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Derek Ruth

Dinesh N. Iyer

Barton M. Sharp

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Derek Ruth [a,*], Dinesh N. Iyer [b,1], Barton M. Sharp [c,2]

[a] Purdue University Calumet School of Management, Anderson Building, Room 356, 2200 169th Street, Hammond, IN 46323-2094, United States
[b] Ohio University College of Business, Copeland Hall, Athens, OH 45701, United States
[c] Northern Illinois University, Department of Management, Barsema Hall, Dekalb, IL 60115, United States

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ABSTRACT

This study considers the decision to undertake an acquisition using a framework built around the concepts of motivation and ability to acquire. The paper develops an integrative model to examine how firm characteristics contribute to motivation and ability in predicting the likelihood of an acquisition and draws on two streams of literature to motivate the model: behavioral theory of the firm to explain a firm's motivation to acquire, and absorptive capacity to explain a firm's ability to acquire. Results from a publicly traded sample show that firms failing to meet aspirations (i.e., those with motivation) are more likely to acquire, as are firms that have a high absorptive capacity (i.e., those with ability). Most interestingly, absorptive capacity moderates the influence of performance shortfalls in the decision to acquire and is most important when the motivation to acquire is low.

1. Introduction

The rationale for acquisition activity has primarily been that firms seek higher performance (Bergh, 1997; Hoskisson & Hitt, 1990) and create value from economies of scale and scope, market power, and learning (Hitt, Ireland, & Harrison, 2001). The extant literature pays considerable attention to the post-acquisition performance of acquisitions (Ahuja & Katila, 2001; King, Dalton, Daily, & Covin, 2004). However, comparatively less is known about the antecedents of these acquisitions, particularly as it relates to their timing (Iyer & Miller, 2008). The decision to acquire may be driven by a firm seeking efficiency (Bailey & Friedlaender, 1982) trying to gain quick access to a target firm's market, resources, and capabilities, overcoming entry barriers (Chang & Rosenzweig, 2001), potential synergies (Porter, 1980, 1985), agency problems (Jensen, 1988), lowering the cost and risks associated with product development, or developing new capabilities. Firms face the need to continually innovate (Nelson, 1995; Rosenkopf & Nerkar, 2001; Teece, Pisano, & Shuen, 1997) and failing such innovation, newer, more innovative products tend to overtake older, less innovative ones in the marketplace. Given the challenge to innovate, many firms face erosion of their competitive advantage when they are unable to meet their need for innovation through in-house development (Rigby & Zook, 2002). Beyond relying on internal processes such as research and development (R&D) activities to create innovations, firms may turn to the acquisition of other companies as a means of gaining access to innovations (e.g., Ahuja & Katila, 2001; Rigby & Zook, 2002).

This paper introduces an integrative model of the decision to acquire, arguing that the decision to acquire is affected not only by the *motivation*, but also by the *ability*, to undertake an acquisition. The first required element, motivation, can range from managerial opportunism and self-interested behavior (Jensen, 1988), to seeking the best outcomes for shareholders. Iyer and Miller (2008) study firm level factors in acquisition timing, as opposed to economy- or industry-wide influences, and consider behavioral motivations as an antecedent to acquisitions. The behavioral theory of the firm (Cyert & March, 1963) holds that firms engage in search in response to performance feedback (Cyert & March, 1963; Levinthal & March, 1981) and Iyer and Miller (2008) suggest that this search may lead to acquisitions.

While motivation is a necessary antecedent to acquisitions, firms must also have the *ability* to identify and successfully integrate targets. The extant literature has considered the ability to acquire to depend on the availability of slack resources (Jensen, 1993; Penrose, 1959) or the potential synergy between acquirer and target firms (Chatterjee & Wernerfelt, 1991; Porter, 1980, 1985; Silverman, 1999) that may result in more market power through increased scale and scope. While Iyer and Miller (2008) consider performance feedback as a primary motivation for acquisition timing, they also consider slack and distress to be other factors to which the firm responds. Although financial slack is normally a required element, it seems evident that it takes more than monetary resources for a firm to successfully acquire. Financial slack can be available to multiple firms and hence distinguishing which ones are likely to engage in

* Corresponding author. Tel.: +1 765 532 1477.
E-mail addresses: ruthda@purduecal.edu (D. Ruth), iyer@ohio.edu (D.N. Iyer), bsharp1@niu.edu (B.M. Sharp).
[1] Tel.: +1 740 593 9170.
[2] Tel.: +1 815 753 6309.

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an acquisition requires a deeper understanding of ability. One such ability is that some firms are better equipped to identify targets and – perhaps more importantly – to make use of the knowledge they possess. Cohen and Levinthal (1990) refer to this capability as absorptive capacity, defining it as the ability of a firm to acquire, assimilate, transform, and exploit knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002). Given the high cost of acquisitions, the identification of the right target among a large number of firms is essential. Thus, firms with higher levels of absorptive capacity are better able to evaluate potential targets and separate the wheat from the chaff, and thus should be more likely to make an acquisition than counterparts with less absorptive capacity. So, while motivation is necessary, the ability to acquire also plays an important role in the decision to acquire. Further, while motivation and ability each influence acquisition activity, this framework argues that the combined effect is also an important consideration.

Prior applications of behavioral theory focus primarily on the influence of performance feedback on business-level strategy and search behaviors. For example, behavioral theory has been used to explain business level decisions such as search through increased R&D spending (Hundley, Jacobson, & Park, 1996), new ways of doing R&D (Bolton, 1993), and innovation and organizational learning (Greve, 2003a, 2003b). Although a firm may engage in different types of search, this paper focuses on one of the possible outcomes of these search activities: the likelihood of acquiring another firm. Underperformance, as understood in behavioral theory, might serve to motivate executives to consider making an acquisition aimed at restoring performance to expected levels. Adding to that nascent stream of research is one of this study's primary contributions. The focus of this paper is to extend the behavioral theory literature by demonstrating that failure to meet aspirations in innovative output influences corporate strategy. Specifically, the authors expect that a discrepancy between performance and aspirations in innovation will lead firms to search for solutions in order to close the performance–aspiration gap. Other studies of performance feedback to which firms respond typically focus on financial and accounting measures such as return on assets (e.g., Iyer & Miller, 2008), free cash flow, and net income. The authors extend theory here by introducing the notion that firms adjust their corporate strategy in response to underperformance in non-financial areas, specifically in innovative output. The authors also expand the understanding of acquisition behavior further by suggesting that both motivation and ability are necessary, and that the presence of both will have a reinforcing effect on the likelihood of acquisition.

2. Theory and hypotheses

Prior research indicates that firm performance hinges in part upon its ability to innovate (e.g., Bowen, Rostami, & Steel, 2010), and hence poor performance in innovation may increase the motivation of managers to act in order to close the performance gap. One potential response to underperformance in innovation would be to obtain innovations outside the organization by acquiring another firm. The behavioral theory of the firm suggests that a change in performance, specifically recent performance (Cyert & March, 1963; Levinthal & March, 1981), is a critical factor in motivating managerial action. More specifically, behavioral theory speaks not to absolute performance, but rather to performance relative to expectations. Iyer and Miller (2008) make the extension of search in response to underperformance to corporate level decisions—namely acquisitions. They find that acquisition activity increases as financial performance approaches aspirations below firm aspiration levels. Instead of using financial performance as a motivating factor, this paper expands the domain of behavioral theory by considering firm performance in terms of innovation.

For innovative firms that rely on innovation to establish competitive advantage, falling short of their expected level of innovation is likely to motivate managers to find ways of restoring innovative output. One option available to them would be to invest more heavily in research and development in order to jump-start innovation internally. However such spending increases may not always be the best option. First, given the uncertain nature of innovation, increased spending does not necessarily translate to improved output. Researchers show that the efficiency with which R&D expenditures become valuable innovations depends on the degree to which a company is able to integrate technologies across domains and functions (Amir-Aslani & Negassi, 2006), the firm's decision to cooperate within a group of firms (Cefis, Rosenkranz, & Weitzel, 2009), corporate diversification decisions (Desyllas & Hughes, 2010), and economies of scale and scope related to the size of the firm's R&D operation (Henderson & Cockburn, 1996). Spending more money is no guarantee of more innovation. Second, internal development can be a slow process, causing innovative output to be below expectations for longer than managers would prefer. Finally, managers who observe the innovative outputs of their firm fall short of expectations may also feel that increased spending on internal development efforts would be ineffective. In these situations, acquiring an existing stock of innovations may be seen as a more immediate, less risky course of action. Supporting this notion, King, Slotegraaf, and Kesner (2008) find that some acquisitions act as a substitute for internal knowledge development through R&D. When internal R&D fails to produce the expected level of innovative output, managers are likely to look elsewhere. Hence failure to meet aspirations for innovation may motivate firms to pursue an acquisition. Therefore, the authors predict a positive relationship between failure to meet innovative aspirations and the decision to acquire:

Hypothesis 1. Performance below aspirations with respect to innovations increases the likelihood of acquisition.

However, the motivation to acquire is likely to be insufficient. Firms must also have the ability to identify suitable targets, and be confident in their ability to successfully integrate the knowledge and capabilities of the target firm post-acquisition. The construct of absorptive capacity (Cohen & Levinthal, 1989, 1990) is a useful perspective from which to view this process. Cohen and Levinthal (1989) define the construct as the ability to "identify, assimilate, and exploit knowledge from the environment." (Pg. 569) Thus the construct represents how skillfully a firm can find, understand, internalize, and use knowledge outside the firm to their advantage. This carries two implications for the decision to acquire. First, while there is little doubt that a firm must have slack resources in terms of cash, debt capacity, and managerial time in order to make an acquisition, the problems associated with identifying suitable targets, collecting and absorbing information about the targets necessary to identify the most promising one, and applying that information to their internal decision-making process must also be addressed. All else being equal, firms that are high in absorptive capacity will have an advantage in being able to understand who the potential targets are, what each of them has to offer in terms of knowledge stocks and innovative capabilities, and to assess which potential targets would best fit the firm's needs. Firms that are lower in absorptive capacity will be less capable of finding suitable acquisition targets and thus less likely to acquire.

The second implication concerns the firm's potential to benefit from an acquisition. A firm that is high in absorptive capacity will be better able to internalize the knowledge resident in an acquisition target and will thus have more opportunities for recombining knowledge (Fleming, 2001). This should ultimately lead to increased innovative output (Henderson & Cockburn, 1996; Wu & Shanley, 2009). Knowledge is "sticky", and simply eliminating the firm boundaries

between those who have the knowledge and those who do not is insufficient to ensure that sharing will occur (Szulanski, 1996). Acquisitions are unlikely to improve the innovative performance of a firm if the firm is unable to absorb and apply the knowledge which resides in the target (Flowers, 2007; Peter J. Lane & Lubatkin, 1998). Partial support for this supposition is found in Jones, Lanctot, and Teegen (2001), who find that internal technical resources (a proxy for absorptive capacity) have a weak but positive moderating effect on the relationship between external technology acquisition and firm performance. Managers would be less likely to pursue an acquisition if their firm lacks the absorptive capacity necessary to reap the benefits. Prior studies propose that the ability to learn from another firm will guide the partner selection decision (Hitt, Dacin, Levitas, Arregle, & Borza, 2000; Peter J. Lane & Lubatkin, 1998). This logic is extended to the decision to acquire, suggesting that firms with more absorptive capacity will be more likely to acquire.

Hypothesis 2. Absorptive capacity is positively associated with the likelihood of acquisition.

In addition to the prediction that acquisitions are driven by both innovation shortfalls (motivation) and absorptive capacity (ability), the authors expect a reinforcing relationship between motivation and ability. In other words, the likelihood of acquisition will be highest in firms that have both the motivation and the ability to acquire. If underperformance in innovation motivates an acquisition, managers overseeing firms with little absorptive capacity and thus little ability to gain advantage from the knowledge contained in a target will be less likely to acquire. Similarly, no amount of absorptive capacity will lead a firm to make an acquisition unless there is some underlying knowledge-based motivation to do so. Acknowledging that a failure to meet aspirations in innovation is only one of many potential motivators of an acquisition, and that absorptive capacity is only one of many necessary abilities that make an acquisition possible, the authors expect that, ceteris paribus, absorptive capacity positively moderates the relationship between failure to meet innovative aspirations and the likelihood of acquisition.

Hypothesis 3. Absorptive capacity positively moderates the relationship between failure to meet aspirations in innovation and the likelihood of acquisition.

3. Methods

3.1. Sample

The study's sample draws from data sources spanning the years 1980 to 2000. The incidence of an acquisition is identified using the SDC M&A Database. The patent data was obtained by downloading records from a USPTO repository library, and the remaining variables, including controls, were drawn from the COMPUSTAT Database. The sample consists of firms in manufacturing industries (SIC codes 2000 to 3999), which help mitigate the possibility of confounding results due to inter-sector differences (Brush, 1996; Davis & Thomas, 1993; Hitt & Hoskisson, 1996). Since data from the SDC M&A and COMPUSTAT share a unique firm identifier, it is easy to merge data from both databases into the same dataset. The patent database, however, does not use the same firm identification system and so firms were matched using a text-matching algorithm that compares company names between the two databases. The algorithm involves cleaning and standardizing names in order to eliminate punctuation and harmonize elements of an organizational name that could potentially be entered differently across databases. After matching the names across databases, a concordance table matching CUSIP identifiers from COMPUSTAT to Assignee Numbers from the patent data is used for all data collection activities.

3.2. Variables

3.2.1. Dependent variable

The SDC database provides data on announcement dates for all intended acquisitions. The dependent variable in all analyses, Decision to Acquire, is a dichotomous variable that takes the value of one for the year in which that firm announces an acquisition, and zero otherwise. The dependent variable is measured for year *t*. The longitudinal nature of the data allows hypothesis testing using lagged independent variables. This partially accounts for the unobservable delays between problem recognition and announcement. Table 1 reports the acquisition events in the dataset by year.

3.2.2. Attainment discrepancy

Following prior research (Greve, 2003a, 2003b; Iyer & Miller, 2008), the authors use prior performance of the firm to determine whether the firm was above or below their aspirations. The performance variable, innovative output, is measured using patent data. Patenting allows firms to protect their innovations from competition by other firms. New knowledge created and recorded in patents represents the portfolio of knowledge for a firm (Ahuja & Katila, 2001; Jaffe, Trajtenberg, & Henderson, 1993). Recent patenting output is the baseline measure of aspirations. To the extent that firms patent more or less than they had in the recent past, they were considered to be over- or under- performing relative to their aspirations. In other words, recent performance is determinative of aspirations. This study uses an internally-referenced aspiration target based on the firm's own prior performance, rather than an externally-referenced aspiration target such as industry average, due to the nature of patenting. Where some firms protect technologies with patents, others rely on trade secrets. Since firms differ in their propensity to patent, comparing a given firm to an industry average number of patents would likely give a false sense of whether or not the firm was meeting aspirations for innovative output.

The least squares slope of the most recent 3 years' patenting output is used (from $t-3$ to $t-1$), where a positive slope indicates a recent increase in the rate of innovation – that is performance above aspirations – and a negative slope indicates a recent decrease in the rate of innovation—that is performance below aspirations. The results were robust to the use of traditional attainment discrepancy measures using a simple difference of the firms' previous 2 years'

Table 1
Acquisition events by firm–year.

Acquisition			
Year	No	Yes	Total
1980	2097	19	2116
1981	2073	117	2190
1982	1961	221	2182
1983	2055	301	2356
1984	2073	348	2421
1985	2205	202	2407
1986	2188	260	2448
1987	2251	276	2527
1988	2153	319	2472
1989	2024	386	2410
1990	1983	375	2358
1991	2023	398	2421
1992	2063	461	2524
1993	2196	553	2749
1994	2272	643	2915
1995	2339	683	3022
1996	2411	782	3193
1997	2394	839	3233
1998	2162	907	3069
1999	2179	789	2968
2000	2132	792	2924
Total	45,234	9671	54,905

patenting output. This approach is grounded in previous work on behavioral theory, indicating that firms set future aspirations based on historic performance. Table 2 reports data on patenting firms and the distribution between acquiring and non-acquiring firms.

There is another potential issue to address, however. Measuring attainment discrepancy as the slope of patenting activity ignores one potentially important factor: the quality or economic importance of a particular patent. A company holding one blockbuster patent could be content to harvest the value generated by that patent and not be spurred to problemistic search should they not receive patents in the following years. However, this possibility adds credibility to any finding of acquisition activity for below-aspiration firms, and hence provides conservative estimates.

3.2.3. Absorptive capacity

Since the introduction of absorptive capacity (Cohen & Levinthal, 1989), most studies use R&D intensity as a proxy following Cohen and Levinthal (1990). While the amount of money spent on research and development likely relates to the volume of a firm's knowledge and its ability to learn, it is not above criticism as a proxy. Recent research points out that work to date in absorptive capacity has been conducted largely by rote without sufficient examination, understanding, or criticism of the construct and its operationalization (see Lane, Koka, & Pathak, 2006).

Instead, this study uses the breadth of technological experience as a proxy for absorptive capacity. While still a simplification of a complex phenomenon, the number of technology classes spanned by a firm's inventions is consistent with Cohen and Levinthal's formulation of the construct. They explicitly recognize that possessing a breadth of knowledge makes a firm better able to recognize and absorb new knowledge. Where previous researchers focus on the volume of knowledge as represented by the amount of money spent on research or the number of patents received, this study focuses on the dimension of knowledge variety. A firm's breadth of technological knowledge is the count of the number of unique technology classes cited in the patents that the firm owns.

Technology classes indicate the types of technology that comprise the invention. A single patent may cite multiple technology classes. For example, Patent Number 7524150, owned by the Robert Bosch company, covers a common woodworking tool called a router. It is classified in two technology classes: Class 144, for woodworking related technologies; and Class 409, for technologies aimed at cutting, milling, or planning materials. These classifications indicate the areas of technological expertise embodied in that patent and thus held by the company.

3.2.4. Control variables

The control variables were lagged 1 year relative to the dependent variables. All models included controls for year and number of acquisitions using the baseline hazard as a function of the observation year. Table 1 indicates significant variability in the rate of acquisitions from year to year. To account for inter-industry differences, the study includes industry controls at the 2-digit SIC level.

Evidence indicates that firms may learn over time how to better undertake acquisitions (Finkelstein & Haleblian, 2002; Haleblian & Finkelstein, 1999) and become more likely to undertake future acquisitions (Collins, Holcomb, Certo, Hitt, & Lester, 2009; Peng & Fang, 2010). To control for acquisition experience, the study uses an indicator variable that takes a value of 1 if the firm has acquired a firm in the 2 years prior to year t, and 0 otherwise (Iyer & Miller, 2008).

R&D spending is a key control variable to include in this study because of the possibility that R&D spending might act as a substitute or complement to acquisitions (Cassiman & Veugelers, 2006). It is also important to include R&D spending to demonstrate that the knowledge breadth measure of absorptive capacity adds predictive power even when the more commonly used variable is included. R&D intensity is measured as the ratio of R&D spending to sales in year $t-1$.

Since the behavioral theory of the firm concerns firms' response to performance feedback, it is important to control for other potential performance metrics to which managers may be responding in making the acquisition decision. To account for a firm's slack, financial health, and growth opportunities respectively, this study uses Potential Slack, as measured by a firm's debt-to-equity ratio (Bromiley, 1991; Greve, 2003a), Free Cash Flows (Haleblian & Finkelstein, 1999), and Market-to-Book Value (Iyer & Miller, 2008). We control for firm size using Total Assets because firm size may affect both diversification (Bettis, 1981; Montgomery, 1982) and risk taking (Baysinger & Hoskisson, 1989).

3.3. Models

Key to the ability to draw meaningful inferences from the results is the ability to control for acquisitions not undertaken. Doing so requires the inclusion of both firms that undertake acquisitions during the sample period, and those that do not (Folta & O'Brien, 2004; Montgomery & Hariharan, 1991). The analyses include all firms in the Compustat population that have values for variables included in the models. Two factors lead to the selection of the statistical model. First, the dependent variable, Decision to Acquire, is binary, rendering methods such as ordinary least squares inappropriate due to their assumption of a continuous dependent variable (see Kennedy, 1998). Second, the data are longitudinal and inspection of Table 1 indicates a high degree of variability from year to year of the incidence of acquisitions among the sample firms. To account for these factors, the authors use the Cox proportional hazards model as described below:

$$\left(\begin{matrix}\text{Likelihood of}\\ \text{Acquisition}\end{matrix}\right)_{i(t)} = \left(\begin{matrix}\text{Baseline Likelihood}\\ \text{of Acquisition}\end{matrix}\right)_{j(t)} \exp\left[f\left(\begin{matrix}\text{Motivation Ability Control}\\ \text{to Acquire, toAcquire, Variables}\end{matrix}\right)\right]_{i(t-1)} \quad (1)$$

where the hazard rate of firm i undertaking an acquisition at time t is modeled against the baseline hazard rate for a given industry j, at time t. The firm-specific, time-, and industry- hazard rate is affected by independent variables including measures of patenting performance and controls.

4. Results

There are 54,905 firm–year observations in the sample. Table 2 breaks these observations down into acquiring and non-acquiring firms, and then patenting and non-patenting firms. 17.6% of observations in the sample undertook an acquisition (these are firm–year observations and so a given firm may undertake more than one acquisition during the sample period), while 27.5% reported at least one patent in the three most recent years. Table 3 shows the descriptive statistics and correlations for the sample.

The results of the hypothesis tests can be found in Table 4. Models 1 through 5 in Table 4 include the results of the Cox regressions for the entire sample (patenting and non-patenting firms), while Model 6 includes only those firms that had at least one patent in the

Table 2
Acquiring and patenting firm distribution.

Acquisition	Patenting firm		Total
	No	Yes	
No	33,742	11,492	45,234
Yes	6078	3593	9671
Total	39,820	15,085	54,905

Table 3
Descriptive statistics and correlations.[a].

	Variable	Mean	sd	Min	Max	1	2	3	4	5	6	7	8	9	10
1	Decision to acquire	0.19	0.39	0.00	1.00	1.00									
2	Negative attainment discrepancy	−0.31	2.47	−117.50	0.00	−0.09	1.00								
3	Positive attainment discrepancy	1.08	7.88	0.00	373.50	0.07	0.02	1.00							
4	Absorptive capacity	17.09	44.67	0.00	357.00	0.20	−0.38	0.43	1.00						
5	Prior acquisitions	0.21	0.41	0.00	1.00	0.30	−0.10	0.08	0.23	1.00					
6	Slack	0.33	2.21	0.00	343.23	−0.02	0.00	0.00	0.00	0.01	1.00				
7	Total assets	4.48	2.28	−2.92	12.54	0.29	−0.17	0.22	0.47	0.33	0.04	1.00			
8	R&D	1.77	45.03	0.00	4672.00	−0.01	0.00	0.00	−0.01	−0.02	−0.01	−0.03	1.00		
9	Market/book	2.28	3.03	0.19	137.18	−0.01	0.02	−0.02	−0.08	−0.07	−0.05	−0.22	0.07	1.00	
10	Free cash flow	0.00	8.05	−875.61	650.38	0.01	0.00	0.00	0.00	0.01	0.00	0.01	−0.02	−0.01	1.00

[a] There are 29,497 observations. Correlations with absolute values greater than .01 are significant at the $p<.05$ level.

previous 3 years. Model 1 includes the control variables and the results are as expected. Acquisition experience and total assets positively affect the likelihood of acquisitions. The potential slack measure is a negative indicator, and hence the negative coefficient implies a positive effect on the likelihood of acquisitions. As expected, firm level R&D expenditures and available market opportunities as reflected by the market to book ratio negatively impact the likelihood of acquisitions.

Hypothesis 1 predicts that an innovation shortfall would lead to an increase in acquisition likelihood. Model 2 introduces the attainment discrepancy variables to test Hypothesis 1. In the case of negative discrepancy – performance below aspirations – innovative output has been decreasing over the previous 3 years. Higher negative values indicate a greater discrepancy. Hence, a negative coefficient implies an increase in the likelihood of acquisitions as performance falls further below aspirations. This is the case in Model 2: the greater the negative attainment discrepancy (i.e., the greater the motivation), the higher the likelihood of an acquisition, supporting Hypothesis 1.

Hypothesis 2 predicts a positive relationship between the likelihood of acquisition and a firm's absorptive capacity. This hypothesis receives support in all relevant models (Models 3 through 6). This implies that a firm's ability, as determined by its absorptive capacity, is a strong predictor of the likelihood of acquisition. Model 4 introduces direct effects of both motivation and ability variables into the same model, and while the ability variable is still significant, the significance of the motivation variable disappears. The results imply that absorptive capacity is paramount in the decision to acquire, so much so that the influence of motivation (in the form of innovation underperformance) on the decision to acquire is mitigated when ability is taken into account.

Hypothesis 3 predicts a positive effect on the decision to acquire from the interaction of motivation and ability. Model 5 includes the interaction variable that tests for this effect. Results show that both

Table 4
Results of Cox regression analyses.

Independent variables	Dependent variable: decision to acquire					
	1	2	3	4	5	6[a]
Negative attainment discrepancy		−0.01***		0.00	−0.03***	−0.02**
		[0.002]		[0.003]	[0.009]	[0.010]
Positive attainment discrepancy		−0.00*		−0.01***	−0.00	−0.00
		[0.001]		[0.001]	[0.003]	[0.003]
Absorptive capacity[b]			0.23***	0.28***	0.29***	0.25***
			[0.023]	[0.025]	[0.026]	[0.037]
Neg attain∗absorptive capacity[b]					0.01***	0.01**
					[0.004]	[0.004]
Pos attain∗absorptive capacity[b]					−0.00*	−0.00
					[0.001]	[0.001]
Prior acquisitions	0.37***	0.37***	0.35***	0.35***	0.35***	0.14***
	[0.029]	[0.029]	[0.029]	[0.029]	[0.029]	[0.043]
Slack	−0.18***	−0.19***	−0.18***	−0.18***	−0.17***	−0.32***
	[0.029]	[0.029]	[0.029]	[0.029]	[0.028]	[0.055]
Total assets	0.16***	0.16***	0.13***	0.13***	0.13***	0.15***
	[0.007]	[0.007]	[0.007]	[0.008]	[0.008]	[0.013]
R&D[b]	−0.45**	−0.45**	−0.49**	−0.48**	−0.48**	−0.27
	[0.224]	[0.224]	[0.231]	[0.229]	[0.228]	[0.253]
Market/book	−0.03***	−0.03***	−0.03***	−0.03***	−0.03***	−0.08***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.012]
Free cash flow[b]	−0.03	−0.03	−0.03	−0.03	−0.03	−0.11
	[0.115]	[0.115]	[0.119]	[0.118]	[0.118]	[0.118]
Observations	29,497	29,497	29,497	29,497	29,497	10,890
No. of acquisitions	5628	5628	5628	5628	5628	2723
chi^2 (df)	1243 (6)	1256 (8)	1335 (7)	1368 (9)	1381 (11)	721.3 (11)
LL	−37,973	−37,966	−37,927	−37,910	−37,903	−15,983

Standard errors in parentheses.
[a] Includes only patenting firms.
[b] The coefficient and standard errors are multiplied by 10^2.
*** $p<0.01$.
** $p<0.05$.
* $p<0.1$.

the attainment discrepancy variable and the interaction variable are significant. The attainment discrepancy variable maintains a negative coefficient (indicating an increase in the likelihood of acquisitions), but the interaction variable has a positive coefficient opposite in direction to that predicted in Hypothesis 3. It seems that, while both motivation and ability are important in the decision to acquire (Models 2, 3, and 5), the interaction indicates that the ability to acquire is most important when the motivation to acquire is lower.

Contrary to Hypothesis 3, which predicts a positive interaction between motivation and ability, findings indicate that ability to acquire enables firms with a lower motivation to more readily engage in acquisitions. This result leads to two equally plausible sets of relationships. In the first, it is ability that acts as a moderating influence on the relationship between motivation and the likelihood of acquisition. In the second, motivation is the moderating factor that modifies the relationship between ability and the likelihood of acquisition. The proper interpretation of this might speak to the fundamental trade-off between internal development and external acquisition of innovation. For example, the breadth of knowledge resident in the firm, besides being a measure of how capable the firm would be to identify and absorb external knowledge from a target, may also serve as a complementary factor, leading a firm with lower motivation to engage in acquisitions anyway. These unexpected results are an aspect of the phenomenon that deserves further research in ongoing work.

Model 6 tests the complete model using only observations from firms that have patented in the previous 3 years. The results of this restricted sample are similar in sign and significance to those of Model 5, which uses the complete sample.

5. Discussion and conclusion

The results of this study lend greater clarity to the process of acquisitions. Whereas previous studies look at the broader interplay between acquisitions and firm performance (Iyer & Miller, 2008), this paper focuses specifically on the role of innovation in the acquisition process. Firms performing below expectations for innovative output are more likely to acquire as are firms with a higher absorptive capacity and thus a greater ability to acquire. Both motivation and ability to acquire are important in a firm's decision to undertake an acquisition. In fact, the results indicate that a lack of absorptive capacity may in fact overwhelm a firm's motivation to acquire.

This paper contributes to both behavioral theory and absorptive capacity. Departing from prior studies in behavioral theory, the authors use innovative output to measure the aspiration levels that would drive firms to engage in acquisitions. Prior behavioral research focuses almost exclusively on financial measures. Results show that, even with the inclusion of those prior financial measures, attainment discrepancy in innovative output is important in the decision to acquire. Also, while prior research tends to measure absorptive capacity using R&D expenditures, the results indicate that the class count measure reflects a different dimension of the underlying construct and adds explanatory power beyond simple R&D expenditures.

As with most studies, the ability to generalize the findings here to other settings is limited since the sample contains only publicly traded manufacturing firms. The focus of this study is on acquisitions, but it is possible that firms may respond to innovation shortfalls in other ways, such as joint ventures or strategic alliances. Also, the extent of attainment discrepancy might dictate the type of search a firm engages in. The authors believe that these other possibilities represent fertile ground for future studies. Researchers should also consider the possibility that there are still other non-financial measures that could operate as feedback mechanisms to guide firm strategy. Another limitation of the study is that the key independent measures were constructed from patent data. In industries and/or companies for which patenting is less important, the findings are less relevant. Future research could explore and develop other non-patent measures of innovative output, such as new product introductions. Although this study attempts to control for other potential motives that might lead to acquisitions, there may still be acquisitions in the sample that are undertaken for reasons not captured in the model.

Although the strategic nature of the choice between patents and internal trade secrets as alternative methods of protecting intellectual property argues strongly in favor of an internally referenced aspiration for innovative output, it is possible that social comparison does play a role that is not captured in this study. For example, firms might compare themselves to competitors that pursue IP strategies similar to their own, and might react based on comparison to those particular outside referents. While there is strong evidence that managers do react to the failure to meet internally-referenced aspirations, there is an opportunity to extend this work by studying the appropriate social aspirations.

Moving beyond the current study, the next opportunity for exploration might be to consider the influence of pre-acquisition conditions on the post-acquisition innovative output. Although this study focuses on aggregate innovative output, looking more deeply at the type of patents and how they affect the acquisition process should also provide fertile ground for further research. Doing so will help extend the understanding of the acquisition process and perhaps offer prescriptive advice for managers planning a technology acquisition.

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References

Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal*, *22*(3), 197–220.
Amir-Aslani, A., & Negassi, S. (2006). Is technology integration the solution to biotechnology's low research and development productivity? *Technovation*, *26*(5–6), 573–582.
Bailey, E. E., & Friedlaender, A. F. (1982). Market-structure and multiproduct industries. *Journal of Economic Literature*, *20*(3), 1024–1048.
Baysinger, B., & Hoskisson, R. E. (1989). Diversification strategy and R&D intensity in multiproduct firms. *Academy of Management Journal*, *32*, 310–332.
Bergh, D. D. (1997). Predicting divestiture of unrelated acquisitions: An integrative model of ex ante conditions. *Strategic Management Journal*, *18*(9), 715–731.
Bettis, R. A. (1981). Performance differences in related and unrelated diversified firms. *Strategic Management Journal*, *2*(4), 379–393.
Bolton, M. K. (1993). Organizational innovation and substandard performance — When is necessity the mother of innovation. *Organization Science*, *4*(1), 57–75.
Bowen, F. E., Rostami, M., & Steel, P. (2010). Timing is everything: A meta-analysis of the relationships between organizational performance and innovation. *Journal of Business Research*, *63*(11), 1179–1185.
Bromiley, P. (1991). Testing a causal model of corporate risk-taking and performance. *Academy of Management Journal*, *34*(1), 37–59.
Brush, T. H. (1996). Predicted change in operational synergy and post-acquisition performance of acquired businesses. *Strategic Management Journal*, *17*(1), 1–24.
Cassiman, B., & Veugelers, R. (2006). In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition. *Management Sciences*, *52*(1), 68–82.
Cefis, E., Rosenkranz, S., & Weitzel, U. (2009). Effects of coordinated strategies on product and process R&D. *Journal of Economics*, *96*(3), 193–222.
Chang, S. J., & Rosenzweig, P. M. (2001). The choice of entry mode in sequential foreign direct investment. *Strategic Management Journal*, *22*(8), 747–776.
Chatterjee, S., & Wernerfelt, B. (1991). The link between resources and type of diversification — Theory and evidence. *Strategic Management Journal*, *12*(1), 33–48.
Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: The two faces of R&D. *The Economic Journal*, 569–596 September.
Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *15*, 128–152.
Collins, J. D., Holcomb, T. R., Certo, S. T., Hitt, M. A., & Lester, R. H. (2009). Learning by doing: Cross-border mergers and acquisitions. *Journal of Business Research*, *62*(12), 1329–1334.

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm.* Englewood Cliffs, New Jersey: Prentice-Hall.
Davis, R., & Thomas, L. G. (1993). Direct estimation of synergy — A new approach to the diversity-performance debate. *Management Sciences*, *39*(11), 1334–1346.
Desyllas, P., & Hughes, A. (2010). Do high technology acquirers become more innovative? *Research Policy*, *39*(8), 1105–1121.
Finkelstein, S., & Haleblian, J. (2002). Understanding acquisition performance: The role of transfer effects. *Organization Science*, *13*(1), 36–47.
Fleming, L. (2001). Recombinant uncertainty in technological search. *Management Sciences*, *47*(1), 117–132.
Flowers, S. (2007). Organizational capabilities and technology acquisition: Why firms know less than they buy. *Industrial Corps Change*, *16*(3), 317–346.
Folta, T. B., & O'Brien, J. P. (2004). Entry in the presence of dueling options. *Strategic Management Journal*, *25*(2), 121–138.
Greve, H. R. (2003). A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal*, *46*(6), 685–702.
Greve, H. R. (2003). Investment and the behavioral theory of the firm: Evidence from shipbuilding. *Industrial Corps Change*, *12*(5), 1051–1076.
Haleblian, J., & Finkelstein, S. (1999). The influence of organizational acquisition experience on acquisition performance: A behavioral learning perspective. *Administrative Science Quarterly*, *44*(1), 29–56.
Henderson, R., & Cockburn, I. (1996). Scale, scope, and spillovers: The determinants of research productivity in drug discovery. *The Rand Journal of Economics*, *27*(1), 32–59.
Hitt, M. A., Dacin, M. T., Levitas, E., Arregle, J. L., & Borza, A. (2000). Partner selection in emerging and developed market contexts: Resource-based and organizational learning perspectives. *Academy of Management Journal*, *43*(3), 449–467.
Hitt, M. A., & Hoskisson, R. E. (1996). The market of corporate control and firm innovation. *Academy of Management Journal*, *39*, 1084–1119.
Hitt, M. A., Ireland, D. R., & Harrison, J. S. (2001). Mergers and acquisitions: A value creating or value destroying strategy? In M. A. Hitt, E. R. Freeman, & J. S. Harrison (Eds.), *The Blackwell handbook of strategic management* (pp. 384–408). MA: Blackwell.
Hoskisson, R. E., & Hitt, M. A. (1990). Antecedents and performance outcomes of diversification — A review and critique of theoretical perspectives. *Journal of Management*, *16*(2), 461–509.
Hundley, G., Jacobson, C. K., & Park, S. H. (1996). Effects of profitability and liquidity on R&D intensity: Japanese and US companies compared. *Academy of Management Journal*, *39*, 1659–1674.
Iyer, D. N., & Miller, K. D. (2008). Performance feedback, slack, and the timing of acquisitions. *Academy of Management Journal*, *51*(4), 808–822.
Jaffe, A. B., Trajtenberg, M., & Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *Quarterly Journal of Economics*, *108*(3), 577–598.
Jensen, M. C. (1988). Takeovers — Their causes and consequences. *Journal of Economic Perspectives*, *2*(1), 21–48.
Jensen, M. C. (1993). The modern industrial-revolution, exit, and the failure of internal control-systems. *Journal of the Finance*, *48*(3), 831–880.
Jones, G. K., Lanctot, A., & Teegen, H. J. (2001). Determinants and performance impacts of external technology acquisition. *Journal of Business Venturing*, *16*(3), 255–283.
Kennedy, P. (1998). *A guide to econometrics* (4th ed). Cambridge, Mass: MIT Press.
King, D. R., Dalton, D. R., Daily, C. M., & Covin, J. G. (2004). Meta-analyses of post-acquisition performance: Indications of unidentified moderators. *Strategic Management Journal*, *25*(2), 187–200.
King, D. R., Slotegraaf, R. J., & Kesner, I. (2008). Performance implications of firm resource interactions in the acquisition of R&D-intensive firms. *Organization Science*, *19*(2), 327–340.
Lane, P. J., Koka, B. R., & Pathak, S. (2006). The reification of absorptive capacity: A critical review and rejuvenation of the construct. *Academy of Management Review*, *31*(4), 833–863.
Lane, P. J., & Lubatkin, M. (1998). Relative absorptive capacity and interorganizational learning. *Strategic Management Journal*, *19*(5), 461–477.
Levinthal, D., & March, J. G. (1981). A model of adaptive organizational search. *Journal of Economic Behavior Organization*, *2*, 307–333.
Montgomery, C. A. (1982). The measurement of firm diversification: Some new evidence. *Academy of Management Journal*, *25*, 299–307.
Montgomery, C. A., & Hariharan, S. (1991). Diversified expansion by large established firms. *Journal of Economic Behavior Organization*, *15*(1), 71–89.
Nelson, R. R. (1995). Recent evolutionary theorizing about economic-change. *Journal of Economic Literature*, *33*(1), 48–90.
Peng, Y. S., & Fang, C. P. (2010). Acquisition experience, board characteristics, and acquisition behavior. *Journal of Business Research*, *63*(5), 502–509.
Penrose, E. (1959). *Theory of the growth of the firm.* New York: Wiley.
Porter, M. E. (1980). *Competitive strategy: Techniques for analyzing industries and competitors.* New York: Free Press.
Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance.* New York: Free Press.
Rigby, D., & Zook, C. (2002). Open market innovation. *Harvard Business Review*, *80*(10), 80–89.
Rosenkopf, L., & Nerkar, A. (2001). Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, *22*(4), 287–306.
Silverman, B. S. (1999). Technological resources and the direction of corporate diversification: Toward an integration of the resource-based view and transaction cost economics. *Management Sciences*, *45*(8), 1109–1124.
Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, *17*, 27–43.
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533.
Wu, J. F., & Shanley, M. T. (2009). Knowledge stock, exploration, and innovation: Research on the United States electromedical device industry. *Journal of Business Research*, *62*(4), 474–483.
Zahra, S. A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, *27*(2), 185–203.