O'Brien, J., & David, P. 2013. Reciprocity and R&D search: Applying the behavioral theory of the firm to a communitarian context. *Strategic Management Journal*, in press.

RECIPROCITY AND R&D SEARCH: APPLYING THE BEHAVIORAL THEORY OF THE FIRM TO A COMMUNITARIAN CONTEXT

ABSTRACT

We propose that the behavioral theory of the firm perspective on R&D search requires modification when applied to "communitarian" cultures such as Japan because reciprocity and embeddedness can influence the search decision. When performance exceeds aspirations, communitarian-oriented firms are more inclined to use their privileged position to help their less fortunate stakeholders by engaging in additional R&D search that should yield greater payoffs for these stakeholders in the future. Our results indicate that while Japanese firms engage in 'problemistic' search in a manner similar to what has been found in other contexts, they respond differently when performance exceeds expectations. We find that as performance rises above aspirations, communitarian-oriented firms raise R&D search to a greater extent than do firms that lack a communitarian orientation.

For industrial corporations, R&D investments constitute a search for solutions that can help build core competencies, exploit growth opportunities, and gain the competitive advantage necessary to obtain higher returns (Franko, 1989; Lengnick-Hall, 1992). A seminal contribution of the BTF lies in explaining how "organizations respond to performance feedback by changing... strategic behaviors" such as R&D (Greve, 2003a; Greve, 2003b: 147). Greve (2003b) notes several examples of firms such as General Motors and Intel that engaged in extensive R&D search in response to performance shortfalls. More recently, in discussing the importance of R&D at Ford, CEO Alan Mulally asserted that "[w]e have never backed off, even through this entire recession. We actually have increased investment in our new vehicles during the toughest of times" (Langlois, 2012). Considerable empirical work has built on the BTF to help illuminate our understanding of the behavioral determinants of R&D search (for reviews see Argote & Greve, 2007; Greve, 2003b). Furthermore, the BTF has also been applied to firm R&D investments in numerous countries, such as the US (Chen, 2008; Chen & Miller, 2007), Japan (Greve, 2003a), India (Vissa, Greve, & Chen, 2010), and Italy (Antonelli, 1989).

While most studies employing the BTF framework have assumed a universal model, cross-country institutional differences can impact search and hence warrant consideration. In his study of Japanese firms, Greve (2003a: 697) recommended that "cultural and institutional differences may cause differences and investigation of such issues should be encouraged." Similarly, in their study of Indian business groups Vissa et al. (2010: 696) also called for "research examining whether problemistic search is affected by how the focal organization is embedded in an organizational and environmental context." In this paper, we build on these suggestions to develop and test theory that explains why the cultural and institutional differences

in Japan warrant an extension to the BTF explanations of search.[1]

Firm search behaviors arise from bargaining amongst salient stakeholder groups (Cyert & March, 1963). While this may be true in most, if not all, contexts, cultural and institutional norms may shape how these various stakeholder groups interact. The BTF was developed by scholars working in the North American tradition. In the U.S., managers tend to adopt a 'contractarian' orientation and treat the firm as a nexus of contracts among various stakeholders that transact at arm's-length. However, managers in other countries are subject to different cultural and institutional context, and hence could manage relationships with stakeholders in very different ways. In Japan, managers tend to adopt a more 'communitarian' orientation, wherein stakeholders are embedded in social and cultural ties and exchanges are guided by norms of reciprocity (Allen & Gale, 2000; Bradley, Schipani, Sundaram, 1999; Dore, 2000). We contend that although the extant BTF purports to be universal, it implicitly assumes that managers adopt a contractarian perspective and hence it ignores how a firm's cultural and institutional context might shape the exchanges among various stakeholders (Hall & Soskice, 2001). Specifically, we argue that the BTF does not fully account for how reciprocity and embeddedness may influence strategic responses to performance feedback. In effect, our study is an attempt to contextualize R&D search behaviors across national borders (O'Brien & David, 2010; Tsui, 2004).

Japan provides a particularly useful setting to investigate such institutional differences. While Japanese firms *generally* tend to be more communitarian than U.S. firms (Bradley *et al.*, 1999), there is considerable variation among Japanese firms. Over the past two decades, Japanese firms have experienced a change in ownership structure resulting in a "clash of

[1] Although Greve's (2003a) study of Japanese shipbuilding firms found results consistent with a universal BTF model, we explore subtle yet important institutional differences in a more-broad based sample of Japanese firms.
[2] In contractarian settings, firms often return excess cash to shareholders or pay their executives high compensation as an incentive for maximizing shareholder value. In communitarian settings, however, managers should generally

capitalisms" (Ahmadjian & Robbins, 2005) between traditional 'relational' owners (*i.e.*, domestic corporations and financial institutions) that support a communitarian orientation, and 'transactional' owners (mostly financial institutions from the U.S. and U.K.) that espouse a more contractarian orientation (David, O'Brien, Yoshikawa, 2010). As search is shaped by the preferences of powerful coalitions in the firm (Cyert & March, 1963), a firm's ownership structure (*i.e.*, the balance of relational versus transactional owners) can influence the extent to which the firm's managers are subjected to communitarian versus contractarian pressures, which in turn influences how they respond to performance feedback.

According to the BTF, performance in excess of aspirations signals the resolution of obstacles to fulfilling the contractual obligations to stakeholders, which induces managers to shift their attention to other issues and either maintain or possibly even reduce R&D search (Cyert & March, 1963). We theorize that this holds in a contractarian setting, but not in a communitarian setting, where obligations to stakeholders transcend contractual provisions and include considerations of reciprocity and embeddedness (Gerlach, 1992; Kester, 1991). Accordingly, when performance is strong, communitarian firms are obliged to use their privileged position to 'pay back' their network of stakeholders (e.g. buyers, suppliers, employees, banks) by helping less fortunate members (Lincoln, Gerlach, & Ahmadjian, 1996) via quantity and price adjustment or other generous terms. Moreover, as we argue in this paper, the firm may also elect to 'pay forward' its network of stakeholders by engaging in additional R&D search that should yield growth opportunities that will benefit these stakeholders in the future.

The results of our empirical analysis support our theory. We find that Japanese firms generally tend to increase R&D as performance rises further above the aspiration level, and that

communitarian-oriented relational owners are more supportive of this 'pay forward' effect than are contractarian-oriented transactional owners. Our results reveal an overall V-shaped relationship between R&D search and performance relative to aspirations, with R&D spending rising as both performance shortfalls and performance surpluses increase relative to aspirations. This is in contrast to the uniform negative association predicted by traditional behavioral theory (Antonelli, 1989; Chen, 2008; Chen & Miller, 2007; Greve, 2003a).

THEORY AND HYPOTHESES

The BTF and R&D Search

In traditional neoclassical economics, strategic investments in R&D are guided by a rational calculus of financial returns. When managers identify investment opportunities that offer expected returns in excess of an appropriately risk-adjusted cost of capital, they should adopt all such projects and *only* those projects. Accordingly, R&D would simply be an expense that is incurred in the present in the hope of a financial return in the future. While this model may describe what organizations *should do* in order to maximize the wealth of shareholders, even economic scholars acknowledge that significant deviations from optimality can occur due to factors such as bounded rationality (Williamson, 1985), financial constraints (Myers & Majluf, 1984), and agency problems (Jensen & Meckling, 1976).

The BTF offers a valuable complementary lens for understanding the investment decision by elucidating how those decisions are actually made in practice by boundedly rational managers navigating a complex business landscape (Cyert & March, 1963). According to a behavioral perspective, managers develop aspirational performance levels for their firms based on historical firm performance and the observed performance of their peers. Performance below aspiration

indicates potential problems in attaining long-term goals and hence triggers a 'problemistic' search for solutions to close the gap. According to this perspective, R&D may serve not so much as an investment with a clear calculated return, but rather as a mechanism to search for new directions through more innovative products, services, and processes that will enable the firm to either raise prices or to reduce costs, thus closing the performance gap.

The behavioral perspective differs from economic perspectives not only in terms of when R&D spending is increased, but also in terms of when it is decreased. Instead of basing the search decision on maximization, whereby a search continues until an optimal solution is found, managers 'satisfice' and continue searching only until a solution is found that is 'good enough' in terms of exceeding the aspirational performance criteria. Performance exceeding aspirations indicates the resolution of problems and precludes the need for problemistic search. Thus, the BTF generally predicts a uniform negative relationship between R&D investment and performance relative to aspiration regardless of whether firms perform above or below their aspiration level. While the slack accumulation from performance in excess of aspirations may yield higher search, after controlling for slack, an overall negative association between performance relative to aspirations and R&D search is typically found (Chen, 2008; Chen & Miller, 2007). Behavioral research has investigated various alternative models of how search responds to performance levels below and above aspiration level (e.g. categorical, constant-slope, and changing-slope models; see Greve, 1998), and has concluded that "performance should show a nearly linear relationship with R&D intensity" (Greve, 2003a: 691).

U.S. Versus Japanese Contexts: Implications of Reciprocity and Embeddedness

Corporations around the world encompass stakeholders such as shareholders, lenders, customers, suppliers, and employees. Yet considerable research has noted cross-country

differences in how firms relate to stakeholders, with the US and Japan presented as examples of polar extremes (Allen & Gale, 2000; Dore, 2000). While a variety of labels have been used to describe this difference, we find the 'contractarian' versus 'communitarian' approach (Bradley *et al.*, 1999) to be especially helpful in understanding the implications for the BTF. A contractarian view treats corporations as a nexus of contracts, both explicit and implicit, among various stakeholder claimants operating at arm's length (Alchian & Demsetz, 1972; Jensen & Meckling, 1976) wherein most stakeholders are fixed claimants who are promised a contractually specified payoff, while shareholders are the residual claimants. Managers negotiate the contracts with fixed claimants so as to maximize the shareholders' residual payment. This 'nexus of contracts' contractarian view is believed to generally reflect the relationships among stakeholders in U.S. corporations.

In contrast, a communitarian perspective views organizations not as a nexus of contracts among stakeholders transacting at arm's-length, but as a nexus of relationships among stakeholders that are embedded in a social context (Bradley *et al.*, 1999). Managers' roles are defined not narrowly as maximizing shareholder value, but broadly as harmonizing the interests of various stakeholders. Exchanges with stakeholders are guided not just by contracts but also by norms of reciprocity (Lincoln, Gerlach, & Takahashi, 1992), whereby obligations are not prescribed by contract but represent a more general obligation to give something in return for what is received (Uzzi, 1996). Hence, parties provide help to each other and trust, without a contractual requirement to do so, in an equitable return of help at some future undefined date (Gouldner, 1960).

Two important differences between communitarian and contractarian models are worth noting. First, reciprocity in a communitarian setting requires a long-term orientation, as the

return of favors may occur well in the future. Contractarian relationships can persist for the long-term, but there is no commitment to continuity. Hence, parties either periodically re-negotiate their contracts or go their separate ways and find new partners. In a communitarian setting, parties are committed to finding ways to make things work out so that stakeholder relationships can be safeguarded for the long-term. Second, with respect to value appropriation, the contractarian setting allows for the possibility of considerable inequality in the distribution of wealth due to differences in bargaining power. In contrast, a communitarian logic promotes "*ex post* distributive fairness" (Bradley *et al.*, 1999: 44) and a more egalitarian distribution of wealth as the managers of the firm act as trustees for a variety of stakeholders.

Japanese managers tend to adopt a communitarian view (Bradley *et al.*, 1999), and a comparison of business practices in Japan vis-à-vis the U.S. provides a vivid contrast between the contractarian emphasis on arm's-length transactions and the communitarian reliance on transactions embedded in social and cultural ties. In comparison to U.S. firms, Japanese firms develop much closer and longer-term relationships with a smaller set of core suppliers (Dyer, 2000). U.S. firms tend to have dispersed ownership structure dominated by short-term investors (Porter, 1992), while much of the equity of Japanese firms is held by long-term owners that are also often customers or suppliers of the firm (Sheard, 1994). While most debt for U.S. firms is publicly traded arm's-length bonds, most of the debt of Japanese firms is from banks with whom firms have close relationships (David, O'Brien, & Yoshikawa, 2008; Hoshi & Kashyap, 2001). Finally, pay disparity may be an order of magnitude higher in U.S. versus Japanese firms (see Anderson, Collins, Pizzigati, 2010; Jilani, 2011).

In communitarian contexts, norms of reciprocity often guide economic exchanges (Lincoln *et al.*, 1992). For example, long-term supplier relationships are not explicitly

contractual, yet core stakeholders make firm-specific investments in Japanese corporations (Williamson, 1991), trusting that the firm will safeguard these investments. Such long-term relationships are facilitated by the willingness to provide help to each other and by the trust in an equitable return of the help at some future undefined date (Gouldner, 1960). Lincoln et al. (1992: 566) note that "[t]he norm of reciprocity… has particular force in Japan where the stress on personal, trusting, and long-term exchange relations encourages mutual obligation to a degree uncommon in the United States" and is a "core value pattern in Japanese culture".

Empirical research has demonstrated that the norm of reciprocity is especially evident in exchanges involving firms with very high and very low performance. Dore (2000: 65) notes that the reciprocity norm in Japan requires that "the losses of the bad times and the gains of the good times should be shared". Thus, poor performers are recipients of assistance and high performers are the providers of such assistance (Lincoln *et al.*, 1996). When firms perform poorly, lenders provide funds on generous terms, employees accept short-term wage adjustments, and long-term suppliers and buyers make quantity and price adjustments to help the firm tide over its problems (Lincoln *et al.*, 1996). While such assistance is costly in the immediate term, firms trust that their partners will reciprocate should they require assistance in the future, which helps to sustain the longevity of the collective group of embedded stakeholders.

Although the research of Lincoln *et al.* (1996) focused on firms that were members of keiretsu, Gedajlovic and Shapiro (2002: 573) show that this norm of reciprocity applies much more broadly, stating: "our study indicates that traditional norms of mutual assistance (Dore, 2000) and risk reduction (Nakatani, 1984) extend beyond formal networks to Japan's broader enterprise system." Furthermore, extensive case study evidence provides detailed accounts of how Japanese firms facing adversity are helped in their recovery by their network of embedded

ties (Gerlach, 1992; Hoshi & Kashyap, 2001). Finally, although Japan's economic downturn in the 1990s has induced some erosion in traditional practices, its economy remains much more communitarian than the contractarian U.S. model (Yoshikawa & Rasheed, 2009).

Implications of Reciprocity and Embeddedness for BTF

While the BTF has been found to be robust and broadly applicable, the theory was developed and most often tested in a contractarian context. We contend that there are subtle yet consequential differences in communitarian contexts. From a contractarian perspective, failure to attain the aspiration level indicates problems in meeting the contractual obligations to priority claimants, which spurs search until solutions are found and aspirations are met. Performance in excess of aspiration level indicates that contractual goals have been achieved, so the impetus for search abates and managers shift their attention to other issues. From a communitarian perspective, however, considerations of reciprocity may come into play and impact managerial attention and search behavior. Specifically, we argue that performance in excess of aspiration level triggers attention to reciprocity concerns which leads to increased, not decreased, search.

Performance below aspiration level and R&D search. In a communitarian context, the problemistic search described by the BTF should be reinforced by the norms of reciprocity. As performance declines, stakeholders may get involved in helping the firm tide over problems in the hope of fostering long-term survival and growth. The norm of reciprocity spurs them to rally around the troubled firm: lenders provide funds on generous terms; employees may accept short-term wage adjustments; and long-term suppliers and customers are more willing to make quantity and price adjustments to assist the firm (Lincoln *et al.*, 1996). These concessions should help the firm fund the search for solutions to the current problems. Thus, in accordance with the

problemistic search behavior predicted by the BTF and demonstrated in multiple empirical studies, R&D intensity should increase as performance drops further below the aspiration level. Thus, as a baseline hypothesis, we posit:

H1: When performance decreases below the aspiration level, R&D intensity increases.

Performance above aspiration level and R&D search. According to the BTF, performance in excess of aspirations signals the successful resolution of problems and therefore diminishes the need for search. From a contractarian perspective, aspirations are set from bargaining amongst various stakeholders. Meeting aspirations indicates that the contractual obligations to various stakeholders have also been met, and hence there is less of a need to search for solutions when aspirations are exceeded. With the diminished need for problemistic search, R&D search should decline, and hence the hypothesized negative relationship with R&D search prevails even when performance exceeds aspirations (Greve, 2003b).

The situation is different, however, in a communitarian context. While performance in excess of aspirations does indeed signal success in meeting the immediate needs of stakeholders, reciprocity considerations remain. Just as stakeholders are obligated to help the firm when performance is low, the firm is obligated to reciprocate by 'paying back' (or perhaps even 'paying forward') its network of stakeholders when performance is high. Prior research by Lincoln et al. (1996) has shown that high performing firms pay back poorly performing affiliated firms through more favorable prices for buyers and suppliers, and favorable interest rates on loans. We propose that in addition to paying back affiliated firms, reciprocity can spur firms to 'pay forward' their stakeholders by investing in R&D to generate future growth opportunities.

Performance in excess of aspirations may signal that the firm has valuable resources

and/or capabilities, finding new applications for which can help ensure the long-term viability of the network of stakeholders. R&D search can lead to new products, services or markets that not only yield additional business opportunities for the firm's buyers, suppliers and banks, but also generate firm growth that provides enhanced job security and additional career advancement opportunities for employees. Japanese firms tend to reinvest more in their operations for the long term (Porter, 1992) in order to grow the firm and benefit the network of stakeholders (Kester, 1991). R&D search can constitute a long-term investment in generating higher value for stakeholders in the future. Accordingly, we predict that in communitarian contexts, performance above aspirations causes managers to shift their attention to reciprocity and hence 'pay forward' its stakeholders by searching for future growth opportunities.[2]

H2: In communitarian contexts, R&D intensity increases when performance increases above the aspiration level.

Ownership Structure and Implications for Search

Although they tend to be more communitarian than U.S. firms (Bradley *et al.*, 1999), Japanese firms vary in the extent to which managers are subject to communitarian versus contractarian pressures. The firm's goals are shaped by the demands of powerful coalitions in the firm (Cyert & March, 1963), and the firm's owners are often powerful stakeholders. In the past two decades, Japanese corporations have faced a "clash of capitalisms" (Ahmadjian & Robbins, 2005) between the traditional domestic relational owners that support a communitarian orientation, and foreign transactional owners that espouse a more contractarian orientation (David *et al.*, 2010). Firms vary in their extent of relational and transactional ownership, and

[2] In contractarian settings, firms often return excess cash to shareholders or pay their executives high compensation as an incentive for maximizing shareholder value. In communitarian settings, however, managers should generally be inclined to more equitably distribute the wealth by searching for ways to sustain the enterprise over the long-haul.

therefore in the extent to which managers face communitarian versus contractarian pressures.

Whether owners espouse a contractarian or a communitarian orientation is shaped by the extent to which they have embedded ties with the firm. Relational owners in Japan are large domestic banks, insurance companies, and other corporations that have business relationships with the firm beyond mere shareholdings, and are therefore more likely to have embedded ties with the firm (Ahmadjian & Robbins, 2005; David *et al.*, 2010). These relational owners are stakeholders in multiple ways. In addition to owning shares, domestic banks and insurance companies provide loans and other financial services, while domestic corporations are often customers or suppliers of the firm. Relational owners have direct economic incentives to favor a stakeholder orientation because investments that serve to perpetuate and grow the firm can yield returns to relational owners through ancillary business relationships. Furthermore, relational ownership stakes tend to be committed for the long-term, sold off only in extraordinary circumstances, and often held reciprocally (Sheard, 1994). Hence, these owners are inclined to help the firm when problems arise, with the assistance effort often coordinated through the main banks (Sheard, 1994). This long-term commitment by a broad community of stakeholders helps engender trust in the reciprocity of the network, thus fostering a communitarian orientation.

Transactional owners, in contrast, tend to be foreign institutional investors, mostly from the U.S. and U.K. (Ahmadjian & Robbins, 2005; David *et al.*, 2010). These owners lack other business relationships with the firm, and hence can benefit only from shareholder profits. Having only arm's length relationships with the firm, transactional owners make no long-term commitment to hold the shares. Nevertheless, they gain influence through the "threat of exit." If dissatisfied, transactional owners can readily selloff their shares, thereby impairing the stock price and exposing the firm to a higher cost of capital and an accentuated threat of hostile

takeover. Thus, managers are responsive to the preferences of transactional owners, and recent research has demonstrated that foreign institutional investors (i.e., transactional owners) influence firms across the world to make changes to their governance mechanisms to favor a more contractarian orientation (Aggarwal, Erel, Ferreira, 2011).

Considerable empirical work has demonstrated differences in relational and transactional owners' orientation towards stakeholders. Relational ownership plays a key role in fostering reciprocity and the redistribution of resources from firms with high profits to those with low profits (Gedajlovic & Shapiro, 2002; Lincoln *et al.*, 1996). Hence, the impact of relational ownership is "conditioned on the prior performance of the firm: Weaker firms do better, but stronger firms do worse," (Lincoln *et al.*, 1996: 73). Relational owners are also more likely to favor lifetime employment and higher employee wages, while transactional owners are more likely to favor layoffs and lower wages, especially in poorly performing firms (Ahmadjian & Robbins, 2005; Ahmadjian & Robinson, 2001; Yoshikawa, Phan, & David, 2005). Furthermore, relational owners generally emphasize growth that benefits stakeholders by encouraging long-term investments, such as R&D (Lee & O'Neill, 2003), while transactional owners tend to only favor R&D if it yields profitable growth opportunities for shareholders (David, Yoshikawa, Chari, 2006). While normative questions about the role of transactional owners are debatable, the research evidence demonstrates that transactional owners do indeed impact firm strategy.

The presence of two types of owners with conflicting interests provides an opportunity to contrast the outcomes predicted by the BTF, which has been traditionally applied in a contractarian context, and the outcomes predicted by our modified version applied in a communitarian context. Generally, we expect that higher levels of transactional ownership should pressure managers to adopt a more contractarian perspective and hence to maximize

shareholder value, while higher levels of relational ownership should help foster a more communitarian orientation that favors a broader set of stakeholders.

As noted in Hypothesis 1, both communitarian and contractarian perspectives predict higher R&D search when performance falls below aspirations. For performance below aspiration, we have noted that the traditional BTF argument rooted in a contractarian context predicts a negative association between performance relative to aspiration and R&D search, as firms step up search to solve underlying performance problems. In addition to this problemistic imperative, we noted that a communitarian orientation provides additional support as the broader network of stakeholders make concessions in order to assist the struggling firm, enabling the firm to be more capable of funding R&D search during troubled times. Accordingly, we expect that communitarian-oriented relational owners should strengthen this negative association to a greater extent than do contractarian-oriented transactional owners.

H3: When performance decreases below the aspiration level, R&D intensity increases to a greater extent with relational than with transactional ownership.

We have noted that the traditional BTF argument for a contractarian context predicts that R&D intensity will be negatively associated with performance above aspiration. However, we have also argued that just the opposite should happen in a communitarian context. Instead of conforming to the expectations of shareholders and cutting back on R&D search because the attainment of aspirational levels obviates the need for problemistic search, communitarian-oriented managers respond to superior performance by searching for the growth opportunities that will yield future benefits for the broader network of stakeholders. Communitarian-oriented relational owners should produce a more positive (or less negative) association between R&D and performance above aspiration than do contractarian-oriented transactional owners.

H4: When performance increases above the aspiration level, R&D intensity increases to a greater extent with relational than with transactional ownership.

METHODS

Data Sources and Sample

We constructed our sample from the Pacific-Basin Capital Markets (PACAP) Database for Japanese firms. We began with all 24,556 observations listed in the database for the years 1992 to 2004. As small firms may be effectively locked out of the foreign securities markets (Anderson & Makhija, 1999), we deleted 1748 observations that had book value of equity of less than 3 billion Yen. We also deleted 712 observations in the highly regulated financial, utilities, and communications industries. Furthermore, to reduce endogeneity concerns we lagged the independent variables by one year so that R&D spending over the course of a year is modeled as a function of the ownership structure at the end of the previous year. Lagging the independent variables reduced the sample to 19,766 observations. With occasional missing variables (mostly pertaining to market value data), the final sample encompassed 2123 firms and 18,283 firm/year observations. All variables were obtained from the PACAP database, with the exception of R&D and advertising expenses, which were merged in from the Nikkei NEEDS database.

Variables

Our dependent variable, *R&D* intensity, is calculated as total research and development expenditures divided by total sales. Although other forms of search occur in organizations, R&D

is a critical form of organizational search that can serve as a useful proxy for how total search in an organization is adjusted in response to changes in performance (Greve, 2003a).

The primary independent variables of interest relate to performance relative to aspirations, and ownership structure. To measure performance relative to aspirations, we first constructed measures of both firm performance and aspiration level. As noted by Greve (2003b: 7), performance feedback comes from "rough measures of overall performance that will tell a manager that something is amiss, but not exactly what. The overall profitability of an organization would be such a measure." Most prior BTF research has typically utilized return on assets (ROA) as a performance aspiration (Greve, 2003b). It is a particularly salient metric as it is tracked, reported, and serves as a common basis for comparison amongst firms. Furthermore, ROA is highly relevant to meeting the needs of the broader stakeholder group because low profitability signals potential problems in meeting the needs of the various stakeholder claimants. Research on reciprocity in Japanese companies also posits that ROA is an appropriate performance measure (Gedajlovic & Shapiro, 2002; Lincoln *et al.*, 1996).

We use the firm's return on assets (ROA) to measure performance in a given year (Greve, 2003a; Iyer & Miller, 2008). ROA was calculated as operating income divided by total firm assets. We then constructed a proxy for aspiration level that was based on both historical firm performance and social aspirations. Similar to Greve (2003a), we measured the historical firm aspiration level with a weighted average of past performance. Specifically, historical aspiration (HA) was calculated as: $HA_t = 0.7(ROA_{t-1}) + 0.2(ROA_{t-2}) + 0.1(ROA_{t-3})$. Results were nearly identical if we weighted recent performance more heavily or if we simply used the previous year's performance as a proxy. We calculated the social aspiration (SA) level as the average ROA of all other firms (i.e., excluding the focal firm) operating in the focal firm's industry.

Following Greve (2003a), our final measure of aspiration level (AL) was constructed as: AL = 0.8*SA + 0.2*HA. Social aspirations are based on performance of other firms in the industry that are likely to be competitors and therefore salient in shaping aspirations.

Next, we subtracted the aspiration level from the firm's actual ROA to construct the variable *Performance-Aspiration*. To assess if the slope of the relationship between R&D and performance relative to aspirations is different for performance above and below the aspiration level, we conduct a spline regression (Greene, 2003: 121). Specifically, we constructed a second variable, *Performance>Aspirations*, which was equal to ROA-AL if ROA>AL and zero otherwise. Using inflection points slightly above or below the AL tended to reduce model fit, thus indicating the appropriateness of setting the inflection point at ROA=AL.

Transactional and relational ownership are assessed as the total percentage of all outstanding shares held by each type of owner. Hence larger values should equate to more power and more influence for each type of owner. We followed prior research and measured *transactional ownership* as the total number of shares owned by foreigners divided by total shares outstanding, and *relational ownership* as the total number of shares owned by Japanese financial institutions and other Japanese business corporations divided by total shares outstanding (David *et al.*, 2010). While foreign owners can include owners from various countries, some of which might espouse a more communitarian perspective, prior research has noted that a majority of foreign owners in Japan are portfolio investors from US and UK, countries with a more contractarian perspective (David *et al.*, 2010). Furthermore, research on foreign owners of Japanese companies (Ahmadjian & Robbins, 2005; Ahmadjian & Robinson, 2001; David *et al.*, 2010; David *et al.*, 2006) as well as foreign owners of firms in a variety of other countries (Aggarwal *et al.*, 2011) has shown that foreign owners, in the aggregate, tend to

act in ways that are consistent with a contractarian perspective. Similarly, while our measure of relational owners includes both financial and non-financial firms, prior research has shown that both these types of owners act in ways that are consistent with a communitarian perspective (Gedajlovic & Shapiro, 2002) and most research on Japanese corporations has tended to combine both groups as a measure of relational ownership (David *et al.*, 2010; Lincoln *et al.*, 1996).

We also controlled for numerous other factors that could influence current R&D spending. In practice, managers generally set R&D budgets by adjusting the previous year's budget up or down, thus we include as a control the variable *lag-R&D*. We also control for several forms of slack. It is especially important to control for slack because slack-based search is an alternate form of search discussed in both the BTF and in agency theory. According to the BTF, when performance exceeds aspirations, firms may add to slack, or when performance drops below aspirations, firms may deplete slack. The availability of slack resources can facilitate experimentation and search (Greve, 2003b). According to agency theory, the presence of slack resources could induce agency problems by allowing managers to wastefully pursue pet projects even in the absence of growth opportunities (Jensen, 1986), a problem that may be particularly acute in Japan (O'Brien & David, 2010). *Unabsorbed slack* is measured as cash and marketable securities divided by current liabilities (Greve, 2003a; Kim, Kim, & Lee, 2008), *absorbed slack* is the ratio of selling and administrative expenses to sales (Greve, 2003a), and *potential slack* is the ratio of total long term debt to total assets (Bromiley, 1991). Other controls include: *size*, the natural log of total firm assets; *fixed assets*, net fixed assets to total assets; *advertising,* the ratio of advertising expenses to sales; and earnings *volatility*, the standard deviation of ROA over the previous five years. We also proxy for the firm's *growth opportunities* with its market to book

ratio, which is calculated as the sum of the book value of debt plus market value of equity divided by total assets.

We also included two industry level control variables. For each industry, *industry R&D* and *industry growth opportunities* represent the median value of the corresponding firm level variable for all firms for which that industry is their primary industry. Finally, several of the variables (namely *R&D, ROA, unabsorbed slack, growth opportunities* and *advertising*) contained some extreme outliers. Rather than exclude those observations, we winsorized those distributions at the top and bottom 0.5^{th} percentiles. After the winsorizing, analysis of Cook's D statistics indicated that no outliers had a significant impact on the models.

Analysis

Conducting our analysis presented several critical methodological considerations. First, unobserved heterogeneity is a concern because our data contains multiple observations per firm. Therefore, we incorporate fixed firm effects into all our models. Fixed effects were deemed superior to random effects because a Hausman tests indicated that there was a significant ($p<0.01$) systematic difference in the coefficients from random effects models versus fixed effects models. Second, our model is dynamic because we include as a control variable the lag of the dependent variable. However, including the lag of the dependent variable in a standard fixed effects regression model will induce bias. Hence, we employ Bruno's (2005) corrected least squares dummy variable (LSDVC) approach to correct for this bias.

Finally, endogeneity is also a potential concern. Endogeneity is a form of omitted variables bias, which occurs when a model excludes one or more variables that significantly influences the dependent variable and is correlated with one or more of the independent variables. While techniques such as two-stage instrumental variables (IV) regressions can be

employed to eliminate this bias and hence yield improved estimates of the effect of an endogenous variable on a dependent variable, these techniques are also less efficient because they tend to produce much larger standard errors (see Chapter 15 of Wooldridge, 2003). Hence, even if a variable is theoretically endogenous, it is preferable to not model it as endogenous unless tests indicate that it induces a statistical problem. Furthermore, our approach minimizes the potential endogeneity problem because lagging all independent variable helps ensure that the model does not use independent variables that were determined simultaneously with the dependent variable, while including firm fixed effects helps control for time invariant omitted variables, and including the lag of the dependent variable as a predictor helps to control for omitted variables that change slowly over time. Nonetheless, we created instruments[3] for the potentially endogenous variables (i.e., *unabsorbed slack, transactional ownership,* and *relational ownership*) and conducted Davidson-MacKinnon tests of exogeneity, which indicated that endogeneity was not a problem in any of the models we report.

RESULTS

Descriptive statistics of our sample are provided in Table 1, while the results of our statistical analyses are given in Table 2. Model 1 of Table 2 presents a base model which, interestingly, suggests that performance relative to aspirations is not related to R&D search. However, because this model only specifies a linear relationship between R&D and performance relative aspirations, it may fail to detect a nonlinear 'kinked' relationship. Model 2 of Table 2 incorporates the spline specification and reveals that performance relative to aspirations does indeed have a significant impact on R&D, albeit a different effect depending on whether

[3] Although the appropriate instruments varied somewhat from model to model, we generally found that either industry average values for the variables in question or lags of those variables served as valid instruments (i.e., they were strongly related to the potentially endogenous variable but not strongly related to the dependent variable).

performance is above or below aspirations. The significant negative coefficient for *Performance-Aspiration* shows that as performance falls further and further below the aspiration level, R&D expenditures increase, thus supporting hypothesis 1.

The significant positive coefficient on *Performance>Aspiration* reveals the relationship is different when performance exceeds aspirations. If the coefficient was of the same magnitude but of opposite valence, it would suggest that the relationship between R&D search and performance relative to aspirations flattens out when performance exceeds aspirations. However, the coefficient for *Performance>Aspiration* is almost twice as large as the absolute value of the coefficient for *Performance-Aspiration*, suggesting that R&D expenditures rise as performance rises further above aspirations, hence making an almost perfect V-shape at the aspiration level. A Wald test confirms that the linear combination of the two coefficients is significantly greater than zero (Chi-square=5.98, $p<0.05$), revealing that the slope is indeed significantly greater than zero when performance exceeds aspirations and hence supporting hypothesis 2.

Although we did not hypothesize main effects for transactional and relational ownership, the significant negative coefficient for transactional ownership and the significant positive coefficient for relational ownership are consistent with our theoretical arguments. In terms of the control variables, it is interesting to note that neither absorbed slack nor potential slack influenced R&D search, but unabsorbed slack had a strong positive effect. Consistent with theory, this suggests that those forms of slack are not as easily accessible as unabsorbed slack.

Model 3 of Table 2 adds in the interactions between ownership structure (i.e., extent of relational and transactional ownership) and performance above and below aspirations. The results reveal that neither transactional ownership nor relational ownership impact how managers alter organizational search behavior in response to performance shortfalls. Thus, we fail to find

support for hypothesis 3. Curiously, ownership structure does impact how performance above aspiration influences search behavior. The negative interactions of *Performance>Aspiration* with both *relational ownership* and *transactional ownership* reveal that both types of owners tend to use their influence to curtail the positive relationship between performance above the aspiration level and R&D search. These results support hypothesis 4 because the interaction between *Performance>Aspiration* and *transactional ownership* is significantly more strongly negative than the interaction between *Performance>Aspiration* and *relational ownership* (Chi-square 18.52, $p<0.01$). The magnitudes of the coefficients reveal that on a share per share basis, transactional owners curtail this increase over twice as strongly as do relational owners. Finally, model 4 demonstrates that the results also hold if we drop the insignificant interactions, model 5 further demonstrates that the results are substantively identical if we give equal weighting to social and historical aspirations when constructing our measure of aspiration levels. Model 6 shows that the results also hold if we exclude the three measures of slack, and model 7 reveals that the results are similar if we limit the sample to just manufacturing firms.

In order to assess the economic significance of our results, we use model 4 of Table 2 to produce predicted vales for R&D for varying levels of performance and for different ownership structures. Figure 1 illustrates that all firms, regardless of ownership structure, respond similarly as performance falls below the aspiration level. However, ownership structure bears a powerful influence on how firms respond to performance above aspiration. When transactional ownership is high, firms continue to cut R&D as performance continues to rise above the aspiration level. In contrast, firms with the median level of both transactional and relational ownership dramatically increase R&D as performance surpasses aspiration levels. Taking into account the main effects also helps us understand between why high levels of relational ownership actually curtail the rise

in R&D associated with performance above aspirations. Relational owners generally support a very high level of R&D *regardless* of the level of performance. Communitarian-oriented relational owners support higher levels of search for future opportunities at all levels of performance. As they support a much higher level of R&D search when performance is at the aspiration level, they likely do not feel the need to increase R&D spending quite as sharply in response to improvements in performance because they started from such a high baseline.

DISCUSSION

In this paper, we show that the BTF provides robust explanations of R&D search in a contractarian setting but requires some modification in a communitarian setting. Japan presents an interesting context because while Japanese firms tend to be more communitarian than U.S., they are also subject to pressures for both a communitarian orientation (from relational owners) and contractarian orientation (from transactional owners). Contrary to the prediction of hypothesis 3, we find that some aspects of R&D search are the same in communitarian settings as they are in contractarian settings. Specifically, firms that perform below their aspiration level engage in problemistic search in order to attempt to resolve their problems, regardless of their ownership structure. In keeping with the canonical BTF prediction of problemistic search, both types of owners seek higher search when performance falls short of aspirations. However, we also find some critical differences that suggest that BTF explanations do require some modification in a communitarian setting. When performance exceeds aspirations, firms in contractarian settings reduce or stabilize R&D search, while communitarian-oriented firms engage in more R&D search. Furthermore, when performance exceeds aspirations relational owners foster higher R&D search than transactional owners.

Our results show that relational owners, who are supportive of a communitarian

orientation, shape R&D search differently from transactional owners, who are more supportive of a contractarian orientation. The median Japanese firm, which adheres to a communitarian logic, responds to performance shortfalls with problemistic search but also increases search for future opportunities in response to performance surpluses. Furthermore, relational ownership strengthens the communitarian orientation of the firm. Although it diminishes the steepness of the 'future search' slope, this is an artifact of the fact that they support much higher levels of search when performance is near the aspiration level, and indeed they promote greater levels of search at all levels of performance. In contrast, transactional owners pressure managers to attenuate R&D search as performance rises above the aspiration level. Thus, owners influence search behavior consistent with their predilection for contractarian or communitarian logic.

Our results indicate that both national context and ownership structure may require explicit consideration when examining R&D search. It is interesting to compare our results with those of Greve (2003a), who studied the Japanese shipbuilding industry and found that search behavior follows patterns similar to what is seen in U.S. firms. While this may appear to be at variance with our finding of a positive relationship between R&D search and performance above the aspiration level, *post hoc* inspection of our data revealed that shipbuilding firms tend to have a high level of transactional ownership. Our research shows that contractarian-oriented transactional owners tend to foster the patterns of search found in traditional BTF research, and hence the firms Greve studied likely conform to the 'Transactional' line depicted in Figure 1.

Our research also suggests that there is still much work to be done in exploring the institutional and contextual boundaries of management theories. We have argued that the BTF is implicitly based on a contractarian context, and that extending the theory to account for a more communitarian context yields a more general understanding. Like the BTF, many management

theories have been developed in a U.S. context and are likely to be shaped by contractarian considerations. For example, agency theory may need some refinement when applied to different institutional contexts (Hoskisson, Eden, Lau, 2000; Wright, Filatotchev, Hoskisson, 2005). While we would expect that most management theories can be generalized relatively readily across developed capitalist economies, more research on which theories may need to be modified and under what conditions is warranted. A more explicit consideration of cross-country institutional differences should help to extend our understanding of other management theories as well.

It is also important to point out several important limitations of our study. First, although we theorized about important differences across national contexts, our empirical sample was limited to Japanese corporations. Cross-country studies would be useful in corroborating our results and verifying its generalizability across national contexts. Across countries, the extent of a communitarian versus a contractarian logic is shaped by culture as well as institutional rules (Hall & Soskice, 2001). Thus, firms in countries such as Germany, which is believed to have a more communitarian logic, should engage in search behaviors similar to what we note for Japan. By contrast, firms in countries such as the U.K., which is believed to have a more contractarian logic, should engage in search behaviors similar to what prior research notes for U.S. firms.

A second limitation of our study is that we have treated all foreign owners of Japanese firms as homogenous and espousing a contractarian logic. While we believe that this is a reasonable generalization because foreign ownership is dominated by U.S. and U.K. institutional investors who lack ancillary business ties to the firm, there could well be some instances in which foreign investors have a close, strategic relationship with the firm. Thus, more research examining variation amongst foreign owners is needed. Third, we do not consider the role of

other owners such as family owners. Family ownership represents a distinct ownership category that is hard to characterize as either relational or transactional. Family owners tend to have a large proportion of their own wealth invested in a firm, much larger than foreign owners or domestic corporations and institutional investors. Unlike relational owners that own long-term share in other firms, family ownership tends to be dedicated to the focal firm, and therefore not as prone to reciprocal obligations to the network of embedded firms. Also, unlike transactional owners that can readily exit their stake, family owners are in for the long-term. Future research would benefit from an expansion of the scope of the study to other kinds of owners. A fourth limitation of our study is that we focused solely on the propensity for ownership structure to shift the dominant logic between contractarian and communitarian. However, more research on other factors that may pressure managers to be more contractarian versus communitarian could significantly enhance our understanding of the determinants of search behavior. Finally, while our theory assumes that R&D can serve as a mechanism for generating the future growth opportunities that will benefit stakeholders, more research is needed to assess the subtle mechanisms by which firms pay back and pay forward their broader network of stakeholders in the short run and in the long run.

In conclusion, we have demonstrated that although the BTF provides a robust explanation of R&D search behavior, there may be subtle yet important differences across institutional contexts. Specifically, managers in communitarian contexts such as Japan may prioritize the demands of the various stakeholder groups differently than do managers in more contractarian cultures. Furthermore, we also demonstrate that not only do different types of owners place divergent pressures on managers, but that the preferences of these owners may even supersede the cultural predispositions of a firm's managers.

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Table 1: Descriptive Statistics

Variable	Mean	St. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) R&D	0.02	0.04														
(2) Perform.-Aspiration	0.00	0.03	0.06													
(3) Perform. > Aspiration	0.01	0.02	0.09	0.85												
(4) Transactional Owner.	0.07	0.09	0.16	0.20	0.22											
(5) Relational Owner.	0.61	0.15	-0.07	-0.05	-0.12	-0.25										
(6) Unabsorbed Slack	0.65	0.95	0.12	0.18	0.22	0.19	-0.12									
(7) Absorbed Slack	0.18	0.13	0.32	0.03	0.14	0.10	-0.18	0.23								
(8) Potential Slack	0.32	0.25	-0.14	-0.36	-0.37	-0.28	0.05	-0.41	-0.26							
(9) Size	11.29	1.26	0.11	-0.02	-0.10	0.37	0.21	-0.09	-0.12	0.17						
(10) Fixed Assets	0.28	0.16	-0.08	-0.05	-0.08	-0.13	0.08	-0.15	0.02	0.17	-0.03					
(11) Advertising	0.01	0.02	0.09	0.04	0.12	0.09	-0.14	0.15	0.53	-0.14	0.05	-0.02				
(12) Volatility	0.02	0.01	0.09	-0.06	0.16	0.06	-0.12	0.09	0.11	-0.11	-0.18	-0.07	0.06			
(13) Growth Oppor.	0.94	0.62	0.11	0.40	0.48	0.33	-0.03	0.25	0.19	-0.34	0.06	-0.01	0.13	0.15		
(14) Industry R&D	0.02	0.02	0.54	0.02	0.04	0.10	-0.11	0.04	0.18	-0.10	-0.03	-0.07	0.00	0.10	0.01	
(15) Indus. Growth Opp.	0.81	0.22	-0.04	-0.03	0.01	0.06	0.14	0.14	0.15	-0.22	-0.03	0.14	0.09	0.12	0.40	-0.08

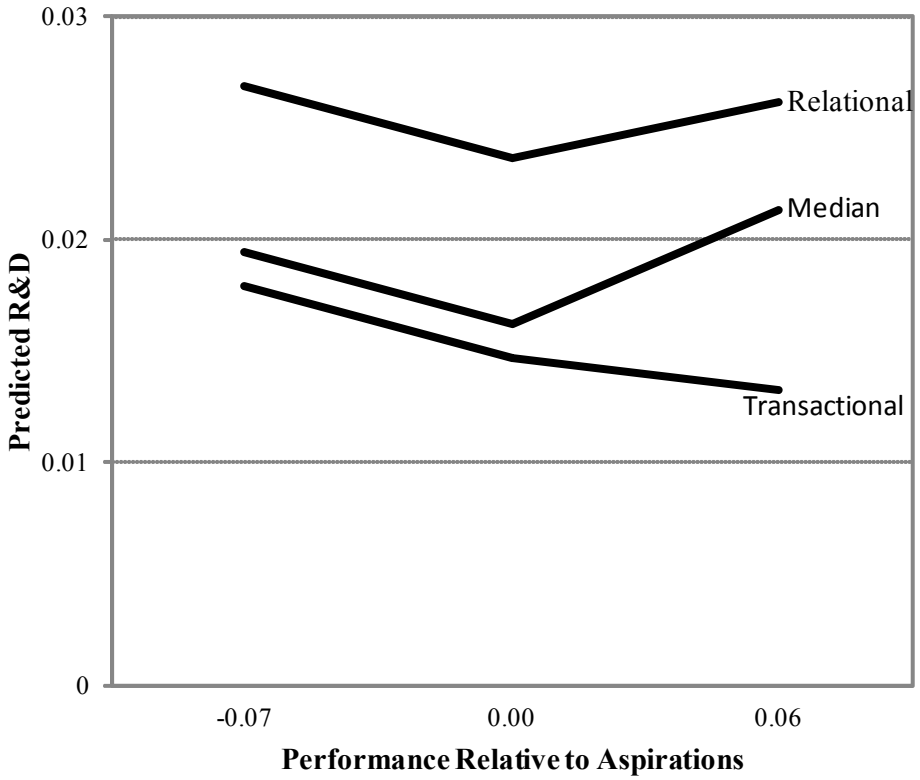
n = 18,283

Table 2: Determinants of R&D Intensity

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Lag-R&D	0.757 **	0.759 **	0.761 **	0.761 **	0.754 **	0.776 **	0.711 **
Perform.-Aspir.	-0.006	-0.042 **	-0.105 *	-0.048 **	-0.101 **	-0.052 **	-0.085 **
Perform.>Aspir		0.080 **	0.370 **	0.295 **	0.294 **	0.284 **	0.421 **
Transactional Owner.	-0.019 **	-0.020 **	-0.010	-0.011	-0.013 **	-0.012 *	-0.013
Relational Owner.	0.042 **	0.041 **	0.045 **	0.043 **	0.042 **	0.042 **	0.068 **
Perf-Aspir x Trans.			0.037				
Perf-Aspir x Relat.			0.095				
Perf>Aspir x Trans.			-0.780 **	-0.733 **	-0.702 **	-0.720 **	-0.934 **
Perf>Aspir x Relat.			-0.362 **	-0.238 **	-0.189 **	-0.227 **	-0.335 **
Unabsorbed Slack	0.001 **	0.001 **	0.002 **	0.002 **	0.001 **		0.002 *
Absorbed Slack	0.007	0.005	0.005	0.005	-0.001		0.007
Potential Slack	0.002	0.002	0.002	0.002	0.001		0.000
Size	0.004 **	0.004 **	0.004 **	0.004 **	0.004 **	0.004 **	0.008 **
Fixed Assets	0.012 **	0.013 **	0.014 **	0.013 **	0.012 **	0.011 *	0.026 **
Advertising	-0.087 *	-0.092 *	-0.096 **	-0.094 **	-0.106 *	-0.088 **	-0.179 **
Volatility	-0.093 **	-0.111 **	-0.113 **	-0.113 **	-0.141 **	-0.112 **	-0.124 **
Growth Oppor.	0.004 **	0.004 **	0.004 **	0.004 **	0.004 **	0.004 **	0.005 **
Industry R&D	-0.067 **	-0.069 **	-0.068 **	-0.068 **	-0.070 **	-0.066 **	-0.238 **
Indus. Growth Opp.	-0.039 **	-0.039 **	-0.039 **	-0.039 **	-0.040 **	-0.039 **	-0.066 **
Observations	18,283	18,283	18,283	18,283	18,283	18,283	11,587
Wald Chi-square	51201 **	51202 **	51269 **	51217 **	51168 **	48162 **	38512 **

Significance Tests (two-tailed): * $p<0.05$; ** $p<0.01$

Figure 1: Predicted R&D



The x-axis plots performance relative to aspirations from the mean minus two standard deviations to the mean plus two standard deviations. The line labeled 'Median' represents firms with the median level of both relational and transactional ownership, while the lines labeled 'Transactional' and 'Relational' depict firms with transactional and relational ownership, respectively, equal to the 90th percentile of the relevant distribution (whilst holding the other type of ownership at the median). All other variables were held constant at their mean.