A BEHAVIORAL PERSPECTIVE ON ATTENTION ALLOCATION AMONG MULTIPLE GOALS: AN EXPLORATORY EXAMINATION OF THE AUTOMOTIVE INDUSTRY

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ABSTRACT

SONGCUI HU: A Behavioral Perspective on Attention Allocation Among Multiple Goals: An Exploratory Examination of the Automotive Industry
(Under the direction of Richard Bettis)

Goals (aspirations) and attention allocation are of considerable interest in practice, in strategic theory, and in research on a behavioral theory of the firm. Empirical studies of the allocation of attention to goals have been limited to two or fewer goals where sequential attention to goals is either not an issue or obvious. The exploratory research discussed in this dissertation is concerned with attention allocation when there are more than two goals. Here sequential attention is ambiguous regarding what goal to which attention should be shifted when the current focal goal is satisfied. Relying on the combination of multiple statistical methods including panel vector autoregression, ordinary least squares regression, and hierarchical linear regression, I test the long-run interplay of and attention allocation among three product goals (car fuel efficiency, safety, and reliability) using a large dataset from the US automotive industry from 1980 to 2009. Major results involve the complexity of shifting attention among goals, issues raised by the correlation structure among multiple goals, and the context dependence of attention shifts. These results suggest the necessity of a substantial modification of the theory of attention allocation. Conjectures are discussed regarding aspects of a new theory of attention allocation for more than two goals in the presence of interdependency.

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TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

LIST OF ABBREVIATIONS

ABV	Attention-based view of the firm
AD	Attainment discrepancy
AIC	Akaike information criterion
BIC	Bayesian information criterion
BOD	Board of directors
BTOF	Behavioral theory of the firm
CAFE	Corporate average fuel economy
CEO	Chief executive officer
CR	Consumer reports
EPA	Environmental protection agency
GMM	Generalized method of moments
HA	Historical aspiration
HLM	Hierarchical linear models
IIHS	Insurance institute for highway safety
IRF	Impulse response function
LR	Likelihood ratio
MMC	Multimarket contact
MPG	Miles per gallon
NHTSA	National highway traffic safety administration
OLS	Ordinary least squares
PVAR	Panel vector autoregression
ROA	Return on assets

SA	Social aspiration
TMT	Top management teams
VAR	Vector autoregression

CHAPTER 1

INTRODUCTION

Organization aspirations, desired performance levels in specific organizational outcomes, are central to strategic decision making. Setting goals and objectives is a long-standing component of strategic planning (e.g., Ansoff, 1984; Chandler, 1962; Hofer & Schendel, 1978). Managers establish organizational goals to communicate strategic direction (Fiegenbaum, Hart, & Schendel, 1996), enhance performance (Carver & Scheier, 1981; Eisenhardt, 1985; Hamel & Prahalad, 2005), and provide measures of success (Kaplan & Norton, 1996, 2001; Meyer, 2002). The literature generally treats aspirations and goals as similar concepts. Therefore, in this dissertation, aspirations and goals are used interchangeably as both concepts lie under the umbrella term – aspirations.

There are numerous theories that provide directional guidance on specific goals, such as the resource-based view that recommends building competencies (Barney, 1991); Ansoff's view that based on forward-looking, goal-seeking, and analytical planning (Ansoff, 1979, 1987); and strategic reference point theory (Fiegenbaum *et al.*, 1996) that is founded on strategic choice concepts and prospect theory. However, most of the existing literature on aspirations follows the behavioral theory of the firm (BTOF) which is based on the Carnegie School concepts of bounded rationality, satisificing, search, adaptive learning, and sequential attention (Cyert & March, 1963; March & Simon, 1958; Simon, 1947).

This stream of work has comprehensively characterized both antecedents and consequence of organization aspirations. Specifically, it is concerned with differences in risk preferences when performance is either above or below a goal. It has mainly focused on a single goal and how the consequences of performance relative to the aspiration level motivate various organizational actions (Bromiley, 1991; Chen & Miller, 2008; Greve, 1998, 2003; Iyer & Miller, 2008; Miller & Chen, 2004; Shimizu, 2007).

However, much of organization theory explicitly recognizes the reality that organizations have a wide range of overall and subunit goals such as market share, quality, productivity, and customer satisfaction (Cyert & March, 1963; Scott, 1998). The existence of multiple goals within organizations is tightly tied to the nature of organizations. According to the Carnegie perspective (Cyert & March, 1963; March & Simon, 1958; Simon, 1947), organizations bring together a set of participants with conflicting interests, goals and knowledge to cooperation in collective action. Organizational members agree to participate so long as the perceived value of the inducements they receive from the organization exceeds the perceived opportunity costs of their contribution (Barnard, 1938). However, given uncertainty and bounded rationality, the implicit contract between the organization and its members is incomplete. With the specialization of decision making and information processing inherent in organization, conflicts among various groups within organizations are never fully resolved.

The role of conflicting interests and goals was partially incorporated into agency theory (Jensen & Meckling, 1976), resource dependence theory (Pfeffer & Salancik, 1978), and upper echelons perspectives (Hambrick & Mason, 1984). Yet, these theories' treatments of conflicting interests and goals depart in fundamental ways from the Carnegie School view (Gavetti, Levinthal, & Ocasio, 2007).

The Carnegie School (Cyert & March, 1963; March & Simon, 1958; Simon, 1947) argues that multiple goals within organizations compete for the limited pool of organizational resources, including energy, time, and attention. For instance, Penrose (1959) argued that rapid firm growth is associated with decreases in production efficiency, because planning for growth takes managerial focus away from keeping production cost down. Multiple-goal pursuit often requires attempting to dynamically balance between opposing demands for the limited resources, to ensure that moving toward one of the goals does not compromise all other goals (Ocasio, 1997). For example, during a conversation with *Automotive News* on Toyota's national safety recall, Seigo Kuzumaki, the project general manager for vehicle safety in Toyota, said

> *"We are trying to find the engineering man-hours for these quality issues. The surging demand for engineers in safety is forcing Toyota to rebalance resources in product development while trying to keep products on schedule. In some cases, that may result in slowed product development, but the company is trying to avoid this… Shifting resources to safety was the right compromise at the right time. Toyota needs to move faster to respond to customer needs…"*(Automotive News, 2010)

Therefore, pursuing multiple goals can create managerial challenges. Specifically, decision makers find it cognitively difficult to manage multiple interdependent goals and ultimately can face confusion and lack of direction (Jensen, 2001), or get caught in a status quo trap (Ethiraj & Levinthal, 2009). This clearly suggests that theoretical and empirical exploration of the boundary conditions of attention allocation is necessary.

Previous studies while recognizing the realities of goal structures in complex organizations have typically focused on the determinants and consequences of successful single-goal pursuit (Locke & Latham, 1990). Surprisingly little is known about the flow of organizational goal-directed behavior in multiple-goal pursuit. Sequential attention is the major theory on attention allocation among multiple goals (Cyert & March, 1963). It states that organizations only focus on one goal at a time, and shift all attention to the next goal once the current one is satisfied. Much of this literature is theoretical in nature. There has been only one empirical study (i.e., Greve, 2008) which considered two organizational goals and none that considered more than two goals[1]. Firms and their subunits each can and obviously do have more than two goals. The increasing number of goals reflects the increase of interdependent constraints (Simon, 1955). Multiple constraints further increase the complexity of decision making, information processing, and attention allocation (Cyert & March, 1963; Simon, 1964; Sullivan, 2010). When the number of goals is two, the switching rule for sequential attention is simply to choose the other goal when the first goal has been met. However, when there are more than two goals the situation is complicated since there is no theoretical rule or empirical research defining how a choice of the next goal for attention is determined. Moreover, organizational goals may be interdependent. Interrelated goals may be congruent and mutually reinforcing or, more commonly, divergent, whereby the satisfaction of one goal comes at the expense of decreasing performance on one or more other goals. Consequently, the attention allocation becomes much more complicated.

Furthermore, previous empirical studies have assumed that all organizations in the reference group (e.g., industry, industry segment, or strategic group) follow the same rule of attention allocation. However, scholars have suggested that attention allocation is context

[1]There are some studies in the literature examining different measures of performance. For example, Miller and Chen (2004) have investigated the effects of multiple measures of profitability on risk taking. Also, some studies have examined multiple goals or reference points. For instance, Baum, Rowley, Shipilov, and Chuang (2005) analyzing two different organizational goals indicate that failure to fulfill one goal was enough to trigger risk taking behavior. Audia and Brion (2007) find that a self-enhancement bias makes individuals facing two divergent goals tend to focus on the one they exceed, and thus to have bias toward inertia and inaction. However, those studies are fundamentally different from the focus of this study on the attention allocation among multiple goals.

dependent (Ocasio, 1997), and the order in which goals are attended is not uniform across organizations but depends on the preferences of the "dominant coalition" of each organization (Cyert & March, 1963).

This dissertation intends to take the first step toward building a nascent theory of attention allocation to multiple goals, especially when the number of goals exceeds two. The literature has examined various processes and mechanisms for minimizing or resolving conflicts among multiple goals within organizations, including hierarchy (Simon, 1947), incentives (Barnard, 1938; Cyert & March, 1963), and organization structures (Burton & Obel, 1988; Lawrence & Lorsch, 1967; Thompson, 1967). In this dissertation, I am interested in one form of goal conflict that is important and realistic, but remains understudied – the attention allocation among more than two goals at a single hierarchical level. I explore attention allocation to multiple goals within and across automotive companies at the level of the individual automobile model. The research is exploratory since empirical studies involving more than two goals have not previously been conducted, and lack a theoretical basis regarding sequential choice. This exploration is driven by propositions based in what seem to be reasonable modifications and extensions of current theory. The main emphasis of this work is on the recognition of the interdependencies of goals, the contextual dependence of decision making, and the consequent challenges of attention allocation to multiple goals within organizations. It develops and tests a model of how organizations selectively regulate the allocation of attention among multiple goals using the panel data from the US automotive industry.

Major results include the complex nature of attention shifts, issues caused by the correlation structures of multiple goals, and context dependence. The details of these results provide important insights and suggest the necessity of a substantial extension and modification of the theory of attention allocation. Conjectures are discussed regarding some aspects a new theory might include. Subsequent research will be directed at formal testing of these conjectures. Some preliminary rules may be applicable, though at this point the outlines of a new theory are still vague regarding the static allocations of attention across multiple goals under various conditions and the detailed dynamics regarding what drives reallocation and the resulting new allocation of attention given various drivers of change. In particular it turns out that the rules of switching attention are likely to depend in part on the context and particularly goal correlation structures. This is counter to the usual assumption of homogeneity of switching rules within a particular reference group.

The remainder of this dissertation is organized as follows. First, I start with a brief review of the background theory, including bounded rationality and attention theory, multiple goals and sequential attention, and performance feedback. Next, I develop a set of propositions in the context of current literature. I then offer a method section that includes a description of the sample, the statistical technique employed, and variables and measurements. Next, I present results of the empirical analysis, including descriptive statistics, results from the panel vector autoregression (VAR) analysis and ordinary least squares (OLS) regression analysis, and several robustness checks. Finally, I conclude with a discussion section which includes contributions, implications for theory and practice, and limitations and future research directions.

CHAPTER 2

BACKGROUND THEORY

The purpose of this dissertation is to investigate how decision makers in the organizations allocate attention to multiple conflicting goals. In this chapter I start with a brief review of the relevant attention theory. I then review the literature on multiple goals within organizations, and discuss how sequential attention can sometimes resolve conflicts among multiple goals. I finally review the literature on adaptive aspirations and performance feedback to summarize the importance of attainment discrepancy on attention allocation to goals.

2.1 Bounded Rationality and Attention Theory

More than half century ago, Herbert Simon (1947) introduced a new perspective on firm behavior, which boldly departed from economists' theories of perfect rationality and highlighted the bounded rationality of humans in explaining how managers make decisions. For Simon, administrators satisfice – look for a course of action that is satisfactory – rather than optimize over the latent choice set. Bounded rationality results from limited attentional capability of humans. Hence organizations rely on performance feedback relative to goals in allocating attention. This involves issues of how the performance is valued and the scope of alternatives for consideration. Firm behavior is a cognitive and a structural process. Organizations make decisions with the limited attentional capacity of humans and under the structural influences of organizations on attention.

The concept of attention has a long history and tradition in organization theory. "*Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form,…Focalization, concentration of consciousness are of its essence*…."(James, 1890). For Simon (1947), attention was referred to the set of elements that enter into consciousness at any given time, and was constrained by human limits on memory and computing power. Organizations influence individual decision-making by allocating and distributing the stimuli that channel the attention of administrators in terms of what selected aspects of the situation are to be attended, and what aspects are to be ignored. March and Olsen (1976) argue that there is a set of structural constraints on the allocation of attention, and there is a pattern of individual action within the constraints. The attention structures exist because of the interdependencies among the actions of individuals, the distribution of individual competences, and the distribution of values and resources across individuals.

Early work on attention has emphasized how attention is shaped by routines and bounded rationality (Cyert & March, 1963; March & Simon, 1958), and how attention is loosely coupled through enactment processes (Weick, 1979) and organized anarchy(Cohen, March, & Olsen, 1972). However, different scholars have emphasized different aspects of attention allocation and structuring, but ignored others. The concept of attention has not developed into a unified perspective on firm behavior (Ocasio, 1997).

To bring back the dual emphasis on structure and cognition developed by Simon (1947), Ocasio (1997) develops an attention-based view of the firm (ABV) by incorporating current understanding of social structures, environmental influences, and individual and social cognition. He defines attention to encompass the noticing, encoding, interpreting, and the focusing of time and effort by organizational decision-makers on both issues (the available repertoire of categories for making sense of the environment) and answers (the available repertoire of action alternatives). ABV focuses on how attention in organizations shapes organizational adaptation.

Recently, ABV has been increasingly adopted as a meta-theoretical perspective in both theoretical (Barnett, 2008; Ocasio & Joseph, 2005) and empirical work (Bouquet, 2008; Bouquet, Morrison, & Birkinshaw, 2008; Cho & Hambrick, 2006; Hoffman & Ocasio, 2001; Hung, 2005; Ocasio & Joseph, 2008; Sullivan, 2010). For example, Hoffman and Ocasio (2001) extend the study of organizational attention to the industry level. By empirically examining one important communication channel within the business press industry, they develop a theoretical model of industry attention to events that draws connections between the social and structural factors affecting the industry and the level of attention to events. They further point out that the search for accountability is a key factor in determining attention to events. Cho and Hambrick (2006) examine the role of attentional orientation of top management teams (TMTs), and find that deregulation causes a shift in managerial attention in the context of airline deregulation, and that attention partially mediates the relationship between TMT changes and strategy changes. These results shed light on the transformation of industry attention patterns following an environmental shift, and the role of TMT composition and incentive systems in that process. By studying failed Clinton reform initiative in healthcare, Nigam and Ocasio (2010) explore how event attention leads to change in field-level institutional logics. Table 1 presents a summary of selected empirical research on attention in organizations and strategic management undertaken since the publication of ABV (Ocasio, 1997).

Meanwhile, overall attention to attention employing a wide variety of meta-theories has also been flourished (Kaplan, 2008; Nadkarni & Barr, 2008; Weick & Sutcliffe, 2006). For instance, Weick and Sutcliffe (2006) have challenged the Carnegie School assumption that attention is a scarce resource and contended that when the allocation of attention is done with discipline, such as with the mindfulness emphasized in Buddhist psychology and philosophy, attention can be plentiful and sufficient and can be paid to different problems by decision makers.

Despite the increasing attention to attention in the last decade, the research has led not to a cumulative body of work but led to a variety of often disparate findings. The main reason for this is that the research on attention relies on both different meta-theories and different definitions and understanding of the construct of attention itself. In a recent review study, Ocasio (2011) examines attention in light of recent developments in the cognitive neuroscience of attention (Corbetta & Shulman, 2002; Posner & Rothbart, 2007), which suggests that attention is not a unitary concept but a variety of interrelated mechanisms and processes that operate in diverse ways in the human brain. To distinguish between the varieties of meaning, he classifies the usages of the attention concept into three ideal types based on their focus on structure, process, or outcomes: *attentional perspective*, defined as "the top-down cognitive (and motivational) structures that generate heightened awareness and focus over time to relevant stimuli and responses"; *attentional engagement*, defined as "the process of intentional, sustained allocation to cognitive resources to guide problem solving, planning, sensemaking, and decision making"; and *attentional selection*, defined as "the emergent outcome of automatic or intentional attentional processes that result in focusing attention on selective stimuli or responses to the exclusion of others".

Ocasio (2011) further applies this framework to the behavioral theory of the firm. Specifically, within BTOF, "attentional perspective is shaped by organizational experience with existing decision and attentional rules;" "attentional engagement is triggered by failure to meet aspiration levels, leading to local search and organizational learning in decision and attentional rules;" "attentional selectivity is the resulting outcome of sequential attention to alternative aspiration levels, as well as attentional engagement that results in guided search (Greve 2008)."

The extant literature on attention has important implications for the current study. However, there are at least three limitations. First, the complexity involved in attending to simultaneous claims in many different arenas and calculating both substantive and symbolic costs and benefits calls for a behavioral theory of attention (March & Olsen, 1976). Sullivan (2010) has tried to move toward this direction by examining how the current rules and new problems in the airline industry compete for organizational attention by analyzing the relationship between current rules' finalization rate and the number of new problems under different circumstances. However, there is still a missing link of theoretical and empirical examination of the context through which multiple potentially conflicting goals interplay and compete for attention within organizations over time. Second, the behavior theory of the firm, as originally developed by Cyert and March (1963), is the most influential foundational perspective in examining the allocation of attention in organizations (Augier & Prietula, 2007). However, as shown in Table 1, there is only one empirical study (i.e., Greve, 2008) relying on the BTOF and the same study is the only one that focuses on the attentional selection. More work built on the tradition of BTOF is needed. Third, while it has been suggested that attention competition is context dependent (Ocasio, 1997), there is a lack of empirical investigation of how contextual factors such as firms' characteristics including size and age affect the attention allocation patterns.

2.2 Multiple Goals and Sequential Attention

Organizations are thought to have a wide range of goals: profitability such as return on assets (Audia, Locke, & Smith, 2000; Bromiley, 1991; Greve, 2003a, 2003b, 2003c; Lant, Milliken, & Batra, 1992; Miller & Chen, 2004), productivity and sales (Audia & Sorenson, 2001), market share and status (Baum, Rowley, Shipilov, & Chuang, 2005), and size (Greve, 2008). The availability of multiple and potentially conflicting performance aspirations or goals is a pervasive feature of organizations. These different performance goals are often contradictory since they aim to capture different aspects of performance (Meyer, 2002; Meyer & Gupta, 1994). For example, *Business Week* ranks companies in the Standard & Poor's 500 by using eight criteria of success that often diverge considerably (Business Week, 2004). The balanced scorecard approach is directed at fine-grained non financial performance measures such as customer, internal business, and learning and growth. It is designed to serve as a guide to strategy and managerial action (Kaplan & Norton, 2001), though it does little to help our understanding of how organizations deal with multiple performance goals that can be contradictory.

The issue of multiple goals is intimately tied to Simon's (1947) notion of bounded rationality. According to the BTOF (Cyert & March, 1963), organizational goals (e.g. production goals, inventory goals, sales goals, market share goals, and profit goals) are a series of more or less *interdependent*[2] constraints imposed on the organization through a

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[2]The original work uses "more or less independent" instead of "more or less interdependent". The author interprets it as "interdependent" for several reasons: first, the author believes, both terms say the same thing but with a different anchor. Both terms equally capture the different degrees of interdependencies caused by the constraints of multiple goals in organizations, but the former one is with the emphasis on the separate actions of

process of bargaining among potential coalition members and elaborated over time in response to environmental pressures. Goals arise in such a form because the firm is a coalition of participants with disparate demands, changing foci of attention, and limited ability to attend to all organizational problems simultaneously. More specifically, organizations factor their decision problems into sub-problems and assign the sub-problems to subunits in the organization. As a result of local rationality, this reduces to solving one problem in terms of only one goal at the subunit level. The sales department mainly focuses on sale goals and sales strategy; the production department is primarily responsible for production goals and procedures; and the pricing department is primarily responsible for price decision and profit goals. Thus, most of organizations most of the time exist and thrive with considerable latent conflict of goals.

For Cyert and March (1963), there are three main mechanisms to resolve inconsistent goals across divergent coalitions. The first is to leverage acceptable-level decision rules, one characteristic of the decision making process. Acceptable-level decision rules facilitate the decision making process by requiring that local decisions satisfy local demands. Such decisions are made by separate decision centers thus resulting in a joint solution that satisfies all demands. However, different local demand constraints do not uniquely define a solution. And more importantly, acceptable-level decision rules often require excess (slack) resources to absorb potential inconsistencies in the local decisions. Slack can partially resolve the conflict among multiple goals, especially when organizations experience low performance, since slack can provide opportunities for organizational change (Levinthal & March, 1981),

possibly independent decision making by different departments with different goals in organizations, while the latter one with the emphasis on the joint outcome and performance of organizational decision making caused by the interaction of multiple goals. Second, as the dissertation will discuss the interdependency of goals in the later sections, the usage of “interdependent” instead of “independent” helps keep consistency throughout the dissertation.

and serve as a buffer against low performance. Slack can also be used as a buffer to protect against external shocks and future uncontrollable contingencies (Milliken & Lant, 1991), as well as experimentation with innovation (Bourgeois, 1981; Nohria & Gulati, 1996).

Second, the resolution of inconsistent goals may occur via decentralization of decision making, e.g., the use of organization structures to map decision makers to goals. Burton and Obel's work has examined both single goals (Burton & Obel, 1980) and multiple goals among subunits (Burton & Obel, 1988) by comparing M-form and U-form structures under organizational design framework. Specifically, Burton and Obel (1980) find the M-form yields superior performance in comparison with the U-form, especially so in nearly decomposable technological regime. Burton and Obel (1988) further compare the M-form and U-form structures under incentives (corporate and division) framework using a laboratory experiment. Although they do not address the problem of attention allocation among multiple goals under different organizational structures, they provide important implications for future investigation in this research vein.

Third, more often, organizations resolve conflict among goals, in part, by resorting to another characteristic of decision process, sequential attention. Sequential attention is a form of quasi-resolution of conflict that lets decision makers treat different goals as constraints to be satisfied in some order of priority rather than as trade-offs that have to be weighed against each other (Cyert & March, 1963). Put differently, organizations attend to different goals at different times. As choices, problems, solutions, and energies exist in a time-frame (March & Olsen, 1976), organizations distribute their time and energy to choices and problems in a "fire station" manner (Cyert & March, 1963). In a world in which there is any scarcity in one or more of the streams, the timing of the several flows will affect the outcome importantly.

The resulting time under buffer between multiple goals permits organizations to solve one problem at a time, attending to one goal at a time (Cyert & March, 1963). Much of the literature in this vein is theoretical in nature, though a small empirical literature in accounting has examined this issue as well.

Earlier work has modeled multiple goals using a parsimonious approach. For instance, Miller and Chen (2004) have investigated the effects of multiple measures of profitability on risk taking. This approach treats the goals as alternative measures of the same construct which is appropriate for closely related goals, but not for qualitative goals, such as quality, sales, and productivity. Later work on multiple goals has showed certain reason for the existence of goal interdependencies. Baum *et al.* (2005) analyzing two different organizational goals indicate that failure to fulfill one goal was enough to trigger risk taking behavior. Audia and Brion (2007), in an experimental and a field study, examine how decision makers respond to the ambiguity introduced by two diverging performance goals of unequal importance, and find mangers shift their attention from a primary to a secondary performance goal especially when the secondary performance goal was high and the primary performance goal was low, confirming managers' self-enhancing mechanism.

Among the few studies examining multiple goals and/or how firms shift their focus among multiple goals of different performance dimensions, Greve's (2008) work appears to be the first and the only empirical demonstration of sequential attention to goals in organizations using quantitative methods. Greve (2008) proposes that managers form an aspiration level for size through social comparison (Festinger, 1954) and they attend to the financial performance goal prior to the size goal, by robustly showing that firms grow more when they are below the aspiration level for size, especially when the performance goals are satisfied. More recently, Ethiraj and Levinthal (2009) explore the trade-offs inherent in the pursuit and fulfillment of multiple performance goals in complex organizations using computational methods. They find that the simultaneous pursuit of multiple performance goals leads to a lock-in to the status quo bias, which counterintuitively could be mitigated by goal myopia, spatial differentiation, or temporal differentiation of performance goals. In their working papers, Joseph and his colleagues (Joseph, 2010a, 2010b; Joseph & Gaba, 2010) have extended the research on multiple goals by examining the relationship between goal interdependencies and organizational search, performance feedback of hierarchical goals and innovation, and TMT's focus on global or local goals and new product introduction. Moreover, in the psychology literature, a multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance has been proposed (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Another study specifies that the individual's proximity to goal attainment and their emotions in completing the task define the model of multiple-goal pursuit (Louro, Pieters, & Zeelenberg, 2007).

The above studies provide important implications for my investigation, however, there are several limitations in the current literature on goals. First, most of current studies have typically focused on a single goal, and thus lacked the investigation of the long-run relationship and competitive interaction among multiple goals within organizations. Theoretically, the more numerous the goals are, the more likely goals can confuse and dilute the allocation of attention, and the more important the role of goals and goal priority play in directing the attention of decision makers. Second, most of the extant studies have focused on financial performance goals but ignored other important performance goals such as production efficiency and quality. Although financial performance goals are clearly important for explaining organizational behaviors as they are widely considered as ends, it is worthwhile to consider other goals as means by which financial performance goals are achieved. Some recent studies have tried to move toward this direction by examining a broad set of strategic behaviors, including illegal behavior (Mishina, Dykes, Block, & Pollock, 2010), search (Chen & Miller, 2007), and learning (Baum & Dahlin, 2007). Third, "…*goals are no more nature-given than aspiration levels are – organizational goals are constructed by managers and assigned to other managers or workers. They in turn construct their goals that may differ from the assigned ones*" (Greve, 2003c:70). For instance, even if top managers announce that profitability is important and assign a goal variable such as ROA, the sales managers may still believe the market share is more important. The goals of the subunits within the firm connect the firm level and individual level goals, and thus play a key role in directing the character and the strategic direction of the firm. However, the literature on goals has mainly focused on either the firm level goal or individual level goal, but the intermediate level (such as the subunit or division level) goal has been largely ignored. Forth, sequential attention to goals may not be sufficient to explain or guide the attention allocation to multiple goals due to the contextual dependence of attention allocation (Cyert & March, 1963; Ocasio, 1997). However, few of the above studies have examined the possible heterogeneous patterns of attention allocation to multiple goals across firms. Vissa, Greve, and Chen (2010) suggest a need to add consideration of organizational form and governance into organizational attention allocation. It is an extremely important but challenging task to examine what factors enhance or inhibit the successful attainment of multiple goals and how goals should be attended to avoid conflict (Locke & Latham, 1990). It might be useful for future work to integrate some aspect(s) from other theoretical views such as the managerial choice of importance or goal priority from Ansoff's (1979) view.

2.3 Adaptive Aspirations and Performance Feedback

Aspiration levels are "*the smallest outcome that would be deemed satisfactory by the decision maker*" (Schneider, 1992: 1053) or "*reference point that is psychologically neutral*" (Kameda & Davis, 1990: 56). Adaptive aspirations have long been recognized as significant to understanding subjective utility and choice behavior (Selten, 1998; Siegel, 1957; Simon, 1955, 1956). The decision maker observes feedback from the environment and compares it with a goal or an aspiration level, and searching is started if the aspiration level is not met (Cyert & March, 1963). Thus, the process of performance feedback in the BTOF is portrayed as an organizational decision process (Greve, 2003c).

Built on the BTOF, there are two streams of research on aspiration levels. The first set is the determinants of aspiration levels. Due to the unobserved nature of the aspiration level in most contexts, rarely did research directly study aspiration levels. Exceptions include Lant and Montgomery (1987), Mezias, Chen, and Murphy (2002), and Blettner, He, Hu, and Bettis (2012). Most extant research on aspirations has used some proxies to measure the aspiration level. These have mainly fallen into two mechanisms. The first mechanism assumes that organizations set their goals based on their historical performance and historical aspirations. March (1988) analyzes a model of risk taking where the aspiration level is built on a certain weight of the past performance and a certain weight of the past goal. The second mechanism assumes that organizations set their goals based on comparable others' performance. Since individuals compare themselves with others (Kelley, 1952), management researchers (e.g., DiMaggio & Powell, 1983; Fiegenbaum & Thomas, 1995) have extended the notion of social comparison theory (Festinger, 1954) from individuals to organizations. Furthermore, most current research on adaptive aspirations has examined the effect of both historical and social aspirations (Baum *et al*., 2005; Bromiley, 1991; Greve, 2003c; Herriott, Levinthal, & March, 1985; Knudsen, 2008; Miller & Chen, 2004).

Most extant literature on social aspirations and reference groups has used the industry average or median as the social aspiration level. There are only a few exceptions. For example, Bromiley (1991) uses striving aspirations by adding an adjustment factor of 1.05 for firms performing above their aspiration level in his study of corporate risk taking. Massini, Lewin, and Greve (2005) propose that innovating firms are more likely to select other innovating firms as their reference group and imitating firms are more likely to select the average firm in the population, or in the sub-population of non innovators, as their reference group. They also argue that the selection of a reference group is a crucial and neglected source of firm heterogeneity. Greve (2008) uses the firms with the similar size and performance to the focal firm as the reference group. Knudsen (2008) considers the situation in which firms may use the average of another population with higher performance as social reference point if they could afford the switching costs of moving to another population. Indeed, Hu, Blettner, and Bettis (2011) have suggested that firms' reference group setting strategies are bundled with risk taking, and the effectiveness of heterogeneous strategies for setting reference groups varies under different contexts.

The second stream is built around the consequences of performance relative to the aspiration level, i.e., the relationship between risk taking and attainment discrepancies, defined as the difference between performance and the aspiration level (Lant, 1992). The single reference point theory, which suggests that decision makers are risk seeking below their aspiration levels, and risk averse above them, is central to modern theories of individual and organizational choice (Cyert & March, 1963; Kahneman & Tversky, 1979; March, 1988). Attainment discrepancies have been considered as consequential for motivating all types of firm behavior including business-level strategy (Greve, 1998); firm risk taking (Bowman, 1982; Bromiley, 1991; Miller & Bromiley, 1990; Miller & Chen, 2004; Singh, 1986; Wiseman & Bromiley, 1996; Wiseman & Gomez-Mejia, 1998), organizational learning (Greve, 2003c); innovation (Greve, 2003a; 2003b), decisions on R&D search (Chen, 2008; Chen & Miller, 2007), new product launches (Greve, 2007); corporate acquisition strategy (Iyer & Miller, 2008); and divestiture (Shimizu, 2007).

Recent studies on aspirations have extended the single reference point theory and proposed two other references points, survival and slack. Specifically, empirical investigations of choice by organizations indicate that organizational risk-taking behavior changes significantly at the extremes of performance. Some research suggests that when decision makers are at a certain distance below their normal reference point, they shift their attention to the survival point (Lopes, 1987; March & Shapira, 1987, 1992) and become risk averse (Staw, Sandelands, & Dutton, 1981), e.g., they may be less likely to initiate acquisitions (Iyer & Miller, 2008) and more likely to engage in divestitures (Shimizu, 2007). There are some voices of opposition (Audia & Greve, 2006). A few studies suggest that increasing threats to survival stimulates greater and greater risk taking, presumably as an attempt to escape the threats (Bowman, 1982; Gooding, Goel, & Wiseman, 1996; Miller & Chen, 2004).

Another extreme case is when organizational performance is significantly above the aspiration level. A positive association between very high levels of performance and increased risk taking has been established (Singh, 1986). Some early studies (e.g. Mansfield, 1961) have associated high levels of slack with high levels of innovation. The BTOF (Cyert & March, 1963) suggests that the presence of slack resources enables firms to increase slack search through activities such as innovation (Nohria & Gulati, 1996), organizational change (Kraatz & Zajac, 2001), and expansion through acquisition (Iyer & Miller, 2008). However, there are also some contradictory findings. Miller and Chen (2004) find no support for the positive relationship between slack and risk taking in spite of using multiple measures for key variables. Based on computational modeling, Hu, Blettner, and Bettis (2011) introduce into the previous models of adaptive aspirations a new risk preference function that incorporates changes in risk preference at extremes of performance, and find important differences in outcomes from earlier studies which invite further studies on managerial goal setting. Though the determination on reference point number and managers' risk preference function is not the focus of the current study, this extension of studies beyond the scope of the BTOF has wide implications to organizational performance.

Table 2 presents a summary of selected research on aspirations. From the review above, a few conclusions can be drawn. First, in aspiration formation, the proxies of social aspiration levels in most previous studies do not follow the rule of organizational similarity and information availability as suggested by Greve (2003c), since they have largely used the industry average or median as the social aspiration. Second, previous analyses have typically been conducted at the firm level. Though the importance of subunit goals has been widely recognized as discussed in the previous section, how to choose the reference group or set the aspiration level for the subunit in the firm has been ignored in the literature. Third, a single reference point theory has been and may continue being the focus of much of the theoretical and empirical work on attainment discrepancies and performance feedback (Lant, 1992; Greve, 2003c).

CHAPTER 3

RESEARCH PROPOSITIONS

Built on the theoretical foundations, this chapter develops three exploratory propositions.

3.1 Sequential Attention and Discretionary Attention

Organizations are characterized by the availability and presence of multiple and potentially inconsistent goals. According to the BTOF (Cyert & March, 1963), organizational goals are a series of more or less interdependent[3] constraints imposed on the organization through a process of bargaining among potential coalition members and elaborated over time in response to environmental pressures. The Carnegie School perspective suggests that decision makers have limited attention capacity, and multiple goals compete for limited organizational attention (Cyert & March, 1963; March & Simon, 1958; Simon, 1947). The gain of attention by one goal is accompanied by the loss of attention by other goals. Furthermore, the BTOF suggests that organizations sequentially attend to multiple goals. Sequential attention is a form of quasi-resolution of conflict that lets decision makers treat different goals as constraints to be satisfied in some order of priority rather than as trade-offs that have to be weighed against each other (Cyert & March, 1963; Greve, 2008). Organizations distribute their attention to multiple goals in a "fire station" manner. The resulting time buffer between multiple goals permits organizations to attend to one goal at a

[3]Empirical research has ignored this interdependency. Interdependency does not arise in studies of a single goal, and implies endogeneity within the model in the case of multiple goals.

time and move on to the next goal when the focal goal is satisfied (Cyert & March, 1963: 117-119).

Sullivan (2010) finds attention is guided by “urgency” induced by the aggregate flow of new problems, which is also partially consistent with the sequential attention rule. As the only empirical demonstration of attention allocation to multiple organization-wide goals, Greve's work (2008) proposes that managers form an aspiration level for size through social comparison and they attend to financial performance prior to the size goal. This greatly enhances our understanding of attention allocation between two goals at the firm level. However, firms and their subunits each can and obviously do have more than two goals. The increasing number of goals reflects the increase of interdependent constraints (Simon, 1955). Multiple constraints further increase the complexity of decision making, information processing, and attention allocation (Cyert & March, 1963; Simon, 1964; Sullivan, 2010). Specifically, when firms or subunits encounter two goals, there are two alternatives of attention allocation. The first is to attend to two goals, perhaps with unequal attention, at a time. The second is to attend to only one goal at a time, which is consistent with the behavioral theory of the firm. With switching, there is no decision since there is only one other goal. When the number of goals is greater than two, the theoretical issue of which goal to attend to sequentially becomes more realistic, more complex, and more interesting theoretically. Firms may combine the two rules of attention allocation. Specifically, firms may not only sequentially attend to a subset of goals, but also simultaneously attend to multiple goals with varying levels of attention. Therefore, it is possible that firms shift their attention among a subset of but not all goals. This is reasonable because the order in which goals are attended is not uniform across organizations but depends on the preferences of the "dominant coalition" of each organization (Cyert & March, 1963: 26-32).

Moreover, the sequential attention rule focuses on a strict sequence in which one goal has to be satisfied prior to other goals. However, observations in organizations suggest the situation is more complex. Organizations might primarily focus on one goal at a time, but they are not likely to completely shift their attention away from one goal to another at any time. Put differently, it is almost impossible for organizations to focus all attention on a single goal and switch all attention to another when the current one is satisfied. Competence building in any goal variable or performance dimension needs investment over time. It is difficult for firms to gain competitive advantage from time compression diseconomies when they allocate discontinuous attention to goals (Dierickx & Cool, 1989). Specifically, for automotive makers, they have to maintain some minimum amount of attention/effort in safety and efficiency dimensions because of government mandates. More importantly, the resources used to achieve these goals, for example, specialized engineering expertise, are sometimes not fungible. Furthermore, different goals in organizations represent different interests of coalitions within organizations (Cyert & March, 1963), so it is generally impossible for the interest of any coalition to be ignored. Thus, attention allocation to multiple goals is not a strict sequence in which one goal has to be addressed prior to other goals, but instead it takes the form of varying the distribution of attention across multiple goals over time. Hence, each goal within an organization draws some minimum level of attention (referred to as *nondiscretionary attention*) to keep the organization functioning. Organizations also have *discretionary attention*[4], which is regulated by managers' own

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[4]The distinction between discretionary and nondiscretionary attention is similar to the notion of unabsorbed and absorbed slack (Singh, 1986). Unabsorbed slack corresponds to excess, uncommitted liquid resources in

discretion or judgment and available for use as needed or desired. The total attention in an organization is the sum of discretionary and nondiscretionary attention. Therefore, the key question of attention allocation is how to distribute the discretionary attention to multiple goals over time.

Overall, as a third goal increases the complexity of attention allocation, more concepts besides sequential attention must be incorporated into the theory of attention allocation among multiple goals. Building on the current literature, I therefore propose the following to guide the empirical exploration:

Exploratory proposition 1: Attention allocation is not a question of all or nothing. Attention is composed of discretionary and nondiscretionary components. Organizations shift discretionary attention among goals across time.

3.2 Interdependencies of Goals

Firms are frequently characterized by interacting organizational components (Rivkin, 2000; Siggelkow, 2001), including organizational goals (Ethiraj & Levinthal, 2009). According to Thompson (1967), there are three types of interdependence in an organizational structure. *Pooled interdependence* is considered as the loosest form of the interdependence. It occurs when each organizational department or business unit performs completely separate functions. As departments may not directly interact and do not directly depend on each other in decision making, there is an almost blind, indirect dependence on the performance or goals of others. *Sequential interdependence* occurs when one unit in the overall process produces an output necessary for the performance by the next unit. The demand for coordination to prevent slowdown is greater than for pooled interdependence. *Reciprocal interdependence* is

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organizations, while absorbed slack corresponds to excess costs in organizations. The amount of discretionary attention of goals may vary over time, though this is beyond the focus of the current study.

similar to sequential interdependence in that the output of one department becomes the input of another, with the addition of being cyclical. Reciprocal models are the most complex and difficult to manage, as they require the highest intensity of interaction.

Similarly, as multiple organizational goals impose a series of more or less interdependent constraints on the organization (Cyert & March, 1963), they can have different levels of interdependence. Goals can be independent or interdependent. Independent goals are those which are weakly correlated or uncorrelated to one another. Interdependent goals include congruent and divergent goals. Congruent goals are those which are positively correlated whereby the satisfaction of one will lead to the satisfaction of another. Divergent goals are those which are negatively correlated and for which the satisfaction of one may come at the expense of declining performance on another. Divergent goals may not only introduce coordination problems and inhibit the search for information in attention allocation (Beyer, 1981; Mitroff & Emshoff, 1979), but also create latent or overt conflict within the organization (Cosier & Rose, 1977; March & Simon, 1958; Pondy, 1967).

Thompson (1967) further suggests that organizations manage each of the three types of interdependence with different coordination methods. Similarly, goal interdependencies have several implications for attention allocation to multiple goals. First, the interdependency of goals may directly impact the complexity of decision making and affect the information processing capacity of the firm (Simon, 1955). Consequently, the effectiveness of organizational search and the attention allocation process is diminished. Second, goal interdependencies may result in or reflect the integration across subunits (Lawrence & Lorsch, 1967) and smooth the coordination of activities within the firm (Child, 1974; Galbraith, 1973) which may aid innovation efforts. Moreover, goal interdependencies may reflect normative environments and the degree to which cooperation exists and ideas are shared. Shared goals typically increase knowledge sharing within the firm (Birkinshaw, 1997; Tsai & Ghoshal, 1998), though pressure for joint decision-making may also supply one of the necessary conditions for internal comparison and conflict (March & Simon, 1958: 124). Thus, the effectiveness of search or attention allocation processes may be conceived as an outcome determined by the ease of coordination driven by goal congruence and the consequences of conflict driven by goal divergence. A complete theory of attention allocation among goals must include the impact of goal interdependence or correlation structures.

Based on the discussion above, I therefore propose

Exploratory proposition 2: Goals within organizations have complex correlation structures, and these matter to decision making in attention allocation.

3.3 Context Dependence of Attention Allocation

Researchers have generally assumed that problemistic search changes as a continuous function of the performance level (Bromiley, 1991; Lant *et al*., 1992) and that the strength of the reaction varies depending on whether performance is above or below the aspiration level (Greve, 1998). Consistent with literature (Lant, 1992; Lewin *et al.*, 1944), *attainment discrepancy* is defined as the difference between performance and the aspiration level. Decision makers are more willing to take risk when the attainment discrepancy is negative than when it is positive (Cyert & March, 1963; Kahneman & Tversky, 1979). Organizations respond to low performance (negative attainment discrepancy) by making a broad range of strategic and operational changes, including acquiring resources, and increasing R&D and innovation efforts (Audia & Greve, 2006; Audia, Locke, & Smith, 2000b; Greve, 1998, 2003a; Lant *et al.*, 1992). Similarly, higher growth in any performance dimension can be a result of risk taking due to low performance in that dimension. This is because problemistic search may lead to discovery of actions that increase growth, and these actions may increase risk since change is always risky. The effect of any goal variable with positive attainment discrepancy should be considered separately. Managers in a gain situation will be motivated to lock in the high performance of goal variables and less willing to take risk (Kahaneman & Tversky, 1979). Thus, the goal is less likely to be active in firms with the performance of that goal variable above the aspiration level, so the relation between a goal variable and its growth becomes weaker.

However, the attention allocated to goal variables needs not depend completely on their attainment discrepancies. Different correlation structures among goals may lead to heterogeneous interaction structures of attention allocation. Consistent with Greve (2008), I consider three possible models of attention allocation corresponding to three types of goal correlations. The first is a parsimonious model in which each goal has a separate and independent effect on each other, and thus managerial actions. The second is a modified sequential attention model in which goals are conflicting with each other and cannot be pursued at the same time, and therefore, high performance on one goal shifts discretionary attention to the next, making organizations pursue one primary goal at a time. The third is an activation model in which goals are positively coupled with each other and low performance on one goal reinforces the effect of low performance on another, allowing organizations to pursue one goal more vigorously when another is not met. The growth of one goal variable results from a mixed effect of its own attainment discrepancy interacting with the attention allocation pattern which in turn is determined by the focal goal variable's interdependencies with other goal variables. Therefore, I would expect the effects of goal variables' attainment discrepancies on their growth not to be homogeneous. This also implies that the correlation structure of goals could be some form of context dependence of attention allocation (Ocasio, 1997).

Moreover, Ansoff (1984) identifies multiple goals across various categories: society, community, shareholder, lender, customers, managers, and employees. He argues that goals have a priority in a hierarchy, and there is the potential for a specific goal to interact with, or moderate the influence of, another (Shinkle, 2012). Scholars have suggested that the order in which goals are attended (the priority of goals) is not uniform across organizations but depends on the preferences of the "dominant coalition" of each organization (Cyert & March, 1963). Managers may allocate their attention following various rules (March & Shapira, 1992; Ocasio, 1997). Therefore, the firm level in addition to the subunit level could be another form of context dependence of attention allocation (Ocasio, 1997).

These arguments lead to the third proposition

Exploratory proposition 3: Attention allocation among goals is context dependent.

CHAPTER 4

METHODS

4.1 Sample and Data Collection

I explore the propositions for attention allocation developed in the previous chapter in the automobile industry with a sample of light vehicle models that were active in the U.S. market between 1980 and 2009, inclusive. The analysis is limited to the U.S. market, because it is the biggest automobile market in the world and high-quality data are available. I also limit my analysis to the mass and luxury light-vehicle market by ruling out the very narrow niches of extremely luxurious performance/sporty car automobiles (e.g., those made by Ferrari, Lamborghini, Maserati, Maybach, and Bogadi). I choose to focus on the automotive industry for three reasons. First, the automobile industry is a competitive market in which high product performance on multiple dimensions is required by consumers and by the USA federal government. Automotive firms make substantial investment in engineering to develop complex products, so there is a substantial need for effective search and attention allocation processes. Second, if search and goal setting is influenced by competition, it should be possible to observe this process in the automotive industry. Conversations with engineers in this industry suggest that auto makers regularly scan public sources of information and use reverse-engineering to identify ideas for new product development. Third, automobiles have multiple important product performance indicators, such as fuel efficiency, reliability, and safety, which are considered to be interdependent with each other. Also, government mandates various requirements that represent external shocks and translate into goals for fuel efficiency and safety. Hence, the automotive industry provides a good opportunity to thoroughly examine how organizations allocate attention across multiple product goals over time.

To form the sample of auto models for this study, I identified a list of candidates through an extensive search of automotive magazines and databases, which I then verified through discussions with industry experts. Only those light vehicle models and non extreme performance cars were included. The product lines producing heavy duty trucks or other-purpose products were excluded from the sample. Specifically, in 1980, there were 89 models produced by 25 automakers. Overtime, the number of models increased. In 2009, there were 239 models produced by 38 automakers. The data consist of 5038 model-year observations in total, with an average of seven year observation periods for each model. The panel of the data is unbalanced. Over the observation period, the number of models and automakers varies, with some new models or automakers entering the market and some old ones extinct. For those models that only exist for a few years, there is not much room for managers to adjust their distribution of attention among safety, fuel efficiency, and reliability. Therefore, to reduce the noise of those models, I only included in the analysis the models that last for more than ten years. Conversations with industry experts confirm that models lasting for more than ten years have passed the introduction stage and become established. Ten years allow for at least one or two major redesigns in addition to varying levels of redesigning for every model year. This also somewhat mitigates problems caused by the substantial number of missing data in multiple variables. The final data analyzed in this study include 152 auto models with an average of about 20 observation points for each model.

Noteworthily, each automobile company can have multiple nameplates, and each nameplate can have multiple automobile models. For instance, Toyota Motor Corp has three different nameplates: Toyota, Lexus, and Scion. Under Toyota nameplate, there are different auto models including Accord, Civic, and Odyssey. The data of goal variable measures were collected and analyzed at the auto model level.

I used three primary sources of data. The data for performance measures, car category, price, and other rating information were manually collected primarily from *Consumer Reports* (CR). As the most important, independent, and reliable source of auto information, this magazine provides scientific test results and ratings of hundreds of car products every year through frequent car road tests and wide customer surveys. The vehicle models assigned with low ratings by CR may suffer from decreasing demand or even be terminated by the auto makers. For example, Acura SLX was rated as "not acceptable" in 1997 and it was discontinued by Acura in 2000. I also validated and supplemented these data with the data from the Insurance Institute for Highway Safety (IIHS), the National Highway Traffic Safety Administration (NHTSA), and the US Environmental Protection Agency (EPA). The sales data and market share data were manually collected from *Automotive News*, a weekly automotive industry magazine. For in-depth coverage of automotive industry with special features, industry dynamics, and technology breakthroughs, I referred to automobile magazines including *Motor Trend*, *Car and Driver*, and *Wards Auto Year Book*. I retrieved data on firm level financial and operational data from the COMPUSTAT dataset of Global Annual and North America Annual.

Finally, I supplemented the primary archival data with interviews with industry participants and observers, including executives, engineers, and industry experts from different auto companies. These interview data further grounded my thinking about the industry. In particular, they strengthened my understanding of the causal mechanisms underlying attention allocation pattern(s) and helped me choose more accurate measures. They also helped in interpreting the results.

4.2 Variables and Measurement

Automakers have goals on safety, fuel efficiency and reliability, and measure performance relative to those goals. *Reliability*, also referred to as durability, is widely considered as one of the most important car performance measures. It is calculated based on frequency of repair records including body exterior, interior, engine mechanical, engine electrical, and so forth. Though different consumers have diverging perspective when buying a new or used car, no purchaser wants a vehicle that breaks down often and requires serious repairs throughout its life. Thus, car reliability is a key performance dimension. The "predicted reliability" measure from CR is used as the indicator of car reliability. It is based on auto engineers' expert knowledge of new models and CR's unique Frequency-of-Repair data for past models. Any predictions on new models are based on a model's history because new models are mechanically similar or identical to earlier models. Reliability shows the average problem rate from all models in the survey year by year[5]. By comparing with the similar models in the market, each auto model is rated from 1 to 5 with approximately equal intervals and 5 as the best rating. Specifically, a problem rate not far from the average (7-9.2%)[6] gets the average rating of 3, to earn a rating of 2 or 4, a model's problem rate differs

[5]CR surveys hundreds of thousands of its subscribers or readers to collect the data of the problem rate of each auto model each year.

by 2.5 percentage points. To earn a rating of 1 or 5, a model's problem rate differs by at least 5 percentage points.

Safety is another extremely important car performance indicator and must meet requirements externally imposed by government. For instance, NHTSA and IIHS scientifically test new vehicle models and publish the crash test results each year. The safety rating from CR is collected as the indicator of car safety. CR has developed a Safety Assessment System, in which each model is assigned with an overall safety score from 0 to 100. The overall safety score is equally divided into 5 ranges: the lowest rating of 1 is assigned to a model with an overall score between 1 and 20, the highest rating of 5 is assigned to a model with an overall score between 80 and 100, and models with a score between 21-40, 41-60, or 61-80 are assigned with a rating of 2, 3 or 4, respectively. Specifically, the overall safety score equally combines the accident-avoidance and crash-protection ratings. Accident avoidance reflects CR's test results for braking performance, emergency handling, acceleration, driving position, visibility, and seat comfort. Crash protection is based on the most current crash tests (IIHS offset-crash results and either frontal- or side-crash results from NHTSA), which are weighted according to experts' judgment of their importance and the percentage of the time a particular seat is likely to be occupied.

The third performance measure is *fuel efficiency*, which is important to consumers and the goal is also imposed by government. EPA measures the fuel efficiency of auto models before they are released to the market. I coded the fuel efficiency for each model from 1 to 5 using the rating from CR and EPA. The overall mileage per gallon (MPG) of

[6]The conversation with the director of the auto test center in Consumer Union suggests that the average problem rates of auto models from 1980 to 2009 are very stable, with some value between 7% and 9.2%.

each model was used, with MPG below 15 as 1, MPG between 16 and 20 as 2, MPG between 21 and 25 as 3, MPG between 26 and 30 as 4, and MPG above 30 as 5. The test equipment and test procedure were not changed significantly until 2010 when the electric car was introduced. For instance, Nissan Leaf, an electrical car going on sale in Dec 2010, is estimated in kilowatts per hour, but its economy is displayed as 99 MPG by EPA, even though the car uses no "gallons" and, indeed, no fuel in the traditional sense.

Conversation with experts at Consumer Union further confirmed that the ratings are reported as linear data after transforming from raw data for the ease of understanding. It also suggested that the intervals between different ratings are approximately equal, and the difference between them is interpretable. Moreover, the rating systems of three goal variables have been very consistent during the observation periods. This supports the validity of fitting continuous statistical models to the data[7].

Prior research has suggested that organizational decision makers construct aspiration levels from organizational reference groups using multiple criteria (Fiegenbaum & Thomas, 1995; Porac & Thomas, 1990; Reger & Huff, 1993) and that market participation is particularly important for choosing reference groups (Clark & Montgomery, 1999). Despite these findings, studies on social aspiration levels have typically used the mean or median performance, which implies that all organizations in the reference group are equally influential on a focal organization (e.g. Audia, Locke, & Smith, 2000b; Fiegenbaum &

[7]Traditionally, transforming continuous raw data to ordinal categorical data will lose some information of raw data and thus the power of analyses. Specifically, the cost in the degradation of measurement due to dichotomization is a loss of one-fifth to two-thirds of the variance that maybe accounted for on the original variables (Cohen, 1983). The problems also include that the intervals of ratings may not be equal and the difference among them is not interpretable. Consequently, fitting continuous statistic models to the rating data might be biased to some degree. Under the empirical setting of this dissertation, as the rating data of three goal variables from CR are the best extant data, and more importantly, those data could be considered as interval data, hence, with large samples, I would expect the estimates from the models using these interval data are approximately consistent with those from the analysis using the raw data.

Thomas, 1988; Greve, 1998). A few exceptions (e.g. Baum *et al.*, 2005; Greve, 2008) show that aspiration levels weighting firms by similarity gave stronger findings than those using the unweighted mean. Moreover, in the empirical setting of the automotive industry, automakers form different reference groups for each niche market/category such as small cars or SUVs. Consequently, it is unreasonable to compare a small car's safety with that of an SUV or a truck, or set a truck's fuel efficiency goal based on the small car's fuel efficiency performance. Therefore, I categorized the auto models into 15 niche markets[8] based on the information from car purchase guidance providers including *Consumer Reports*, *Edmunds*, *JD Power*, and etc. *Social aspiration level* of each goal variable for a model in a specific year is calculated as that goal variable's average performance of all auto models in the same category as the focal model. *Attainment discrepancy* is calculated as the difference between each goal variable's performance and the corresponding social aspiration level. *Change of performance / performance growth* is calculated as the first difference of the ratings for each performance dimension.

I also controlled model *size*, calculated as the logarithm of revenues of models, and model *age*, calculated as the logarithm of age. Table 3 summarizes all variables and their measures used in the dissertation.

4.3 Statistical Method

Proposition 1 states that attention allocation is not a question of all or nothing and attention includes both discretionary and nondiscretionary components. Proposition 2 states that goals within organizations have complex correlation structures. To explore those two propositions, I need to examine the relationships among fuel efficiency, safety, and reliability

[8]Niche markets refer to as small cars, compact cars, family sedans, large cars, sporty cars, upscale sedans, upscale sporty cars, luxury sedans, luxury sporty cars, SUVs, luxury SUVs, hybrid cars, wagons, minivans, and pickups.

over time. Estimating the relationship among the three goals across time is difficult because the three are determined endogenously. The literature (e.g. Holtz-Eakin, Newey, & Rosen, 1988) suggests that the interplay of three performance dimensions as a dynamic coevolving system of interdependent variables is best described in the context of a Vector Autoregression (VAR) model. Because data are collected on numerous auto models at a yearly frequency, I am able to employ a Panel Vector Autoregression (PVAR) model. The PVAR combines the traditional VAR approach which captures co-evolution and interdependencies between multiple time series and treats all the variables in the system as endogenous, with the panel data approach which corrects for unobserved individual heterogeneity. Because of the complicated dynamics in the VAR, impulse responses are often more informative in understanding the evolution of interdependent variables over time than the raw estimated VAR regression coefficient, and they are reported as a standard practice in the VAR analysis (Stock & Watson, 2001). Simulation of each of the three estimated equations from the VAR analysis is usually used to examine the temporal response of each variable to the shock of each other variable. These simulations are called impulse response functions (IRFs) and can yield important insights. Specifically, IRFs show the response of one variable of interest (e.g. safety) to a shock in another variable of interest (e.g. fuel efficiency), while holding other shocks constant. Plotting IRFs graphs is a practical way to visually represent the behavior of the variable series in response to the various shocks (Enders, 2010). A discussion of the standard VAR model is presented in Appendix A.

The PVAR methodology has several econometric advantages. It does not impose any *a priori* causal structure on the relationship between the variables in the model. Instead, all current period measures of fuel efficiency, safety, and reliability are allowed to be a function of the past values of each other. This enables us to estimate, for example, the total reduced-form effect that a past increase in fuel efficiency had on each of the other dependent variables and how those changes move over time. I specify a first-order three-variable VAR model as follows:

$$\boldsymbol{X}_{it} = \boldsymbol{A}_0 + \boldsymbol{A}_1\boldsymbol{X}_{it\text{-}1} + \boldsymbol{f}_i + \boldsymbol{e}_t \qquad (1)$$

where $\boldsymbol{X}_{it}$ is the three-variable vector: {*z*_safety, *z*_efficiency, *z*_reliability}; *z*_safety is the standard score of safety, *z*_efficiency is the standard score of efficiency, and *z*_reliability is the standard score of reliability.

In applying the VAR procedure to panel data, we need to impose the restriction that the underlying structure is the same for each cross-sectional unit. One way to overcome the restriction on parameters is to allow for "individual heterogeneity" in the levels of variables by introducing fixed effects of the model, denoted by $\boldsymbol{f}_i$ in the model. Since the fixed effects are correlated with the regressors due to lags of dependent variables, the mean-differencing procedure commonly used to eliminate fixed effects will create biased coefficients[9]. I use forward mean-differencing, also referred to as the Helmert procedure (Arellano & Bover, 1995; Eakin, Newey, & Rosen, 1988), to avoid this problem. This procedure removes only the forward mean, i.e., the mean of all the future observations available for each model year. This transformation preserves the orthogonality between transformed variables and lagged regressors, I use lagged regressors as instruments and estimate the coefficients by system generalized method of moments (GMM).

[9]The inclusion of lagged dependent variables can be a source of bias for fixed-effect estimation of dynamic panel-data models. The intuition is that the fixed effect would be "double-counted" in some sense if the dependent variable is included in the regression equation at time *t* and also at previous times due to the lag structure. This problem is known as "Nickell-bias" afeter Nickell (1981). Nickell-bias is often observed to be rather small, however, and so its importance is a matter of debate.

I focus my analysis on the IRFs, which describe the reaction of one variable in the systems to the innovations in another variable in the system, while holding all other shocks at zero. However, since the actual variance/covariance matrix of errors is not sufficient to identify the primitive system, and unlikely to be diagonal, additional restriction on the three-variable VAR system must be imposed in order to identify the impulse response. The usual convention is to adopt a particular ordering using the Choleski decomposition such that *z*_safety does not have a contemporaneous effect on *z*_reliability[10]. The identifying assumption is that the variables that come earlier in the ordering affect the following variables contemporaneously, as well as with lags, while the variables that come later only affect the previous variables with lags. In other words, the decomposition forces a potentially important asymmetry on the system, and the variables that appear earlier in the system are more exogenous and the ones that appear later are more endogenous. Since, in this study, there is no theoretical reason to suppose that one variable has no contemporaneous effect on the other, the usual practical procedure is to obtain the impulse response function using a particular ordering. Compare the results to the impulse function obtained by reversing the ordering[11]. If the implications are quite different, additional investigation into the relationship between the variables is necessary (Enders, 2010: 311). To analyze the IRFs I need some estimate of their confidence intervals. Following Love and Zicchino (2006), I report standard errors of the IRFs by using Monte Carlos simulation to generate the confidence intervals.

[10]Choleski decomposition of variance/covariance matrix of residuals procedure is equivalent to transforming the system in a “recursive” VAR for identification purposes. See Appendix A for the derivations and further discussion of impulse-response functions.

[11]The main results from PVAR model reported in this study are based on the model with the ordering of safety, efficiency, and reliability. Robustness check shows that models with different orderings give consistent results.

The dataset needs to meet two major requirements for the PVAR methodology: comparability and stationarity. In order to make the three performance dimensions comparable with each other, the original goal variables were time-demeaned. In other words, each model-year observation for three indicators was standardized using that year's mean and standard deviation, respectively. Moreover, each of three variables was also found to be stationary using a Fisher-type unit root test for panel data[12] (further results in Appendix B). To ensure the consistency of the reduced-form VAR coefficient estimates, the appropriate lag structure needs to be determined. I selected the lag length that minimizes goodness-of-fit statistics, specially the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). I settled on a lag length of one (further results refer to Appendix C).

Proposition 1, stating that attention allocation is not a question of strictly all or nothing, was explored by the significance level of the estimated coefficients. If sequential attention is a strict sequence one goal has to be addressed prior to other goals. Hence, the coefficients between one goal's performance and other goals' past performance will not be significantly different from zero. The reason is that if organizations allocate all of their attention to one goal at a time, the focal goal variable's performance will be positive, while other goal variables' performance will drop to zero statistically[13] if goals are independent. Proposition 2, stating that goals have complex correlation structures, is explored by a combination of estimated coefficients and IRF graphs. The estimated coefficients show the correlation coefficients of goals, and the IRF graphs visibly show the interdependencies of

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[12]Fisher-type test for unit root does not require strongly balanced data, and the individual series can have gaps (Maddala & Wu, 1999).

[13]An intuitive example would be that, assume an organization has a constant amount of 100 engineering man-hours. The strict sequential attention rule will make the organization allocate all 100 engineering man-hours to one goal, saying, safety. Then there will be no output of other goals, saying, reliability and fuel efficiency.

goals and how one goal variable's increase will affect other goals' performance in the following period(s).

To explore Proposition 3 I would like to estimate the growth of each goal variable as a function of all goals' past growth and their attainment discrepancies, with auto model fixed effects and size and age effects controlled. This will allow me to observe auto model fixed effects and the effect of different goal correlation structures on attention allocation with endogeneity of goals controlled. However, current statistical technology does not support running VAR model in panel data with control /exogenous variables included. Although the VAR test for each auto model (time series data) is allowed to include control variables, there is a problem with the length of the time periods. There are only a few auto models with enough observations. The VAR test results from those auto models demonstrate the difference at the auto model level. Hence, I resort to the next best method as a first order approximation, where I could pool data together and run separate regressions of each goal variable's growth on their own attainment discrepancy, the interaction of attainment discrepancy with a second goal variable's status (below/above the aspiration level), and the auto model fixed effects. This is consistent with the method in Greve's (2008) study, where he develops the method of interacting each of two goal variables with a dummy variable indicating whether the second goal variable has been satisfied specifically to test the sequential attention hypothesis. The innovation in this paper is to explore potentially different attention allocation patterns for goals with different correlation structures[14] and possible heterogeneous model level fixed effects. While this method does not solve all the

[14]I only focus on interaction of attention allocation of any two of the three goals in this study, as the dissertation aims to explore whether attention allocation contextually depends on goal correlation structures and individual auto models. The interaction effects of three goals will be more interesting and also much more complicated. However, as it is beyond the main focus of the dissertation, it is not included in the analysis of the current study. Future study could examine the interaction of three goal variables.

problems, it appears to be the most feasible solution given the current state of the art. The aim of this set of tests is to explore how much variation in attention allocation occurs in the auto model level and how much is determined and responded by different goals.

To be consistent with previous studies (e.g. Chen & Miller, 2007), I incorporate a spline for underperforming firms, $I_{1,j,t-1}$, which equals to 1 if model i's past performance of goal variable j falls below the aspiration level in period $t-1$. Therefore, $(1- I_{1,j,t-1})$ indicates outperforming models whose past performance meets or exceeds the reference point. I estimate the following model

$$
\begin{aligned}
y_{i,j,t} = a_{0j} + \alpha_{1j} I_{1,j,t-1} (P_{i,j,t-1} - A_{i,j,t-1}) + \alpha_{2j}(1 - I_{1,j,t-1})(P_{i,j,t-1} - A_{i,j,t-1}) + \\
\alpha_{3j} I_{2,j,t-1} + \alpha_{4j} I_{1,j,t-1} (P_{i,j,t-1} - A_{i,j,t-1}) \times I_{2,j,t-1} + \alpha_{5j}(1 - I_{1,j,t-1})(P_{i,j,t-1} - A_{i,j,t-1}) \times I_{2,j,t-1} + \\
\alpha_{6j} I_{3,j,t-1} + \alpha_{7j} I_{1,j,t-1} (P_{i,j,t-1} - A_{i,j,t-1}) \times I_{3,j,t-1} + \alpha_{8j}(1 - I_{1,j,t-1})(P_{i,j,t-1} - A_{i,j,t-1}) \times I_{3,j,t-1} + \\
a_{9j} c_i + a_{10j} m_i + a_{11j} yr_i + \varepsilon_{i,j,t} \qquad (2)
\end{aligned}
$$

where $y_{i,j,t}$ designates model i's growth/change of goal variable j in period t. The growth is measured as the first difference of goal variable performance. $P_{i,j,t-1}$ is the measure of individual model i's performance of goal variable j in period t-1. $A_{i,j,t-1}$ is the measure of model i's aspiration level of goal variable j in period t-1. $I_{2,j,t-1}$ and $I_{3,j,t-1}$ are dummy variables indicating whether a second or a third goal's performance is below the aspiration level in period t-1. The model includes dummy variables for auto models (m_i) and years (yr_i), and control variables (c_i) including model size and age. The use of lagged independent variables reflects the temporal ordering in the causal arguments. $\varepsilon_{i,j,t}$ is the error term.

Proposition 3, stating that attention allocation is context dependent, is explored in two ways. First, I investigate whether there is a systematic attention shifting rule across multiple OLS regression models with three pairs of goals (causality can flow one or two ways).

Specifically, the level of significance and the signs of the main effect and interaction variables are compared (more details refer to the next section). Second, I compare the values of partial eta-squares of the regression models with and without the auto model fixed effects to examine whether the fit of the regression model has been improved significantly. Note that, the concept "attention" in this project falls into the category of attentional selection in Ocasio's (2011) framework. Consistent with Greve (2008), attention is inferred from shifts in aspiration levels among goals.

CHAPTER 5

RESULTS

5.1 Descriptive Statistics

Table 4 displays the descriptive statistics including means and standard deviations for all variables and their correlations. The industry average of fuel economy becomes lower in later 1990s when more automakers started to introduce compact pickups and SUVs. It is not surprising that means of the three Z scores (standard scores) and attainment discrepancies are zero. The correlation table yields no surprises, with the highest correlations being seen in predictable places. Each goal variable is highly positively related to their own Z score and attainment discrepancy. Efficiency is positively related to reliability. Safety is positively associated with model size and age. Both efficiency and reliability are negatively related to model size and age.

To graphically show the interplay among the three performance dimensions (fuel economy, safety, and reliability), for each of them, I first calculate the industry average using the performance of all auto models for a specific year, and then transform each industry-year observation into that year's percent deviation (positive/negative) from the industry mean over the time periods being estimated. Figure 1 charts on one graph the average deviations of fuel economy, safety, and reliability over time. It is difficult to see any consistent correlation among fuel economy, safety, and reliability. There was a striking rise in fuel economy in 1981 that occurred at the same time as a drop in safety. This mainly resulted from the

Corporate Average Fuel Economy (CAFE) regulation and the increased price of oil in the late 1970s. There was another strike rise in fuel economy in 1989 that occurred at the same time as a drop in reliability. Fuel economy and safety are mainly distributed as consistently below and above the zero line (industry mean over time) after 1996 respectively. The relationship between safety and reliability is not clear from the figure. There is a spike in reliability in 1982 that is associated with a drop in safety in 1981. Similarly, there is a drop in reliability in 2003 followed by a spike in safety in 2004. The relationship between fuel economy and reliability is also not clear from Figure 1.

5.2 Panel Vector Autoregression Analysis

Table 5 shows the estimates from the PVAR model[15]. The model with lag one length entails the estimation of as many as nine coefficients. As is common in VAR analysis, I forgo a discussion of the specific coefficients in this section.

A first observation is that all series exhibit positive autocorrelation – this is shown along the diagonal of the coefficient matrix for lag one. This is as expected. The positive autocorrelation means the current allocation of attention continues strongly for at least a period, and the shift of attention does not occur quickly if it occurs. The results also show some significant correlation among goals as shown by the off diagonal coefficients (e.g., safety is negatively related to efficiency at the previous period (-.34), and reliability is positively related to efficiency at the previous period (.16)). These results support Proposition 1 stating that attention allocation is not a question of all or nothing, where a goal draws either all or no attention. Organizations attend to multiple goals with nondiscretionary or a minimum level of attention at any time and they shift their allocation of discretionary

[15]The impulse response results are estimated using STATA code written by Inessa Love from the World Bank. For these estimates, the data were demeaned by year, eliminating the time specific shocks. The demeaning by time did not reintroduce model-level fixed effects.

attention to goals across time. In other words, attention allocation is not a strict sequence in which one goal has to be addressed prior to other goals, but instead it takes the form of shifting the distribution of attention, especially discretionary attention, across multiple goals.

The dynamic relationships estimated in this PVAR are best illustrated by graphing IRFs as discussed in Chapter 4. Figure 2 charts the response to a unit increase (one-year, one-standard-deviation positive shock, hereafter referred to simply as a shock) in period zero over the following six-year period. The units on the vertical axis show the dependent variable's response (unit change) in each year. The middle line is the point estimates of the response, and the top and the bottom lines show the 90 percent confidence interval around that estimate, created using bootstrap standard errors with five hundred repetitions. The responses in IRFs show how a variable is affected in a given year.

Generally speaking, a goal variable's responses to shocks in other goal variables are very different in magnitude and shape. The responses of variables to shocks, not unexpectedly, decline and return to the zero line over several periods. However, the details of the path back to equilibrium vary. The responses of variables to their own shocks decline faster than the responses of variables to the shocks of other variables. As shown along the diagonal of Figure 2 (row 1 column 1; row 2 column 2; row 3 column 3), the responses of variables to their own shocks are consistently positive as expected. As seen in row 1 columns 2 and 3, the responses of safety to efficiency and reliability shocks are negative as suggested by the corresponding coefficients in the PVAR[16]. As seen in row 2 column 3, the response of efficiency to the reliability shock is also negative. As seen in row 3 column 2, the response of reliability to the efficiency shock has some time lag, but turns positive after two periods. This

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[16]The response of safety to reliability shock is significantly negative in the subsequent three periods, and then decays to zero.

delay raises interesting issue regarding organizational response times. As seen in row 2 column 1, and row 3 column 1, the responses of efficiency and reliability to the safety shock are not significantly different from zero in any period. These results show that the responses of one goal variable to their own or other goal variables' shock vary in direction (sign), magnitude (significance), and response time. Also for any pair of goals, the response of one goal to another goal's shock can be unidirectional. For instance, the response of safety to the efficiency shock is negative, while efficiency does not significantly respond to the safety shock. This also suggests that the response of goals imply directional causality not just association between goals.

In summary, the combination of correlation estimates from Table 5 and heterogeneous responses of goal variables to the shocks in Figure 2 clearly suggest that goals have complex correlation and causality structures, as stated in Proposition 2. Goals within organizations have different levels of interdependency. They may be congruent, divergent or independent. This calls into question the practice of analyzing goals separately.

5.3 Ordinary Least Squares Analysis

I regress the growth of different goal variables on their corresponding attainment discrepancies, the second goal's dummy variable indicating whether its performance is below the aspiration level, their interaction terms[17], and control variables including auto model size, age, and year effects. Table 6 reports the results of the above models. To show the variance explained by auto model fixed effects, Table 7 reports the results based on the three full models including auto model dummy variables. Including model dummy variables into the original models significantly improves the Adjusted R-square of the OLS regressions. The

[17]Interaction variables are evaluated by an F-test of their joint significance for each model. For the space concern, I only report the regression results from full models. More results are available upon request.

three full models as reported in Table 7 have a significantly better fit with the data than the models described in Table 6. The results from the Likelihood-ratio test of the three pairs of models are as follows: LR chi^2 (137) = 170.63 (Prob > chi^2 = 0.0271), LR chi^2 (132) = 170.37 (Prob > chi^2 = 0.0137), LR chi^2 (138) = 376.88 (Prob > chi^2 = 0.0000). Therefore, I interpret the results based on the full models as reported in Table 7.

There are some general results such as one goal variable's performance is negatively related to its growth no matter if the goal variable is above or below the aspiration level (refer to the estimated coefficients from row 3 to row 8). This is consistent with the argument that problemistic search changes as a continuous function of the performance level (Bromiley, 1991; Lant *et al*., 1992). The strength of the reaction varies depending on whether performance is above or below the aspiration level (Greve, 1998; Kahaneman & Tversky, 1979). The goal is less likely to be active in firms with the performance of that goal variable above the aspiration level, so the relation between a goal variable and its growth becomes weaker.

Specifically, Model 1 explores the efficiency growth as a function of the efficiency attainment discrepancy and its interaction with safety and reliability indicators (with one as the indicator of their performance below the aspiration level). If safety/reliability draws attention away from the efficiency goal when they are below the aspiration levels, then the interaction variables will have opposite signs to the main effect of the attainment discrepancy of efficiency, and will thus weaken the main effects. This will suggest the modified non-strict sequential attention rule stating that organizations attribute less discretionary attention to efficiency when the safety/reliability goal is not satisfied. If safety/reliability draws attention toward the efficiency goal when they are below the aspiration levels, then the interaction variables will have the same signs as the main effects of the attainment discrepancy of efficiency and thus will strengthen the main effects. This will suggest the goal activation rule in which efficiency and safety/reliability are causally linked in goal hierarchies/priority in such a way that fulfillment of efficiency helps organizations fulfill safety/reliability (March & Simon, 1958). The results from Model 1show that safety draws attention toward the efficiency goal when both safety and efficiency goals are not met (coefficients of rows 3 and 12 have the same signs), while safety draws attention away from efficiency when the efficiency goal is met but the safety goal is not met (coefficients of rows 4 and 13 have opposite signs). Therefore, the activation model is used when both the efficiency and the safety goals are not satisfied, and the modified sequential attention model is used when the efficiency goal is met, but the safety goal is not met. This suggests that there could be heterogeneous attention allocation patterns for the same pair of goals when they have different attainment discrepancies. The results from Model 1 also show that there is no interaction between the efficiency and reliability goals as the interaction effects (coefficients of rows 14 and 15) are not significant.

Model 2 explores the safety growth as a function of the safety attainment discrepancy and its interaction with efficiency and reliability indicators (with one indicating their performance below the aspiration level). The results show that efficiency draws attention away from safety when both the safety and efficiency goals are not met (coefficients of rows 5 and 16 have opposite signs). This is consistent with the results from Model 1 that when the efficiency growth is considered as the dependent variable, the activation rule is adopted as efficiency draws attention away from safety when both the safety and efficiency goals are not met. This implicitly indicates the higher priority of efficiency than that of safety. I also find there is no interaction between the two goals when the safety goal is met but the efficiency goal is not met (coefficient of row 17 is not significant). The results from Model 2 also show that there is no interaction between safety and reliability as the interaction effects (coefficients of rows 18 and 19) are not significant. Similarly, Model 3 explores the reliability growth as a function of the reliability attainment discrepancy and its interactions with efficiency and safety. The results from Model 3 show that efficiency draws attention away from reliability when the reliability goal is met but the efficiency goal is not (coefficients of row 8 and 21 have opposite signs), while there is no interaction between two goals when both goals are not met (coefficients of row 22 is not significant). The results from Model 3 also show that there is no interaction between reliability and safety as the interaction effects (coefficients of rows 22 and 23) are not significant. Overall, the interaction between the reliability goal and the other two goals is not as intense as that between safety and efficiency. These results are hardly observed from the correlations as shown in Table 4.

Table 8 summarizes the heterogeneous attention allocation patterns for three pairs of goals (causality can flow one or two ways). Overall, the results suggest that there are different patterns of attention allocation among multiple goals with varying degrees of interdependencies. Attention allocated to a goal variable depends on its own attainment discrepancy interacting with the attention allocation pattern which in turn is determined by the focal goal variable's interdependencies with other goal variables. Therefore, the overall effects of goal variables' attainment discrepancies on their growth are heterogeneous. This is important and very different from current approach.

Moreover, the significant improvement of fit of the full models suggests the huge effect of individual automobile models on attention allocation. Table 9 reports the descriptive statistics from the model fixed effect coefficients from OLS regressions. Noteworthy is that the magnitude, sign, and significance level of fixed effect coefficients completely depend on the choice of the base model, the auto model dropped in the regression analysis. Changing the base model will shift all fixed effect coefficients toward the same direction with the same magnitude. The results in Table 9 are based on the fact that the auto model with the medium effect was dropped in each regression model[18]. Therefore, the fixed effect coefficients in this table should be interpreted as the difference from the base model in each regression model.

Figure 3 further plots the frequency distribution of fixed effect coefficients from regressions. Roughly speaking, individual auto models show strong heterogeneity in allocating discretionary attention to the same set of goals. This is different from the assumption of homogeneity that is inevitably made in current literature. I also observe that auto model fixed effects in Models 3 are more dispersed with a larger standard deviation of coefficients compared with Models 1and 2. This suggests that auto models have stronger fixed effects on the growth of reliability.

Overall, the combination of the heterogeneity of attention shifting rules among three equations with different goals of varying interdependence, and the heterogeneous auto model fixed effects on attention allocation for the same sets of goals, suggests that attention allocation is context dependent, supporting Proposition 3. The control variable size and age show different levels of significance in different regression models. Age is found to be positively related to the growth of safety. This is reasonable, as auto models lasting longer tend to focus more on safety.

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[18]Specifically, Honda Odyssey in regression model 1, Oldsmobile Bravada in regression model 2, and Hyundai Elantra in regression model 3 were dropped.

5.4 Robustness Analyses

I also performed several changes in specification in order to assess the robustness of the models and results discussed above. As the panel VAR model is sufficient to test the interplay of three goal variables as illustrated in Propositions 1 and 2, this section mainly focuses on the robustness analyses on the test of Proposition 3.

5.4.1 Alternative measures

The *social aspiration* employed in above analyses is based on the average performance of all auto models in the same category (e.g. small cars) as the focal model. Though this measure is much more refined compared to those used in most previous studies, I ran the robust check using an alternative measure of social aspirations. Research has observed upward striving as a possible social reference point. Upward striving is the setting of aspiration levels higher than nominally expected in behavioral theory. For instance, Bromiley (1991) adds an adjustment factor of 1.05 for firms performing above their aspiration level in his study of corporate risk taking. While this adjustment approach is used in only a few studies (e.g. Deephouse & Wiseman, 2000), it is consistent with Cyert and March’s (1963:34) statement: “[I]n the steady state, aspiration level exceeds achievement by a small amount.” However, this elevation varies over time and across industries. To be consistent with Massini, Lewin, and Greve's (2005) argument that innovating firms are more likely to select other innovating firms as their reference group and imitating firms are more likely to select the average firm in the population, I created an alternative measure of the social aspiration, in which high performing players (whose performance is above the category average) select the 75^{th} percentile of the performers within the category as their reference group and low performing players(whose performance is below the category average) select the average performance as their reference point. I then ran the same analysis as in Section 5.3.

Table 10 offers a robustness check using the alternative measure of the social aspiration level. The general prediction that one goal variable's performance is negatively related to its growth is only confirmed in Model 2. Surprisingly, negative attainment discrepancies of fuel efficiency and reliability are found to be positively related to their growth, which implies that the lower the fuel efficiency/reliability, the less likely decision makers will activate that goal. This puzzling results, but might be explained by the fact that three quarters of auto models are underperforming relative to their goals, as low performing players set the average as their goals and high performing players set the 75th percentile performance as their goals. This change causes a significant drop of the sample size due to the substantial number of missing values of dummy variables indicating the positive attainment discrepancy of goal variables and thus their interaction terms.

Specifically, the results from Model 1show that safety draws attention away from the efficiency goal when both the safety and efficiency goals are not met (coefficients of rows 3 and 12 have opposite signs), while there is no interaction between two goals when the efficiency goal is met but the safety goal is not met (coefficient of row 4 is not significant). Therefore, the modified sequential attention model is used when both the efficiency goal and the safety goal are not met. The results from Model 1 also show that there is no interaction between the efficiency and reliability goals as the interaction effects are not significant. The results from Model 2 show that efficiency draws attention away from safety when both the safety and efficiency goals are not met (coefficients of rows 5 and 16 have opposite signs), while there is no interaction between two goals when the safety goal is met but the efficiency goal is not met. The results from Model 2 also show that reliability draws attention away from safety when the safety goal is met but the reliability goal is not met (coefficients of rows 6 and 19 have opposite signs), while there is no interaction between two goals when both goals are not met. The results from Model 3 show that efficiency draws attention away from reliability when both goals are not met (coefficients of row 8 and 21 have opposite signs), while there is no interaction between two goals when the reliability goal is met but the efficiency goal is not. There is no interaction between reliability and safety as the interaction effects are not significant.

Table 11 summarizes the heterogeneous attention allocation patterns for three pairs of goals (causality can flow one or two ways) using the alternative measure of social aspirations. The distribution of attention allocation patterns of three pairs of goals is different from that in Table 8, however, overall, the results confirm Proposition 3 that there are different patterns of attention allocation among multiple goals with varying degrees of interdependencies. Another interesting finding is that organizations only use the sequential attention rule in attention allocation when they generally set high social aspiration levels using the upward striving mechanism.

5.4.2 Control variables

A broad range of indicators are considered for inclusion as control variables. The *industry size* is included as a control for the investment opportunities available to the auto models. It is measured as the sum of all auto models' revenues for a specific year. The company-level *financial performance* is included. It is measured as ROA using the data from COMPUSTAT. The following nameplate-level control variables are included: *nameplate size* is the logarithms of total revenues within each nameplate. *Product line number* is the number of products manufactured within a nameplate such as Lexus in Toyota Motor Corp. *Niche count* is the number of niches in which a nameplate offers products and is calculated by the number of categories. Diversified firms may compete less aggressively in each market niche than firms that are committed to few niches (Chen, 1996). To account for this effect, I enter the *level of diversification* as one minus a Herfindahl index of its distribution of own revenues across the product lines. Similarly, firms may compete less aggressively when they have a high level of contact with others in multiple markets (Gimeno, 1999; Gimeno & Woo, 1996). To control for this effect, I include the average *multimarket contact (MMC)* of the focal nameplate with all its competitors (Baum & Korn, 1996). I formed this measure by taking, for each multimarket competitor (each firm a focal firm competes in at least two markets), the proportion of focal firm markets in which the competitor is also present. This proportion was averaged over all multimarket competitors to generate the average multimarket contact of the focal firm. I also control another model-level variable *model price* as the manufacturer's suggested retail price.

The results based on the models including all above control variables are presented in Table 12. The main results stay robust except that in Model 2 there is no interaction between the safety goal and the efficiency goal. Most control variables are found to not significantly affect the goal variable growth. *Niche count* is positively related to the efficiency growth, suggesting that the more niches a nameplate focuses on, the more likely the efficiency of the model within that nameplate grows. *MMC* negatively relates to the reliability growth, implying that the more multimarket contacts a nameplate has, the less likely it will grow their reliability. This is consistent with the argument that firms with high levels of MMC are less likely to behave aggressively. *Industry size* is negatively related to the growth of both safety and reliability, suggesting that when the market size grows, the auto models tend to focus less on the improvement of safety and reliability.

5.4.3 Alternative statistical method – Hierarchical linear model

Automobile models are nested in automobile nameplates and nameplates are nested in automobile companies. Specifically, the variables in above analyses are at multiple levels. The goal variables are at the auto model level, other variables such as the nameplate size and diversification level are at the nameplate level, and still other variables including financial performance ROA are at the company level. Given this characteristic, a natural concern is how these level issues influence organizational research (e.g. Rousseau, 1985). The literature (e.g. Hofmann & Gavin, 1998) has suggested that the relationships across levels of analysis are best described in the context of hierarchical linear models (HLM). HLMs, also known as "multilevel models", "random coefficient models", or "mixed effects" models, allow researchers to analyze hierarchically nested data with two or more levels. In a HLM, varied covariance structures can be imposed on the residuals based on the nature of the data. If there appear variances in an outcome to be explained by second-level or higher-level variables, as possibly seen from the data with nested structure in this study, HLM has advantages over standard multiple regression and other statistical methods because HLM can analyze multilevel data (Draper, 1995) and incorporate the heteroscedasticity and dependence into the model. For instance, HLM provides a mathematical form that allows researchers to investigate the underlying theory about the functional relationship among the variables in each level (Heck & Thomas, 2000).

A two-level hierarchical linear model can be illustrated as: at level-1, a within group model is estimated separately for each group. In this analysis, an individual level outcome is regressed on the individual level predictor(s). The parameter estimates from the first level (i.e., slopes and incepts) are then used as outcome variables in the level-2 analysis in which they are modeled as a function of group level variables. This basic model can be formulated as follows:

Level-1: $Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + r_{ij}$ (3)

Level-2: $\beta_{oj} = \gamma_{00} + \gamma_{01}G_j + U_{0j}$ (4)

$\beta_{1j} = \gamma_{10} + \gamma_{11}G_j + U_{1j}$ (5)

where Y_{ij} is the individual level outcome variable, X_{ij} is the individual score on a given individual level variable, and G_j is a group level variable with the value for the group assigned down to each group member. β_{0j} and β_{1j} are level-1 intercepts and slopes, respectively, estimated separately for each group (noted by the subscript j); γ_{00} and γ_{10} are the level-2 intercepts terms, and γ_{01} and γ_{11} are the level-2 slopes relating to the intercept and slope terms from the level-1 equation, respectively. r_{ij}, U_0, and U_{1j} are the level-1 and level-2 residuals. Equation 4 represents the main effect of G_j on Y_{ij} and equation 5 represents the interaction of G_j and X_{ij}.

Hierarchical linear models are random coefficient models in the sense that the level-1 parameters are allowed to vary across groups. Furthermore, the variance and covariance of the level-2 residuals, or the variance components, are also estimated (Bryk & Raudenbush, 1992). This approach differs from the traditional OLS approach where all of the regression parameters are fixed and level-2 variance components are not separable from the individual level residual.

Table 13 reports the results from HLM tests. Only in Model 3 hierarchical linear regression provides better fit with the data than the OLS regression (Prob > Chi^2 = .0000).

The results stay robust in HLM tests, except for a slight difference in the significance level (e.g., from .005 to .001 level) for some variables. Table 14 further reports the random-effect parameters of *company*, *nameplates*, and *model*, and the variance partition across levels. Specifically, for safety growth, roughly 3.2% of the variance is attributable to the company level, and 0.3% to the nameplate level. Noteworthily, for reliability growth, a huge amount of variance, 21.9%, is attributable to the company level, 1.2% to the nameplate level, and 1.8% to the model level. This implies that attention to reliability largely depends on the company level decision making. This is also consistent with the results in Table 7 that inclusion of auto model fixed effects into OLS regression of reliability growth improves the Adjusted R-square most significantly.

CHAPTER 6

EXTENSION TEST

The above chapters have suggested the complex nature of attention shifts, issues caused by the correlation structures of multiple goals, and context dependence of attention shifts. The details of these results provide important insights and suggest the necessity of a substantial extension and modification of the theory of attention allocation. In particular it turns out that the rules of switching attention are likely to depend in part on the organizational characteristics. This chapter focuses on some possible extension of the above analyses. Specifically, in this chapter I explore the interplay of three goals at a more disaggregated level. I examine whether attention allocation processes are constrained by organizational characteristics such as size, age, and geography.

Managers allocate their attention following various rules (March & Shapira, 1992; Ocasio, 1997). Two factors are proposed to determine the attention allocation pattern in this chapter. The first is the capability to attend to the goal(s). The second is the willingness to attend to the goal(s). I focus on how three factors – organizational size, age, and geography – affect the ability and the willingness of organizational attention to goals.

6.1 Propositions

6.1.1 Size as a moderator

The behavioral theory of the firm suggests that slack resources are important to resolving the conflicts among divergent goals (Cyert & March, 1963). Empirical studies explicitly refer to firm size as an indicator of a firm's current resource endowment. For example, Mitchell (1994) suggests that "larger businesses tend to have larger pools of financial and managerial resources that help overcome problems that threaten their survival" (Mitchell, 1994: 577). Large firm size also increases the potential to attract additional resources. Large firms have advantages in raising capital, face better tax conditions and government regulations, and are in better position to compete for qualified labor (Brüderl & Schüssler, 1990). Therefore, large resource endowment could meet more competing demands from different goals, and increases firms' capability to attend to more than one goal at a time. Similarly, as automobile companies tend to allocate more resources to the auto models with a large volume of sales to keep it continuously successful, resource slack allows auto models with large size to attend to multiple goals simultaneously. By contrast, small organizations are associated with a small stock of resources, which will intensify the competition and conflicts among multiple goals, and thus they are less capable to attend to multiple goals simultaneously.

Moreover, empirical evidence also shows that small firm size increases the probability of firm failure because a small stock of resources makes firms more vulnerable (Bruderl & Schussler, 1990; Dobrev, 2001; Mitchell, 1994). For example, small firms are more vulnerable to a random shock such as the loss of an important client (Levinthal, 1991). This vulnerability manifests itself as risk of either bankruptcy or of becoming a takeover target. Therefore, small firms are less likely to take risk or change (Audia & Greve, 2006; Greve, 2010). Switching attention from one goal to another may involve a strategic reorientation of the organization in addition to the subunit at the auto model level, thus it is a risky move by the organizations *per se*. Therefore, auto models with a small volume of sales are less willing to switch attention among different goals but more likely to be persistent with their goal(s) than large organizations. I propose that

Proposition 4: Large organizations allocate their attention to multiple goals differently than small ones. The resource slack associated with size allows large organizations to adopt multiple attention allocation rules at the same time. Small organizations are more likely to suffer from the lack of resource slack, therefore, they are more likely to be persistent in their attention allocation to goal(s), and less likely to simultaneously attend to multiple goals or frequently shift attention among goals. In summary, goals in large organizations show a higher level of interaction in terms of competition for attention than in small ones.

6.1.2 Age as a moderator

With increasing age organizations become generally larger and often have greater slack resources (Ranger-Moore, 1997). Slack resources can absorb potential inconsistencies among divergent goals (Cyert & March, 1963; Thompson, 1967) and tolerate the risk of shifting attention among goals. Thus, older organizations are more likely to attend to multiple goals simultaneously and more often to shift their attention among goals. In addition, young auto models may carry entrepreneurial persistence or stubbornness (e.g., Gatewood, Shaver, & Gartner, 1995; Wu, Dagher, & others, 2007). Therefore, they are less likely to shift attention among goals. Hence, I suggest the following proposition:

Proposition 5: Older organizations allocate their attention to multiple goals differently than younger ones. The resource slack associated with age allows older organizations to adopt multiple attention allocation rules at the same time. Younger organizations are more likely to be persistent in their attention allocation to goal(s), and less *likely to frequently shift attention among goals. In summary, goals in older organizations show a higher level of interaction in terms of competition for attention than in younger ones.*

6.1.3 Geography as a moderator

Institutional theorists have shown how organizational attention is structured by the institutional logics prevailing in the environment (Thornton & Ocasio, 1999). External factors, such as country cultural institutions and economic institutions (e.g., regulatory regimes) may be moderating the attention shifts among goals within organizations. Grouzet *et al*. (2005) indicate countries' cultures influence goal aspirations (goal importance) at an individual level. Thus, it is likely that the attention allocation pattern among goals for auto models belonging to US and non-US automobile companies would vary. Therefore, I propose

Proposition 6: Goals within domestic (U.S.) auto models show a different level of interaction in terms of competition for attention than those within international (Non-U.S.) auto models.

6.2 Analysis Results

Similar to the OLS model used in Section 4.3, I regress the growth of different goal variables on their corresponding attainment discrepancies, the second goal's dummy variable indicating whether its performance is below the aspiration level, their interaction terms, and control variables including auto model size, age, and year effects. To test Propositions 4 and 5, I split the sample into two groups according to the median of auto models' size and age. To test Proposition 6, I split the sample into two subgroups, one with domestic auto models and the other international auto models. For the simplicity and readability of the dissertation, I only report in Table 15 the summary of attention shifting rules for different subgroups.

The results show that large organizations use both the modified sequential attention rule and the activation rule in attention allocation. More interaction occurs between the fuel efficiency and safety goals. For small organizations, there is no interaction between any pair of goals. This implies that large organizations allocate their attention to multiple goals differently from small ones. The resource slack associated with size allows large organizations to adopt multiple attention allocation rules at the same time. Small organizations are more likely to suffer from the lack of resource slack, therefore, they are more likely to be persistent in their goal(s), and less likely to simultaneously attend to multiple goals or frequently shift attention among goals. Overall, goals in large organizations show a higher level of interaction in terms of competition for attention than in small ones, supporting Proposition 4.

Similar patterns are found between older and younger subgroups. Older organizations allocate their attention to multiple goals differently from younger ones. The resource slack associated with age allows older organizations to adopt both the modified sequential attention rule and the activation rule in attention allocation. Younger organizations are more likely to be persistent in their goal(s), and less likely to frequently shift attention among goals. In sum, goals in older organizations show a higher level of interaction in terms of competition for attention than in younger ones, supporting Proposition 5.

The results also suggest that domestic and international auto models show different attention allocation patterns, and their goals are with different levels of interaction in terms of competition for attention, confirming Proposition 6. A close examination of the results, for instance, suggests that domestic and international auto models use different attention shifting rules between the fuel efficiency goal and the other two goals. Specifically, for domestic auto models, when the efficiency goal is met, they tend to shift their attention away from efficiency to safety/reliability, while when the efficiency goal is not met, there is no interaction between efficiency and safety/reliability. For international auto models, when efficiency is met, they tend to shift their attention away from efficiency to safety, however, when both efficiency and safety goals are not met, they will draw attention from safety toward efficiency. This implicitly indicates the relatively higher priority of the efficiency goal than the safety goal for international auto models. This high priority of efficiency may come from the society as a contextual factor that the gasoline price is generally higher in Asia and Europe than in US.

6.3 Discussion

This chapter extends the main tests in the dissertation by investigating some possible moderators of attention allocation. The results suggest that organizational size, age, and geography affect managerial attention allocation to multiple goals. This further confirms the third proposition stating that attention allocation is context dependent. Not to forget that, this research is exploratory in nature since empirical studies involving more than two goals have not previously been conducted, and lack a theoretical basis regarding sequential choice.

The details of these results provide some conjectures regarding some aspects a new theory might include. These preliminary rules may direct future studies at formal testing of these conjectures, though at this point the outlines of a new theory are still vague regarding the detailed choice of the next goal for attention when there are more than two goals.

CHAPTER 7

DISCUSSION AND CONCLUSION

In this study, I explore the long-run interplay of multiple goals and attention allocation to them within organizations from the behavior perspective. In so doing, I address three questions associated with attention allocation: first, what is the long run relationship of multiple goals within organization? Second, how do organizations allocate their limited attention to multiple potentially conflicting goals? Third, is sequential attention sufficient to explain and guide attention allocation to multiple goals? Or is attention allocation context dependent? In empirical tests where I investigate the interplay of three product goals (efficiency, safety, and reliability) using the longitudinal data from the US automotive industry, combing panel vector autoregression and OLS regression as a first order approximation, I find some major results including the complex nature of attention shifts, issues caused by the correlation structures of multiple goals, and context dependence of attention allocation.

This research is associated with several inter-related contributions to strategic management and organization theory and implications to practice. It is also associated with several limitations, which future research may address. I first elaborate on potential contributions and implications as follows.

7.1 Contributions and Implications

7.1.1 Contributions to organizational theory on goals

The first contribution associated with this research is linked with organizational theory on goals. First, the observation that organizations seek to meet aspiration levels for multiple goal variables has long been part of organizational theory (Cyert & March, 1963). Organizations pursue multiple goals which are empirically negatively related (Meyer, 2002). The complexity involved in attending to simultaneous claims in many different arenas and calculating both substantive and symbolic costs and benefits calls for a behavioral theory of attention (March & Olsen, 1976). However, in spite of this theory and the theory that multiple goals compete for limited attention of organizations, empirical research on organizational goals or aspirations has mainly focused on a single goal and how the consequences of performance relative to the aspiration level motivate various organizational activities. There is still a missing link of theoretical and empirical examination of the context through which multiple potentially conflicting goals interplay and compete for attention within organizations over time. This study makes a start toward a theory of how managers allocate and manage their attention among multiple goals within firms by exploring the long-run relationship and competitive interaction among them over time. Such theory is needed because many organizational goals are related through competition for attention, in which fulfilling one goal makes another or others more problemistic. The ignorance of research on how decision makers respond to multiple goals, especially when there are more than two, or diverging performance obscures the potential efficacy of the performance feedback in decision making (there is extensive evidence that past performance relative to the aspiration level determines organizational subsequent actions), as decision makers encounter ambiguity in deciding which goal or performance dimension to attend to determine their success or failure. A single decision may freeze managerial action when it improves one performance goal at the expense of other goals (Ethiraj & Levinthal, 2009).The finding that car safety, fuel efficiency, and reliability goal variables dynamically interact with each other over time is important because it empirically supports the need for new theory development and more empirical study of goal structures when there are more than two goals.

Secondly, while acknowledging that organizations have a broad set of goals, most of the extant studies have focused on financial performance goals but ignored other important performance goals such as production efficiency and quality. Although financial performance goals are clearly important for explaining organizational behaviors as they are widely considered as ends, it is worthwhile to consider other goals as means by which financial performance goals are achieved. This study examines the interplay of three product level goals – car safety, reliability, and fuel efficiency. This greatly enhances our understanding of organizational goals that are of considerable importance to financial performance.

Thirdly, a key concern of the Carnegie School is the relationship between individual and firm-level goals (Gavetti, Levinthal, &Ocasio, 2007). Hierarchy is presented as an instrument for firms to reconcile individual and firm-level goals (Simon, 1947) so that problems that exceed individual limitations can be decomposed and solved. Firm-level goals are constructed by managers and assigned to other managers or workers. The goals of the subunits within the firms connect the firm level and individual level goals, and thus play a key role in directing the character and the strategic direction of firms. However, the extant literature on goals in strategy, management, and psychology has mainly focused on either the individual level or the firm level, and the intermediate level – subunit level analysis has been significantly lost in the literature. This study casts light on the dynamics of the selection of subunit goal and multiple levels of analysis (e.g. Staw, Sandelands, & Dutton, 1981) by examining how subunit managers at the auto model level set their goals and allocate their attention to them subsequently.

7.1.2 Contributions to behavioral theory and attention theory

A second contribution concerns the behavior theory and attention theory. First, BTOF (Cyert & March, 1963) suggests organizations, with the sequential attention rule, allocate attention to the problemistic area and then shift their attention to the next problemistic area when the first one is solved. However, through the exploratory examination of the automotive industry, the long-term dynamic relationships among the three goal variables (safety, reliability, and fuel efficiency) show that goal variables are correlated to others' past performance. This implies that the nature of attention shifting is not a question of all or nothing, where a goal draws either all or zero managerial attention. This suggests that sequential attention (Cyert & March, 1963) is not sufficient to explain or guide the attention allocation among more than two goals. BTOF argues sequential attention is a form of quasi-resolution of conflict that lets decision makers treat different goals as constraints to be satisfied in some order of priority rather than as trade-offs that have to be weighed against each other. However, the results from this exploratory study show that sequential attention is not a strict sequence in which one goal has to be addressed prior to other goals, but instead it takes the form of shifting the distribution of attention, especially discretionary attention, across multiple goals. This further indicates the necessity of a modification of the current theory. An obvious and seemingly reasonable extension would be that attention has both discretionary and nondiscretionary components. Organizations attend to multiple goals with nondiscretionary attention simultaneously and shift their allocation of discretionary attention among goals across time.

Secondly, while it has been suggested that attention allocation is context dependent (Ocasio, 1997), sequential attention to goals is the only major theory on multiple goals in the literature. There is a lack of empirical investigation of the possible heterogeneous attention allocation patterns and consequently the potential contextual factors of attention allocation. For instance, scholars have suggested firms' patterns of resource allocation may be related to their strategies (Bower, 1986). It is possible that firms prefers allocating their attention to the highly performing dimensions above the aspiration level to allocating their efforts to underperforming dimensions to match others, because they desire to differentiate themselves from their competitors by not being in sync with rivals (e.g. Katila &Chen, 2008). Vissa *et al.* (2010) suggest a need to add consideration of organizational form and governance into organizational attention allocation. Also, organizations may focus on multiple goals if they possess slack or focus on no goal if the failure to reach goals is of large magnitude or persists for a long time (Greve, 2008). It is an extremely important but challenging task to examine what factors enhance or inhibit the successful attainment of multiple goals and how goals should be attended to avoid conflict (Locke & Latham, 1990).

This study unfolds and tests the contextual dependence of attention allocation in three ways. First, it shows goals within organizations have complex correlation structures. Goals may be congruent, divergent, or independent, and this depends on the specifics of the context. Specifically, the responses of one goal variable to their own or other goal variables' shocks vary in response time, direction, and magnitude. An increase or shock in one goal variable can result in an increase, decrease, or no reaction of another goal variable subsequently. And for any pair of goals, the response of one goal variable to another goal variable's shock can be unidirectional. For instance, the response of safety to the efficiency shock is negative, while efficiency does not significantly respond to the safety shock. Hence, the relationship between goals can be asymmetric. This is very important theoretically and practically. This suggests that the response of goals imply directional causality but not just association between goals. This directionality further complicates the conditions any realistic theory must fulfill. The correlation structures of goals obviously matter in important ways. The comparison of attention allocation in three pairs of goals shows that the rules of attention shifting are not homogeneous. There are three possible rules of attention allocation for goals with different correlation structures. The first is a parsimonious model in which each goal has a separate and independent effect on each other, and thus managerial actions. The second is the modified sequential attention rule, in which goals are conflicting with each other and high performance on one goal shifts discretionary attention toward to the next, making organizations pursue one primary goal at a time. The third is the goal activation rule, in which goals are positively coupled with each other and low performance on one goal reinforces the effect of low performance on another, making organizations pursue one goal more vigorously when another is not met. Organizations may use different attention shifting rules for different sets of goals, or for the same set of goals but with different attainment discrepancies of goal variables. This further suggests that attention allocation to goals depends on their own attainment discrepancies interacting with the attention allocation pattern which in turn is determined by the focal goal variable's correlation structures with other goal variables. Therefore, the effects of goal variables' attainment discrepancies on their growth are heterogeneous. This finding is important and supports that the relationship between organizational goals may have several important consequences for problem solving and search (Ethiraj & Levinthal, 2009).

Also, this study finds that individual auto models show strong heterogeneity in allocating discretionary attention to the same set of goals, which further supports the argument that attention allocation is context dependent (Ocasio, 1997). The order in which goals are attended is not uniform across organizations but depends on the preferences of the "dominant coalition" of each organization (Cyert & March, 1963). This raises the possibility that context dependency may overwhelm the effect of general theoretical rules for shifting attention among goals in complex goal structures. Moreover, this study tests the "*situation constrained*" characteristic of attention suggested by the Carnegie School perspective, by exploring how firm characteristics including size, age, and geography affect the mechanisms of attention allocation. In sum, this study takes the first attempt to integrate into the theory of attention allocation to multiple goals some aspect(s) from other theoretical views such as the managerial choice of importance or goal priority from Ansoff's (1979) view. It also suggests the conditions, relationships, and dynamics that new theories of attention allocation to goals must be able to explain. When the new theory arrives, it can still be based in bounded rationality and sequential attention, but it will move on to other concepts (perhaps still based on bounded rationality).

Thirdly, the behavioral theory of the firm, as originally developed by Cyert and March (1963), is by far the most influential perspective in examining the allocation of attention in organizations (Augier & Prietula, 2007). However, as shown in Table 1 in the literature review section, there is only one empirical study (i.e., Greve, 2008) relying on BTOF and the same study is the only one that focuses on the attentional selection. More work built on the tradition of BTOF is needed, starting with work that more fully exploit important insights in the original work. For example, this study brings back the research focus on some significant missing pillars of the Carnegie School. By revisiting the Carnegie School, Gavetti, Levinthal, and Ocasio (2007) conclude that the role and the importance of specialized decision making structures, and conflicting interests and cooperation inherent in organizational activity, have been significantly lost. This study reemphasizes the coexistence of multiple divergent goals within organizations and revitalizes the role of decision making, attention allocation, and goal conflict.

Moreover, this study also contributes to the literature on adaptive aspirations. Prior research has suggested that organizational decision makers construct aspiration levels from organizational reference groups using multiple criteria (Fiegenbaum & Thomas, 1995; Porac & Thomas, 1990; Reger & Huff, 1993) and that market participation is particularly important for choosing reference groups (Clark & Montgomery, 1999). However, most studies on social aspiration levels have typically measured it as the mean or median performance of the industry, which implies that all organizations in the reference group are equally influential on a focal organization. A few exceptions (e.g., Baum *et al*., 2005; Greve, 2008) show that aspiration levels weighting firms by similarity gave stronger findings than those using the unweighted mean. This study relies on fine-grained measures of social aspirations by comparing each auto model with other participants in the same niche market (e.g., small cars and upscale sedans). Specifically, I constructed the social aspiration level of each auto model by using the average performance of all participants in the same niche market. I also ran the robustness check by constructing an alternative measure of social aspiration levels to test the upward striving mechanism (Cyert & March, 1963; Bromiley, 1991): players whose performance are below the average of the niche market use the average performance as their social aspiration points, while players whose performance is above the average uses the 75th percentile of performance of the niche market as their social aspiration points. In so doing, this study strictly follows the rule of market participation as a particularly important consideration in choosing reference groups (Clark & Montgomery, 1999; Porac & Thomas, 1990).

7.1.3 Methodology contribution

This research has methodological implications. To estimate the relationship among three goals (car fuel efficiency, safety, and reliability) that are determined endogenously across time, I rely on the panel vector autoregression model, combining the traditional VAR approach which captures co-evolution and interdependencies between multiple time series and treats all the variables in the system as endogenous, with the panel data approach which corrects for unobserved individual heterogeneity. I also rely on impulse-response functions to show the response of one variable of interest (e.g. safety) to a shock in another variable of interest (e.g. fuel efficiency), while holding other shocks constant. IRFs graphs visually represent the behavior of the variable series in response to the various shocks and show the directional relationships instead of correlations between goal variables. This methodology is new to the strategy field, but is appropriately driven by the research questions in this study. I would expect this method to have wide implications in the strategy field because most issues in strategy involve interdependency among key variables across time (e.g., the relationship between organizational strategy and structure), and VAR is one of the most powerful tools to study this interdependency across time.

7.2 Limitations and Opportunities for Future Research

Examination of attention allocation across multiple goals opens up new avenues for research. This study appears to be the first exploratory examination of attention allocation across more than two goals within organizations. When the number of goals exceeds two, it is often more realistic, but also less analytically tractable. As noted, this research also has limitations that future research can address. First, the research is exploratory since empirical studies involving more than two goals have not previously been conducted, and lack a theoretical basis regarding sequential choice. This exploration is driven by propositions based in what seem to be reasonable modifications and extensions of current theory. It develops and tests a model of how organizations selectively regulate the allocation of attention among multiple goals using the panel data from the US automotive industry. It raises the interesting questions such as how to differentiate discretionary attention from nondiscretionary attention, how goal interdependencies affect the attention allocation rules, and how effective are different possible attention allocation rules under varying contexts. The details of these results provide important insights and suggest the necessity of a substantial extension and modification of the theory of attention allocation. At this point the outlines of a new theory for more than two goals are still vague regarding the static allocations of attention across multiple goals under various conditions and the detailed dynamics regarding what drives reallocation and the resulting new allocation of attention given various drivers of change. Accordingly, more theoretical development and empirical examination of attention allocation among goals in different contexts is needed to help facilitate a revised theory of attention allocation to goals.

Second, in support of the argument that attention allocation is context dependent (Ocasio, 1997), the current study examines some possible moderators of attention allocation including organizational size, age, and geography. While the test results have interesting implications, more potential moderators are worth further exploration. Scholars have suggested firms' patterns of resource allocation may be related to their strategies (Bower, 1986). Vissa, Greve, Chen (2010) found organizational form and governance as moderators of organizational attention allocation. Conversely, more fine-grained analyses on organizational strategies (e.g., generalists versus specialists), organizational characteristics, or contingency factors are called to examine the effectiveness of different attention allocation rules. Moreover, studying what sequences of attention shifting rules are related to organizational success could be a productive area for future studies.

Third, the results from the PVAR model and IRFs demonstrate the existence of directional causality among goals (asymmetry in their relationships). This further implies that goals are prioritized within organizations. Future study could also integrate goal priority into attention allocation research and examine the role of goal priority in attention allocation and the possible interaction effect of goal priority and goal correlation structures on attention shifts.

A fourth limitation relates to the data used in the study. The empirical context in this study is the automotive industry. It is an appropriate setting for the current study. However, it is only a single industry. Future studies could generalize the results by examining how multiple goals interplay with each other over time in other industries. Specifically, similar to Lant, Milliken, and Batra's (1992) examination on psychological and contextual factors of aspiration adaptation, future study could investigate how heterogeneous industries with varying levels of turbulence differ in attention allocation patterns. Moreover, I used change of performance as the indicator of risk taking with the assumption that inconsistency or variation of outcomes is driven by the organizational risk-taking behavior. This is not the perfect measure but a reasonable first cut surrogate. I plan to further explore this issue in the future. Future studies, including my own, may explore how the attainment discrepancy of each performance dimension affects organizations' introduction of new features or new product in that area by examining auto models' technology specification data over years (e.g., the introduction of antilock technology as a result of attention allocation to the safety dimension).

Overall, there remain considerable untapped opportunities to study the richness inherent in multiple goals and attention allocation building off the theoretical components and relationship structures originally developed by the Carnegie School (Gavetti, Levinthal, & Ocasio, 2007). This also calls for a serious consideration of how various types of decision making structures affect the intelligence of search and decision making (Ethiraj & Levinthal, 2004; Rivkin & Siggelkow, 2003). Simon's (1947, 1962) insights on the hierarchical structure of organizational decision making provides a starting point for renewed attention to the consequences of structure on organizational decision making. Padgett's (1980a; 1980b; 1981) work on the effects of hierarchy, ecological control, and serial judgment on federal budgetary decision-making processes is an early example of this research agenda. More recent simulation research on the effects of alternative decision structures is also relevant to this effort (e.g. Ethiraj & Levinthal, 2004; Rivkin & Siggelkow, 2003). Future research could follow this line of inquiry by empirically or theoretically examining how organizational design, posited as a mechanism parallel with sequential allocation of attention to enhance organizational intelligence by the Carnegie School, could attenuate conflicts amongst competing goals and ease the attention allocation processes.

7.3 Conclusion

Attention allocation among multiple goals is a specific topic drawn from the Carnegie School perspective including Simon (1947), March and Simon (1958), and Cyert and March (1963). It is an old yet under-investigated idea, and it yields promising findings in a longitudinal study of three goals of automotive firms. The present study suggests that a complete theory of attention allocation for more than two goals might include the components of discretionary versus non-discretionary attention within organizations, impact of interdependencies or correlation structures of goals, and heterogeneity of organizations. The present study also suggests several opportunities for additional research. For instance, more empirical work examining attention allocation among goals in different contexts is needed to help facilitate a revised theory of attention allocation to goals; more fine-grained analyses on organizational strategies, organizational characteristics, or contingency factors are called to examine the effectiveness of different attention allocation rules; future study could also examine the role of goal priority in attention allocation and the possible interaction effect of goal priority and goal correlation structures on attention shifts. Despite the progress made here and in other recent research on multiple goals (Audia & Brion, 2007; Baum *et al.*, 2005; Ethiraj & Levinthal, 2009; Greve, 2008; McNamara, Moon, & Bromiley, 2002), organizational responses to goals still define a research area where important questions remain unexplored.

Table 1 Selected Studies on Attention

Study	Meta-theory	Attention to attention	Attention measure	Dependent variable	Findings
Thornton and Ocasio (1999)	Institutional theory; ABV	Perspective	Interviews, inferred	CEO succession	Institutional logics moderate attention to market and organizational factors.
Hung (2005)	ABV; institutional theory	Perspective	Comparative case analysis	Entry into China	Focus on regulatory versus market environment shaped by external ties.
Cho and Hambrick (2006)	ABV;TMT	Perspective	Content analysis of letters to shareholders	Attention to orientation; strategic change	Attention mediates TMT effects on adaptation.
Bouquet *et al.* (2009)	ABV	Perspective	Survey	Financial performance	Curvilinear effects of global attention on performance.
Tuggle, Sirmon, Reutzel, and Bierman (2010)	ABV	Perspective	Content analysis of board meeting transcripts	Attention to monitoring	Deviation from prior performance and CEO duality affect BOD' attention to monitoring.
Eggers and Kaplan (2009)	Managerial cognition	Perspective	Content analysis of letters to shareholders	Technology commercialization	CEO attention to technology increases commercialization.
Kaplan (2008)	Managerial cognition	Perspective	Content analysis of letters to shareholders	Patent activity	CEO attention to technology increases patenting.
Nadkarni and Barr (2008)	Managerial cognition	Perspective	Causal maps of letters to shareholders	Environmental attention; speed of strategic change	Attention to task environment mediates the effects of industry velocity.
Kabanoff and Brown (2008)	Managerial cognition	Perspective	Content analysis of letters to shareholders	Financial performance	Attentional configurations create performance differences.
Ocasio and Joseph (2008)	ABV	Engagement	Documents; secondary sources	Change in strategic planning	Developing and coupling of attentional channels shapes strategic planning.

Study	Meta-theory	Attention to attention	Attention measure	Dependent variable	Findings
Rerup (2009)	ABV; sensemaking	Engagement	Case analysis of rare event	Attention to issues	Learning from rare events involves attentional vividness, stability, coherence.
Nigam and Ocasio (2010)	Sensemaking; ABV	Engagement	Content analysis of industry journal	Enactment of environment	Attention to event triggers top-down and bottom-up sensemaking.
Hansen and Hass (2001)	Ecology; ABV	Selection (bottom-up)	Number of document hits	Attention to documents	Focus increases attention in crowded markets.
Hoffman and Ocasio (2001)	ABV; identity theory	Selection (top-down)	Content analysis of industry journal	Attention to events	Media attention is shaped by industry identity and accountability.
Bouquet and Birkinshaw (2008)	ABV; issue selling	Selection (top-down; bottom-up)	Survey	Relative attention to subsidiary	Attention to multinational subsidiaries is a function of weight and voice.
Greve (2008)	BTOF	Selection	Inferred from shifts in aspiration levels	Firm growth	Attention to aspiration levels for size and performance.

Note: This table is adapted from Ocasio (2011); Theoretical approach: ABV, attention-based view; BTOF, behavioral theory of the firm; TMT, top management team; BOD, board of directors.

Table 2 Selected Studies on Aspirations (Built on Behaviorial Theory and Adaptive Learning)

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Simon (1955)	HA	Simple payoffs, Costly information	Rational choice	Book	Aspirations adjust to previous aspiration level and attainment.
March and Simon (1958)				Book	Bounded rationality, Satisficing.
Cyert and March (1963)				Book	Credited with "Aspirations Theory".
Simon (1964)					Organizational goals help determine courses of action.
Greve (2003c)				Book	Learning and change from performance feedback.
Levinthal and March (1981)	HA	Slack, Experience, Technology	Performance	Simulation	Sharp distinctions between success and failure.
March and Shapira (1987)	Aspiration	Performance, Survival point	Risk taking	Simulation	Aspiration and survival points; Ideas about attention.
March (1988)	SA	Wealth (performance)	Risk	Simulation	Adaptive aspirations and variable risk preferences.
Lant and Mezias (1992)	WAE	Environment, Ambiguity, Size, Search rules	Change	Simulation	Aspirations mediate failure/success Interpretation; Learning model approximates punctuated equilibria.
March and Shapira (1992)	HA + SA	Aspiration adjustment Rate, Shifting attention	Variable risk Taking, Survival	Simulation	Historical aspirations different than social in learning rate influence on risk taking; Survival reference point is salient.
Mezias and Glynn (1993)	WAE	Institution, revolution, and evolution strategies	Innovation performance	Simulation	Performance aspirations mediate search–change relationship.

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Denrell and March (2001)	WAE	Learning rate	Risk taking	Simulation	Slow adaptation increases risk taking.
Knudsen (2008)	SA	Wealth (performance)	Risk preferences	Simulation	Social comparison aids wealth and survival.
Hu, Blettner, and Bettis (2011)	HA + SA	Adapting speed, reference group setting strategy	Risk preferences, Wealth	Simulation	The effectiveness of adapting speeds and reference group setting strategies depends on the risk preference functions.
Lant and Montgomery (1987)	HA, Performance	R&D, Resources	Aspirations, Risk, Search	Executive education marketing strategy simulation	Aspiration equation supported; Risk taking is related to past risk taking; Negative attainment discrepancy is related to innovativeness.
Lant (1992)	WAE	Past aspiration, Performance, AD	Aspiration levels	Executive education marketing strategy simulation	Best fit was to an AD model (adaptive history dependent model)
Lant and Hewlin (2002)	HSA	Decision momentum, Competitor actions, Decision processes	Tactical and strategic decision making	Strategy simulation game	Past performance did not influence tactical decisions.
Greve (2002)	HSA	Aspiration updating	Strategy change	Simulation of strategy change, Radio industry	Slower aspiration adjustment results in higher performance.
Denrell (2008)	Performance		Risk taking	Simulation and COMPUSTAT	Alternative model: avoid actions with poor past performance = variable risk preferences.
Manns and March (1978)	Performance	Reputation	Curriculum change	University curriculum	Reputation, not only financial condition, influenced change.

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Singh (1986)	Performance	Performance aspiration, Slack, Decentralization	Risk taking	U.S. and Canadian firms	Poor performance relative to competitors increases risk taking.
Grinyer and McKiernan (1990)	HA+SA	SA, HA, External expectations	Major change	U.K. firms that "sharpbent" performance	Aspiration-induced crisis required for radical change; Various sources and types of aspirations.
Bromiley (1991)	SAae, Above +5%	Performance, Expectations, Slack	Risk taking	U.S. firms in COMPUSTAT	Low performance and lack of slack drive risk taking.
Lant, Milliken, and Batra (1992)	SA	CEO turnover, TMT attributes, Environmental awareness, External attributions	Strategic reorientation	Furniture and computer software industries	Past performance, managerial interpretations, industry context, and TMT characteristics influence strategic reorientation.
Bolton (1993)	SA	R&D, Slack	Innovation	High technology firms in United States	Propensity to innovate fluctuates with performance when timing is controlled.
Gooding *et al*. (1996)	SA—inflection point	Industry, Time	Inflection point of risk	U.S. firms in COMPUSTAT	Reference point is elevated above industry median; Aspirations influenced by industry conditions and economy.
Miller and Leiblein (1996)	SEL—HA	Downside risk, Slack	Financial performance	U.S. firms in COMPUSTAT	Downside risk leads to strategic changes that improve performance; Slack moderates.
Wiseman and Bromiley (1996)	SAae, Above +5%	Expectations, Slack, Size	Risk, Performance, Size change	U.S. firms in COMPUSTAT and IBES	Extends Bromiley (1991) with single measure of attainment discrepancy.
McNamara and Bromiley (1997)	Past performance	Relationship duration, Loan amount, Industry attributes, Standardization	Risk-rating errors	Five branches of Norwest Banks	Performance did not influence risk rating errors.

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Wiseman and Catanach (1997)	SA	Slack, leverage, stock ownership, Regulation, Rivalry	Risk, Performance	U.S. savings and loan banks	Regulated and deregulated context has influence; Behavioral and agency theories both have influences.
Greve (1998)	HSA	SA, HA	Production and format change	Radio Broadcasting in United States	Aspiration-level learning has behavioral consequences; Kinked curve relationship.
Ketchen and Palmer (1999)	SA	Referent group, SA (years of poor performance)	Change in the profile of technologies and services	Metropolitan hospitals	Partial support for behavioral—poor performance leads to change; Method to determine strategic group referent.
Palmer and Wiseman (1999)	SAae, Above +5%	Dynamism, Ownership, TMT, Slack, Prior risk taking,	Managerial risk taking, Organization risk taking	U.S. firms in COMPUSTAT	AD relates to both managerial and organizational risk taking.
Audia, Locke, and Smith (2000)	Past performance Satisfaction	Market diversity, Size, CEO change	Strategic Persistence, Performance	Airlines, trucking, and a simulation	Success leads to dysfunctional persistence in strategy.
Deephouse and Wiseman (2000)	SAae, Above +5%	Slack, Leverage, BOD monitoring	Risk, Return	U.S. firms in COMPUSTAT and IBES	Turbulent and growth period is different; Growth period risk was lower for high-performing firms.
Mezias *et al.*(2002)	HSA	Previous aspiration	Current aspiration	Financial services retail in United States	Direct measure of aspiration; Previous aspiration is most important.
Chatterjee, Wiseman, Fiegenbaum, and Devers (2003)	HA+SA	Industry growth prospects, Executive compensation	Risk, Earnings		Risk taking is important to competitive advantage.
Greve (2003a)	WAE	Slack	R&D intensity, Innovation launches	Shipbuilding in Japan	Attainment functions as a “master switch” to many organizational behaviors.

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Greve (2003b)	HSA	Slack	Assets, Installed machinery	Shipbuilding in Japan	Solutions compared based on risk tolerance.
Short and Palmer (2003)	HSA	Size, Performance, Age	Referents—external or internal	Restaurant industry in United States	Support for strategic reference point theory; Firms have unique referents.
Miller and Chen (2004)	HA+SA	Bankruptcy risk	Risk taking	U.S. manufacturing firms	Risk taking increases as performance decreases for firms above aspirations, below aspirations, and near bankruptcy.
Baum *et al.* (2005)	HSA	Market share and network status	Partnering behavior	Investment banks in Canada	Aspiration-learning models apply to investment banks partnering risk.
Massini, Lewin, and Greve (2005)	SA	Referent groups high, medium, low	Adoption of innovative forms	INNFORM Euro and U.S. firms	Referent groups are different by level of innovation.
Audia and Greve (2006)	HA+SA	Firm size	Factory expansion	Shipbuilding in Japan	Risk aversion hypothesis supported.
Audia and Brion (2007)	SEL-HA	Revenue growth, Profitability growth	Product introductions	University undergrads, Hard disk drive firms	Decision makers are self-enhance; Contradicts behavioral theory.
Baum and Dahlin (2007)	HSA	Others experience Own experience	Experience vs. vicarious learning	U.S. freight railroads	Aspirations affect experiential versus vicarious learning; Experience moderates
Chen and Miller (2007)	HA+SA	Bankruptcy, Slack	R&D search intensity	U.S. manufacturing firms	R&D is related to focus on bankruptcy, performance below aspirations, performance above aspirations, and slack.
Harris and Bromiley (2007)	HSA	Incentive compensation	Misconduct: financial statements	U.S. firms that Restated income because of irregularities	Incentive compensation and performance aspirations influence financial statement misrepresentation (at extremes).

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Park (2007)	WAE, Above +5%	Target-focal firm relative performance	Strategic positioning	U.S. food processing industry	Direction of strategic change is shaped by aspiration, performance, and gap to referent firm.
Shimizu (2007)	Performance of acquired unit	Ambiguity, Failure to improve, Resource availability, Divestiture experience, Relative size	Divestiture decisions	Mergers of U.S. firms (1988–1998)	Effect of performance nonlinear; Moderators of the aspiration–divestiture relationship (ambiguity, performance, resource, experience, and size).
Desai (2008)	SEL-SA	Operating experience, Legitimacy, Age	Capacity and asset growth	U.S. railroad firms	Operating experience and legitimacy moderate.
Greve (2008)	SA	Size aspirations, Performance aspirations.	Growth	Insurance industry in Norway	Organizations seek to meet aspirations on multiple goals; Aspiration for size is attended before growth.
Iyer and Miller (2008)	HA+SA	Distance from Bankruptcy, Slack	Corporate acquisitions	U.S. manufacturing firms (1980– 2000)	Survival, aspirations, and slack; Acquisition probability increases as performance increases for firms below aspiration.
Lant and Shapira (2008)		Semantic differences in terminology	Managerial mode of reasoning	Israeli economists and managers	Separates how managers think about aspirations and expectations.
Labianca, Fairbank, Andrevski, and Parzen (2009)	SA	Competitive and striving discrepancy	Planned change	Business schools	Striving discrepancies relate to radical change.
Mishina *et al.* (2010)	SA	Stock price relative to expectations, Prominence	Corporate illegality	S&P 500 firms (1990–1999)	Performance above aspirations increases illegality particularly for prominent firms.

Study	Aspiration measure	Other independent variables	Dependent Variable	Context	Findings
Vissa, Greve, and Chen (2010)	WAE	Business group affiliation	Market and R&D search	PROWESS—Indian firms	Organizational form and governance are moderators.
Blettner, He, Hu, and Bettis (2012)	Internal and external SA	Previous aspirations, Age, Size, Stages of life cycle, Advertising Strategy, Time, Firm	Current aspiration level	German magazine industry from (1972 – 2009)	Cross-sectional and inter-temporal heterogeneity of aspiration updating for organizations. Multiple variables explain this variance.

Note: This table is adapted from Shinkle (2012); Aspiration approach: HA = historical comparison (discrepancy); SA = social comparison (discrepancy); WAE = weighted equation combination; HSA = both HA and SA simultaneously modeled; SEL = both HA and SA independently modeled, then one selected; SAae = SA based on analysts' expectations not performance; Above 5% = Bromiley's (1991) adjustment for firms above aspirations. Theoretical approach: TMT = top management team; BOD = board of directors.

Table 3 Variable Description and Measure

Variables	Description	Measure	Main Data Source
Safety	Safety performance of each model	Safety rating (1 to 5) is based on CR's Safety Assessment. Each model is assigned with an overall safety score from 0 to 100. The overall safety score is equally divided into 5 ranges: the lowest rating of 1 is assigned to a model with an overall score between 1 and 20, the highest rating of 5 is assigned to a model with an overall score between 80 and 100, and a model with a score in between is assigned with a rating of 2, 3 or 4. The overall safety score equally combines the accident-avoidance and crash-protection ratings. Accident avoidance reflects CR' test results for braking performance, emergency handling, acceleration, driving position, visibility, and set comfort. Crash protection is based on the most current crash tests (IIHS offset-crash results and either frontal- or side-crash results from NHTSA).	*Consumer Reports*, IIHS, NHTSA
Efficiency	Fuel efficiency performance of each model	Fuel efficiency rating (1 to 5) is based on CR's annual car road test, and the efficiency information published by EPA. The overall mileage per gallon (mpg) of each model was used, with mpg below 15 as 1, mpg between 16 and 20 as 2, mpg between 21 and 25 as 3, mpg between 26 and 30 as 4, and mpg above 30 as 5.	*Consumer Reports*, EPA
Reliability	Reliability performance of each model	Reliability rating (1 to 5) is based on each model's frequency of repair record and problem rate from CR's annual customer surveys. By comparing with the similar models in the market, each vehicle model is rated from 1 to 5 with approximately equal intervals and 5 as the best rating. For instance, a problem rate not far from the average gets the average rating of 3, to earn a rating of 2 or 4, a model's problem rate differs by 2.5 percentage points. To earn a rating of 1 or 5, a model's problem rate differs by at least 5 percentage points.	*Consumer Reports*
Z_safety	Standardized value of safety	It is calculated as dividing the difference of an individual safety rating and the industry average safety rating by the population standard deviation for a specific year.	
Z_efficiency	Standardized value of efficiency	It is calculated as dividing the difference of an individual fuel efficiency rating and the industry fuel efficiency rating by the population standard deviation for a specific year.	
Z_reliability	Standardized value of reliability	It is calculated as dividing the difference of an individual reliability rating and the industry average reliability rating by the population standard deviation for a specific year.	
Aspiration level	Social aspiration level	Calculated as the average of the ratings of the goal variables of all similar vehicles in the same vehicle category	
S_discrepancy	Attainment discrepancy of safety	Calculated as the difference between performance of the safety goal variable and social aspiration level of safety	
E_discrepancy	Attainment discrepancy of efficiency	Calculated as the difference between performance of the efficiency goal variable and social aspiration level of efficiency	
R_discrepancy	Attainment discrepancy of reliability	Calculated as the difference between performance of the reliability goal variable and social aspiration level of reliability	

Variables	Description	Measure	Main Data Source
Sale	Units sold of each model	The sold units of each auto model	*Automotive News*
Model Size	Revenue size of each model	Logarithm of one plus revenues	*Automotive News*
Age	Age of each model	Logarithm of one plus age	*Automotive magazines, company websites*
Price	Model price	Logarithm of one plus manufacturer's suggested retail price	*Consumer Reports*
Nameplate Size	Revenue size of each nameplate	Logarithms of one plus total revenues within the nameplate	
Product line number	Count of product Lines	The number of the product produced within a nameplate at a specific year	
Niche count	Number of niches for nameplates	Number of categories in which a nameplate offers products	
Diversification	Nameplate level of diversification	One minus a Herfindahl index of its distribution of own premiums across the niches	
MMC	Average of Multimarket contact number	This measure is formed by taking, for each multimarket competitor (each Make a focal Make meets in at least two niche markets), the proportion of focal Make markets in which the competitors is also present. This proportion was averaged over all multimarket competitors to yield the average multimarket contact of the focal Make	
Financial performance	Company-level financial performance	The ratio of operating income before depreciation (OIBDP) to total assets (AT).	COMPUSTAT
Industry size	Industry investment opportunities	Logarithm of one plus sum of all auto models' revenues	
Dummy variables	Year, model, nameplate, company, geography	Dummy variables for year, model, nameplate, company and geography (domestic vs. international)	

Table 4 Descriptive Statistics[a] and Correlations[b] between Key Variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Median	1	2	3	4	5	6	7	8	9	10
1. Safety	1764	3.67	.99	1	5	4	1.00									
2. Efficiency	1950	2.32	1.18	1	5	2	.05	1.00								
3. Reliability	2104	3.11	1.33	1	5	3	.04	.32	1.00							
4. Z_safety[c]	1764	.02	.99	-2.75	2.14	.22	.94	.11	.06	1.00						
5. Z_efficiency	1950	-.04	.96	-2.47	2.96	-.17	.12	.88	.36	.10	1.00					
6. Z_reliability	2104	.03	1.00	-1.99	1.74	-.06	.04	.35	.99	.07	.36	1.00				
7. S_discrepancy[d]	1764	.05	.83	-2.7	2.73	.05	.83	.12	.07	.83	.12	.07	1.00			
8. E_discrepancy	1950	-.02	.62	-2.65	2.67	-.05	.04	.51	.27	.04	.58	.28	.08	1.00		
9. R_discrepancy	2104	.06	1.21	-2.91	2.93	0	.02	.20	.91	.04	.19	.91	.06	.29	1.00	
10. Size	2550	7.02	1.18	.12	10.37	6.77	.09	-.22	-.09	.03	-.16	-.10	.08	-.01	-.06	1.00
11. Age	2583	2.73	.74	.69	4.33	2.77	.11	-.11	-.15	.06	-.01	-.15	.01	-.09	-.13	.15
12. Price	2566	9.87	.94	8.50	11.58	9.95	.15	-.62	-.05	.06	-.34	-.08	-.03	-.10	-.04	.41
13. Nameplate size	2583	9.13	1.11	4.92	11.29	9.11	.05	-.20	-.13	-.03	-.07	-.13	.04	.06	-.05	.49
14. Product umber	2583	9.41	4.52	1	21	8	-.02	-.09	-.06	-.07	.01	-.06	-.01	.09	.01	.25
15. Niche count	2583	5.56	2.43	1	13	5	.04	-.05	.11	-.02	.09	.11	.00	.14	.15	.23
16. MMC	2583	.59	.20	0	1	.58	.00	.18	.01	.04	.07	.02	-.01	-.05	-.02	-.16
17. Diversification	2583	.77	.12	0	.91	.80	-.03	-.01	-.11	-.05	.03	-.10	-.03	.07	-.04	.18
18. ROA	2506	.09	.05	-.12	.31	.09	.07	.19	-.02	.13	.00	.02	.13	.02	.04	.06
19. Industry size	2583	12.45	.53	10.87	13.11	12.61	.14	-.39	.01	-.03	.02	-.03	-.05	.01	-.02	.23

[a] The data have 2583 observations.
[b] Coefficients greater in magnitude than .05 are significant at the .05 level.
[c] Z_safety, Z_efficiency, Z_reliability are the Z scores (standard scores) of safety, efficiency, and reliability.
[d] S_discrepancy, E_disrepancy, R_discrepancy are the attainment discrepancy of safety, efficiency and reliability

Continued - Table 4 Descriptive Statistics[a] and Correlations[b] between Key Variables

Variable	11	12	13	14	15	16	17	18	19
11. Age	1.00								
12. Price	.15	1.00							
13. Nameplate size	.22	.09	1.00						
14. Product number	.14	.00	.80	1.00					
15. Niche count	.12	.05	.70	.84	1.00				
16. MMC	-.06	-.07	-.34	-.35	-.42	1.00			
17. Diversification	.12	-.08	.64	.74	.65	-.09	1.00		
18. ROA	-.05	-.16	.03	-.11	-.18	.12	-.05	1.00	
19. Industry size	.19	.44	.36	.23	.30	-.19	.09	-.30	1.00

Table 5 Main Results of the Panel VAR Model

	βt-1		
	Safety	**Efficiency**	**Reliability**
Safety	**.41*** **	**-.34*** **	**-.14** **
	(11.74)	*(-2.91)*	*(-2.28)*
Efficiency	**-.026**	**.22*** **	**-.11*** **
	(-1.22)	*(2.61)*	*(-2.62)*
Reliability	**-.01**	**.16** **	**.53*** **
	(-.28)	*(2.01)*	*(12.72)*

Note: The model coefficients are estimated using GMM method in the PVAR model as described in Holtz *et al*. (1988). The data are Helmert transformed prior to estimation in order to remove the fixed effects. The original variables are time-demeaned before Helmert transformation. The model uses untransformed variables as instruments for the Helmert-transformed variables in the model. The values within parentheses are *t* value from GMM test.

Obs. Number = 813

* Significant at .1 level

** Significant at .05 level

*** Significant at .01 level

Table 6 OLS Regressions of Growth of Goal Variables[a]

	Variable	Model 1 Efficiency Growth		Model 2 Safety Growth		Model 3 Reliability Growth	
1	Revenues	.01	(.02)	.03*	(.02)	.00	(.02)
2	Age	-.03	(.03)	.03	(.04)	-.03	(.04)
3	Efficiency - Aspiration Level[b]	-.06	(.09)				
4	Efficiency - Aspiration Level[c]	-.48***	(.08)				
5	Safety - Aspiration Level[b]			-.40***	(.11)		
6	Safety - Aspiration Level[c]			-.29***	(.09)		
7	Reliability - Aspiration Level[b]					-.17*	(.09)
8	Reliability - Aspiration Level[c]					-.23***	(.07)
9	Efficiency – Aspiration level[b] (indicator variable)			.04	(.08)	-.42***	(.10)
10	Safety – Aspiration level[b] (indicator variable)	-.16***	(.06)			.06	(.10)
11	Reliability – Aspiration level[b] (indicator variable)	-.10*	(.06)	-.08	(.08)		
12	Efficiency - Aspiration Level[b] × Safety – Aspiration level[b]	-.17	(.10)				
13	Efficiency - Aspiration Level[c] × Safety – Aspiration level[b]	.21**	(.10)				
14	Efficiency - Aspiration Level[b] × Reliability – Aspiration level[b]	-.05	(.11)				
15	Efficiency - Aspiration Level[c] × Reliability – Aspiration level[b]	-.05	(.11)				
16	Safety - Aspiration Level[b] × Efficiency – Aspiration level[b]			.09	(.12)		
17	Safety - Aspiration Level[c] × Efficiency – Aspiration level[b]			.04	(.11)		
18	Safety - Aspiration Level[b] × Reliability – Aspiration level[b]			-.07	(.12)		
19	Safety - Aspiration Level[c] × Reliability – Aspiration level[b]			-.05	(.11)		
20	Reliability - Aspiration Level[b] × Efficiency – Aspiration level[b]					-.19**	(.10)
21	Reliability - Aspiration Level[c] × Efficiency – Aspiration level[b]					.22**	(.09)
22	Reliability - Aspiration Level[b] × Safety – Aspiration level[b]					-.05	(.09)
23	Reliability – Aspiration Level[c] × Safety – Aspiration level[b]					-.01	(.08)
24	Constant	.19	(.22)	-.81**	(.29)	.23	(.31)
25	Year Dummies		Yes				
26	Model Dummies		No				
27	Obs.		881		851		890
28	Adj. R-squared		.198		.215		.115

[a] Standard errors are in parentheses.
[b] If less than zero.
[c] If more than zero.
*** p<0.01 ** p<0.05 * p<0.1

Table 7 OLS Regressions of Growth of Goal Variables (Full Models)[a]

	Variable	Model 1 Efficiency Growth		Model 2 Safety Growth		Model 3 Reliability Growth	
1	Revenues	.02	(.02)	.03	(.03)	-.04	(.03)
2	Age	-.06	(.12)	.38**	(.16)	.05	(.16)
3	Efficiency - Aspiration Level[b]	-.30**	(.13)				
4	Efficiency - Aspiration Level[c]	-.71***	(.10)				
5	Safety - Aspiration Level[b]			-.55***	(.13)		
6	Safety - Aspiration Level[c]			-.40***	(.10)		
7	Reliability - Aspiration Level[b]					-.60***	(.09)
8	Reliability - Aspiration Level[c]					-.62***	(.08)
9	Efficiency – Aspiration level[b] (indicator variable)			.18*	(.10)	-.21*	(.11)
10	Safety – Aspiration level[b] (indicator variable)	-.19**	(.06)			.16	(.10)
11	Reliability – Aspiration level[b] (indicator variable)	.02	(.08)	.06	(.09)		
12	Efficiency - Aspiration Level[b] × Safety – Aspiration level[b]	-.44***	(.14)				
13	Efficiency - Aspiration Level[c] × Safety – Aspiration level[b]	.34***	(.11)				
14	Efficiency - Aspiration Level[b] × Reliability – Aspiration level[b]	.12	(.14)				
15	Efficiency - Aspiration Level[c] × Reliability – Aspiration level[b]	-.09	(.13)				
16	Safety - Aspiration Level[b] × Efficiency – Aspiration level[b]			.24*	(.13)		
17	Safety - Aspiration Level[c] × Efficiency – Aspiration level[b]			.02	(.13)		
18	Safety - Aspiration Level[b] × Reliability – Aspiration level[b]			-.08	(.13)		
19	Safety - Aspiration Level[c] × Reliability – Aspiration level[b]			-.04	(.13)		
20	Reliability - Aspiration Level[b] × Efficiency – Aspiration level[b]					-.15	(.10)
21	Reliability - Aspiration Level[c] × Efficiency – Aspiration level[b]					.16*	(.09)
22	Reliability - Aspiration Level[b] × Safety – Aspiration level[b]					.07	(.10)
23	Reliability – Aspiration Level[c] × Safety – Aspiration level[b]					.00	(.09)
24	Constant	.01	(.35)	-1.86**	(.92)	.31	(.55)
25	Year Dummies		Yes				
26	Model Dummies		Yes				
27	Obs.		881		851		890
28	Adj. R-squared		.211		.233		.309

[a] Standard errors are in parentheses.
[b] If less than zero.
[c] If more than zero.
*** p<0.01 ** p<0.05 * p<0.1

Table 8 Summary of Attention Shifting Rules for Different Pairs of Goals

		Pair 1	Pair 2	Pair 3	Pair 4	Pair 5	Pair 6
Dependent variable		Efficiency growth	Efficiency growth	Safety growth	Safety growth	Reliability growth	Reliability growth
Second goal		Safety	Reliability	Efficiency	Reliability	Efficiency	Safety
Attention shifting rule	P	Activation	---	Modified sequential attention	---	---	---
	N	Modified sequential attention	---	---	---	Modified sequential attention	---

Note: "---" means no significant interaction between goals; "P" means when the focus goal has positive attainment discrepancy; "N" means when the focal goal has negative attainment discrepancy.

Table 9 Model Fixed-Effect Coefficients from OLS Regressions[a]

Model	Obs.	Mean	Std. Dev.	Min	Max	Base Auto Model
OLS Model 1	152	.05	.32	-1.16	.78	Honda Odyssey
OLS Model 2	152	-.03	.45	-1.46	1.77	Oldsmobile Bravada
OLS Model 3	152	-.13	.72	-1.81	1.74	Hyundai Elantra

[a] The magnitude of auto model fixed-effect coefficients depends on the base model (the model dropped in the regressions). The fixed-effect coefficients should be interpreted as the difference from the base model in each regression model.

Table 10 OLS Regressions with the Alternative SA Measure[a]

	Variable	Model 1 Efficiency Growth	Model 2 Safety Growth	Model 3 Reliability Growth
1	Revenues	-.13** (.05)	.04 (.08)	.07 (.12)
2	Age	.00 (.26)	.12 (.46)	.24 (.52)
3	Efficiency - Aspiration Level[b]	.62** (1.16)		
4	Efficiency - Aspiration Level[c]	-.42 (.49)		
5	Safety - Aspiration Level[b]		-1.81* (1.06)	
6	Safety - Aspiration Level[c]		-2.80***(1.63)	
7	Reliability - Aspiration Level[b]			3.39* (1.75)
8	Reliability - Aspiration Level[c]			-3.18 (2.16)
9	Efficiency – Aspiration level[b] (indicator variable)		1.93** (.85)	-1.93 (1.12)
10	Safety – Aspiration level[b] (indicator variable)	-.72***(.19)		.08 (.45)
11	Reliability – Aspiration level[b] (indicator variable)	.03 (.31)	-1.20 (.81)	
12	Efficiency - Aspiration Level[b] × Safety – Aspiration level[b]	-1.37***(.28)		
13	Efficiency - Aspiration Level[c] × Safety – Aspiration level[b]	.42***(.37)		
14	Efficiency - Aspiration Level[b] × Reliability – Aspiration level[b]	-.23 (1.13)		
15	Efficiency - Aspiration Level[c] × Reliability – Aspiration level[b]	-.26 (.37)		
16	Safety - Aspiration Level[b] × Efficiency – Aspiration level[b]		3.47** (1.54)	
17	Safety - Aspiration Level[c] × Efficiency – Aspiration level[b]		-1.26 (1.19)	
18	Safety - Aspiration Level[b] × Reliability – Aspiration level[b]		-2.06 (1.32)	
19	Safety - Aspiration Level[c] × Reliability – Aspiration level[b]		3.41* (1.99)	
20	Reliability - Aspiration Level[b] × Efficiency – Aspiration level[b]			-3.79** (1.80)
21	Reliability - Aspiration Level[c] × Efficiency – Aspiration level[b]			-3.66* (1.43)
22	Reliability - Aspiration Level[b] × Safety – Aspiration level[b]			-.26 (.40)
23	Reliability – Aspiration Level[c] × Safety – Aspiration level[b]			-.43 (1.57)
24	Constant	2.22***(.83)	-1.67 (1.91)	-1.09 (3.01)
25	Year Dummies	Yes		
26	Model Dummies	Yes		
27	Obs.	245	241	250
28	Adj. R-squared	.464	.253	.229

[a] Standard errors are in parentheses.
[b] If less than zero.
[c] If more than zero.
*** p<0.01 ** p<0.05 * p<0.1

Table 11 Summary of Attention Shifting Rules with the Alternative SA Measure

	Pair 1	Pair 2	Pair 3	Pair 4	Pair 5	Pair 6
Dependent variable	Efficiency growth	Efficiency growth	Safety growth	Safety growth	Reliability growth	Reliability growth
Second goal	Safety	Reliability	Efficiency	Reliability	Efficiency	Safety
Attention shifting rule	Modified sequential attention	---	Modified sequential attention	---	Modified sequential attention	---
	---	---	---	Modified sequential attention	---	---

Note: "---" means no significant interaction between goals; "P" means when the focus goal has positive attainment discrepancy; "N" means when the focal goal has negative attainment discrepancy.

Table 12 OLS Regressions with Other Control Variables[a]

	Variable	Model 1 Efficiency Growth		Model 2 Safety Growth		Model 3 Reliability Growth	
1	Revenues	.00	(.03)	.01	(.03)	-.03	(.04)
2	Age	-.03	(.12)	.30*	(.16)	.08	(.17)
3	Efficiency - Aspiration Level[b]	-.29**	(.13)				
4	Efficiency - Aspiration Level[c]	-.74***	(.10)				
5	Safety - Aspiration Level[b]			-.47***	(.13)		
6	Safety - Aspiration Level[c]			-.42***	(.10)		
7	Reliability - Aspiration Level[b]					-.62***	(.10)
8	Reliability - Aspiration Level[c]					-.61***	(.08)
9	Efficiency – Aspiration level[b] (indicator variable)			.15	(.10)	-.20*	(.11)
10	Safety – Aspiration level[b] (indicator variable)	-.18***	(.07)			.15	(.10)
11	Reliability – Aspiration level[b] (indicator variable)	.03	(.08)	.07	(.09)		
12	Efficiency - Aspiration Level[b] × Safety – Aspiration level[b]	-.44***	(.14)				
13	Efficiency - Aspiration Level[c] × Safety – Aspiration level[b]	.31***	(.11)				
14	Efficiency - Aspiration Level[b] × Reliability – Aspiration level[b]	.12	(.14)				
15	Efficiency - Aspiration Level[c] × Reliability – Aspiration level[b]	-.07	(.13)				
16	Safety - Aspiration Level[b] × Efficiency – Aspiration level[b]			.16	(.14)		
17	Safety - Aspiration Level[c] × Efficiency – Aspiration level[b]			.05	(.12)		
18	Safety - Aspiration Level[b] × Reliability – Aspiration level[b]			-.11	(.13)		
19	Safety - Aspiration Level[c] × Reliability – Aspiration level[b]			-.07	(.13)		
20	Reliability - Aspiration Level[b] × Efficiency – Aspiration level[b]					-.16	(.10)
21	Reliability - Aspiration Level[c] × Efficiency – Aspiration level[b]					.16*	(.09)
22	Reliability - Aspiration Level[b] × Safety – Aspiration level[b]					.07	(.10)
23	Reliability – Aspiration Level[c] × Safety – Aspiration level[b]					.01	(.09)
24	Price	-.00	(.00)	-.00	(.00)	.00	(.00)
25	Diversification	.50	(.40)	. 60	(.52)	-.51	(.54)
26	Number of Product Line	-.02	(.02)	.03	(.02)	.01	(.02)
27	Niche Count	.04*	(.02)	-.03	(.03)	-.01	(.03)
28	Nameplate Size	.10	(.08)	.02	(.10)	.01	(.11)
29	MMC	-.01	(.21)	.16	(.24)	-.52**	(.25)
30	ROA	.26	(.73)	1.25	(.96)	-.58	(1.00)
31	Industry Size	-.00	(.00)	-.00*	(.00)	-.00**	(.00)

32	Constant	-.84	(.89)	-1.59*	(.87)	1.37*	(.82)
33	Year Dummies	Yes					
34	Model Dummies	Yes					
35	Obs.	860		831		867	
36	Adj. R-squared	.218		.241		.309	

[a] Standard errors are in parentheses.
[b] If less than zero.
[c] If more than zero.
*** p<0.01 ** p<0.05 * p<0.1

Table 13 Hierarchical Linear Regression of Growth of Goal Variables[a]

	Variable	Model 1 Efficiency Growth		Model 2 Safety Growth		Model 3 Reliability Growth	
1	Revenues	.00	(.02)	.03	(.02)	-.01	(.03)
2	Age	-.02	(.03)	.02	(.04)	.03	(.05)
3	Efficiency - Aspiration Level[b]	-.06	(.09)				
4	Efficiency - Aspiration Level[c]	-.50***	(.08)				
5	Safety - Aspiration Level[b]			-.39***	(.11)		
6	Safety - Aspiration Level[c]			-.34***	(.09)		
7	Reliability - Aspiration Level[b]					-.29***	(.08)
8	Reliability - Aspiration Level[c]					-.49***	(.07)
9	Efficiency – Aspiration level[b] (indicator variable)			.07	(.08)	-.29***	(.10)
10	Safety – Aspiration level[b] (indicator variable)	-.15***	(.05)			.14	(.09)
11	Reliability – Aspiration level[b] (indicator variable)	.08	(.06)	-.04	(.08)		
12	Efficiency - Aspiration Level[b] × Safety – Aspiration level[b]	-.17*	(.10)				
13	Efficiency - Aspiration Level[c] × Safety – Aspiration level[b]	.20**	(.10)				
14	Efficiency - Aspiration Level[b] × Reliability – Aspiration level[b]	-.05	(.11)				
15	Efficiency - Aspiration Level[c] × Reliability – Aspiration level[b]	-.05	(.10)				
16	Safety - Aspiration Level[b] × Efficiency – Aspiration level[b]			.08	(.12)		
17	Safety - Aspiration Level[c] × Efficiency – Aspiration level[b]			.01	(.11)		
18	Safety - Aspiration Level[b] × Reliability – Aspiration level[b]			-.09	(.11)		
19	Safety - Aspiration Level[c] × Reliability – Aspiration level[b]			-.01	(.11)		
20	Reliability - Aspiration Level[b] × Efficiency – Aspiration level[b]					-.14	(.09)
21	Reliability - Aspiration Level[c] × Efficiency – Aspiration level[b]					.20**	(.08)
22	Reliability - Aspiration Level[b] × Safety – Aspiration level[b]					-.04	(.09)
23	Reliability – Aspiration Level[c] × Safety – Aspiration level[b]					.01	(.08)
24	Price	-.00***	(.00)	-.00	(.00)	.00	(.00)
25	Diversification	.14	(.26)	.22	(.36)	.05	(.43)
26	Number of Product Line	-.01	(.01)	.01	(.01)	.01	(.02)
27	Niche Count	.01	(.01)	-.02	(.02)	.03	(.02)
28	Nameplate Size	-.01	(.04)	-.00	(.05)	-.06	(.07)
29	MMC	-.02	(.12)	.16	(.16)	.17	(.19)
30	ROA	1.02*	(.56)	.85	(.80)	-2.30**	(.90)
31	Industry Size	-.00	(.00)	-.00***	(.00)	-.00**	(.00)

32	Contstant	-.84	(.89)	-1.59*	(.87)	1.37*	(.82)
33	Year Dummies	Yes					
34	Obs.	860		831		867	
35	LR test (Prob>Chi2)	1.000		.43		.00***	

[a] Standard errors are in parentheses.
[b] If less than zero.
[c] If more than zero.
*** p<0.01 ** p<0.05 * p<0.1

Table 14 HLM Random-Effect Parameters and Variance Partition

	Variables	Model 1 Efficiency Growth		Model 2 Safety Growth		Model 3 Reliability Growth	
		Random effects parameters	Variance partition	Random effects parameters	Variance partition	Random effects parameters	Variance partition
1	Company sd.(_cons)	.00 (.00)	0%	.11 (.05)	3.2%	.32 (.07)	21.9%
2	Nameplate sd.(_cons)	.00 (.00)	0%	.03 (.08)	0.3%	.09 (.10)	1.2%
3	Model sd.(_cons)	.00 (.00)	0%	.00 (.00)	0%	.07 (.10)	1.8%
4	Sd.(Residual)	.47 (.02)		.60 (.02)		.67 (.02)	

Table 15 Summary of Attention Shifting Rules for Subgroup Analyses

		Pair 1	Pair 2	Pair 3	Pair 4	Pair 5	Pair 6
Dependent variable		Efficiency growth	Efficiency growth	Safety growth	Safety growth	Reliability growth	Reliability growth
Second goal		Safety	Reliability	Efficiency	Reliability	Efficiency	Safety
Large units	P	Modified sequential attention	Activation	---	---	---	---
	N	---	Modified sequential attention	---	---	---	Activation
Small units	P	---	---	---	---	---	---
	N	---	---	---	---	---	---
Old units	P	Modified sequential attention	---	---	---	Modified sequential attention	Modified sequential attention
	N	---	---	Modified sequential attention	Activation	Activation	---
Young units	P	---	---	---	---	---	---
	N	---	---	---	---	---	---
Domestic units	P	Modified sequential attention	Modified sequential attention	---	---	---	---
	N	---	---	---	---	Activation	---
International units	P	Modified sequential attention	Activation	---	Activation	---	---
	N	Activation	---	---	---	Activation	---
Aggregate group	P	Activation	---	Modified sequential attention	---	---	---
	N	Modified sequential attention	---	---	---	Modified sequential attention	---

Note: "---" means no significant interaction between goals; "P" means when the focus goal has positive attainment discrepancy; "N" means when the focal goal has negative attainment discrepancy.

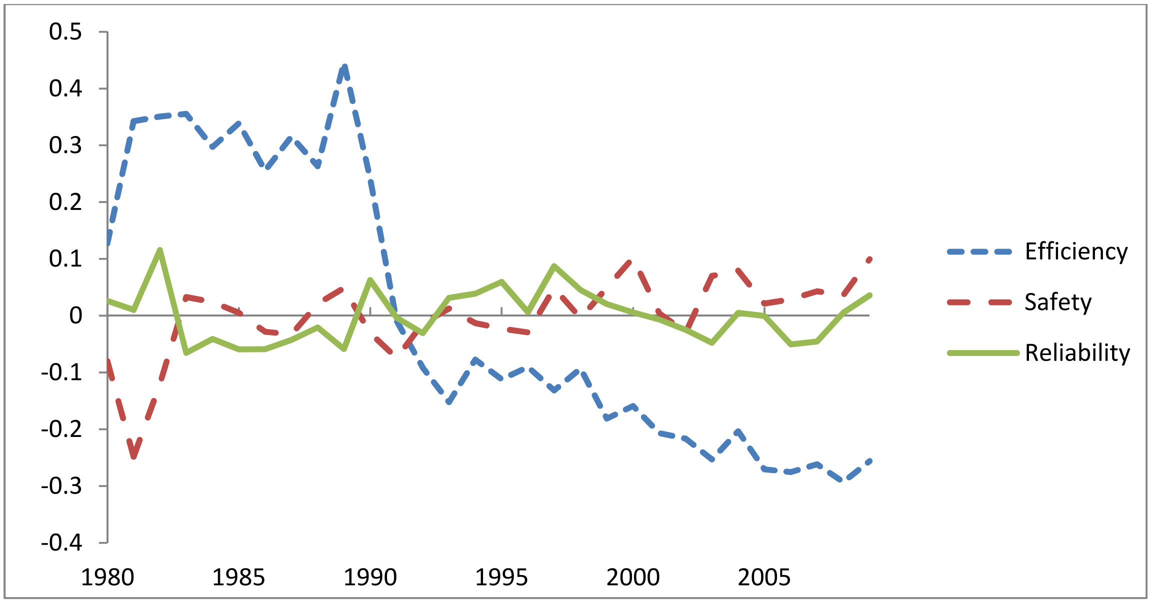
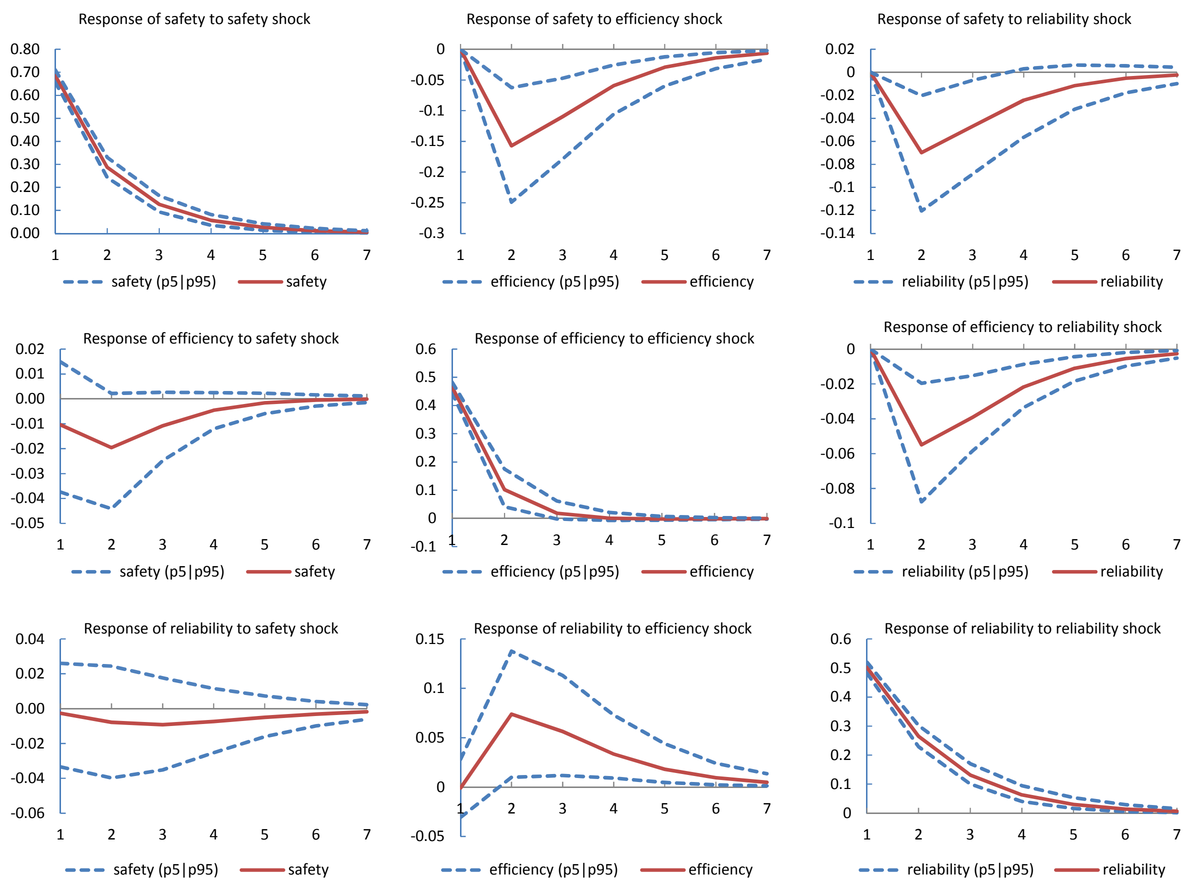


Figure 1 Trend in Percent Deviations from Mean Levels of Fuel Economy, Safety, and Reliability



Note: Errors are 5% on each side generated by Monte-Carlo with 500 reps

Figure 2 Impulse-Responses for the PVAR Model

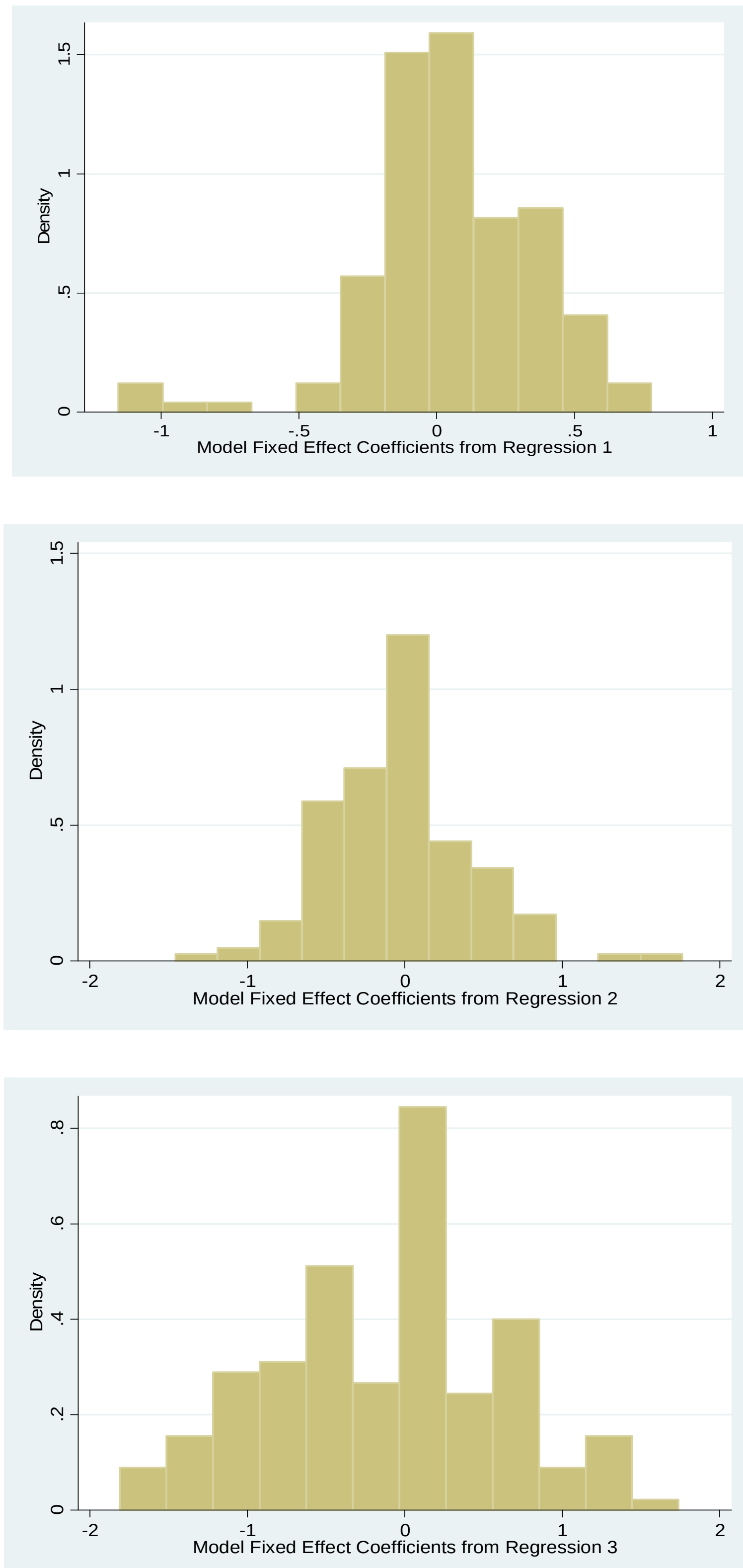


Figure 3 Frequency Distribution of Auto Model Fixed Effect Coefficients from Regressions

APPENDICES

Appendix A: VAR with Panel Data

A VAR is a multivariate simultaneous equation system, in which each variable under study is regressed on a finite number of lags of all variables jointly considered. The VAR approach is useful when the intention is to analyze a phenomenon without having any strong priors about competing explanations of it. The method focuses on deriving a good statistical representation of the interactions between variables, letting the data determine the model. In a simple bivariate system, a first-order vector autoregression model can be written as follows:

$$y_t = b_{10} - b_{12} z_t + \gamma_{11} y_{t-1} + \gamma_{12} z_{t-1} + \varepsilon_{yt} \qquad (6)$$

$$z_t = b_{20} - b_{21} y_t + \gamma_{21} y_{t-1} + \gamma_{22} z_{t-1} + \varepsilon_{zt} \qquad (7)$$

The time path of $\{y_t\}$ is affected by current and past realizations of the $\{z_t\}$ sequence and the time path of the $\{z_t\}$ is affected by current and past realizations of the $\{y_t\}$ sequence. Both y_t and z_t are stationary. The errors $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ are uncorrelated white-nose disturbances with standard variances. The model presented by Equations (6) and (7) is called "structural" VAR since y_t has a contemporaneous effect ($-b_{21}$) on z_t and z_t has a contemporaneous effect ($-b_{12}$) on y_t. If b_{21} is not equal to zero, ε_{yt} has an indirect contemporaneous effect on z_t, and if b_{12} is not equal to zero, ε_{zt} has an indirect contemporaneous effect on y_t. In this case, these equations cannot be estimated directly due to the correlation of y_t with ε_{yt} and of z_t with ε_{zt}.

Fortunately, Equations (6) and (7) can be rewritten in the compact form using matrix algebra:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

or

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t \qquad (8)$$

where $B = \begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix}$, $x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix}$, $\Gamma_0 = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix}$, $\Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}$, $\varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$

Premultiplication by B^{-1} allows us to obtain the VAR model in standard form:

$$x_t = A_0 + A_1 x_{t-1} + e_t \qquad (9)$$

where $A_0 = B^{-1}\Gamma_0$, $A_1 = B^{-1}\Gamma_1$, and $e_t = B^{-1}\varepsilon_t$.

For notational purpose, we can define as a_{i0} as element i of the vector A_0, a_{ij} as the element in row i and column j of the matrix A_1, and e_{it} as the element i of the vector e_t. Thus, we can rewrite Equation (9) in the equivalent form:

$$y_t = a_{10} + a_{11} y_{t-1} + a_{12} z_{t-1} + e_{1t} \qquad (10)$$

$$z_t = a_{20} + a_{21} y_{t-1} + a_{22} z_{t-1} + e_{2t} \qquad (11)$$

In the standard form of the model, the errors e_t are composites of the white-noise processes ε_t and therefore have zero means, constant variances and are individually serially uncorrelated. However, the covariance of the e_{1t} and e_{2t} shocks is not in general equal to zero. The VAR model in standard form does not present the estimation problems of structural form. The OLS method gives unbiased estimates of the elements of the matrices A_0 and A_1, and of the variance-covariance matrix of the errors $\{e_t\}$. However, the estimation of the standard model yields fewer estimates than the number of parameters of the primitive model. For instance, estimating (10) and (11) yields six coefficient estimates (a_{10}, a_{11}, a_{12}, a_{20}, a_{21}, and a_{22}) and the calculated values of var(e_{1t}), var(e_{2t}), and cov(e_{1t},e_{2t}). However, the primitive system (6) and (7) contains ten parameters: the two intercept coefficients b_{10} and b_{20}, the four autoregressive coefficients γ_{11}, γ_{12}, γ_{21}, and γ_{22}, the two feedback coefficients b_{12} and b_{12}, and the two standard deviations σ_y and σ_z. In all, the primitive system contains 10 parameters whereas the VAR estimation yields only nine parameters. Therefore, to identify the system some restrictions on the parameters of the structural model are necessary (for example, one of the parameters might be imposed to be equal to zero) [19].

A vector autoregression can be written as a vector moving average (VMA) presentation as follows:

$$x_t = \mu + \sum_{i=0}^{\infty} A_1^i e_{t-i} \qquad (12)$$

where u is a function of the parameters of the model and A_1^i is the i^{th} power of the matrix A_1 from equation (11). However, equation (12) expressing y_t and z_t in term of the $\{e_{1t}\}$ and $\{e_{2t}\}$ sequences is not very useful to study the effect of changes in, say, e_t on either $\{y_t\}$ or $\{z_t\}$ because the errors are correlated and therefore tend to move together. It is insightful to rewrite (12) in terms of $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences. We can rewrite x_t as:

$$x_t = \mu + \sum_{i=0}^{\infty} \emptyset_i \varepsilon_{t-i} \qquad (13)$$

The coefficients of $\emptyset_i$ are the impulse-response functions. The coefficients $\emptyset_i$ can be used to generate the effects of ε_{yt} and ε_{zt} shocks on the entire paths of the $\{y_t\}$ and $\{z_t\}$ sequences. For example, the coefficient $\emptyset_{12}$ (0) is the instantaneous impact of a one-unit change in ε_{zt} on y_t. By the same token, the element $\emptyset_{11}$ (1) and $\emptyset_{12}$ (1) are the one-period response of unite changes in ε_{yt-1} and ε_{zt-1} on y_t, respectively. To qualify the cumulative response of an element of y_t to an unpredicted innovation in some component of ε_t, the components of ε_t must be orthogonal. If we assume that the $\Omega = E\,(\varepsilon_t\, \varepsilon_t')$ is positive definite, then there exists a unique lower triangular matrix K with ones along the principal diagonal and a unique diagonal matrix D with positive entries along the principal diagonal, such that:

$$\Omega = KDK' \qquad (14)$$

[19]More details refer to Enders' (2010) book "*Applied econometric time series*", Chapter 5.

Let

$$\omega_t = K^{-1}\varepsilon_t \tag{15}$$

Then $E(\omega_t\omega_t') = K^{-1}\Omega\ (K^{-1})'$ = D. Since $\varepsilon_t = K\omega_t$, the vector $\{x_t\}$ has a moving average representation in terms of $\{\omega_t\}$ sequences:

$$x_t = \mu + \sum_{i=0}^{\infty} K\emptyset_i\omega_{t-i} \tag{16}$$

For example in the two-variable case, we will have that

$$\frac{\partial z_t}{\partial \omega_{y,t-s}} = \emptyset_s K_y \tag{17}$$

where K_y is the first column of the matrix K. The plot of (17) as a function of $s > 0$ is an orthogonalized impulse response function.

Appendix B: Fisher-Type Unit Root Test for Panel Data

		Z_safety *p-value*	**Z_reliability** *p-value*	**Z_efficiency** *p-value*
Inverse chi-squared	P	0.000	0.000	0.000
Inverse normal	Z	0.000	0.000	0.000
Inverse logit transformations	L*	0.000	0.000	0.000
Modified inverse chi-squared transformation	Pm	0.000	0.000	0.000

Ho: All panels contain unit roots; Ha: At least one panel is stationary.

Appendix C: Lag Length Specifications

Lags	AIC	BIC
1	**4.32***	**4.42***
2	4.36	4.55
3	4.38	4.65
4	4.32	4.68
5	4.42	4.85
6	4.48	5.75

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