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Investors' Reactions to Alliance-Engendered Acquisition Ambiguity: Evidence from U.S. Technology Deals

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ABSTRACT We study how, when target firms are engaged in strategic alliances, the ambiguity surrounding an acquisition's anticipated synergies influences investors' reactions to announcements of acquisitions. Drawing on behavioural finance research and the resource redeployment literature, we predict that investors' limited access to the information encoded in the target firms' alliances and the uncertainty around the re-deployability of their embedded resources generate a negative relationship between the number of target alliances and investors' reactions. We also hypothesize that this negative effect is exacerbated when the alliances involve foreign alliance partners but is attenuated when acquirers are experienced in acquiring targets with alliances. Analysis of a large sample of US technology acquisitions supports all our hypotheses. We contribute to management research by offering a viable explanation of investors' reactions to the announcement of major corporate events, such as acquisitions, whose structural characteristics deny investors material information about these events' potential to create value.

Keywords: ambiguity, investor reaction, mergers and acquisitions, resource redeployment, strategic alliances

INTRODUCTION

A long-standing puzzle in management research is that, although mergers and acquisitions (M&A) represent a popular strategic tool for corporate growth, stock market investors generally react unfavourably or remain neutral to M&A announcements (Haleblian

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et al., 2009; King et al., 2004, 2021). This finding is interpreted in much of the literature as a token of acquirers chasing acquisitions that fail to generate synergies (Graebner et al., 2010, 2017; Welch et al., 2020). However, a recent surge of M&A research has questioned whether investors' reactions to acquisition announcements reflect rational calculations of what these acquisitions imply about future performance (Aalbers et al., 2021; Blagoeva et al., 2020; de Groote et al., 2021; Litov and Zenger, 2011; Schijven and Hitt, 2012). Proposing instead to take a behavioural perspective on investors' reactions, this stream of research regards investors' decisions as subject to cognitive limitations and made based on incomplete information (Benner and Zenger, 2016; Schijven and Hitt, 2012). Emphasizing investors' limited cognitive ability to understand specific types of deals, previous studies have shown investors fail to accurately evaluate acquisitions pursued out of mixed motives (Aalbers et al., 2021) or that lead to unfamiliar, novel, or unique business combinations (de Groote et al., 2021; Litov et al., 2012; Litov and Zenger, 2011).

Although cognition-based explanations have advanced our understanding of investors' behaviour, we still know little about how investors' limited access to information necessary for evaluating the synergistic potential of an acquisition may affect their response to its announcement. This is an important aspect to understand because, when investors have limited information about acquisitions, they are likely to view them as having ambiguous performance prospects. This gap in the management literature is surprising if one considers that a substantial amount of finance research has demonstrated the aversion investors have for ambiguity. In cases where investors perceive a firm's prospects as ambiguous, they price its stock according to their expectations of worst-case scenarios and not on probabilistically weighted expectations of future possibilities (e.g., Drechsler, 2013; Epstein and Schneider, 2008). Therefore, if investors cannot objectively assess the synergistic potential of acquisitions they regard as ambiguous, such deals will be systematically undervalued in the stock market. This undervaluation can discourage managers from carrying out potentially valuable acquisitions to avoid being penalized by the stock market (Luo, 2005). In addition, the theory and empirical evidence that rely on stock market movements in response to announcements of acquisitions regarded as ambiguous may give rise to biased or even misleading inferences about the outcomes of these acquisitions.

We fill this void in the literature by asking: *How does an acquisition's perceived ambiguity influence investors' reactions to its announcement?* Drawing on Frisch and Baron's (1988) perspective on ambiguity, we conceptualize *acquisition ambiguity* as the experience of investors when they lack information important to the evaluation of an acquisition. We study the role of ambiguity by observing the extent to which firms that are acquisition targets are engaged in strategic alliances. Acquisitions of such firms could contribute to synergy by providing an acquirer with access to complementary resources (Dyer et al., 2018; Furlotti and Soda, 2018; Lavie, 2006) and an improved position in industry networks (Feldman and Hernandez, 2022; Hernandez and Menon, 2018). However, we contend investors regard such acquisitions as ambiguous because the value and prospects of the alliances involved are indiscernible. Investors usually lack the detailed financial and operational information necessary for an evaluation because these alliances are usually defined in confidential contracts or determined by implicit relational contracts between the partners (Poppo and Zenger, 2002; Reuer and Ariño, 2007).

To build our conceptual framework, we integrate insights from behavioural finance research on ambiguity-aversion (Drechsler, 2013; Epstein and Schneider, 2008; Frisch and Baron, 1988) and from the literature on resource redeployment (Anand et al., 2016; Karim and Capron, 2016; Karim and Mitchell, 2000). Our theorizing yields two mechanisms that explain how a target firm's alliances trigger investors' behavioural responses. The first reflects investors' inability to access (some or all of) the information encoded in the existence of an alliance or set of alliances of the target firm when its acquisition is announced. The second captures the uncertainty investors face regarding whether the acquirer will be able to inherit and redeploy the resources embedded in the target's alliances in support of synergy. The operation of these mechanisms suggests that when targets have multiple alliances, investors are hard-pressed during the brief period of the announcement to assess these alliances' contribution to the value-creation potential of an acquisition. Thus, we predict a negative relationship between the number of alliances of a target firm and investors' reactions to an announcement of its acquisition. Furthermore, we consider the boundary conditions of this relationship by examining the potentially moderating roles of the target firm's international alliances and the acquirer's experience in acquiring targets with alliances.

We test our predictions by applying an event study methodology to a sample of 908 technology acquisitions by publicly traded US firms. We infer the impact of the number of target alliances on investors' reactions by observing how varying degrees of targets' alliance activity influence acquirers' abnormal returns at the time the acquisitions were announced. Our methods use a two-stage Heckman model and deal-level matching procedures to mitigate the potential impact of endogeneity. The results from the empirical analyses support all our predictions.

This paper makes three contributions to management research. First, we contribute to research on the behavioural underpinnings of investors' reactions to announcements of acquisitions by shifting attention from investors' cognitive limitations to the implications of their limited access to information critical to evaluating an acquisition. Our theory and findings indicate that investors react negatively to these acquisitions because they perceive them as ambiguous events. This ambiguity arises from their limited access to the information encoded in targeted firms' alliances and the uncertainty around the re-deployability of their embedded resources. Thus, our study offers a viable explanation of investors' reactions to the announcement of major corporate events, such as acquisitions, whose structural characteristics are opaque to investors in terms of their value-creation potential. Second, we contribute to the emerging stream of research in the literature that highlights that alliances and acquisitions are not just alternative means of corporate development but also have the potential to interfere with one another (Lavie et al., 2022; Tandon et al., 2023). Our study reveals that, although alliances may be perceived as valuable relational assets of autonomous partners, changes in ownership via acquisition may cause them to be perceived as potential sources of value distraction. Finally, we also contribute to research on how ambiguity impacts strategy and its evaluation by moving beyond theoretical modelling (Reuer and Sakhartov, 2021; Sakhartov, 2018) and operationalizing ambiguity in the context of acquisitions of targets with alliances.

THEORETICAL BACKGROUND AND HYPOTHESES

Ambiguity as a Trigger of investors' Behavioural Decisions

Recognizing that individuals are not perfectly rational, researchers have relied on behavioural theory to explain the decisions of firms' internal and external stakeholders (Devers et al., 2020; Powell et al., 2011; Schijven and Hitt, 2012). According to behavioural theory, boundedly rational individuals make decisions subject to varying cognitive, informational, and temporal limitations (Barberis and Thaler, 2003; Gigerenzer and Gaissmaier, 2011). Within this perspective, many management scholars have argued that the cognitive limitations of investors (and other stock market participants, such as analysts) bias their evaluations of firms making strategic choices that, relative to their competitors, are new or unique (Benner and Zenger, 2016; Litov et al., 2012; Zuckerman, 1999, 2000). Because such choices are inconsistent with investors' backgrounds and experiences, their evaluation heightens investors' burden by raising their costs of information collection and analysis. Several M&A studies have used a similar argument to explain investors' negativity toward announcements of difficult-to-understand acquisitions. Such acquisitions include deals in which the acquirers' motives are regarded as mixed or unclear (Aalbers et al., 2021), deals in which the acquiring and acquired firms are related through complementary (rather than similar) products, markets, or technologies (de Groote et al., 2021), and deals that lead to uncommon bundlings of assets between the acquiring and acquired firms (Litov and Zenger, 2011).

These studies have demonstrated the applicability of cognition-based explanations to deals with unfamiliar characteristics or those that confuse investors. However, we still lack a clear understanding of how investors' evaluations are influenced by the incompleteness of the information they think they need to assess an acquisition's financial impact using their standard equity-valuation tools. According to behavioural research, the perception that emerges when investors lack information that they consider relevant to the evaluation of an event amounts to ambiguity[1] (Drechsler, 2013; Epstein and Schneider, 2008; Frisch and Baron, 1988). Although all probability judgements involve some degree of uncertainty, in ambiguous situations, caused by insufficient information, uncertainty is associated with the specification of which one among a set of potential distributions of outcomes is appropriate (Einhorn and Hogarth, 1985). In other words, the decision maker does not have the 'right' information to understand the odds of each probable outcome.

One behavioural response to ambiguity is ambiguity-aversion. Ambiguity-averse individuals follow the heuristic that it is inadvisable to bet on ambiguous probabilities because of missing information; instead, they prefer to bet on 'known' probabilities (Ellsberg, 1961). Ample finance research has examined the implications of investors' ambiguity aversion for markets. Modelling work by Drechsler (2013) implies that, in the presence of ambiguity, investors price stocks according to their expectations of worst-case scenarios (i.e., the worst-case probability distribution), and not on probabilistically weighted expectations of future possibilities. Several empirical studies have corroborated this proposition by capturing ambiguity through consideration

of situations in which available information is scanty, unreliable, or conflicting. For example, Epstein and Schneider (2008) distinguished between tangible information about dividends considered unambiguous and intangible information based on companies' news reports that were hard to quantify and assumed to be ambiguous. They showed that investors, confronted by otherwise similar stocks, are less willing to pay for those whose informational quality they perceive as more ambiguous. Antoniou et al. (2015) proxied ambiguity by measuring the dispersion in analysts' implied forecasts about market returns. They reported that investors were less likely to invest in equities as ambiguity in the stock market increased. Similarly, Williams (2015) studied how ambiguity caused by shocks from macro-uncertainty influenced investors' processing of news of corporate earnings. He reported that investors, when valuing the stock of a firm affected by ambiguity, responded asymmetrically to good and bad news, discounting good news but treating bad news seriously.

Recently, researchers on strategy have also begun exploring the role of ambiguity in investors' decisions. Theoretical modelling by Sakhartov (2018) suggests that the confluence of the ambiguity about the costs involved when a firm redeploys its resources to enter a new business and the uncertainty of the returns anticipated from redeployment will cause the stock market to undervalue the firm's resources. This prediction is pertinent to our study because if investors hold biased estimates of the cash flows generated from a firm's resource redeployment, they may also be biased when evaluating the acquisition synergies from such redeployment.

Therefore, although the impact of ambiguity on the evaluation of investment decisions has attracted considerable overall attention and from a variety of research domains, the potential influence of ambiguity on the stock market's reactions to acquisitions has remained largely unaddressed in management research. We address this gap by focusing on the question of how investors respond to announcements of acquisitions they perceive as ambiguous.

Investors' Reactions to Alliance-Engendered Acquisition Ambiguity

To shed light on how the perception of ambiguity around an acquisition influences investors' reaction to it, we consider the role of the ambiguity engendered by the strategic alliances a target firm has at the time of its acquisition. Alliances are voluntary arrangements between firms that involve the exchange, sharing, or co-development of products, technologies, or services (Gulati, 1998). They represent valuable relational assets by enabling the partners to access and combine complementary or scarce resources (Dyer et al., 2018; Furlotti and Soda, 2018; Lavie, 2006). These resources give rise to relational rents, representing economic benefits that accrue to the alliance partners through the combination, exchange, and co-development of the resultant assets (Anand and Khanna, 2000; Dyer et al., 2018; Lunnan and Haugland, 2008).

In theory, an alliance could still generate rents after one of the partners is acquired (Feldman and Hernandez, 2022). In general, when a firm is acquired, achieving acquisition-related synergies requires some redeployment of its resources (Capron et al., 1998; Capron and Mitchell, 1998, 2012; Karim and Mitchell, 2000), either through their physical transfer to new locations or by sharing them across organizational

boundaries without physical transfer (Anand et al., 2016). Like synergies that stem from the redeployment of a target's proprietary resources, alliance-based resource redeployment can also generate synergies (Feldman and Hernandez, 2022). At a dyadic alliance level, a target's alliance-based resources might be redeployed after an acquisition to lower costs or increase earnings. For example, if a target is involved in a buyer–supplier alliance, its acquirer can benefit from the advantageous deals the supplier has offered to the target firm (Homburg and Bucerius, 2006; Lusch et al., 2011). Furthermore, when a target firm has multiple alliances, the entire network of the target's alliances can be leveraged through an acquisition. According to a simulation study by Hernandez and Menon (2018), acquirers can improve their competitive position and performance by acquiring targets with valuable alliance resources and combining the acquiring and acquired firms' alliances to create a less constrained and more diverse alliance network.

Despite the synergistic potential of alliance-based resources, we contend investors are likely to perceive the acquisition of a target with one or more alliances as a deal with ambiguous performance prospects. We identify two mechanisms that explicate the behavioural responses that a target firm's alliances trigger in investors. These mechanisms can be better understood with the help of Figure 1, which depicts the informational challenges targets' alliances present for investors.

The first mechanism reflects investors' inability to access (some or all of) the information encoded in the existence of an alliance or set of alliances in a target firm when its acquisition is announced (this is represented in Figure 1 by the dark-blue shaded areas with dots). Unlike information about a target's proprietary resources, which is available from a company's strategy documents, statements, and accounts (Brauer and Wiersema, 2018), investors usually lack sufficient information to use their standard equity-valuation tools to evaluate the potential incremental future cash flows associated with a target's alliances.[2] Such an evaluation would require knowledge of the specific terms of the alliance, including its governance and structure and how partners share risks, costs, and proceeds. However, these terms are typically covered by confidential contracts (Reuer

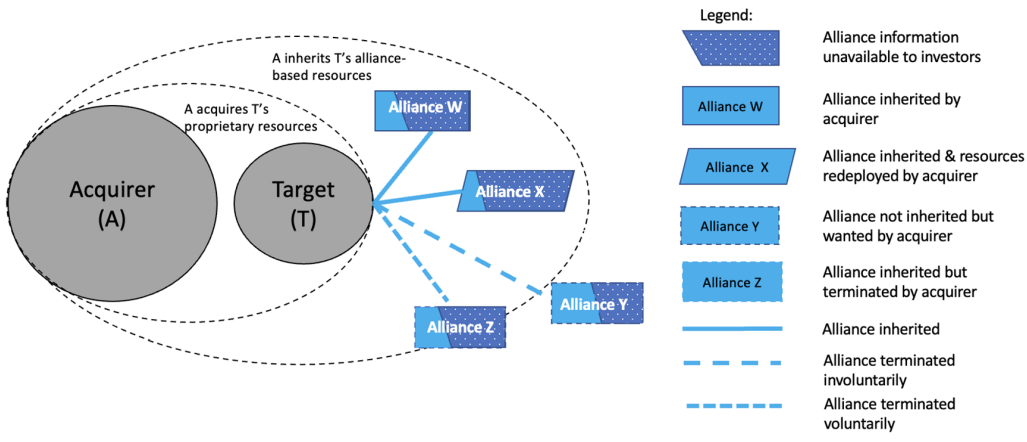

Figure 1. Investors' informational challenge when evaluating anticipated synergies from acquiring targets with alliances

and Ariño, 2007) or determined by implicit relational contracts between the partners (Bouncken et al., 2020; Poppo and Zenger, 2002). Although an acquirer's managers usually learn the terms of a target firm's alliances during the due diligence process, investors and analysts are left to speculate on what the alliances entail (Benner and Zenger, 2016; Brauer and Wiersema, 2018). Thus, a target firm's engagement in alliances exacerbates the typical informational asymmetry between informationally disadvantaged investors and corporate managers (Akerlof, 1970; Bergh et al., 2019).

The informational challenges for investors about a target's alliances were corroborated by our exploratory interviews with equity analysts,[3] who have been perceived as 'surrogate investors' (Zuckerman, 1999) because they advise investors and influence their investments. They typically reported that a target's alliances represent big unknowns during the brief period of an acquisition announcement. As one analyst noted: '*The announcement of a merger will have zero, or maybe just one percent, of the information to relate it to target alliances, but it is the analyst's job to have an idea of what kind of alliances the target has*'.

The second mechanism linking targets' alliances and investors' behaviour reflects the ambiguity investors face as to whether the acquirer will be able to redeploy resources embedded in target alliances. This redeployment depends on the uncertain (and potentially opportunistic) behaviour of the alliance partners concerned (Gulati et al., 2012). That is, investors are unable to determine the odds of each probable scenario when it comes to the prospects of alliance-based resources. On the one hand, acquirers may fail to inherit (some or all of) a target firm's alliances (e.g., 'Alliance Y' in Figure 1). This is a plausible scenario because acquisitions can be associated with significant organizational challenges in the acquired firms, including high employee turnover and the disruption of established routines, processes, and trade agreements (Graebner et al., 2017; King et al., 2020; Rogan and Greve, 2015; Rogan and Sorenson, 2014; Rouzies et al., 2019). These can alter the underlying value of an alliance to the external partner and can thereby undermine that partner's commitment to an ongoing relationship (Cui et al., 2011; Madhok et al., 2015; Parkhe, 1993; Tandon et al., 2023).

Furthermore, alliance agreements often contain 'change of control' clauses for the eventuality of the acquisition of either partner (Campbell and Reuer, 2001). Such agreements allow premature termination of the alliance by the counterparty without financial repercussions. One of our sample deals – Pfizer's acquisition of Wyeth – exemplifies investors' concerns about the inheritability of target alliances. Wyeth had several alliances, including a co-promotion agreement with Amgen for Enbrel, the latter's arthritis and psoriasis drug, which had sales of $5.9 billion in the year before the acquisition. During a news conference about Pfizer's intended acquisition, analysts and investors aired concerns as to whether the change in control of Wyeth's share capital could jeopardize its most important strategic alliance (with Amgen): '*Jessica Merrill with The Pink Sheet. I have a question about Enbrel. When is Wyeth supposed to return full rights to Amgen for Enbrel and is there anything in the deal that would trigger an earlier opportunity for Amgen to require rights, like an acquisition?*' (Fair Disclosure Wire, 2009).

On the other hand, if an acquirer inherits the target's alliances, investors are likely to be uncertain about whether the resources embedded in these alliances can be profitably redeployed. In a 'good' state of the world, the acquirer will be able to inherit the acquired alliances and redeploy their embedded resources (e.g., 'Alliance X' in

Figure 1). However, because control of alliance-based resources is shared among all the alliance partners, redeployment necessitates that the acquirer renegotiates several aspects of the alliance, including its strategic objectives, the execution of relevant tasks, and the sharing of costs and proceeds between the partners (Parkhe, 1991). Renegotiation of pre-existing agreements can engender significant tensions between the acquirer and its newly acquired partners (Ariño and Reuer, 2004; Reuer and Ariño, 2002), preventing the redeployment of acquired alliance-based resources (e.g., 'Alliance W' in Figure 1). Finally, if such redeployment is blocked, acquirers may come to view the inherited alliance as a liability (rather than a strategic resource) and a source of dis-synergy because of strategic conflicts with their other resources (Feldman and Hernandez, 2022). Then, they are likely to choose to dissolve this inherited alliance voluntarily (e.g., 'Alliance Z').

Therefore, we propose that the unavailability of (some of) the information encoded in the existence of a target firm's alliances and the uncertain redeployability of their resources will foster the focus among ambiguity-averse investors on the worst-case post-acquisition scenario in relation to synergy generation (i.e., the 'Alliance Y' scenario of Figure 1). In turn, this reaction will trigger a lower stock market valuation of an acquisition of a target with alliances relative to otherwise similar deals without such alliances. We also propose that investors' perceived ambiguity in relation to an acquisition's synergistic potential will increase with the number of target alliances. That is, we expect that the more alliances a target has, the more investors' informational deficit will be compounded when they evaluate an acquisition's value-creation potential at the time the acquisition is announced. Our exploratory interviews with analysts corroborated this perspective, as indicated by the following response from one: *'If I see a company with lots of collaborations, this, to me, generally speaking, would be risk, primarily because you've just got a limited amount of time as an analyst to be digging through'*.

In summary, we predict investors will react more negatively (or less positively) to acquisition announcements as the number of alliances of a target increases. Accordingly, we posit:

Hypothesis 1: There will be a negative relationship between investors' reactions to the announcement of an acquisition and the number of the target firm's alliances at the time of its acquisition.

Having hypothesized about how a target firm's alliances affect investors' reactions, in what follows, we explore the boundary conditions of this relationship by examining how some key characteristics of the alliance and the acquirer influence investors' perceptions of the ambiguity of an acquisition and, hence, their reactions.

The Role of International Versus Domestic Alliances of the Target

We begin by examining how a target firm's engagement in international alliances —that is, agreements with foreign partners (Yan and Zeng, 1999) —influences investors' reactions to acquisition announcements. An advantage of international alliances is that they can unlock unique synergistic opportunities by offering firms access to location-bound advantages such as new markets or a more diverse set of technologies (Hamel, 1991;

Inkpen, 1998; Sirmon and Lane, 2004). Simultaneously, however, they entail a significant challenge: Firms need to work with partners from different national cultures and institutions and with different values, norms, beliefs, and languages, all of which complicate inter-partner collaboration (Barkema and Vermeulen, 1997; Hofstede and Bond, 1988; Nippa and Reuer, 2019).

We contend that the geographical, national cultural, and institutional differences present in international alliances will exacerbate investors' difficulties in accessing the information encoded in target alliances and diminish their capacity to evaluate them. Consistent with this view, research in finance has shown investors have less access to, and possess less information about, foreign companies' strategies and performance than they do about domestic ones (e.g., Bae et al., 2008; Choi et al., 2022). This is because residing in a country other than that of the foreign company hinders investment research through lack of primary qualitative data on the firm and a lesser understanding than local investors of country-level developments. As a result, investors have been shown to make less precise earnings forecasts for foreign-country firms than for domestic ones. In our context, these findings imply that investors will have less information available to evaluate the nature of target firms' international alliances than they would with domestic ones.

Furthermore, we predict investors will find it harder to ascertain whether an acquirer will be able to generate synergy from the redeployment of resources embedded in targets' international alliances. The different national and organizational cultures between partners raise communication barriers that hinder coordination and make misunderstandings between them more likely (Castañer and Oliveira, 2020; Gulati et al., 2012; Ness, 2009). Moreover, these differences obstruct inter-partner negotiations and renegotiations about the critical technical, governance, and strategic aspects of an alliance (Kumar, 2014; Yan and Zeng, 1999). Therefore, a target firm's international alliances entail many more sources of potential instability than its domestic ones. These potential destabilizers can curtail investors' capacity to account for and assess the odds of each probable alliance-related outcome.

To sum up, we expect investors' more limited access to the information encoded in target firms' international alliances and the many more sources of potential instability associated with them will cause investors to perceive acquisitions of targets with such alliances as being relatively more ambiguous. Therefore, we predict that greater numbers of international alliances will exacerbate investors' adverse reactions to the presence of alliances and we propose the following hypothesis:

Hypothesis 2: The negative relationship between investors' reactions to the announcement of an acquisition and the number of the target firm's alliances at the time of its acquisition will be exacerbated when these alliances are international.

The Role of the Acquirer's Experience in Acquiring Targets with Alliances

Earlier, we argued that investors' limited information about the nature and prospects of target alliances causes them to be ambiguous about the wisdom of such acquisitions. Here, we propose that an acquirer's prior experience in acquiring targets with alliances can serve as a credible signal to investors of the potential synergies available

from the redeployment of a target's alliance-based resources when the same acquirer implements similar acquisitions in the future.

According to signalling theory (Bergh et al., 2014; Spence, 1974, 2002), informational asymmetry between two parties, motivates the disadvantaged party to search for cues about the focal event, interpret those cues, and use these interpretations as guidance in formulating its actions. Such cues can be crude but readily available public information that is assumed to contribute to a more informed evaluation (Cohen and Dean, 2005; Schijven and Hitt, 2012). From this perspective, we argue that an acquirer's experience in acquiring targets with alliances represents readily available information for investors, who can draw on it when evaluating similar acquisitions by the same acquirer. Specifically, investors can substitute the readily available information on the acquirer's relevant acquisition experience for the unavailable encoded information about target alliances and their prospects (Muehlfeld et al., 2012). This substitution of information can alleviate a deal's ambiguity as perceived by investors. That is, investors' knowledge of an inquirer's past activity will better position them to assess whether the acquirer will be able to evaluate, inherit, and redeploy acquired alliances in support of synergy and dissolve those that represent a liability for the acquirer. Thus, investors will be better able to decide which synergistic outcomes, if any, are most likely.

Therefore, we predict that an acquirers' experience in acquiring targets with alliances conveys ambiguity-reducing signals to investors that will mitigate their adverse reactions to acquisition announcements in the presence of target alliances. Hence, we posit:

Hypothesis 3: The negative relationship between investors' reactions to the announcement of an acquisition and the number of the target firm's alliances at the time of its acquisition will be weakened when the acquirer has experience in acquiring targets with alliances.

METHODS

Data Collection

To test our hypotheses, we collected data on acquisitions from the Mergers and Acquisitions database of Refinitiv's Securities Data Company (SDC). We used the following criteria: (1) the deal was completed between 1990 and 2021; (2) the acquirer was a publicly traded US firm active in biopharmaceuticals, computer equipment, or medical devices; (3) the target was a public or private US firm; (4) the deal increased the acquirer's ownership stake from less than 50 per cent to at least 50 per cent; (5) the data for all the variables described in the following subsection were available. Acquisitions and alliances are particularly important in technology-driven industries (Stuart, 2000), and our three industries — biopharmaceuticals, computer equipment, and medical devices – are well-known for their use of both modes of corporate development (Hagedoorn, 2002; Schilling, 2009). We limited the sample to targets that were public or private US-based firms for three reasons: first, identifying the investors' reaction to the international alliances of target firms would be more difficult if the acquisition itself was already cross-border; second, the necessary data on the control variables for

US-based target firms was more easily available; finally, we excluded acquisitions of business units or assets from our sample because the alliances tied to these are hard to identify.

For each acquisition, we collected data about the acquirer, the target, and the deal from a variety of sources. Stock price data and returns were retrieved from the Center for Research in Security Prices (CRSP), alliance data stemmed from the Joint Ventures/Alliances database in SDC Platinum, firms' financial data were obtained from SDC Platinum, Compustat, SEC Edgar filings and Mergent Intelligence, and patent information was obtained from the US Patent and Trademark Office (USPTO). After the removal of events with incomplete data, our initial dataset contained 1679 acquisition deals.

Measurement

Investors' reactions to acquisition announcements were captured by the three-day cumulative abnormal stock market returns (CAR) of the acquirer as observed around the date of the announcement of the acquisition. Investors make inferences from announcements of major corporate events, and their reactions to the available information are reflected in the firm's stock price. CAR is the most commonly used measure of investors' reactions to both acquisitions and alliances (Findikoglu and Lavie, 2019; Haleblian et al., 2009; King et al., 2021; Wassmer and Dussauge, 2011). Abnormal market returns measure the difference between the returns of an individual stock and the expected risk-adjusted return for that stock. The expected return for an acquirer's stock was estimated using a value-weighted Fama–French three-factor model (Fama and French, 1996) over a period from 285 days to 30 days before each event.

Although the simpler capital asset pricing model (CAPM) often used in event studies tends to be well-specified for average firms, it may be poorly specified for a collection of firms characterized by common underlying characteristics (typically, acquirers tend to be characterized by large firm size, high prior returns, and low book-to-market ratios). This potential bias is avoided by the Fama and French model, which includes a market index, size index, and book-to-market index to predict normal stock returns. Investors' reactions were measured by using a three-day window [t-1; t + 1] around the announcement date (similar to Blagoeva et al., 2020). Use of this narrow event window lets us account for the possible leakage of information before the official announcement, and also to exclude unrelated events that could contaminate stock market evaluation (McWilliams and Siegel, 1997). We also tested the robustness of our findings by recalculating abnormal returns over different event windows.

We measured *Target firm's alliances* as the number of strategic alliances of a target firm at the time of its acquisition. These are formalized interfirm relationships and cover R&D, licensing and technology transfer, manufacturing, and marketing and distribution. Data on alliance terminations are almost non-existent, so like previous researchers, we assumed alliance agreements endure for three years (Schilling and Phelps, 2007) and then re-estimated the results using a five-year duration in the robustness checks (e.g., Gulati and Gargiulo, 1999). To distinguish *International alliances* from *Domestic alliances*, we split the alliances into two groups according to whether the alliance partner was located inside or outside the US, and then counted the number of each of these alliance types for each acquisition.

To capture an acquirer's experience in acquiring targets with alliances, we constructed the variable *Relevant acquisition experience*. Thus, for each acquirer, we collected the firms' acquisitions for the three years before the focal acquisition announcement and checked whether these acquisitions involved target firms engaged in alliances (again assuming alliance agreements endure for three years), counting the total number of such alliances. As a robustness check, we also applied a five-year window.

To account for alternative explanations of the results, we controlled for several factors known to affect investors' reactions to acquisition announcements (Capron and Shen, 2007; Haleblian et al., 2009; King et al., 2021; Laamanen, 2007). For the acquirers, we controlled for *Acquirer size* through total assets, *Acquirer age* in years since its incorporation, and *Acquirer leverage* and *Acquirer liquidity* through, respectively, debt-to-asset and current ratios. We also controlled for *Acquirer R&D intensity* to accommodate an acquirer's focus on innovation (Desyllas and Hughes, 2010) and controlled for business development experience through *Acquirer prior acquisitions* and *Acquirer prior alliances* by counting their numbers in the preceding three years. On the target side, we controlled for *Target size* through its assets, and *Target age* in years since its incorporation, and the *Target public* variable controls for whether it is public. We used the variable *Target patents*, measured as the number of successful patent applications in the preceding five years, as a control for a target firm's focus on innovation because private target firms do not disclose their R&D expenses.

At the level of the deal, we accounted for several deal and dyadic characteristics. Thus, we controlled for financial characteristics through *Deal value* and *Deal premium*, using the dummy variables *Deal value missing* and *Deal premium missing* when these details were not available. To control for the payment method, dummies for *Deal paid with cash* and *Deal paid with stock* were included. There are also controls for *Competing bids* and *Hostile acquisitions*, both of which can lead to overpayment and to negative reactions by investors. At the dyadic acquirer–target level, controls were added for *Size difference* (target assets as a fraction of acquirer's assets), the presence of a *Prior tie* as a result of a prior alliance or equity stake between the pair, *Same industry* (dummy indicating if the acquirer and the target have the same primary SIC code), and their *Geographic distance* (Chen et al., 2018).

Sample Creation and Analytical Method

When estimating our models, sample selection bias may influence the regression analyses because investors' reactions to acquisition announcements are only observed if and when a firm's intent to acquire a firm is publicly announced. However, systematic differences may occur during specific periods between firms making and not making acquisitions, and investors' reactions may be correlated with these differences. So, to correct for potential sample selection bias, we used a Heckman two-stage estimation procedure (Certo et al., 2016). In the first stage, we created firm-year observations to estimate the likelihood of an acquisition based on a vector of a firm's characteristics and time effects. Following Blagoeva et al. (2020), we used the acquisition activity in the appropriate industries, measured as the number of acquisitions made by American firms within a specific three-digit SIC code, as an exclusion restriction. As shown in Appendix Table AI, this variable fulfilled the requirement

of statistical significance ($\beta = 0.097$; $p = 0.001$). We also verified that this variable was not significantly related to investors' reactions upon announcement of a deal. In the second stage, we included the *Inverse Mills ratio*, which accounts for possible selection bias.

A second potential bias arises because among firms making an acquisition, acquirers may not select their acquisition targets randomly. Instead, it is possible that certain acquirers are attracted to target firms with alliances and that these choices may also correlate with their investors' reactions. Similarly, targets' decisions to engage in alliances may be endogenous to a firm's attributes. To address this possibility, we used a matched-sample technique to account for potential unobserved heterogeneity among acquirers and targets, and self-selection into acquisitions involving targets with alliances by the acquirers. Therefore, we selected all 454 acquisitions that involved target firms with alliances and used a nearest-neighbour approach to find an otherwise similar acquisition not involving alliances among the remaining 1225 acquisitions in the dataset. Thus, for each acquisition involving alliances, the most similar acquisition without alliances was chosen based on the deal year, industry (three-digit SIC codes) and size of firm (total assets) of the acquirers and their targets. This resulted in a sample of 454 acquisitions involving alliances (treatment group) matched to 454 similar acquisitions without alliances (control group). Table I documents the distributions of the original and matched samples by year and industry.

The hypotheses were tested using ordinary least squares (OLS) regression methods. Dummies for years and industries were added to control for temporal and industry effects (Schommer et al., 2019; Shapiro, 2010). Standard errors were clustered according to the acquirer involved because some acquirers were involved in multiple deals. To avoid estimation issues related to outliers, all skewed non-negative count variables were log-transformed, as indicated in the variable names.

RESULTS

Table II includes descriptive statistics and pairwise correlation coefficients for all our variables. Investors' reactions range from −53.7 per cent to +205.2 per cent and have a mean of 0.56 per cent, which does not differ significantly from zero ($t = 1.340$, $p = 0.181$). For the 454 acquisitions involving targets with alliances, investors' reactions are negative but insignificant with a mean of −0.48 per cent ($t = -0.949$, $p = 0.343$), whereas the 454 matched acquisitions without target alliances receive significantly positive reactions from investors of +1.61 per cent ($t = 2.432$, $p = 0.015$). Thus, as displayed in Figure 2, acquisitions involving alliances lead to relatively lower investors' reactions around their announcement dates.

Table III provides the regression results from the multivariate regression analysis and enables us to examine how target alliances influence investors' reactions after accounting for other factors known to influence investors' reaction (e.g., King et al., 2021), and these may be correlated with the presence of alliances at the target firm. Model 1 in Table III contains only the control variables, whereas in Models 2 to 9, we also introduce our independent and moderating variables. The explanatory power of the regressions ranges from 15 per cent to 16 per cent, which is similar to earlier M&A event studies in technology-driven industries (Laamanen et al., 2014; Lavie et al., 2022). Furthermore, F-tests for model improvement after the addition of our independent variables to the regression models indicate that their inclusion explains significant additional variance compared with the reduced models

Table I. Sample description

	Full sample				*Matched sample*			
Year	*Biopharmaceuticals*	*Computer equipment*	*Medical devices*	*Total*	*Biopharmaceuticals*	*Computer equipment*	*Medical devices*	*Total*
1990	2	4	6	12	2	0	0	2
1991	17	8	7	32	8	6	0	14
1992	14	10	12	36	6	10	4	20
1993	11	20	12	43	4	14	4	22
1994	20	15	24	59	16	18	14	48
1995	15	16	18	49	16	14	14	44
1996	12	10	17	39	14	14	6	34
1997	20	13	20	53	14	10	6	30
1998	10	17	26	53	10	12	8	30
1999	19	18	15	52	22	18	10	50
2000	23	20	10	53	22	12	4	38
2001	20	10	13	43	20	6	6	32
2002	10	7	10	27	6	8	0	14
2003	20	12	10	42	12	12	4	28
2004	4	14	13	31	4	14	8	26
2005	26	17	16	59	18	20	4	42
2006	17	15	16	48	16	20	4	40
2007	25	12	15	52	18	14	6	38
2008	28	21	17	66	20	18	2	40
2009	27	17	11	55	20	22	2	44
2010	11	29	15	55	6	22	4	32

(Continues)

Table I. (Continued)

	Full sample				*Matched sample*			
Year	*Biopharmaceuticals*	*Computer equipment*	*Medical devices*	*Total*	*Biopharmaceuticals*	*Computer equipment*	*Medical devices*	*Total*
2011	20	18	16	54	2	8	2	12
2012	19	17	13	49	8	2	0	10
2013	10	7	6	23	6	0	0	6
2014	34	29	25	88	10	6	2	18
2015	30	32	25	87	8	12	4	24
2016	39	17	21	77	6	2	2	10
2017	27	23	23	73	8	4	0	12
2018	19	21	19	59	8	12	2	22
2019	33	21	27	81	18	16	4	38
2020	26	15	20	61	20	10	6	36
2021	27	15	26	68	20	14	18	52
Total	635	520	524	1679	388	370	150	908

Table II. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
(1) Investors' reaction	1.00																												
(2) Target firm's alliances (ln)	−0.14	1.00																											
(3) International alliances (ln)	−0.14	0.77	1.00																										
(4) Domestic alliances (ln)	−0.12	0.90	0.48	1.00																									
(5) Relevant acq. experience (ln)	−0.06	0.07	−0.01	0.12	1.00																								
(6) Acquirer size (ln)	−0.14	0.08	0.05	0.09	0.56	1.00																							
(7) Acquirer age	−0.03	0.01	0.02	0.01	0.29	0.62	1.00																						
(8) Acquirer leverage	−0.08	0.10	0.07	0.09	0.27	0.29	0.29	1.00																					
(9) Acquirer liquidity	0.07	0.00	0.01	−0.02	−0.18	−0.22	−0.21	−0.10	1.00																				
(10) Acquirer R&D intensity	0.00	−0.02	−0.02	−0.02	−0.04	−0.04	−0.04	−0.04	0.01	1.00																			
(11) Acquirer prior acq. (ln)	−0.08	0.01	−0.03	0.05	0.75	0.65	0.41	0.25	−0.24	−0.06	1.00																		
(12) Acquirer prior alliances (ln)	−0.09	0.21	0.12	0.24	0.64	0.70	0.49	0.24	−0.19	−0.02	0.63	1.00																	
(13) Target size (ln)	−0.17	0.26	0.28	0.23	0.16	0.51	0.29	0.18	−0.09	−0.01	0.23	0.24	1.00																
(14) Target age	−0.03	0.22	0.23	0.19	−0.07	0.04	0.11	0.05	−0.04	−0.03	−0.02	−0.04	0.32	1.00															
(15) Target public	−0.13	0.37	0.28	0.32	0.04	0.11	0.11	0.13	−0.02	−0.03	−0.01	0.14	0.19	0.29	1.00														
(16) Target patents (ln)	−0.05	0.37	0.37	0.29	−0.05	0.20	0.18	0.05	0.00	−0.03	−0.03	0.09	0.38	0.29	0.43	1.00													
(17) Deal value (ln)	−0.08	0.38	0.34	0.31	0.01	0.21	0.08	0.08	0.03	−0.05	−0.01	0.13	0.47	0.32	0.60	0.52	1.00												
(18) Deal value missing	−0.02	−0.23	−0.17	−0.19	0.19	0.24	0.16	0.04	−0.11	0.05	0.23	0.12	0.01	−0.19	−0.49	−0.28	−0.75	1.00											

(Continues)

Table II. (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
(19) Deal premium	−0.07	0.18	0.12	0.17	−0.01	0.03	0.09	0.06	0.01	−0.02	−0.03	0.05	0.04	0.10	0.39	0.16	0.23	−0.20	1.00										
(20) Deal premium missing	0.16	−0.36	−0.28	−0.32	−0.05	−0.18	−0.15	−0.10	0.06	0.03	−0.02	−0.16	−0.29	−0.29	−0.90	−0.44	−0.64	0.47	−0.44	1.00									
(21) Deal paid with cash	−0.02	0.04	0.01	0.02	0.05	0.27	0.16	0.05	0.02	−0.02	0.07	0.06	0.23	0.14	0.24	0.19	0.43	−0.38	0.11	−0.27	1.00								
(22) Deal paid with stock	0.06	0.17	0.14	0.14	−0.15	−0.29	−0.19	−0.05	0.05	−0.01	−0.21	−0.05	−0.10	0.05	0.23	0.15	0.21	−0.28	0.08	−0.19	−0.36	1.00							
(23) Competing bids	0.01	0.05	0.05	0.04	0.01	0.03	0.00	0.04	0.01	0.06	0.03	−0.02	0.11	0.11	0.14	0.06	0.14	−0.08	0.12	−0.16	0.13	−0.04	1.00						
(24) Hostile acquisition	−0.02	0.16	0.15	0.18	−0.02	0.05	0.12	0.06	−0.02	0.00	0.02	0.08	0.12	0.23	0.07	0.13	0.11	−0.04	0.07	−0.08	0.04	0.02	0.09	1.00					
(25) Same industry	−0.03	0.12	0.10	0.09	0.09	0.09	0.04	0.06	0.04	0.02	0.02	0.10	0.06	0.04	0.16	0.17	0.21	−0.14	0.09	−0.16	0.06	0.08	0.02	0.00	1.00				
(26) Geographic distance	−0.05	−0.01	−0.06	0.01	0.09	0.07	0.03	0.03	−0.04	0.00	0.07	0.06	−0.01	−0.07	−0.03	0.00	0.00	0.02	0.02	0.04	0.04	−0.03	0.02	−0.05	0.00	1.00			
(27) Size difference	0.01	0.01	−0.01	0.01	−0.06	−0.13	−0.06	−0.07	−0.01	0.40	−0.09	−0.04	−0.01	−0.03	−0.03	−0.03	−0.04	−0.02	−0.02	0.02	−0.03	0.00	0.06	0.00	−0.05	−0.02	1.00		
(28) Prior tie	−0.06	0.30	0.20	0.34	0.05	0.10	0.05	0.10	−0.03	−0.02	0.08	0.18	0.15	0.10	0.17	0.16	0.21	−0.13	0.09	−0.17	0.08	0.01	0.02	0.18	0.02	−0.01	−0.02	1.00	
(29) Inverse Mills ratio	0.18	−0.11	−0.05	−0.13	−0.48	−0.78	−0.49	−0.24	0.26	0.04	−0.51	−0.64	−0.36	−0.05	−0.10	−0.17	−0.17	−0.17	−0.03	0.15	−0.14	0.16	0.02	−0.02	−0.05	−0.05	0.09	−0.12	1.00
Mean	0.56	0.57	0.26	0.41	0.82	7.74	39.9	0.35	3.07	8.05	1.41	1.94	4.62	13.5	0.50	1.32	4.16	0.21	15.0	0.55	0.37	0.26	0.02	0.01	0.63	1785	0.80	0.10	1.08
S.D.	12.7	0.71	0.49	0.62	1.13	2.79	40.5	0.26	4.63	153	1.20	1.41	1.60	14.9	0.50	1.49	2.87	0.41	37.9	0.50	0.48	0.44	0.15	0.07	0.48	1633	9.46	0.30	0.50
Min	−53.7	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	−95.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37
Max	205	4.52	3.99	3.66	4.43	12.3	161	3.47	66.1	4299	4.11	6.06	11.5	149	1.00	7.66	11.4	1.00	726	1.00	1.00	1.00	1.00	1.00	1.00	9478	244	1.00	2.71

Note: N = 908. Correlation coefficients above |0.065| are statistically significant at the 5% level and coefficients above |0.0855| are significant at the 1% level.

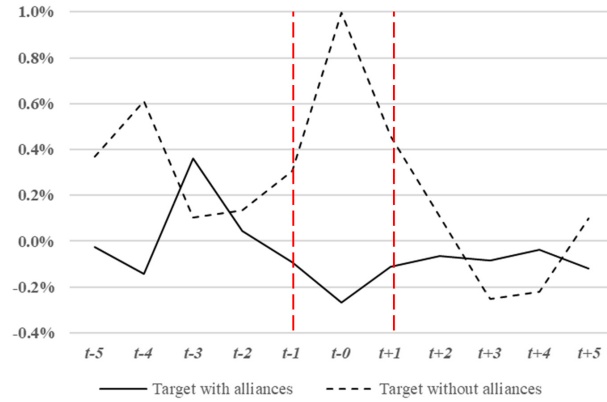

Figure 2. Investors' reaction to acquisitions (daily abnormal returns)

without these variables (e.g., Reus and Lamont, 2009).[4] The Inverse Mills ratio, added to control for potential sample selection biases, does not have a significant effect in any of the models, indicating no evidence of such bias (Certo et al., 2016).

The first hypothesis predicts a negative relationship between a target firm's alliances and investors' reactions to an acquisition announcement. This is confirmed in Model 2, in which the coefficient is negative and significant ($\beta = -1.656$, $p = 0.007$). It implies that doubling the number of alliances at a target firm results in −1.7 per cent drop in the price of the acquirer's stock. In terms of economic significance, this means a loss in market value of $57.5 million, based on the median market value of the sample acquirers one month before their acquisitions.

The second hypothesis states that the negative relationship between a target firm's alliances and investors' reactions is stronger for international than domestic alliances. When we split target firms' alliances into two groups, we do not observe any statistically significant effect for domestic alliances (Model 6: $\beta = -0.250$, $p = 0.773$), but we see a significant negative effect for international ones (Model 6: $\beta = -2.904$, $p = 0.006$). A coefficient comparison test reveals these two coefficients also differ statistically ($F_{1,316} = 3.05$, $p = 0.082$). Therefore, as predicted, the evidence indicates international alliances are the predominant factor in the negative relationship between target firms' alliances and investors' reactions.

The third hypothesis postulates that the negative relationship between a target firm's alliances and investors' reactions to the news of its acquisition will be weakened when acquirers are experienced in acquiring targets with alliances. This is supported by the positive coefficient in Model 3 for the interaction term between a target firm's alliances and an acquirer's relevant experience in acquisition ($\beta = 1.271$, $p = 0.004$). Just over half the acquirers lack such relevant experience; thus, when the target firm has alliances, investors' reactions are lessened, as depicted in Figure 3. In fact, acquirers with relevant experience do not incur lowered investors' reactions when target firms have alliances. When we examine the interaction of such experience with the different types of alliances, experience also weakens the negative effect of international alliances on investors' reactions (Model 9: $\beta = 1.262$, $p = 0.057$). Taken together, these results strongly support Hypothesis 3.

Table III. Multivariate analysis

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*
Target firm's alliances (ln)		−1.656**	−2.904***						
		(0.613)	(0.867)						
Relevant acq. experience (ln) × Target firm's alliances (ln)			1.271**						
			(0.439)						
Domestic alliances (ln)				−1.067		−0.250	−1.467	−0.487	−1.169
				(0.661)		(0.731)	(0.927)	(0.700)	(0.998)
International alliances (ln)					−3.006**	−2.904**	−3.011**	−4.375**	−4.033**
					(0.960)	(1.052)	(1.067)	(1.430)	(1.483)
Relevant acq. experience (ln) × Domestic alliances (ln)							1.218*		0.749
							(0.482)		(0.496)
Relevant acq. experience (ln) × International alliances (ln)								1.745**	1.262+
								(0.597)	(0.660)
Relevant acq. experience (ln)	1.165	1.181	0.218	1.202	1.094	1.105	0.364	0.570	0.263
	(0.750)	(0.755)	(0.725)	(0.754)	(0.748)	(0.749)	(0.759)	(0.712)	(0.740)
Acquirer size (ln)	−0.590	−0.695	−0.675	−0.628	−0.751	−0.754	−0.739	−0.730	−0.727
	(0.672)	(0.684)	(0.678)	(0.680)	(0.680)	(0.683)	(0.677)	(0.681)	(0.678)
Acquirer age	0.045*	0.042*	0.040+	0.043*	0.043*	0.042*	0.040+	0.042+	0.041+
	(0.022)	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Acquirer leverage	−1.847	−1.609	−1.551	−1.774	−1.612	−1.603	−1.635	−1.444	−1.508
	(2.510)	(2.491)	(2.480)	(2.518)	(2.465)	(2.470)	(2.479)	(2.445)	(2.461)

(Continues)

Table III. (Continued)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*
Acquirer liquidity	0.050	0.056	0.067	0.054	0.046	0.047	0.057	0.055	0.059
	(0.126)	(0.130)	(0.135)	(0.129)	(0.128)	(0.129)	(0.133)	(0.131)	(0.133)
Acquirer R&D intensity	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Acquirer prior acquisitions (ln)	−0.226	−0.308	−0.181	−0.279	−0.260	−0.272	−0.165	−0.197	−0.152
	(0.608)	(0.615)	(0.603)	(0.607)	(0.613)	(0.607)	(0.600)	(0.599)	(0.600)
Acquirer prior alliances (ln)	1.209+	1.452*	1.480*	1.329*	1.456*	1.475*	1.494*	1.515*	1.516*
	(0.659)	(0.664)	(0.662)	(0.661)	(0.660)	(0.661)	(0.657)	(0.662)	(0.660)
Target size (ln)	−1.354**	−1.287**	−1.298**	−1.309**	−1.242**	−1.236*	−1.237*	−1.270**	−1.261**
	(0.469)	(0.475)	(0.475)	(0.479)	(0.473)	(0.480)	(0.479)	(0.481)	(0.481)
Target age	0.019	0.024	0.019	0.022	0.026	0.027	0.023	0.024	0.022
	(0.029)	(0.028)	(0.027)	(0.029)	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)
Target public	−1.364	−0.959	−0.783	−1.250	−0.952	−0.940	−0.892	−0.701	−0.738
	(2.636)	(2.613)	(2.591)	(2.644)	(2.569)	(2.574)	(2.575)	(2.550)	(2.563)
Target patents (ln)	0.357	0.497	0.491	0.412	0.580	0.585	0.571	0.556	0.555
	(0.390)	(0.377)	(0.371)	(0.381)	(0.388)	(0.384)	(0.379)	(0.379)	(0.378)
Deal value (ln)	−0.063	0.029	−0.007	−0.031	0.068	0.071	0.045	0.046	0.037
	(0.409)	(0.415)	(0.411)	(0.411)	(0.414)	(0.415)	(0.412)	(0.412)	(0.412)
Deal value missing	−2.916	−2.672	−2.779	−2.852	−2.458	−2.459	−2.524	−2.501	−2.529
	(2.561)	(2.569)	(2.556)	(2.567)	(2.558)	(2.560)	(2.548)	(2.548)	(2.545)
Deal premium	−0.006	−0.004	−0.004	−0.005	−0.005	−0.005	−0.005	−0.005	−0.005
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)

(Continues)

Table III. (Continued)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*
Deal premium missing	2.652	2.657	2.602	2.568	2.833	2.808	2.696	2.772	2.713
	(2.172)	(2.127)	(2.123)	(2.171)	(2.105)	(2.122)	(2.137)	(2.097)	(2.117)
Deal paid with cash	0.877	0.667	0.543	0.782	0.487	0.478	0.375	0.475	0.413
	(1.039)	(1.054)	(1.043)	(1.043)	(1.071)	(1.069)	(1.054)	(1.062)	(1.050)
Deal paid with stock	2.190	2.217	2.630	2.196	2.146	2.149	2.462	2.511	2.604
	(1.697)	(1.693)	(1.763)	(1.695)	(1.687)	(1.688)	(1.738)	(1.735)	(1.754)
Competing bids	2.437	2.270	3.067	2.322	2.385	2.360	3.036	2.682	3.008
	(2.179)	(2.139)	(2.089)	(2.181)	(2.098)	(2.108)	(2.087)	(2.079)	(2.073)
Hostile acquisition	−0.662	0.351	1.790	0.093	0.490	0.628	1.979	2.023	2.467
	(3.192)	(3.267)	(3.124)	(3.229)	(3.454)	(3.494)	(3.380)	(3.311)	(3.352)
Same industry	−0.999	−0.897	−0.920	−0.945	−0.935	−0.925	−0.915	−0.977	−0.956
	(1.055)	(1.035)	(1.020)	(1.044)	(1.036)	(1.032)	(1.018)	(1.029)	(1.021)
Geographic distance	−0.000^{+}	−0.000^{+}	−0.000	−0.000^{+}	−0.000^{+}	−0.000^{+}	−0.000^{+}	−0.000^{+}	−0.000^{+}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size difference	−0.019	−0.015	−0.012	−0.016	−0.021	−0.020	−0.018	−0.018	−0.017
	(0.034)	(0.033)	(0.033)	(0.033)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Prior tie	0.538	1.168	0.764	0.997	0.943	1.036	0.707	0.866	0.710
	(1.038)	(1.085)	(1.026)	(1.079)	(1.050)	(1.040)	(0.994)	(1.044)	(1.016)
Inverse Mills ratio	4.481	4.500	4.253	4.520	4.452	4.462	4.219	4.408	4.274
	(3.738)	(3.775)	(3.695)	(3.749)	(3.758)	(3.753)	(3.703)	(3.710)	(3.705)
Constant	0.618	0.009	0.485	0.417	−0.557	−0.565	0.057	−0.833	−0.377
	(8.609)	(8.715)	(8.661)	(8.641)	(8.693)	(8.706)	(8.693)	(8.661)	(8.714)
Industry effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)

(Continues)

Table III. (Continued)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*
Year effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)
Observations	908	908	908	908	908	908	908	908	908
R-squared	0.146	0.151	0.157	0.147	0.155	0.155	0.160	0.161	0.162
F-test for model significance	1.865***	2.021***	2.168***	1.990***	1.987***	2.039***	2.180***	2.343***	2.339***
F-test for model improvement compared to model		7.30** (Model 1)	8.38** (Model 2)	2.60 (Model 1)	9.80** (Model 1)	5.28** (Model 1)	6.38* (Model 6)	8.53** (Model 6)	5.29** (Model 6)

Note: Acquirer-clustered standard errors in parentheses.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; $^{+}p < 0.1$.

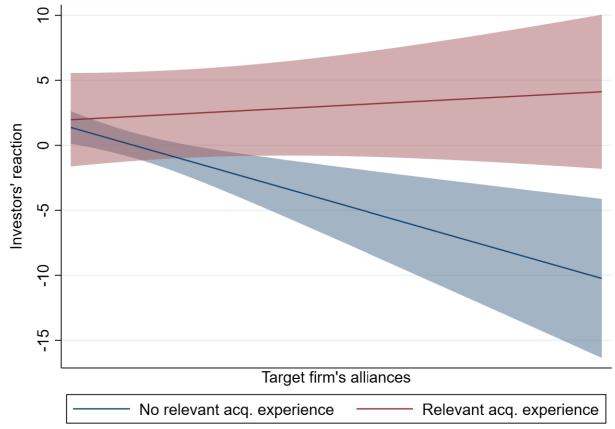

Figure 3. Moderating effect: acquirer experience of acquiring targets with alliances

Sensitivity Analyses

We perform additional analyses to test the robustness of our results. First, we check the sensitivity of our findings in relation to the independent variables. We re-estimate our models when the variables of a target's alliances and the acquirer's relevant acquisition experience are not log-transformed numbers but instead use simple count measures. Models 1 and 2 in Table IV demonstrate that the coefficients are similar in direction, albeit weaker in magnitude. They continue to be significant when these variables are not log-transformed. The results also persist when the observation windows for a target's alliances and an acquirer's relevant acquisition experience are extended from three to five years (Models 3 and 4).

Second, we test the robustness of our results to changes in the measurement of investors' reactions. Extending the time window for observing investors' reactions from three days to five days (Models 5 and 6) and 12 days (Models 7 and 8) revealed that the effect persists over time. Moreover, our findings do not change with winsorizing or removing potential outliers in the investors' reactions (those identified as the five deals with the largest and the five with the least investors' reactions).

Third, event study research is subject to a general concern about confounding events potentially affecting investors' reactions (Clougherty and Duso, 2009; Li et al., 2021). Therefore, we perform a subsample analysis that excludes acquisitions with confounding events. These acquisitions are identified as those in which the acquirer was involved in an acquisition, alliance, or other major corporate event announced in the five-day window around the announcement of our focal acquisition. Although this reduces the sample size by 217 deals, our results remain robust (Models 9 and 10).

Next, we check whether our results hold across target alliances covering different functional areas and of different functional breadth. When counting alliances by functional area (licensing, R&D, marketing, or manufacturing), we find that all the count variables have a significantly negative effect (Models 11 to 14). To test the effect of the functional breadth of alliances, we split alliances into broad ones, covering at least two fields, and narrow ones. Both variables result in negative reactions from investors, but the effect is somewhat more

Table IV. Sensitivity checks

	No log-transformations		*Five-year alliances and experience*		*Investors' reaction [t-1; t+3]*		*Investors' reaction [t-1; t+10]*		*No confounding events*	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*	*Model 10*
Target firm's alliances	−0.302***		−2.345**		−2.478**		−4.313***		−2.945**	
	(0.089)		(0.740)		(0.948)		(1.256)		(1.047)	
Target firm's alliances × Relevant acq. experience	0.009**		0.717**		1.231*		1.849**		1.237*	
	(0.003)		(0.242)		(0.562)		(0.671)		(0.542)	
Domestic alliances		−0.085		−1.293		−0.963		−1.180		−1.567
		(0.276)		(0.969)		(1.147)		(1.656)		(1.238)
International alliances		−0.633*		−2.510^{+}		−3.308*		−6.580**		−3.604*
		(0.298)		(1.317)		(1.636)		(2.268)		(1.607)
Domestic alliances × Relevant acq. experience		−0.019		0.502		0.717		0.726		0.974
		(0.017)		(0.336)		(0.545)		(0.755)		(0.674)
International alliances × Relevant acq. experience		0.059*		0.561		1.130		2.244*		1.061
		(0.030)		(0.466)		(0.743)		(1.057)		(1.028)
Relevant acq. experience	0.084	0.106^{+}	0.669	0.690	0.665	0.752	0.181	0.324	0.192	0.128
	(0.051)	(0.058)	(0.646)	(0.647)	(0.838)	(0.855)	(1.017)	(1.036)	(0.790)	(0.796)

(Continues)

Table IV. (Continued)

	No log-transformations		*Five-year alliances and experience*		*Investors' reaction [t-1; t+3]*		*Investors' reaction [t-1; t+10]*		*No confounding events*	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*	*Model 9*	*Model 10*
Industry effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)
Year effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)
Control variables	(included)	(included)	(included)	(included)	(included)	(included)	(included)	(included)	(included)	(included)
Observations	908	908	908	908	908	908	908	908	691	691
R-squared	0.152	0.153	0.161	0.163	0.153	0.154	0.160	0.166	0.142	0.145

	Alliance functional area				*Broad versus narrow alliances*		*Alliance governance*	
	Model 11	*Model 12*	*Model 13*	*Model 14*	*Model 15*	*Model 16*	*Model 17*	*Model 18*
Licensing alliances (ln)	−1.614*							
	(0.755)							
R&D alliances (ln)		−2.076*						
		(0.903)						
Marketing alliances (ln)			−1.931*					
			(0.861)					
Manufacturing alliances (ln)				−2.169+				
				(1.257)				
Narrow alliances (ln)					−1.481*			
					(0.737)			

(Continues)

Table IV. (Continued)

	Alliance functional area				*Broad versus narrow alliances*		*Alliance governance*	
	Model 11	*Model 12*	*Model 13*	*Model 14*	*Model 15*	*Model 16*	*Model 17*	*Model 18*
Broad alliances (ln)						−2.450*		
						(0.964)		
Joint venture alliances (ln)							−1.076	
							(1.404)	
Contractual alliances (ln)								−1.666**
								(0.615)
Relevant acq. experience	1.209	1.186	1.229	1.239	1.182	1.195	1.164	1.186
	(0.758)	(0.751)	(0.763)	(0.764)	(0.753)	(0.756)	(0.751)	(0.755)
Industry effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)
Year effects	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)	(fixed)
Control variables	(included)	(included)	(included)	(included)	(included)	(included)	(included)	(included)
Observations	908	908	908	908	908	908	908	908
R-squared	0.149	0.150	0.149	0.148	0.149	0.151	0.146	0.151

Note: Acquirer-clustered standard errors in parentheses.
***p < 0.001; **p < 0.01; *p < 0.05; $^{+}$p < 0.1.

pronounced for broad alliances (Models 15 to 16). Finally, when we distinguish between contractual alliances and joint ventures (the latter are a minority in our sample), we find negative coefficients for both alliance types, but only the coefficient of the former is also statistically significant (Models 17 to 18). All these checks increase our confidence in our findings.

DISCUSSION

We studied the role of an unexplored acquisition feature—namely the ambiguity surrounding an acquisition's anticipated synergies—that we contended jeopardizes investors' capacity to evaluate acquisitions during the brief period of an acquisition announcement. To capture such ambiguity, we observed the extent to which target firms were engaged in strategic alliances at the time of their acquisition. We predicted and found empirical support that the more alliances an acquisition target has, the greater the adverse effect on investors' reactions. We also found evidence that this negative effect is exacerbated by international alliances but attenuated when an acquirer has experience in acquiring targets with alliances. Thus, although alliances are generally perceived as value-creating arrangements (Anand and Khanna, 2000; Lunnan and Haugland, 2008), our theory and findings indicate investors react negatively to potential acquisition synergies that depend on targets' alliances and redeployment of their resources because of the ambiguity they associate with such transactions.

Contributions to the Literature

Our study contributes to management research in three major ways. First, we respond to calls for more research from a behavioural perspective on investor reactions to corporate events (Benner and Zenger, 2016; Schijven and Hitt, 2012) by undertaking the first study of the impact of alliance-engendered ambiguity on investors' responses to acquisitions. In doing so, our research complements previous studies that have attributed investors' biased reactions to a limited cognitive ability to decipher the value of hard-to-understand acquisitions (Aalbers et al., 2021; de Groote et al., 2021; Litov and Zenger, 2011). Although cognition-based explanations are valuable, they are likely most applicable to deals with characteristics inconsistent with an investor's background and experiences, such as those leading to unique or novel business combinations. Unlike these previous studies, our research focused on cases in which investors cannot access—let alone understand—information critical for evaluating the anticipated synergies arising from an acquisition.

Using the context of acquisitions of targets with alliances, we theorized and found evidence consistent with the view that a target firm's engagement in alliances undermines investors' ability to evaluate such acquisitions. Therefore, from an investor's perspective, a target firm's alliances appear to represent structural barriers that prevent the flow of information encoded therein and reduce investors' ability to access information critical for evaluating the target firm's alliance-based resources. Furthermore, the uncertain re-deployability of these resources makes ambiguity-averse investors susceptible to focusing on the worst-case scenario in terms of the potential synergies stemming from such alliances. Thus, our study provides a viable explanation for investors' unfavourable reactions to acquisitions when these deals

display structural characteristics that deny investors material information about the nature and prospects of such deals. With appropriate modifications, our framework can be used to analyse stock market responses to other corporate events with similar structural characteristics, including acquisitions of 'opaque' state-owned firms (Li et al., 2019) or nested acquisitions in which the integration of recently acquired businesses by the target firm is ongoing (Zorn et al., 2019).

Second, we contribute to the emerging research stream in the literature regarding the intersection of alliances and acquisitions as alternative modes of corporate development. Most prior work has explored different sources of complementarity between the two forms, including performance advantages when firms organize exploration and exploitation across acquisitions and alliances (Stettner and Lavie, 2014); when the merging firms have pre-existing ties with one another (Porrini, 2004; Zaheer et al., 2010); or when acquirers consider a target firm's interfirm relationships to be a proxy for a firm's underlying quality or reduced information asymmetry (Mazzola et al., 2016; Ozmel et al., 2013). However, more recently, some of the literature on strategic management has highlighted how alliances and acquisitions may interfere with one another. Thus, acquisitions have been blamed for increasing the likelihood of alliance instability (Tandon et al., 2023) and for reducing the value of an existing alliance when the other partner in the alliance acquires a target firm that competes with the focal firm (Lavie et al., 2022).

Our study extends this perspective by revealing a negative interaction between the two modes: during acquisitions, a target's alliances make the materialization of synergies more ambiguous for investors and lower an acquirer's market value. This finding has implications for the perceived value of relational resources (Dyer et al., 2018; Dyer and Singh, 1998; Lavie, 2006) by highlighting its contingent nature. That is, although investors perceive alliances to be valuable relational assets when the firms involved remain autonomous for the duration of the alliance (Anand and Khanna, 2000; Lunnan and Haugland, 2008), they consider them risky and uncertain relational assets when ownership is transferred through an acquisition.

Third, we contribute to research on how ambiguity impacts strategy and its evaluation by moving beyond theoretical modelling. Sakhartov (2018), parametrizing ambiguity as arising when investors lack information about the costs of and anticipated returns from unique resource redeployment, predicted ambiguity will cause the stock market to undervalue a firm's resources when it redeploys them to enter a new business. Our study adds to this theoretical research by operationalizing ambiguity in the context of acquisitions of target firms engaged in alliances and showing that alliance-engendered ambiguity triggers negative reactions by investors. Thus, we provide broad support to Sakhartov's prediction that, although managers may have unique value-creation insights in relation to resource redeployment, informationally constrained investors react unfavourably to such initiatives if they perceive them as ambiguous.

Limitations and Suggestions for Future Research

As with most studies, this study's findings and contributions need to be considered in light of its limitations. Ideally, we would have liked to use more precise information on the nature

and value of alliances so as to estimate more accurately the value embedded in the relational assets of target firms when associating their alliances with reactions in the stock market. In addition, the availability of information on the timing of alliances and their provisions for dissolution would permit us to relate the long-term value-enhancing nature of target alliances to either their continuation or their restructuring. Thus, future research might seek to address these questions by identifying and focusing on samples of firms for which the financial and operational details of their acquisitions and alliances are available.

Furthermore, in keeping with a long tradition of strategy research in the evaluation of the performance consequences of major corporate events, our study used the moment when an acquisition was announced to assess the effect on an acquirer's market value when the acquisition involves target alliances. In the future, it would be interesting to examine whether the short-term performance differences attributed to targets' alliances are sustained over longer time horizons, such as two or three years (e.g., Rabier, 2017). Considering long-term stock market reactions could enable the analysis to capture how analysts' and investors' perceptions may be changing as a deal unfolds and more of its information enters the public domain. Similarly, it would be useful to test whether differences in investors' reactions continue to pertain if alternative performance indicators are used (Cording et al., 2010), such as Tobin's q, which combines accounting and market performance (Zorn et al., 2019).

Finally, in this study, we have considered the consequences of the stock market's reaction to acquisitions when some of a target's resources are embedded in alliances. Our approach could be extended to include the influence of complementarities between the alliance portfolios of the acquiring and the acquired firms in each deal. Previous strategy research has emphasized the importance of complementary differences in relation to resource redeployment opportunities (Bauer and Matzler, 2014; Wassmer and Dussauge, 2011). Given that context, the examination of synergistic opportunities with reference to varying degrees of alliance portfolio complementarity offers a promising avenue for future research.

Implications for Management Practice and Policy Making

Notwithstanding the above limitations, this study has important practical implications for managers and policy-makers. Our findings demonstrate that investors often, but not always, take a dim view of acquisitions of targets with alliances. Investors' strong negative reactions that are triggered by ambiguity seem to be curbed when they have adequate information about the alliances of the target firm (e.g., in the case of domestic alliances) or some information that can serve as a proxy for their synergistic potential (e.g., when acquirers possess relevant acquisition experience).

Reflecting on these findings, we suggest that acquiring managers should strive to alleviate investors' informational deficit by sharing details about the nature and anticipated value of the alliances of their target as soon as they announce their acquisition intention. For this purpose, they need to put in place a clear communications strategy that includes details of how the alliances of their target can contribute to the overall value creation anticipated from the acquisition. Acquiring managers should also explain what specific steps they plan to take to maintain, manage, and leverage the alliances of their target (e.g., Hughes and Perrons, 2011). Such clear and timely communications could enable managers to avoid misunderstandings and dispel rumours about the survival and evolution of target firms'

alliances —especially when these involve foreign partners about whom investors' information is more limited —that can trigger adverse speculation and stock market reactions.

Furthermore, our study has implications for the target selection approach of firms that aspire to acquire targets with alliances but lack relevant acquisition experience. Our findings indicate that the managers of such acquirers should aim for a gradual engagement with increasingly more alliance-intensive targets. By adopting this more measured approach, acquirers are less likely to trigger the negative stock market responses that we detected when they lack relevant experience and plan to acquire alliance-rich targets.

Finally, our study has implications for policymakers concerned with the efficient functioning of capital markets and markets for corporate resources and control. While acquisitions of target firms with alliances can create synergies and longer-term value (Feldman and Hernandez, 2022; Hernandez and Menon, 2018), our findings show that they diminish acquirer shareholder value upon announcement. Our results suggest this disconnect stems from a paucity of information available to shareholders about the potential for relational synergies between acquirers and target firms. This capital market inefficiency may be transmitted to markets for firm resources and control. Because acquisitions that are met with strong negative stock market reactions are more likely to go uncompleted (Luo, 2005), the negative market reactions associated with targets with alliances may lead acquirers to forego value-creating combinations.

Our study implies that increasing the availability of useful information about firms' alliances could reduce these market inefficiencies. An important purpose of both regulation and accounting standards is to increase transparency and reduce information asymmetries among market participants so as to enhance market efficiency (Healy and Palepu, 2001; Khan et al., 2018). Policymakers should therefore consider implementing regulations and accounting standards that promote greater transparency and disclosure of information about strategic alliances to ensure investors can make informed decisions that promote market efficiency.

CONCLUSION

Our study contributes to the growing research on the behavioural underpinnings of investors' reactions to acquisition announcements by offering a novel explanation for the long-standing puzzle in management research of why investors generally react unfavourably to acquisition announcements despite the popularity of M&A. Although investors' cognitive limitations may well prevent them from understanding and evaluating particular types of acquisitions objectively, we have focused here on cases in which investors cannot access —let alone understand —information critical for assessing an acquisition's anticipated synergies. Conceptualizing acquisition ambiguity as what investors experience when they lack important information relevant to the evaluation of an acquisition, we postulated and found supporting evidence for the notion that investors react negatively to alliance-engendered acquisition ambiguity because they are wary of the synergistic potential of the alliances therein. Our study contributes to management research by revealing how, when an acquisition's structural characteristics limit investors' access to material information about anticipated synergies, the attendant ambiguity jeopardizes

investors' capacity to evaluate the acquisition during the brief period associated with its announcement.

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NOTES

[1] The resource-based view of the firm is also concerned with ambiguity, but the emphasis is on 'causal ambiguity'. This is about individuals' lack of understanding of 'the nature of the causal connections between actions and results' (Lippman and Rumelt, 1982, p. 420). This construct differs from the focus of our framework on what investors experience when they lack access to financial and operational information that investors use as input into their standard equity valuation tools to estimate the effect on an acquirer's market value from potential incremental cash flows relating to target alliances.

[2] Investors' informational incompleteness can be caused by other deal characteristics. These include cases such as when the acquired firms are privately held (see publicly traded), and investors experience higher informational search costs and valuation difficulties (Capron and Shen, 2007). Although this type of informational deficit can increase evaluation uncertainty, it differs from ambiguity because investors can collect the requisite information from companies' accounts, tax filings, and strategy documents to estimate the probability distribution of anticipated synergies. Our analysis controls for the acquired firm's public status and other characteristics that may increase uncertainty.

[3] Following the approach by Westphal and Graebner (2010), we conducted exploratory interviews to understand the views of key stakeholders in M&A. We carried out 15 semi-structured interviews during March–June 2019 with corporate development executives of technology corporations and equity analysts who cover such firms. The interviews lasted between 40 and 60 minutes. All interviews were recorded, transcribed, and systematically analysed. The interview protocol we used in the interviews with executives consisted of questions about the general acquisition process; the role of a target's strategic alliances in the target selection and the due diligence processes; and their expectation about how target alliances impact the realization of synergies. The protocol used to interview equity analysts included questions about the general acquisition evaluation process and most popular tools; whether and how analysts consider a target's strategic alliances in acquisition evaluation; and whether certain types of alliances influence acquisition evaluations more.

[4] As can be seen from Table III, the introduction of target alliances in Model 2 significantly increases model fit compared with Model 1 ($F = 7.30$, $p < 0.01$), which contains only the control variables. Then, the addition of the interaction effect of relevant acquisition experience and target alliances in Model 3 leads to significantly increased model fit compared with Model 2 ($F = 8.38$, $p < 0.01$). A similar conclusion is reached when considering the F-tests for model improvement across all the other models of the table, except for Model 4, which accounts for only domestic alliances in addition to the variables of Model 1.

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APPENDIX A

Table AI. First-stage probit regression model predicting acquisition timing

	Model 1	*Model 2*	*Model 3*
Industry acquisition intensity (ln)			0.097***
			(0.020)
Firm age		−0.001	−0.000
		(0.001)	(0.001)
Firm assets (ln)		0.212***	0.210***
		(0.005)	(0.005)
Firm leverage		−0.067^{+}	−0.068*
		(0.034)	(0.034)
Firm liquidity		0.013^{+}	0.012
		(0.008)	(0.008)
Firm R&D intensity		−0.000	−0.000
		(0.000)	(0.000)
Constant	−1.493***	−2.370***	−2.599***
	(0.112)	(0.127)	(0.136)
Industry effects	(fixed)	(fixed)	(fixed)
Year effects	(fixed)	(fixed)	(fixed)
Observations	16,320	16,320	16,320
Log-likelihood	−6530	−5237	−5225

Note: Standard errors in parentheses.
***p < 0.001; **p < 0.01; *p < 0.05; $^{+}$p < 0.1.