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**RESOLVING DIVERGENCE: HOW THE STAKEHOLDER ENVIRONMENT
MODERATES THE EFFECTS OF CONFLICTING PERFORMANCE FEEDBACK ON
ORGANIZATIONAL CHANGE**

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Resolving Divergence: How the Stakeholder Environment Moderates the Effects of Conflicting Performance Feedback on Organizational Change

Abstract

Organizations are typically evaluated across a variety of performance dimensions. But extant work on how organizational decision makers guide organizational change by integrating feedback about different types of performance fails to consider the organizational context. In the present study, we begin to address this weakness in the existing literature by explicitly examining how an organization's stakeholder environment moderates the process through which decision makers respond to divergent performance feedback in managing organizational change. We test related hypotheses through a field study of divergent safety and financial performance feedback and organizational change in the U.S. railroad industry, finding support for the notion that decision makers consider external stakeholder assessments of organizational performance when determining appropriate responses to divergent performance feedback.

Resolving Divergence: How the Stakeholder Environment Moderates the Effects of Conflicting Performance Feedback on Organizational Change

Introduction

Organizations are not static; they adapt and change through performance feedback from their environments (Chuang & Baum, 2003; Denrell, 2003; Levinthal & March, 1993; Sitkin, 1992). One particularly consistent set of findings in this literature is that organizational decision makers compare their organizations' performance to a set of performance aspirations and initiate organizational change activities according to the discrepancy between the two (Audia & Greve, 2006; Greve, 1998, 2003a). However, although organization theory has long recognized that performance in organizations is multidimensional (e.g., Cyert & March, 1963), in the burgeoning literature on organizational performance feedback, few studies attempt to incorporate this complexity. Rather, studies typically focus on the effect of feedback on one performance dimension at a time (Baum & Dahlin, 2007; Greve, 1998, 2003a; Lant, 1992; Mezas et al., 2002), or how various types of performance each independently influence organizational change (Iyer & Miller, 2008; Singh, 1986; Wiseman & Bromiley, 1996). But very little prior work explicitly considers the interaction between performance feedback on multiple dimensions and how it influences organizational action (for two notable exceptions see Audia & Brion, 2007 and Greve, 2008).

Given that decision makers in real organizations commonly evaluate organizational performance across multiple dimensions, studying the relationships among feedback on multiple dimensions of performance and organizational change constitutes an important direction for future development of organizational learning theory. Recognizing the significance of this issue, organizational learning theorists have developed a set of theoretical arguments around the question of how decision makers determine which of multiple performance dimensions to direct their attention to (Cyert & March, 1963; Greve, 2008; March & Shapira, 1992). This work identifies a set of rules—known as switching rules—that decision makers employ to help them determine when performance feedback indicates the need for

organizational change. Two of the most important of these switching rules are the fire-alarm rule, which suggests that decision makers initiate organizational change when their organizations underperform on any meaningful performance dimension (Greve, 2003); and the self-enhancement rule, which suggests that decision makers only initiate organizational change when their organizations underperform on all relevant dimensions of performance at once (Audia & Brion, 2007).

However, neither existing theoretical work nor existing empirical work on switching rules explores the possibility that the external organizational environment moderates the use of different switching rules by organizational decision makers. The purpose of the present study is to address this weakness in the existing literature, by theorizing and testing the effect of an organization's stakeholder environment on organizational use of switching rules. Specifically, we propose that stakeholder evaluations of an organization's performance moderate the relationship between divergent performance and organizational change. Drawing on theories of the stakeholder environment (e.g., Freeman, 1984), we suggest that decision makers consider external assessments of organizational performance to determine appropriate responses to diverging performance feedback. We argue that self-enhancing responses to divergent performance would be more likely in a supportive stakeholder environment—that is, when relevant stakeholders already view the organization's performance on multiple dimensions in a positive light; and we argue that use of the fire-alarm switching rule is more likely in a hostile stakeholder environment. We test these hypotheses through a field study of divergent performance and organizational change in the U.S. railroad industry.

This study contributes both to the literature on the determinants of organizational change and the stakeholder theory literature. First, it extends the existing literature on switching rules in organizational decision making by proposing that the stakeholder environment acts as a boundary condition regarding the use of the various switching rules. Second, it extends stakeholder theory by theorizing that stakeholder evaluations of organizational performance influence how organizational decision makers respond to performance feedback.

Organizational Switching Rules

The behavioral theory of the firm suggests that organizational decision makers evaluate the need to change existing organizational strategies and routines by comparing organizational performance against a relevant organizational aspiration level (Cyert & March, 1963; Greve, 1998). According to this perspective, decision makers in organizations with performance below the relevant aspiration level interpret this condition as a failure, and are motivated to initiate a search for solutions to the performance shortfall. Search is initially local, as decision makers consider making changes directly related to the performance problem or changes that have worked in the past; but as performance continues to fall short, the radius of the search broadens (Audia & Greve, 2006; Baum et al., 2005; Greve, 2003a). The essential argument of this problemistic search process is that decision makers become more likely to engage in organizational change as organizational performance falls further and further below organizational goals (Cyert & March, 1963). As performance improves above the aspiration, organizational propensity to change drops even further and resources are diverted to other activities (Lant, 1992; March & Shapira, 1987, 1992).

A large body of evidence suggests that how organizational decision makers learn from and respond to complex events is a function of where they allocate their attention (Cyert & March, 1963; Daft & Weick, 1984; March & Shapira, 1992; Ocasio, 1997). As organizational decision makers attend to multiple dimensions of performance, performance along each of the dimensions may in some cases provide conflicting information regarding the appropriate type or extent of organizational change (Cyert & March, 1963). Audia and Brion (2007) label these situations as cases of divergent performance. To resolve conflict in these cases, decision makers shift their attention among various performance dimensions according to a predetermined hierarchy or set of rules, making changes responsive to performance on one dimension at a time (Cyert & March, 1963; March & Shapira, 1992; Ocasio, 1997). A switching rule is a meta-rule governing the sequence in which decision makers attend to performance on various relevant dimensions (Greve, 1998; March & Shapira, 1992). Several classes of switching rules

have been proposed (March & Shapira, 1987, 1992; Wiseman & Bromiley, 1996). Two of the most significant of these rules are the fire-alarm rule and the self-enhancement rule.

The Fire-Alarm Rule. As discussed above, the behavioral theory of the firm suggests that decision makers engage in searches for solutions in response to performance feedback. The process of problemistic search implies that shortfalls or failures are relatively salient when compared with successes (Cyert & March, 1963; Lant, 1992). This argument has been extended to propose the fire-alarm rule for resolving conflict when performance on two or more dimensions diverges (Greve, 1998, 2003b).

According to the fire-alarm switching rule, when organizational decision makers are confronted with diverging performance feedback along two or more dimensions, they focus attention first on dimensions where performance is below aspirations (Greve, 2003b, 2008). Once the performance shortfall has been resolved on the focal dimension, decision makers may then shift their attention toward other dimensions where performance is above its respective aspiration level, since performance along these dimensions is already successful and requires a less immediate response.

Divergent performance along two dimensions does not necessarily require the condition that performance along one dimension is above its respective aspiration level while performance along the other dimension is below its respective aspiration level. Rather, divergent performance occurs whenever the levels of performance along two or more dimensions provide conflicting information regarding how or how much to change (Audia & Brion, 2007). However, a focus on the condition that performance along one dimension is above its aspiration while performance along the other dimension is below its aspiration vastly simplifies tests of the fire-alarm rule (as well as tests of other switching rules). In those cases where levels of performance along two dimensions provide conflicting information regarding change, and where performance on one dimension is low while performance on the other dimension is high, the fire-alarm rule would predict that decision makers resolve the conflict by making changes that are responsive to the dimension where performance is below its aspiration level. We formalize this prediction as:

***Hypothesis 1:** When performance along two dimensions provides conflicting information regarding the need for organizational change, decision makers resolve the conflict by making changes responsive to the dimension where performance falls below its respective aspiration level*

The Self-Enhancement Rule. The self-enhancement rule forwards an alternate perspective regarding how decision makers respond in cases of divergent performance feedback. This perspective suggests that organizational decision makers are strongly motivated to maintain a positive image of their organization's performance. This argument is rooted in findings from research on individual judgment and decision making, which suggest that individuals tend to make evaluative judgments and respond to events in ways that are intended to preserve their self-image (Burger, 1981; Ford, 1985). For example, individuals who perform poorly on specific tasks tend to attribute the causes of their performance to external or uncontrollable causes (Burger, 1981). Ample evidence suggests a motivational bias wherein individuals desire to protect their self-image from negative evaluation, and this bias appears to influence individuals' judgments of and reactions to performance shortfalls (Burger, 1981; Flammer & Schmid, 2003; Powell et al., 2006; Rogoff et al., 2004).

At the organizational level, a parallel perspective suggests that organizational decision makers are motivated to protect their own positive evaluations of their organizations (Audia & Brion, 2007; Elsbach, 1994; Oliver, 1991; Suchman, 1995). Organizational members may attempt to enhance their organization's image for several reasons. To the extent that they identify with their organization's image, they may be motivated to evaluate it positively because negative evaluations would impact their individual self-image (Powell et al., 2006; Rogoff et al., 2004). Or, members may seek to protect the organization's image because negative evaluations would impact the organization's reputation and access to resources (Pfeffer & Salancik, 1978; Podolny, 1994; Roberts & Dowling, 2002).

One self-enhancement strategy that becomes available to organizational members when an organization's performance is multi-dimensional is to selectively direct their attention among various

available performance dimensions. When an organization's performance on multiple important dimensions provides conflicting information regarding the need for organizational change, organizational members may be motivated to direct their attention away from poor performance on one dimension and toward stronger performance on other dimensions. Elsbach and Sutton (1992) find evidence of this type of behavior, in that organizational members shift attention away from controversial organizational actions and toward more legitimate practices. In an experimental setting, Audia and Brion (2007) study the use of the self-enhancement rule in the context of divergent performance. These authors find that decision makers faced with divergent performance exhibit self-enhancing tendencies. We propose a similar test.

***Hypothesis 2:** When performance along two dimensions provides conflicting information regarding organizational change, decision makers resolve the conflict by making changes responsive to the dimension where performance is above its respective aspiration level.*

The Stakeholder Environment as a Moderator between Switching Rules

While the fire-alarm and self-enhancement perspectives are rooted in different models of individual decision making (Ford, 1985; Kahneman & Tversky, 1979), their extensions to the organizational level of analysis require incorporating the influence of the organization's context (Cyert & March, 1963; Dutton et al., 1994; Elsbach et al., 1998). Specifically, the explanatory power of each perspective regarding how organizational decision makers respond to divergent performance may be influenced by the organizational environment. One key part of the organizational environment is the set of stakeholders that interact with the organization—the stakeholder environment (Agle et al., 1999; Frooman, 1999; Mitchell et al., 1997).

Organizations' activities influence and are influenced by many groups and individuals who come into contact with the organization. An organization's stakeholders are defined as any groups or individuals that can affect or are affected by the achievement of an organization's objectives (Freeman, 1984), such as customers, regulators, employees, and communities. Stakeholders learn about organizations through their experience interacting with those and similar organizations and through

information regarding other stakeholders' interactions. Together, these stakeholders and their interactions with the organization comprise the organization's stakeholder environment (Freeman, 1984).

While organizational decision makers may not receive perfect information regarding stakeholders' beliefs and expectations, they have been shown to search for and incorporate available information regarding relevant stakeholders' perceptions into their actions (Hillman & Keim, 2001; Lapre & Tsikriktsis, 2006; Nutt, 2005). Although the relevant stakeholder groups do not necessarily publicize their beliefs regarding the organization, organizational decision makers rely on information which is disclosed publicly to learn about the stakeholder environment.

This information could be used by organizational decision makers to understand stakeholders' assessments regarding the organization's performance. Public external assessments regarding organizational performance are relatively common. For instance, analysts provide expectations regarding potential earnings, regulators across various industries may disclose their evaluations of organizations' reliability or quality, customers may provide feedback regarding product performance through surveys and complaint hotlines, and stakeholders from several groups may attempt to enlist the news media to publicize their views (e.g., Arthur & Aiman-Smith, 2001; Lapre & Tsikriktsis, 2006; Marcus & Nichols, 1999). These external assessments of organizational performance do not necessarily correlate with actual performance. This occurs for several reasons. Stakeholders may focus on a different set of criteria to gauge the organization's performance than the set of criteria used by internal decision makers, they may receive limited information regarding the organization's practices, they may focus on particularly salient events rather than the organization's ongoing operations, they may transfer expectations across similar organizations, or they may be influenced by organizations' prior public reputation (e.g., Elsbach, 1994; Hillman & Keim, 2001; Lapre & Tsikriktsis, 2006).

Thus, although external stakeholder assessments of an organization may not provide decision makers with new information on key organizational performance dimensions, they do provide information on how the organization is viewed externally. This information may influence the switching rule employed by organizational decision makers.

The behavioral assumptions underlying the self-enhancement rule are most likely to be met under conditions of positive external stakeholder sentiment than under conditions of negative sentiment. In other words, when evaluating two dimensions of performance which provide conflicting feedback, organizational decision makers would likely self-enhance rather than attend to the dimension with weak performance when external assessments suggest that stakeholders believe the organization is performing well. This prediction derives from research on individual self enhancement which finds that decision makers direct their attention away from areas where their performance is deficient under normal conditions but cannot do so when an external actor draws attention to those areas of poor performance (Ford, 1985).

On the other hand, decision makers should be less inclined to follow the self-enhancement rule when external assessments suggest that stakeholders believe the organization is performing poorly. In a negative stakeholder environment, organizational decision makers are forced to attend to performance shortfalls (Marcus et al., 1992; Marcus & Nichols 1999; Sutton & Galunic, 1996). This attention to aspects of organizational performance that fall short of organizational goals is likely to push decision makers toward use of the fire-alarm rule as they attempt to deflect negative stakeholder attention by improving organizational performance in areas where it is weak. Together these arguments suggest the following hypothesis.

***Hypothesis 3:** When performance along two dimensions provides conflicting information regarding organizational change, decision makers are more likely to employ the self-enhancement switching rule when external stakeholder assessments of the organization are positive and more likely to employ the fire-alarm rule when external stakeholder assessments of the organization are negative.*

METHODS

Setting and Data

We test the study hypotheses on a panel of all U.S. Class I railroad firms operating between 1980 and 2003. Class I railroads primarily engage in freight or passenger transport. Railroad Companies are grouped based on their revenues with class I carriers being the largest, accounting for over 95 percent of the industry's traffic (Railroad Ten-Year Trends 1984). The unit of analysis is the company-year, and the total sample includes 386 observations. Most data come from the annual *Analysis of Class I Railroads*, published by the Association of American Railroads, and from *The Historical Guide to North American Railroads* (Drury, 2000). An analysis of media reports was also conducted, and is described further below.

The railroad industry presents an ideal setting in which to conduct a study on divergent performance feedback and organizational change. Since the industry underwent deregulation in 1980, competition has increased and railroad firms have faced increasing pressure to manage their performance (Boyer, 1987; McFarland, 1987; Smith & Grimm, 1987). Railroad firms are evaluated on a variety of performance metrics. Of these, managers frequently cite two categories of performance as critically relevant to railroad operations at both a strategic and operational level (Baum & Dahlin, 2007; Drury, 2000; Hicks, 1986; Johnson et al., 2004). First, railroad firms are evaluated based on their infrastructure reliability (Baum & Dahlin, 2007; Drury, 2000; Watson, 1997). Anecdotal evidence suggests that railroad executives make infrastructure investments responsive to system reliability for several reasons (e.g., Norfolk Southern Annual Report 2000). First, railroads with poor infrastructure reliability face large accident costs. Second, railroads with poor reliability may lose customers unless infrastructure problems are visibly corrected (Hicks, 1986). Third, managers in railroads that respond to reliability problems may mitigate reputation loss (Watson, 1997).

Second, railroad firms are also evaluated based on their financial performance (Mentzer & Near, 1992; Railroad Ten-Year Trends 1984; Watson, 1997; Wilner, 1997). Financial performance is especially important in the railroad industry given its capital intensive nature, since poorly performing firms may lack the resources needed to invest in more efficient or profitable technologies. A variety of metrics can be used to gauge financial performance. Railroad industry analysts and executives frequently discuss the

operating ratio as the key financial performance metric in the industry (e.g., Kansas City Southern Annual Report 2003; Norfolk Southern Annual Report 2000: 3, 2001: 2). Operating ratio is the proportion of revenues used to cover operating costs, and is measured as total railroad operating expense divided by total railroad operating revenue, with lower values indicating more effective cost containment or a stronger revenue base. Railroad firms face competitive pressures to reduce operating costs and achieve economies of scale, and managers pay particular attention to a firm's operating ratio as an overall gauge of the success of their efforts (e.g., Norfolk Southern Annual Report 2000: 3, 2001: 2; Union Pacific Annual Report 2002). Railroad firms track this measure on an annual basis, and the measure is used by executives and analysts to compare performance both within and across railroads since it is adjusted for revenue differences across firms (Chandler, 1992: 268; Thompson, 2003).

In addition to infrastructure reliability, the operating ratio provides information used by railroad decision makers to time infrastructure improvements. Railroads with strong financial performance (i.e., a low operating ratio) have excess resources that can be used to replace outdated infrastructure, while railroad managers cite poor financial performance (i.e., a high operating ratio) as a reason to control costs and limit infrastructure improvements (Norfolk Southern Annual Report 2000: 3, 2001: 2; Union Pacific Annual Report 2002). Because both reliability and financial performance drive infrastructure investment in the railroad industry, differences in performance relative to aspirations on each dimension yield conflicting information regarding whether to increase or decrease infrastructure investments.

Measures

Organizational Change. Railroad decision makers have several options to improve infrastructure. For example, they may replace locomotives and freight or passenger cars with newer technology, they may improve fixed facilities such as loading terminals, or they may replace worn rail track or ties. Of these, we focus on the replacement of worn railroad ties. Railroad ties are wooden (or occasionally concrete) planks used by all railroads to fasten metal rails to the ground (or to cushioning material atop the ground). We choose the focus on tie replacement for several reasons. First, rail ties are subject to frequent mechanical deterioration, since they dampen the load of passing trains and transfer vibrations to

supporting substructures. Furthermore, they are particularly sensitive to weathering and deterioration. For these reasons, rail ties must be replaced relatively frequently and are particularly sensitive indicators of infrastructure investment, since railroads often replace ties before replacing metal rails (which are not disturbed during the tie replacement procedure) or undertaking more extensive repairs (Webster, 1992). Second, although a number of other infrastructure investments (such as safety-oriented innovations in engine equipment) were increasingly mandated over the study period, railroad decision makers have substantial discretion regarding how frequently to replace rail ties (Judge, 2000). Third, although each individual tie is relatively inexpensive, there are approximately 2,800 to 3,000 ties per mile of track. When this volume is considered, tie replacement represents a substantial component of railroads' infrastructure investment (Oaks, 1999). Fourth, railroads maintain records of the ties replaced on their existing track as well as ties laid on new track, allowing differentiation between infrastructure improvement and infrastructure growth. Railroads' records regarding other forms of infrastructure investment, such as railcar and locomotive additions, do not permit such differentiation.

Research on infrastructure investment suggests the need to control for prior levels of investment, given inertia in the resource allocation process within organizations (Audia & Greve, 2006; Greve, 2003a). Therefore, the dependent variable used in the present study is the rate of change in infrastructure improvement, measured as the change in the number of ties (in hundreds) replaced per mile of track, from the prior period to the current period.

Infrastructure Reliability. To measure infrastructure reliability, we use the reverse-scored number of accidents due to track defects, scaled by the focal company's railroad system length (in miles). This is a direct indicator of physical infrastructure condition, with higher values indicating more reliability (fewer accidents per mile). Furthermore, limiting the measure to accidents involving track defects (excluding operator error, collisions, and equipment failures) is preferable when studying changes that involve repairs or upgrades to existing track.

As discussed above, theory suggests that decision makers evaluate this and other forms of performance relative to aspiration levels. The empirical setting gave little guidance regarding the

aspiration levels relevant to this performance measure, with evidence mixed on whether managers compare their performance to prior levels or to the performance of peer organizations (e.g., Norfolk Southern Annual Report 2000, 2001; Union Pacific Annual Report 2002). Therefore, we employed a procedure commonly used in research on performance feedback to determine the most appropriate type of aspiration level (e.g., Baum & Dahlin, 2007; Greve, 1998, 2003b). This literature suggests that aspiration levels can be constructed based either on the focal organization's past performance (a historical aspiration) or based on the performance of comparable organizations (a social aspiration). The performance variable is then split into two variables. One of these two variables is equal to the difference between the aspiration level and level of performance when performance is below the aspiration level, and is set to zero otherwise, while the other variable equals the difference between performance and the aspiration when performance exceeds the aspiration level and is set to zero otherwise. This spline treatment allows estimation of separate effects of performance variables below or above the aspiration level on organizational change.

While some studies simultaneously include performance relative to both social and historical aspirations (Greve, 1998), other studies seek parsimony by selecting the aspiration level which allows performance above and below the aspiration to explain the greatest variance (Greve, 2003b). We follow the latter approach. Specifically, we estimated several preliminary models including controls (similar to model 1 in Table 2, below) as well as performance above and below one aspiration level at a time. Through this process, we constructed two social aspiration levels, one equal to the average performance of all other organizations and another equal to the average performance of organizations competing in the same geographic region, and a historical aspiration level. The historical aspiration is an exponentially weighted average of the focal organization's past performance values, generated using this formula:

$$A_t = aA_{t-1} + (1-a)P_{t-1}$$

In this formula, A is the aspiration level, P is the performance, a is the level of inertia in the aspiration-level updating process, and t indicates the time period. The appropriate rate of aspiration updating can be determined by comparing the fitness of models including controls and performance

relative to its historical aspiration under incrementally varying values of a . Low values of a , close to zero, indicate rapid updating of the historical aspiration level, while values of a closer to 1 suggest that the aspiration level adjusts more slowly to recent performance levels.

When comparing models using performance relative to social aspiration levels (either all peers or a geographically based subset) and various historical aspiration levels (under values of a from zero to one in 0.01 step increments), performance relative to historical aspiration levels consistently yielded better fit, with fit being maximized when $a = 0.40$. Therefore, the results below rely on performance above and below this historical aspiration level. We refer to the two reliability variables respectively as *Infrastructure Reliability < asp* and *Infrastructure Reliability > asp*. To restate our previous arguments, we expect *Infrastructure Reliability < asp* to be positively related to tie replacement rate and *Infrastructure Reliability > asp* to be negatively related to tie replacement rate, such that railroads invest more resources in replacing ties as they experience more track related accidents than expected and fewer resources as they experience fewer such accidents than expected.

Financial Performance. We reverse-scored each firm's operating ratio (total railroad operating expense divided by total railroad operating revenue) so that higher values indicate stronger financial performance. This measure is inherently size-adjusted, since operating revenue correlates highly with total assets ($r = 0.97$). Preliminary analyses similar to those described above suggested splitting this measure based on its historical aspiration level, with an aspiration updating value of $a = 0.10$. Thus, increasing values on one variable connote improvements in financial performance below the aspiration level while increasing values on the other variable connote improvements in financial performance above the aspiration level. These variables are respectively named *Revenue Retention < asp* and *Revenue Retention > asp*. We expect *Revenue Retention < asp* to be positively associated with tie replacement rate and *Revenue Retention > asp* to be unrelated to tie replacement rate, as railroads performing further below their financial aspirations invest less in tie replacement than those performing close to financial aspirations but railroads performing above financial aspirations to disassociate tie replacement from financial performance.

Multiple Aspirations. Because switching rules take into account performance relative to multiple aspiration levels simultaneously, it was important for us to consider organizational response to reliability and financial performance under various combinations of performance relative to aspirations. Therefore, in some models, we split each of the performance variables, *Infrastructure Reliability < asp*, *Infrastructure Reliability > asp*, *Revenue Retention < asp*, and *Revenue Retention > asp*, into two separate variables based on organizational performance relative to aspirations on the other performance dimension. For example, *Inf. Reliability < asp when Rev. Retention < asp* takes the value of *Infrastructure Reliability < asp* when *Revenue Retention* falls below its aspiration, and zero otherwise. Similarly, *Inf. Reliability < asp when Rev. Retention > asp* takes the value of *Infrastructure Reliability < asp* when *Revenue Retention* exceeds its aspiration, and zero otherwise. A total of eight multiple aspiration performance variables are constructed in this manner to track organizational responsiveness to each of the two performance dimensions under all possible combinations of performance relative to the two aspirations. In each case, the new variable takes the value of the focal performance dimension minus its aspiration level when the specified conditions of performance relative to aspirations are met, and takes a value of zero otherwise. In practice, to facilitate interpretation of results, we report only the combinations in which performance diverges across the two performance dimensions. Examining the effect of each performance variable on organizational change in each of these four cases allowed us to identify the switching rule in operation and test the study hypotheses.

External Stakeholder Environment. We operationalized external stakeholder scrutiny through content analysis of articles in the print media, since stakeholder assessments are reflected through media communication (Bansal & Clelland, 2004; Deephouse, 1999; Deephouse & Carter, 2005; Suchman, 1995). We conducted searches on the Factiva news media database using relevant keywords (e.g., rail, railroad, Class I railroad) to develop a comprehensive set of newspaper articles pertaining to the industry. Then, we collected articles pertaining to the company panel if the relevant company name appeared anywhere in the article and the article was an editorial, letter to the editor, commentary, or front-page story, since these represent media content items with high visibility and broad readership (Deephouse,

1999; Deephouse & Carter, 2005). We also collected general news stories if the relevant company appeared in the headline or lead paragraph. Within this set, we randomly sampled 33% of the articles within each company-year. When fewer than five articles were available in any given company-year, we collected all articles. This yielded 4,828 articles (articles could be repeated if they referenced multiple companies within any particular year). One firm was excluded from the sample because it had no coverage during the study period. Some other firms did not receive media coverage during a few years, and were excluded for the missing years only.

Each article was coded on two dimensions. First, articles primarily discussing railroad operations were distinguished from all other content (705 out of 4,828 articles). This focus on operations (rather than stock price or corporate governance) was appropriate given that both of our performance measures are operationally based. Second, the general tone of each article was rated as negatively evaluating the company's performance, positively evaluating the company's performance, or neutral in content. Articles were rated negatively when they suggested that a company's performance or actions were being challenged or poorly perceived by any of a company's stakeholders (e.g., regulators, stockholders, proximate communities, employees, or suppliers). Examples include shippers' concerns regarding bottlenecks and delayed shipments or community concerns regarding railroad accidents. Articles were rated positively if they presented stakeholder endorsements, such as favorable reports regarding on-time deliveries or reduced bottlenecks. Articles were coded as neutral if a main stance could not be discerned.

To develop the measure of external stakeholder assessment, we constructed a variable equaling the proportion of favorable to unfavorable articles, following a formula commonly employed to calculate the tenor of media communication (see Bansal & Clelland, 2004; Deephouse, 1999; Deephouse & Carter, 2005). This measure has favorable properties, as it takes on higher values when firms have more positive rather than negative media coverage and lower values in the opposite case. In addition, as the formula adjusts for the total amount of media coverage per firm, the measure can be used to compare the tenor of media coverage across firms.

Control Variables. The industry environment and prior research suggest a number of relevant controls. As the infrastructure reliability variables focus on the rate of accidents due to track defects, a control is included for the number of accidents per mile that are unrelated to track defects (e.g., operator error, pedestrian or vehicle collisions, equipment problems), as these may result infrastructure investments outside of the performance evaluation process under study. Since models estimate changes in the rate of improvement to existing infrastructure, a control is included for year-over-year changes in the rate of infrastructure growth, which is distinct from improvements to existing infrastructure. This is constructed similarly to the dependent variable, except that it measures the change in the number of ties added on new track (scaled by overall system length, in miles) from the prior period to the current period.

The logged number of track miles operated by each railroad company during the period controls for operating scale, consistent with prior work in this industry (Baum & Dahlin, 2007). The measure was highly correlated with several controls for size (asset values, length of track, number of employees), and the latter were excluded from final models. Age controls for the effects of age-dependent inertia and experience. The capacity and resources of each railroad firm's maintenance function could affect propensities to replace infrastructure; thus, a control is included for the ratio of maintenance employees to total employees. In addition, freight railroading and passenger transportation require different levels of infrastructure investment; thus, a ratio of passenger transportation revenue to total transportation revenue controls for each railroad company's passenger to freight service mix. The availability of slack resources may also influence investment. Thus, controls are included for absorbed slack (the ratio of selling, general, and administrative expenses to sales), which corresponds to costs that can be recovered relatively quickly; unabsorbed slack (the ratio of quick assets—cash and marketable securities—to liabilities), which corresponds to excess, instantaneously available resources; and potential slack (the ratio of debt to equity), which gauges the firm's borrowing ability. A control is included for acquisition events, and fixed year effects are included in all models to control for changes impacting the entire industry over time, such as shifts in railroad industry demand. All control and independent variables were lagged to reduce the possibility of reverse causality.

Analysis

We estimate models on the pooled dataset with an observation for each railroad company in each year it operates between 1980 and 2003. Final model selection and estimation were based on preliminary analyses and specification tests. Diagnostics of models estimated using firm random and fixed effects were examined. Coefficient estimates and effect sizes were substantially similar under each approach, and fixed effects were chosen to control for stable firm characteristics. The inclusion of organization fixed effects is critical here because many characteristics of railroad firms were unobservable during the sample period. If not controlled, inter-organizational heterogeneity in these characteristics could bias the regression results. Railroad fixed effects eliminate this potential source of bias by controlling for all stable unobserved organizational characteristics. Final models were estimated using cross-sectional time-series OLS regression with fixed effects (xtreg, in Stata 10.0).

RESULTS

Table 1 presents descriptive statistics and correlations for the variables of interest. None of the correlations raise particular concerns regarding collinearity. Nonetheless, models were hierarchically nested. In addition, an examination of variance inflation factors on final models did not indicate substantial problems with collinearity among any predictor variables.

Insert Table 1 about here

Table 2 presents models estimating changes in the rate of infrastructure improvement. Model 1 includes only controls. Infrastructure growth has a significant negative effect on infrastructure improvement, suggesting that firms trade off levels of growth and improvement to existing infrastructure rather than pursuing both activities simultaneously. Maintenance department capacity also has a significant negative effect across models, perhaps because firms with a large maintenance component are more willing to delay infrastructure improvements under the belief they are more capable at responding to problems, such as train delays, that could result from weak infrastructure after the fact. Although several

other controls lack significant effects, they are retained due to their theoretical importance in the present context.

Insert Table 2 about here

Models 2-4 include the variables for revenue retention relative to its aspiration and infrastructure reliability relative to its aspiration, respectively. These models also add the measure of external stakeholder assessment. In Model 2, infrastructure reliability above its aspiration has a significant negative effect on change, while performance below the aspiration does not influence change. In Model 3, revenue retention below its aspiration has a significant positive effect on change, while change is not affected by further increases above the aspiration level on this measure of performance. These results are largely in line with expectations. Model 4 includes both performance variables simultaneously, and results are similar to those of Models 2 and 3. External stakeholder evaluation does not significantly impact tie replacement rate change in any of the models.

Model 5 introduces versions of the two performance variables split by performance relative to both aspiration levels. The results show that tie replacement rate change responds to reliability performance, but not to revenue retention performance, under conditions of divergent performance (performance exceeds one aspiration but falls below the other). This pattern of results is inconsistent with the use of either of the two switching rules discussed above (the fire alarm rule or the self-enhancement rule), and indicates a possible moderator meriting further research.

Model 6 is identical to Model 5, with two exceptions. First, the external stakeholder evaluation variable was removed. Second, the sample used in Model 6 was restricted to observations for which external stakeholder evaluation was negative—indicating a greater number of negative media articles than positive media articles printed in the previous year; 138 railroad-years met this condition. In this restricted sample, infrastructure investment rate responds only to reliability (in that the reliability coefficient is significant while the revenue coefficient is not) when performance met revenue aspirations but not reliability aspirations. Conversely, infrastructure investment rate responded to revenue retention when performance met reliability aspirations but not revenue aspirations. In other words, organizational

change appeared to respond to the dimension of performance that fell below its respective aspiration. In both cases coefficients were in the expected directions. This pattern of results is consistent with the use of the fire-alarm switching rule, which dictates that when performance feedback diverges, organizational action be made responsive to the performance dimension on which performance fell short of aspirations. This finding lends support to H1, with respect to this subsample.

Model 7 is identical to Model 6, but it is estimated using only the subsample of observations for which external stakeholder evaluation was positive or neutral in the previous year; 248 observations met this condition. In this subsample, infrastructure investment rate responded to reliability (i.e. the reliability coefficient is significant) when the reliability aspiration had been met, but the revenue retention aspiration had not. In other words, when performance diverged on the two dimensions, organizational change responded to the dimension on which performance exceeded its aspiration. This result is largely consistent with the use of a self-enhancement switching rule, and lends partial support to H2, for this subsample.

Taken together, the results of Models 6 and 7 provide strong support for the notion that the switching rule used by organizational decision makers depends on the negativity of external stakeholder assessments of organizational performance. Railroad decision makers appeared to have employed a fire-alarm rule when stakeholder assessments were negative and a self-enhancement rule when they were not. This finding strongly supports H3.

DISCUSSION

This study's findings imply that how organizational decision makers respond to performance conflicts may depend on whether their stakeholder environment appears negative or supportive. Specifically, when levels of performance on two dimensions provide conflicting information regarding whether organizational change is needed, decision makers appear to use different switching rules depending on the recent stakeholder assessments of organizational performance. In environments where stakeholders more favorably assess organizational performance, decision makers appear to make

organizational changes responsive to the performance dimension that falls above its aspiration level. This is consistent with a self-enhancement rule. But in environments where stakeholders assess organizational performance negatively, decision makers appear to make organizational changes responsive to the performance dimension that fails to meet its aspiration level, consistent with a fire-alarm rule. This study's most striking contribution, therefore, is to identify a mechanism through which the stakeholder environment influences organizational change and moderates between two different switching rules used by decision makers as responses to performance conflicts. This is notable, since it is the first attempt to specify a boundary condition between the two alternate theoretical perspectives of the fire alarm rule and the self-enhancement rule (c.f. Audia & Brion, 2007; Greve, 2008).

This study yields two main findings. First, the study empirically demonstrates the use of two proposed organizational switching rules, the fire-alarm rule and the self-enhancement rule. While a few recent studies have explored the use of switching rules empirically, (e.g., Audia & Brion, 2007; Greve, 2008), more work in this important area is clearly needed. Furthermore, this paper constitutes the first empirical demonstration of which we are aware of the use of the fire-alarm rule by organizational decision makers. This is important in that the fire-alarm rule is a theoretically important switching rule.

Second, this work forwards support for an important boundary condition between two competing switching rules regarding how performance conflicts influence organizational change. The findings reported here imply that organizational decision makers may employ a range of switching rules, selecting the rule to activate based on external conditions. While much prior research demonstrates that organizations make change responsive to performance (e.g., Baum & Dahlin, 2007; Greve, 1998; Iyer & Miller, 2008; Wiseman & Bromiley, 1996), this work rarely considers the complexity that decision makers face in responding to varying levels of performance on multiple performance dimensions. Our finding that responses to performance feedback are moderated by external assessments suggests a more nuanced approach by decision makers, who seem to not only evaluate their organization's performance but to also consider the appropriateness of various switching rules relative to their external environment before determining how to proceed. Although this is studied with respect to performance conflicts here,

the finding yields a broader contribution to the burgeoning literature on organizational performance and change. Organizational responses to performance feedback may be moderated by the stakeholder environment in other areas as well.

Although several important sources of variation were controlled in the empirical models, this study could be limited by its empirical setting more generally. Following deregulation, competition in the U.S. railroad industry has increasingly focused on cost containment and returns to scale, and the industry has seen a number of prominent consolidations. These factors make the industry an ideal setting for this study, since cost containment and system reliability are critical performance dimensions that are directly related to competitive strength, and since infrastructure investment is a prominent type of organizational change used by railroad decision makers to manage their system reliability and operating costs. Nonetheless, a variety of other changes are available across industries, and future research should determine whether similar processes influence other changes such as strategic shifts, innovations, acquisitions, restructurings, or new product and service offerings.

This paper advances the literature on performance feedback and change by examining how external stakeholder assessments lead decision makers to resolve performance conflicts. Furthermore, the paper extends beyond a test of competing switching rules in order to better understand the explanatory power and boundaries of each perspective. Findings suggest that how decision makers resolve conflicts and initiate change may in some cases depend on performance assessments made by external stakeholders. These findings also suggest the need for future research to identify additional processes through which organizational decision makers resolve performance conflicts. These efforts would be particularly promising given the scarcity of literature regarding how performance along multiple dimensions influences change and the relative frequency of organizations whose activities are evaluated across two or more dimensions of performance.

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Table 1

Descriptive Statistics and Correlations

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. Change in Infrastructure Improvement Rate	0.000	0.657																	
2. Revenue Retention < asp	-1.449	2.495	0.04																
3. Revenue Retention > asp	1.205	2.351	0.04	0.30															
4. Infrastructure Reliability < asp	-0.002	0.006	-0.02	0.05	0.07														
5. Infrastructure Reliability > asp	0.003	0.006	-0.11	-0.19	0.03	0.16													
6. External Stakeholder Evaluation	-0.031	0.106	0.01	-0.03	0.04	-0.04	0.03												
7. Non-track Accident Rate	0.025	0.024	0.00	-0.05	-0.06	-0.47	0.12	-0.02											
8. Change in Infrastructure Growth Rate	-0.557	13.154	-0.14	0.02	-0.02	-0.01	0.02	0.00	0.00										
9. Miles Operated (logged)	16.472	1.371	-0.01	0.18	0.00	0.24	-0.24	-0.04	-0.32	0.04									
10. Age	103.314	39.246	0.00	-0.05	0.06	-0.04	0.02	0.09	0.05	0.00	-0.20								
11. Maintenance Department Capacity	0.205	0.035	-0.05	0.07	0.04	0.07	-0.21	0.01	-0.24	0.00	0.08	-0.05							
12. Passenger Revenue Ratio	0.011	0.070	-0.02	0.05	0.06	-0.01	0.01	0.01	0.06	0.01	0.00	0.08	-0.12						
13. Absorbed Slack	11.070	4.615	0.03	-0.26	0.05	0.01	0.17	-0.01	0.00	0.03	-0.11	0.12	-0.14	-0.06					
14. Unabsorbed Slack	2.595	4.298	-0.01	0.06	0.07	0.06	-0.08	0.01	-0.07	0.02	0.08	0.04	0.16	-0.06	0.08				
15. Potential Slack	120.024	320.198	0.01	0.00	0.06	0.03	0.09	0.01	0.03	0.02	-0.02	0.07	0.04	0.06	0.04	0.07			
16. Acquisition	0.047	0.211	0.00	0.01	0.04	0.05	0.01	-0.02	-0.09	0.00	0.17	-0.01	0.03	-0.03	-0.01	-0.02	-0.04		
17. Year	1987.982	6.631	-0.02	0.04	0.12	0.13	-0.22	-0.04	-0.27	0.03	0.39	0.09	0.22	-0.12	0.28	0.59	0.08	0.09	

N = 386

Table 2

Fixed Effects Panel Regression Models of Change in Infrastructure Improvement Rate

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>
						<i>Neg. Ext. Eval.</i>	<i>Pos. Ext. Eval.</i>
<i>Independent variables</i>							
Inf. Reliability > asp. when Rev. Retention < asp					-27.387 ** (9.590)	-37.144 (25.463)	-37.180 ** (13.218)
Inf. Reliability < asp. when Rev. Retention > asp					21.839 † (12.468)	130.353 † (71.533)	20.922 (14.755)
Rev. Retention > asp when Inf. Reliability < asp					0.010 (0.032)	(0.011) (0.045)	0.006 (0.050)
Rev. Retention < asp when Inf. Reliability > asp					0.008 (0.020)	0.053 * (0.021)	-0.038 (0.037)
Infrastructure Reliability < asp		12.062 (7.440)		10.511 (7.443)			
Infrastructure Reliability > asp		-21.470 ** (8.289)		-19.654 * (8.436)			
Revenue Retention < asp			0.032 * (0.016)	0.025 † (0.016)			
Revenue Retention > asp			0.010 (0.016)	0.014 (0.016)			
External Stakeholder Evaluation		0.085 (0.081)	0.087 (0.081)	0.088 (0.080)	0.084 (0.080)		
<i>Control variables</i>							
Non-track Accident Rate	-0.862 (2.659)	-1.266 (2.758)	-0.843 (2.643)	-1.210 (2.749)	-3.396 (2.961)	5.495 (7.449)	-3.979 (3.977)
Change in Infrastructure Growth Rate	-0.008 ** (0.002)	-0.008 ** (0.002)	-0.009 ** (0.002)	-0.008 ** (0.002)	-0.008 ** (0.002)	-0.009 (0.010)	-0.009 ** (0.003)
Miles Operated	0.017 (0.114)	0.019 (0.114)	0.002 (0.114)	0.017 (0.114)	0.001 (0.114)	0.167 (0.173)	-0.056 (0.184)
Age	0.009 (0.015)	0.004 (0.015)	0.007 (0.015)	0.004 (0.015)	0.004 (0.015)	0.060 (0.037)	0.006 (0.060)
Maintenance Department Capacity	-6.739 *** (1.741)	-6.928 *** (1.732)	-7.238 *** (1.743)	-7.298 *** (1.734)	-8.016 *** (1.763)	-11.116 *** (2.593)	-11.470 *** (2.922)
Passenger Revenue Ratio	-1.474 (1.564)	-1.272 (1.555)	-1.788 (1.560)	-1.550 (1.554)	-1.859 (1.585)	0.165 (1.528)	0.963 (10.573)
Absorbed Slack	0.015 (0.010)	0.017 † (0.010)	0.021 * (0.010)	0.021 * (0.010)	0.022 * (0.010)	0.022 † (0.013)	0.031 † (0.016)
Unabsorbed Slack	-0.001 (0.019)	0.000 (0.019)	-0.004 (0.019)	-0.003 (0.019)	-0.003 (0.019)	0.015 (0.018)	-0.011 (0.055)
Potential Slack	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Acquisition	0.007 (0.164)	0.006 (0.163)	-0.021 (0.163)	-0.012 (0.162)	-0.020 (0.162)	0.261 (0.156)	-0.281 (0.322)
Wald chi-square	3.55 ***	3.54 ***	3.50 ***	3.51 ***	3.32 ***	1.88 **	2.79 ***
<i>df</i>	32.00	35.00	35.00	37.00	41.00	40.00	40.00
<i>N</i>	386	386	386	386	386	138	248

Standard errors are in parentheses. † p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001