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Aspiration formation and attention rules

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Abstract

Research Summary: The behavioral theory of the firm (BTOF) proposes that firm behavior is goal-directed and that organizational aspirations are a function of prior historical aspirations, past performance, and the performance of others. Despite the centrality of aspirations in the BTOF, little is known about aspiration formation and why firms favor one aspiration type over others, that is, attention rules. Drawing on the attention-based view, we posit that attention rules are shaped by environmental volatility over time and vary by locus of attention across firms. Data from US manufacturing firms managing their toxic chemical waste provide evidence for attention-rule adaptation.

Managerial Summary: Firms must set aspirations, measure, and improve their toxic waste levels to avoid costly economic, regulatory, and environmental hazards. Although aspirations play a vital role in driving firm behavior, we still have limited understanding of how managers allocate their attention to various performance feedback during aspiration formation. We argue that attention allocation differs for managers across organizational hierarchy exposed to varying degrees of environmental volatility. Greater volatility of the business environment steers managerial attention from the performance of others toward their own historical

aspirations. We also suggest that the attention of managers at higher levels of the organizational structure are directed from their own historical aspirations toward performance of others. We find corroborating evidence for our conjectures.

KEYWORDS

aspiration formation, attention-based view, behavioral theory of the firm, performance aspirations

1 | INTRODUCTION

According to the behavioral theory of the firm (BTOF) (Cyert & March, 1963), a firm's strategic and innovative behavior is a response to the attainment of performance-related aspirations (Bromiley & Harris, 2014; Posen, Keil, Kim, & Meissner, 2018; Shinkle, 2012; Washburn & Bromiley, 2012). The two core elements of this theory are that (i) firms form aspiration levels by combining historical aspirations, past performance, and social aspirations (i.e., competitors' performance), and that (ii) these aspirations are regulated by *attention rules*—the relative weighting of one aspiration against others. That is, the more a firm pays attention to some aspiration type, the more weight it assigns to that aspiration when forming aspiration levels.

While the past two decades has yielded a rich and flourishing body of research scrutinizing the first core element (Audia & Brion, 2006; Greve, 2003a; Harris & Bromiley, 2007; Iyer & Miller, 2008; Kacperczyk, Beckman, & Moliterno, 2015; Keum & Eggers, 2018; Miller & Chen, 2004; Shimizu, 2007), only a few recent studies have explored antecedents of attention rules—the second core element (Blettner, He, Hu, & Bettis, 2015; Hu, He, Blettner, & Bettis, 2017; Shinkle, Hodgkinson, & Gary, 2021). Since the BTOF affirms that organizational learning is rooted in adaptive behavior, examining the adaptation in attention rules (Cyert & March, 1963) is essential to fully understand firm behavior.

Recent advances in the BTOF have featured this adaptive nature of attention rules. For example, Blettner et al. (2015) observed that firms tend to focus on prior aspirations as they mature. Hu et al. (2017) reported that firms favor social aspirations when feedback hinders learning. While these studies have shown firms to shape their attention rules, attention-rule adaptation has been cast as a function of experience and performance feedback. However, performance feedback also serves as an information cue. Since decision-makers have limited cognitive capacity (Simon, 1947), it becomes critical to understand aspiration formation in how they allocate attention across these cues selectively. Attention thus steers aspiration formation.

To unearth the attention-related drivers of aspiration formation, we build on the attention-based view of the firm (ABV) (Ocasio, 1997, 2011), which has advanced our understanding of organizational attention. The ABV proposes that an organization's attention is molded by two core factors: the environmental context surrounding the organization and its organizational structure distributing attention (Bouquet & Birkinshaw, 2008; Gaba & Joseph, 2013; Joseph, Klingebiel, & Wilson, 2016; Ocasio, 1997, 2011; Tuggle, Sirmon, Reutzel, & Bierman, 2010). We argue that organizational attention spawns aspiration formation, thus justifying the relevance of both the external environment and locus of attention on attention rules for two reasons.

First, "the behavior of organizations cannot be well understood unless the question of how this behavior is embedded in its environment is considered" (Gavetti, Levinthal, & Ocasio, 2007). In particular, *environmental volatility*—rate and magnitude of change (Dess & Beard, 1984; Duncan, 1972)—makes understanding and learning from the business environment difficult. The BTOF has recognized environmental volatility as an important contingency regarding the effect of performance-aspiration discrepancy on organization adaptation (Levinthal & March, 1981), performance (Wiklund & Shepherd, 2013), risk (Deephouse & Wiseman, 2000; Gooding, Goel, & Wiseman, 1996), search (Blettner, Kotiloglu, & Lechler, 2019), and strategic positioning (Schimmer & Brauer, 2012). Yet, it remains unclear how environmental volatility shapes aspiration formation. By examining the effect of environmental volatility on attention rules, we detect whether "exogenous environmental change makes adaptation essential" (March, 1991, p. 80).

Second, "the relevance, interpretation of particular problems, and solutions may vary (in part) with the structural position of individual decision-makers" (Joseph & Gaba, 2020). The decision-maker position determines both attention distribution and information processing (Bouquet & Birkinshaw, 2008; Gaba & Joseph, 2013; Joseph & Ocasio, 2012; Joseph & Wilson, 2018; Rerup, 2009). While these studies provide much-needed evidence on how organizational structure regulates managerial attention, there remains limited understanding of how *locus of attention* shapes aspiration formation.

To unveil the attention-based antecedents of aspiration formation, we enlisted data on manufacturing firms' chemical waste reduction aspirations surveyed by the US Environmental Protection Agency (EPA). Waste reduction is a critical goal for manufacturing firms, strongly affecting production efficiency and operational performance (e.g., Berchicci, Dutt, & Mitchell, 2019; King & Lenox, 2001; Klassen & Whybark, 1999). Evidence from more than 16,000 manufacturing firms over 21 years shows that firms favor historical aspirations over social aspirations as environmental volatility increases. We also find support for firms relying more on social (historical) aspirations when corporate (plant) managers form the aspirations.

Our attention-based view of aspiration formation makes three important contributions. First, we offer fresh insights on how firms form aspirations—a central tenet of the BTOF. We propose and show that both the external environment and the locus of attention affect how decision-makers weigh multiple aspirations. This perspective is important since it further informs the flourishing stream of efforts that study (in)consistent performance feedback across multiple goals (Audia & Brion, 2006; Gaba & Greve, 2019; Jordan & Audia, 2012; Joseph & Gaba, 2015; Lucas, Knoben, & Meeus, 2015; Wooldridge, Tarakci, Ateş, Floyd, & Ahn, 2018). Our results imply that as the environmental volatility and locus of attention influence firms' attention, they might resolve inconsistent feedback by disproportionately weighing one aspiration type against others during aspiration formation.

Second, we contribute to the debate on the empirical assumption that firms uniformly assign fixed weights to one aspiration type versus others (Shinkle, 2012). We join research that has recently cast attention rules as shifting across time and between firms (Blettner et al., 2015; Hu et al., 2017). Importantly, we offer an attention-based view of aspiration formation where a firm allocates attention to aspirations selectively in response to volatility in its external business environment, based on the locus of attention situated within the firm.

Third, we contribute to the ABV by proposing that two distinct attention drivers—environmental volatility and organizational structure—not only regulate organizational

attention, helping managers identify which problems and solutions to attend (Ocasio, 1997), but can also play a vital role in forming aspirations. Aspirations, in turn, steer firm behavior. Merging attention drivers with attention rules allows us to synergize the ABV and BTOF as complementary theories that better explain firm behavior.

2 | THEORETICAL BACKGROUND

2.1 | Aspiration formation

A key tenet of the BTOF is that firms adapt their aspiration levels in relation to social aspirations (i.e., competitors' performance), historical aspiration levels, and past performance. Greve (2003a) represents this feedback mechanism through the following equations[1]:

$$\underbrace{A_{i,t}}_{\text{Aspiration level}} = \alpha_1 \underbrace{S_{i,t}}_{\text{Social aspiration}} + (1-\alpha_1) \underbrace{H_{i,t}}_{\text{Historical aspiration}} + e_{i,t} \quad (1)$$

where

$$H_{i,t} = \alpha_2 H_{i,t-1} + (1-\alpha_2) \underbrace{P_{i,t-1}}_{\text{Past performance}} + u_{i,t} \quad (2)$$

Equation (1) conceptualizes $A_{i,t}$—firm i's aspiration level at time t—as the average of $S_{i,t}$ (i.e., average performance of competitor[s] at time t) and $H_{i,t}$ (i.e., firm i's historical aspiration) weighted by the attention rule, α_1. Note that the current historical aspiration $H_{i,t}$ presented in Equation (2) is an average of past historical aspiration (i.e., $H_{i,t-1}$) and past performance (i.e., $P_{i,t-1}$) at time $t-1$, weighted by attention rule α_2. Terms $e_{i,t}$ and $u_{i,t}$ each represent the errors.

The main parameters of interest in our study are α_1 and α_2. These weights denote the *attention rules* assigned to social aspirations (α_1), prior historical aspirations (α_2), and past performance ($1-\alpha_2$). Coefficient α_1 captures a firm's attention to current rival performance, whereas "$[1-\alpha_1]$ reflects the speed at which the organization revises goals in the face of [its own] experience" (Cyert & March, 1963, p. 172). Bromiley and Harris (2014) label these differing aspirations as social and self-referent, respectively, to distinguish attention between current external cues versus past internal cues. When managers allocate more attention to current external cues, they set future aspirations by weighing social aspirations over self-referent historical aspirations (i.e., $\alpha_1 > 0.5$). After selecting a reference group, managers may deem information derived from

[1]To better understand how prior research has treated aspiration formation and attention rules, we searched for articles related to aspirations published in journals among the Financial Times 50 list between 1998 and 2019 bracketed by publications of Greve (1998) and a most recent meta-analysis by Kotiloglu et al. (2019). This search yielded a final list of 103 empirical studies where the two most common formulations are by Greve (1998) at 49% and by Cyert and March (1963) at 30%. We used the former in our main analyses since it offers a more general specification that aids our understanding as to whether prior historical aspiration or prior performance carries a greater weight in the construction of historical aspirations. Appendix compares formulations of Greve (2003a, 2003b) vs. Cyert and March (1963).

this reference group's performance as more relevant, reflecting the "sensitivity of the organization to external comparisons" (Cyert & March, 1963, p. 123).

Historical aspirations in Equation (2) capture the self-referent aspirations influenced only by past internal cues. In this case, the attention rule weighs prior historical aspiration (α_2) and past performance ($1 - \alpha_2$). When managers favor past performance (i.e., $1 - \alpha_2 > 0.5$), they focus on the most recent performance data of the organization. In contrast, a bent toward historical aspirations invokes inertia as managers merely extrapolate historical aspirations and downplay the latest information on firm performance.

Cyert and March (1963, p. 174) asserted that "if we assume that search is problem-oriented, we must also assume that [attention] rules change." Despite the centrality of aspiration and its impetus to the BTOF, much prior work has ignored the adaptive nature of attention rules when casting them as homogenous across firms and time (Blettner et al., 2015; Hu et al., 2017; Shinkle et al., 2021). Questioning this assumed homogeneity is relevant for two reasons. First, such an assumption conflicts with the core of the BTOF that organizations exhibit adaptive behavior over time. Second, homogenous attention rules fail to address how firms favor specific aspirations over others. Organizations update their aspiration levels based on information they draw from prior historical aspirations, past performance, and social aspirations. Subject to limited cognitive capacity (Simon, 1947), organizations must therefore allocate attention selectively across aspirations (i.e., attention rules). This is why, in the next section, we enlist the attention-based view of the firm (Ocasio, 1997, 2011)—a core theory explaining how organizations regulate attention.

2.2 | Aspirations and the attention-based view

Attention refers to "the noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers" (Ocasio, 1997, p. 189). Since firm behavior is goal-directed (Cyert & March, 1963), attention is conducive for organizational aspirations formation. Attention was first proposed by Simon (1947) to explain the limits in attention capability of individuals and groups within their bounded rationalities. According to Simon, decision-maker attention is directed by external stimuli and distributed within organizations. Subsequent works by March and Simon (1958), Cyert and March (1963), and Ocasio (1997, 2011) have proposed an attention-based view (ABV) of the firm. As Ocasio (1997, p. 189) summarized, "the cognition and action of individuals are...derived from the specific organizational context and situations that individual decision-makers find themselves in." Hence, the outside environment and internal structure are core to organizational attention.

One important element of environmental context shaping organizational attention is *environmental volatility*—the rate and magnitude of change in the business environment (Dess & Beard, 1984; Duncan, 1972). Cho and Hambrick (2006) have noted deregulation in the airline industry as shifting top managers' attention in ways that, in turn, have amplified their entrepreneurial strategies. Nadkarni and Barr (2008), too, have found environmental volatility to influence organizational focus and strategic response. Recent meta-analyses have detected industry characteristics affecting to what degree firms respond to performance feedback (Blettner et al., 2019; Kotiloglu, Chen, & Lechler, 2019). Recently, Blettner et al. (2019) have found that firms in low-volatility environments intensify organizational search and risk-taking in response to poor performance, more so than firms subject to high volatility. Both the ABV and BTOF

have stressed environmental volatility as a vital factor, while overlooking volatility's role in forming aspirations (Shinkle et al., 2021).

Firm behavior emanates not only from the environmental context besieging managers, but it "is [also] the result of how firms channel and distribute the attention of their decision-makers" (Ocasio, 1997, p. 197). That is, organizational structure determines where attention resides—that is, the locus of attention. Since the internal structure of an organization shapes decision-makers' perceptions and expectations (Rhee, Ocasio, & Kim, 2019), the distribution of attention must vary according to hierarchical position (Joseph & Gaba, 2020).

Scholars have shown that attention focus varies between decision-makers at higher levels of the organizational hierarchy versus those underneath (Bouquet & Birkinshaw, 2008; Dutt & Joseph, 2019; Gaba & Joseph, 2013; Joseph et al., 2016). For example, Dutt and Joseph (2019) have shown how US utility executives attend to regulatory changes more than subordinate managers do. Such attentional differences, in turn, affect strategic responses. For instance, Gaba and Joseph (2013) provided evidence of opposing reactions to poor performance by subsidiaries versus their headquarters in the global mobile-device industry. We build on these studies by distinguishing the organizational locus of attention at upper versus lower management levels, proposing that locus of organizational attention influences both direction of attention and the interpretation of relevant information (Joseph & Gaba, 2020).

We thereby advance the ABV theory into aspiration formation. The original theory (Ocasio, 1997, 2011) and subsequent progress have confirmed that environmental volatility and locus of attention play vital roles in regulating organizational attention in ways that help managers identify and prioritize problems, as well as solutions to attend. Yet, the ABV has remained silent on the attentional drivers of aspiration formation. Uncovering these drivers is critical not only to better understand aspiration formation, but this also yields an opportunity to integrate the BTOF and ABV. In the following two sections, we build an attention-based view of aspiration formation and hypothesize how environmental volatility and locus of attention impact aspiration formation.

3 | AN ATTENTION-BASED VIEW OF ASPIRATION FORMATION

3.1 | Environmental volatility effect on attention rules

Aspiration formation entails processing information on social and historical aspirations (e.g., prior historical aspirations and past performance) into a current aspiration level (Equation (1) and (2)). First, we propose that environmental volatility steers firms' attention toward historical aspirations and away from social aspirations, because it is difficult to identify a reference group and rely on information of others. Low-volatility environments allow fair assessments of business landscapes (Nadkarni & Barr, 2008). Here, firms can easily monitor and benchmark the performance of comparable rivals. Social aspirations that diverge from the historical patterns immediately alert a firm's attention. Hence, firms are more likely to allocate attention to social aspirations amid stable environments.

In contrast, evaluating and forecasting patterns and regularities become difficult in volatile environments (Eisenhardt & Bourgeois, 1988; Gort, 1969; Hrebiniak & Joyce, 1985). "Reappraisal of goals...appears to be a constant problem in an unstable environment" (Thompson & McEwen, 1958, p. 24) because it is difficult to make sense of and learn from a

volatile environment. For example, volatility obfuscates the selection of an appropriate reference group and the observation of rival actions driving performance outcomes—a requirement for deriving social aspirations (Audia, Rousseau, & Brion, 2021).

As volatility worsens, decision-makers may deem the latest data from reference groups as more confusing than clarifying. As Levinthal and March (1981, p. 307) highlighted, adaptation in volatile environments is "complicated by the confusions of a changing and autonomous environment." This confusion undermines faith in alternative paths of action. High environmental volatility is often associated with impaired production performance (e.g., Azadegan, Patel, Zangoueinezhad, & Linderman, 2013) owing to hardships in synchronizing production processes (e.g., González-Benito, Da Rocha, & Queiruga, 2010; Patel, Azadegan, & Ellram, 2013). In contrast to social aspirations, historical aspirations rely on the organization's own resources and knowledge base. Decision-makers who are familiar with these characteristics find it easier to understand and derive the organization's aspirations. Hence, firms may rely more on their own past internal cues than on current peer groups when volatility complicates.

Second, we propose that firms allocate attention to prior historical aspirations rather than on past performance when environmental volatility increases since this erodes the value of recent information as the life span of new information truncates in volatile environments (Posen & Levinthal, 2012). Firms view the latest information as riskier, noisier, and less valid for making decisions (Dess & Beard, 1984; Duncan, 1972). For example, Schimmer and Brauer (2012) have shown elevated industry volatility to curb risk-taking behavior and reinforce inertia as firms opt to retain entrenched paths of action. Likewise, Posen and Levinthal (2012, p. 594) noted that under high environmental volatility, "the optimal response is, in fact, one of greater inertia" as the ability of managers to sense the potential impact of their decisions on future business activities muddles. And since prior historical aspiration entails a more "modest information requirement" (Greve, 2003b, p. 42), it tends to dominate in uncertain environments as slower updates in aspiration levels lead to reduced responsiveness to fluctuations in hopes of averting unnecessary costly changes (Greve, 2002). Therefore, high environmental volatility may prod firms to favor inertia and disregard past results amid noisy signals from recent information.

Overall, as environmental volatility increases, the eroding value of recent information amplifies the cognitive challenge of making sense of it. Consequently, attention shifts away from social (i.e., α_1) to historical aspirations, and from past performance (i.e., 1-α_2) toward prior historical aspirations (i.e., α_2).

> **Hypothesis 1 (H1).** *As environmental volatility increases over time, firms attend less to social aspiration and more to historical aspiration, and they weigh prior historical aspirations more than past performance.*

3.2 | Locus of attention effect on attention rules

Firm behavior is shaped not only by environmental volatility, but also by those "who ultimately do the attending" (Ocasio, 1997, p. 189). We argue that firms are more apt to focus on social (vs. historical) aspirations when the locus of attention occupies higher (vs. lower) levels of the organizational structure. Our arguments stem from the core premise of the ABV: the focus of attention within a firm is governed by attention structures (Ocasio, 1997; Stevens, Moray,

Bruneel, & Clarysse, 2015). These structures distinguish the traits of decision-makers, the rules they follow, and the resources they command.

First, decision-makers are the key individuals who shape the generation and assessment of issues. A decision-maker's structural position shapes her focus and directs attention to different aspects of the environment (Ocasio, 1997). In particular, those at higher levels of organizational structure better perceive developments in the external environment, while lower level managers focus on their own firms' boundaries and day-to-day operations (Floyd & Lane, 2000). As the locus of attention lies at higher levels, firms tend to favor current external cues as decision makers channel their focus toward the broader business environment. For example, Joseph and Wilson (2018) have noted how Motorola executives intervened at the divisional level to realign organizational attention toward new technologies. Dutt and Joseph (2019) also report that US electric utility executives were more likely to be informed of regulatory changes and to invest in renewable energy than were subsidiary managers.

Second, decision-maker attention is also influenced by enforced rules and norms. Ocasio (1997, p. 196) has defined these rules as "the formal and informal principles of action, interaction, and interpretation that guide and constrain decision-makers in accomplishing the firm's tasks and in obtaining social status, credits, and rewards in the process." In particular, decision-makers at higher levels seem more prone than those at lower levels to experience normative pressures from external audiences. These audiences include customers choosing among rival products, analysts assessing the firm's performance, and regulators monitoring compliance (Birkinshaw & Lingblad, 2005; Dutt & Joseph, 2019; Mishina, Dykes, Block, Pollock, & Dame, 2010). These normative pressures invoke greater scrutiny on a firm's activities and its performance versus peer firms in the industry (Brooks, Highhouse, Russell, & Mohr, 2003; Pollock, Rindova, & Maggitti, 2008). To avoid possible negative stakeholder reactions (e.g., a fall in stock price or bad publicity), higher level managers are more apt to closely monitor these expectations and industry-level comparisons versus lower level managers. In contrast, the assessments that determine lower level manager bonuses, salary raises, and promotion decisions are dictated by the higher levels. Upper management imposes expectations upon lower levels to improve day-to-day operation. Therefore, we expect a higher attention allocation to social aspiration (α_1) in firms where high-level (vs. low-level) managers form the aspirations.

Third, the ABV also highlights the role of resources defined as "the human, physical, technological, and financial capital available to the firm at any moment" (Ocasio, 1997, p. 198). Available resources, such as (in)tangible assets required to operate and achieve firms' aims, also govern attention since "translat[ing] answers selected by organizational decision-makers into organizational moves" (Ocasio, 1997, p. 198) demands resources. Organizational moves include conducting both external and internal searches to gain information to fuel decision-making processes, and search entails resources (Acar, Tarakci, & van Knippenberg, 2019).

Higher level managers command and better mobilize resources than at lower tiers. When upper echelon managers constitute the locus of attention that forms aspiration levels, they can enlist extensive resources to explore and set new aspirations that replace old ones, building on the latest internal and external cues. In contrast, low-level managerial resources are limited. Low-level management is also confined in discretion and must obtain approval. Fewer resources and limited discretion here curb abilities to allocate attention beyond self-referent performance feedback (i.e., past performance and prior historical aspirations). Such a line of argument proposes that resources harnessed by decision-makers at higher levels of the

organizational structure better position them not only to focus on social aspirations, but also to build on past performance $(1 - \alpha_2)$.

> **Hypothesis 2 (H2).** *Firms with a locus of attention at high-level management (vs. firms with a locus of attention at lower levels) weigh social aspirations more than historical aspirations, and they weigh past performance more than prior historical aspirations.*

4 | METHOD

Our aim is to explain the antecedents of attention rules that firms utilize to update their aspiration levels. Thus, the critical requirement is to enlist fine-grained data that can document aspiration levels explicitly set by organizations over time. The Toxics Release Inventory (TRI) of the US Environmental Protection Agency (EPA) offers an excellent repository to test our model. Since 1987, the EPA has required every manufacturing facility exceeding 10 employees to report aspiration levels, including its realized performance regarding toxic chemical waste (hereafter waste) processed or produced during its operations. The EPA's TRI is an information disclosure program that publishes yearly the management of 612 toxic chemicals handled by production facilities. The program aims to incentivize companies to improve their environmental performance "by sharing information about releases of toxic chemicals in their community" (EPA, 2019).

Though self-reported, TRI data are deemed valid for two reasons. First of all, the EPA fines misreporting up to $25,000 per violation. High toxic releases also tend to capture the attention of the media and analysts. For example, upon release of such information, Hamilton (1995) found that firms reporting high TRI pollution figures saw negative abnormal returns. Second, prior studies have checked the accuracy of the TRI data, confirming that 95% of facilities report information correctly (De Marchi & Hamilton, 2006). This is perhaps why many scholars have used the TRI data to address several strategy and non-market strategy research questions (Berchicci et al., 2019; Berchicci, Dowell, & King, 2012, 2017; Delmas & Toffel, 2008; Dutt & King, 2014; King & Lenox, 2002; Klassen & Whybark, 1999).

The TRI data are particularly valuable on several fronts. First, the TRI data include *explicit* aspiration levels that prior research often lacks (Blettner et al., 2015; Hu et al., 2017; Lant & Theresa, 1992; Mezias, Chen, & Murphy, 2002). Firms must report both current quantities of chemicals their plants process *as well as targets* for the subsequent year. Costs of managing toxic waste and its potential negative impact are a major priority for firms. They must set goals, measure, assess, notify, and report every aspect of toxic waste handling. While a firm is audited for actual waste generated in the current year, target specification is left to a firm's discretion as a self-imposed aspiration. Second, waste reduction has been strongly correlated with production efficiency and operational performance (Berchicci et al., 2019; Dutt & King, 2014; King & Lenox, 2001; Klassen & Whybark, 1999). The Pollution Prevention Act of 1990 enjoins manufacturing facilities to manage waste levels, to increase efficiency in the use of materials, and/or to reduce the hazardous substances released into the environment prior to recycling, treatment, or disposal.

Third, the data inform at both the facility and chemical levels. Facility data disclose establishment site, size, industry affiliation, and managing personnel. Chemical data on processed toxic chemical waste relate how a chemical is produced, treated, recycled, transferred, and

eventually reduced. For instance, if a plant processes bleaching of wood pulp (making paper), then managers must report the handled amount of ozone and chlorine (toxic chemicals often used in bleaching) in *two* TRI forms, one for each chemical. Although our analysis focuses on the firm level, these granular data at the chemical level allow us to calculate firm-level aspiration formation (detailed in the next section). Fourth, these data offer wide coverage of US manufacturers. More than half of all US manufacturing facilities report their chemical toxic waste to EPA through the TRI program, making this one of the largest repositories of plant-level manufacturing data.

We merged the TRI data with the National Establishment Time-Series (NETS) Database that contains information on firm ownership, structure, number of employees, and sales for each facility. Most facilities are privately owned. We excluded data from 1987 to 1990 due to a change in the TRI reporting guidelines in 1991 (Doshi, Dowell, & Toffel, 2013; King & Lenox, 2000, 2002). We also included US Census figures to capture industry data to build a proxy for environmental volatility. We thus created a comprehensive dataset that reports the production and waste activities of a large population of US manufacturing facilities operating from 1991 to 2011 (latest US Census year available). Our final sample embodies data for about 16,820 firms in the manufacturing sector (SIC codes 2000 to 3999), 85% being private firms, comprising 150,420 firm-year observations. To calculate the attention rules (as discussed below), we exploited the multilevel nature of our data: waste per chemical, nested within each plant, and for each firm. The average firm in our sample runs 1.8 plants per year, and each plant reported the use of three chemicals, on average, per year.

Finally, we integrated *qualitative* data to better understand the TRI data and reporting. We interviewed five experts and managers that deal with waste reporting: the chief of the Environmental Protection Agency's TRI program, two top managers and an operations manager who certify their firms' TRI reports, and one consultant who assists firms with regulatory compliance. All interviews were video-recorded and transcribed.

4.1 | Variables

4.1.1 | Dependent variables

Our main dependent variables are the attention rules denoted in Equations (1) and (2): α_1 and α_2. We used a two-step approach to calculate the attention rules[2] (Blettner et al., 2015).

In the first step, we log-transformed aspirations given their skewness and kurtosis (117.4 and 26,485), as well as constructed matrix columns comprising the social aspirations, prior historical aspirations, and past performance at the chemical level for each firm and year. We multiplied this matrix with α_1 and α_2 combinations formed in 0.025 increments according to Equations 1 and 2. We thus pooled all chemicals by aggregating them from the chemical to the firm level. Our aggregation method is consistent with common practice as confirmed by our informants: chemicals, regardless of toxicity, are stocked together and treated, burned, recycled, landfilled, or released into the air. As the Chief of the TRI Program disclosed to us: "A lot of

[2]Equations (1) and (2) assume that the speed at which aspirations are updated is based on a 1-year lag structure. We tested this assumption and explored additional lags. While unreported here, we ran autoregressive models of aspirations to find that the 1-year lag model offers the best fit with the highest adjusted R^2. This result aligns with Bromiley and Harris (2014).

people just want to know about releases. They just want to know how many pounds are being released." One VP of operations we interviewed also noted: "I was basically sending out waste in order to make sure that I don't exceed the 100 kg per month level."

Prior historical aspirations ($H_{i,t-1}$) denote waste levels set as goals for a given chemical in the previous year, and past performance ($P_{i,t-1}$) represents *actual* prior-year waste levels for that same chemical.

Selecting a suitable comparison peer group is also an important issue in the BTOF (Audia et al., 2021). When we queried the compliance consultant about how her clients benchmarked waste levels, she noted that firms assess "...how they're doing compared to other companies in their same industry. But I did not have anyone ask me how they're doing compared to the same kind of company down the road." Based on these insights, we followed the common practice in prior research (Shinkle, 2012) and computed social aspirations ($S_{i,t}$) as the mean waste level across firms in the same industry (four-digit SIC code) using the same chemicals that same year.

In the second step of calculating attention rules, we re-computed the attention rules (i.e., α_1 and α_2) to next minimize the discrepancy between *actual* aspiration levels and those estimated in the first step. While several accuracy measurement options exist, there is no "clear agreement as to the advantages and drawbacks of each [different accuracy measure]" (Makridakis, Spiliotis, & Assimakopoulos, 2020, p. 58). For example, Blettner et al. (2015) used root mean squared error (RMSE), although this measure is scale-dependent and more difficult to interpret (Makridakis, 1993). We followed Makridakis et al. (2020) and used the average of Symmetric Mean Absolute Percentage Error (sMAPE) and Mean Absolute Scaled Error (MASE)—two of the most popular accuracy measures. These measures are intuitive, scale-independent, and exert superior mathematical properties (Makridakis et al., 2020). Finally, we created panel data of the attention rules for each firm in a given year from the grid search results that provided the best fit.

4.1.2 | Independent variables

Our first independent variable is *environmental volatility*. We used US Census data capturing two important variables for our context: shipment sales and value-added from 1987 to 2011, covering four digit SIC codes from 2000 to 3999. While shipment sales are a common measure of output across industries, value-added is a measure of manufacturing activity deemed best for ranking the relative economic importance of manufacturing activities (U.S. Census, 2020). Since waste reduction often correlates with production and operational efficiency (Berchicci et al., 2019; Dutt & King, 2014), high variances of value-added may impact production volume and operational efficiency that, in turn, affect waste production. Therefore, we derived environmental volatility from the value-added measure. Aligning with Dess and Beard (1984), as well as Nadkarni and Barr (2008), we first regressed industry value-added against *four* preceding years at the four-digit level to capture volatility for a given year.[3] For example, we used industry value-added from 2000 to 2004 to predict industry value-added in 2005. Second, we took the standard error of the regression slope coefficient and divided by the average industry value-added for that industry to obtain environmental volatility.

[3]We also regressed industry value-added against only its preceding year at the four-digit level as a robustness test. This alternative formulation that enlists the AR(1) specification provided consistent results.

Our second independent variable features *locus of attention*. We focus on aspirations formed by managers at the corporate versus plant levels. The EPA (2021) requires that:

> an official with management responsibility for the person or persons completing the report, or the manager of environmental programs for the facility or establishments, or for the corporation owning or operating the facility or establishments, responsible for certifying similar reports under other environmental regulatory requirements [40 CFR §372.3] (EPA, 2019, p. 316)...must certify the submission by signing hard copy TRI forms (EPA, 2021, p. 3).

Note here that the EPA does not specify the certifying manager's rank as long as the certifier has authority and responsibility. This ensures that certifiers are held accountable, as the chief of the TRI program explained:

> We do have inspectors that do site inspections: they do spot checks on these facilities, and they ask to see the documentation. They ask how you derived the release quantity that you describe on your report from a couple of years ago: "Let me see the calculations you have; let me see on what assumptions you based it. How did you get this number that you disclose?" So, they are held accountable.

This quote illustrates that the certifier has expertise and authority. However, the rank of the certifier might vary since the EPA does not mandate any specific rank. The name and title of the certifying officer are documented in the report explicitly. The certifier's position indicates the locus of attention as confirmed by one interviewee:

> Those [chemical waste] goals are set only by me...I'm a VP of environmental health and safety. I've got seven directors that work for me over different divisions in the company...I've been doing this for a long time; I've been there 26 years now.

Thus, we measured *locus of attention* by classifying the title of the certifying officer as either top- or lower level manager. Top-manager titles include CEO, VP, Director, and General Counsel, while lower level manager titles include manager, plant supervisor, and controller.[4]

We aggregated data at the firm-year level by choosing the most common title by firm and year. Next, we assigned the *top-manager* dummy variable equal to 1 when reports were signed by a top manager, and zero otherwise. As a robustness check, we applied an alternate measure denoting headquarters versus subsidiary (Dutt & Joseph, 2019) with consistent results.

4.1.3 | Control variables

We controlled for several variables that could influence how aspirations are updated. First, we controlled for *production change* measured as the ratio of volumes produced in years t and $t-1$. Significant changes may have prompted managers to relinquish prior aspirations. Firms

[4]The full list of top-manager titles includes President, Owner, Vice-President, CEO, COO, CFO, Chairman, Chief Administrative Officer, Chief Environmental Officer, Corporate Manager, Chairman, Director, Treasurer, Secretary, and General Counsel.

report this variable directly to the EPA as a ratio at the chemical level. We aggregated this ratio at the firm level by averaging it. We excluded 1,126 observations that reported very high, dubious values—likely erroneous. To be conservative, we excluded values exceeding seven times the volume produced the prior year. Our results remained similar when we later included these doubtful observations.

We controlled for firm characteristics. Control for *firm size* tallied the total number of employees by plant, aggregated to the firm level. High skewness and high kurtosis required a log-transformation of this variable (22.6 and 803, respectively). We included the average number of years that plants reported to the EPA to control for whether experience mattered (*reporting time*). Prior work has also tied firms' maturity and experience with attention rules (Blettner et al., 2015). The ownership structure is expressed by the variable *private firm*, whose value is equal to 1 when a firm is privately owned, and zero otherwise. Finally, we included *regulatory pressure* measured as the mean number of regulatory permits to account for outside pressures possibly shaping changes in the attention rules (Shinkle et al., 2021).

4.2 | Analytical approach

Our two hypotheses require distinct empirical approaches. Hypothesis 1 postulates that for a focal firm with environmental volatility rising *over time*, the weighting on social aspiration and past performance declines while the weighting on prior historical aspiration intensifies. This hypothesis requires an approach that measures changes in attention rules *within the firm* as environmental volatility increases (decreases) from year to year, often called a predictor's *within-firm effect* on the dependent variable. Capturing the within-firm effect requires a *fixed-effect* regression model estimating the relationship using only the inter-year variance of firms.

Conversely, Hypothesis 2 posits that *across firms*, organizations under high-level (vs. low-level) management weigh social performance more than historical aspirations and weigh past performance more than prior historical aspirations. Since organizational structure tends to be generally time-invariant, we are thus interested in the effect of the locus of attention on attention rules by *comparing* firms. Such a comparison requires a *between-firm effect* regression model. Here, this model estimates the relationship *across firms* using only the inter-firm variance. Between-firm variance models include both time- and industry-fixed effects. Regardless of variance, all models report bootstrapped standard errors.

5 | RESULTS

Table 1 presents descriptive statistics. Weights assigned to social aspiration (i.e., α_1) yield a mean of 0.62 (SD = 0.34), while those assigned to prior historical aspiration (i.e., α_2) show a mean of 0.34 (SD = 0.43). These results suggest that prior historical aspirations play an overall less dominant role in aspiration formation than social aspirations or past performance levels across industries and years. Table 1 also suggests that α_1 and α_2 weakly correlate (0.12) across the whole sample.

Figure 1 depicts averages of α_1 (left panel) and α_2 (right panel) for all firms versus those occupying two industries with the largest set of firm-year observations (four-digit SIC code): Electroplating, Plating, Polishing (SIC: 3471; ~10,000 firm-year observations) and Plastics Products, NEC Industries (SIC: 3089; ~6,500 firm-year observations). Figure 1 suggests two

TABLE 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max								
α_1 (social aspiration)	0.625	0.345	0	1	1							
α_2 (prior historical aspiration)	0.339	0.430	0	1	0.1253	1						
Environmental volatility	0.045	0.072	0	7.152	−0.0404	−0.058	1					
Top-manager	0.617	0.486	0	1	0.0324	−0.1068	−0.0114	1				
Private firm	0.854	0.339	0	1	0.0174	−0.0696	0.1898	−0.2419	1			
Firm size	4.849	1.499	0.693	11.781	0.0119	0.1388	−0.2919	0.3188	−0.3419	1		
Production change	0.960	0.582	0	7	0.1088	0.0764	−0.0358	0.0546	−0.0486	0.0884	1	
Reporting time	21.663	4.969	1	25	0.0308	−0.0118	0.0713	0.0137	0.056	0.0001	−0.0075	1
Regulatory pressure	1.839	0.865	0	3	0.0549	0.1148	−0.0834	0.1123	−0.0602	0.2018	0.058	0.1

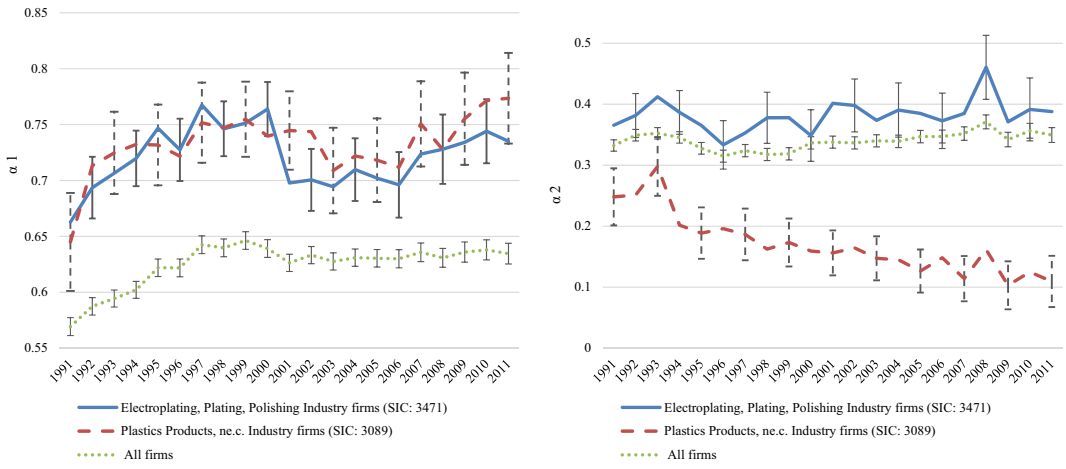

FIGURE 1 Distribution of attention rules across time for all firms and for selected industries

conjectures. First, aspiration formation differs across industries. Second, while on average attention rules remain relatively stable across years, error bars exhibit significant variations *within* years.

Table 2 presents two sets of models. The first set tests Hypothesis 1—the effect of environmental volatility on social aspirations (Model 2) versus prior historical aspirations (Model 4) subject to *within-firm* variance (i.e., fixed-effect). The second set investigates Hypothesis 2—the effect of *top-manager* on social aspirations (Model 6) and prior historical aspirations (Model 8) subject to *between-firm* variance (i.e., between-effect). The remaining models show the effects of the control variables. As *reporting time* (filing experience) builds, Models 1 and 3 show firms attending more toward social aspirations and past performance. We note a similar tendency across firms for those subject to elevated regulatory pressure. Models also show that as firms grow, managers focus less on social aspirations ($B = -0.0078$, p value $<.0001$) and more on prior historical aspirations ($B = 0.048$, p value $<.0001$).

Models 2 and 4 introduce the environmental volatility variable. Model 2 shows that firms favor self-referent historical aspirations over social aspirations as they experience greater environmental volatility over time ($B = -0.10$, p value $= .001$). It means that an increase of one unit of environmental volatility is associated with ten percent increase of self-referent historical aspirations. Turning to Model 4, we find the effect of environmental volatility on prior historical performance to be negative, but non-significant ($B = -0.024$, p value $= .536$). This implies that as environmental volatility worsens, firms favor neither prior historical aspirations nor prior performance under within-firm variance. Taken together, these findings suggest that firms focus their attention on self-referent historical aspirations rather than on social aspirations as they experience greater environmental volatility. Yet, firms favor neither past performance nor prior historical aspirations as volatility increases. Here, we only find partial support for Hypothesis 1.

The second set of models considers the effect of locus of attention (*top-manager*) on aspiration formation under *between-firm* variance. Model 6 shows the effect of *top-manager* to be positive and significant on social aspiration ($B = 0.015$, p value $= .002$), while Model 8 reveals the effect of *top-manager* to be negative and significant on prior historical aspiration ($B = -0.048$, p value $<.0001$). Results suggest that firms having the locus of attention at the higher levels tend to favor social over

TABLE 2 The effect of environmental volatility (within-firm) and locus of attention (between-firm) on attention rules

	Within-firm variance				Between-firm variance			
	Model 1 α_1 (social aspiration)	Model 2	Model 3 α_2 (prior historical aspiration)	Model 4	Model 5 α_1 (social aspiration)	Model 6	Model 7 α_2 (prior historical aspiration)	Model 8
Private firm	0.011	0.011	0.0038	0.0050	−0.0034	−0.0046	−0.031	−0.022
	(0.542)	(0.575)	(0.855)	(0.790)	(0.606)	(0.529)	(0.000)	(0.001)
Firm size	−0.0078	−0.0077	0.048	0.047	0.00044	0.00082	0.041	0.035
	(0.001)	(0.000)	(0.000)	(0.000)	(0.815)	(0.684)	(0.000)	(0.000)
Production change	0.033	0.033	0.013	0.013	0.13	0.14	−0.000057	0.066
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.746)	(0.000)
Reporting time	0.0025	0.0025	−0.0056	−0.0055	−0.00013	−0.00017	−0.0019	−0.0015
	(0.000)	(0.002)	(0.000)	(0.000)	(0.730)	(0.625)	(0.000)	(0.000)
Regulatory pressure	0.026	0.026	−0.0092	−0.0086	0.026	0.027	0.037	0.034
	(0.000)	(0.000)	(0.228)	(0.090)	(0.000)	(0.000)	(0.000)	(0.000)
Environmental volatility		−0.10 H1		−0.024 H1				
		(0.001)		(0.536)				
Top-manager						0.015 H2		−0.048 H2
						(0.002)		(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE					Yes	Yes	Yes	Yes
Constant	0.49	0.49	0.25	0.26	0.33	0.34	−0.048	−0.022
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.305)
Observations	148,910	148,910	148,910	148,910	148,910	148,910	148,910	148,910
Adjusted R^2	0.008	0.008	0.010	0.011	0.103	0.106	0.147	0.161

Note: *p* values are in parentheses and standard errors are bootstrapped.

TABLE 3 The effect of environmental volatility (within-firm) and locus of attention (between-firm) on attention rules. The environmental volatility variable is based on shipment sales

	Within-firm variance				Between-firm variance			
	Model 1 α_1 **(social aspiration)**	**Model 2**	**Model 3** α_2 **(prior historical aspiration)**	**Model 4**	**Model 5** α_1 **(social aspiration)**	**Model 6**	**Model 7** α_2 **(prior historical aspiration)**	**Model 8**
Private firm	0.011	0.011	0.0038	0.0050	−0.0034	−0.0050	−0.029	−0.023
	(0.595)	(0.573)	(0.859)	(0.811)	(0.637)	(0.439)	(0.000)	(0.001)
Firm size	−0.0078	−0.0077	0.048	0.047	0.00044	0.00070	0.039	0.034
	(0.000)	(0.000)	(0.000)	(0.000)	(0.793)	(0.704)	(0.000)	(0.000)
Production change	0.033	0.033	0.013	0.013	0.13	0.13	0.066	0.065
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Reporting time	0.0025	0.0025	−0.0056	−0.0055	−0.00013	−0.00013	−0.0018	−0.0015
	(0.000)	(0.000)	(0.000)	(0.000)	(0.756)	(0.692)	(0.000)	(0.000)
Regulatory pressure	0.026	0.026	−0.0092	−0.0086	0.026	0.026	0.035	0.034
	(0.000)	(0.000)	(0.184)	(0.212)	(0.000)	(0.000)	(0.000)	(0.000)
Environmental volatility		−0.12 H1		−0.027 H1				
		(0.007)		(0.600)				
Top-manager						0.015 H2		−0.047 H2
						(0.004)		(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE					Yes	Yes	Yes	Yes
Constant	0.49	0.49	0.25	0.26	0.33	0.34	−0.081	−0.021
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.312)
Observations	148,910	148,910	148,910	148,910	148,910	148,910	148,910	148,910
Adjusted R-squared	0.008	0.008	0.010	0.011	0.103	0.106	0.147	0.161

Note: *p* values are in parentheses and standard errors are bootstrapped.

TABLE 4 The effect of environmental volatility (within-firm) and locus of attention (between-firm) on attention rules. The proxy of the locus of attention is headquarters

	Model 1 α_1 (social aspiration)	Model 2		Model 3 α_2 (prior historical aspiration)	Model 4		Model 5 α_1 (social aspiration)	Model 6		Model 7 α_2 (prior historical aspiration)	Model 8	
Private firm	0.011	0.010		0.0038	0.0055		−0.0034	−0.0046		−0.029	−0.026	
	(0.546)	(0.598)		(0.847)	(0.800)		(0.560)	(0.491)		(0.000)	(0.002)	
Firm size	−0.0078	−0.0069		0.048	0.045		0.00044	0.00043		0.039	0.037	
	(0.000)	(0.001)		(0.000)	(0.000)		(0.757)	(0.827)		(0.000)	(0.000)	
Production change	0.033	0.033		0.013	0.013		0.13	0.14		0.066	0.066	
	(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)	
Reporting time	0.0025	0.0026		−0.0056	−0.0057		−0.00013	−0.000063		−0.0018	−0.0018	
	(0.000)	(0.000)		(0.000)	(0.000)		(0.714)	(0.877)		(0.000)	(0.000)	
Regulatory pressure	0.026	0.026		−0.0092	−0.0077		0.026	0.027		0.035	0.035	
	(0.000)	(0.000)		(0.146)	(0.253)		(0.000)	(0.000)		(0.000)	(0.000)	
Environmental volatility		−0.10	H1		−0.022	H1						
		(0.000)			(0.510)							
Headquarter								0.0090	H2		−0.013	H2
								(0.028)			(0.015)	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Industry FE							Yes	Yes		Yes	Yes	
Constant	0.49	0.47		0.25	0.29		0.33	0.34		−0.081	−0.049	
	(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.044)	
Observations	148,910	148,910		148,910	148,910		148,910	148,910		148,910	148,910	
Adjusted R^2	0.008	0.008		0.010	0.011		0.105	0.108		0.157	0.160	

Note: *p* values are in parentheses and standard errors are bootstrapped.

historical aspiration (by 1.5 percent difference) and weigh past performance more than prior historical aspirations (by 4.8 percent difference). Overall, these findings offer support for Hypothesis 2.

5.1 | Robustness checks

We conducted a number of robustness checks to test whether these findings persist under different specifications. First, we explored shipment sales as another common proxy for environmental volatility and found consistent results (see Table 3).

Second, we formed an alternate measure capturing the position of the decision-maker. We focused on whether aspirations were formed at subsidiaries or headquarters. NETS data report when plants are subsidiaries of a focal firm. Thirty-one percent of all firms in the sample have a subsidiary structure, identifying decision-makers acting at the subsidiary unit. Other firms list a head office structure, defined as "headquarters" by NETS data. We created a variable *headquarters* assigning the value equal to 1 for firms having a head office structure, and zero otherwise. Table 4 lists models with the *headquarters* variable, and findings remain consistent with those shown in Table 2.

Third, we ran a number of robust models excluding outliers under alternate measures for social aspirations by broadening the reference group (e.g., from SIC 4-digit to SIC 3-digit industry classification). Again, results remain consistent with those shown in Table 2 (the results with 3-digit SIC codes are available from the authors).

6 | DISCUSSION

The BTOF emphasizes the importance of aspirations underlying firm behavior. Accordingly, firms update their aspiration levels by taking into account their historical aspirations, past performance, and the performance of others (Bromiley & Harris, 2014; Posen et al., 2018; Washburn & Bromiley, 2012). Yet, little is known about how firms weigh one aspiration against another since it has been commonly assumed that attention rules remain unchanged across firms and over time. We engage the recent debate to challenge this assumption (e.g., Blettner et al., 2015; Hu et al., 2017) and invoke the attention-based view (Ocasio, 1997, 2011) to hypothesize that environmental and organizational contexts shape how firms allocate attention among different aspirations.

Data from US manufacturing firms' waste reduction efforts between 1991 and 2011 provide empirical support that as environmental volatility worsens, a firm's attention shifts toward historical and away from social aspirations. It reinforces the idea that making sense of a volatile environment is complex, and adapting is troublesome (Levinthal & March, 1981). In general, this result bolsters the salience of what Ocasio (1997) calls "situational attention"–a focus attuned with a firm's specific operating context, thus shifting per the environment.

Greve (2003b) foresaw environmental volatility favoring social aspirations "since rapid changes in the environment make the history of the focal organization less diagnostic for judging its performance than the contemporary performance of comparable organizations." However, he also observed that decision-makers attend historical aspirations when new information is "absent, unreliable, or deemed irrelevant" (Greve, 2003b, p. 42). In fact, volatile environments undermine the current value of information obtained from comparable others. Volatility makes it harder to identify a relevant reference group and observe their actions driving performance

outcomes. Even when viable, such learning remains transitory as landscapes keep shifting, and the environmental signals tend to be ambiguous and noisy.

Contrary to our prediction, our results did not reveal any statistically significant effect of volatility on how firms shift their attention between self-referent aspirations, that is, prior historical aspirations and past performance, as volatility increases. That is, while volatility makes the comparison to industry participants more difficult and diminishes the value of most recent information, firms weigh inertia and past performance equally. On one hand, decision-makers better understand past-performance feedback produced internally, reliant on the firm's stable knowledge and resource base (Greve, 2003b). On the other hand, the way firms keep and store information for members' access reinforces inertia by setting its routines for attention allocation (Cyert & March, 1963; Ocasio, 1997). As Greve suggested, "numerous organizational routines bring attention to the past" (2002, p. 2), more so under high environmental volatility by reinforcing inertia. Their experience and prior performance set future aspirations, while the current aspirations of others yield little predictive power. Therefore, firms may rely more on the full set of their own past internal cues to form aspirations.

Our results also provide evidence that the locus of attention within an organization matters in aspiration formation. Consistent with our hypothesis, we find that firms attend to social aspirations and weigh past performance more than prior historical aspirations when the locus of attention resides with upper management. Such findings contribute to the recent discussion on the relevance of one element of the ABV—its tenet of structural distribution of attention (Dutt & Joseph, 2019; Gaba & Joseph, 2013; Joseph et al., 2016). We conjecture that high-level managers tend to allocate attention to social aspiration rather than to historical aspiration as their perches allow them to better observe the external environment and gather information while being more exposed to external pressure (e.g., Dutt & Joseph, 2019). They rely, not only on current external cues, but also on the latest internal information given their positions' greater insight and discretion in resource allocation to set up aspirations versus low-level managers.

6.1 | Theoretical implications

These results yield important theoretical implications for the BTOF tradition and the attention-based view of the firm. First, our study enriches the BTOF by offering insights on why and how organizations adapt attention rules. The BTOF has traditionally aided our understanding by showing that the discrepancy between a firm's aspirations and performance will trigger organization-wide search and risk-taking (for reviews, see Shinkle, 2012; Washburn & Bromiley, 2012; Bromiley & Harris, 2014; Posen et al., 2018; Kotiloglu et al., 2019). Although aspirations play a central role in this theory, little research has focused on *how* aspirations are reformulated. Our study shows that both environmental and organizational contexts drive firms' attention rules as to how aspiration levels are updated. By understanding how firms form aspirations, we provide insights on organizational search. Recent studies have highlighted the relevance of search direction (Kuusela, Keil, & Maula, 2017; Zhang & Greve, 2019). Since attention is allocated to varied aspirations across firms, our results imply that subsequent search is likely to occur around attention-rich aspirations.

Moreover, a growing stream of research has examined organizational responses to (in)consistent performance feedback regarding multiple goals, albeit with conflicting findings (Audia & Brion, 2006; Gaba & Greve, 2019; Jordan & Audia, 2012; Joseph & Gaba, 2015; Lucas

et al., 2015; Wooldridge et al., 2018). For instance, Hu et al. (2017) have observed that (in)consistent feedback moves firms to select among different aspiration types. We join this conversation by underscoring that organizational attention is an overlooked, yet vital factor in research on performance aspirations. We argue that firms allocate their attention to aspirations selectively since decision-makers have limited cognitive capacity (Simon, 1947). As a result, our findings may resolve conflicting results that have clouded prior research as we propose that firms address (in)consistent feedback when forming aspirations. Our findings stress that both environmental context and locus of attention shape attention allocated to different aspirations across firms and over time. Thereby, we open new avenues for theory development toward shedding light on attention allocation among multiple aspiration types.

Second, beyond clarifying how firms' aspirations are updated, we also challenge the empirical assumption that all firms weigh aspirations in the same manner, across industries, and over time. Earlier work has assigned weights a priori favoring prior historical aspirations (Mezias et al., 2002), social aspirations (Greve, 1998, 2003a, 2008; Mishina et al., 2010), or past performance (Audia & Brion, 2006; Gaba & Joseph, 2013; Tuggle et al., 2010)—often driven by convenient parameter-tuning. This lack of consensus highlights the ongoing debate summarized by Shinkle (2012, p. 433): "...there is a unanimous consensus that both historical and social aspirations do influence future aspirations; however, it is not clear which [of the two] dominates." We qualify this debate by showing that a particular aspiration may not be universally salient across all firms, all of the time. We do not challenge parameter selection in prior research since we understand that attention rules were selected to fit their specific samples. However, the question of why such a wide range of attention rules prevails has remained unanswered. We address this question by arguing that (i) firms simply vary in the attention they allocate to different aspiration levels as they face changing levels of environmental volatility, and that (ii) locus of attention determines not only attention distribution and information processing, but also aspiration formation.

Third, we link the ABV directly with aspiration formation. While the ABV has substantially shaped our understanding of how environmental and organizational contexts influence decision-maker attention and subsequent strategic choices (e.g., Bouquet & Birkinshaw, 2008; Cho & Hambrick, 2006; Levy, 2005; Ocasio & Joseph, 2008), the ABV is still mute on the attentional drivers of aspiration formation. These drivers form an essential missing puzzle piece in the ABV that could allow us to integrate the ABV with the BTOF. For instance, environmental stimuli and locus of attention may shift a firm's aspiration levels, and the discrepancy between actual performance and shifted attention-based aspiration levels may, in turn, explain firm behavior.

6.2 | Limitations

These novel theoretical implications, however, come with limitations. First, although the empirical domain provides the opportunity to fully examine attention rules, the effects of attention drivers found here could be specifically relevant only toward operational and toxic-waste handling performance. The effect of environmental volatility and locus of attention on aspiration formation related to financial or innovation performance may shape attention rules there quite differently, thus offering a promising research venue.

Second, our research is limited to one sub-goal of the organization. We were not able to collect data on aspiration formation as to other sub-goals or main goals of organizations. Thus, we

treated aspiration formation related to operational and environmental performance in isolation, ignoring how attention drivers may influence multiple outcomes. Future work could tackle this issue.

Third, we draw on the ABV, which casts environmental context and organizational structure as the core elements of organizational attention, and we focus on two specific dimensions—environmental volatility and locus of attention. Yet, environmental context can be characterized not only by volatility but also, for instance, by uncertainty, complexity, ambiguity, or munificence. In addition to these dimensions, the business environment can be shaken by rare, black-swan events such as the Covid-19 pandemic. Similarly, organizational structure might entail aspects beyond loci of attention, such as centralization, formalization, and specialization. We invite future work to explore different elements of environmental context and organizational structure to shed further light on the attention-based drivers of aspiration formation.

Finally, we have measured managerial attention using secondary data to analyze whether managers are paying more attention to a particular aspiration type by weighing it more when forming their aspirations. The weights assigned to distinct aspirations refer to the attention allocated to a specific type. We are not the first to assert this: Cyert and March (1963) long ago dubbed the relative weights of aspirations "attention rules." Yet, we did not measure managerial attention directly. Since our data cover operations for tens of thousands of (mostly private) firms, measuring attention using primary sources would have been unattainable. Future research could test our conjectures in a similar setting with a fewer, doable number of manufacturing firms by observing attention directly, for example, by asking managers to rank different aspirations.

7 | CONCLUSION

We examine how attention rules are both shaped by external environment and locus of attention within the organization. Given the importance of aspiration formation and the dearth of studies, we hope that our paper stimulates other researchers to test the boundaries of our predictions and provide a better sense of exactly how managers weigh attention rules.

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DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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APPENDIX A.

We compare the conceptualizations of aspiration formation by Greve (2003a, 2003b) and Cyert and March (1963). The latter authors propose the following formulation:

$$\begin{gathered} A_{i,t} = \gamma_1 A_{i,t-1} + \gamma_2 P_{i,t-1} + \gamma_3 S_{i,t-1} \\ \gamma_1 + \gamma_2 + \gamma_3 = 1 \end{gathered} \tag{3}$$

$A_{i,t-1}$ refers to prior aspirations. Let us drop the subscript i from the equations for notational simplicity. Equation (3) can be rewritten after recursion as follows:

$$A_t = \gamma_1^t + \sum_{j=1}^{t} \gamma_1^{t-j} \gamma_2 P_{j-1} + \sum_{j=1}^{t} \gamma_1^{t-j} \gamma_3 S_{j-1} \tag{4}$$

Equation (4) shows that the weight for the aspiration level in period $k < t$ is γ_1^{t-k}, $\gamma_1^{t-k-1}\gamma_2$ for P_k, and $\gamma_1^{t-k-1}\gamma_3$ for S_k.

To make a better comparison, we merge Equations (1) and (2) and rewrite Greve (2003a, 2003b) formulation in recursive form as well:

$$A_t = \alpha_2^t (1-\alpha_1) H_0 + \sum_{j=1}^{t} \alpha_2^{t-j} (1-\alpha_2)(1-\alpha_1) P_{j-1} + \alpha_1 S_t \tag{5}$$

There may exist an infinite number of combinations of the parameters $\alpha_1, \alpha_2, \gamma_1, \gamma_2,$ and γ_3 to satisfy the equality of Equations (4) and (5). One possibility is:

$$\begin{gathered} \gamma_1 = \alpha_2, \\ \gamma_2 = 1 - \alpha_2 - \alpha_1 + \alpha_1 \alpha_2, \\ \gamma_3 = \alpha_1 - \alpha_1 \alpha_2, \\ A_0 = (1-\alpha_1) H_0, \\ S_t = \sum_{j=1}^{t} \alpha_2^{t-j} (1-\alpha_2) S_{j-1} \end{gathered} \tag{6}$$

That is, the conceptualizations by Cyert and March (1963) and Greve (1998) become equivalent only when we assume $A_0 = (1-\alpha_1) H_0$ and $S_t = \sum_{j=1}^{t} \alpha_2^{t-j} (1-\alpha_2) S_{j-1}$.