Corporate Structure, Performance Feedback and Innovation:
Failure-Induced Change and Threat-Rigidity Effects in
Multi-divisional Firms

Vibha Gaba
Organizational Behavior Area
INSEAD
1 Ayer Rajah Avenue
Singapore 138676
vibha.gaba@insead.edu

John Joseph
Fuqua School of Business
Duke University
1 Towerview Drive
Durham, NC 27708
john.e.joseph@duke.edu

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ABSTRACT

This paper examines the effects of corporate and business unit performance feedback on new product introductions in the multi-divisional firm. We depart from previous studies which have focused on unitary firms or implicitly ignored the unique goals embedded within the corporate structure. We propose that because the corporate structure segments attention to goals, responses to performance feedback at the corporate and business unit levels diverge. We find that business units respond to negative feedback in a manner consistent with failure-induced change models, whereas corporate units demonstrate threat-rigidity and status quo behavior. We further argue that goals and corresponding feedback may be prioritized through the corporate structure. Our results show that because the corporate unit shapes what business units attend to, the corporate unit’s performance feedback both dominates and attenuates business unit responses to performance changes.
Introduction

Beginning with the behavioral theory of the firm (March and Simon 1958, Cyert and March 1963), a long research tradition has identified the importance of performance feedback and problem-driven search in challenging the status quo and stimulating innovative activity (Bolton 1993, Denrell and March 2001, Chen and Miller 2007, Greve 2003a 2007, Audia and Brion 2007, Birkinshaw, Hamel and Mol 2008). Yet, most performance feedback studies have focused on unitary firms (e.g. Moliterno and Beckman 2009), or implicitly ignored the corporate structure and focus on the unique goals embedded at the corporate (e.g. Iyer and Miller 2008) and business unit levels (e.g. Greve 1998; Mezias, Chen and Murphy 2003). This is an important oversight because there is a natural tension between innovative and status quo behavior within the multi-divisional (M-form) firm (Baysinger and Hoskisson 1989; Hoskisson and Hitt 1988). In this study, we address this gap and show how the corporate structure, by segmenting and prioritizing corporate and business unit-level attention, significantly impacts firm responsiveness to performance feedback.

Performance feedback models suggest that innovative behavior may be driven by specific problems or opportunities, and that responsiveness varies with performance relative to some reference point, aspiration level or goal (Kahneman and Tversky 1979, Bromiley 1991, March and Shapira 1992, Figenbaum, Hart and Schendel 1996, Heath, Larrick and Wu 1999). Attainment discrepancies direct attention to goals not met and motivate greater effort toward goal achievement (Lant, Milliken and Batra 1992). As a result, movement away from the status quo is more likely when performance falls below its aspiration levels and less likely when performance exceeds aspirations (Greve 1998). Accordingly, responses to performance feedback
serve as a powerful mechanism for initiating change and innovative activity within the firm, such as introducing new products (see Greve 2003b for a comprehensive review).

Yet, other research suggests that attention to goals may be selective (Ocasio 1997) and, in the case of the M-form firm, may be shaped by the corporate structure (Gavetti 2005). M-form firms are characterized by a decentralized system of semiautonomous operating units, organized as profit centers, and a corporate unit of executives that monitor performance and formulate strategies (Chandler 1962). The corporate hierarchy segments attention between corporate and business unit goals and provides a formal system of control and a set of decision premises (Simon 1947, Ocasio 1997, Gavetti 2005) to guide attention and decision making lower in the hierarchy.

In this study, we build a theory of performance feedback that incorporates the corporate-business unit distinction. Our primary thesis is that because the M-form structure allocates attention in the corporate unit to broad firm-level performance measures, and in the business unit to goals reflecting product market performance, responses to performance feedback and orientation towards innovative activity may be more heterogeneous than previously hypothesized. That is, whether the firm commercializes new products or sticks with the status quo (i.e. products already on the market), may be conditional on the level at which particular goals are established and decisions concerning performance feedback are made. Furthermore, we argue that because goals are embedded within the corporate structure, corporate unit threat-rigidity responses dominate failure-induced change behavior in the business unit and moderate its relationship with innovative activity.

We test our predictions using a unique data set of new product introductions in the global mobile device industry. The mobile phone industry serves as an ideal setting for this study
because the critical goals for the firms in the industry (e.g. efficient use of firm-level resources and business unit market share) are widely shared, and watched closely by competitor firms and industry analysts. The industry is characterized by a high rate of technological advances and new product introductions and a single industry setting limits the variance in upstream development, since mobile phone innovation is a roughly similar process across firms. We focus on new product introductions as an expression of innovative activity, because new product launches are a critical activity for firm adaptation (Brown and Eisenhardt 1995, Dougherty 1992) and stand in contrast to pressures of maintaining the status quo (Leonard-Barton 1992).

Our study makes several contributions to the literature. First, we link theories of performance feedback (Lant, Milliken and Batra 1992, Greve 2003b, Audia and Brion 2007, Baum and Dahlin 2007), with theories of selective attention (Ocasio 1995 1997) and M-form organizations (Hill and Hoskisson 1987, Hoskisson and Hitt 1988; Baysinger and Hoskisson 1989), to develop a theory of corporate structure, goal prioritization and innovation. We demonstrate that the heterogeneity of responses to performance feedback within the firm is, in part, due to the level at which goals are embedded within the structure and the corresponding attention to performance feedback. Our findings are consistent with studies which argue that subgoal differentiation is consequential for firm performance (Ethiraj and Levinthal 2009), but rather than focus on subunits or divisions, we explicitly examine goals attended to at different levels in the corporate hierarchy. Our study also provides more nuanced insights into how corporate structure, though goal prioritization, affects decisions to launch new products.

Finally, we also offer a plausible solution to the inconsistent findings of studies of performance feedback, which demonstrate both failure-induced change as well as threat-rigidity effects on behavior for performance below aspirations (Ocasio 1995; Audia and Greve 2006).
In what follows, we first elaborate our theory in the context of the M-form firm and develop specific hypotheses relating performance feedback at the corporate and business units levels to new product introductions. We then proceed to describe our measures and analytical methods, and report results. The paper concludes by discussing the implications of our findings.

Theory

The behavioral theory of the firm suggests two sets of variables may affect the goals of an organization (Cyert and March 1963), particularly as they relate to innovation. The first set affects the goal’s aspiration level and includes past goals, past performance and the performance of comparable firms. Much of the subsequent theoretical and empirical work on attainment discrepancies (Lant 1992) and performance feedback (Greve 2003b) have focused on this set of factors, and robust findings suggest that they are consequential for motivating all types of innovative activity including participation in R&D collaboratives (Bolton 1993), greater R&D expenditures (Greve 2003a, Chen and Miller 2007, Chen 2008), and higher rate of product launches (Greve 2007). The second set of factors affects the dimensions of the goal, or what is viewed as important, and includes the problems facing the firm, the political coalition of the firm and the division of labor within the firm (Cyert and March 1963). In this study, we focus on the division of labor and, specifically the corporate structure in the multi-divisional firm which, according to studies of adaptation (Burgelman 1983, Burgelman and Sayles 1988) is consequential for new product development.

The multi-divisional structure has several implications for organizational attention. First, corporate structure separates the attentional focus of the business units from that of the corporate headquarters and divides operating and strategic decision responsibility accordingly. Research
has found that differentiated structures may improve performance (Cohen 1984, Ethiraj and Levinthal 2009), ensure more systematic search (Ethiraj and Levinthal 2004) and lead to more effective adaptation to local environmental changes (Levinthal 1997). Divisional autonomy and loose coupling to other business units focuses line managers’ attention on unique markets and facilitates the development of products tailored to meet market needs (Stinchcombe 1990; Levinthal 1997, Siggelkow 2001, Weick 1976). Structural differentiation allows the business unit to respond more quickly to market changes and keep perturbations from affecting the rest of the organization (Simon 1962). Knowledge sharing among divisions helps the corporation realize the benefits of related diversification (Goold and Campbell 1987, Hill et al. 1992), without compromising the business units’ focus on their unique interests (Williamson 1975). Relatedly, the segmentation of attention and decision responsibility deepens the decision-making capacity of corporate executives in the multi-business firm (Chandler 1977). By removing executives from the routine operation of the business units, they can be more dedicated to strategic planning and performance of the overall enterprise (Chandler 1962: 309).

Second, in the M-form firm, corporate headquarters utilizes mechanisms of control to shape decision making in the business units. Corporate hierarchies provide for strong implicit contracts and limit opportunism by bringing business unit activity within the boundaries of the firm (Williamson 1985). Corporate executives may allocate cash flow to divisions which promise high-yield and establish internal incentives to monitor resources. This is accomplished because decision making at the corporate-level is based, in part, on financial control. Top managers focus attention on the budget and financial results such as return on assets (ROA) and utilize financial criteria to evaluate business unit performance (Williamson 1975). This type of control is characterized by a greater abstraction of information, which on one hand allows senior
managers to understand the essence of output from lower levels in the corporations and make important decisions without knowing the unnecessary details. This is particularly useful in large multi-business firms, where top managers are required to evaluate all the data provided by the business units, yet, at the same time, lack first hand knowledge of the specifics of the industry, technological area or geographic region in which they operate (Hill and Hoskisson 1987).

A second, and much less studied type of control exhibited within the corporate hierarchy is cognitive control (Gavetti 2005). Cognitive control within the multi-divisional firm refers to the provision of cognitive models or decision premises by top management for the benefit of actors lower in the corporate hierarchy. Senior managers’ assumptions, values and beliefs and the goals which they reflect, partially establish the business units’ foci of attention (Ocasio 1995) and the issues that direct divisional search efforts. These decision premises (Simon 1947) also shape the interpretation of issues as threat or opportunities (Dutton and Jackson 1987, Gilbert 2006), and filter and determine the solutions and initiatives that operating units utilize in responding to issues. For example, Gavetti (2005) demonstrates that at Polaroid, the corporate office established the premises which guided divisional actors in their efforts to establish new capabilities and develop new digital products. Likewise, Kaplan, Murray and Henderson (2003) found that pharmaceutical CEOs’ attention to biotechnology increased the responsiveness of their organizations, and the subsequent likelihood of entry into biotech. Influence from the top may be particularly strong leaving little discretion in the business units for planning, interpreting and responding to performance feedback from the external environment. At the other extreme, there may be few or no constraints which leaves the business unit to “think for itself.” Firms in between these two extremes reflect both a top down and bottom up process of strategic decision
making, whereby the corporate unit establishes the decision premises for the business unit, but the business unit maintains some discretion (Ocasio and Joseph 2005).

**Performance Feedback and the Corporate Structure**

Performance feedback has been found to be a powerful mechanism for initiating strategic change (Park, 2007), stimulating organizational learning (Haunschild and Rhee 2004) and motivating organizational innovation (Greve 2003a, 2007). Performance feedback shifts organizational attention to aspirational performance targets (Cyert and March 1963, March and Shapira 1987 1992, Massini, Lewin, and Greve 2005) which managers then use to judge success and failure. Aspiration-level research recognizes that performance targets are adaptive and based on past performance and previous aspiration levels (Lant 1992), as well as selection of a reference group and social comparison with other firms (Massini et al. 2005). Accordingly, organizational behavior is a function of reactive processes as resources are allocated in response to performance above or below historical performance and performance relative to comparable firms (Greve 1998). A range of studies provide evidence that performance below aspiration-levels may lead to greater risk taking and change efforts (Lant, Milliken, and Batra 1992), while satisfactory performance does not (Singh 1986, March and Shapira 1992). Performance below aspiration levels lead to an expanded focus of organizational attention as firms search for new organizational programs or operating procedures (Cyert and March 1963, March and Simon 1958, Ocasio 1995). These models have been demonstrated to shape a variety of growth and innovation-related activities including R&D (Greve 2003), investment in assets (Audia et al. 2006), development of new products (Greve 2007), and procurement of resources (Moliterno and Beckman, 2009, Stimmler and Audia 2010).
An implicit assumption in these studies is that shifts in attention, in response to performance gaps, are uniformly directed to the same aspiration level within the firm. However, organizational settings are characterized by the presence of multiple goals (Ethiraj and Levinthal 2009) and firms may respond to multiple goals simultaneously, though not necessarily symmetrically (e.g. Baum et al. 2005). In the multi-business firm, business units may compete in different product markets and may construct social aspirations from the performance of different sets of competitors. For example, Samsung’s semiconductor division likely uses different aspiration levels than its handset division. Correspondingly, aspiration levels may also differ at the business unit and corporate levels. As noted above, business units have particular competitive environments to contend with and focus on operational goals, activities and performance, whereas the corporate unit of a multi-business firm does not compete in a particular product market and its primary focus is the overall enterprise. In a related vein, Vissa, Greve and Chen (2010) finds that, single firms with no business group affiliation in India, have attentional patterns that differ from those of firms affiliated with a business group in India. In the present study, we suggest that effects of performance feedback on innovative vs. status quo behavior may vary across levels in the corporation because business unit and corporate managers may react differently to economic adversity (Ocasio 1995), and because the corporate structure creates a natural prioritization of attention to corporate goals over business unit goals.

Hypotheses

Business Units, Failure-Induced Change and New Product Launches

The effects of business unit-level performance feedback on innovative activity may reflect the desire to move away from the status quo that occurs when firms perceive threats in the
external product market (Fiegenbaum and Thomas 1988, Wiseman and Gomez-Mejia 1998). When business unit executives face threats, such as those associated with drops in performance relative to competitors, they may respond with externally directed actions aimed at correcting the discrepancy (Chattopadhyay, Glick and Huber 2001, Baum and Dahlin 2007). For example, Mezias, Chen and Murphy (2002) find that social comparisons among business units (branches) of a large financial services firm led to discrepancy reduction efforts when performance fell below the mean aspiration-level of other branches. Similarly, Greve (1998) found that when radio station units were performing below social aspiration levels, they responded by changing their station formats. Studies of corporate entrepreneurial activities demonstrate a similar effect in that the support for new ventures increases as firm performance decreases in hopes of improving future prospects (Jelinek 1979).

Responsiveness to performance feedback at the business unit-level is enhanced by the fact that they are “close” to problems in the product market (such as a drop in market share or sales) and therefore, there is a close correspondence between aspiration levels, performance feedback and tactical activities in the business unit directed toward their achievement. Business unit goals restrict attention at the business unit level to the unique market information relevant to that business unit rather than for all the business units in the firm. The positive effect of this focus on responsiveness is based on the idea that unique market information may be addressed more efficiently by semi-autonomous activity and by managers who have claims to domain expertise (Freeland 1996). This may be particularly true for innovative activity which requires a deep understanding of the market as well as a strong sense for the evolution of new products.

Because the focus of attention in the business unit is the subenvironment in which it operates (Lawrence and Lorsch 1967), decision makers may more easily attribute performance
feedback to the location of performance problems. Solutions to performance problems within
the unit’s charter or domain of expertise are likely to be more readily identified, and provide
decision makers with an unambiguous connection between goal satisfaction and a course of
action (March and Simon 1958). Since the prospect of loss or failure leads to objectively risk-
seeking behavior (Bowman 1982) and a willingness to break from the status quo as well as an
external orientation (Chattopadhyay et al. 2001), it is likely that under these conditions business
units will respond with greater innovative activity including the development of new
technologies and the introduction of new products. For example, business unit managers may
find it relatively straightforward to identify the problems associated with a drop in sales relative
to competitors, and in an attempt to resolve the performance discrepancy, may respond
accordingly with by launching new products to increase sales and recapture market share.
Consequently, we suggest that in response to performance feedback reflecting poor performance
at the business unit-level, greater attention will be given to business unit aspiration levels and
will result in a proliferation of products in support of breaking from the status quo. This suggests
the following hypothesis:

Hypothesis 1 (H1): When performance is below aspirations, performance-aspiration
gaps at the business unit-level lead to higher levels of new product introductions.

Corporate Units, Threat-Rigidity and New Product Launches

Performance feedback at the corporate level may have different implications for
innovation than performance feedback at the business unit level. This is due, in part, to the
the threat-rigidity behavior of top managers during periods of economic adversity (Staw, et. al.
1981, D’Aveni and MacMillan 1990, Ocasio 1995). Theories of threat rigidity suggest that
threats in the form of losses may lead to a constriction in the use of information for decision
making, more extensive formalization and greater attention to well-learned routines and organizational efficiency. Ocasio (1995) notes that threat increases the salience of risk, narrows the attentional foci of the firm and results in “the failure to consider alternative responses that are not well understood, whose outcome is highly ambiguous, and for which a probability distribution is not well-defined” (1995: 297). Thus, the alternatives considered are those which do not impose additional risk. Consequently, the firm may respond with behavior that appears risk-averse (Sitkin and Pablo 1992) and internally oriented (Chattopadhyay et al. 2001) such as curtailing innovative activity and limiting the number of new programs, products or services. The shift toward efficiency concerns will manifest in the intensification of efforts to insure accountability, tightening of budgets and increased cost-cutting further limiting innovation.

Corporate executives, unlike business unit managers, have a different set of alternatives they may draw from and are likely to propose solutions that favor the overall firm. For example, the corporation may chose to shift resources from one division to another, divest underperforming units, or impose new return on investment criteria among others, but business units must find solutions in its operations and activities in the product market. Thus, when performance problems arise at the corporate level, decision making and attention shifts internally to what are perceived to be biased toward the status quo. As a result, innovative activity may be curtailed and organizational change or the introduction of new products may be eschewed. For example, in the first quarter of 2007, following a sharp drop in earnings at Motorola, the CEO stated in a corporate earnings call that “We are moving aggressively to simplify the business through common software platforms, reducing the number of products, driving customer managed inventory processes and back to simplifying unified marketing messages worldwide.” (Motorola 2007).
Threat-rigidity effects may be exacerbated by the complexity of the organization and the use of financial control systems to guide decision making. First, corporate goals encompass the activities of the entire firm, and it may be difficult to attribute performance feedback to a particular part of the firm. Without a well-defined organization location for the problem, it may restrict decision making for operational decisions such as those concerned with activities closer to the technical core (Thompson 1967), and turn to broader solutions. Senior managers may acknowledge a drop in earnings per share or return on assets, but may not be clear on the cause, and institute an “across the board” cut in resources. Second, threat-induced behavior may be amplified through the use of financial control systems, commonly used in multi-divisional firms (Goold and Campbell 1987). Studies suggest that that M-form firms with high levels of diversification and a greater utilization of financial control systems, may have a lower rate of investment in corporate R&D (Hoskisson and Hitt 1988) or lower levels of responsiveness to performance feedback (Aime, McNamara and Kolev, 2010) The rationale is that financial control of the corporation drives profit maximizing behavior leading to shorter time horizons. Likewise, Burgelman (1983) suggests less variation in new products and technologies under a multidivisional structure since, by design, the control mechanisms tend to favor the status quo. Consequently, we suggest the following hypothesis:

*Hypothesis 2 (H2): When performance is below aspirations, performance-aspiration gaps at the corporate unit-level lead to lower levels of new product introductions.*

**Corporate Structure and Goal Prioritization**

Because both corporate and business unit goals may be activated simultaneously in response to attainment discrepancies, they may compete for managerial attention (Joseph and Ocasio 2010). Few studies of performance feedback have employed multiple aspiration levels
(Baum et al. 2005, for example), and the evidence is sparse on how performance feedback works when multiple goals are present or how multiple attainment discrepancies may affect each other. Theories of sequential attention (Cyert and March 1963, Greve 2007) assume that firms are loosely coupled and subunits independently focus on their own performance feedback without the benefit of other prioritization mechanisms. However, because goals are embedded within the vertical hierarchy, the corporate structure naturally creates a prioritization of higher order (corporate) goals and feedback over lower order (business unit) goals and feedback.

Important decisions, such as those concerning overall firm performance, are commonly made at high levels within the organization, because top management reflects the dominant political coalition (Cyert and March 1963). Attention to corporate goals and performance feedback may be pronounced during periods of poor performance, because threat-rigidity increases the centralization of authority in the firm (Staw et al. 1981). As Staw and colleagues (1981:502) suggest, “When a threat occurs, there may be a constriction in control, such that power and influence can become more concentrated or placed in higher levels of hierarchy.” Therefore, due to the consolidation of power at the top, and the restricted focus of the firm’s subunits on the product market, top management will serve as the primary influence on organization attention and responsiveness to performance feedback. This suggests the following hypothesis:

_Hypothesis 3 (H3): Corporate unit performance-aspiration gaps will have a greater impact on new product introductions than business unit performance-aspiration gaps._

As noted earlier, studies of corporate hierarchies (e.g. Williamson 1975 1985, Chandler 1977 1990) suggest that the M-form firm is characterized by control and coordination though authority relationships and attention directing mechanisms. Control conceived in this manner
vests both strategy and decisions concerning firm and product scope with corporate-level executives who coordinate activities by fiat and through the provision of the necessary decision premises for divisional actors. The latter includes both goals and means by which decision makers respond to their achievements and shortfalls, and is central to understanding of how responsiveness to corporate feedback (threat-rigidity behavior) may trump responsiveness to business unit feedback (failure-induced change behavior). When the corporate unit is underperforming, corporate executives are likely to enact and enforce threat-rigidity induced behavior which may in turn, regulate the decision premises that business units use for perceiving, interpreting and responding to threats and opportunities (March and Olsen 1976, Ocasio 1995). Organizational members look to the CEO and senior managers for cues and explicit instructions on how to improve performance, and come to identify closely with their beliefs and behaviors. External threat may further focus the attention of organizational members on senior managers’ and their response behavior, potentially making threat-rigidity the dominant response to performance-aspiration gaps throughout the organization. Moreover, if the threat-rigidity response becomes the firm’s dominant response model, attainment discrepancy-driven efforts to innovate and move away from the status quo in the business units will be likely be diminished resulting in fewer new products. Based on the foregoing arguments, we hypothesize:

\textit{Hypothesis 4 (H4): An underperforming corporate unit will attenuate the influence of performance-aspiration gap on new product introductions.}

\section*{Methods}

\subsection*{Sample}

Our sample consists of six firms including Nokia, Motorola, Samsung, SonyEricsson, Siemens and LG in the global mobile phone industry. These firms are the largest cellular phone
manufacturers in the world and account for 70%-85% of total unit sales from 2001-2008. The mobile phone industry serves as an ideal setting to examine the effects of corporate and business unit performance feedback on new product introductions, and at the same time, generalize to other industry settings. First, it is considered a high-velocity industry characterized by a high rate of new product introductions and technological advances (Eisenhardt 1989). Second, the major players have not changed much since the advent of the industry in 1981. They are all multi-divisional firms which manufacture other products, in addition to a broad range of cell phones, such as digital video recorders, radio equipment and cellular communications infrastructure. Third, the critical goals for the firms in the industry are widely shared (such as unit sales and ROA) and watched by competitor firms and industry analysts. We collected quarterly data spanning the first quarter of 2001 to the last quarter in 2008.

**Dependent variable.**

We explore the effect of performance aspiration gaps at different levels of corporate structure on new product introductions. Firms in the mobile phone industry operate in a dynamic competitive environment characterized by short product life cycles where there is an increasing burden on handset manufacturers to ensure a continuous stream of products. Continuous innovation through high rates of new product introductions is a critical decision variable in such an environment. New product introductions involve judging whether the launch of an additional product, rather than reliance on existing products already in the product market (i.e. status quo behavior), is acceptable to the firm, at multiple levels of the corporate hierarchy. Therefore our key dependent variable is *new phone introductions* measured as the number of new phones introduced during each quarter in a year. We relied on multiple sources to compile the mobile
device data including the World Cellular Information Service, Informs Cellular Handset Tracker and Strategy Analytics SpecTRAX database of mobile phones as well as internet searches.

**Independent variables.**

*Performance Variables.* At the corporate unit (CU) level, we use return on assets (ROA) as the performance variable. Prior literature on performance feedback, (Bromiley 1991, Greve 2003, Miller and Chen 2004, Audia and Greve 2006) almost exclusively uses this variable to measure performance (as well as to calculate the performance-aspiration gap) at the corporate level. ROA is also a critical measure for manufacturing-intensive industries and, unlike ROE, avoids problems caused by financial leverage differences across firms (Bromiley 1991, Greve 2003a). Data on ROA are calculated as Income Before Extraordinary Items divided by Total Assets from COMPUSTAT Fundamentals Quarterly files.

At the business unit (BU) level, we use mobile phone sales (in natural logs) as our performance measure. One of the concerns with using quarterly data on mobile phone sales is that there is a strong seasonal element to it – sales tend to peak in the fourth quarter holiday season which includes Christmas. In fact, a simple regression of sales on quarter dummies yields a positive and highly significant coefficient on the dummy for the fourth quarter. Since the seasonal element in sales may generate spurious correlations, we smooth out these seasonal fluctuations by applying a 5-period moving average filter to each firm’s phone sales. Figure 1 shows both the original sales and the smoothed sales (averaged across all firms) over the time-

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1 The choice of the 5 period moving average ensures that there are no seasonal peaks and troughs in the data. We check this by regressing the filtered series on the quarter dummies. None of the quarter dummies are significant in this regression.

2 Davidson and Mackinnon (1993) argue that such linear moving average filters, in most cases, have the same properties as the official adjustment procedures used by the US Census Bureau (the X-12 ARIMA procedure) and a host of other statistical agencies. We follow their suggestion and check this empirically by regressing the seasonally adjusted series on the lags and leads of the correspondingly unadjusted series. This yields an $R^2$ of 0.97.
period of our study. The original sales shows clear peaks for the fourth quarter while the smoothed sales do not display any evidence of seasonal fluctuations.

Aspiration levels. Aspirations can arise from two types of comparisons: historical and social. The historical aspirations uses the past performance of a focal firm as an indicator or standard of how well the firm should perform, while the social comparison uses the performance information on other comparable firms as the reference level (Cyert and March 1963). Following previous studies (Greve 2003, Audia and Greve 2006), we define firm $i$'s social aspiration metric at the $u^{th}$ level ($u = \text{corporate unit or business unit}$) at time $t$ ($SA^u_{it}$) as the simple average of the appropriate performance variable over every other firm. That is, $SA^u_{it} = \frac{1}{N} \sum_{j \neq i}^{N} \frac{P_{jt}^{u}}{}$ where $P_{jt}^{u}$ is the performance of the $j^{th}$ firm, $u$ indexes corporate vs. business unit performance, and $N = 5$ is the total number of firms in firm $i$'s industry sector, not counting firm $i$. Therefore the average is calculated over competitors’ ROA for corporate unit aspiration and over competitors’ phone Sales for business unit aspiration. Next, we define the historical aspiration of firm $i$ as an exponentially weighted moving average of its past performance. Denoting $HA^u_{it}$ for historical aspirations of firm $i$ at time $t$ at the $u^{th}$ level ($u = \text{corporate unit or business unit}$) at time $t$, $P_{it}^{u}$ as the performance of the $i^{th}$ firm, and $\alpha$ as an adjustment parameter, historical aspiration is given by $HA^u_{it} = \alpha P_{it-1}^{u} + (1 - \alpha)HA^u_{i,t-1}$. Following Cyert and March (1963) and Greve (2003a) we constructed aspiration levels as a weighted average of social and historical aspiration levels $A^u_{it} = \beta SA^u_{it-1} + (1 - \beta)HA^u_{i,t-1}$. The weights $\alpha$ and $\beta$ were chosen by searching over all parameter values of $\alpha$ and $\beta$ in increments of 0.1 and using the combination that yields the

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3 Using the median rather than the mean performance of firms does not change results.
maximum log-likelihood. This procedure resulted in $\alpha = 0.3$ and $\beta = 1$ for both the corporate and the business unit. In other words, the best fitting model was one that put 100% weight on social aspirations. Henceforth, we use only social aspirations in all our models. The 100% weight on social aspirations also indicates that in the mobile phone industry with rapid technological changes and turnover of mobile phone models managers tend to pay more attention to their competitors and not to their own past performance.

**Performance aspiration gap.** The performance-aspiration gap is simply defined as the difference between performance and aspiration level for each of the corporate and business units. We implemented a spline function to compare the effects of the performance-aspiration gap above and below the aspiration-level point (Miller and Chen 2007, Greve 2003a). We did this by splitting each of the social performance variables into two variables. Performance above aspiration equals zero for all observations in which the performance (at the corporate or business unit level) of the focal firm is less than its social aspiration level and equals the difference between performance and its social aspiration level when the performance of the focal firm is above social aspiration. That is,

$$\text{Performance above social aspiration}(u) = \max[0, (P^u - S^u)]$$

where $u = \text{corporate unit or business unit}$. Performance below social aspiration is defined in a symmetric fashion - it is zero when performance is above the aspiration level and equals the performance-aspiration gap when performance falls below aspiration level. That is,

$$\text{Performance below social aspiration}(u) = \min[0, (P^u - S^u)]$$

All performance-aspiration gap variables are lagged by one quarter in the empirical specification.

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4 We ran the models using only historical aspirations, the results were not significant. The results are available from the authors.
To test hypothesis H4, we simply created a dummy variable. Underperforming corporate unit that takes the value 1 if corporate performance (in terms of ROA) is below social aspirations and zero otherwise.

**Control variables.**

To isolate the impact of theorized variables upon new product introductions, we control for a number of variables in estimating the model. First, we control for a variety of firm-level characteristics. As they age, firms acquire both experience in introducing innovations (Sorenson & Stuart 2000) and inertia that may impede quick response (Abernathy and Utterback 1978). To control for age, we count years since a firm's founding. Since organizational size has been demonstrated to affect innovation (Sorensen and Stuart 2000) we include two variables measuring firm size – the value of corporate sales and number of employees, both of which are logged. We also control for existing capabilities by including a control for the number of mobile patents held by the focal firm. Patent data was drawn from Thompson Innovation and included worldwide patents for mobile device technology. In addition, R&D spending was also entered but was consistently insignificant (including the baseline model) and therefore not included in the models. Firm diversification was also included as a control since greater diversification may affect the responsiveness to performance feedback at both the corporate and business unit levels. Firm diversification was calculated using the entropy measure (Palepu 1995). Excess organizational resources enable firm’s to engage in experimentation and organization change (Cyert and March 1963, March 1991, Greve 2003). We use two measures of slack – available slack measured as the firm's current ratio, (ratio of current assets to liabilities) and absorbed slack measured as sales, general, and administrative expense to sales ratio. The former measures the
liquid resources uncommitted to liabilities (Bromiley 1991) while the latter slack represents resources absorbed by certain operational activities but that are recoverable, if necessary (Wiseman and Bromiley 1996). Both slack measures were constructed using COMPUSTAT data. Second, we include quarter-year dummies to account for common global and industry time-effects. For instance, these dummies would capture the density of firms and mobile products, as well as global growth in demand. In addition, if product introductions are vulnerable to seasonal factors, the quarter-year dummies should account for these seasonal effects as well. Table 1 provides summary statistics as well as correlations between the predictor variables.

***** Insert Table 1 about here*****

**Model Specification**

New product introductions is a count variable that takes integer values from zero onwards, with the data censored at zero. The mean value for the sample is 18.8 and the variance is 234.3. Since the variance is more than 12 times the mean, we have over-dispersion, so a negative-binomial model which explicitly estimates an over-dispersion parameter is more appropriate as compared to a Poisson model which assumes equality of mean and variance.\(^5\) Fixed and random models were also tested. A Hausman-test, which tests whether the coefficients estimated by the models are the same indicated no difference between the models (p-value = 0.5) so we use a random-effects specification to obtain more efficient estimates. Finally, in all model specifications, we use the test suggested by Wooldridge (2002) to check for

---

\(^5\) The censoring at zero suggests the use of either a zero-inflated negative binomial model, which is well-equipped to deal with presence of zeros. However, the incidence of zeros is very low in our sample (only 1.2% of the observations exhibit a zero). The Vuong test (Vuong, 1989) fails to reject the negative-binomial specification in favor of a zero-inflated negative binomial specification. Furthermore, a zero-inflated negative binomial model requires an explicit empirical specification that explains the zeros and we lack a well-developed theoretical justification for a data generating process for the zeros. For all these reasons, we chose a negative binomial model, simply because it is more parsimonious.
autocorrelation in the residuals. In all cases, the null hypothesis of “no auto-correlation” is not rejected.

Results

Table 2 shows the negative-binomial results for the number of new phones introduced each quarter. Model 1 includes only the control variables, while Models 2-4 add the various performance-aspiration gap variables for the business and corporate units. Model 2 includes only the variables relevant for the business unit, Model 3 only the corporate unit, and Model 4 includes variables for both corporate and business units.

In Model 1, we find that older firms are relatively inert and are less likely to introduce new phone models. Size as measured in terms of either the number of employees or corporate sales does not influence new product introductions. However, in a subset of subsequent models, we do find that larger firms who have more personnel employed also have a higher rate of new phone introductions. Next, a higher number of mobile phone patents is also associated with a higher number of new phone introductions. In line with previous research, we find that unabsorbed slack has a strong positive influence on new phone introductions. While absorbed slack has a negative and significant sign in Model 1, this effect becomes insignificant in subsequent models. This is similar to Greve (2003a) who shows that unabsorbed slack matters for innovation launches while unabsorbed slack matter only for R&D expenditures. Finally, a Wald-test shows that the model as a whole is significant at the 1% level.

Model 2 adds the two performance-aspiration gap measures for the business units. Hypothesis 1 argued that when business unit performance is below aspirations, performance-aspiration gaps will lead to movement away from the status quo and a greater number of new
product introductions. We obtain a negative and significant coefficient on for ‘performance below aspiration’ supporting Hypothesis H1. That is, as performance deteriorates and business unit sales move further away from a firm’s aspiration level, firms increase the rate at which they introduce new phones. Interestingly, performance improvements for performance above social aspiration levels in the business unit also induce more phone introductions. Using a likelihood-ratio test to compare Model 2 to Model 1, we find obtain a chi-square test statistic (with 2 degrees of freedom) of 4.07 yielding a p-value of 0.14 suggesting only a marginal improvement in model fit.

Model 3 shows the effect of performance improvements, defined in terms of ROA at the corporate level, above and below the firm’s aspiration level. Hypothesis H2 predicted that for performance below aspirations, corporate units will exhibit threat rigidity effects and fewer new product introductions. We find a positive and significant coefficient for ‘performance below aspiration’ supporting Hypothesis H2. It suggests that performance deterioration below the aspiration level leads to fewer new phone introductions. For performance above social aspirations, performance improvements results in a lower number of new phone introductions. A likelihood-ratio test comparing Model 3 to Model 1 yields a chi-square test statistic of 6.54 (with 2 degrees of freedom and p-value = 0.04) suggesting a significant improvement in model fit over Model 1.

Model 4 adds the performance-aspiration variables for both the business and corporate units. We find that the results from Models 2 and 3 continue to be supported – an increase in the performance-aspiration gap (above and below aspirations) for the business unit induces new product introductions while an increase in this gap (above and below aspirations) for the corporate unit results in status quo behavior. Comparing Model 4 to Models 2 and 3 yields chi-
square test statistics of 5.1 and 7.6 respectively, suggesting that the model which includes performance-aspiration gaps at both the business unit and corporate unit, dominates models that includes only one of the performance-aspiration gap. Overall, our results highlight the heterogeneity in responses of new product introductions to performance-aspiration gaps at multiple levels of corporate structure.

*****Insert Figure 2 and Figure 3 about here*****

Figures 2 and 3 provide a graphical depiction of our results and are based on the coefficient estimates in Model 4. Figure 2 shows the multiplier effect of the performance-aspiration gap on new phone introductions for the business unit, while Figure 3 does the same for corporate unit. To facilitate easier interpretation of the figures, we set the rate of new phone introductions to unity at the origin and varied each of the performance-aspiration gaps over their entire range of values. This construction also allows us to compare the effect of the performance changes above and below the aspiration levels. We find that Figure 2 is close to being symmetric. This implies that for the business unit, performance improvements above the aspiration level by 1 unit raises the multiplier of the rate of product introductions by 1.33, while a decline in performance below the aspiration level by 1 unit raises the multiplier of the rate of product introductions by 1.29. In Figure 3, on the other hand, for the corporate unit, performance declines below the aspiration level reduce the multiplier at a faster rate than do performance improvements above the aspiration level. However, for small changes in ROA around the origin, the effects are more or less symmetric. We plot these separately since the values spanned by the
Model 4 also allows us to calculate the relative magnitude of effects of the performance aspiration gaps for the corporate vs. the business unit. To test hypothesis H3, we calculate the marginal effects of changes in the performance-aspiration gap below the aspiration level, holding all other variables at their mean levels. To make the estimates comparable, we calculate elasticities and express the magnitude of changes as percentage changes. Our estimates imply that a 1% change in the performance-aspiration gap for the corporate unit below aspirations changes the rate of new phone introductions by 1.11% while a 1% change in this gap below aspiration for the business unit changes the rate of new phone introductions by 0.08%. This provides support for Hypothesis 3. In other words, performance shortfalls at the corporate unit have a greater effect on firm behavior than performance shortfalls at the business unit level.

Finally, we test hypothesis H4, by checking whether the impact of performance-aspiration gap in the business unit is moderated for an underperforming corporate unit. In Table 3, a dummy variable that takes the value 1 if the corporate unit is underperforming is interacted with the two performance-aspiration gap variables for the business unit. Model 5 omits the performance-aspiration gap variables for the corporate unit while Model 6 uses the full set of variables. In Model 5, we obtain a positive sign on performance-aspiration gap variable for the business unit, when the performance is above aspirations. At the same time, the coefficient on the interaction of this term with the underperforming corporate dummy variable is negative. In other words, an underperforming corporate unit attenuates the impact of performance improvements in the business unit above the social aspiration level. Similarly, the coefficient on performance-aspiration gap, when performance is below aspirations is negative, while the
The coefficient of its interaction with the underperforming corporate dummy is positive. Again, while business units may be inclined to introduce newer phones at a faster rate in response to performance deterioration below the aspiration level, this effect is attenuated if the corporate unit is underperforming as well. However, this interaction term fails to be statistically significant, so we receive only partial support for Hypothesis H4. Model 6 shows that these effects are robust to the addition of the corporate performance-aspiration gap variables – again we obtain a negative sign on the ‘underperforming corporate unit’ dummy interacted with business unit performance above aspiration and a positive sign on its interaction with performance below aspiration. The coefficient on the stand-alone underperforming corporate unit dummy variable is not significant in either of the two models. Finally, Model 6 is a significant improvement over Model 4 yielding a chi-square statistic of 9.82 which is significant at the 5% level.

**DISCUSSION AND CONCLUSION**

This study addresses the implications of corporate structure and corresponding goal prioritization and performance feedback on new product introductions. In doing so, we provide insights into how the corporate structure and multiple goals in organizations guide attention and decision making in the multi-business firm. Our theory links models of performance feedback, with theories of attention, and M-form organizations to explain and decompose the corporate and operating impact on problem-driven search and to explain the heterogeneity of responses to performance feedback and their effects on new product introductions. We augment the growing scholarship on performance feedback by considering multiple aspiration-levels and highlighting some important conditional effects imposed by the corporate structure.
Specifically, we find that because corporate structure segments attention to goals, responses to performance feedback at the corporate and business unit levels diverge. Business units respond to negative feedback in a manner consistent with failure-induced change: by increasing innovative activity. Whereas corporate units demonstrate threat-rigidity and, in response, maintain the status quo and rely on existing products. This difference stems from both the focus of feedback in the unit and the degree to which the respective units are “close” to problem at hand. Business unit performance measures focus on the product market and, as result, there is a close link between goal satisfaction and new product introductions. Corporate units are far removed from product market activities and focus on blunt financial performance measures that do not provide a close correspondence between feedback and the location of the problem. Additionally, the corporate unit, when faced with performance problems, may rely on well-understood responses reflecting internal resource allocation such as budget cuts. Therefore, corporate responses to attainment discrepancies appear more risk-averse and less oriented toward innovative activity.

This corporate-business unit distinction also offers one potential solution to the ongoing debate concerning risk attitudes following threats or poor performance (Ocasio 1995, Audía and Greve 2006). On the one hand, studies have shown that when performance is below aspiration-levels, it results in risk seeking behavior (e.g. Greve 1998). On the other hand, research has also demonstrated threat rigidity effects, which emphasize the risk aversion from situations interpreted as threats (e.g. Gilbert 2006, Iyer and Miller 2008). In a theory paper, Ocasio (1995) argued that understanding that the resolution of these two perspectives relies on cross-level perspective of managerial cognition and suggests problemistic search at the individual level is also affected by group-level cognition and political dynamics as well as organizational-level
logics. We empirically demonstrate the importance of decomposing cognition at different levels of the firm, but further theorize the control aspects of corporate structure and the relative importance of corporate cognitive control over business unit actions.

Accordingly, we find that because the goals are arranged hierarchically, corporate feedback also impact business unit feedback. In the M-form firm, cognitive models for responding to performance feedback are arranged with higher order goals and feedback models shaping lower order business unit goals and feedback models. Consequently, corporate unit response to underperformance dominates business unit response to performance feedback and new product introductions at the business unit level are attenuated for an underperforming corporate unit.

Our study highlights the role of the corporation in innovation and argues for greater attention to mechanisms of cognitive control. Much of the work on control of the multi-divisional firm has focused on internal resource allocation (Chandler 1962, Williamson 1975), whereby the corporate hierarchy links corporate headquarters and business units through financial control and authority relationships. A key aspect of these theories is that goals are set by corporate headquarters to serve as a guide for decision making lower in the hierarchy.

In this paper, we expand on these studies by examining the cognitive consequences of corporate hierarchy. Mechanisms of cognitive control or mental models - in this case performance feedback models - provide broad guidance on what to attend to and how to respond to issues such as poor performance but leave some discretion to the business units on the precise mode of response. As Long, Burton, and Cardinal (2002) suggest, control is any mechanism that managers use to direct attention and motivate organizational members to act in desired ways to meet an organization’s goals. These decision premises are advanced through discourse and
behavior within the hierarchy as well as the goals and activities carried out through them. For example, mental models may be advanced by training, the provision of guidelines, the articulation of agendas, or the elaboration of strategic plans and frameworks. Decision making is left to the business units, based on the underlying logic endorsed by the CEO, top management or the corporation more generally. Thus, firm action is due, not only to the goals set, but also the performance feedback model imposed from above. We therefore add to growing body of theoretical and empirical research which emphasizes the criticality of managerial attention in decision making (Ocasio 1997, Cho and Hambrick 2006, Kaplan 2008, Eggers and Kaplan 2009) and highlights the role of the corporate and corresponding goal prioritization.

Our study also complements and extends studies that have found evidence for cognitive inertia at the top management level. Cognitive inertia has been demonstrated in studies of technological change and often manifests as constraints on learning (Levitt and March 1988) and the development of capabilities (Tripsas and Gavetti 2000). For example, in Tripsas and Gavetti’s (2000) analysis of Polaroid, top manager cognition was intricately tied to the razor/blade business model, and as a result, the firm found it difficult to commercialize digital technology despite their competencies. However, our analysis suggests that it is important to consider the mental models at both the corporate and business unit levels, and the relative impact of corporate on business unit feedback.

What makes the diversified multibusiness firm a special case for the effects of cognition on strategy is, in part, its vertical structure. Cognitive perspectives of strategy generally assume that the influence of cognitive frames is consistent across the firm. However, cognition is strongly influenced by situational contexts (Lewin 1951, Dearborn and Simon 1958) rather than by universal, abstract high-level regulative or normative mental models (DiMaggio, 1997). This
level of analysis suggests that ‘cognition’ varies within the firm and business units can at least partially deviate from corporate mental models. Discretion allows BUs to focus on product market problems and converge more quickly on appropriate solutions for those problems (Ethiraj and Levinthal 2004). This suggests that inertia may be partially overcome and potential advantages may accrue to corporate units that grant the business units greater autonomy or effectively direct managerial attention to key emerging competencies, technologies and products.

Our research also has limitations. First, conclusions drawn from studying mobile device industry should be extrapolated cautiously to firms in other industries. The global mobile device industry has relatively few large players and different competitive dynamics may result in different findings. Second, top management focuses on a host of goals and the consequences of attention to multiple simultaneous goals at both the corporate and business unit levels should be consideration for future investigation. Moreover, the degree to which goals are interdependent may also be consequential (Ethiraj and Levinthal 2009). Highly correlated goals may suggest different outcomes than those performance measures that are either uncorrelated or negatively correlated.

In all, studies of multiple goals are in short supply and we still know little of how managers allocate attention in the face of multiple goals. Recent inquiries have focused on the performance outcomes that follow from subunit goals (Cohen 1984, Burton and Obel 1988, Cohen 1984, Ethiraj and Levinthal 2009) and multiple aspiration levels (e.g. Greve. 2008). Generally, these studies find that in order to deal with the cognitive overload or political discord that may arise from multiple competing goals, firms create a subgoal focus or sequentially attend to goals one-at-a-time. For example, Ethiraj and Levinthal (2009) find that spatially or temporally segmented goals may help prevent a status quo bias which emerges with attention to
multiple performance goals simultaneously. We suggest that the corporate structure and the corresponding goal prioritization may also serve as a possible alternative.

Of course, our solution is not without its problems. First, since higher order goals have a greater level of abstraction than lower level goals, their effects on decision making is notably different. In addition, since corporate and business units are often focused on unique goals, decision makers may find it difficult to link lower order with higher order goals, a process known as laddering (Reynolds and Gutman 1988). Either there may be too many steps required to make the link, or the corporate goals are sufficiently vague as to make a reasonable connection impossible. This is often true for broad strategic goals or corporate visions. And it may be that rather than connecting the two, decision makers may substitute one for the other (March and Simon 1958) or completely ignore particular goals altogether (March and Olsen 1976).

Hopefully, it is clear from this discussion, that although we introduce this notion of goal prioritization, much work needs to be done to understand their impact on organizational action. Yet, despite these limitations and the counterproductive implications for innovation, the corporate hierarchy, whether through fiat or provision of decision premises, nonetheless offers a means to direct attention and prioritize performance feedback within the corporation.
References


Burgelman, R. A. 1983. A process model of internal corporate venturing in the diversified major firm. Administrative Science Quart. 28(2) 223-244.


Lawrence, P. R., J. W. Lorsch. 1967. Organization and environment. Graduate School of Business Administration, Harvard University, Boston, MA.


Motorola, 2007, Internal documents.


### Table 1: Summary Statistics and Cross-Correlations (N = 170)

<table>
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<th>Variables</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<th>13</th>
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<tr>
<td>1. New phone introductions</td>
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<td></td>
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</tr>
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<td>2. Performance above Aspiration (business unit sales) ( ^* )</td>
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<td>0.48</td>
<td>-0.23</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>3. Performance below Aspiration (business unit sales) ( ^+ )</td>
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<td>0.4</td>
<td>-0.04</td>
<td>0.41</td>
<td>1</td>
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<tr>
<td>4. Performance above Aspiration (corporate unit ROA) ( ^* )</td>
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<td>0.04</td>
<td>0.11</td>
<td>0.13</td>
<td>0.11</td>
<td>1</td>
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<td>5. Performance below Aspiration (corporate unit ROA) ( ^+ )</td>
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<td>0.11</td>
<td>1</td>
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<td>6. Underperforming corporate unit</td>
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<td>-0.23</td>
<td>-0.3</td>
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<td>7. Age( ^* )</td>
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<tr>
<td>8. Number of employees( ^* )</td>
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<tr>
<td>9. Corporate Sales( ^* )</td>
<td>9.06</td>
<td>0.53</td>
<td>0.17</td>
<td>0.24</td>
<td>0.69</td>
<td>0.09</td>
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<td>10. Diversification( ^* )</td>
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<td>0.55</td>
<td>0.14</td>
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<td>11. Mobile patents( ^* )</td>
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<td>0.23</td>
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<td>12. Unabsorbed slack( ^* )</td>
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<td>0.64</td>
<td>0.02</td>
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<td>0.06</td>
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<td>13. Absorbed slack( ^* )</td>
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<td>0.53</td>
<td>-0.09</td>
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*: in natural logs  \( ^* \): Lagged by one-quarter
Table 2: Random-Effects Negative Binomial Model of New Phone Introductions

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<td><strong>Performance below Aspiration</strong> (business unit sales)</td>
<td>-0.207*</td>
<td>-0.231*</td>
<td>-0.231*</td>
<td>-0.231*</td>
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<td>(0.123)</td>
<td>(0.121)</td>
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<td><strong>Performance above Aspiration</strong> (business unit sales)</td>
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<td>0.246*</td>
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<td>(0.137)</td>
<td>(0.137)</td>
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<tr>
<td><strong>Performance below Aspiration</strong> (corporate unit ROA)</td>
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<td>3.293*</td>
<td>3.293*</td>
<td>3.293*</td>
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<td>(1.885)</td>
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**Controls**

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<td><strong>Corporate Sales</strong></td>
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<td>(0.220)</td>
<td>(0.234)</td>
<td>(0.241)</td>
<td>(0.245)</td>
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<td><strong>Diversification</strong></td>
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<td>0.076</td>
<td>0.059</td>
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<td>(0.064)</td>
<td>(0.067)</td>
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<td>(0.069)</td>
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<td><strong>Mobile patents</strong></td>
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<td>0.122*</td>
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<td>(0.067)</td>
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<td><strong>Unabsorbed slack</strong></td>
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<td>0.165***</td>
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<td><strong>Absorbed slack</strong></td>
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<td>(1.175)</td>
<td>(0.841)</td>
<td>(1.153)</td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td><strong>Number of firms</strong></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Log likelihood</strong></td>
<td>-516.85</td>
<td>-514.82</td>
<td>-513.58</td>
<td>-511.03</td>
</tr>
<tr>
<td><strong>Overall model test</strong></td>
<td>715.69***</td>
<td>760.29***</td>
<td>757.46***</td>
<td>815.23***</td>
</tr>
<tr>
<td>(df)</td>
<td>(37)</td>
<td>(39)</td>
<td>(39)</td>
<td>(41)</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; All columns include (quarter-year) time dummies; Performance-aspiration gap variables are lagged by one quarter.

* significant at 10%; ** significant at 5%; *** significant at 1%
Table 3: Random-Effects Negative Binomial Model of New Phone Introductions

<table>
<thead>
<tr>
<th></th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance below Social Aspiration</strong></td>
<td>-0.232</td>
<td>-0.293*</td>
</tr>
<tr>
<td>(business unit sales)</td>
<td>(0.172)</td>
<td>(0.168)</td>
</tr>
<tr>
<td><strong>Performance above Social Aspiration</strong></td>
<td>0.333**</td>
<td>0.380**</td>
</tr>
<tr>
<td>(business unit sales)</td>
<td>(0.153)</td>
<td>(0.148)</td>
</tr>
<tr>
<td><strong>Performance below Social Aspiration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(corporate unit ROA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance above Social Aspiration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(corporate unit ROA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Underperforming corporate unit* Performance above Social Aspiration</strong></td>
<td>-0.736**</td>
<td>-0.956***</td>
</tr>
<tr>
<td>(business unit sales)</td>
<td>(0.344)</td>
<td>(0.336)</td>
</tr>
<tr>
<td><strong>Underperforming corporate unit* Performance below Social Aspiration</strong></td>
<td>0.122</td>
<td>0.180</td>
</tr>
<tr>
<td>(business unit sales)</td>
<td>(0.181)</td>
<td>(0.177)</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>-0.010***</td>
<td>-0.010***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td><strong>Number of employees</strong></td>
<td>0.202*</td>
<td>0.184*</td>
</tr>
<tr>
<td></td>
<td>(0.111)</td>
<td>(0.108)</td>
</tr>
<tr>
<td><strong>Corporate Sales</strong></td>
<td>-0.099</td>
<td>-0.329</td>
</tr>
<tr>
<td></td>
<td>(0.247)</td>
<td>(0.249)</td>
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<tr>
<td><strong>Diversification</strong></td>
<td>0.075</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td>(0.066)</td>
<td>(0.069)</td>
</tr>
<tr>
<td><strong>Mobile patents</strong></td>
<td>0.116*</td>
<td>0.116*</td>
</tr>
<tr>
<td></td>
<td>(0.064)</td>
<td>(0.062)</td>
</tr>
<tr>
<td><strong>Unabsorbed slack</strong></td>
<td>0.159***</td>
<td>0.180***</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(0.035)</td>
</tr>
<tr>
<td><strong>Absorbed slack</strong></td>
<td>-0.271</td>
<td>-0.016</td>
</tr>
<tr>
<td></td>
<td>(0.217)</td>
<td>(0.225)</td>
</tr>
<tr>
<td><strong>Underperforming corporate unit</strong></td>
<td>0.151</td>
<td>0.179</td>
</tr>
<tr>
<td></td>
<td>(0.122)</td>
<td>(0.125)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>4.841***</td>
<td>5.305***</td>
</tr>
<tr>
<td></td>
<td>(1.188)</td>
<td>(1.155)</td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td><strong>Number of firms</strong></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Log likelihood</strong></td>
<td>-512.01</td>
<td>-506.12</td>
</tr>
<tr>
<td><strong>Overall model test</strong></td>
<td>788.57***</td>
<td>873.19***</td>
</tr>
<tr>
<td>(df)</td>
<td>(42)</td>
<td>(44)</td>
</tr>
</tbody>
</table>

Standard errors in parentheses; All columns include (quarter-year) time dummies; Performance-aspiration gap variables are lagged by one quarter.

* significant at 10%; ** significant at 5%; *** significant at 1%
Figure 1: Smoothing Sales Revenue
Figure 2: New Product Introductions Multiplier Rate

Performance - Aspiration (Business Unit Sales)

Multiplier of Rate
Figure 3: New Product Introductions Multiplier Rate