied a probit selection model to the full sample of 3,266 firm-year observations in marketing alliances and 2,808 firm-year observations in R&D alliances to estimate the probability that a firm would engage in a

strategic alliance in a given year.

In the first-stage equation of the value creation model, the dependent variable equals 1 if the two firms enter a strategic alliance in year t and 0 otherwise. In the first-stage equation of the value appropriation model, the dependent variable is 1 if the firm forms a strategic alliance in year t and 0 otherwise. The selection equation also includes factors likely to affect the firm's decision to engage in such activities: firm size, alliance experience, marketing intensity, and R&D intensity. These elements may determine the relative advantage derived from strategic alliances. Finally, year dummies account for temporal variance in the market environment that might influence strategic alliance decisions. The first-stage results appear in Web Appendix C.

Results

Event window selection. To choose the appropriate event windows, we computed the cumulative average abnormal returns (CAAR) for various time frames (+7 days to –7 days) surrounding the alliance events and tested their significance with t-statistics (Brown and Warner 1985). The window with the most significant t-test for both partners spanned from day –1 to day 0 (see Table A1, Web Appendix A). A positive abnormal return arose around this event window, implying that marketing and R&D alliances generate positive financial value on average.

Value creation model. The Study 1a estimation results in Table 4 include the main effect Models 1 and 3, then add the interaction terms in Models 2 and 4. In Model 2, the effect of structural asymmetry on joint CAR following marketing alliances is positive (b = .099, $p < .05$), in support of H_{1a}, and its effect on joint CAR following the R&D alliances is negative (b = –.056, $p < .05$), in support of H_{1b}. Temporal overlap weakens the positive effect of structural asymmetry on joint value from marketing alliances (b = –.068, $p < .10$) and the negative effect of structural asymmetry on joint value from R&D alliances (b = .026, $p < .10$), as we predicted in H_{2a} and H_{2b}. Spatial overlap strengthens the positive effect of structural asymmetry on joint value from marketing alliances (b = .119, $p < .05$), in line with H_{3a}, though it does not have a significant moderating effect on this relationship in R&D alliances (b = –.021, n.s.), so we must reject H_{3b}.

Value appropriation model. We report the estimation results for Study 1b in Table 5. The interaction effects Model 2 reveals that the effect of a customer-centric structure on the firm's share of CAR is positive in both marketing alliances (b = 1.529, $p < .05$) and R&D alliances (b = 1.368, $p < .05$), in support of H_{4a} and H_{4b}. The moderating effect of temporal overlap weakens the positive effect of a customer-centric structure on the share of value appropriated in marketing

alliances (b = –1.098, $p < .10$), in support of H_{5a}. However, we do not find a similar significant moderating effect in R&D alliances (b = –.033, n.s.), in contrast with H_{5b}. The interaction effect between spatial overlap and customer-centric structure on the share of value appropriated in marketing alliances is not significant (b = .390, n.s.), so we cannot support H_{6a}, whereas the interaction between spatial overlap and customer-centric structure in marketing alliances has a negative and significant effect on value appropriation (b = –2.052, $p < .05$), in support of H_{6b}.

—Tables follow References—

Study 2: Effect of Alliance Portfolio Structural Composition

Study 1 clarifies value creation and appropriation processes in a single alliance dyad and also identifies a concern for firms with product-centric structures, which likely suffer vulnerability in terms of appropriating alliance value, relative to their customer-centric partners in an alliance. Yet transitioning from a product-centric to a customer-centric structure is infeasible for many firms because it is often very costly and complex (Lee, Sridhar, and Palmatier 2015). Accordingly, 79.6% of *Fortune* 1000 firms still maintained a product-centric structure in 2014. Over time, these product-centric firms that form alliances with customer-centric firms still might be better off, because the alliances may be more valuable, even if they retain a smaller share of this larger pie. We therefore attempt to offer some guidance regarding how product-centric firms should construct their alliance portfolios to improve their performance, according to the net effect of this structure across multiple alliances. That is, we consider the *alliance portfolio's structural composition*, or the proportion of alliance partners with customer-centric structures in the alliance portfolio. We examine how a firm's own structure and its alliance portfolio's structural composition (i.e., structural fit between the firm and its alliance partners in the portfolio) interact to influence its performance. In this sense, Study 2 relies on the notion of structural asymmetry, in parallel with Study 1, but provides managerially relevant guidance for the firm's alliance portfolio management.

Conceptual model and hypotheses

Effect of alliance portfolio structural asymmetry on firm performance. All else being equal, product-centric firms should be able to achieve better performance by allying with customer-centric rather than product-centric partners. With a lower share of alliance partners with customer-centric structures, the focal product-centric firm suffers reduced access to

customer-specific knowledge and organizational commitment, so it cannot leverage such customer-based relational resources. Access to relational resources is key to building competitive advantages (Srivastava, Shervani, and Fahey 1998), so a lack of customer-centric partners in the portfolio should be detrimental to product-centric firms. When a product-centric firm increases the share of customer-centric partners in its alliance portfolio, the result is a more heterogeneous pool of resources, including both product- and customer-specific knowledge, and it also increases its ability to adapt to its customer-centric partners.

However, if the focal firm itself has a customer-centric structure, the benefits of customer-based relational resources drawn from its alliance portfolio's structural composition are redundant, and it still faces the complexity costs associated with a customer-centric structure. The benefits of a customer-centric structure can be readily overwhelmed by internal complexity costs, due to the complicated reporting structure and potential resource duplication (Gulati 2007). A product-centric firm instead circumvents these internal operating inefficiencies by allying with customer-centric partners. Therefore, we anticipate that a product-centric firm with greater alliance portfolio structural composition performs better than a customer-centric firm.

H_7: The interaction between product-centric structure and alliance portfolio structural composition has a positive effect on firm performance.

Moderating effect of alliance types. The positive interaction between a product-centric structure and the alliance portfolio's structural composition should be enhanced when the firm increases the share of marketing versus R&D alliances in its portfolio. The diverse resources provided by each alliance participant are most beneficial for firms with more exploitative marketing alliances, in which alliance partners focus on commercializing their existing knowledge and using their complementary resources (Lavie and Rosenkopf 2006). Conversely, if the firm has a higher share of R&D alliances, the increased structural asymmetry in the alliance portfolio may be disruptive to its ability to integrate the heterogeneous resources and learning, as is critical for achieving exploitative goals. The relative benefits of asymmetry thus may be more likely to offset the costs in marketing alliances.

H_8: The positive interaction effect of product-centric structure and alliance portfolio structural composition on firm performance is enhanced when the firm has a greater share of marketing alliances than R&D alliances.

Data, measures, and operationalization

We test these hypotheses with *Fortune* 1000 firms too, by aggregating the Study 1 data to

the alliance portfolio level. Each portfolio included alliances formed by a focal firm in the previous five years (Cui and O'Connor 2012; Lavie 2007). The final sample includes 193 firms and 1,215 firm-year observations for which we have complete data.

To measure firm performance, we used a firm's return on assets (ROA), calculated as the ratio of net income to total assets. This performance metric is managerially accessible and captures profitability. To measure the alliance portfolio's structural composition, we used the total number of alliances formed with customer-centric partners in the alliance portfolio, divided by the total number of alliances in the portfolio. We gathered the structure information from the 10-Ks and 10-Qs and the portfolio information from SDC Platinum. For product-centric structure, we used a binary variable, coded as 1 if the firm organizes its business units by product groups and 0 if it organizes its business units by customer groups. These data also came from the firm's 10-Ks and 10-Qs. To measure marketing (vs. R&D) alliances, we calculated the number of marketing alliances divided by the total number of alliances in the firm's portfolio, so it represents the share of marketing alliances in the portfolio (Cui and O'Connor 2012).

We controlled for several variables at the alliance portfolio, firm, and industry levels. At the portfolio level, we controlled for temporal overlap and spatial overlap to account for the relational factors that we investigated in Study 1. In each case, overlap at the portfolio level reflected the average of the temporal or spatial overlap of all alliances in the focal firm's portfolio. At the firm level, we controlled for market share, measured as the average ratio of a firm's sales revenue to the industry's overall sales revenue at the four-digit SIC level for each operating segment, as well as a restructuring dummy that equals 1 if the firm is involved in restructuring, as indicated by non-zero values for the COMPUSTAT items RCD, RCA, RCEPS, or RCP, and 0 otherwise. At the industry level, we controlled for industry technological turbulence, calculated as the standard deviation of the residuals about the time trend line of annual four-digit SIC-level R&D expenditures divided by the industry average. We also assessed industry profitability as the average ROA of firms in the same four-digit SIC industry. These constructs, definitions, measurements, and data sources are in Table 2; the descriptive statistics and correlations are in Table 3.

Model specification

To test our hypotheses empirically, we employed a system generalized method of moments (GMM), which produces consistent and efficient coefficient estimates in the presence

of endogeneity and firm-specific unobserved heterogeneity (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998). A system GMM estimator jointly estimates first-differencing and level models. We thus can specify the model as follows:

(3) $\text{Firm Performance}_{i,t+1} = \theta_1\text{Firm Performance}_{i,t} + \zeta_0 + \zeta_1\text{Alliance Portfolio's Structural Composition}_{i,t} + \zeta_2\text{Product-Centric Structure}_{i,t} + \zeta_3\text{Marketing Alliances}_{i,t} + \zeta_4\text{Alliance Portfolio's Structural Composition}_{i,t} \times \text{Product-Centric Structure}_{i,t} + \zeta_5\text{Alliance Portfolio's Structural Composition}_{i,t} \times \text{Marketing Alliances}_{i,t} + \zeta_6\text{Product-Centric Structure}_{i,t} \times \text{Marketing Alliances}_{i,t} + \zeta_7\text{Alliance Portfolio's Structural Composition}_{i,t} \times \text{Product-Centric Structure}_{i,t} \times \text{Marketing Alliances}_{i,t} + \zeta_8\text{Control Variables}_{,t} + \eta_i + \varepsilon^3_{i,t},$

The first differencing eliminates unobserved fixed effects (η_i), but the first differences of the regressors are still endogenous. To address endogeneity concerns, the system GMM estimator uses older differenced lags of the endogenous variables as instruments (Roodman 2006). Specifically, the second and longer lags of the endogenous variables are instruments in the transformed equation, and the first lag serves this function for the level equation (Roodman 2009). We treat the independent variables—structural composition and product-centric structure—and the interactions involving these variables as endogenous and adopt instrumental variables. We also estimate robust standard errors to account for heteroskedasticity and autocorrelation within panels. We use the xtabond2 command in Stata to estimate the model.

Results

We report the estimation results in Table 6. Models 1–3 provide support for our model specification: AR(1) tests are statistically significant, but AR(2) tests fail to reject the null. The Hansen J overidentification test statistics fail to reject the null hypotheses, so our instruments are valid. In Model 3, the interaction effect of product-centric structure and alliance portfolio structural composition on firm performance is marginally significant and positive (b = .099, $p < .10$), in support of H_7. The three-way interaction effect of product-centric structure, alliance portfolio structural composition, and marketing alliances on firm performance also is positive and significant (b = .189, $p < .05$), as we predicted in H_8.

—Tables follow References—

Discussion

These studies show that a customer-centric structure enables firms to cultivate relational

market-based resources, as well as leverage those resources in alliances. With an event study methodology in Study 1, we examine when structural asymmetry creates alliance value, as well as which firm appropriates more of that created value. Moving beyond the dyadic exchange, Study 2 takes a portfolio approach and investigates how the structural composition of a firm's alliance portfolio drives firm performance. Drawing on the RBV, we in turn can offer several theoretical and managerial implications.

Theoretical implications

We shed new light on how a customer-centric structure can help create and appropriate value from strategic alliances. Customer-centric structures already have been shown to improve customer relational outcomes, such as satisfaction and loyalty (Day 2006), but our study also illustrates how they can influence *performance outcomes in strategic alliances*. We show that structural asymmetry is more beneficial for creating value for marketing than for R&D alliances, and customer-centric firms seize a greater share of value from alliances than do product-centric partners, because strong customer relationships offer unique, valuable, and hard-to-duplicate resources, so these firms have more bargaining power. Whereas structure generally is regarded as a management topic, our research reveals that it also can help marketers understand how to build powerful relationships with alliance partners, then generate value in various ways.

Any alliance involves a relationship between participants, so we also examine how temporal and spatial overlaps can leverage value creation and appropriation processes through customer-centric structures. In the value creation process, these relational factors operate in opposite ways: Temporal overlap promotes interfirm trust, but spatial overlap undermines it. In value appropriation, they both reduce the benefits of customer-centric structures and hinder a customer-centric firm's ability to capture a greater share of alliance value.

Shifting to a customer-centric structure is not feasible for many firms (Lee et al. 2015), but our findings suggest that allying with customer-centric firms may be a suitable option for product-centric firms to gain access to valuable resources, such as customer relationships. Our portfolio analysis shows that more customer-centric partners in an alliance portfolio increases the performance of product-centric firms but lowers that of customer-centric firms. The positive synergies of product-centric structure and structural composition are greater when firms have more marketing (vs. R&D) alliances in their portfolios too. Thus, our studies provide a more comprehensive view of the role of customer-centric structures in strategic alliances.

Managerial implications

To provide more prescriptive guidance to managers, we conducted post hoc analyses for each study and illustrate the findings in Figure 2. For Study 1, we offer model-free evidence of how a customer-centric structure creates and appropriates alliance value by comparing the average of the value created by two firms (sum of stock returns) and the value appropriated by each firm (share of joint stock returns). For Study 2, we calculate the performance elasticity of structural composition, or the percentage change in ROA due to a 1% change in the structural composition, to compare its effectiveness in product-centric versus customer-centric structures. We perform these analyses only for significant effects.

Structural asymmetry increases the pie in marketing (but not R&D) alliances. A mean comparison shows that structural asymmetry increases the sum of the value created between participants in marketing alliances, such that the value due to structural asymmetry is 3.76 times greater than that achieved with structural symmetry. Structural asymmetry reduces the collective value in R&D alliances though; the value created through structural symmetry is 2.60 times greater than that resulting from structural asymmetry. To evaluate moderating effects, we also median split the sample into high and low overlap conditions. Temporal overlap suppresses the positive effect of structural asymmetry on marketing alliance value creation, such that in the high temporal overlap group, the value created through structural asymmetry is .75 times lower than that from structural symmetry. In contrast, spatial overlap enhances the positive effect of structural asymmetry on marketing alliance value creation; in the high temporal overlap group, the value created due to structural asymmetry is 12.33 times greater than that due to structural symmetry. Their effects also have contrasting effects on R&D alliance value creation. Specifically, temporal overlap alleviates the negative effect of structural asymmetry on R&D alliance value creation, so in the high temporal overlap group, the value created due to structural asymmetry is 2.89 times greater than that achieved through structural symmetry. These post hoc analyses thus offer additional support for our empirical findings.

Firms with customer-centric structures capture more of the pie. Across marketing and R&D alliances, the mean comparison reveals that firms with customer-centric structures claim value shares that are 2.64 times larger on average than the shares obtained by product-centric partners. The substantial disproportion primarily arises because product-centric firms pay a price to gain access to the customer-specific knowledge possessed by customer-centric partners. In

addition, temporal and spatial overlap affect the ability to appropriate value: Our results suggest that temporal overlap undermines a customer-centric firm's ability to retain more value from a marketing alliance, and spatial overlap hampers its ability to access value from a R&D alliance.

Customer-centric alliance portfolios only benefit product-centric firms. With regard to the *net* effect of growing and sharing the value pie, as detailed in Study 2, we conduct an elasticity analysis and find that a 1% increase in the share of customer-centric partners in a portfolio increases a product-centric firm's ROA by +18.03%. For a customer-centric firm though, the effect is negative, with a –17.33% decrease in its ROA. If the customer-centric firm also enters into more marketing alliances (+1 standard deviation), its performance suffers even more, such that 1% increase in structural composition results in a –29.87% decline in its ROA. If a product-centric firm is heavy on marketing alliances though (+1 standard deviation), the same 1% increase in structural composition leads to a +18.81% improvement in its ROA. Therefore, having more customer-centric partners in the alliance portfolio is beneficial for product-centric firms but detrimental to customer-centric firms.

—Figures follow References—

Limitations and further research

This study suggests several directions for research. First, the sample we used consists of publicly traded *Fortune* 1000 firms; the results might not generalize to small, private, or non-U.S. firms. It is important to consider cultural differences in this research stream. Second, we used secondary data and thus cannot capture individual perceptions (e.g., from senior executives) of the value-creating and value-appropriating mechanisms of a customer-centric structure. Further research might test the robustness of our findings by using survey or in-depth interview data. Third, a customer-centric structure needs some time to take effect in terms of customer relationships (Lee, Sridhar, and Palmatier 2015). Additional research might study its dynamic effect to determine if the effectiveness of value appropriation becomes stronger over time.

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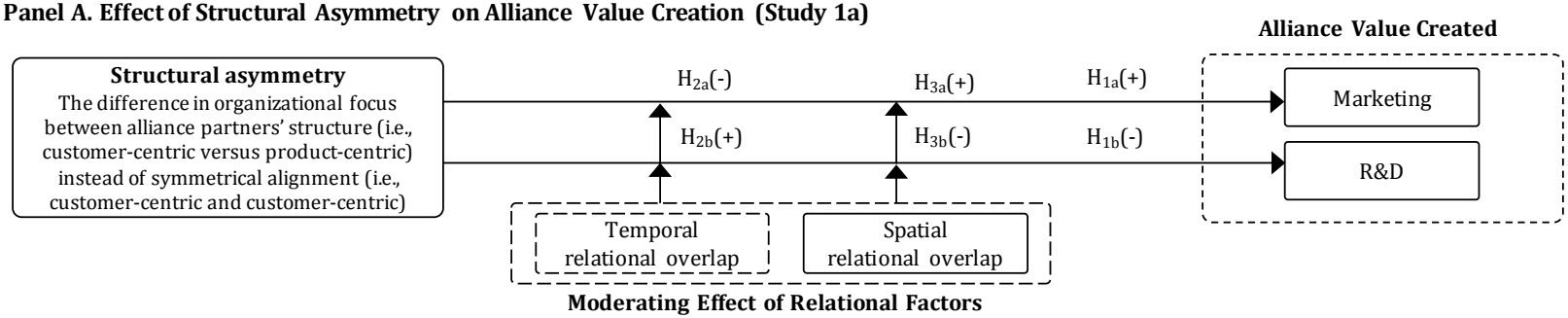
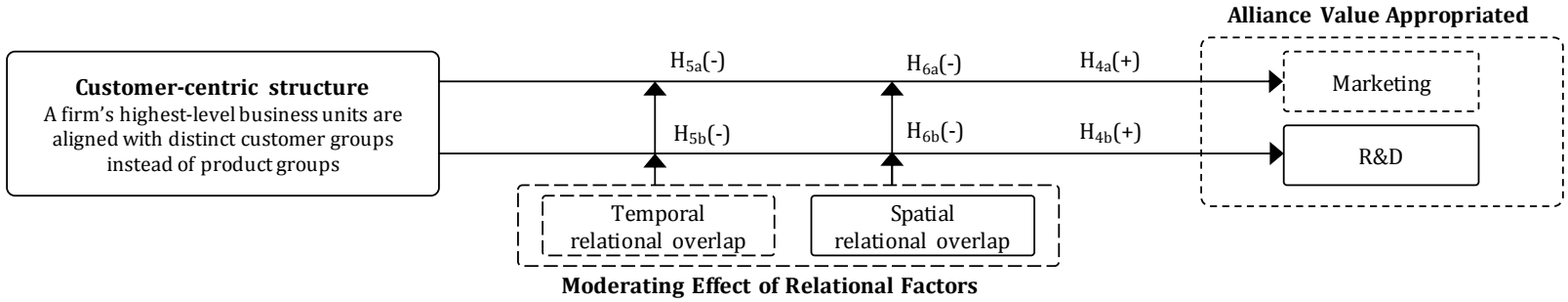
FIGURE 1
Creating and Appropriating Alliance Value through Customer-Centric Structures

Panel A. Effect of Structural Asymmetry on Alliance Value Creation (Study 1a)



Panel B. Effect of Customer-Centric Structure on Alliance Value Appropriation (Study 1b)



Panel C. Effect of Alliance Portfolio's Structural Composition on Firm Performance (Study 2)

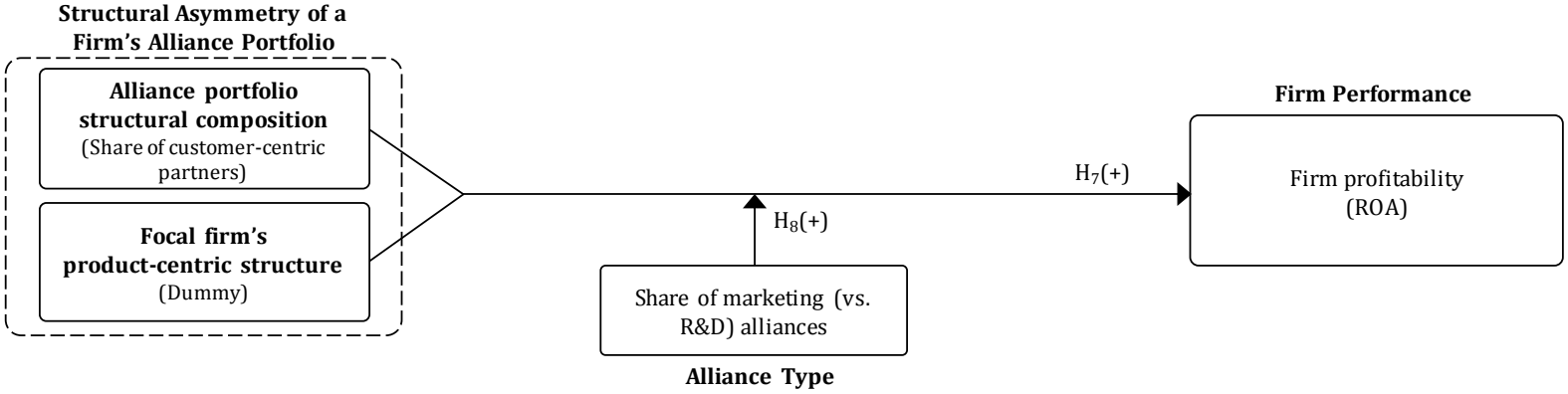
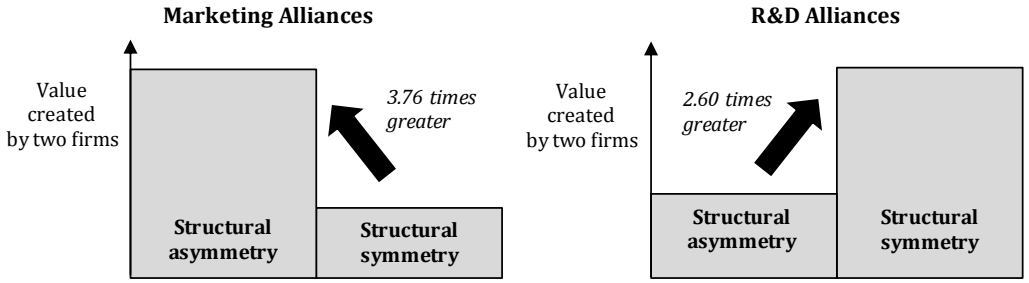


FIGURE 2
Managerial Implications: Creating and Appropriating Alliance Value through Customer-Centric Structures

Panel A. Effect of Customer-Centric Structural Asymmetry on Alliance Value Creation

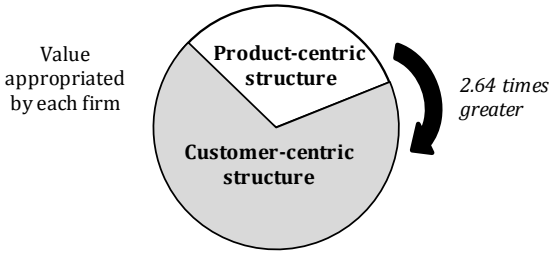
Managerial Takeaways: Structural asymmetry increases the pie in marketing (but not R&D) alliances.



(Results from Study 1a)

Panel B. Effect of Customer-Centric Structure on Alliance Value Appropriation

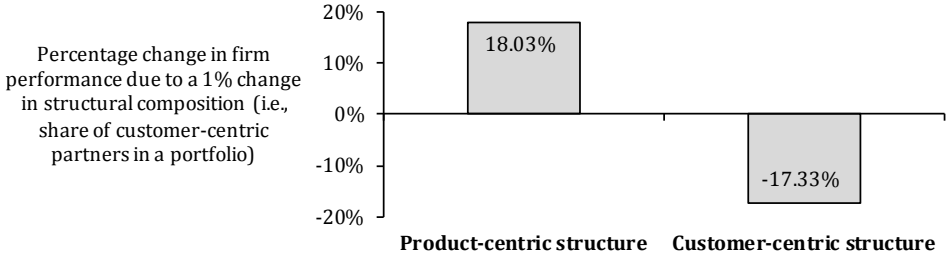
Managerial Takeaways: In the presence of asymmetry, firms with customer-centric structures capture more of the pie.



(Results from Study 1b)

Panel C. Effect of Alliance Portfolio's Structural Composition on Firm Performance

Managerial Takeaways: Customer-centric alliance portfolios only benefit product-centric firms.



(Results from Study 2)

Note: Alliance type (marketing, R&D alliances) has differential effects in value creation. However, there is no difference in value appropriation for customer-centric structure across alliance type. Our results are based on non-equity strategic alliances formed by *Fortune* 1000 firms over a 17-year period, from 1998 to 2014. Study 1A and 1B conduct event studies on 251 marketing and 245 R&D alliance announcements, and Study 2 analyzes 193 firms and their alliance portfolios.

TABLE 1
Selected Literature on Strategic Alliances

Reference	Context	Outcome	Unit of Analysis	Types of Alliances	Findings
Boyd and Spekman (2008)	290 indirect ties created by 51 firms that formed technology alliances over 1998–2000	Value creation	Alliance	R&D	The negative effect of indirect tie on a focal firm's market value in a technology alliance is suppressed by alliance duration and horizontal alliance but enhanced by cross-border alliances and partner portfolio composition.
Bucklin and Sengupta (1993)	Survey of senior executives on 98 co-marketing alliance	Value creation	Alliance	Marketing	Alliance effectiveness perceived by both participants is reduced by power imbalance, managerial imbalance, and conflict. This effectiveness is increased by organizational compatibility and rate of technological change.
Cui and O'Connor (2012)	85 firms from manufacturing, retail trade, and service industries	Value creation	Firm	Marketing, R&D	The effect of the resource diversity of multiple alliance partners on firm innovation becomes negative as functional heterogeneity, national dispersion, and market uncertainty increase. The effect becomes positive as majority control and alliance management function increase.
Fang, Lee, and Yang (2015)	276 codevelopment agreements between biotech and pharmaceutical firms over 1998-2010	Value creation, value appropriation	Alliance	R&D	The performance of codevelopment initiated at different new product development stages depends on upstream and downstream firms' alliance equity governance, partner technological capability, and market competitiveness.
Fang et al. (2016)	928 marketing alliances by 213 firms during 1998–2010	Value creation, value appropriation	Alliance	Marketing	The performance of plural structures, relative to dyadic structures, is enhanced when alliances involve more product-related tasks, the upstream firm has more alliance experience, or industry growth increases. Market overlap and prior ties between downstream partners result in greater returns for the upstream firm when the upstream firm has more alliance experience and a better reputation.
Kalaignanam, Shankar, and Varadarajan (2007)	167 asymmetric alliances in the information technology and communication industries	Value creation, value appropriation	Alliance	R&D	In asymmetric alliances, involving disproportionally sized firms, the financial gains for the larger firm increase as alliance breadth, partner alliance experience, and partner innovativeness increase. Smaller firms gain more when firms jointly contribute resources to the new product development stage.
Lane and Lubatkin (1998)	Survey of 69 pharmaceutical-biotech R&D alliances from 1985-1993	Value creation	Alliance	R&D	Because a firm's organizational structure represents how the firm processes knowledge, the similarity of the alliance participants' structure influences their ability to assimilate new external knowledge. The similarity of lower management formalization and research centralization promote interfirm learning. However, the similarity of upper management formalization and management centralization impede interfirm learning.
Lee (2011)	78 firms in the pharmaceutical industry over 1990-2006	Value creation	Firm	R&D	A firm's knowledge-creating relationship portfolio improves radical new products as the firm uses more scale resource integration combined with nonequity sharing or more diverse alignments of contract terms. A firm's knowledge-appropriating relationship portfolio improves incremental new products when the firm uses more link resource integration combined with nonequity sharing.
Luo, Rindfleisch, and Tse (2007)	Survey and archival data of 387 executives from diverse industries including computer industry	Value creation	Firm	Not specified	The effect of the intensity of a firm's alliances with its competitors exhibits an inverted U-shaped relationship with return on equity. A firm's competitor orientation makes an inverted U-shaped effect on return on equity stronger.
Robson, Katsikeas, and Bello (2008)	Personal interviews in 177 international strategic alliances	Value creation	Alliance	Not specified	Because partner similarity—measured as a compatibility in organizational structure, culture, size, and policies—reduces managerial complications, it enhances interpartner trust, which in turn improves alliance performance.
Swaminathan and Moorman (2009)	230 marketing alliance announcements in the software industry during 1988-2005	Value creation	Alliance	Marketing	Marketing alliances generate positive abnormal stock returns. The positive effect of marketing alliances on firm abnormal returns is enhanced when a firm has a moderate level of network efficiency or network density. Network reputation and network centrality do not moderate the relationship.
Thomaz and Swaminathan (2015)	251 marketing alliance announcements during 1988-2008	Value creation	Alliance	Marketing	Marketing alliances have a negative effect on a firm's idiosyncratic and systematic risk. The negative effect of the marketing alliance on firm risk is suppressed for repeat partnerships. At higher levels, a firm's network density increases idiosyncratic risk, and a partner's network density increases systematic risk, of a firm after alliance formation.
Wuyts, Dutta, and Stremersch (2004)	991 R&D agreements by 58 pharmaceutical firms during 1985-1998	Value creation	Firm	R&D	Technological diversity of a firm's portfolio of interfirm R&D agreements improves radical and incremental innovation. Repeated partnering also increases radical innovation.
Current Study	*Fortune* 1000 firms and their partners, over 1998-2014	Value creation, value appropriation	Alliance, firm	Marketing, R&D	Structural asymmetry improves marketing alliance value creation but undermines R&D alliance value creation. Across marketing and R&D alliances, firms with customer-centric structure appropriate a greater share of the created value than their product-centric partners. A product-centric firm can enhance its performance by increasing the share of customer-centric partners in its alliance portfolio.

TABLE 2
Constructs, Definitions, Measurements, and Data Sources

Constructs	Definitions	Measurements	Data Sources
Study 1. Value Creation and Appropriation Effect of Customer-Centric Structure			
Value created	Combined value created in a dyadic strategic alliance	Sum of the cumulative abnormal stock returns of alliance participants following the strategic alliance announcement.	CRSP, SDC Platinum
Structural asymmetry	The difference in organizational focus between alliance partners' structure (i.e., customer-centric versus product-centric) instead of symmetrical alignment (i.e., customer-centric and customer-centric)	1 if customer-product or product-customer; 0 if customer-customer or product-product.	Form 10-Ks and 10-Qs, SDC Platinum
Value appropriated	Share of the value that a firm retains from a dyadic strategic alliance	A firm's abnormal returns generated following the strategic alliance announcement, divided by the joint abnormal returns.	CRSP, SDC Platinum
Firm's customer-centric structure	Whether a firm's primary organizational structure is organized around customer groups (vs. product groups)	Dummy variable coded as 1 for a firm that organizes its business units by customer groups; 0 for a firm that organizes its business units by product groups (Day 2006; Gulati 2007; Lee et al. 2015).	Form 10-Ks and 10-Qs
Temporal overlap	The degree to which two alliance participants have repeated strategic alliances	The accumulated number of all prior strategic alliances formed with the same partner in the past five years.	SDC Platinum
Spatial overlap	The degree of similarity in the market in which each firm operates	Business similarity equals 1 if the first four digits of the two firms' SIC codes are the same, .75 if the first three digits are the same, .5 if the first two digits are the same, .25 if the first digit is the same, and 0 if the first digit of the two firms' SIC codes differs (Wang and Zajac 2007).	SDC Platinum
Firm size[a]	Size of the firm	Natural log of the book value of total assets.	COMPUSTAT
Alliance experience[a]	Overall experience in forming strategic alliances	Number of alliances the focal firm has formed since 1985 until the current period (Cui and O'Connor 2012).	SDC Platinum
Marketing intensity[a]	Firm's focus on marketing activities	Ratio of advertising expenditures to total assets.	COMPUSTAT
R&D intensity[a]	Firm's focus on R&D activities	Ratio of R&D expenditures to total assets.	COMPUSTAT
Business scope[a]	The extent to which a firm competes in a wide set of end markets	The number of distinct 4-digit business segment SICs in which the firm operates.	COMPUSTAT Segment
Study 2. Performance Effect of Alliance Portfolio's Structural Composition			
Firm performance	Profitability of the firm	Return on assets. Net income divided by total assets.	COMPUSTAT
Alliance portfolio structural composition	A firm's share of alliances formed with customer-centric partners	Number of alliances formed with customer-centric partners in the focal firm's alliance portfolio, divided by the total number of alliances in the portfolio.	Form 10-Ks and 10-Qs, SDC Platinum
Firm's product-centric structure	Whether a firm's primary organizational structure is organized around product groups (vs. customer groups)	Dummy variable coded as 1 for a firm that organizes its business units by product groups; 0 for a firm that organizes its business units by customer groups.	Form 10-Ks and 10-Qs
Marketing (vs. R&D) alliance	Share of marketing (R&D) alliances in the alliance portfolio	Number of marketing alliances in the alliance portfolio, divided by the total number of alliances in the portfolio (Cui and O'Connor 2012).	SDC Platinum
Temporal overlap	The degree to which the focal firm has repeated strategic alliances with the same partner in its alliance portfolio	Average of temporal overlap of all alliances in the focal firm's portfolio.	SDC Platinum
Spatial overlap	The degree to which the focal firm's alliance portfolio consists of partners which operate in the similar market	Average of spatial overlap of all alliances in the focal firm's portfolio.	SDC Platinum
Market share	Firm's sales share in its markets	Average ratio of a firm's sales revenue to the industry's overall sales revenue at the 4-digit SIC level across each operating segment.	COMPUSTAT Segment
Restructuring dummy	Indicator of restructuring	Dummy variable that is equal to 1 if the firm is involved in restructuring as indicated by non-zero values for COMPUSTAT items RCD, RCA, RCEPS, or RCP, and 0 otherwise.	COMPUSTAT
Industry technological turbulence	The extent of technological volatility in an industry	Standard deviations of residuals about the time trend line of annual 4-digit SIC R&D expenditure divided by the industry average R&D expenditure.	COMPUSTAT
Industry profitability	Profitability of the industry in which the firm operates.	Average return on assets of firms operating in the same 4-digit SIC industry as a sample firm.	COMPUSTAT Segment

[a]Construct measured for both focal and alliance partner firms.
Notes: SIC = standard industrial classification.

TABLE 3
Descriptive Statistics and Correlations

Panel A. Study 1a Descriptive Statistics and Correlations

Variables	Mean	Std Dev	Correlations													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Value created	.019	.111	1													
2. Structural asymmetry	.258	.438	.024	1												
3. Temporal overlap	1.278	.804	-.034	.031	1											
4. Spatial overlap	.308	.385	.080	-.017	.056	1										
5. Firm size	9.659	1.598	-.013	.244	.167	.013	1									
6. Partner firm size	7.668	2.628	-.171	.153	.273	-.075	.118	1								
7. Alliance experience	189.683	273.390	.035	.385	.253	.095	.560	.036	1							
8. Partner alliance experience	77.274	181.648	-.027	.225	.307	.003	-.018	.480	-.088	1						
9. Marketing intensity	.015	.028	-.048	.026	-.009	-.024	-.095	-.061	-.007	-.082	1					
10. Partner marketing intensity	.014	.034	-.075	-.002	-.016	-.077	.001	-.074	-.086	.007	.150	1				
11. R&D intensity	.064	.064	.008	-.119	.070	.129	-.133	-.028	.087	-.003	.080	-.020	1			
12. Partner R&D intensity	.095	.111	.094	-.075	-.042	.139	-.025	-.420	-.017	-.077	-.034	-.101	.160	1		
13. Business scope	2.456	1.524	.034	.344	.136	-.068	.554	.028	.503	-.030	-.106	-.059	-.247	.035	1	
14. Partner business scope	1.839	1.316	-.063	.153	.172	-.077	.005	.586	-.059	.434	-.103	-.023	-.015	-.258	.036	1

Panel B. Study 1b Descriptive Statistics and Correlations

Variables	Mean	Std Dev	Correlations													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Value appropriated	.152	1.325	1													
2. Customer-centric structure	.500	.501	.052	1												
3. Temporal overlap	1.261	.691	.052	.000	1											
4. Spatial overlap	.313	.365	.068	.000	.249	1										
5. Firm size	9.005	2.649	-.134	.507	.164	-.097	1									
6. Partner firm size	9.005	2.649	.039	-.507	.164	-.097	-.194	1								
7. Alliance experience	253.380	366.267	-.038	.532	.225	.160	.617	-.297	1							
8. Partner alliance experience	253.380	366.267	-.003	-.532	.225	.160	-.297	.617	-.350	1						
9. Marketing intensity	.015	.030	.028	.005	-.026	-.030	.017	-.077	.002	-.185	1					
10. Partner marketing intensity	.015	.030	.030	-.005	-.026	-.030	-.077	.017	-.185	.002	-.013	1				
11. R&D intensity	.069	.082	.117	-.327	.022	.100	-.475	.147	-.116	.174	-.124	-.087	1			
12. Partner R&D intensity	.069	.082	-.063	.327	.022	.100	.147	-.475	.174	-.116	-.087	-.124	-.075	1		
13. Business scope	2.739	1.822	-.057	.467	.141	-.004	.716	-.313	.734	-.360	.012	-.178	-.281	.250	1	
14. Partner business scope	2.739	1.822	-.014	-.467	.141	-.004	-.313	.716	-.360	.734	-.178	.012	.250	-.281	-.340	1

Panel C. Study 2 Descriptive Statistics and Correlations

Variables	Mean	Std Dev	Correlations									
			1	2	3	4	5	6	7	8	9	10
1. Firm performance	.042	.113	1									
2. Alliance portfolio's structural composition	.069	.163	.057	1								
3. Product-centric structure	.816	.388	-.030	-.130	1							
4. Marketing (vs. R&D) alliance portfolio	.615	.429	-.059	-.024	.057	1						
5. Temporal overlap	.533	.383	-.106	.004	.124	.299	1					
6. Spatial overlap	.200	.213	.008	-.071	.092	-.161	.007	1				
7. Market share	.173	.188	.135	.114	-.097	.062	.051	-.239	1			
8. Restructuring dummy	.491	.500	-.166	-.003	-.093	-.119	-.149	-.049	-.011	1		
9. Industry technological turbulence	.008	.008	.064	-.008	.001	-.298	-.282	.405	-.134	.079	1	
10. Industry profitability	.040	.056	.395	-.010	.013	-.064	-.087	.046	.048	-.094	.070	1

TABLE 4
Study 1a Estimation Results: Effects of Structural Asymmetry on Value Creation

		Joint CAR Following Marketing Alliance Announcements					Joint CAR Following R&D Alliance Announcements			
		Model 1		Model 2			Model 3		Model 4	
		Coeff	Std Err	Coeff	Std Err		Coeff	Std Err	Coeff	Std Err
Main effect										
Structural asymmetry	H_{1a} (+)	.042*	(.022)	.099**	(.049)	H_{1b} (-)	-.029*	(.015)	-.056**	(.026)
Moderating effect										
Structural asymmetry × Temporal overlap	H_{2a} (-)			-.068*	(.038)	H_{2b} (+)			.026*	(.016)
Structural asymmetry × Spatial overlap	H_{3a} (+)			.119**	(.060)	H_{3b} (-)			-.021	(.036)
Control variables										
Temporal overlap		.003	(.011)	.005	(.011)		-.003	(.008)	-.011	(.010)
Spatial overlap		.011	(.022)	-.005	(.024)		.019	(.015)	.022	(.017)
Firm size		.000	(.006)	.001	(.006)		-.006	(.005)	-.008	(.005)
Partner firm size		-.008*	(.004)	-.008*	(.004)		-.016***	(.004)	-.016***	(.004)
Alliance experience		.000	(.000)	.000	(.000)		.000	(.000)	.000	(.000)
Partner alliance experience		.000	(.000)	.000	(.000)		.000	(.000)	.000	(.000)
Marketing intensity		-.149	(.242)	-.171	(.239)		-.313	(.282)	-.325	(.281)
Partner marketing intensity		-.278	(.176)	-.284	(.174)		.181	(.443)	.200	(.441)
R&D intensity		.079	(.118)	.075	(.117)		-.137	(.133)	-.132	(.133)
Partner R&D intensity		.044	(.070)	.054	(.070)		-.164*	(.085)	-.166*	(.085)
Business scope		-.001	(.007)	-.002	(.007)		.005	(.006)	.005	(.006)
Partner business scope		.005	(.008)	.006	(.008)		.001	(.006)	.000	(.006)
Correlation of self-selection (inverse Mills ratio)		-.021	(.032)	-.018	(.032)		.057**	(.027)	.056**	(.027)
Constant		.091	(.080)	.081	(.079)		.104	(.068)	.124*	(.069)
R-squared		.052		.073			.123		.133	

* $p < .10$, ** $p < .05$, *** $p < .01$.
Note: Standard errors are in parentheses.

TABLE 5
Study 1b Estimation Results: Effects of Customer-Centric Structure on Value Appropriation

		Share of CAR Following Marketing Alliance Announcements					Share of CAR Following R&D Alliance Announcements			
		Model 1		Model 2			Model 3		Model 4	
		Coeff	Std Err	Coeff	Std Err		Coeff	Std Err	Coeff	Std Err
Main effect										
Customer-centric structure	H_{4a} (+)	.395	(.285)	1.529**	(.670)	H_{4b} (+)	.923*	(.477)	1.368**	(.670)
Moderating effect										
Customer-centric structure × Temporal overlap	H_{5a} (-)			-1.098*	(.593)	H_{5b} (-)			-.033	(.354)
Customer-centric structure × Spatial overlap	H_{6a} (-)			.390	(.645)	H_{6b} (-)			-2.052**	(.939)
Control variables										
Temporal overlap		.088	(.348)	.637	(.452)		.100	(.192)	.117	(.257)
Spatial overlap		.242	(.327)	.047	(.454)		.085	(.528)	1.111	(.697)
Firm size		-.062	(.061)	-.077	(.061)		-.064	(.111)	.005	(.115)
Partner firm size		.007	(.061)	.021	(.061)		.086	(.111)	.017	(.115)
Alliance experience		.000	(.000)	.000	(.000)		-.001	(.001)	-.001	(.001)
Partner alliance experience		-.001*	(.000)	-.001**	(.000)		.001	(.001)	.001	(.001)
Marketing intensity		.668	(2.474)	.801	(2.428)		-.594	(12.668)	1.113	(12.382)
Partner marketing intensity		-.408	(2.474)	-.541	(2.428)		1.012	(12.668)	-.695	(12.382)
R&D intensity		.064	(1.204)	.136	(1.184)		8.097**	(4.061)	8.036**	(3.961)
Partner R&D intensity		-1.024	(1.204)	-1.097	(1.184)		-.884	(4.061)	-.823	(3.961)
Business scope		-.181*	(.104)	-.170*	(.102)		.265*	(.143)	.292**	(.141)
Partner business scope		.090	(.104)	.079	(.102)		-.252*	(.143)	-.279**	(.141)
Correlation of self-selection (inverse Mills ratio)		.381	(.505)	.381	(.494)		-.449	(.907)	-.449	(.885)
Constant		.021	(.937)	-.546	(.968)		-.384	(1.892)	-.607	(1.862)
R-squared		.202		.234			.118		.161	

* $p < .10$, ** $p < .05$, *** $p < .01$.
Note: Standard errors are in parentheses.

TABLE 6
Study 2 Estimation: Effect of Alliance Portfolio Structural Composition on Firm Performance

		Model 1		Model 2		Model 3	
		Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
Effect of Structural Aymmetry in a Firm's Alliance Portfolio							
Structural composition × Product-centric structure	H_7 (+)			.147**	(.060)	.099*	(.060)
Moderating Effects of Marketing Alliances							
Structural composition × Product-centric structure × Marketing (vs. R&D) alliances	H_8 (+)					.189**	(.092)
Structural composition × Marketing (vs. R&D) alliances						-.178**	(.077)
Product-centric structure × Marketing (vs. R&D) alliances						-.064***	(.021)
Control variables							
One year lag of firm performance		.365***	(.064)	.375***	(.057)	.402***	(.042)
Structural composition		.021	(.042)	-.059	(.041)	.004	(.042)
Product-centric structure		-.018	(.014)	-.039***	(.015)	-.010	(.011)
Share of marketing (vs. R&D) alliances		.003	(.017)	.003	(.015)	.053***	(.019)
Temporal overlap		.015	(.018)	.031**	(.015)	.007	(.013)
Spatial overlap		.023	(.071)	.042	(.052)	.041	(.028)
Market share		.090**	(.041)	.066***	(.024)	.046**	(.018)
Restructuring dummy		-.019	(.014)	-.014	(.010)	-.018**	(.008)
Industry technological turbulence		-.260	(.882)	.050	(.573)	.020	(.427)
Industry profitability		.587***	(.120)	.589***	(.110)	.472***	(.102)
Model Details							
Hansen J test		156.742		158.627		160.022	
AR(1)		-2.866***		-2.947***		-3.141***	
AR(2)		0.523		0.546		0.582	
Wald $\chi 2$		316.053***		608.457***		825.215***	

* $p < .10$, ** $p < .05$, *** $p < .01$.
Note: Standard errors are in parentheses.

Web Appendix A

Calculation of Abnormal Returns Based on Four-Factor Model

Following extant literature (e.g., Swaminathan and Moorman 2009), we used daily data about the stock market returns from the CRSP database during a 240-day period ending 10 days before the event day. Specifically, we adopted a four-factor model of stock returns that accounts for the difference in returns due to size risk factor, the value risk factor, and a systematic risk factor. As a baseline, the market model is

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it},$$

where

R_{it} = the daily returns for firm i on day t,

R_{mt} = the daily returns on the equally weighted index (i.e., all stocks listed in CRSP),

β_i = a measure of stock i's sensitivity to market changes, and

ε_{it} = the error term.

This model can extended by including three-factor (Fama and French 1992, 1996) and momentum (Carhart 1997) factors, as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + s_i SMB_t + h_i HML_t + u_i UMD_t + \varepsilon_{it},$$

where

SMB_t = the return on a value-weighted portfolio of small stocks minus the return of big stocks (size factor),

HML_t = the return on a value-weighted portfolio of high book-to-market stocks minus the return on a value-weighted portfolio of low book-to-market stocks (value factor), and

UMD_t = the average return on two high prior-return portfolios minus the average return on two low prior-return portfolios (momentum factor).

Using this four-factor model and generalized autoregressive conditional heteroscedasticity (GARCH) estimation methods, we define abnormal returns as follows:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt} + \hat{s}_i SMB_t + \hat{h}_i HML_t + \hat{u}_i UMD_t),$$

where $\hat{\alpha}_i, \hat{\beta}_i, \hat{s}_i, \hat{h}_i,$ and $\hat{u}_i$ are the GARCH (1, 1) estimates of $\alpha_i, \beta_i, s_i, h_i,$ and u_i. The GARCH (1, 1) method has been used previously in event study contexts in marketing (Karniouchina, Uslay, and Erenburg 2011), because by controlling for time-varying conditional volatility and skewness in stock returns (Boehmer, Masumeci, and Poulsen 1991), it produces more robust results than traditional methodologies. We thus calculate the CAR as follows:

$CAR_i[-t_1, t_2] = \sum_{t=-t_1}^{t_2} AR_{it}$.

Because the event study is conducted over N events, we averaged CAR to the cumulative average abnormal return (CAAR):

$CAAR_i[-t_1, t_2] = \sum_{i=1}^{N} \frac{CAR_i[-t_1, t_2]}{N}$.

TABLE A1
CAARs and Significance Tests for Fama–French-Momentum Time-Series Model
Equally Weighted Index, GARCH (1, 1) Estimation

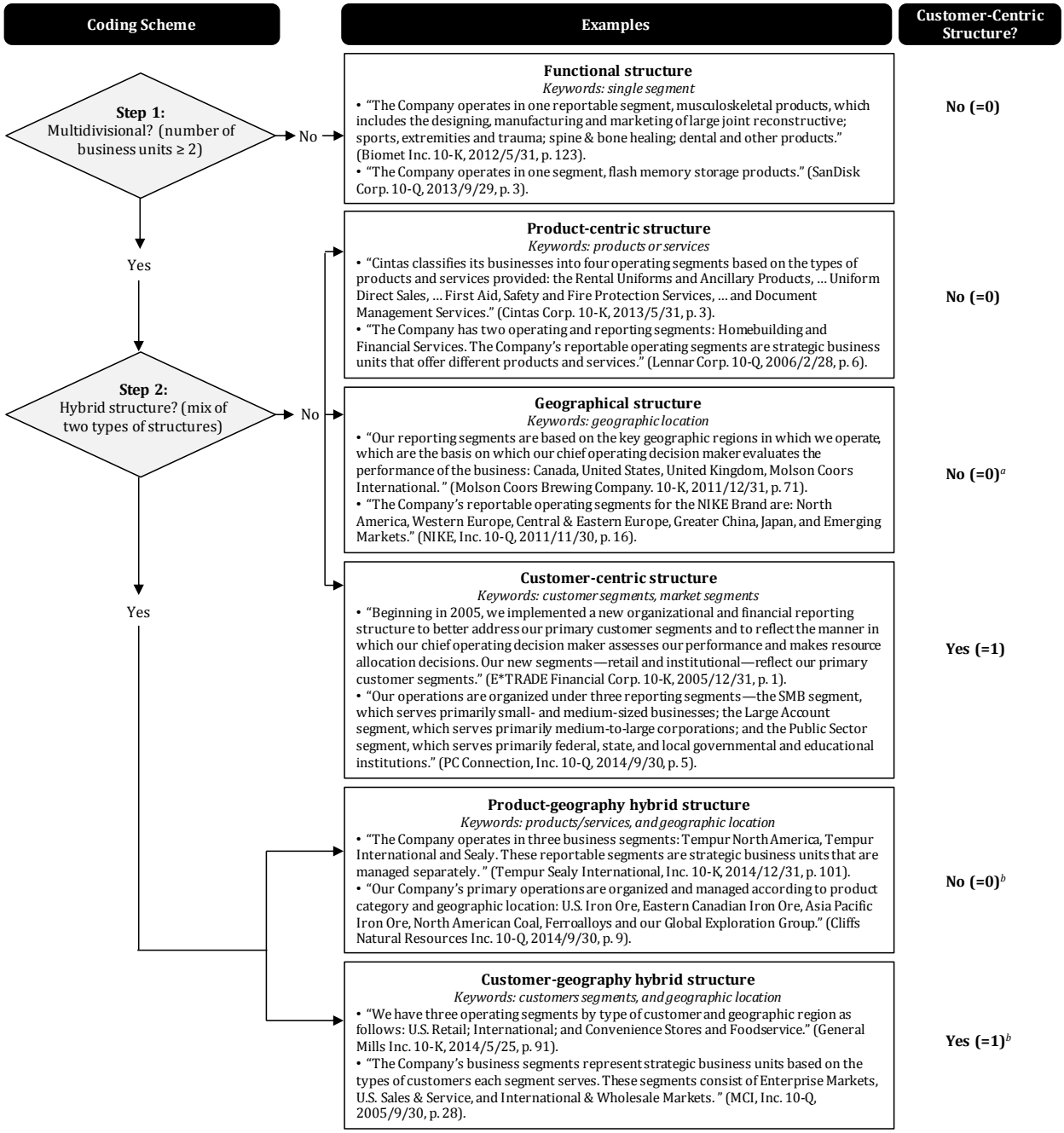
Days	Cumulative Average Abnormal Return (CAAR)	Portfolio Time-Series CDA t	Rank Test Z	Wilcoxon Signed Rank test
(-7,+7)	0.56%	1.395	-0.441	4088.5
(-6,+6)	0.91%	2.430**	0.096	6613.5
(-5,+5)	0.89%	2.569**	-0.015	5894.5
(-4,+4)	1.05%	3.344***	0.694	13528.5*
(-3,+3)	1.09%	3.967***	0.917	13955.5*
(-2,+2)	1.13%	4.869***	1.796*	21095.5***
(-1,+1)	0.98%	5.437***	2.323*	19755.5**
(-3, 0)	0.98%	4.691***	1.625	14442.5*
(-2, 0)	0.95%	5.271***	2.690**	20103.5**
(-1, 0)	**0.99%**	**6.742*** **	**3.288*** **	**24321.5*** **
(-1,+2)	1.18%	5.646***	2.003*	20614.5***
(-1,+3)	1.11%	4.762***	1.711*	20772.5***
(0,+1)	0.87%	5.919***	2.548**	21332.5***
(0,+2)	1.07%	5.915***	2.070*	22939.5***
(0,+3)	1.00%	4.800***	1.703*	21282.5***

* $p < .05$, ** $p < .01$, *** $p < .001$. One-tail test.
Note: CDA = crude dependence adjustment.

WEB APPENDIX B

Coding Scheme Used to Classify a Firms' Organizational Structure and Examples, from 10-K and 10-Q Statements

Effective in 1998, the Statement of Financial Accounting Standards (SFAS) No. 131 mandates that all U.S. publicly traded firms must disclose information about their operating units that correspond to its internal organizational structure in Forms 10-K and 10-Q (Financial Accounting Standards Board 1997). We searched for "segment information" in each firm's Forms 10-K and 10-Q (available at <http://www.sec.gov/edgar/searchedgar/companysearch.html>) from 1998 to 2014. Then we followed a two-step coding scheme (multidivisional and hybrid structure) and used keywords to classify the firm's structural type.



[a] Pure geographical structure was not included in this study, because the structural form within the geography determines the nature of the structure.
[b] In the case of a hybrid structure, if sales from geographical business units (i.e., international division) account for less than 50% of the firm's total sales, then a product-geography hybrid structure is reclassified as a product structure, and a customer-geography hybrid structure is reclassified as a customer-centric structure. Sales revenues from each operating segment were collected from the COMPUSTAT Business Segments database.

WEB APPENDIX C
Self-Selection Model Results (Heckman Correction)

Panel A. Study 1a Self-Selection Model Results

Variables	Marketing Alliance Announcements		R&D Alliance Announcements	
	Model 1		Model 2	
	Coeff	Std Err	Coeff	Std Err
Focal firm size	.025	(.024)	.005	(.028)
Partner firm size	-.003	(.014)	-.042**	(.017)
Focal alliance experience	-.001***	(.000)	-.000**	(.000)
Partner alliance experience	-.001***	(.000)	-.001***	(.000)
Focal marketing intensity	-.171	(.991)	-.710	(1.451)
Alliance marketing intensity	.600	(.742)	-.662	(2.026)
Focal R&D intensity	-.865	(.531)	-.954	(.624)
Partner R&D intensity	-.200	(.289)	-.861**	(.368)
	Year dummy		Year dummy	
Constant	-1.332***	(.248)	-1.009***	(.303)

Panel B. Study 1b Self-Selection Model Results

Variables	Marketing Alliance Announcements		R&D Alliance Announcements	
	Model 1		Model 2	
	Coeff	Std Err	Coeff	Std Err
Focal firm size	-.012	(.029)	-.050	(.031)
Partner firm size	-.012	(.029)	-.050	(.031)
Focal alliance experience	-.000	(.000)	-.000	(.000)
Partner alliance experience	-.000	(.000)	-.000	(.000)
Focal marketing intensity	.426	(1.568)	-2.960	(3.210)
Alliance marketing intensity	.426	(1.568)	-2.960	(3.210)
Focal R&D intensity	-.778	(.713)	-1.192	(.993)
Partner R&D intensity	-.778	(.713)	-1.192	(.993)
	Year dummy		Year dummy	
Constant	-1.074***	(.398)	-.554	(.432)

* $p < .10$, ** $p < .05$, *** $p < .01$.

Note: Standard errors are in parentheses.