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The Choice Between Joint Ventures and Acquisitions: Insights from Signaling Theory

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This paper extends information economics in corporate strategy and organizational governance research by using signaling theory to explain firms' market entry modes. We exploit features of the initial public offering (IPO) context to investigate how signals on newly public firms shape other companies' governance choices to form joint ventures with them versus acquiring them. We also develop theoretical arguments on how the value of these signals will vary across exchange partners. The results reveal that companies are more apt to acquire, versus partner with, IPO firms taken public by reputable investment banks compared with IPO firms associated with less prominent underwriters. Venture capitalist backing also appears to be a valuable signal for prospective acquirers, particularly when the acquirer and target reside in different industries and possess dissimilar knowledge bases. We also present evidence that signals affect target selection and the emergence of market segmentation for joint venture partners and acquisition candidates.

Key words: signaling theory; joint ventures; alliances; acquisitions

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Introduction

One of the most important judgments a firm can make concerning its collaborative strategy is whether or not a given alliance is an efficient governance choice relative to alternatives such as an acquisition (e.g., Dyer et al. 2004). Scholars have explicated some of the criteria derived from transaction cost economics and other theories that can guide such boundary-of-the-firm decisions (e.g., Williamson 1991, Wang and Zajac 2007). Transaction cost research typically uses market-mediated exchange as the default governance arrangement and identifies market failures stemming from ex post opportunism to justify hierarchical governance structures. Similarly, alliance research routinely takes mergers and acquisitions (M&A) as the baseline organizational form and identifies various inefficiencies associated with acquisitions that alliances can help relieve, including integration costs (e.g., Hennart and Reddy 1997, Yin and Shanley 2008).

Information economics applications in corporate strategy have complemented transaction cost research on organizational governance structures' ex post hazards by emphasizing the ex ante hazards surrounding M&A deal making. For instance, a seller often possesses private information on its resources and faces difficulties in credibly conveying its resources' value (Ravenscraft and Scherer 1987). For its part, a buyer can find it difficult to evaluate the target's resources to ensure that it captures value from a deal (e.g., Puranam et al. 2006, Capron and Shen 2007). Joint ventures can be useful under these

conditions because they pool together resources on a piecemeal, experimental basis and offer the possibility of sequential investment; joint ownership allows firms to share overpayment risk rather than making lump-sum payments; and the threat of termination and shared control can facilitate knowledge sharing (e.g., Mitchell and Singh 1992, Balakrishnan and Koza 1993, Higgins and Rodriguez 2006). Although research using information economics in the alliance domain has focused on equity joint ventures (e.g., Balakrishnan and Koza 1993, Hennart and Reddy 1997), other forms of alliances can also be useful to reduce overpayment risk. However, some of these other forms of alliances do not entail the same firsthand access to a firm's resources (e.g., minority equity partnerships), and other alliance forms do not have some of the governance properties of joint ventures (e.g., incentive alignment through shared ownership and control through a joint board) that facilitate knowledge transfers (e.g., nonequity alliances).

Although the alliance literature has noted the general usefulness of joint ventures to cope with adverse selection surrounding acquisitions, this body of research has not accounted for a number of alternative solutions that can work as substitutes to joint ventures and therefore facilitate acquisitions over joint ventures at the margin (e.g., Dewally and Ederington 2006). In this paper, one of our main objectives is to bring signaling theory into the literature on firms' market entry modes (e.g., Spence 1974; see Riley 2001 for a review). Our theory development suggests that signals on target firms can help

reduce adverse selection problems and thus allow parties to use acquisitions rather than resort to joint ventures or even avoid a transaction altogether. We also develop the argument that the value of signals will vary across exchange partners and will therefore be context-dependent. Specifically, we suggest that the impact that signals have on firms' decisions to partner or acquire will be more pronounced for diversifying entrants rather than direct rivals because the former confront greater information asymmetries.

Our research hypotheses and analyses exploit features of the initial public offering (IPO) context to use signaling theory and investigate firms' decisions to partner with or acquire newly public firms. As we will discuss, several characteristics of IPO firms convey important signals on issuing firms that can be valuable to other organizations. Our study builds on recent research that has examined IPO firms' associations with reputable investment banks and venture capitalists (e.g., Ragozzino and Reuer 2007, Arikan and Capron 2010), and we suggest that the information generated on IPO firms can spill over to the market for exchange partners and have efficiency implications for such transactions. By showing how IPOs can affect firms' corporate development activities and their organizational governance choices, our study underscores several interesting opportunities to connect IPOs with the research agenda in corporate strategy. For the joint venture literature in particular, our study demonstrates how signaling can affect a firm's decision to partner or acquire. Although prior research on alliances using information economics has focused on the joint venture versus acquisition decision, in additional analyses we also consider whether other forms of alliances such as nonequity alliances and minority equity partnerships might also substitute for the signals we study (e.g., Vanhaverbeke et al. 2002). In addition, research on firms' market entry choices has examined the determinants of certain governance choices (joint venture versus M&A, make versus buy, license versus foreign direct investment, etc.), conditional on some exchange occurring. We contribute to this literature by showing how the absence of signals can lead to neither joint ventures nor acquisitions occurring, so information economics, and signaling theory in particular, helps account for selection processes in such markets.

Theoretical Background

George A. Akerlof, A. Michael Spence, and Joseph E. Stiglitz shared the Nobel Prize in economics in 2001 for their work showing how information asymmetries across exchange parties can adversely affect the efficiency of various markets (durable goods, labor, financial services, etc.). Since their seminal studies in the 1970s (Akerlof 1970, Spence 1974; see Stiglitz 2002 for a review), these ideas have been widely used in research

in many of the functional areas in business, as well as in the public policy sphere (see Stiglitz 2002 for a review). Although the research in corporate strategy and management that has benefited from, or might benefit from, the insights of Akerlof, Spence, and Stiglitz is considerable, this literature has paid less attention to information economics than other areas of organizational economics such as transaction cost economics and agency theory. Thus, it might be useful at the outset to briefly classify extant research that has used this theoretical lens, as well as mention how information asymmetries across various types of actors have been found to have an impact on firm behavior and performance.

A number of studies have focused on the private information held by *managers in relation to investors*. For instance, management scholars have recently examined how various activities by firms, such as name changes (Lee 2001) or insider trading in R&D-intensive firms (Ahuja et al. 2005), convey market signals to outside investors. Other research in finance has observed that some firms are constrained in the investments they can make as a consequence of information asymmetries between managers and investors (e.g., Fazzari et al. 1988). Other studies have examined information asymmetries between *firms and customers*, and information asymmetries crop up in a range of other contracting situations. Nayyar (1990), for instance, notes that because information asymmetries impose costs on customers, service firms have an incentive to use their reputations and diversify into related services in order to reduce these costs and gain a competitive advantage. A third set of studies has investigated the implications of asymmetric information *across firms* engaged in corporate deal making, and this stream of research is closest to the present study. For instance, Coff (1999) examined several ways that acquirers cope with asymmetric information in M&A, including offering lower premia, avoiding lump-sum cash payments, and seeking more information on targets, all of which offer different benefits as well as costs. Other studies in finance and economics have considered how buyers and sellers can design M&A contracts in order to address asymmetric information (e.g., Kohers and Ang 2000). Prior research has also examined whether asymmetric information associated with diversifying transactions leads firms to choose a joint venture over an acquisition, based on the reasoning described above (e.g., Hennart and Reddy 1997).

Two conclusions that are germane to our study follow from this brief literature review. First, each of these research streams has considered several solutions to the problems presented by asymmetric information, but the solutions investigated in one stream have, in many cases, not been studied in the others. Thus, one of our specific objectives is to examine whether signals influence firms' decisions to engage in joint ventures versus M&A. Second, the three research streams

discussed above have investigated many different solutions to asymmetric information (contracting, ownership sharing, reputation, signaling, etc.), but these remedies have typically been examined in isolation (cf. Dewally and Ederington 2006). Given that these solutions potentially operate as substitutes in addressing the problem of adverse selection, it is valuable to consider more than one remedy at once and investigate this possibility. Therefore, one of our objectives is to examine whether signaling reduces the need for ownership sharing (i.e., joint ventures) in the external corporate development setting.

Research Hypotheses

Signaling by IPO Firms

Evidence suggests that initial public offerings produce substantial information on IPO firms in general and might also have efficiency consequences for M&A markets involving these firms as targets (e.g., Pagano et al. 1998). Firms are routinely “picked off” shortly after going public, and some private firms use a “dual tracking” strategy of going public prior to a sale (e.g., Field and Karpoff 2002, Brau and Fawcett 2006), and this phenomenon suggests important new connections between IPOs and M&A in the corporate strategy literature.

Not only can the process of going public generally reduce information asymmetries in the M&A market, but the IPO context is rich in signaling opportunities that can also help reduce the problem of adverse selection for firms seeking to acquire particular targets that have gone public (Ragozzino and Reuer 2007). Indeed, prior research suggests that there is considerable heterogeneity among IPO firms on the signals they convey to others (e.g., Sanders and Boivie 2004). Previous studies in finance have also identified specific features of IPOs that can convey signals, such as the underpricing of shares (e.g., Welch 1989) or lockup provisions that affect share retention (e.g., Brav and Gompers 2003). Given the large number of possible signals on IPO firms as well as our interest in examining contingencies affecting the value of signals, we sought to be selective in choosing signals for our theory development, focusing specifically on signaling variables that are closely tied to the IPO process, that are extensively used in the IPO literature, and that have received recent interest and research attention in the management literature (e.g., Gulati and Higgins 2003, Pollock and Gulati 2007, Arikan and Capron 2010).

We chose to focus on firms’ relationships with venture capitalists (VCs) and reputable investment banks for these reasons, as well as for several additional theoretical reasons. Both of these signals share similarities with our key dependent variable (i.e., use of a joint venture) in representing forms of interorganizational relationships with the IPO firm. These variables have also

been argued to be important signals of IPO firm quality. For instance, research has suggested that having a reputable underwriter is one of the most important signals of an IPO firm’s quality (e.g., Carter and Manaster 1990, Stuart et al. 1999) and that underwriter reputation captures other signals of the firm’s quality, such as various prominent upper echelon affiliations (Higgins and Gulati 2003). Similarly, prior research on the short- and long-run performance of newly public VC-backed firms has established the importance of this variable as a signal, because VCs are selective in the firms in which they invest (e.g., Megginson and Weiss 1991, Gompers and Lerner 2004), as we discuss below.

Investment Bank Reputation. Associations between reputable investment banks and IPO firms not only send important signals to equity investors when a firm goes public, but they lead to a sorting of IPO firms that can also benefit exchange partners in the M&A market, owing to at least two related mechanisms.

First, in an attempt to obtain a higher offering price, high-quality firms are willing to pay for the services of the most reputable underwriters in order to differentiate themselves from other issuers. Going public represents a one-shot transaction for firms, so they have an incentive to behave opportunistically in representing themselves to investors. Anticipating this behavior, investors would discount the firm’s stock price accordingly at the time of the offering. By contrast, prominent investment banks engage in substantial repeat business, and future IPOs effectively cast a shadow of the future on their behavior in the focal IPO. High-quality issuers therefore bond themselves to prominent underwriters or borrow their reputations to curb opportunism (e.g., Riley 2001), which in turn enables higher-quality firms to obtain higher prices (Draho 2004).

Second, the most prominent investment banks also engage in risk signaling, whereby they seek to take public firms that present less risk to their accumulated reputation capital (Carter and Manaster 1990, Gulati and Higgins 2003). Sorting of IPO firms therefore also arises because the most reputable investment banks have an incentive to screen out firms that are more speculative or expose the firm to legal liabilities (Tiniç 1988, Beatty and Welch 1996).

The fact that higher-quality IPO firms have an incentive to associate with prominent underwriters, and vice versa, suggests that prospective exchange partners can use these interorganizational ties when making decisions on whether to target them for a deal as well as whether to partner with or acquire them. Given the sorting process described above, the risk of adverse selection is likely to be most severe for firms that are associated with the least reputable underwriters upon going public, and no transaction might take place for such firms. For transactions that do occur, IPO firms associated with prominent

underwriters are less likely to pose a risk of adverse selection, so the buyer will be better able to proceed with an acquisition rather than a joint venture. By contrast, for IPO firms experiencing transactions and that are associated with less reputable underwriters, joint ventures will be more efficient than acquisitions given some of their properties that reduce the risk of adverse selection (e.g., limited, sequential investment; resource pooling; incentive alignment; shared control). We therefore hypothesize the following.

HYPOTHESIS 1 (H1). *The likelihood that an IPO firm experiences either a joint venture or an acquisition will be positively related to the reputation of the IPO firm's investment bank.*

HYPOTHESIS 2 (H2). *The likelihood that a firm chooses to joint venture with a newly public firm rather than acquire it will be negatively related to the reputation of the IPO firm's investment bank.*

Venture Capitalist Backing. Just as IPO firms' associations with investment banks can offer signals that spill over from the IPO market to the market for exchange partners, we hypothesize that IPO firms' relationships with venture capitalists can also shape other firms' market entry decisions and governance choices. Although nearly all firms are taken public by an investment bank, a great many firms go public without the backing of venture capitalists. As a result, our prediction for the signals attached to VC backing focuses on the presence or absence of a venture capitalist at the time a firm goes public (e.g., Brau et al. 2010).

Previous studies have discussed a number of ways in which venture capitalist backing can signal quality, and the arguments in many ways parallel the logic above. First of all, venture capitalists are very selective in making investments in businesses. Megginson and Weiss (1991), for instance, report that venture capitalists typically fund less than 1% of the proposals they receive. When they do invest, VCs typically make important resource commitments to the firm, on average holding 34% of the firm at the time of an IPO (Gompers and Lerner 2004). Even after the IPO, venture capitalists tend to hold equity in the issuing firm and provide access to capital, either directly or through their network of financial intermediaries (e.g., Gompers and Lerner 2004). These costly activities are also consistent with VCs' selectivity in making investments in new ventures. Compared with investment banks, venture capitalists often have longer relations with issuers, and some venture capitalists also specialize by industry, which lends weight to their investment decisions (e.g., Jain and Kini 1995). If IPO firms backed by VCs present less risk of an adverse selection, then such IPO firms are more likely to experience a deal, and the deal is more likely to take the

form of an acquisition rather than a joint venture, compared with firms that lack such associations with venture capitalists. Paralleling the above two hypotheses for IPO firms' associations with reputable underwriters, we therefore posit the following.

HYPOTHESIS 3 (H3). *The likelihood that an IPO firm experiences either a joint venture or an acquisition will be higher for an IPO firm with venture capitalist backing than for other IPO firms.*

HYPOTHESIS 4 (H4). *The likelihood that a firm chooses to joint venture with a newly public firm rather than acquire it will be lower for an IPO firm with venture capitalist backing than for other IPO firms.*

Exchange Partners in the M&A Market

The above hypotheses portray signals conveyed by IPO firms as valuable to all potential exchange partners, yet the impact of these signals is apt to vary across prospective acquirers. For example, for certain exchange partners with little or no knowledge of the IPO firm's resources and prospects, signals can be beneficial in reducing the risk of adverse selection and therefore in facilitating an acquisition over a joint venture at the margin. For other exchange partners who already have significant familiarity with the IPO firm's capabilities or are in a better position to evaluate its resources and prospects, the fact that the IPO firm is associated with a prominent underwriter or venture capitalist will have less impact on the risk of adverse selection and, thus, the selected governance structure. Thus, information economics indicates that the value of signals is heterogeneous across exchange partners.

There are likely to be a number of factors that could moderate the above relationships and potentially bound the value of signals, yet prior information economics research would suggest that differences in the knowledge bases of exchange partners represent an important consideration shaping the benefits that signals can offer to decision makers. Indeed, studies that have utilized information economics in the context of joint ventures and acquisitions have all focused on the relatedness of the firms engaged in these transactions to discuss the risk of adverse selection, the efficiency of the due diligence process, and the value of other remedial mechanisms. For instance, in intraindustry deals, prospective acquirers are more likely to be familiar with the IPO firm's resources and prospects (e.g., Montgomery and Hariharan 1991), so they are able to conduct due diligence on the target more efficiently and signals will add less value. By contrast, in interindustry deals in which the parties' knowledge bases are dissimilar, the potential acquirer tends to be in a disadvantageous position in evaluating the issuer (e.g., Balakrishnan and Koza 1993), so signals can be particularly useful for such firms. This suggests that signals are more likely to substitute for joint ventures in

addressing the risk of adverse selection in interindustry deals in which the parties' knowledge bases are dissimilar compared with intraindustry transactions presenting less asymmetric information and a lower risk of adverse selection.

HYPOTHESIS 5 (H5). *The signaling effect of investment bank reputation on the choice between joint venture versus acquisition will be stronger for exchange partners with knowledge bases dissimilar to the IPO firm's.*

HYPOTHESIS 6 (H6). *The signaling effect of venture capitalist backing on the choice between joint venture versus acquisition will be stronger for exchange partners with knowledge bases dissimilar to the IPO firm's.*

Methods

Sample

The base data for our study were drawn from the Security Data Corporation (SDC) database maintained by Thomson Financial. This database provides firm- and transaction-level information on firms' external corporate development activities as well as their financing activities. Separate modules exist, for example, on venture capital, the issuance of various securities, mergers and acquisitions, alliances, and so forth. The SDC database canvasses public information, including U.S. Securities and Exchange Commission filings, wire sources, news publications, trade sources, and so forth to obtain data on individual transactions.

We first examined all initial public offerings of common shares by U.S. firms during the 1986–2001 time frame. We excluded transactions involving real estate investment trusts, investment funds, equity carve-outs (i.e., offerings of units of diversified firms), reverse leveraged buyouts, and offerings by firms operating in the financial services sector. We then merged this information with data on alliances and acquisitions contained in separate modules of the SDC database. Given our focus on the entry mode choices of firms, and specifically their use of joint ventures versus acquisitions as alternative governance structures, we first sampled IPO firms that experienced a joint venture or were an object of an acquisition (e.g., Kogut and Singh 1988, Hennart and Reddy 1997). Other studies that have examined IPO firms as M&A targets have considered transactions occurring up to 10 years after the IPO (e.g., Mikkelsen et al. 1997). However, a trade-off exists between using a long time window to be more inclusive but for which IPO characteristics and information might not be relevant and using a short window that is more conservative yet restricts the sample. To balance these considerations and to be consistent with recent work on post-IPO acquisitions (e.g., Field and Karpoff 2002), we initially sampled the first joint venture (JV) or acquisition involving newly public firms up to five years after their IPOs.

A number of additional sampling screens were implemented for the alliance and acquisition transactions. In both cases the partner, or nonfocal firm, had to be a U.S. firm and a single operating company as opposed to an investor group. We also excluded other types of transactions that appear in the SDC database (buybacks, recapitalizations, acquisitions of remaining interests, bankruptcies, divestitures, etc.) as well as acquisitions that were announced but not closed. To address the heterogeneity of acquisitions and partners' motives, we excluded deals that were minority investments or that involved the acquirer purchasing additional equity in a firm in which it already maintained an ownership position. All of the sampled acquisitions involve the acquirer taking a controlling interest in the target (i.e., greater than 50%), and 95% of these transactions are full acquisitions. Parallel steps were also taken as applicable for the alliance transactions. Given that the literature upon which this study builds has focused on joint ventures rather than the many forms of nonequity collaborative agreements in which firms might be engaged (e.g., Balakrishnan and Koza 1993), our initial sample also focused on equity joint ventures and did not include various nonequity alliances such as licensing agreements, research collaborations, supply contracts, and so forth that have different theoretical characteristics. In supplemental analyses presented below, we investigate how the results generalize to these alternative forms of collaboration to ascertain whether IPO firms' signals also substitute for these types of alliances. We also limited our attention to two-partner joint ventures in order to enhance the comparability of the transactions and as a practical means of calculating the variables across joint venture and acquisition partners in a consistent fashion. As will be described below, after the IPO data were combined with the joint venture and acquisition data, we then merged these data with accounting and financial information provided by Compustat. After accounting for missing data, the base sample consisted of 343 transactions, 85% of which were acquisitions, and descriptive statistics appear in the Results section.

Measures and Analyses

Joint Venture vs. Acquisition. The dependent variable for the analyses used to test the hypotheses on the form of governance structure chosen is a dichotomous measure indicating whether the parties used a joint venture versus an acquisition as the market entry mode (e.g., Kogut and Singh 1988, Hennart and Reddy 1997). Thus, *Joint venture* equals 1 for joint ventures with newly public firms and 0 for acquisitions of newly public firms. The governance structure for each transaction was obtained from the SDC database.

We estimated probit models with sample selection to test H1 and H3 on the realization of joint venture or

acquisition transactions, as well as to safeguard against the possibility of sample selection bias in testing H2 and H4 on the types of governance structures that firms choose for realized deals. As previously noted, prior studies in the market entry mode literature and empirical transaction cost literature take as given some business opportunity or exchange and therefore focus on the determinants of the governance structure implemented for a focal transaction, conditional on the exchange being consummated. As a consequence, the estimated relationships between particular transactional attributes and firms' governance choices might reflect the possibility that only certain firms or types of transactions are actually observed. In our empirical context, for instance, firms that are of poorer quality or lack relevant signals might not be partnered with or acquired. The potential correlation between the unobserved selection process and the error term in previous governance choice models could lead to biased empirical estimates as a result. Results appear for probit models with sample selection using the full-information maximum-likelihood estimator and simultaneous estimation of equations (e.g., Van de Ven and van Praag 1981, Puhani 2000), and we also estimated two-step Heckman models and obtained the same interpretations.

We developed a sample selection equation by distinguishing IPO firms that were either partnered with or acquired from firms that did not experience such transactions. Variables that also appear in the probit model for the chosen governance arrangement (i.e., joint venture versus acquisition) are described below, and we incorporated a number of additional variables as regressors in the probit selection model. Although the selection model is formally identified through the nonlinearity of the sample selection correction, it is useful to select exclusion restrictions in order to enhance the precision and reliability of estimates in the governance structure model. Specifically, we incorporated several variables for the general visibility of the IPO firm as well as market conditions that might have a bearing on overall joint venture and acquisition investments by firms. We included the dummy variable *Major exchange* to indicate whether the IPO firm listed on the New York Stock Exchange or NASDAQ versus some other exchange, because stock market listings can enhance firms' visibility, relationships, and identities (e.g., Corwin and Harris 2001, Draho 2004). We noted that this variable is positively associated with whether or not the IPO firm experiences a deal ($r = 0.15$, $p < 0.0001$) but not whether realized transactions take the form of a joint venture versus acquisition ($r = 0.05$, not significant (n.s.)). We also included a count of the firm's *Pre-IPO alliances* because such relationships can make firms more visible to prospective exchange partners (Rangan 2000), and this variable was also positively related to whether a deal occurs ($r = 0.14$, $p < 0.0001$) but not the form it takes

($r = 0.03$, n.s.). To capture overall market conditions and investment opportunities (e.g., Ritter 1984, Lerner 1994, Baker and Gompers 2003), we controlled for the number of IPOs in the focal firm's industry in a given year (i.e., *Industry IPO volume*) as well as the number of transactions occurring in this industry (i.e., *Industry M&A volume* and *Industry JV volume*). All three of these variables are correlated with whether the IPO firm experiences a deal (all $p < 0.0001$), but only the level of joint venture activity in an industry is not significantly correlated with the second-stage dependent variable. Finally, we also included those variables described below that appear in the second-stage model that are definable when the firm goes public. Second-stage variables that are definable only for firms experiencing a joint venture or acquisition (the knowledge distance between two firms, the investing firm's acquisition experience, etc.) therefore do not appear in the first-stage selection model. Inclusion of our two core theoretical variables of backing by prominent underwriters or venture capitalists (i.e., *Investment bank reputation* and *Venture capitalist backing*, respectively) enables us to test H1 and H3 on the value of signals in facilitating transactions and how the absence of signals might contribute to the lack of joint ventures or acquisitions occurring.

We also analyzed firms that were not partnered with or acquired in a second way by constructing ordered probit models. For these analyses, the dependent variable assumes one of three values—no transaction (0), joint venture (1), and acquisition (2)—reflecting increasing levels of financial and other commitments by the exchange partner. We also estimated four-category ordinal models incorporating nonequity collaborations (i.e., no transaction (0), nonequity alliance (1), joint venture (2), and acquisition (3)) to indicate higher degrees of integration and commitment (e.g., Villalonga and McGahan 2005). The theory and hypotheses developed earlier would suggest that signals facilitate more commitment-intensive governance forms and that the lack of signals will result in less commitment or even no transactions at all taking place.

Independent Variables. Our first theoretical variable is the reputation of the lead investment bank that took the target firm public. We measured *Investment bank reputation* using the index initially developed by Carter and Manaster (1990). This measure is constructed based on the positions that investment banks occupy in tombstone announcements listing members of the underwriting syndicate, and it has been used widely in finance as well as in organizational research (e.g., Podolny 1994, Gulati and Higgins 2003). For banks that always appear in the highest bracket, a ranking of 9 is assigned, whereas investment banks receive lower rankings should their positions in successive tombstone announcements drop. We used the data on investment bank reputation from

Loughran and Ritter (2004) because they utilize expert knowledge for exceptional cases, cover a longer period of time, and update prior data sources to accommodate more recent transactions. Although firms often associate with underwriters years before the focal joint venture and acquisition decisions are carried out, and such associations are subject to different objectives by firms and banks, it is possible that such interorganizational relationships are outcomes of unobservable firm or other characteristics that might affect the influence this variable has on subsequent joint venture versus acquisition decisions by other firms. Thus, to address the potential endogeneity of the investment bank reputation variable, we estimated a two-stage model and performed a Smith–Blundell test for whether this variable was endogenous (Smith and Blundell 1986). Given that firm location has been shown to be correlated with the reputation of underwriters taking companies public as well as their associations with other financial intermediaries (e.g., Gompers and Lerner 2004), we incorporated indicator variables for California, Massachusetts, and New York in the first-stage model predicting underwriter reputation, and the first two variables were positively related to underwriter reputation ($p < 0.01$ and $p < 0.05$, respectively) but were unrelated to governance structure (i.e., joint venture versus acquisition) (both n.s.). We also followed Higgins and Gulati (2003) and included the previous alliances formed by the firm; this variable was also positively related to underwriter reputation ($p < 0.01$) but not the joint venture versus acquisition outcome (i.e., $r = 0.03$). A control for firm size was positive and significant ($p < 0.001$) in the first stage, but the level of IPO activity was insignificant. The chi-square value for the Smith–Blundell test was 1.004 (n.s.), which did not reject the null of exogeneity for the investment bank reputation variable.¹

The second theoretical variable is whether or not the issuing firm was associated with a venture capitalist at the time of the IPO. Specifically, *Venture capitalist backing* equals 1 if the issuer was backed by a venture capitalist, and 0 otherwise. Data for this variable were obtained from the new issues module of the SDC database. We also examined the possibility that the VC backing variable is subject to endogeneity concerns. Such associations might reflect unobserved heterogeneity, but the passage of time between the firm receiving VC funding and experiencing an acquisition or joint venture post-IPO, as well as the differences in motives involved (e.g., accessing growth capital versus complementary resources), likely reduces endogeneity concerns in our governance choice models compared with other models that would involve more proximate outcomes more directly tied to performance (new venture performance, IPO timing, etc.). We followed Baker and Gompers (2003) in using geographic location as an instrument for VC backing, and we also drew on

Gompers and Lerner's (2004) work to incorporate other determinants of VC backing, including interest rates (n.s.) and capital gains tax rates in a given year (negative and $p < 0.05$), as well as the number of rounds of VC funding flowing into the focal firm's industry in the year of its IPO ($p < 0.001$). Firms in California and Massachusetts are more likely to be backed by VCs ($p < 0.001$) but are no more or less likely to experience joint ventures versus acquisitions compared to firms located in other states. Firms are also more likely to be backed by VCs in industries receiving substantial VC funding ($p < 0.0001$), but this variable is not related to the joint venture versus acquisition decision. The self-selection term was insignificant in the second-stage treatment model as well as in joint venture versus acquisition models for subsamples of firms with and without VC backing, providing no evidence that the null of exogeneity could be rejected for this variable (Woolridge 2008).²

To examine how the signals of investment bank reputation and venture capitalist backing potentially vary in importance for intraindustry deals versus transactions involving parties with very different knowledge bases coming from disparate industries, we incorporated a measure of *Knowledge distance*. This variable was used to construct interaction terms with the signaling variables of backing by prominent underwriters as well as venture capitalists. The knowledge distance construct that we used was first introduced in corporate strategy research by Farjoun (1994) and has been subsequently utilized by other scholars in the M&A literature, partly to address limitations in using dummy variables for relatedness based on Standard Industrial Classification (SIC) codes. This variable measures the Euclidian distance between firms' industries based on their knowledge requirements, as proxied by their respective employment distributions. Data for the calculation of this variable are provided from the Occupation Employment Survey from the Bureau of Labor Statistics, which offers information on the distribution of employment across 823 occupational categories within industries at the three-digit SIC level. It is also valuable to control for the direct effects associated with intra- and interindustry transactions, not only because this variable has been used as the primary proxy for asymmetric information in corporate deals (e.g., Balakrishnan and Koza 1993, Hennart and Reddy 1997, Kohers and Ang 2000), but because this variable captures potential synergies, and firms might be more subject to ex post opportunism in joint ventures with competitors and therefore prefer acquisitions in intraindustry deals (e.g., Park and Russo 1996). Moreover, as noted below, because dummy variables constructed from exchange partners' SIC codes have frequently been used in prior research to proxy for asymmetric information, we also used their SIC codes to distinguish interindustry and intraindustry transactions as a robustness check.

Control Variables. We incorporated a series of controls for attributes of the IPO target firms and exchange partners that might be related to the explanatory variables discussed above as well as to the selected governance structure. At the target firm level, we first controlled for the IPO firm's growth opportunities because joint ventures are suited for sequential investment (Kogut 1991), and venture capitalists' investments are similarly geared for staged investment (e.g., Draho 2004). We measured the issuing firm's growth opportunities as its *Tobin's Q*, following the approach suggested by Chung and Pruitt (1994). Data for this measure were obtained from the Compustat data files. We next controlled for the target firm's underpricing, or its first-day stock returns, because underpricing can reflect uncertainty about the firm, as well as some of the different objectives held by issuing firms, venture capitalists, and investment bankers (e.g., Loughran and Ritter 2004, Heeley et al. 2007). *Target underpricing* was measured as the percentage change between the price at the close of trading on the first day and the IPO's offer price. Data for this measure were assembled from the SDC database. We also controlled for whether or not a lockup provision was in place at the time of the focal transaction (i.e., *Lockup provision*) because such agreements place restrictions on the disposition of shares and can reflect the presence of pre-IPO shareholders as well as signal quality (e.g., Brav and Gompers 2003). In supplemental analyses, we also examined the use, as well as the duration, of lockups at the time of firms' IPOs to address ownership changes by insiders at the time of the IPO as well as in subsequent time periods. Finally, at the target firm level we controlled for the IPO firm's performance and size at the time of the transaction. Low-performing firms may present more value creation potential to prospective acquirers (e.g., Capron 1999), and *Target performance* was measured as the IPO firm's return on assets. We controlled for the size of targets because those that are larger can present greater integration obstacles, leading firms to prefer joint ventures over acquisitions (Hennart and Reddy 1997). *Target size* was measured as its total assets in millions of dollars. To address significant positive skewness for this measure, we took the natural log of total assets. Data for these variables were obtained from Compustat.

At the level of the exchange partner, we incorporated controls for the non-IPO firm's acquisition experience as well as its alliance experience. Exchange partners that have significant acquisition experience are more likely to have developed acquisition management capabilities (e.g., Pennings et al. 1994) or possess other characteristics that might lead them to choose an acquisition over a joint venture at the margin. For similar reasons, we incorporated a control for the partner firm's experience with alliances. Specifically, we used the SDC database to track a firm's investments in alliances and acquisitions,

and we then counted the numbers of alliances (i.e., *Alliance experience*) and acquisitions (i.e., *Acquisition experience*) that the firm had during the five years preceding the focal transaction. Both measures exhibited significant positive skewness, and because firms can have zero acquisition experience or alliance experience, we transformed the count measures by taking the log of 1 plus the number of prior alliances or acquisitions, respectively. Finally, to address industry-level heterogeneity we incorporated a series of indicator variables for the sectors in which the issuing firms reside.

Results

Table 1 presents descriptive statistics for the sampled transactions as well as a correlation matrix. We noted that the incidence of joint ventures compared to acquisitions was lower in our sample (i.e., 15%) than in previous research on entry into international markets through joint ventures and acquisitions (e.g., Hennart and Reddy 1997, López-Duarte and García-Canal 2002). This variation can be attributed at least in part to differences in investment contexts. For instance, Hennart and Reddy (1997) examined Japanese firms' joint ventures and acquisitions into the United States during the 1970s and 1980s and found a higher incidence of joint ventures (i.e., 43%) for these firms following their previous export-led growth strategies. In addition, López-Duarte and García-Canal (2002) also found an incidence of JVs around 40% for Spanish firms conducting foreign direct investment (FDI), which can be attributed to the fact that their investing firms were entering into higher-risk host countries, were considerably smaller (mean sales of 533 million euros versus \$5.2 billion in our sample), and had less acquisition experience (mean of 0.97 in their sample versus 2.0 in ours), all of which favor joint ventures over acquisitions. The average size of targets was \$310 million in total assets, and the average first-day return for these firms was 32%. Larger targets tended to perform better after the IPO, as well as be associated with more reputable investment banks (both $p < 0.001$), which might reflect market segmentation in the services of investment banks as well as the scale economies associated with issuing equity. On the buy side, exchange partners engaged in 2 acquisitions and 11 alliances on average in the five years before the focal transaction. Roughly half of the transactions involved exchange partners with different primary businesses at the two-digit SIC level (i.e., 46%), but this pattern differed markedly across joint ventures and acquisitions ($\chi^2 = 22.5$, $p < 0.0001$). Specifically, 75% of the joint ventures involved parents from different primary businesses, whereas this percentage was 41% for acquisitions. Finally, 76% of the lead underwriters had a reputation score of 8 or 9 on a 9-point scale, and 59% of the targets were backed by a venture capitalist. Firms associated with reputable

Table 1 Descriptive Statistics and Correlation Matrix

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Joint venture	0.15	0.36										
(2) Acquisition experience	0.75	0.79	-0.25***									
(3) Alliance experience	1.23	1.32	-0.03	0.40***								
(4) Target size	4.59	1.36	0.13*	0.07	0.06							
(5) Target performance	-0.24	0.75	0.11*	0.05	-0.02	0.26***						
(6) Lockup provision	0.02	0.13	0.01	-0.03	-0.02	-0.06	-0.00					
(7) Target underpricing	0.32	0.61	-0.05	0.16**	0.20***	0.12*	-0.08	0.11*				
(8) Target Tobin's Q	3.27	5.26	0.08	0.13*	0.27***	-0.03	0.01	0.11*	0.34***			
(9) Knowledge distance	0.36	0.35	0.31***	0.05	-0.01	-0.01	0.08	-0.06	-0.03	-0.00		
(10) Investment bank reputation	7.79	1.72	-0.08	0.11*	0.03	0.45***	-0.04	-0.07	0.18***	0.07	-0.07	
(11) Venture capitalist backing	0.59	0.49	-0.21***	0.14*	0.28***	-0.16**	-0.09†	-0.07	0.17**	0.18***	-0.05	0.21***

Note. $N = 343$.

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

investment bankers also tended to be backed by venture capitalists ($p < 0.001$) and underprice more ($p < 0.01$) (Loughran and Ritter 2004). Although larger firms were more likely to be associated with reputable investment banks ($p < 0.001$), they were less likely to be backed by venture capitalists ($p < 0.01$). The correlations among some of the variables in Table 1 as well as the use of interaction terms led us to standardize continuous variables prior to the formation of multiplicative terms in the models.

Table 2 presents the multivariate results from the probit models with the sample selection used for hypothesis testing. Results from the models comparing joint ventures and acquisitions appear in the top panel, and estimates from the selection equations appear in the lower panel. In the top panel, positive parameter estimates indicate that increases in a variable increase the likelihood of joint venture *versus* acquisition. In the bottom panel, positive parameter estimates indicate that increases in a variable increase the likelihood of a joint venture *or* an acquisition rather than no transactions for the IPO firm. Column I reports estimates for the control variables, column II augments this baseline model with the two signaling variables of investment bank reputation and venture capitalist backing, and column III incorporates the interaction terms to investigate how the signaling variables vary in influence across exchange partners residing in industries with different knowledge requirements. The full model can classify 95% of the transactions correctly, which corresponds to a percent reduction in error of 67% over predicting acquisition for all observations (e.g., Hagle and Mitchell 1992).

Beginning with the results for the first-stage selection models, there is evidence that firms taken public by more reputable underwriters are more likely to experience a joint venture or acquisition, whereas firms taken public by less reputable investment banks are less likely to experience such transactions ($p < 0.001$ in columns I and III, and $p < 0.01$ in column II). This finding provides support for H1. It also appears that firms backed by venture capitalists are more likely to experience a joint

venture or acquisition compared with IPO firms lacking associations with VCs ($p < 0.01$ in columns I–III), offering support for H3.

Consistent with H2 and H4, the reputation of the issuer's lead underwriter and VC backing both decrease the likelihood of joint venture over acquisition (both $p < 0.01$). These findings support the idea that signals can substitute for joint ventures and enable firms to proceed with acquisitions at the margin. In interpreting the marginal effects of these variables, we examined the average marginal effect for all observations rather than the marginal effect at the average of the variables (e.g., Train 1986). Specifically, in column II the probability of joint venture declines by 6.1% when the firm is VC backed compared with non-VC backed ($p = 0.018$), and the probability of joint venture generally declines 4.2% with a one standard deviation increase in investment bank reputation ($p = 0.016$). We also followed Hoetker's (2007) suggestion to examine marginal effects for theoretically meaningful values of other variables. For instance, for intraindustry transactions, the average marginal effect for the VC variable is -4.8% ($p = 0.019$), and this effect is even stronger for less related transactions (i.e., -8.0%, $p = 0.017$, when the knowledge distance variable is at the 75th percentile). Contrary to H5, the negative influence of investment bank reputation on the decision to form a joint venture with, versus acquire, the target firm is invariant to whether the partner operates in the target's core business or is diversifying from an industry with very different knowledge requirements. Using graphical analysis and the procedure outlined in Ai and Norton (1998), we also observed insignificant marginal effects on the joint venture probability for the lion's share of observations. Lending support for H6, the negative effect of VC backing on the exchange partner's decision to joint venture with, versus acquire, the IPO firm is stronger when exchange partners come from industries with different knowledge requirements compared to exchange partners operating in the target's core business ($p < 0.001$). Analysis of marginal effects showed that this negative

Table 2 Determinants of Joint Ventures and Acquisitions

	I	II	III
Joint venture vs. M&A choice model ($N = 343$)			
<i>Intercept</i>	-1.81* (0.77)	0.98** (0.31)	1.02*** (0.23)
<i>Sector fixed effects</i>	Included	Included	Included
<i>Acquisition experience</i>	-1.22*** (0.25)	-0.55*** (0.15)	-0.50*** (0.08)
<i>Alliance experience</i>	0.13 (0.09)	0.06 (0.04)	0.09** (0.03)
<i>Target size</i>	0.16* (0.07)	0.06 (0.05)	0.06 (0.04)
<i>Target performance</i>	0.91† (0.53)	0.42† (0.22)	0.41* (0.16)
<i>Lockup provision</i>	0.42 (0.76)	0.31 (0.29)	0.27† (0.16)
<i>Underpricing</i>	-0.23 (0.27)	0.03 (0.15)	-0.00 (0.11)
<i>Target Tobin's Q</i>	0.08*** (0.02)	0.03* (0.01)	0.03** (0.01)
<i>Knowledge distance</i>	0.69*** (0.16)	0.31*** (0.10)	0.44*** (0.07)
<i>IB reputation</i>		-0.24** (0.06)	-0.23*** (0.05)
<i>VC backing</i>		-0.35** (0.12)	-0.30** (0.10)
<i>IB reputation* Knowledge distance</i>			0.00 (0.03)
<i>VC backing* Knowledge distance</i>			-0.33*** (0.08)
Selection equation variables ($N = 2,103$)			
<i>Intercept</i>	-1.38*** (0.20)	-1.49*** (0.18)	-1.46*** (0.16)
<i>IPO firm size</i>	-0.02 (0.03)	0.00 (0.03)	0.00 (0.03)
<i>IPO firm performance</i>	0.14 (0.13)	0.07 (0.12)	0.05 (0.11)
<i>Underpricing</i>	-0.17* (0.07)	-0.18** (0.07)	-0.18** (0.07)
<i>IPO firm Tobin's Q</i>	0.00 (0.00)	0.01 (0.00)	0.01† (0.00)
<i>Major exchange</i>	0.34** (0.13)	0.40*** (0.11)	0.38*** (0.08)
<i>Pre-IPO alliances</i>	0.08 (0.06)	0.08† (0.05)	0.08† (0.04)
<i>Industry IPO volume</i>	-0.06 (0.06)	-0.11* (0.05)	-0.12** (0.04)
<i>Industry M&A volume</i>	0.06 (0.05)	0.08† (0.04)	0.06† (0.04)
<i>Industry JV volume</i>	0.10* (0.05)	0.09* (0.04)	0.10** (0.04)
<i>IB reputation</i>	0.15*** (0.04)	0.13** (0.04)	0.13*** (0.04)
<i>VC backing</i>	0.22** (0.08)	0.23** (0.08)	0.24** (0.08)
Model χ^2	459.18***	477.21***	493.46***
Wald test of independent equations ($\rho = 0$)	0.38	9.96**	19.87***

Notes. Standard errors appear in parentheses. Top panel: positive coefficients indicate that increases in a variable increase the likelihood of a joint venture versus an acquisition. Bottom panel: positive coefficients indicate that increases in a variable increase the likelihood of either a joint venture or an acquisition after a company's IPO. IB, investment bank.

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

interaction was particularly significant for transactions with intermediate joint venture probability estimates.

Before presenting the results from our other analyses, the control variables deserve comment because they shed light on other theories of organizational governance and market entry modes. First, the acquisition experience of exchange partners is, as expected, negatively related to their choice of joint ventures over acquisitions of newly public targets ($p < 0.001$) (e.g., Pennings et al. 1994). Similarly, there is some evidence that firms with more alliance experience are more apt to joint venture with the IPO firm than acquire it ($p < 0.01$ in column III). Second, we also see some evidence that firms are more likely to joint venture with rather than acquire IPO firms that are large in size in absolute terms ($p < 0.05$ in column I) and might present greater structural integration challenges. To pursue this idea further, we examined a measure of the target's size (in total assets) divided by the partner's size for a subsample of observations for which firm size is known on both sides of the transaction. This variable took on a positive sign ($p < 0.01$), indicating that the larger the target's relative size, the greater the likelihood that the partner opts for

a joint venture rather than bearing the structural integration difficulties of acquiring a large firm (Hennart and Reddy 1997). Third, it is interesting that variables capturing financial aspects of the IPO that might also function as signals (e.g., underpricing and lockup provisions) were insignificant in the models we tested. Fourth, Tobin's Q has a positive coefficient ($p < 0.001$ in column I, $p < 0.05$ in column II, and $p < 0.01$ in column III), which is consistent with the view that joint ventures are attractive organizational arrangements to exploit the IPO firm's growth opportunities (Kogut 1991). Finally, the direct effect of the knowledge distance variable is positive and significant in all of the specifications ($p < 0.001$), indicating that firms are more likely to choose JVs over acquisitions when transacting with firms in industries with dissimilar knowledge requirements (cf. Balakrishnan and Koza 1993, Hennart and Reddy 1997).

We performed a number of analyses to examine the robustness of the results and to explore the generalizability of the findings to alternative forms of collaborative agreements (results are available from the authors upon request). First, as discussed earlier, the sample is composed of joint ventures and acquisitions occurring

up to five years after a target firm's IPO. We noted that selecting a cutoff value for this time window involves a trade-off between incorporating more transactions by lengthening the time frame versus including corporate investment decisions after the signaling effects of the going-public event are apt to be at work. To examine the time lag between the acquisition or joint venture transaction and the firms' IPOs, two additional steps were taken. We first conducted subsample analyses utilizing shorter or longer time frames. Results from models employing four-year time windows yielded the same interpretations as those presented above. When the time frame was reduced to three years, the investment bank reputation variable continued to be significant ($p < 0.01$), and the coefficient estimate for the venture capitalist backing variable was negative but failed to reach significance, perhaps because of the loss in statistical power (i.e., the sample size was reduced by 29%). To determine whether the signaling variables decayed in influence, we formed interaction terms between the signaling variables and a measure of the time elapsed between the IPO and the acquisition or joint venture transaction. The insignificance of these interactions suggested that the influence of these signaling variables is not contingent upon the time since going public. However, when we incorporated transactions as late as six or seven years after the IPO event, the direct effects of the signaling variables became insignificant, which is consistent with the diminishing importance of signals and the natural accumulation of information on IPO firms.

Second, although prior theoretical applications of information economics to firms' entry mode choices have focused on equity joint ventures (e.g., Balakrishnan and Koza 1993, Hennart and Reddy 1997), we also sought to test whether the interpretations offered above extend to other forms of alliances. We first wanted to examine minority equity partnerships, in which the firm takes on an ownership stake of less than 50% in the IPO firm in its entirety. Such investments can be useful in reducing adverse selection because they allow firms to share overpayment risk via ownership sharing. However, such equity alliances lack other features of joint ventures that can be helpful in reducing asymmetric information in a more direct manner. These include the piecemeal pooling of assets in a distinct business, putting in place a board over a separate business entity, and sharing knowledge in a more intensive fashion through greater involvement at an operational level. We observed 103 minority equity partnerships involving IPO firms, and in models comparing this form of equity alliance with acquisitions of IPO firms, the investment bank reputation variable was always negative as above ($p < 0.001$), but the venture capitalist backing variable was insignificant. One explanation for this finding is that VC backing does not substitute for minority equity partnerships because VCs tend to have a longer association with the firm, often

specialize by industry, and are more intimately involved in the firm's operations. By contrast, in minority equity investments firms take a limited financial stake in the firm, often do not even have a seat on the partner's board (Robinson and Stuart 2007), and do not seek direct operational involvement or the pooling of assets that are characteristic of joint ventures.

We next wanted to examine whether the results and interpretations presented above extend to nonequity alliances involving IPO firms. Similar to minority equity partnerships, nonequity alliances can enable the firm to reduce overpayment risk because they can entail limited financial commitments. Like equity joint ventures, nonequity alliances often involve interaction at an operational level, although they do not have certain governance properties that can provide incentives and monitoring to facilitate information sharing (e.g., shared ownership and enhanced control through a joint board). We observed 477 nonequity alliances for the sampled IPO firms, and in models comparing such transactions to M&A deals, we noted that backing by both reputable investment banks as well as venture capitalists reduced the likelihood of nonequity alliances over acquisitions ($p < 0.05$ and $p < 0.001$, respectively). As such, it appears that nonequity alliances are a closer substitute for the VC backing signal than are minority equity partnerships. However, we did not find evidence that the effects of VC backing are stronger for entrants with dissimilar knowledge bases coming from very different industries.

Third, we wanted to explore whether the two signals that are the focus of our analyses work as substitutes. Specifically, does the fact that a firm is taken public by a prominent underwriter reduce the potential value of the firm being backed by a venture capitalist (or vice versa)? To investigate this issue in our context of corporate development activities involving IPO firms, we formed interaction terms between the investment bank reputation and venture capitalist backing variables in all of the models estimated. In none of them did we find evidence that the signals operate as substitutes; these interactions were always insignificant.

Finally, we investigated alternative modeling and measurement approaches to explore the sensitivity of the findings presented above. We first used the traditional approach in the market entry and organizational governance literatures by estimating standard probit models without the sample selection equations. The determinants of firms' governance choices, conditional on an exchange occurring, were qualitatively similar to the interpretations above from probit analyses with sample selection. Next, given the investing firms' greater tendency to employ acquisitions rather than equity joint ventures for IPO firms in general, we investigated alternative probability models in order to determine whether potential asymmetry in the distribution function might

affect our interpretations (e.g., Long 1997). In particular, we specified the models using a complementary log-log estimator that assumes an extreme value distribution for the errors, which yielded similar interpretations. Finally, because prior research on joint ventures using information economics has employed an indicator variable to differentiate intra- and interindustry deals using SIC data rather than using the continuous knowledge distance measure (e.g., Koh and Venkatraman 1991, Hennart and Reddy 1997, Kohers and Ang 2000), we also reestimated the models using this indicator. We again found that investing firms exhibit a preference for joint ventures over acquisitions for diversifying transactions compared with investments in their primary industry ($p < 0.001$), whether interindustry deals were defined at the two-, three-, or four-digit level.

Table 3 offers the results for the ordered probit models. Columns I and II present three-category models for no transactions, joint ventures, and acquisitions. Column I incorporates control variables available for IPO firms at the time they went public, irrespective of whether or not they were partnered with or acquired.

Column II includes the two signaling variables of investment bank reputation and venture capitalist backing. Columns III and IV present four-category models that incorporate nonequity alliances when forms of investment are arrayed in increasing order of commitment and integration: no transaction, nonequity alliance, joint venture, and acquisition. The ordered probit results appearing in Table 3 offer evidence consistent with the findings above: the likelihood of more commitment-intensive forms of governance increases when the IPO firm is taken public by a more reputable investment bank (i.e., $p < 0.001$ in column II and $p < 0.05$ in column IV) or is backed by a venture capitalist (i.e., $p < 0.001$ in both models).

Discussion

Implications and Contributions

Taken together, the results provide support for the extension of signaling theory to the corporate strategy setting, reveal that signals can substitute for other remedies such

Table 3 Ordered Probit Models

	I	II	III	IV
	DV: 0 = no transaction 1 = JV 2 = acquisition		DV: 0 = no transaction 1 = nonequity alliance 2 = JV 3 = acquisition	
Independent variables				
Cutpoint estimates				
θ_1	-0.77*** (0.13)	-0.59*** (0.17)	0.06 (0.10)	0.11 (0.12)
θ_2	0.25*** (0.03)	0.26*** (0.03)	-0.93*** (0.04)	-0.95*** (0.04)
θ_3			-1.12*** (0.04)	-1.14*** (0.04)
Controls and theoretical variables				
<i>Sector fixed effects</i>	Included	Included	Included	Included
<i>IPO firm performance</i>	-0.09 (0.14)	0.10 (0.15)	-0.17* (0.08)	-0.08 (0.08)
<i>IPO firm Tobin's Q</i>	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)
<i>IPO firm size</i>	0.05 [†] (0.03)	-0.05 (0.04)	0.03 (0.02)	-0.02 (0.03)
<i>Lockup provision</i>	-2.02*** (0.13)	-2.01*** (0.13)	-1.65*** (0.07)	-1.61*** (0.07)
<i>Underpricing</i>	-0.08 (0.08)	-0.16 [†] (0.09)	-0.05 (0.05)	-0.09 [†] (0.06)
<i>IB reputation</i>		0.24*** (0.07)		0.10* (0.05)
<i>VC backing</i>		0.48*** (0.09)		0.35*** (0.06)
Model χ^2	549.63***	849.95***	786.88***	837.63***
N		1,572		2,087

Notes. Standard errors appear in parentheses. Positive coefficients indicate that increases in a variable are associated with an increase in the level of commitment and integration. IB, investment bank.

[†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

as joint ventures and other forms of alliances to the problems presented by asymmetric information in the M&A context, and show how the effects of certain signals are heterogeneous across exchange partners. Consistent with the predictions of information economics, the evidence also demonstrates that exchanges such as joint ventures or acquisitions are less likely to occur at all when signals on IPO firms are lacking. When investigating potential signals that might be valuable for firms seeking to acquire or partner with newly public firms to tap into their resources or opportunities, we focused on venture capitalist backing as well as associations with prominent underwriters. These signals are closely tied to the process of going public, they represent interfirm relationships serving as endorsements that capture important institutional features of the IPO process, and they have recently attracted the research attention of scholars in strategy and management. The theory suggests that because segmentation arises in markets for these intermediaries' services (e.g., the most prominent underwriters or VCs are apt to be associated with higher-quality issuers), prospective acquirers can use these relationships in vetting M&A targets and making organizational governance and market entry mode choices.

We also used signaling theory to develop the argument that the value of these signals is not likely to be uniform across exchange partners, but it is a function of their familiarity with the focal firm's resources and their ability to evaluate its capabilities and prospects efficiently. The empirical evidence suggests that the signaling effects of VC backing appear to be more sensitive to these considerations than are the effects of relations with reputable investment banks. The fact that the effects of VC backing are context-dependent and those of investment bank reputation are not might reflect several considerations. As a practical matter, investment banks are involved in nearly all IPOs, and we have information on the reputation of individual underwriters, whereas many firms go public without the backing of VCs, and we only have information on the presence or absence of VCs. Moreover, venture capitalists tend to have longer associations with IPO firms, are more intimately involved with their portfolio companies, and often specialize by industry. This suggests that they are apt to have more detailed industry- and firm-specific information when selecting and reinvesting in firms. Such signals are expected to be particularly relevant for diversifying entrants compared to prospective acquirers operating in the same line of business. Finally, beyond these efficiency considerations, it is possible that IPO firms stand to gain from the endorsements and legitimacy of the most prominent underwriters, even when the issuing firm is ultimately acquired by a direct rival.

This study extends prior research on firms' external corporate development activities and IPOs in several ways. To understand the value of viewing IPOs within an

extended process of external corporate development, it is useful to situate our study historically within the corporate strategy literature. The earliest research on joint ventures or acquisitions considered their benefits in isolation from each other. This research stream highlighted benefits, such as synergies, access to resources, market power, and so forth, that both joint ventures and acquisitions might provide. More recently, this literature has advanced by framing the decision to partner in explicitly comparative terms, and many of the studies used transaction cost economics to understand when firms use joint ventures versus acquisitions. The value of bringing IPOs to the literature on organizational governance and market entry modes is evident once signaling theory and interdependencies across these financing and investment decisions are considered.

This study also contributes to the stream of work on strategic alliances in several ways. As discussed in the introduction, much of the current research on interorganizational relationships has focused on important ex post exchange hazards (e.g., holdup, moral, knowledge misappropriation) that firms encounter, as well as the formal and relational governance mechanisms at their disposal to address these hazards (e.g., Hoetker and Mellewigt 2009, Li et al. 2010). Less research has used information economics to attend to the ex ante exchange hazards posed by asymmetric information in acquisition deals that alliances can help relieve, and our study extends this stream of research by examining the impact of various signals that can mitigate adverse selection and thereby substitute for joint ventures. There are likely to be other remedies to the risk of adverse selection, and research that examines how these remedies substitute for one another would be valuable. For instance, it is possible that networks or geographic proximity might alter information flows or have an impact on the credibility of a target's claims in such a way that other methods of information production or asocial remedies to these problems are unnecessary. It is also likely that there are many other ways that both private and newly public firms can signal their quality to prospective acquirers. Although we do not find evidence that financial aspects of IPOs such as lockups or underpricing work as signals, it would be valuable to expand the types of signals considered (e.g., Certo 2003), and our study has also only begun to explore some of the contingencies shaping the value of signals in different market contexts.

Our study is also unique in its simultaneous analysis of the determinants of both exchanges that do or do not occur as well as of the governance choices firms make for exchanges that do transpire, and this approach could be used more broadly in research on firms' market entry and governance choices (alliance versus acquire, make versus buy, FDI versus license, acquisition versus Greenfield, etc.). For example, it would be interesting for studies employing other theories such as transaction

cost theory or the resource-based view to determine whether these theories not only explain firms' governance choices for exchange relationships that actually go forward but also can address earlier search and selection considerations that have a bearing on efficiency and on the transactional attributes of observed exchange relationships.

Finally, our research revisits the mixed evidence on firms' choices to partner versus acquire in intra- and interindustry transactions and their performance implications (e.g., Koh and Venkatraman 1991, Balakrishnan and Koza 1993, Hennart and Reddy 1997, Reuer and Koza 2000, Villalonga and McGahan 2005). We tested the relationship between product–market relatedness and governance in the setting of newly public targets, and the evidence supports the prediction from information economics that firms are more likely to choose joint ventures over acquisitions in interindustry transactions compared with horizontal deals.

Limitations and Future Research Directions

Apart from the avenues for research previously mentioned, the present study has a number of limitations that future research could address. First, extensions could consider a number of important generalizability issues. For example, we have focused exclusively on initial public offerings and have not considered equity carve-outs, which involve the issuance of equity by divisions of established, public firms. Many of these carved-out units are sold or repurchased after going public (e.g., Vijh 2002), so questions arise as to whether similar information spillovers and consequences exist for such deals. It is also worth emphasizing that our study is limited to two-partner joint ventures and purely domestic deals, so extensions could examine whether the findings apply to other forms of alliances, collaborations involving more partners, or cross-border transactions.

Second, our research has contributed to empirical research on IPOs as well as market entry modes by devoting attention to endogeneity and sample selection issues. However, we have investigated multiple types of endogeneity and sample selection independently rather than simultaneously because the governance choice dependent variable is discrete (Wooldridge 2008, p. 571). Moreover, it might be possible that there are other sources of sample selection and endogeneity than we have investigated because new ventures progress through multiple stages of development, and these may reflect founder preferences or other considerations earlier in the development of firms. Such issues might affect the analyses of organizational governance of private firms (e.g., JV versus acquisition) and might be evident when other outcome variables are examined in future studies using signaling theory.

Finally, there are interesting sources of heterogeneity in acquisitions that might be examined in detail to

investigate adverse selection in M&A as well as remedies other than joint ventures. For instance, although joint ventures can directly reduce information asymmetries through knowledge transfers, firms can implement other solutions in M&A to cope with the effects of asymmetric information. Examples include paying with stock rather than cash or devising a contingent contract that ties payments to the target's performance, or social remedies such as relying on networks or trust. It is noteworthy that empirical applications of information economics typically focus on a single remedy to adverse selection at a time rather than enumerating the full gamut of solutions for a particular exchange. However, the challenge for decision makers is precisely to choose among a set of remedies that may have distinct merits or drawbacks for firms in different corporate investment situations and might substitute for one another. Research in directions such as these could enhance information economics in general as well as signaling theory in particular alongside other theories of organizational governance and firms' market entry modes.

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Endnotes

¹In addition, we estimated Heckman models by dichotomizing this variable into high and low categories, but the self-selection term was insignificant in the second-stage treatment model as well as in second-stage joint venture versus acquisition models for high and low investment bank reputation subsamples, again suggesting that the null of exogeneity could not be rejected (Wooldridge 2008). We also used the same approaches to address whether the underwriter reputation variable is endogenous in the model for whether a joint venture or acquisition versus no deal occurred. The Smith–Blundell test provided no evidence of endogeneity (i.e., $\chi^2 = 1.55$, n.s.), and the self-selection term was insignificant in treatment models as well as subsamples based on underwriter reputation scores.

²We also examined the potential endogeneity of the VC backing variable in models differentiating IPO firms that experienced a joint venture or acquisition versus those subject to neither deal, and the self-selection term was insignificant in a treatment model as well as subsample analyses for VC-backed and non-VC backed firms.

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