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Make, Buy, or Ally? Choice of and Payoff from Announcements of Alternate Strategies for Innovations

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Firms constantly grapple with the question of whether to make, buy, or ally for innovations. The literature has not, to our knowledge, analyzed the choice of and payoff from these alternate routes to innovation for the same firm. To address this issue, we collect, code, and analyze the choice of and payoff from 3,522 announcements of make, buy, and ally for 192 firms across 108 industries over five years.

We find that announcements to make or ally generate positive and higher payoffs than announcements to buy, which generate negative payoffs. Nevertheless, firms continue to buy for two reasons. First, firms seem to have no memory of the payoff from buy, even though they have a memory of the payoff from make. Second, firms tend to buy when they lack commercializations, even though this strategy does not always seem to pay off. These results suggest that firms see buy as a signal to investors that they have a solution for what may be a deep strategic problem. Nevertheless, the negative returns to a buy can be mitigated if the acquirer is experienced, and the target is related and offers high customer benefit. We offer explanations for and implications of the results.

Key words: innovation; announcements; make; buy; ally; content analysis; event study; stock market returns
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Introduction

Innovations are critical for survival, growth, and success in today's global competitive markets, especially when recession depresses sales of mature products. Making, buying, and allying are the three most widely used strategies for expanding a firm's innovation portfolio. Firms spend billions of dollars each year in implementing these three strategies. Booz & Company (2012) estimates that the top 1,000 public firms investing in research and development (R&D) spent $603 billion to make innovations in 2011. The Boston Consulting Group reports 22,700 mergers and acquisitions in 2011 worldwide, with a value of $1.79 trillion (Kengelbach et al. 2012). Concurrently, Dealogic estimates firms in 2011 spent $12.1 billion in joint ventures in emerging markets alone (KPMG 2013).

Despite extensive research on decisions to make, buy, or ally across disciplines such as strategic management, economics, marketing, and law (Geyskens et al. 2006), several aspects of the relative payoff from making, buying, or allying are still not clear.

First, prior research has not compared the payoffs from announcing decisions to make, buy, or ally within the same firm (henceforth, called *make*, *buy*, or *ally*, respectively). Researchers have evaluated make, buy, or ally in distinct studies using separate samples of firms (see Table 1). Separate analysis may not be comparable because of differences in samples or contexts. To address this issue, the current study compares the choice of and payoff from announcements to make, buy, and ally within the same firm and time periods.

Second, prior studies have not examined whether firms learn from their past successes or mistakes. That is, do past successes stimulate adoption of the successful strategy while past failures lead to avoidance of the failing strategy? For example, Hewlett-Packard (HP) recently announced a write-down of $8.8 billion from an $11 billion acquisition of Autonomy Corporation announced earlier (Worthen and Scheck 2013). Ironically, HP similarly announced huge write-downs in two similar announcements of acquisitions, Palm and EDS (Steenkamp 2013).

Third, researchers have also not examined how a firm's past commercialization of innovations affects its strategy to make, buy, or ally. For example, are buy announcements used by firms to complement a

Table 1 Papers on Make, Buy, and/or Ally in the 16 Top Business and Economics Journals from January 2001 to April 2013

No.	Authors	Year	Journal[a]	Focus of study	Event	Derived measure	Is event = announcement?
1	Louis K. C. Chan, Josef Lakonishok, and Theodore Sougiannis	2001	*Journal of Finance*	Make	Research and development expenditures	Buy and hold returns	No
2	Allan C. Eberhart, William F. Maxwell, and Akhtar R. Siddique	2004	*Journal of Finance*	Make	Unexpected R&D increases	Long-term abnormal returns	No
3	Namgyoo K. Park, John M. Mezias, and Jaeyong Song	2004	*Journal of Management*	Ally	Technological alliances	Cumulative abnormal returns	No
4	Matthew J. Higgins and Daniel Rodriguez	2006	*Journal of Financial Economics*	Buy	New product-focused biotechnology industry acquisitions	Cumulative abnormal returns	No
5	Kartik Kalaignanam, Venkatesh Shankar, and Rajan Varadarajan	2007	*Management Science*	Ally	New product development alliances	Cumulative abnormal returns	No
6	David Benson and Rosemarie H. Ziedonis	2008	*Organization Science*	Buy	Acquisitions of technology start-ups	Cumulative abnormal returns	No
7	Joanne E. Oxley, Rachelle C. Sampson, and Brian S. Silverman	2009	*Management Science*	Ally	Research and development alliances	Cumulative abnormal returns	No
8	Ashish Sood and Gerard J. Tellis	2009	*Marketing Science*	Make, buy, and ally grouped into one category called alliances	Alliance formation including acquisitions; make only includes new development or manufacturing facilities	Cumulative abnormal returns	No
9	Sam Ransbotham and Sabyasachi Mitra	2010	*Management Science*	Buy	Acquisitions of innovation	Abnormal returns	No
10	Akbar Zaheer, Exequiel Hernandez, and Sanjay Banerjee	2010	*Organization Science*	Buy	High-technology acquisitions	Cumulative abnormal returns	No
11	Joshua Sears and Glenn Hoetker	2013	*Strategic Management Journal*	Buy	Technological acquisitions	Cumulative abnormal returns	No

Note. Full references for these papers appear in Online Appendix J (available as supplemental material at http://doi.dx.org/10.1287/mksc.2013.0818).

[a]The 16 top journals are as follows: the *Journal of Marketing*, the *Journal of Marketing Research, Marketing Science, Management Science*, the *Strategic Management Journal*, the *Academy of Management Journal*, *Organization Science*, *Administrative Science Quarterly*, the *Journal of Management*, the *Journal of Finance*, the *Journal of Financial Economics*, *Review of Financial Studies, American Economic Review*, the *Journal of Political Economy, Review of Economic Studies*, and the *Quarterly Journal of Economics*.

high level of commercializations or to compensate for a low level of commercializations? Thus, the current study seeks to answer the following questions:

- What factors drive a firm to choose between make, buy, or ally?
- How do payoffs differ for announcements to make, buy, and ally within the same firm?
- What factors affect the payoff from announcements to make, buy, or ally?
- Do firms "learn" from the success or failure of their past strategies? That is, do payoffs from past strategies affect current strategies?
- How does a firm's prior commercialization of innovations affect the firm's choice to make, buy, or ally?

To answer these questions, we collect a unique data set of 3,522 announcements to make, buy, and ally for 192 firms across 108 industries for five years. We model the choice of a make, buy, or ally using a multinomial logit model with correlated responses and firm heterogeneity, and then we carry out a regression analysis of the payoff as a function of the choice to make, buy, or ally, as well as other explanatory and control variables. We employ an event study to estimate payoffs from announcing a make, buy, and ally. Our models control for selection bias, firm heterogeneity, repeated observations, and other explanatory factors. Furthermore, we create novel, dynamic measures of innovation relatedness and customer benefit using content analysis.

To simplify the terminology and for ease of exposition, we use the terms "make," "buy," and "ally" to refer to announcements of make, buy, and ally for innovations, respectively.

Our results indicate that make and ally generate positive and higher payoffs than buy, which generate negative payoffs. Nevertheless, firms continue to buy for two reasons. First, firms seem to have no memory of the payoff from buy. Second, firms tend to buy when they lack commercializations. Nevertheless, if firms choose to buy, the negative returns to a buy can be mitigated if the acquirer is experienced and the target is related and offers high customer benefit.

The rest of this paper is organized as follows: The next four sections present the theory, method, model, and results. The last section concludes with the findings, discussion of the findings, implications, and study limitations.

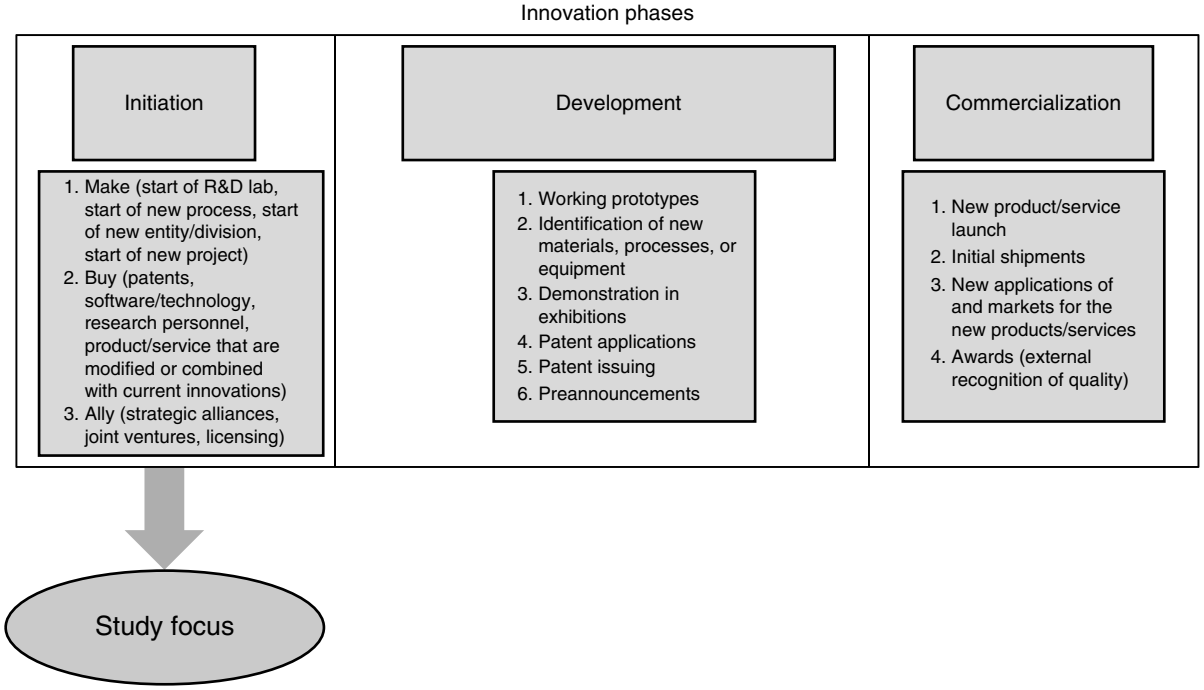
Theory and Hypotheses

This section explains the conceptual framework and builds hypotheses for the drivers of the choice of and payoff from making, buying, and allying. We begin with the definitions of the key terms and the theory for the payoff metric employed in the study.

Definitions

We define seven key terms relevant to the study: innovation project, initiation phase, announcement, make, buy, ally, and choice. An *innovation project* is the total of a firm's activities in researching, developing, and introducing a new product or service (Sood and Tellis 2009) (see Figure 1). An innovation project comprises three phases: initiation, development, and commercialization (Sood and Tellis 2009). The *initiation phase* is defined as the start of an innovation project. An *announcement* is the release of information by the firm directly or by other sources about some event (e.g., to make, buy, or ally) in the innovation project. We define *make* as a firm's announcement that it will develop a new product or service internally at the initiation phase of the innovation project. We identify four types of makes: (1) starting a research and development center or research laboratory or innovation center, (2) starting a new process or system, (3) starting a new entity or division, and (4) starting a new project for developing a product or service. Note that a make is a promise of or intention for future innovation. We define *buy* as a firm's announcement to acquire a firm or part of a firm explicitly for its innovation at the initiation phase. We exclude all acquisitions undertaken for non-innovation reasons (e.g., cost considerations, tax reductions, economies of scale). We identify four types of buys: (1) buying patents, (2) buying software or technology, (3) buying research personnel, and (4) buying products or services that are modified or combined with current innovations. Note that a buy may also be a promise because in most cases the firm has to integrate R&D, production, branding, marketing, and distribution, which is not guaranteed

Figure 1 **Events During Initiation, Development, and Commercialization Activities of the Innovation Project**



to be successful. We define *ally* as the announcement of joining of two or more entities, for a specified or unspecified period, to develop an innovation at the initiation phase. These alliances, which include open innovations (Chesbrough 2003, West et al. 2006, Hagel and Brown 2011, Lichtenthaler 2011, Bayus 2013), comprise the following: (1) forming a joint venture with other companies to develop products, (2) codeveloping products with firms, (3) licensing of technology, (4) hiring an expert on a contract basis to answer a research problem, (5) collaborating with universities or research institutes, and (6) participating in networks to develop innovations. Thus, alliances can be of three types: joint ventures, strategic alliances, and licensing agreements. Note that an ally may also be a promise because in most cases the firm has to share R&D, production, branding, marketing, and distribution with its partner(s), which is not guaranteed to be successful. The term *choice* denotes the decision among make, buy, or ally.

The literature supports the consideration of make, buy, and ally as alternatives. Kreutzer (2012) points out that firms are aware that these three choices represent alternative means of innovation. Dyer et al. (2004) find that 82% of firms view acquisitions and alliances as substitutes. For example, Cisco Systems has one senior vice president responsible for acquisitions, alliances, and internal development (Dyer et al. 2004). By placing all three functions under the same person, Cisco checks the feasibility of each option starting with its internal capabilities. Cisco's head of corporate development states, "[W]e make the choice between internal development, acquisitions, or alliances. At some point, I have to make the decision about what's the right strategy for us" (Dyer et al. 2004, p. 115). Using various criteria, Cisco decides on one of the three options (Cisco Systems Canada 2009). Capron and Mitchell (2010) argue that the typical firm makes one choice out of the three alternatives. They cite Eli Lilly as an exemplar of a firm that makes one of the three choices at any given time based on the firm's existing capabilities and partnership characteristics.

Logic for Event Study

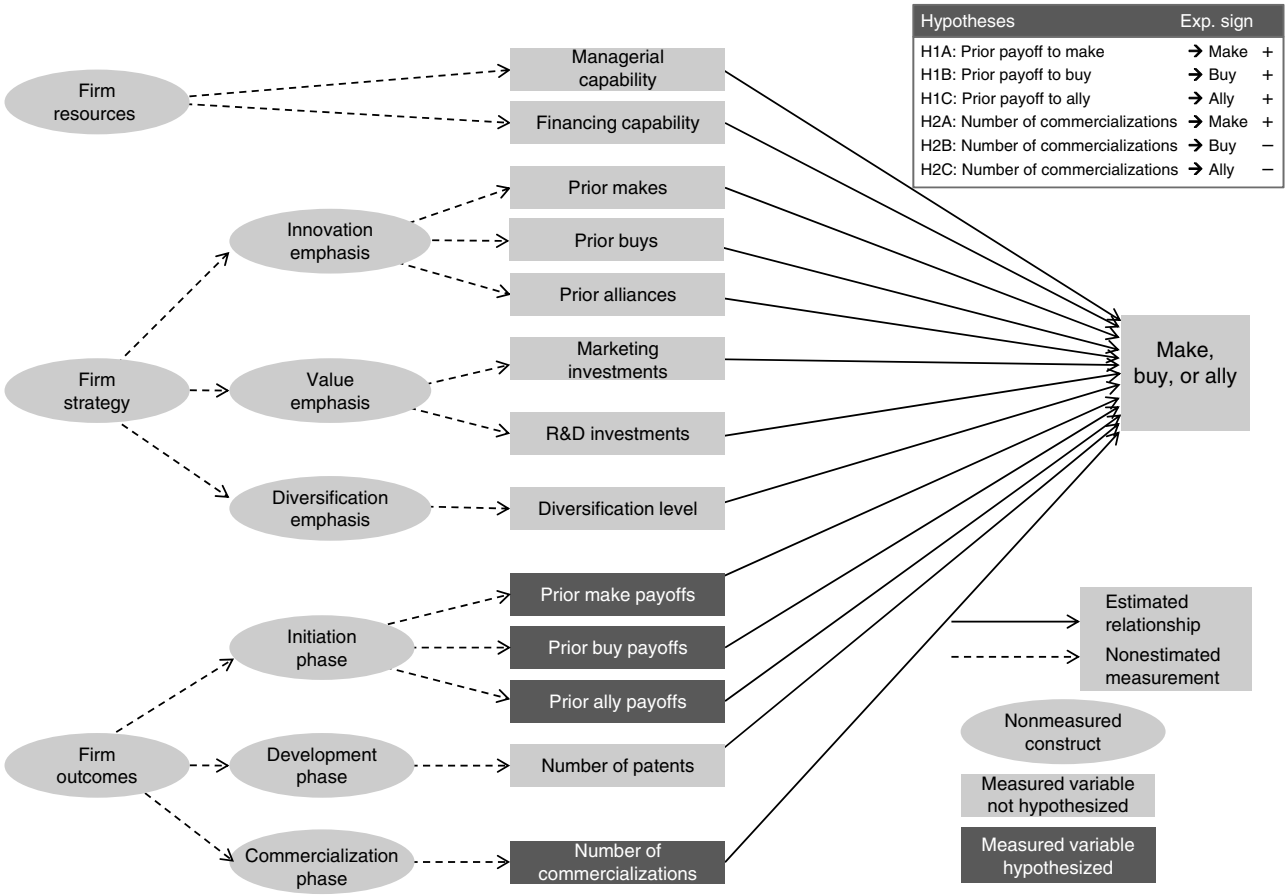
Tracking the long-term success of each of these choices is difficult if not impossible because companies do not reveal the specific outcomes to each of these announcements and the causes of the outcome. To resolve the information problem, we make use of the event method. This method relies on the assumption that the stock price at a particular point in time fully reflects all available information up to that point (Sharpe 1964, Fama 1998). The stock price relies on trades by a market of thousands of investors the world over who track the company's choices and performance. The company's announcement of a new decision reflects new information that may affect the stock price positively, negatively, or not at all. The change in stock price, if any, at the time of the announcement of a decision reflects the discounted future cash flows that the market expects from the decision, taking into account the past performance of the company, its future potential, and its competition (Fama et al. 1969, Fama 1991). Thus, by definition, returns are future looking and incorporate the long term (Campbell et al. 1997, Srinivasan and Bharadwaj 2004, Srinivasan and Hanssens 2009). By this logic, the stock market returns to make, buy, or ally would reflect the discounted expected returns in the future. By analyzing these returns against the characteristics of these announcements, we can assess the payoff from a make, buy, or ally and what factors drive that payoff. The use of this method is increasing in marketing (e.g., Tellis and Johnson 2007, Joshi and Hanssens 2009, Luo 2009, Sood and Tellis 2009, Wiles et al. 2010).

The Drivers of Choice

This section proposes the conceptual framework for the drivers of choice and derives several hypotheses. Based on the literature, three broad constructs drive choice: firm resources, firm strategy, and firm outcomes (Williamson 1975, Jensen 1986, Kelm et al. 1995, Mizik and Jacobson 2003, Haleblian et al. 2006, Sorescu et al. 2007, Sood and Tellis 2009). Figure 2 depicts the conceptual framework. The most important firm resources are its managerial and financing capability. Within firm strategy, the key constructs that drive choice are the firm's emphasis on innovation, value (creation and appropriation), and diversification. We measure a firm's innovation emphasis by its prior makes, buys, and alliances. We measure a firm's emphasis on value creation by its research and development investments and on value appropriation by its marketing investments. Within firm outcomes, the key constructs are based on outcomes of each phase of an innovation project: initiation, development, and commercialization (Sood and Tellis 2009). We measure outcomes of the initiation phase by payoff from prior makes, buys, and alliances. The most important outcomes of the development and commercialization phases are the number of patents and the number of commercializations, respectively.

We next build hypotheses on the effect of the outcomes of the initiation and commercialization phases of an innovation project on choice. We focus on the firm outcome construct, as there is no prior research, to our knowledge, that has examined how firm outcomes affect choice. Performance feedback plays a crucial role in indicating whether a firm needs to maintain or change its management strategy. Firms

Figure 2 Conceptual Framework: Drivers of Choice for Make, Buy, or Ally



can differ in their responses to performance outcomes (March 1981).

Payoff from Prior Make, Buy, or Ally. The payoff from a prior make, buy, or ally can affect choice (Cyert and March 1963, Levitt and March 1988, Greve 2003). Organizational learning theory states that firms are outcome oriented (Levitt and March 1988). A firm observes an outcome and links it to routines (Levitt and March 1988). If a routine is associated with a successful outcome, the firm learns to continue that routine. If a routine is associated with an unsuccessful outcome, the firm learns to avoid the routine (Cyert and March 1963). If firms achieve a positive outcome from a make, buy, or ally, it serves as a positive reinforcement to a firm's current strategy. This prompts firms to continue with the strategy. There is substantial evidence that outcomes affect firm behavior: good outcomes lead to organizational persistence (e.g., Miller and Chen 1994), whereas bad outcomes lead to organizational change (Haleblian et al. 2006). This line of reasoning suggests the following.

Hypothesis 1A (H1A). *High payoff from make in the prior year encourages firms to make.*

Hypothesis 1B (H1B). *High payoff from buy in the prior year encourages firms to buy.*

Hypothesis 1C (H1C). *High payoff from ally in the prior year encourages firms to ally.*

Number of Commercializations. Firms vary in their ability to commercialize innovations (Chandy et al. 2006). Commercializations are more relevant to marketing scholars and more important for marketing managers than any intermediate output (Prabhu et al. 2005). Indeed, Hauser et al. (2006, p. 698) point out that "a firm's overall profitability results from the portfolio of products it commercializes over time and across product lines." We posit that commercialization intensity is a factor that affects buys and alliances negatively and makes positively for the following reasons. First, for firms with low commercializations, a buy allows them to gain access to the ideas, talent, and tacit and codified knowledge of targets, which eventually translates into commercializations. Second, buys and alliances allow a relatively fast means of obtaining commercializations, whereas makes take a long time to materialize into a commercialization. Much research has shown that

it is desirable to bring products to market quickly (Kessler and Chakrabarti 1996). Buying innovative firms or partnering to obtain innovations allows firms to quickly gain access to the target's commercializable products, trusted channel relationships, and loyal customer base. This line of reasoning suggests the following.

Hypothesis 2A (H2A). *A high number of commercializations in the prior year encourages firms to make.*

Hypothesis 2B (H2B). *A low number of commercializations in the prior year encourages firms to buy.*

Hypothesis 2C (H2C). *A low number of commercializations in the prior year encourages firms to ally.*

The Drivers of Payoff from a Make, Buy, or Ally

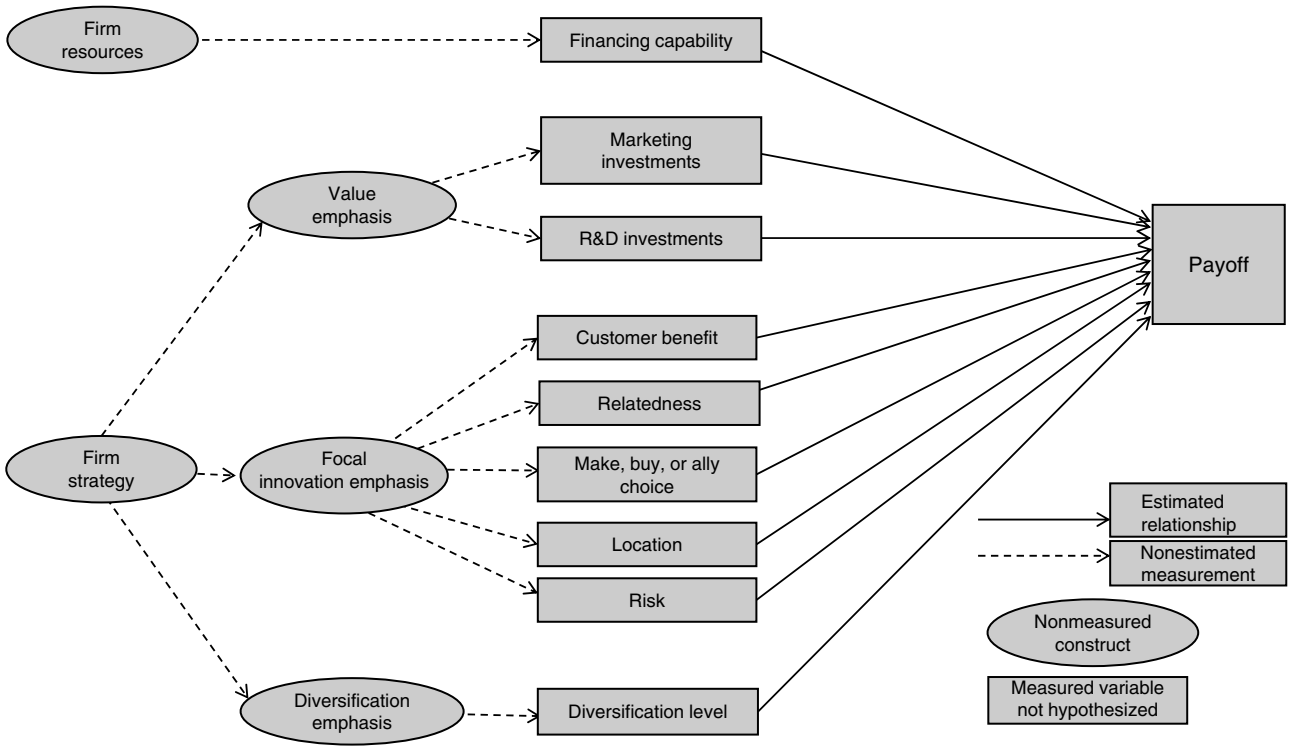
Figure 3 shows our conceptual framework for the drivers of payoff from a make, buy, or ally. We suggest two broad constructs that drive the payoff from a make, buy, or ally: firm resources and firm strategy. Under firm resources, the key construct that drives payoff is the firm's financing ability. Under firm strategy, the three key constructs that drive payoff are the firm's focal innovation emphasis, value (creation and appropriation) emphasis, and diversification emphasis. We measure a firm's focal innovation emphasis by the make, buy, or ally choice and the customer benefit, relatedness, location, and riskiness of the innovation.

We do not have specific hypotheses about the payoff from a make, buy, or ally because the literature contains arguments for both positive and negative payoffs. Instead, we merely summarize the reasons proposed for positive and negative payoffs and address these issues as research questions.

First, a make can lead to a positive payoff because of the internalization of capabilities, ownership of intellectual property, and full capture of returns associated with making (Doukas and Switzer 1992, Kanter 1999, Cefis and Marsili 2006, Kreutzer 2012). On the other hand, the announcement can lead to a negative payoff because of the uncertainty, huge investments, and long development periods also associated with making (Erickson and Jacobson 1992, Lev 2001, Nakamura 2001, Griffin 2002, Rothaermel and Hess 2010, Kreutzer 2012). This study seeks to empirically examine whether makes lead to a positive or negative payoff.

Second, a buy can lead to a positive payoff because buying is characterized by the acquisition of knowledge such as new technology, talent, and intellectual property (Ranft and Lord 2000, Mayer and Kenney 2004). On the other hand, the announcement can lead to a negative payoff because disturbance in conventional routines, high transaction costs, low reversibility, risk of overpayment, and cultural clashes also characterize buying (Williamson 1975; Nahavandi and Malekzadeh 1988; Hitt et al. 1996, 2009; Rothaermel and Hess 2010; Kreutzer 2012). This study seeks to empirically examine whether buys lead to a positive or negative payoff.

Figure 3 Conceptual Framework: Drivers of Payoff from a Make, Buy, or Ally



Third, an ally can lead to a positive payoff because allying is associated with shared risk; access to knowledge with low transaction costs; and high flexibility to enter, commit, or exit (Gomes-Casseres 2000, Capron and Mitchell 2012, Kreutzer 2012). On the other hand, the announcement can lead to a negative payoff because allying is also associated with a lack of management attention, relationship risks, threat of opportunistic behavior, potential competition between partners, and shared returns (Parkhe 1993, Bleeke and Ernst 2002, Ybarra and Turk 2011, Capron and Mitchell 2012, Kreutzer 2012). This study seeks to empirically examine whether alliances lead to a positive or negative payoff.

Control Variables

We use the following control variables in our choice model: *managerial capability, financing capability, number of patents, prior number of makes, prior number of buys, prior number of alliances, marketing investments, R&D investments, diversification levels,* and *industry.* Please see panel A of Table 2 for the measures of these variables and Table 3 for the reasons these variables are used. We use the following control variables in our payoff model: *innovation relatedness, customer benefit, marketing investments, R&D investments, financing capability, diversification levels, prior risk to make, prior risk to buy, prior risk to ally, location* (*emerging markets versus developed markets*), *licensing agreement, target value, type of make, type of buy, type of ally, industry,* and *competition*. The measures are in panel B of Table 2, and the rationale for the inclusion of these control variables is provided in Table 3.

Method

We test the hypotheses by assembling data from 192 firms across 108 industries. We collect these data using the historical method (Golder and Tellis 1993, Golder 2000). Below we detail the sample selection, data collection, and the measures of the focal variables.

Sample Selection

We use four different samples to minimize any sample selection bias and maximize the generalizability of results. The samples exclude firms not listed on the American stock exchanges and financial institutions because they experienced considerable turmoil during our study's time frame. Moreover, financial innovations are inherently risky and complex. We outline each sample in turn below.

Sample 1. Our first sample is drawn from a list of the most innovative firms in the world. We include this sampling frame because the most innovative firms have an ample number of makes. We use the 2008 *BusinessWeek* and Boston Consulting Group's list of the 50 most innovative firms in the world for the sampling frame. The list includes firms from various industries. Although the list had 50 firms, we could only include 36; we dropped 14 firms because they are either financial institutions or not listed on the American stock exchanges.

Sample 2. To ensure that we have a sizeable number of buys, for our second sample, we select the 36 most acquisitive firms in the world.[1] We rely on the Securities Data Company (SDC) mergers and acquisitions database to extract the list. The SDC database comprehensively covers all worldwide mergers and acquisitions from 1985.

Sample 3. For our third sample, we randomly select 64 firms from the 2008 Fortune 500 list. The Fortune 500 is a list compiled by *Fortune* magazine ranking the top 500 public corporations of the United States as measured by their gross revenue. This sampling frame allows us to select the largest publicly held firms in the United States.

Sample 4. Our fourth sample comprises 64 firms chosen at random from the 2008 Fortune 501–1,000 list. This sampling frame allows us to select relatively smaller and publicly held firms in the United States. Samples 3 and 4 include firms that vary in their number of makes, buys, and alliances.

As a result, we have 192 firms in our sample. There is an overlap of eight firms between Samples 1 and 2.[2] This sample selection strategy enables us to compile a substantial number of makes, buys, and alliances from various industries. Firms range from large to small, from innovative to non-innovative, with low to high make, buy, and ally rates, and include marketers of products and services. This sampling strategy leads to a broad, representative set of firms and is important for the generalizability of results.

The list of the 192 firms is in Online Appendix §A1. For time sampling, we chose the period from July 1, 2002 to June 30, 2007. We focus on this five-year period because the most recent Fama–French factors were available through June 2007, when we started data collection in 2008. The availability of the Fama–French factors is intrinsically important to our study.

Data Collection

We use a number of sources for collecting the announcements to make, buy, and ally. We identify announcements using four respected syndicated sources (Capital IQ, Factiva, the SDC database, and

[1] We use the period from 2002 to 2007 to select the top 36 acquirers. Financial institutions are dropped.

[2] We exclude firms from Samples 1 and 2 for the random selection process for Samples 3 and 4.

Table 2 Operationalization of Control Variables

Variable	Source	Definition/operationalization
		Panel A: Variables in both the model for choice and payoff
Managerial capability	Compustat	Tobin's *q*: Ratio of the market value of a firm to its total assets. Market value of the firm equals the market value of common equity plus the book value of preferred stock plus the book value of total debt ($t-1$).
Financing capability	Compustat	Free cash flow: Operating cash flow minus capital expenditures. We normalize this measure by dividing the free cash flow by the total assets ($t-1$).
Number of patents	NBER patent database (Hall et al. 2005)	Number of patents granted in the year prior to the announcement date. Because we have a range of industries, we standardize this measure by industry. We use the NBER patent database to collect patents for all firms for every four-digit SIC code in our sample.
Prior number of makes/Prior number of buys/Prior number of alliances	Capital IQ, Factiva, LexisNexis	Number of makes/buys/alliances per year prior to the date of the current event. We use a window of one year for calculating this variable. To control for size, we normalize this measure by the total sales in year $t-1$.
Marketing investments	Compustat	Ratio of selling and general administrative (SG&A) expenses to the total assets ($t-1$) standardized by each SIC code. It is set to 0 when SG&A expense is missing.
R&D investments	Compustat	Ratio of research and development expenses to the total assets ($t-1$) standardized by each SIC code. It is set to 0 when R&D expense is missing.
Diversification levels (*low diversified firms* (*base case*), *related diversified firms, unrelated diversified firms, high diversified firms*)	Compustat	Four different categories of diversification based on two broad patterns of diversification (Varadarajan and Ramanujan 1987): broad spectrum diversification, the number of two-digit SIC codes in which a firm operates; and mean narrow spectrum diversification, the number of four-digit SIC codes in which a firm operates divided by the number of two-digit SIC categories in which it operates.
Industry	Occupational Safety and Health Administration	Firms are categorized by whether they are in business-to-business (B2B) goods, B2B service, business-to-consumer (B2C) goods, and B2C service (Srinivasan et al. 2011) industries.
		Panel B: Variables in the model for payoff only
Innovation relatedness	Capital IQ, Factiva, LexisNexis, SDC	Schema of innovation relatedness expressing increasing relatedness, on a 10-point scale ranging from 1 to 10. Scale coded by two research assistants who did not know the study's objectives. (See Online Appendix §A7.1 for the schema; $\kappa = 0.66$.)
Customer benefit	Capital IQ, Factiva, LexisNexis, SDC	Schema of customer benefit expressing increasing customer benefits, on a 10-point scale ranging from 1 to 10. Scale coded by two research assistants who did not know the study's objectives. (See Online Appendix §A7.2 for the schema; $\kappa = 0.72$.)
Prior risk to make/Prior risk to buy/Prior risk to ally	CRSP, Kenneth French's website[a]	Coefficient of β_{1i} in Equation (B1) in Online Appendix B, i.e., the Carhart four-factor model for computing payoffs. First, we estimate prior event β_{1i} for each firm using 265 days of daily returns ending 1 day before the event day. Next, we estimate post-event β_{1i} for each firm using 265 days of daily returns starting 1 day before the event day. The change in systematic risk ($\Delta\beta_{1i}$) attributed to the announcement is the difference between the pre- and post-event systematic risk. We measure this variable by averaging the systematic risks to the firm's makes, buys, and alliances per year prior to the date of the current event. For robustness, we also use alternative end and start dates of 10 days before the event day.
Competition	Compustat	For each firms' primary SIC industry, we square each firm's market share and take the sum over all firms. We next subtract this sum from 1 (Fang et al. 2008).
Location (*emerging vs. developed markets*)	Capital IQ, Factiva, LexisNexis, SDC	If the announcement indicated that the innovation was going to be carried out in an emerging market. We used the summary list provided in *Wikipedia* (http://en.wikipedia.org/wiki/Emerging_markets, accessed June 26, 2012). We identified a country as en emerging market if the country appeared in the "Summary list" on the website.
Type of make (R&D center, new process, new entity, new product)	Capital IQ, Factiva, LexisNexis, SDC	We read the text of the announcement to identify whether the innovation involved the development of an R&D center, the incorporation of a new process, the start of a new entity to develop product, or the start of a new project to develop a product. We indicated the presence of a make type by a dummy variable.
Type of buy (target's product, target's software, target's research personnel, target's patent)	Capital IQ, Factiva, LexisNexis, SDC	We read the text of the announcement to identify whether the target's product, software, research personnel, or patents were bought in the acquisition. We indicated the presence of a buy type by a dummy variable.

Table 2 (Cont'd.)

Variable	Source	Definition/operationalization
Type of ally (*strategic alliance, joint venture*)	Capital IQ, Factiva, LexisNexis, SDC	We read the text of the announcement to identify whether the innovation was a strategic alliance or a joint venture. We indicated the presence of a joint venture by a dummy variable.
Licensing agreement	Capital IQ, Factiva, LexisNexis, SDC	We read the text of the announcement to identify whether the firm in our sample licensed an innovation from another firm. We only categorize alliances as licensing agreements if the firm in our sample was a licensee rather than a licensor. We indicated the presence of a licensing agreement by a dummy variable.
Target value	Capital IQ, Factiva, LexisNexis, SDC	We read the text of the announcement to capture the amount the acquirer paid to buy the target. We use U.S. dollars to determine the value. Thus, target value in currencies other than U.S. dollars were converted using the exchange rate on the acquisition date. We used http://www.oanda.com/currency/historical-rates/ (accessed May 24, 2012) for the conversion.

Note. NBER, National Bureau of Economic Research; SIC, Standard Industrial Classification.
[a]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

LexisNexis® Academic). Other sources include company websites, news websites, company blogs, and independent blogs. As such, we use a variety of sources to collect all the information related to the innovation. We code an announcement as a make, buy, or ally if it occurs in at least two of the sources above. Details about data sources are in Online Appendix §A2.

We use Capital IQ, Factiva, and LexisNexis to identify and control for seven different types of confounding events around the −1 to +1 window. The data collection procedure is described in Online Appendix §A3. We identify 1,174 makes, 1,331 buys, and 1,017 alliances, for a total of 3,522 announcements. All announcements are at the level of a specific innovation project of a firm. From the 3,260

Table 3 Rationale for Inclusion of Control Variables

Variable	Rationale for inclusion
Model for choice	
Managerial capability	Firms with capable managers may manage the post-acquisition process better than firms with noncapable managers.
Financing capability	Firms with financing capability may spend the cash on acquisitions instead of offering the cash to shareholders (Jensen 1986).
Number of patents	Firms with a low number of patents can quickly and easily gain an entire portfolio of patents and pending patent applications using buy and ally decisions.
Prior number of makes/buys/alliances	Firms may follow the same strategy used in the past as a result of inertia (Szulanski 1996).
Marketing investments	We use marketing investments to measure value appropriation. Value-appropriating firms may put more focus on ally and buy than make decisions.
R&D investments	We use R&D investments to measure value creation. Value-creating firms may put more focus on make than buy and ally decisions.
Diversification levels	Firms may use acquisitions as a diversification strategy.
Industry	Choice of whether to make, buy, or ally may differ by industry.
Model for payoff	
Innovation relatedness	Relatedness of the innovation to a firm's current capabilities allows firms to recognize, assimilate, and apply new information (Cohen and Levinthal 1989).
Customer benefit	Innovations that benefit customers may lead to higher sales, cash flow, and/or earnings.
Marketing investments	High payoffs as a result of better advertising, branding, pricing, and distribution.
R&D investments	High payoffs as a result of better in-house R&D infrastructure and expertise.
Financing capability	High payoffs as a result of a firm's ability to finance, maintain, and finish projects.
Diversification levels	High payoffs as diversified firms can absorb innovations unrelated to their core skills.
Prior risk to make/buy/ally	Risks involved in a make, buy, and ally are different (e.g., a buy is less risky than a make because there are many factors involved in the success of a buy decision).
Location of make/buy/ally (*emerging vs. developed markets*)	Location of innovation may affect payoff (e.g., setting up an R&D center in emerging markets may lead to lower payoffs because of the lack of established institutional systems).
Target value	Firms may pay more than the target was worth to them (Eccles et al. 1999).
Type of make/buy/ally	Payoffs might be influenced by the different types of make, buy, and ally decisions.
Industry	Payoff to strategies might differ by industry.
Competition	Some firms may achieve a higher payoff to buy if they use it to preempt competitors who are also interested in the same target (Dyer et al. 2004).

announcements that we use in our multinomial logit model, we eliminate 1,671 because of confounding events. Thus, our sample for the event analysis and payoff regression model comprises 441 makes, 754 buys, and 394 alliances for a total of 1,589. This sample size is, to our knowledge, higher than all other marketing studies, which use the event study method and also run a check for confounding events.[3] Overall, collecting, reading, and coding all the different types of data used in the study consumed approximately 3,100 man-hours.

Measures

This section describes the measures of and rationale behind the key variables in the hypotheses. The details and definition of the measures for all the other variables are in Table 2.

Payoff to Prior Make, Buy, and Ally. We measure the *prior make payoff*, *prior buy payoff*, and *prior ally payoff* variables by averaging the returns to the firm's makes, buys, and alliances, respectively, per year prior to the date of the current event. We use the −1- to +1-day window to calculate the returns for each event. We measure these variables over the previous year but also test for longer windows in the robustness checks. Our position for using this measure of prior payoff is as follows. When considering whether to make, buy, or ally, managers are likely to consider how the firm fared when it made the decision in the past (Cyert and March 1963, Levitt and March 1988). In other words, they are likely to learn from past experience with these decisions (Cyert and March 1963, Levitt and March 1988). The most recent payoff to these decisions in the prior year is likely to be the most important factor influencing a manager's learning from the past (Haleblian et al. 2006).

Number of Commercializations. We measure the *number of commercializations* by the number of new product launches per year prior to the date of the current event. We create this measure with the following formula:

$$\text{ShareComm}_{it} = \frac{\sum_{t=t-1}^{t-365} NPA_{it}}{\sum_i \sum_{t=t-1}^{t-365} NPA_{it}}, \qquad (1)$$

where NPA_{it} stands for new product launch announcement for firm i on day t. We sum all new product launch announcements for a firm i prior to day t up to one year and divide the same by the total of all new product launch announcements for all firms prior to t up to one year. We rely on the Capital IQ database for this particular variable. We read each entry under the category of "Product-Related Announcements" within the Key Developments feature to ascertain a new product launch. Because the database has complete coverage only from January 2002 for new product launch announcements, we use a moving window of one year for announcements from January 1, 2003 to June 30, 2007 and the maximum time available (six months to one year) for announcements from July 1, 2002 to December 31, 2002.

[3] Wiles et al. (2012) use 880 events, Chen et al. (2012) use 606 events, Karniouchina et al. (2011) use 928 events, Swaminathan and Moorman (2009) use 230 events, Tellis and Johnson (2007) use 421 events, and Geyskens et al. (2002) use 98 events. Some studies use a higher number of events but do not control for confounding events (Sood and Tellis 2009, Elberse 2007). Meta-analyses for 127 acquisition studies report average sample sizes of 221 events (King et al. 2004).

Model

This section describes the Carhart four-factor model for returns, the model for choice, and the model for payoffs. Because we have firms' decisions that take the form of makes, buys, and alliances with known time stamps, we employ the event method to gauge the impact of these announcements on returns (Srinivasan and Hanssens 2009).

Four-Factor Model for Computing Returns

The normal return to a stock is the price of a stock on a day minus that on the prior day divided by the price on the prior day. The expected return of a stock on a day is the return of a stock that can be predicted for that day based on a general market index such as the S&P. The abnormal returns to a stock as a result of an event are the normal returns minus the expected returns for the same day. As such, abnormal returns control for fluctuations in price that affect the whole market (not as a result of the particular event of a particular firm) as revealed in movements of a market index. We use the Fama–French (Fama and French 1993) and Carhart four-factor (Carhart 1997) models to calculate the abnormal returns. We use the cumulative average abnormal returns (CAR) in the $(-1, 1)$ window as our payoff metric. Because the model has been used in prior research (e.g., Wiles et al. 2010, Tirunillai and Tellis 2012), we skip the details for brevity. The interested reader can refer to Online Appendix B for details.

Model for Choice

Because we have three unordered announcements (make, buy, and ally), we estimate a multinomial logit choice model. Our specification allows for correlated choices. For example, a firm's make choice might be correlated with its buy choice. Our specification also allows for firm heterogeneity. For example, two firms with similar make, buy, or ally experience could develop different abilities of managing make, buy, or

ally. In equation form, the multinomial logit model with random intercepts is

$$\log \frac{\pi_{ijc}}{\pi_{ij1}} = \alpha + x'_{ij}\beta_c + u_{ic}, \quad c = \text{make, ally, or buy.} \quad (2)$$

Here, i denotes the firm, and there exists I ($i = 1, 2, \ldots, I$) firms. The ith firm has n_i observations, where j denotes the jth observation at each unique time t (which in our case is a day). Response probabilities are denoted by $\pi_{ijc} = P(Y_{ij} = c)$, where Y_{ij} denotes the jth response for firm i ($j = 1, 2, \ldots, n_i$). This response is from one of c (make, ally, or buy) choices. A column vector of p explanatory variables for the jth observation for firm i is denoted by x_{ij}; x_{ij} includes the hypothesized variables *prior make payoff*, *prior buy payoff*, and *prior ally payoff*; *number of commercializations*; and numerous control variables defined in Table 2. Whenever possible, we use a window of one year prior to the announcement date to calculate the explanatory variable. Otherwise, we use the prior year's value. This helps us tackle any endogeneity issues (Boulding and Staelin 1995). Constant terms are denoted by α_c, and the effects of the p explanatory variables are assessed through $\beta_c = (\beta_{1c}, \beta_{2c}, \ldots, \beta_{pc})'$. Here, α_c and β_c are considered fixed effects; u_{ic} are considered random effects. We assume a multivariate normal distribution for u_{ic} with an expectation of 0 and an unstructured covariance matrix Σ; i.e., for $u_i = (u_{i1}, u_{i2}, u_{i3})'$, we have $u_i \sim \mathrm{N}(0, \Sigma)$. For reasons of identification, we have $\alpha_1 = 0$, $\beta_1 = 0$, and $u_{i1} = 0$. This identification scheme results in the interpretation of parameters with reference to the first category and Σ to be a 2×2 matrix. In our model, the first category is make ($c = 1$, where 1 stands for a make). Ally is indicated by $c = 2$ and buy by $c = 3$. Thus, the likelihood contribution of the ith firm is

$$l_i(\alpha_c, \beta_c, \Sigma) = \int_{-\infty}^{\infty} \left(\prod_{j=1}^{n_i} \left[\frac{\exp(\alpha_c + x'_{ij}\beta_c + u_{ic})}{\sum_{m=1}^{3} \exp(\alpha_m + x'_{ij}\beta_m + u_{im})} \right]^{I(Y_{ij}=c)} \right) \times f_u(u_i, \Sigma)\, du_i. \quad (3)$$

Here, $f_u(u_i, \Sigma)$ is the multivariate normal density and $I(\,)$ is the indicator function. The overall likelihood function is the product of the likelihood contributions for each firm, i.e., l_i. This likelihood function consists of a product of I integrals, where each of these cannot be solved in closed form. Thus, maximum likelihood estimation of the parameters is not possible. We thus resort to estimating the model using numerical integration—more specifically, by adaptive Gaussian quadrature. We use SAS to program and estimate the model (Kuss and McLerran 2007).[4] Note that our estimation does not suffer from the independence of irrelevant alternatives assumption because we assume the random intercepts to be correlated across choice occasions.

Model for Payoff

To specify the payoff model, we first test for sample selection bias in panel data following the procedure suggested by Verbeek and Nijman (1992). If we do not find evidence of selection bias, we estimate the model without controlling for selection bias. If we find evidence for such bias, we resort to procedure suggested by Wooldridge (1995). The details of the procedure and the results are in Online Appendix C. We find no evidence of sample selection bias. So we run a random effects panel regression analysis of payoff as a function of the independent variables, combining make, buy, and ally in one model. In equation form, we estimate the following model:

$$payoff_{it} = \alpha_i + buy_{it} \times \beta_b + ally_{it} \times \beta_a + \text{controls} \times \gamma + \varepsilon^4_{it} \quad (4)$$

for $i = 1, 2, \ldots, I$ firms, where t denotes the time (which in our case is a day) when firm i makes a choice, a denotes ally, b denotes buy, α_i are random firm-specific effects and assumed to be independent and identically distributed, ε^4_{it} is an idiosyncratic error, buy_{it} is an indicator variable where 1 indicates that the firm made a buy choice, and $ally_{it}$ is an indicator variable where 1 indicates that the firm made an ally choice. The control variables such as R&D investment, marketing investment, financing capability, and prior risk are measured before the announcement date to control for endogeneity (Boulding and Staelin 1995). Our estimation method takes care of the potential problem of unobserved heterogeneity because we use a random effects model (Greene 2003). We use Stata's xtreg command and the vce option to obtain firm-robust standard errors.

Results

Each announcement type has been made within every project of a firm. Within a project, the majority of announcements ($N = 3{,}260$, or 92.6%) are either only a make, ally, or buy. We call these *pure strategies*. A minority of projects have a combination of two or more announcement types. We call these *mixed strategies*. They amount to 7.4% ($N = 262$) of the announcements. Our subsequent analysis is divided into two parts: first that of pure strategies within projects and then that of mixed strategies within projects.

[4] Following Kuss and McLerran (2007), we parameterize the covariance of the random effects such that (1) the estimate of the variance is positive definite, (2) the components of the covariance are constructed as a correlation multiplied by the root of the product of the components of the variance, and (3) the correlation is constrained to be between −1 and 1.

Analysis of Pure Strategies Within Projects

This section presents the results of the descriptive analysis, choice analysis, and multivariate analysis of payoffs.

Descriptive Analysis. The descriptive statistics of all variables are in Online Appendix D. At the firm level, on average, a firm in our sample has made 5.3 makes, 6.6 buys, and 5 alliances. One-third of the firms (34%) predominantly use only one strategy. We define a *predominant strategy* as one used for 90% or more of a firm's innovations. We find that for firms that have a predominant strategy, most use buys than use either makes or alliances: 23% of firms predominantly use buys, 5.5% of firms predominantly use makes, and 4.9% of firms predominantly use alliances. Moreover, 68% of firms chose one announcement type for more than 50% of its innovations. Thus, most firms tend to favor one of the three types.

Next we analyze the payoff from these pure strategies using the $(-1, 1)$ window. We use this window because we can control for confounding events around it. Table 4(a) shows the mean results of the payoff from a make, buy, or ally. Note that the payoff from a buy is strongly negative and significant, whereas that from a make or ally is strongly positive and significant.

The first objection to these results is that they are across all observations, including firms who use buys sparely and those who use them intensely. The argument can be made that firms that use buys intensely may be more adept at it and may be able to earn higher returns. Table 4(b) shows the payoffs from buy based on the intensity of its use: firms that mainly buy, moderately buy, minimally buy, and never buy. Note that the payoff is negative and significant both for firms that use buy moderately and for those that mainly buy.

Table 4(a) Abnormal Returns to an Average Event by Strategy for $(-1, +1)$ Window

Strategy	*N*	Returns (%)	Significance level
Make	441	0.25	<0.01
Buy	754	−0.28	<0.05
Ally	394	0.32	<0.05

Table 4(b) Abnormal Returns to an Average Event by Strategy of Buy for $(-1, +1)$ Window

Buy	Definition	*N*	Returns (%)	Sig. level
Mainly buy	Firms that use buys 75%–100% of the time	361	−0.09	<0.01
Moderately buy	Firms that use buys 25%–74% of the time	747	−0.1	<0.01
Minimally buy	Firms that use buys < 25% of the time	462	0.18	<0.01
Never buy	Firms that do not use buys	19	1.68	<0.05

Another objection to these results could be that firms that use a mixed strategy would do better because they can combine the advantages of each of these strategies: developing innovations internally when they have the expertise, allying where they lack expertise, and buying when allying and making are insufficient. Table 4(c) shows the mean payoff for mixed strategies. Note that mostly ally or mostly make is better than any combination of make, buy, and ally.

The next objection could be that the above strategies do not take into account the relatedness and innovativeness of the target. Table 4(d) shows the payoff from a buy under various conditions. Note that a buy does best when the target is related or when the benefits to customers are high, or both. However, the mean

Table 4(c) Abnormal Returns to an Average Event by Strategy Group for $(-1, +1)$ Window

Strategy group	Definition	*N*	Returns (%)	Sig. level
Mostly ally	Firms that use alliances > 25% and use each of the other two types < 25% of the time	74	1.74	<0.01
Mostly make	Firms that use makes > 25% and use each of the other two types < 25% of the time	60	0.5	<0.01
Mostly make and ally	Firms that use makes and alliances > 25% of the time and use buys < 25% of the time	347	0.19	<0.05
Mostly make and buy	Firms that use makes and buys > 25% of the time and use alliances < 25% of the time	241	0.07	<0.05
Mostly triple play	Firms that use each of the three announcement types > 25% of the time	234	−0.001	<0.05
Mostly buy	Firms that use buys > 25% of the time and use each of the other two types < 25% of the time	408	−0.09	<0.05
Mostly buy and ally	Firms that use buys and alliances > 25% of the time and use makes < 25% of the time	225	−0.33	<0.05

Table 4(d) Abnormal Returns to an Average Event by Condition of Buy for $(-1, +1)$ Window

Condition	Returns (%)	Sig. level
Low relatedness	−0.60	<0.05
High relatedness	−0.03	<0.05
Low customer benefit	−0.53	<0.05
High customer benefit	−0.01	<0.05

Note. We use median split to determine low and high relatedness/customer benefit.

results even in these circumstances are negative. This analysis indicates that even though a buy generally yields negative returns, those returns can be mitigated but not eliminated by buying targets that are related and that have substantially better customer benefits.

A final objection could be that the above analyses are all descriptive and mostly univariate. They do not take into account characteristics of the firm, selectivity bias in each strategy, and prior risk from the strategies. To control for these other factors, we proceed to the multivariate analysis of the payoff to strategies conditioned on the multinomial analysis of the choice of these strategies.

Analysis of Choice. Table 5 shows the results of the multinomial logit model with random intercepts. The dependent variable is a nominal variable where the reference category is the choice of a make that is coded as 1. The choice of an ally and buy is coded as 2 and 3, respectively. To assess the simultaneous effect of the explanatory variables on the probabilities of a make, buy, or ally,[5] Table 5 reports the marginal effects. The estimated coefficients of Equation (2) are in the Online Appendix E. We report the marginal effects at the mean. The estimated parameters in Table 5 show the effect of the explanatory variables on the probability of undertaking the innovation choice.

We first turn to the effects of a prior payoff from each strategy. Payoff from a prior make is positively and significantly (3.053, $p < 0.05$) associated with make. This result supports Hypothesis H1A. However, the marginal effects both of payoff from a prior buy on a buy choice and of payoff from a prior ally on an ally choice are not significant. Thus, we do not find support for Hypotheses H1B and H1C. These results imply that firms have a memory for the payoff from a make but no memory for the payoff from a buy or ally.[6] We suggest possible explanations for this result in the Discussion.

The number of commercializations is positively and significantly associated with a make (2.96, $p < 0.05$) and significantly and negatively associated with a buy (-4.76, $p < 0.01$). However, the number of commercializations does not significantly affect an ally. Thus, we find support for Hypotheses H2A and H2B but not for Hypothesis H2C. This result suggests that firms with low commercializations have a higher likelihood to buy than to make. Given the importance of new products and the long lead time to produce them, firms see buys as a signal to investors that they have a solution for what may be a deep strategic problem.

A firm's number of patents has no significant effect on the innovation choices. Thus, an increasing number of patents does not seem to affect the likelihood of a make, buy, or ally. The prior number of makes is positively and significantly associated with a make (0.236, $p < 0.05$). Thus, firms that focus on making continue to make. Financing capability is positively and significantly associated with buy (0.499, $p < 0.05$). This result indicates that cash-rich firms have a propensity to buy. High diversification has a negative and significant association with ally (-0.07, $p < 0.05$). This result suggests that highly diversified firms do not use alliances to learn new knowledge and diversify into new industries. The prior number of alliances and buys does not significantly affect ally and buy choice, respectively. This result, along with the prior result of the nonsignificant effect of prior payoffs of buys and alliances, suggests that firms forget both their buys and alliances as well as the payoffs from these announcements. Multicollinearity is not an issue in the model. The results of stepwise buildup are in Online Appendix Table H1.

Table 5 Results of the Multinomial Model of Choice: Marginal Effects

	Make		Buy		Ally	
Independent variable	Coeff.	*t*-Value	Coeff.	*t*-Value	Coeff.	*t*-Value
Prior make payoff	3.053*	2.51	−3.17**	2.9	0.125	0.19
Prior buy payoff	0.679	1.1	−0.193	0.29	−0.485	1.12
Prior ally payoff	0.768	1.19	−0.57	0.83	−0.192	0.54
Number of patents	−0.001	0.07	−0.005	0.56	0.006	1.29
Number of commercializations	2.956*	2.02	−4.76**	2.78	1.722	1.82
Managerial capability	−0.005	0.65	0.006	0.59	−0.001	0.11
Financing capability	−0.323	1.41	0.499*	1.98	−0.174	1.27
Prior no. of makes	0.236*	2.15	−0.139	1.69	−0.096	1.18
Prior no. of buys	−0.05	0.5	0.125	0.98	−0.067	0.98
Prior no. of alliances	−0.156	1.46	0.142	1.22	0.014	0.24
Marketing investments	0.038	0.85	−0.019	0.39	−0.017	0.55
R&D investments	0.012	0.53	0.009	0.35	−0.021	1.2
Div. levels—Related diversified firms	−0.006	0.1	0.012	0.16	−0.006	0.24
Div. levels—Unrelated diversified firms	0.094	1.23	−0.062	0.8	−0.03	0.96
Div. levels—Highly diversified firms	−0.005	0.07	0.083	0.96	−0.07*	2.01
Industry—B2B goods	0.7	1.46	−0.05	1.45	0.011	0.77
Industry—B2C goods	0.279**	2.65	−0.3**	2.67	0.132	1.91
Industry—B2C services	0.178*	2.52	−0.31**	2.89	0.14*	2.03
Intercept	−0.372*	2.31	0.426**	3.02	−0.05	0.72

Note. Log likelihood value = −3,090.75.
*Statistical significance at the 0.05 level; **statistical significance at the 0.01 level.

[5] The formula for the marginal effect of an explanatory variable x_p on choice c for firm i is $P_{ic} \times (\beta_{pc} - \sum_{c=2}^{3} P_{ic} \times \beta_{pc})$.

[6] The effects of a prior make, buy, or ally on choice may differ if these outcomes are measured for longer time intervals. We thus reestimate the model for choice using longer time intervals, ranging from two to five years. Online Appendix F has the estimated coefficients of Equation (2) for two- and three-year intervals. Our results remain the same in terms of both direction and significance. Our results remain same using the value-weighted CRSP index (see Online Appendix G).

Table 6 Results of Regression Model of Payoff (Dependent Variable Is Returns)

	Model without target value		Model with target value	
Independent variable	Coeff. (%)	*z*-stat	Coeff. (%)	*z*-stat
Buy indicator	−2.83**	−3.46	−4.48**	−4.37
Ally indicator	0.16	0.35	0.10	0.23
Innovation relatedness	−0.03	−0.67	−0.02	−0.54
Customer benefit	−0.02	−0.55	−0.02	−0.48
Prior number of buys	−1.18	−1.4	−1.33	−1.64
Buy indicator × Innovation relatedness	0.16**	2.66	0.26**	3.14
Buy indicator × Customer benefit	0.21*	2.46	0.31*	1.96
Buy indicator × Prior number of buys	1.71*	1.96	2.29*	2.09
Marketing investments	0.12	0.84	0.16	0.87
R&D investments	0.05	0.69	0.04	0.47
Financing capability	0.24	0.25	1.20	1.05
Diversification levels—Related diversified firms	0.03	0.15	−0.04	−0.17
Diversification levels—Unrelated diversified firms	0.00	−0.02	−0.07	−0.33
Diversification levels—Highly diversified firms	−0.20	−1.15	−0.29	−1.26
Prior risk to buy	0.11	0.46	0.25	0.74
Prior risk to ally	−0.30	−0.88	−0.32	−0.84
Prior risk to make	0.21	0.67	0.04	0.12
Emerging markets—Make	0.17	0.78	0.29	0.78
Emerging markets—Buy	−0.31	−0.84	−0.30	−0.82
Emerging markets—Ally	−0.09	−0.43	−0.09	−0.41
Type of buy—Target's product	−0.50	−1.28	−0.15	−0.25
Type of buy—Target's software	−0.04	−0.19	−0.37	−0.98
Type of buy—Target's research personnel	−0.58*	−1.99	−1.90**	−3.15
Type of buy—Target's patent	−0.77	−1.35	−0.56	−0.53
Type of ally—Joint venture	−0.61	−1.43	−0.56	−1.31
Type of ally—Licensing agreement	−0.55	−0.95	−0.51	−0.88
Type of make—R&D center	0.02	0.04	0.02	0.04
Type of make—New project	−0.05	−0.1	−0.07	−0.15
Type of make—New entity	−0.35	−0.86	−0.36	−0.89
Industry—B2B goods	−0.46	−1.42	−0.52	−1.12
Industry—B2C goods	−0.58	−1.73	−0.69	−1.56
Industry—B2C services	−0.74*	−1.97	−0.72	−1.45
Competition	−0.06	−0.22	−0.27	−0.81
Target value			0.00	−1.6
Intercept	1.42	1.89	1.61	1.83
Fit statistics	Overall R^2: 0.043		Overall R^2: 0.056	
N	Make = 441, Buy = 754, Ally = 394		Make = 441, Buy = 320, Ally = 394	

Notes. Our results regarding the main effects and interactions remain the same when we impute the missing value of the target value with the grand mean. Results of the propensity score matching, an alternative estimator, are in Online Appendix I.

*Statistical significance at the 0.05 level; **statistical significance at the 0.01 level.

Multivariate Analysis of Payoff. We pool the payoffs from makes, buys, and alliances into a single model to analyze their differences after controlling for other independent variables (see Table 6). For this purpose, we estimate Equation (4) using a random effects model instead of the fixed effects model because we cannot reject the null hypothesis that the random effects model is consistent and efficient[7] (Hausman 1978). In this model, the coefficient of the included buy and ally indicators denote the difference in a payoff from a make (excluded level) after controlling for all other effects. We include interactions of a buy with other independent variables to test whether these other effects vary by type of buy.

The coefficient of the buy indicator is negative and significant (−2.83%, $p < 0.01$; see Table 6). Thus, a buy leads to a negative and smaller payoff than a make even after controlling for all other variables, confirming the simple descriptive analysis. We find that the coefficient of the interaction of the buy indicator and innovation relatedness is positive and significant (0.16%, $p < 0.01$). This result indicates that firms can improve the payoff from a buy if the target is related to it. Moreover, the coefficient of the interaction of the buy indicator and customer benefit is found to be positive and significant (0.21%, $p < 0.05$). This indicates that firms can improve the payoff from

[7] Hausman test: χ^2 value (33) = 31.27, p-value = 0.5533.

Table 7 Analysis of Mixed Strategies Within Projects

	Make	Buy	Ally
Panel A: Average abnormal returns[a] to subsequent announcements on event day			
Conditional on			
Make comes first	−0.44% ($N = 14$)	−0.15% ($N = 9$)	−0.69% ($N = 9$)
Buy comes first	0.34% ($N = 34$)	0.62% ($N = 5$)	−0.95% ($N = 2$)
Ally comes first	0.03% ($N = 25$)	0.86% ($N = 2$)	−0.52% ($N = 5$)
Mixed comes first[b]	0.46%* ($N = 58$)	0.79% ($N = 4$)	−0.25% ($N = 10$)
Total	0.25%* ($N = 131$)	0.33% ($N = 20$)	−0.51% ($N = 26$)
Panel B: Average abnormal returns[a] to announcements on event day			
Projects			
All (pure and mixed)	0.09%* ($N = 1{,}174$)	−0.08%* ($N = 1{,}331$)	0.13%* ($N = 1{,}017$)
Pure only	0.09%* ($N = 1{,}022$)	−0.1%* ($N = 1{,}276$)	0.14%* ($N = 962$)

Note. N is the number of announcements.
[a]For the (0, 0) event window.
[b]Mixed strategy means two different types of announcements preceded the target announcement.
*Statistical significance at the 0.05 level; **statistical significance at the 0.01 level.

a buy if they buy targets with high customer benefits. We also find that the coefficient of the interaction of the buy indicator and prior number of buy is positive and significant (1.71%, $p < 0.05$), indicating that firms can achieve positive payoffs to buy if they have prior buy experience. The finding that the coefficient of buying a target's research personnel is negative and significant (−0.58%, $p < 0.05$) indicates that firms should be wary of buying only research personnel, as integrating such personnel into the acquired firm may be difficult because of the employee's felt loss of independence.

As a robustness check, we include the amount paid to acquire the target in the regression model as it can affect the buy payoff. For example, firms may pay more than the target was worth to them (Eccles et al. 1999). We could only obtain the buy amount for 320 of the 754 buys. Thus, we dropped 434 observations. Moreover, we could not calculate the acquisition premium for more than 80% of the buys because either the market value or the amount paid was not available. The results are in the two rightmost columns of Table 6 and are similar to our main model. Multicollinearity is not an issue in the model. Results of the stepwise buildup are in Online Appendix Table H2. We find similar results using propensity score matching, which is an alternative to our modeling framework.

Analysis of Mixed Strategies Within Projects

The prior analysis deals entirely with pure strategies of makes, buys, or alliances within a project. It could be argued that firms do best when they carry out a mix of such announcements within a project. Do such within-project mixed strategies fare better? We next address this question.

Each announcement in our data belongs to a unique innovation project. To identify mixed strategies, we need to find what combinations of make, buy, and ally were used for the same project. Also, to reduce left censoring[8] in the identification of mixed strategies, we need to find out whether another announcement for the same project preceded the announcements in our sampling window. We collect announcements for 18 months before our main window of time sampling to reduce left censoring, at least to some extent. We then identify multiple makes, buys, and alliances within a project.

We find that in 7.4% of cases (262 announcements), firms did use some mixture of make, buy, and ally within a single project. These 262 announcements relate to 87 projects. Within these 87 projects, we identify strings of related announcements to make, buy, and ally. Note that, as far as the market is concerned, the first announcement in the string for a particular project does not appear as a mixed strategy. Only the second, third, etc., announcements can be perceived as part of a mixed strategy. We next analyze the payoffs from these subsequent announcements conditional on the first announcement within a project. We use the Fama–French Carhart model to calculate the abnormal returns and report the abnormal returns of the (0, 0) window.

Table 7, panel A presents the number of announcements involving mixed strategies and the average payoff from each combination. For any mixed strategy—with one exception—we do not find the payoff from subsequent announcements significant conditional on the first announcement. The one exception is this: the payoff from a make is 0.46% ($p < 0.05$, $N = 58$) when a mixed strategy comes first. Also, the

[8] Here, we are concerned only about left censoring because the market would know about any announcements within a project prior to our sampling time. However, announcements after our sampling time would be unknown to the market and would not affect returns within our sampling time.

last row of Table 7, panel A shows that when a make is part of a mixed strategy, returns are significantly positive and better than if a buy or ally were part of the mixed strategy.

Finally, we combine the pure strategies analyzed earlier with the mixed strategies analyzed here and present the results in Table 7, panel B. Note that our primary descriptive results remain the same for all strategies as for the pure strategies: namely, that makes and alliances yield significantly positive returns, whereas buys yield significantly negative returns (see Table 7, panel B).

We do not pool the mixed strategies with the pure strategies and redo the logit and regression analysis because the number of mixed strategies is relatively small, the main descriptive results do not change, and the analysis of the pooled data becomes extremely complex as a result of the vast number of possible combinations.

Discussion

Firms constantly grapple with the question of whether to make, buy, or ally. They widely pursue these strategies, spending trillions of dollars in the process. This study seeks to identify the pattern of make, buy, and ally announcements, the factors that drive this pattern, and the factors that drive the payoff from such announcements. This section summarizes the findings, discusses some key issues, suggests implications for practice, and lists some limitations.

Summary of Findings

The key findings of the study are the following:

- Make, buy, and ally are widely used as strategies to obtain innovations, but buy is the most prevalent, followed by make and ally. Despite buy's higher prevalence, make and ally generate a significantly positive and much higher payoff than buy. Buy leads to a significantly negative payoff of −0.28%. Make and ally have a significantly higher payoff than buy even after controlling for several explanatory variables, different estimation methods, and various combinations of pure and mixed strategies.
- Firms do not use their prior payoffs from buy as a factor in their subsequent buy choice. However, they do use their prior payoffs from make in their subsequent make choice. This result suggests that firms do not have any memory of or "learn from" their prior payoffs from buy but do remember or "learn" from their prior payoffs from make.
- The number of commercializations of innovations is negative and significantly associated with a buy choice. This result suggests that firms buy to compensate for a low level of commercializations rather than to complement a high level of commercializations.
- The negative returns to buy can be mitigated if targets are related to acquirers and have high customer benefits and if acquirers have prior buy experience.

Discussion of Key Issues

This section addresses three key questions emerging from the results: Why are make and ally consistently better than buy? Why do firms not learn from prior payoffs from buy? Why do firms buy when they lack commercializations?

Why Are Make and Ally Consistently Better Than Buy? Buy does worse than make or ally for several reasons. First, make and ally are relatively more reversible and flexible than buy. When firms buy, they incur high financial, management, and reputation costs. These costs increase the firm's separation pain, which translates to a potential lock-in (Kreutzer 2012). Second, compared with make and ally, a buy has numerous post-acquisition problems such as clash of cultures, difficulty of integration, difficulty of employee retention (Nahavandi and Malekzadeh 1988, Hitt et al. 2009), and difficulty of full exploitation of target. For example, eBay could not make a profit from its $2.6 billion acquisition of Skype in 2005, so it wrote off $1.4 billion 24 months later. Third, by the time a firm determines the target is a good buy, many other firms also make a similar determination, and the price of the target increases to match or exceed its potential value. Fourth, a buy often involves a bidding game with rivals, resulting in the winner's curse (Varaiya and Ferris 1987).

Why Do Firms Not Learn from Prior Payoffs from Buy? Firms may not learn from their prior payoffs for several reasons. First, firms might not consider payoffs from buys because management might believe that the costs of not buying—before their rivals—can be higher than the potential loss. Second, the absence of commercializations may create pressure for firms to buy. This pressure may lead firms to ignore or downplay their prior buys that led to poor payoffs. Indeed, our result for prior commercializations shows that firms tend to buy when they lack commercializations, even though the strategy seems not to pay off. These results suggest that firms see buys as a quick fix for what may be a deep strategic problem (Tellis 2013). Third, both theoretical and empirical evidence show that more often than not, buys are followed by employee turnover in both the parent and the acquired firms (O'Shaughnessy and Flanagan 1998, Krishnan and Park 2002, Krishnan et al. 2007). Thus, the memory for a buy may slowly die out. Fourth, managers may forget payoffs to prior buys because of their vested interests, such as compensation, influence within the firm, and risk of unemployment (Trautwein 1990, Hitt et al. 2009).

Why Do Firms Buy When They Lack Commercializations? A lack of commercializations may prompt a buy for three reasons. First, commercializations are the culmination and probably the most important output of a firm's innovation project. A firm's future growth and earnings depend on its commercializations (Hauser et al. 2006). The lack of commercializations exposes firms to a bleak future. For example, facing the absence of a good position in the mobile devices market, Microsoft spent $7 billion to acquire Nokia's smartphone business, even though that firm was a rapidly declining star and prior investment in it had not borne fruit (Tellis 2013). Second, in a competitive marketplace, rivals and new entrants are constantly commercializing new products. The lack of commercializations puts the target firm at a growing disadvantage. Third, in the absence of commercializations, a buy may offer an immediate ownership of a portfolio of impending and completed commercializations of new products.

Implications for Managers

The findings of this study have six implications for managers.

First, although make and ally have uncertain payoffs in the distant future, firms should undertake make and ally and announce these events because they lead to immediate positive returns on the stock market. In our study, the total dollar value for a make is, on average, US$165 million, and the total dollar value for an ally is, on average, US$62 million.

Second, firms should take a hard look at buy, because this strategy leads to immediate negative returns on the stock market for many reasons stated previously. In our study, the total dollar value for a buy is, on average, negative US$42 million.

Third, our results indicate that firms learn from their past makes but not from their past buys. So firms should develop internal mechanisms to learn from their past experiences with makes, alliances, and buys. For example, even though HP lost out by purchasing Palm for its mobile software (Steenkamp 2013), it invested $11 billion in acquiring Autonomy (Worthen and Scheck 2013). Only 18 months later, HP wrote off $8.8 billion of that investment (Worthen and Scheck 2013). In additional analysis, we find that the average abnormal stock returns in the three-day period surrounding HP's three acquisition announcements of Compaq, EDS, and Palm is −10.35%. In absolute dollar terms, HP lost, on average, approximately $6.6 billion dollars for these three buys. Day's (1994, p. 44) quote nicely summarizes the situation firms might find themselves in if they do not develop adequate memory systems: "Organizations without practical mechanisms to remember what has worked and why will have to repeat their failures and rediscover their success formulas over and over again." Some successful acquirers are using innovative methods to inquire about and capture the lessons from their prior buys. A global industrial conglomerate uses a wiki-style "deal room" to discuss and store prior acquisition processes (Heimeriks et al. 2008).

Fourth, if a buy is warranted, firms can maximize the payoff if they acquire innovations related to their current capabilities. When Nokia bought Sega.com in August 2003, Nokia had built substantial capabilities in multiplayer gaming. The relatedness of SEGA's innovation to Nokia allowed Nokia to garner US$540 million in the three-day window surrounding the announcement.

Fifth, if a buy is warranted, firms can maximize the payoff if they acquire innovations with high customer benefit. Consider Parker Hannifin's buy of Airtek in January 2007. Airtek's drying and filtration equipment for compressed air enabled Parker Hannifin's global filtration business customers to enjoy a complete compressed-air treatment package from the compressor to the point of use. The customer benefit of Airtek's innovation allowed Parker Hannifin to garner US$319 million in the three-day window surrounding the announcement.

Sixth, firms can obtain higher payoffs from buys by developing acquisition experience. Experience enables firms to learn from their prior successes and failures (Levitt and March 1988). Consider the success of Cisco, which is attributed to its team of well-practiced executives and a well-tuned acquisition screening, selection, and integration process (Goldblatt 1999).

Limitations

This study has several limitations that can be the basis of future research. First, we study the *announcements* about making, buying, and allying innovations—not the *events* per se. Indeed, there could be events in these strategies that are not announced. It is extremely challenging and complicated to obtain information about each event of a make, buy, or ally and its outcome. So a stream of research in marketing, strategy, economics, and finance, does treat the *announcement* of a make, buy, or ally as equivalent to the *event* (see Table 1). Second, the data do not include firms that are not listed on the American stock exchanges. Future research might explore whether the same results hold for such firms. Third, we do not control for confounding events as a result of competitors' activities. No previous studies in marketing, management, and finance have controlled for competitor events. Although this limitation increases the noise in the data, it does not bias any estimated coefficient. Fourth, the primary driver for a make, buy or ally may be the infeasibility of one or more of the other options. Although we do not explicitly model

this situation, we partly account for it by including prior choices and outcomes as independent variables in current choices. Fifth, we assume the efficient market hypothesis (EMH) for our empirical analysis. We acknowledge that EMH accepts that the amount of publicly available information about a firm or project can be limited and may vary across firms and projects. Sixth, our measure of an ally includes strategic alliances, joint ventures, and licensing agreements. This may be a good measure of an ally, but it is an imperfect measure of open innovation. Future research should consider richer measures for open innovation. Seventh, we do not know whether all three alternatives appear in the firm's consideration set while making the choice and whether the consideration set varies across decision points. Data limitations prevent us from measuring consideration sets. We assume that our panel of firms considers these choices at each point. Thus, our estimates may be considered conservative. All these remain promising avenues for future research.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mksc.2013.0818.

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