Performance, Aspirations, and Risky Organizational Change

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The study reported here uses learning theory to examine how performance feedback affects the probability of risky organizational changes that are consequential to an organization's performance. The theory predicts how decision makers interpret organizational performance by comparing it with historical and social aspiration levels. Empirical analysis of the consequences of performance shortfalls on the probability of strategic change in the radio broadcasting industry shows clear sensitivity to social and historical aspiration levels. It also shows that changes seen or done by the station predict future change, suggesting that the recent experiences of organizations cause differences in capabilities and perceived opportunities, leading to differences in organizational inertia.

A central assumption in learning perspectives on organizations is that organizations learn from their experience by making the probability of changes conditional on their history (Cyert and March, 1963; Levitt and March, 1988). This has led to an interest in how the performance of the organization determines the likelihood of different types of organizational change (March, 1988; Bolton, 1993; Miller and Chen, 1994; Ocasio, 1994). Theorists have proposed different learning rules and examined their adaptive consequences (Levinthal and March, 1981; March, 1988; March and Shapira, 1992), and empirical researchers have tried to find which learning rules exist in practice (Singh, 1986; Bromiley, 1991; Lant, Milliken, and Batra, 1992). This theoretical and empirical work has emphasized organizational characteristics that are consequential for performance, such as market position and technology.

The research has been guided by two insights on organizational change. First, organizational change involves risk. The consequences of changing are usually less well known than the consequences of not changing, which means that the study of organizational change is informed by theory on individual risk-taking behavior (Libby and Fishburn, 1977; Lopes, 1987; Sitkin and Pablo, 1992) and by theory integrating individual risk-taking behavior with decision-making processes in organizations (Staw, Sandelands, and Dutton, 1981; Milliken and Lant, 1991; Ocasio, 1995). An important idea taken from this theory is that risk taking is oriented toward goals: the behavior differs depending on whether the actor is above or below some aspiration level (Kahneman and Tversky, 1979; March, 1988; March and Shapira, 1992). Second, organizations do not necessarily change whenever performance feedback rules suggest they would. Decision makers become committed to losing courses of action (Staw, Sandelands, and Dutton, 1981) or interpret performance feedback in ways that allow the organization to stay inert (Hirschman, 1970; Milliken and Lant, 1991). Organizations exhibit political resistance to change, and managers face uncertainty on what opportunities are given in the environment (Stinchcombe, 1965; Hannan and Freeman, 1977). The probability of change does not depend only on performance.

Organizational change can be seen as an outcome jointly determined by motivation to change, opportunity to change,

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and capability to change (Miller and Chen, 1994). This paper emphasizes motivation to change by examining how performance relative to aspiration levels influences the probability of change, but it also takes into account opportunity to change and capability to change. Opportunity to change is important because decision makers need to find attractive alternatives before changing. For a change in market position, the outcome examined in this paper, arguments of opportunity can be used to examine how managers discover, learn, and enact market positions (Porac et al., 1995). Capability to change is important because decision makers may initiate changes that are obstructed by the organization (Stinchcombe, 1965; Hannan and Freeman, 1977), or organizations may initiate changes and fail in the attempt (Hannan and Freeman, 1984). Organizations are more likely to change when they have developed routines for making changes (Kelly and Amburgey, 1991), including routines to develop or acquire the necessary skills and resources. Arguments on capability suggest that experience with market position changes causes organizations to be more likely to make new position changes.

THEORY AND HYPOTHESES

Motivation to Change: Performance Relative to Aspirations

Organizational change is a risky decision, so the literature on individual and organizational risk taking is important in understanding the motivation to change. People often show risk aversion, choosing gambles with lower variance at some cost in expected value, but the degree of risk aversion seems to depend on the context of the choice (Lopes, 1987; Thaler and Johnson, 1990). In particular, individual risk taking appears to increase when people fail to attain a goal or aspiration level (Kahneman and Tversky, 1979), an observation that has been supported by study of decision makers in many contexts (March, 1988). Experiments on risk taking in business situations show an increase in risk taking below the aspiration level (Lant and Montgomery, 1987; Wehrung, 1989). Managers report taking fewer risks when performance exceeds their goals (Singh, 1986; March and Shapira, 1987), and high organizational risk taking is related to low performance relative to aspirations (Bowman, 1982; Grinyer and McKiernan, 1990; Bromiley, 1991; Bolton, 1993).

An aspiration level in individual decision making has been described as a "reference point that is psychologically neutral" (Kameda and Davis, 1990: 56) or as "the smallest outcome that would be deemed satisfactory by the decision maker" (Schneider, 1992: 1053), which is similar to a reservation value in bargaining (Schurr, 1987). It is a result of a boundedly rational decision maker trying to simplify evaluation by transforming a continuous measure of performance into a discrete measure of success or failure (March and Simon, 1958; March, 1988). The aspiration level is the borderline between perceived success and failure and the starting point of doubt and conflict in decision making (Lopes, 1987; Schneider, 1992).

Since many organizational measures of performance come without ready-made definitions of what performance level is acceptable, organizations may have different aspiration levels depending on their history and the attention patterns of their members, so the same performance level might be evaluated differently in different organizations. Whether a given performance level is categorized as a success or a failure is consequential, because the value function used to judge performance is not a smooth function of the level of performance but, rather, decreases more quickly in the failure range (Kahneman and Tversky, 1979). The simplified information processing obtained by categorizing outcomes as successes and failures means that organizational risk taking could be highly sensitive to performance relative to the aspiration level.

Social and historical aspiration levels. If performance relative to aspiration levels is important, then we ought to study how aspiration levels are formed. Social comparison theory suggests that aspiration levels are determined by the performance of similar others (Festinger, 1954; Cyert and March, 1963). People compare themselves with referent others either for self-assessment or self-enhancement (Wood, 1989). When the goal of social comparison is to make an accurate assessment, others who are diagnostic because they are similar to the focal actor are included in the reference group, but when the goal is self-enhancement, high-performing others may be removed from the reference group. The situation can also determine the referents by making a group of (possibly unwanted) others highly salient (Wood, 1989).

There is less research on social comparison among organizations, so we know little about how managers form reference groups of other organizations. Size, industry, and performance are important organizational characteristics that seem to affect reference group composition (Haveman, 1993; Davis and Greve, 1997), and within an industry similarity judgment may also be based on product, market, or production methods of the firms (Reger and Huff, 1993; Porac et al., 1995). As in individual social comparison, salience may be so important that opportunities to edit the reference group by relevance or self-enhancement criteria are limited. Physical proximity is important in the composition of reference groups (Baum and Lant, 1993), reflecting its importance as a relevance criterion or simple ease of observation.

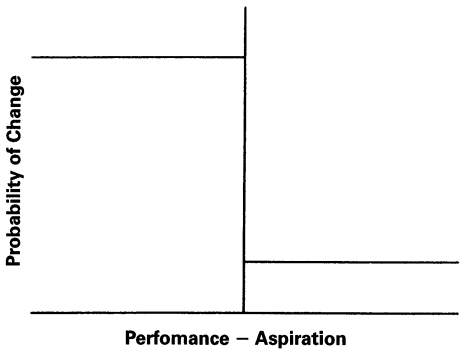
A second theory of aspiration levels is that they are determined by the performance history of the firm itself (Cyert and March, 1963; Levinthal and March, 1981). The recent performance history of the organization can be used to set an aspiration level that holds differences among organizations constant. Aspiration levels based on historical performance have been related to early, and hence high-risk, firm entry into research and development consortia (Bolton, 1993), changes in organizational strategy in both stable and changing environments (Lant, Milliken, and Batra, 1992), and decisions in a simulated market (Lant, 1992). Lant (1992) also argued that the processes of expectation formation and aspiration formation are similar and that studies of adaptive learning of expectations indicate that historical data are used to form aspirations (e.g., Jacobs and Jones, 1980; Sterman, 1987).

Social and historical aspiration levels can be seen as results of the decision maker behaving as an intuitive scientist (Nisbett and Ross, 1980): available data are combined with simple processing rules to create an expectation of future performance, which then becomes the aspiration level (Meyer and Gellatly, 1988). When the recent performance of other organizations in the market are used to form an expectation, the proximity in time makes bias due to temporal changes in the market unlikely, but the selection of referents can introduce bias. When the performance history of the same organization is used to form an expectation, heterogeneity among organizations is not a problem, but changes in the market situation over time can lead to bias. Judging performance by historical and social aspiration levels is a decision-making heuristic, but it resembles more formal ways of forming expectations.

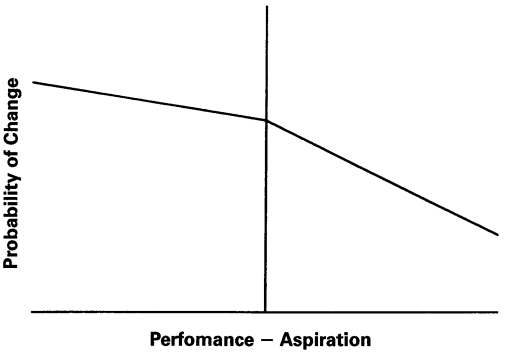
From relative performance to risk taking. Scholars have proposed different functional forms of the relationship of performance relative to an aspiration level and the probability of organizational change (e.g., March and Shapira, 1992), and figure 1 illustrates some of them. Figure 1a shows a very simple model that assumes that decision makers classify outcomes into two categories, success and failure, and that the probability of change is higher in the failure category (March and Simon, 1958). Figures 1b–d show models with continuous adjustments of the probability of change. In figure 1b the probability of change decreases as the performance increases, but in the success range (above the aspiration level) the probability decreases faster than in the failure range (below the aspiration level). Probability of change may decrease more slowly below the aspiration level because of the decision makers' commitment to failing courses of action (Staw, Sandelands, and Dutton, 1981), perceptual and attributional biases (Milliken and Lant, 1991), or preferences for the status quo (Hannan and Freeman, 1977; Kahneman and Tversky, 1979). In figure 1c these inertial factors are absent, leading to a constant decrease in the probability of change over the entire range of performance. In figure 1c, aspiration levels would not be necessary to explain the probability of change, since there is no discontinuity or change in slope anywhere in the function. Finally, in figure 1d change is most likely near the aspiration level and declines away from it. Such a relation might happen if obvious failure produced rigidity in the organization, while outcomes that cannot be easily classified as successes or failures allow political contests over the interpretation of performance, leading to new political coalitions and subsequent change (Ocasio, 1995).

The curve in figure 1b is characterized by two properties: (1) decline in the probability of change as performance increases, both in the negative and positive range of relative performance; and (2) higher sensitivity above the aspiration level, as the decline in probability of change is greater when relative performance is positive. The first of these properties incorporates the idea that failure increases the probability of change by initiating search activities (Cyert and March, 1963) and by making the future performance levels that might result from a change more attractive relative to the present.

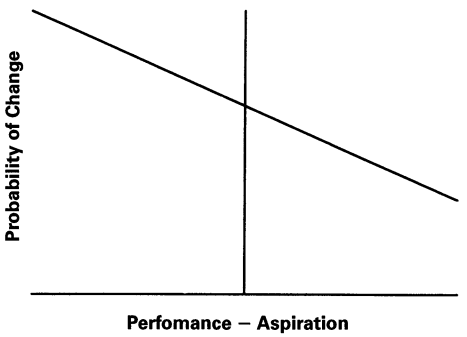
Figure 1. Proposed functional forms for relationship of performance relative to an aspiration level and probability of change.



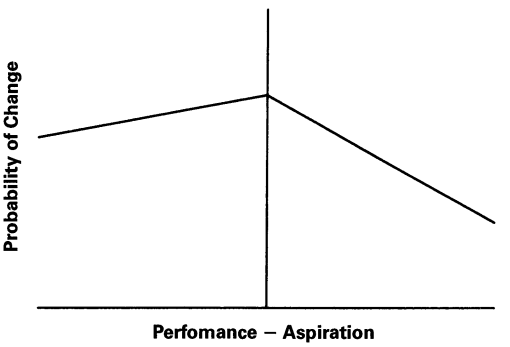
1a: Categorical Response



1b: Changing-slope Response



1c: Constant-slope Response



1d : Non-homogenous Response

The second is consistent with organizational inertia in the face of failure (Hannan and Freeman, 1977; Staw, Sandelands, and Dutton, 1981; Milliken and Lant, 1991) and individual decision makers assigning a very low value to outcomes in the failure category (Kahneman and Tversky, 1979), leading to conservativeness once the current performance is classified as a success. Organizations are likely to exhibit both problem-oriented search and inertia, so the functional form shown in figure 1b is the basis of the hypotheses.

The empirical model is specified so that the parameter estimates can yield all the displayed continuous-change relations (figures 1b–d) and some not shown (such as a V-shaped or a horizontal relation) and can be tested against different null hypotheses. Tests of whether the slopes are negative and significantly different from zero reveal whether risk taking declines when performance increases, allowing a distinction between the always declining curves 1b or c and the non-homogenous curves (1d or V-shaped) or a horizontal curve (no response to performance). Tests of whether the slope becomes steeper above the aspiration-level point show whether the behavior is more sensitive to performance changes in the positive range of the relative performance, so that curve 1b can be distinguished from curve 1c.

The hypotheses assume that the social and historical aspiration levels affect the probability of change by the functional form shown in figure 1b. The social aspiration level is based on the contemporary performance of a reference group of organizations. Here, the reference group is all other organizations in a market, specified according to industry convention, and the aspiration level is set to their mean performance. Clearly, the composition of the reference group and the rule for integrating their performance into an aspiration level can be specified differently, but these choices seem like a good start for investigating the effects of a socially constructed aspiration level. The hypotheses are:

Hypothesis 1a (H1a): When performance relative to the social aspiration level increases, the probability of change decreases.

Hypothesis 1b (H1b): The decrease in the probability of change is greater for performance increases above the social aspiration level.

The historical aspiration level gradually accommodates to the current performance of the firm. This is done by specifying it as an exponentially weighted moving average of experienced performance (Levinthal and March, 1981; March, 1988; Lant, 1992). Defining the symbols A for aspiration level, P for performance, t for time period, and α for an adjustment parameter, the formula is:

$$A_t = \alpha P_{t-1} + (1 - \alpha)A_{t-1}.$$

This formulation of the historical aspiration level can be viewed as the result of an anchoring and adjustment process (Schneider, 1992), with last period's aspiration level as the anchor and this period's performance as the adjustment. The α is the weight given to the performance, and high α means that the aspiration level is updated quickly, implying an emphasis on the recent performance. The model's premise that previous aspiration levels and performance affect the aspiration level is supported by experimental and field studies, but the functional form of the effects is still debated (Lant, 1992; Mezias, Chen, and Murphy, 1997). The hypotheses are:

Hypothesis 2a (H2a): When performance relative to the historical aspiration level increases, the probability of change decreases.

Hypothesis 2b (H2b): The decrease in the probability of change is greater for performance increases above the historical aspiration level.

Modifications of received theory. The theory of responses to performance feedback contains some ambiguous or disputed points, and it is important to discuss how this paper differs from others. First, some treatments assume that the historical and social aspirations are integrated into one aspiration level (i.e., Cyert and March, 1963; March, 1988), but these hypotheses assume that decision makers attend to multiple aspiration levels. Some scholars have suggested that there are multiple goals and an aspiration level that shifts between them as the manager's focus of attention changes (Bromiley, 1991; March and Shapira, 1992), but independent effects of multiple aspiration levels have not been examined. That suggestion is consistent, however, with the idea that multiple goals are present in organizational

decision making and that decision makers attend to each one as they become salient (Cyert and March, 1963).

Decision makers' attention may shift between goals according to organizational routines or situational stimuli (Ocasio, 1997), but attention may also shift depending on the performance relative to each goal (March and Shapira, 1992). Such endogenous shifting of attention would be problematic if performance were higher than one aspiration level but lower than another. Different rules for shifting attention can give dramatically different behaviors: a ''fire alarm'' rule would shift attention to the aspiration level above the current performance, just as people pay attention to a ringing fire alarm, making change responsive to the most demanding standard. A self-enhancing rule would shift attention to the aspiration level below the current performance, making change responsive to the least demanding standard. Because endogenous shifts of attention are possible, the models include a variable that captures the effect of inconsistent aspiration levels.

The theory often assumes that decision makers are oriented toward goals but does not specify whether these are period-to-period goals or goals of accumulation (March, 1988; March and Shapira, 1992). This paper, like some others (Levinthal and March, 1981; Lant, 1992), specifies an aspiration level based on current performance, but work has also been done using accumulated wealth (March, 1988; March and Shapira, 1992). Neither current performance nor accumulated wealth is inherently more eye-catching than the other, but since organizational accounting systems often emphasize current performance, it is reasonable to assume that managers' attention is oriented toward performance measures, like the return on assets or stock returns, more than wealth measures, like the accounting or stock value of the firm.

It is often suggested that increases in the resources of an organization increase experimentation and organizational change (Cyert and March, 1963; Levinthal and March, 1981). Such slack search has been found in studies of research and development expenditures (Antonelli, 1989) and managerial risk taking (Singh, 1986), but not in a study of income stream variability (Bromiley, 1991). Change due to slack search is not hypothesized here, because these market position changes imply the abandonment of the niche that gives the current performance and entry into a niche with different resources and competitors. This is equivalent to trading the current stream of income for an unknown, an action very different from acquiring future income options, as in resource exploration or research and development, or incrementally changing the income stream, such as entering a new business in addition to the old. Increased experimentation due to slack is unlikely to lead to abandonment of the strategy that yielded the slack to begin with.

Opportunities to Change: Market Niche Dynamics

The competitive environment is an important influence on organizational change of market position, as it gives the opportunities for such changes. The niche structures of markets determine the profitability of different market positions but are difficult for decision makers to estimate, as consumer preferences can only be observed indirectly through

their responses to concrete choices (Leifer and White, 1987). It is difficult for consumers to guess whether they will like something they have not seen, and it is difficult for firms to guess whether the consumers might like something they have not yet been offered. This means that finding free niches is difficult, while entering occupied niches may lead to high post-entry competition. Market position changes have to be made under high uncertainty about the payoffs to the organization, a situation that may lead to inertia or to the use of heuristic rules to guess which positions are better.

Market dynamics provide information by giving managers an opportunity to learn about the market structure through the experience of others (Levitt and March, 1988; Greve, 1996). When another organization enters a new market position, decision makers learn about the niche it abandoned and the niche it entered. At least these niches become salient through the competitor's change, and if the performance of the competitor is known, the resource availability in the niches may also be estimated. The greater salience of the niche may lead to imitation, and the change may reveal information helping the decision maker evaluate market positions better. Also, for decision makers concerned with the dangers of competing with experienced rivals, recently abandoned or entered niches may be seen as better opportunities than niches with entrenched competitors. This leads to the following hypothesis:

Hypothesis 3a (H3a): Market position change is more likely when the organization has recently observed market changes by competitors in its local market.

In radio broadcasting, as in other multi-market industries, corporations participate in many markets by owning units in each one. This creates the opportunity for communication across corporate units, so that the local learning hypothesized above is augmented by nonlocal learning. As a result of this nonlocal learning, market position changes observed by the corporate "alters" of a station may cause the station to change (Greve, 1995; 1996):

Hypothesis 3b (H3b): Market position change is more likely when other organizations in the same corporation have recently observed market changes by competitors in their local markets.

Capabilities of Change: Organizational Change Dynamics

Organizations appear to differ in their change patterns, with some organizations changing readily and often, while others in similar contexts appear inert. Based on their experience, organizations develop routines for responding to environmental stimuli, and they are likely to reuse old solutions to problems (Kelly and Amburgey, 1991; Amburgey and Miner, 1992). This pattern may result from repetitive momentum, in which strategic changes are repeated regardless of their consequences for performance (Kelly and Amburgey, 1991), perhaps because they have become easily available action programs (March and Simon, 1958). Though momentum would seem to be more likely when a solution has been applied successfully, organizational reliance on routine action may cause momentum even in the absence of feedback. Adversity could even increase momentum by increasing individual reliance on well-learned responses and organizational

emphasis on actions available in the organizational memory (Staw, Sandelands, and Dutton, 1981; Levitt and March, 1988; Ocasio, 1995). Assuming, for simplicity, that momentum is independent of the level of performance leads to the following hypothesis:

Hypothesis 4a (H4a): Market position changes are more likely when the organization has recently made a market position change.

A multimarket corporation may also have nonlocal momentum. Changes done in one unit organization can be routinized at the corporate level and repeated in other unit organizations, which leads to the following hypothesis:

Hypothesis 4b (H4b): Market position changes are more likely when other organizations in the same corporation have recently made market position changes.

Momentum at the organization level may be caused by responses to performance feedback rather than routinization of changes. In a highly competitive environment it is difficult to find a market position that gives high performance relative to a social aspiration level. In an environment with increasing competition it is difficult to find a market position that gives high performance relative to a historical aspiration level. This can lead low-performing firms to change, but they find that performance after the change is still low and then change again. If performance alone predicted change, analysis of the effect of change on the probability of subsequent change would produce a momentum effect when performance measures were omitted, but it would produce none once performance measures were included. If performance and momentum effects were both present, the effect of change on the probability of subsequent change would be smaller when performance measures were included. Empirical work on momentum typically has not included performance measures (Amburgey and Miner, 1992; Amburgey, Kelly, and Barnett, 1993), so it is not clear whether performance feedback can account for some or all of the momentum effect.

I tested the hypotheses using data on the format changes of U.S. radio stations. Radio broadcasting is a fruitful setting for testing effects of performance measures because audience estimates are a shared and very important performance measure for radio stations. Audience estimates are scrutinized by a station's top manager, programming manager, and salespeople and are used to guide decisions on programming, advertising rates and targeted advertisers, and format changes. Because the competition (and audience measurement) in radio broadcasting is local to each market, it is possible to use data on multiple markets to get variation in social aspiration levels across observations. Because data are available over time, it is possible to trace the effect of performance relative to historical aspiration levels. The decision to change the format has serious and uncertain consequences for the station's economic performance, so it is an appropriate outcome for a study informed by the theory of risk-taking behavior.

The Radio Broadcasting Industry

Radio markets are differentiated because audiences differ in tastes for music and other programming material. These

preferences vary systematically by demographic variables but also vary within each demographic group. One person may prefer different programming at different times, but radio stations generally choose to program one kind of music (or other material) throughout the day. As long as stations are predictable, listeners can use the dial to choose what kind of programming they want at any one time. Stations target specific groups of listeners by selecting a format, which is a combination of program content, announcer style, timing of program and commercial material, and methods for listener feedback and quality control. There are about 30 main formats (M Street Corp., 1992), and variations on the main formats increase the possibilities even more. The composition of the audience differs depending on the format. Demographic profiles of some well-known formats include audiences concentrated in the teen demographic (Contemporary Hit Radio), an 18–34, mostly male audience (Modern Rock), and an even 35–54 distribution with mostly women (Adult Contemporary) (Arbitron, 1991a). The size of the audience of a station depends on its choice of format and the formats of competing stations. A good choice of format can locate the station in a munificent niche with little competition, giving a large audience and high advertising revenue, but it is difficult to find a format that appeals to a large audience and is not already used.

Format changes are costly for the station. They may require staff changes, market surveys, or help from format consultants. Because they do require setting advertising rates without knowing the audience size until the first market report after the change, they may cause problems with advertisers. Warning advertisers about a format change in advance may cause some to withdraw advertising or renegotiate rates, and changing format without warning advertisers may cause loss of goodwill. Broadcasters try not to change formats unnecessarily, and when changing formats, they want to succeed on the first attempt.

Regulatory limits on transmission power means that the competition in radio broadcasting takes place in the local market. U.S. broadcasting consists of about 450 different radio markets, ranging in size from New York and Long Island (population 16,321,400) to Juneau, Alaska (population 26,200) (M Street Corp., 1992), plus a high number of locations too small to be classified as markets. The Arbitron Company, which is the dominant audience measurement firm, had 261 markets scheduled for measurement in 1991 and 1992 (Arbitron, 1991b), but the set of markets measured changes occasionally as Arbitron adds or drops markets. Other companies survey some markets not served by Arbitron, but their estimates are difficult to compare with Arbitron's because of differences in survey methodology.

The audience estimates are published in market reports that list all stations with measurable influence in the market, regardless of whether they subscribe to the service or not, so they give a comprehensive view of the listening patterns in the market. Market measurements are usually done twice a year, but in some small markets they are done only annually, and in large markets they are done quarterly. Although the audience measures are estimates, and hence have some

standard error and possible bias (Apel, 1992), the consequences are just as serious as if they had been entirely accurate. They are presented to advertisers to justify advertising rates and sell advertising spots, in effect becoming real sources of revenue for the station. In an interview, a program director referred to the audience measures (informally called ratings) as a ''report card'' and then noted their significance for station revenue: ''Nine times out of ten, if you have good ratings, you can charge good rates for your commercials, sell lots of commercials, and bring in as much revenue as possible. And the only source of revenue that radio stations have is advertising.''

Commercial radio stations are owned by private persons, small joint stock companies, schools and religious orders, large broadcast corporations, and divisions of media corporations or diversified corporations.[1] A single radio station is not a large business, so a corporation that wants a large investment in the radio industry will own several. The legal limit was 30 in each of the AM and FM bands at the end of the study, but it was 12 in each band until August 1992 (Skall, 1992). By the end of this study the corporation with the highest number of stations had a total of 25 (Duncan, 1993). To avoid local monopolies, the number of stations a corporation can have in one market is limited, so large corporations spread their station holdings across several markets. Corporations may manage stations as a financial portfolio with no attempt to use central management or transfer of knowledge among stations, but they can provide programming or management knowledge that makes their stations behave differently than single stations.

DATA AND METHODS

Sample and Data Sources

I used data from stations in 160 U.S. radio markets measured by Arbitron and measured format changes from January 1, 1984 to December 31, 1992. These choices were dictated by the availability of performance measures comparable across markets and stations and measures of format change, respectively. I coded format changes from the *M Street Journal* (1984–1992), a weekly newsletter (biweekly in the first 10 months of publishing) monitoring events in the radio broadcasting industry. Each change noted in the newsletter contained data on origin and destination formats, station call letters, state, and market. The newsletter reports are based on information supplied from a network of industry insiders who monitor markets and alert the editor whenever they judge that a station has changed its format (Greve, 1995, 1996).

I obtained audience measurement data from Duncan (1992). This source shows Arbitron audience estimates for 160 different markets from 1975 (or the first year the market was measured, if that is later) to 1992 for most stations in the market. The data on audiences from 1975 made it possible to generate historical aspiration levels with a long lead before the measurement of format change. The data source omits public radio stations and some commercial radio stations that had very low ratings throughout this time interval.

1
Institutions such as schools and religious orders often operate public radio stations, but some instead hold a commercial license.

The latter exclusion is a regrettable flaw, as it limits the ability to observe the effect of long periods of very low performance, but the limited availability of audience measurement data makes it very difficult to remedy. Not all Arbitron markets are listed, and small markets are especially likely to be omitted. Of the 261 markets measured by Arbitron in 1991, 10 were partially or wholly enclosed in others, so they were not meaningfully separate markets. Of the remaining, Duncan omitted most of the markets ranked below 200 (9 remained), 37 of the 101–200 markets, and 3 of the top 100 markets.[2] This amounts to unintentional sampling but does not appear to be a serious flaw as long as the results are interpreted with some attention to the overrepresentation of stations in large markets. All stations with performance data contributed observations. The format change data for 1984 and 1985 were only used to initialize the variables on previous station changes, so the analysis used the data for 1986 through 1992.

Measures

Dependent variables. The analyses have five different events as dependent variables. The most inclusive event consists of all changes in format or production, effectively counting all entries in the *M Street Journal.* This is called *all changes*. To investigate whether changes with different risk levels show different effects of performance, I partitioned the events into four subevents and analyzed them separately. The first subevent consists of entries into one of the formats: Soft Adult Contemporary, New Age, Urban Contemporary, and Soft Urban Contemporary. These formats were recently developed and had a low number of adopter stations throughout the study period. They can be considered especially risky choices, as there was less knowledge available on the market potential and programming practices of these formats than on the more well-known formats. This event is called *innovative format,* and since it omits both the most common formats (Adult Contemporary and Country & Western) and many less common but older formats (such as Easy Listening and Album-oriented Rock), it has substantially fewer events. The second counts all format changes in which the destination format is a *satellite format*. These are provided by programming services that sell, for money or a portion of the advertising time, ready-made programming in a number of different formats. Buying a satellite feed allows a reduction in operating costs by eliminating announcers and programming staff, and it offers some security, as many satellite services offer a range of formats, allowing the station to change easily if the format fails in the market. This makes entry into satellite format a low-risk alternative.[3] Third, the event *production change* consists of all changes among the production modes, live, simulcast, or satellite, that *do not* also change the format. The risk level of this event is difficult to judge but may be somewhere between innovative change and satellite change. Finally, *new format* consists of all format changes except entry into innovative or satellite formats and should also have a risk level between innovative and satellite entry.

Performance measures. The performance measure used in this study is the 12+ Metro audience share (Monday–Sun-

2
The markets are ranked according to the population, not the actual number of radio listeners.

3
One coding problem had to be solved. Near the end of the study period innovative formats became available by satellite, and the data showed six entries into an innovative format by satellite. I counted them as satellite entries, which seems most correct, since they were offered by the largest satellite provider, allowing adopting stations to change to another format if the format failed in the market.

day, 6 AM–midnight). This shows the average proportion of all listeners over 12 years old tuned in to the focal station during the broadcast week. It is a gross market share that does not take into account which age segment the station targets and is convenient for comparing the audiences of stations with different formats. Many other measures exist in the Arbitron audience reports, showing audience in specific demographic and time segments (Arbitron, 1992). These detailed measures are useful for programming management and sales, but since their interpretation depends on the format of the station, they are less useful for cross-station comparison of performance, and they are not given in the usual industry data books, such as Duncan or M Street Corp.'s publications.

For evaluating how broadcasting managers use audience estimates to form social and historical aspiration levels it is useful to know the layout of the Arbitron market reports. The reports have a preamble about market characteristics and station broadcast facilities and then present the audience estimates (Arbitron, 1992). The first table is called "Metro Audience Trends" and shows for each station the most recent and the four preceding audience estimates. This is shown for a number of day parts and demographics, but the first displayed is the 12+ Mon.–Sun. 6 AM–mid used in this study. Each station's history is displayed along the row, and all the stations in the market are shown down the column (the list is alphabetical and often more than one page). This creates a clear opportunity for both historical and social comparisons of the audience and appears to encourage a comparison with the entire market as a comparison group. Three audience measures are shown directly below each other for each station, and the first of these is the *share,* which is used here (the others are average quarter-hour persons and cume rating).[4] This presentation of audience measures is important because it reflects the rating agency's judgment of what measures broadcasters are interested in, and it directs the attention of the report readers toward these measures, thus enacting them as important performance measures in this industry.

Because some markets are close to each other, stations are sometimes listed in the reports of more than one market. Since there seems to be no reasonable way to capture the effects of multiple feedback sources for some organizations, I followed a rule of including only the measurement from the largest market. This will understate the total audience of some stations but seems preferable to attempting to integrate the market measurements by constructing some measure showing average relative performance across the two markets in which a station is represented. Nine percent of the stations were listed in more than one market. This proportion is high enough to affect the results if these stations behave differently, so I also did the analyses on a dataset omitting stations measured in more than one market. The results were the same as those of the main analysis.

Social aspiration level is the mean share of all stations in the market. The numerator in this measure is the sum of the shares of the local commercial stations with measurable influence, which is nearly always below one. This is because

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Cume persons is the number of different people who listen to a station in a quarter-hour, which is different from average quarter-hour persons because it does not take into account for how long they listen. Cume ratings express this as a percentage of the persons in the target demographic.

the local commercial stations lose listeners to public stations, stations with audiences too small for measurable influence (i.e., their audience is below the minimum required for listing in the market report), and stations with measurable influence in the market but a different primary market. In these data, the percentage of the audience left to local commercial stations was on average 79.93, with a standard deviation of 14.17. The denominator in the measure is the number of local commercial stations with measurable influence. The *historical aspiration level* also uses the audience share and makes an exponentially weighted moving average of the share experienced by the focal station.

The key variables are relative performance measures, defined as share minus the social aspiration level or the historical aspiration level. I specified the effect of relative performance as a spline function (Greene, 1993: 235–238). A spline specification means that the variable coefficient can change at a predetermined point, just as figures 1b and 1d have different slopes above and below zero. Naturally, the estimation may show that the variable coefficient does not change, so a spline specification can also yield the straight line curve in figure 1c. Splines can be made by entering separate variables for performance above and below the aspiration level or by entering performance and an interaction variable of performance and an indicator when it is below the aspiration level. In the latter approach, the interaction variable will measure how much the slope changes below the aspiration level. For the curve in figure 1b, which declines less quickly below zero, the interaction variable will have a positive coefficient. I used both methods in the analysis, since the separate variables method gives separate tests of hypotheses 1a and 2a (decline in change as performance decreases) above and below zero, and the interaction tests hypotheses 1b and 2b (greater decline above zero) by testing whether the interaction variable is significantly greater than zero. Estimation by two methods also provides an implicit test of the estimation. If the two specifications had given different estimates, which did not happen, then estimation problems would be indicated. The key variables and predictions are:

Share – Average share (above zero):	$b < 0$ (H1a),
Share – Average share (below zero):	$b < 0$ (H1a),
Share – Historical share (above zero):	$b < 0$ (H2a),
Share – Historical share (below zero):	$b < 0$ (H2a),
Change in share – Average share below zero:	$b > 0$ (H1b),
Change in share – Historical share below zero:	$b > 0$ (H2b).

To control for the effect of performance above one aspiration level but below another, the models include a negative inconsistency variable, which is set to zero if the performance is over or under both aspiration levels and is set to the difference of the performance and the highest aspiration level if the performance is between the two aspiration levels. If a self-enhancing rule is in operation, the effect of performance below one aspiration level will be reduced when the other aspiration level is below the performance level. The negative coefficient of the relative performance will then become closer to zero, which means that the negative inconsistency variable will have a positive coefficient estimate.[5]

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It is also possible to specify a positive inconsistency variable equal to the difference of the performance and the lowest aspiration level when the aspiration levels are inconsistent. A fire-alarm rule will lead to a positive coefficient estimate for this variable. Only the negative inconsistency variable is included in the analyses displayed, as analyses with the positive inconsistency variable entered alone or with the negative gave similar results.

Change measures. To test hypotheses 3 and 4, I specified four variables as counts of changes observed or experienced by the station. I tested H3a by a count of the station's format changes during the past two years *(station change, local),* and H3b by a count of the format changes made by the other stations in the focal corporation during the previous two years *(station change, nonlocal).* I tested H4a by a count of the format changes by other stations in the local market in the previous year *(market change, local),* and H4b by a count of all format changes in markets in which the focal corporation had stations, except changes in the focal market and by its own stations *(market change, nonlocal).* The market change variables test how information about opportunities affect change, so I only added recent events; the station and corporate change variables test how capabilities affect change, so I used a two-year span to capture a longer period of buildup and retention.

Control variables. A high number of competitors can create competitive pressures that cause organizations to change their market position (Amburgey, Kelly, and Barnett, 1993). To control for this, I entered the number of stations in the market, and I entered the human population in the market to control for the resource base the stations were competing for. The number of stations in the market (market *density*) counted all stations in the market, including public stations and commercial stations that do not appear in the performance data. I constructed market density from M Street Corp. (1992) and the event data, which included station entries and exits, allowing annual updates.

Two variables control for differences in change behavior among stations owned by different size corporations. The first is just an indicator variable showing whether the station was owned by a multimarket corporation, defined as an entity owning three or more stations. The variable *station number* is the number of stations owned by the station's corporation. Finally, I attempted to control for the absolute level of performance of the station by including the variable *share – market size.* This is the station's share of the audience multiplied by the total radio advertising revenue in the market (estimated by Duncan, 1992) and serves as a proxy for the advertising revenue collected by the station. It is only a proxy, because the same audience share can have different values to advertisers depending on their listening habits and on demographic characteristics related to their buying power.

Model

The outcome is the binary variable (no change or change) at a specific time. The structure of the dependent variables would in principle allow continuous-time event-history analysis, as the timing of format changes was measured to the nearest week. The key independent variables are annual audience measurements, however, formed as an average of the spring and fall ratings books for markets surveyed at least twice a year and as the spring ratings book for markets surveyed only once a year (Duncan, 1992). Since continuous-time methods assume that independent variables are updated exactly when they change, the effect of these inde-

pendent variables are better estimated by discrete-time analysis. The analysis was done using a logit model predicting format change in a given year with last year's performance and current market conditions as independent variables. Stations sometimes had more than one format change in a year, but this was too rare to justify models of the count of events in a time period. The estimation was done by the Probit/logit routine in SAS, and the coefficient significance was tested by the Wald tests supplied by this routine (SAS Institute, 1989: 1335).[6]

RESULTS

Descriptive statistics are shown in table 1. The variables using historical aspiration levels differ depending on the updating constant α, so each level of α has its own correlation table. Here the table for $\alpha = 0.1$ is shown, as it is the value used in the subsequent tables. The correlations do not differ substantially for different levels of α. The table shows high correlations in some places, such as between number of stations and multimarket corporations and nonlocal changes. Except for these variables, which may be estimated with less precision as a result of the correlations, the table does not suggest any data problems.

Table 2 shows a comparison of different models of the *all changes* event. Model 1 does not have any performance variables and suggests that stations with many competitors are more likely to change their format, while stations owned by multimarket corporations are less likely to do so. Model 2 adds *share x market size* and *share* adjusted by social and historical aspiration levels. The results are quite intuitive; high performance on any measure reduces the probability of a format change. As the log likelihood test shows, this model greatly improves on model 1.

Model 3 tests the predictions for the social and historical aspiration levels. The coefficients for *share – average share* support H1a: they are negative both above and below zero, so the probability of change is declining as the performance relative to the social aspiration level increases. The *change at zero* coefficient is the difference between the slopes above and below zero, and it shows that the negative slope above zero becomes less steep below zero but remains negative (i.e., −.207 + .147 = −.061). Results support H1b, as the change below zero is positive and significant, showing the expected increase in sensitivity above the zero point. For the historical aspiration level, the coefficients are also significant in the predicted direction, supporting H2a and 2b. The relation between relative performance and change appears to be as in figure 1b for both the social and historical aspiration levels. The log likelihood test shows a statistically significant improvement over model 2. Model 4 adds the negative inconsistency variable to test for endogenous shift of attention. The coefficient estimate is positive, consistent with a self-enhancing rule, but only significant at the .10 level.

Model 5 adds variables that test H3a, 3b, 4a, and 4b. Observation of changes in the market appears to facilitate change in the station, as H3a stated, and recent experience with change also predicts change, as H4a stated. The finding that

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The SAS Probit/logit routine is specified as the probability of no event [i.e., P(Y = 0)] (SAS Institute, 1989: 1326), which causes the coefficient signs to be opposite of the usual specification, but I reversed them to normal when I entered them into the tables.

Table 1

Descriptive Statistics

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Density	30.44	18.39												
2. Multi-unit corporation	.448	.497	.27											
3. Station number	3.694	5.434	.34	.75										
4. Share × Market size	159.91	226.09	.59	.30	.41									
5. Share – Avg. share (above zero)	1.572	2.935	−.12	.12	.08	.23								
6. Share – Avg. share (below zero)	−1.513	1.869	.19	.20	.19	.42	.43							
7. Share – Hist. share (above zero)	.896	1.831	−.11	.03	−.01	.12	.65	.33						
8. Share – Hist. share (below zero)	−1.481	2.149	.20	.03	.04	.23	.17	.35	.34					
9. Share – Asp. level (if <0 and other >0)	−.628	1.414	.10	.00	.01	.03	−.06	−.08	.13	.24				
10. Station change, local	.242	.485	.03	−.01	−.01	−.11	−.18	−.20	−.10	−.13	.07			
11. Market changes, local	3.741	2.819	.52	.13	.19	.27	−.07	.11	−.07	.11	.07	.13		
12. Station changes, nonlocal	.668	1.458	.31	.50	.70	.33	.02	.13	−.03	.03	.01	.12	.19	
13. Market changes, nonlocal	6.364	15.409	.36	.46	.78	.40	.01	.15	−.04	.05	.02	.05	.25	.73

recent experience with change predicts change even when performance variables are included is noteworthy and suggests that the momentum findings in earlier studies (Amburgey and Miner, 1992; Amburgey, Kelly, and Barnett, 1993) were not caused only by performance feedback. The coefficients for nonlocal changes seen or done are also positive, as predicted by H3b and 4b, but are insignificant or marginally significant, respectively. There is little support for an effect of nonlocal changes. The log likelihood test shows that this model significantly improves on the previous one.

The effects of social and historical aspiration levels are shown in figures 2 and 3. These figures use the estimates of model 5 to graph the relative performance against the probability of change for a station with zero values on all station and market change variables and average values on the other variables. The axes are the same as in figure 1, as the probability of change is graphed as a function of relative performance, but the curves are not straight lines because of the functional form of the logit model. In figure 2, the probability of change clearly declines as the performance relative to the historical aspiration level increases, and it declines more rapidly above the aspiration level. The range is from a probability of .153 down to .043. If the station had covariate values that gave it a greater probability of changing (such as having many competitors or recently experienced change) these probabilities would increase, but the shape of the function would remain the same. When the performance is below the historical aspiration level but above the social aspiration level, the inconsistent aspiration levels appear to lead to a lower increase in the probability of change, as the dotted line shows, but this difference is not significant in the model.

The effect of the social aspiration level is similar, but slightly stronger, as the range of probabilities is from .157 down to .028. The change in slope at the aspiration level point is also greater for this outcome. Shortfalls in performance relative to either aspiration level causes changes, and the sensitivity

Table 2

Logit Models of All Format Changes*

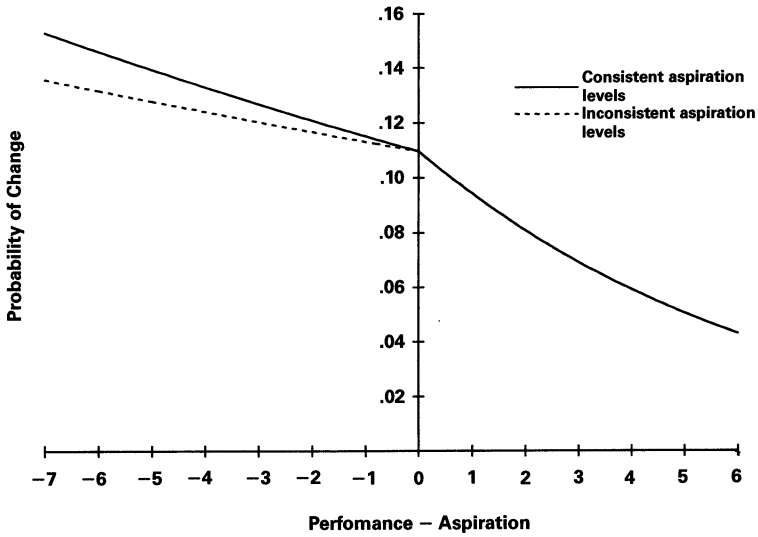
	1	2	3	4	5
Intercept	−1.940	−2.339	−2.006	−1.977	−2.085
	(.046)	(.053)	(.075)	(.077)	(.080)
Density	.0043•••	.0127•••	.0096•••	.0094•••	.0059•••
	(.0013)	(.0016)	(.0017)	(.0017)	(.0019)
Multi-unit corporation	−.202•••	−.105	−.096	−.097	−.091
	(.072)	(.075)	(.075)	(.074)	(.079)
Station number	.001	.016••	.016••	.016••	.002
	(.007)	(.007)	(.007)	(.007)	(.010)
Share × Market size		−.00115•••	−.00111•••	−.00112•••	−.00097•••
		(.00020)	(.00021)	(.00021)	(.00021)
Share − Avg. share		−.126•••			
		(.010)			
Share − Hist. share		−.075•••			
		(.009)			
Share − Avg. share (above zero) (H1a)			−.207•••	−.202•••	−.187•••
			(.023)	(.023)	(.023)
Share − Avg. share (below zero) (H1a)			−.061•••	−.057•••	−.048•••
			(.015)	(.016)	(.016)
Share − Hist. share (above zero) (H2a)			−.156•••	−.159•••	−.168•••
			(.033)	(.033)	(.037)
Share − Hist. share (below zero) (H2a)			−.061•••	−.063•••	−.054•••
			(.011)	(.011)	(.011)
Share − Asp. level (if <0 and other >0)				.032•	.020
				(.019)	(.020)
Market changes, local (H3a)					.024••
					(.010)
Station change, local (H4a)					.423•••
					(.044)
Market changes, nonlocal (H3b)					.0012
					(.0030)
Station changes, nonlocal (H4b)					.043•
					(.037)
Change below zero:					
Share − Avg. share (H1b)			.147•••	−.145•••	.139•••
			(.031)	(.031)	(.031)
Share − Hist. share (H2b)			.094••	.096••	.113•••
			(.037)	(.037)	(.037)
Log likelihood	−6326.29	−5915.22	−5895.44	−5893.97	−5832.65
Log likelihood test		822.14•••	39.57•••	2.93	122.64•••
Degrees of freedom		3	2	1	4

• $p < .10$; •• $p < .05$; ••• $p < .01$.
* Wald tests of coefficient significance (1 d.f.), log likelihood tests of models (d.f. given below). Standard errors are in parentheses.

to the social aspiration level is stronger. This is surprising, given the earlier arguments on self-enhancing social comparison, which would lead to less sensitivity to this aspiration level, and suggests that managers of low-performing radio stations are unable to define their comparison groups selectively to exclude high-performing stations. The apparent lower responsiveness to performance below the social aspiration level when the aspiration levels are inconsistent is suggestive, but not statistically significant.

Table 3 shows models for *all changes* and its component events with the same variables as model 5 of table 2. This table is useful for looking for the relation between relative performance and changes with different levels of risk. In the table, each change has been categorized into one of the four subevents, except for some stations that had events of

Figure 2. Historical aspiration level and format change.



more than one type during one year. For them, both types of events are included, so the total number of partitioned events is 2,170—30 more than the number of all changes. The model of *new format* shows mostly the same results as the all-changes model, but one difference is that the change in slope below the social aspiration level is so great that performance changes below the social aspiration level have no effect on the probability of change—the curve is horizontal below zero. Another difference is that the coefficient of local market changes is zero. Most likely this is caused by the correlation of density and local market changes, as all partitioned events have significant coefficients for one of these two variables, but none have for both. Station changes have large and significant coefficients for all partitioned events.

Figure 3. Social aspiration level and format change.

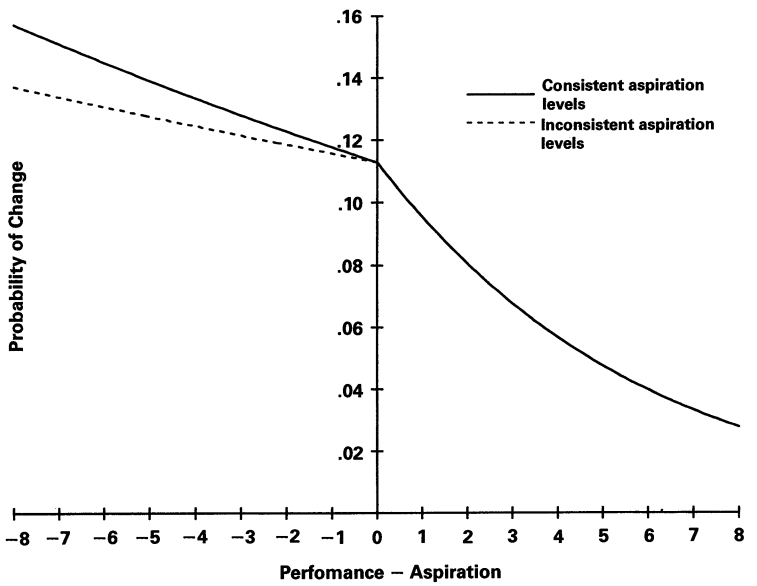


Table 3

Logit Models of Format Changes*

Variable	All changes	New format	Innovative format	Enter satellite	Other production change
Intercept	−2.085	−2.559	−4.601	−3.849	−4.128
	(.080)	(.098)	(.229)	(.179)	(.218)
Density	.0059•••	.0081•••	.0140•••	−.0018	−.0076
	(.0019)	(.0022)	(.0045)	(.0048)	(.0056)
Multi-unit corporation	−.091	−.085	−.193	−.034	−.034
	(.079)	(.097)	(.230)	(.176)	(.211)
Station number	.002	−.001	−.000	−.005	.016
	(.010)	(.013)	(.029)	(.026)	(.028)
Share × Market size	−.00097•••	−.00093•••	−.00056	−.00264•••	−.00016
	(.00021)	(.00025)	(.00045)	(.00072)	(.00054)
Share − Avg. share (above zero) (H1a)	−.187•••	−.219•••	−.039	−.194•••	−.210•••
	(.023)	(.030)	(.049)	(.058)	(.069)
Share − Avg. share (below zero) (H1a)	−.048•••	−.008	.015	−.114•••	−.046
	(.016)	(.019)	(.050)	(.031)	(.042)
Share − Hist. share (above zero) (H2a)	−.168•••	−.136•••	−.249•••	−.080	−.264••
	(.037)	(.040)	(.092)	(.073)	(.102)
Share − Hist. share (below zero) (H2a)	−.054•••	−.053•••	.041	−.072•••	.003
	(.011)	(.014)	(.041)	(.020)	(.032)
Share − Asp. level (if <0 and other >0)	.020	.004	−.052	.049	.103
	(.020)	(.023)	(.054)	(.043)	(.063)
Market changes, local (H3a)	.024••	.000	.020	.067•••	.079•••
	(.010)	(.012)	(.027)	(.021)	(.026)
Station change, local (H4a)	.423•••	.395•••	.293••	.297•••	.380•••
	(.044)	(.037)	(.133)	(.087)	(.110)
Market changes, nonlocal (H3b)	.0012	.0005	.0140•	.0029	−.0081
	(.0030)	(.0037)	(.0078)	(.0074)	(.0081)
Station changes, nonlocal (H4b)	.043•	.060••	−.114	.019	.073
	(.037)	(.030)	(.072)	(.058)	(.062)
Change below zero:					
Share − Avg. share (H1b)	.139•••	.210•••	.054	.080	.164•
	(.031)	(.039)	(.079)	(.072)	(.089)
Share − Hist. share (H2b)	.113•••	.084•	.290•••	.008	.267••
	(.037)	(.046)	(.092)	(.081)	(.114)
Frequencies:					
No change	14,154	14,998	16,088	15,877	16,043
Change	2140	1296	206	417	251
Log likelihood	−5832.65	−4231.81	−107.08	−1784.00	−1226.18
Log likelihood test	987.28•••	567.14•••	46.43•••	295.89•••	14.26•••

• $p < .10$; •• $p < .05$; ••• $p < .01$.
* Wald tests of coefficients (1 d.f.), log likelihood tests of models (10 d.f.). Standard errors are in parentheses.

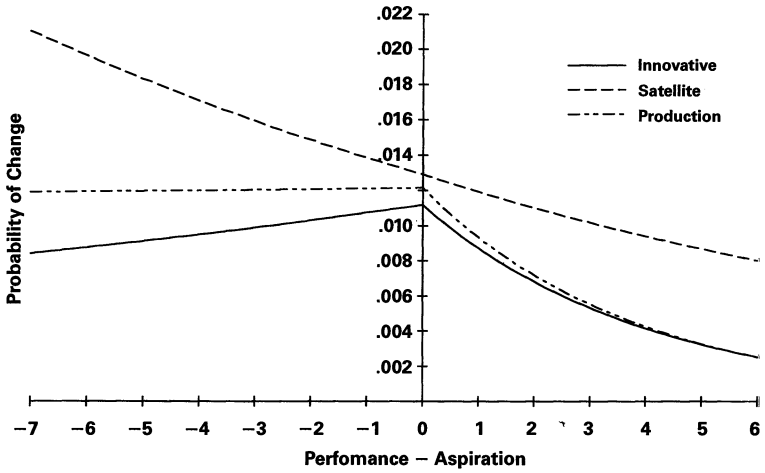
For innovative formats, the social aspiration level does not seem to affect the probability of change. Performance increases over the historical aspiration levels greatly reduce the probability of change, while performance decreases below the historical aspiration level seem to have no effect. The apparent pattern is one of stable and high probability of change at any performance below the historical aspiration level and rapid reduction once performance is above the historical aspiration level. The change in slope at the aspiration level is significant and large. These results suggest a strong status quo effect for innovative formats. As the most risky form of change, it occurs in stations doing worse than they have before and, hence, making decisions in a loss-framed situation (Kahneman and Tversky, 1979). For satellite entry, performance changes affect the probability of change both

above and below the social aspiration level. There appears to be a change in slope at the aspiration level point, but it is not significant. The effect of the historical aspiration level is small and only significant below zero. These results are very different from those of innovative change. Satellite changes save operating expenses and give a format new for the station, but one well tested by the satellite service. Shortfalls relative to the social aspiration level seem to lead to this event, which has lower risk and is more oriented toward cost cutting. For production changes, there is a strong reduction in the probability of change when performance increases above both aspiration levels and no significant change below the aspiration levels. The change in slope is significant for both aspiration levels, but only at the .10 level for the social aspiration level. Success on any performance measure quickly reduces the probability of a pure production change, while any performance in the failure range gives roughly the same probability of change.

Graphic analysis can show the relations more clearly. Innovative, satellite entry, and production changes have roughly equal frequencies (though satellite is most frequent), so the effects of the historical aspiration level can be graphed on the same scale, as in figure 4. Comparison of the curves suggests that the differences in risk level have an impact on the effect of performance feedback. Innovative changes show a strong status quo effect in which performance above the station's own previous performance greatly decreases the probability of high-risk format adoptions. The probability of satellite change decreases gradually across the range of performance changes. Since this outcome has more events than the others, direct comparison of the slopes in the figure overstates the responsiveness to performance for satellite changes. Surprisingly, production changes show nearly the same responsiveness as innovative changes, though they were not categorized as high risk a priori. Production changes do have strong effects on the internal operations of the organizations, like satellite changes do, because a staff of announcers is needed for live production but not for satellite transmission or for one of a pair of simulcasting stations. Unlike satellite changes, which also change the format, pure production changes are harder to justify as a response to market pressures, and hence this change may be preceded by more internal conflict. Of the production changes, 81 percent were from live to satellite (66 percent) or simulcast (15 percent), 6 percent were from simulcast or satellite to live production, and the rest were from satellite to simulcast or from simulcast to satellite, so most of them involved staff cuts.

Table 4 shows models with the market and station changes, but not the performance variables, to test whether omitting performance variables will inflate the estimates of the change coefficients. The table shows that the coefficients on local market changes were practically unchanged when the performance measures were dropped. The coefficients for station changes increased for all outcomes, as would be expected if some of the momentum effect were the result of performance feedback. Hence, there is some support for the idea that momentum can be explained by performance feed-

Figure 4. Historical aspiration level and innovative, satellite, and production change.



back, but there is also momentum unexplained by performance feedback. The estimates of nonlocal station and market changes were unaffected by omitting the performance variables.

I did additional analyses to test the sensitivity of the estimates to changes in assumptions. The station and corporate change variables used in the displayed models counted events over two years, but I also estimated models that counted events over one to four years. Each year added required omitting one more year of observations, so these were done on different size datasets. The estimates of the

Table 4

Logit Models of Format Changes*

Variable	All changes	New format	Innovative format	Enter satellite	Other production change
Intercept	−2.150	−2.712	−4.896	−3.570	−4.454
	(.063)	(.063)	(.151)	(.114)	(.144)
Density	.0019	.0049•••	.0138•••	−.0149•••	−.0055
	(.0015)	(.0018)	(.0038)	(.0042)	(.0045)
Multi-unit corporation	−.193••	−.179•	−.259	−.152	−.136
	(.077)	(.095)	(.228)	(.172)	(.208)
Station number	.006	−.009	−.002	−.015	.009
	(.010)	(.013)	(.029)	(.025)	(.027)
Market changes, local (H3a)	.018•	−.004	.019	.065•••	.072•••
	(.010)	(.012)	(.027)	(.021)	(.025)
Station change, local (H4a)	.680•••	.621•••	.365•••	.638•••	.612•••
	(.042)	(.051)	(.127)	(.083)	(.105)
Market changes, nonlocal (H3b)	.0002	−.0004	.0131•	.0010	−.0073
	(.0029)	(.0035)	(.0076)	(.0069)	(.0079)
Station changes, nonlocal (H4b)	.036	.057•	−.118	.001	.067
	(.024)	(.030)	(.073)	(.007)	(.062)
Log likelihood	−6182.88	−4436.99	−1087.08	−1895.48	−1272.88
Log likelihood tests:					
Better than baseline (4 d.f.)	286.82•••	156.78•••	12.43••	72.94•••	46.86•••
Worse than full model (4 d.f.)	70.45•••	41.36•••	34.00•••	222.95•••	107.32•••

• $p < .10$; •• $p < .05$; ••• $p < .01$.
* Wald tests of coefficients (1 d.f.). Standard errors are in parentheses.

change variables were practically the same on these datasets, but the standard errors were larger in the one-year dataset, suggesting that a lag of only one year made estimation more difficult. To check whether local or nonlocal station changes of the same type predicted change better than just any kind of format change, I estimated models in which the station change variables were replaced with station changes of the same kind (so innovative changes for innovative, satellite changes for satellite, and so on). These showed the same results and very similar log likelihoods as those presented. Models using different values of the historical aspiration level variable α had different log likelihoods and coefficient estimates, but a comparison of these showed that they differed little for α values from .05 to .3. When α was .4 or greater, the models had smaller log likelihood statistics. The models that best fit the data had relatively slowly adjusting aspiration levels, with the current performance given a weight of 30 percent or below. March (1988) found that low values of α led to high survival rates, so these values suggest that radio stations have failure-resistant learning patterns.

DISCUSSION AND CONCLUSIONS

The analysis shows that format change decisions were guided by performance relative to social and historical aspiration levels, opportunities presented by market dynamics, and momentum through prior format changes. These effects were all significant when entered simultaneously into the model. Although the momentum effect was partly explained by performance feedback, it remained even when relative performance was controlled for. The effects of the social and historical aspiration levels did not change when variables for market dynamics and momentum were included. The analysis clearly shows that risky organizational changes are taken when motivation, opportunity, and capabilities are present.

The results on aspiration levels may be the most important contribution of this paper. The analysis showed that aspiration levels matter and gave preliminary evidence on the functional form of the relation of performance to probability of organizational change. For both social and historical aspiration levels, the form of the relation showed the expected decline in probability of change above the aspiration level and for some outcomes below it. The support for the decline in the probability of change as performance increases is perhaps more reassuring than surprising. The idea that failure drives change conforms with our intuition on adaptive behavior, is well-established in the literature since Cyert and March's (1963) discussion of search caused by problems, and is a frequent assumption in learning models of organizational change.

The support for the increased sensitivity above zero is novel and important for two reasons. First, it is strong evidence that aspiration levels have behavioral consequences. It shows that the decision maker watches the zero point of relative performance, and behavior is different above and below that point. The parallel results for the social and historical aspiration levels show, perhaps unexpectedly, that

these alternative ways of forming aspiration levels are very similar in their behavioral consequences. Second, the increase in sensitivity is important because it supports the idea that organizations are not fully responsive to poor performance. Such unresponsiveness is known from case studies of poor-performing organizations and experimental studies of decision makers' response to failure, but longitudinal panel studies of organizational risk taking often do not search for it or do not find it (Bowman, 1982; Singh, 1986; Bromiley, 1991; Miller and Chen, 1994). This analysis shows that organizations are not fully responsive to a reduction in performance below the aspiration level, but it did not show that they are unresponsive to performance.

Since the sources and consequences of organizational inertia have become very important research topics for organizational researchers, it may be surprising to find such clear evidence of responsiveness to performance feedback as this study provided. The results were no doubt helped by the fact that this industry has performance measures that are external to the organization and, hence, are less vulnerable to self-enhancing uses of internal accounting. Managers of radio stations are regularly presented with audience measures that effectively become a report card, unalterable and with limited opportunity for reinterpretation. This is different from organizations in which important performance measures are partly or entirely constructed internally, because the rules used to generate performance measures may be changed to provide feedback that can be interpreted complacently. Internal performance measures may lead to less response to performance feedback overall, which in an analysis like this would result in low change activity overall and to performance having little power to predict the probability of change. Instead, the internal politics of the top leaders of the firm may become more important in themselves and as a moderator of the effect of performance. A likely suggestion is that firms with cohesive top leadership will be unresponsive to low performance, while firms with fractured top leadership will be responsive (Ocasio, 1994, 1995). This leads to a limitation on the generalizibility of the results: the effects of performance feedback may be moderated by the internal politics of the organization, especially if the performance measure is constructed internally.

While the above limitation is important, stock prices are an external performance measure that managers of joint stock corporations pay attention to. Whether stock prices predict changes is less clear when the corporation has a number of places to make organizational changes, such as in the different divisions of a conglomerate, and the difficulty of attributing the performance feedback to specific parts of the organization may contribute to inertia for such corporations. Organizational change is easier in the parts of the organization close to the perceived problem (Cyert and March, 1963), so inertia may result when a problem has no well-defined organizational location. This further limits the generalizibility of the results: the effect of performance feedback is likely weaker when the correspondence between the performance measure and specific organizational changes is ambiguous. The importance of this limitation is well illustrated by the fact

that the lower responsiveness of complex organizations is given as one reason why the simplified, de-conglomerated corporation is becoming a highly legitimate organizational form (Davis, Diekmann, and Tinsley, 1994).

The results suggest that decision makers have well-defined rules for responding to performance feedback, and these rules are similar to rules that produce adaptive behaviors in simulations (March, 1988). Where is the inertia, then? First, although the probability of change adjusts according to an adaptive rule, it is not high under any circumstance. Figure 3 shows a maximum probability of change of .157 for a station with performance two standard deviations below the social aspiration levels. The probability increases when the station has experienced or observed change, however, as it jumps to .22 with one station change event in the previous two years and crawls up about .01 for every two changes done by other stations in the market. Limitations in organizational opportunities and capabilities of change are important for these radio stations, just as the theory explains inertia by problems of finding opportunities and lack of change routines (Hannan and Freeman, 1977). Second, the decreased sensitivity to performance decrements below the aspiration level is also a form of inertia, since failure increases the probability of change much more slowly than success decreases it.

Inertia is not the only puzzle in the study of the effect of performance feedback on organizational change. It was also not expected that some organizations would make changes even when performing highly, though such changes were likely to reduce performance (March, 1981). As the relations of relative performance to change estimated here suggest, some stations performing well above their aspiration levels changed their formats. This cannot be completely explained by a theory of change as a response to social or historical aspiration levels, as there seems to be no reason for the probability of change not to drop to zero when the organization is performing highly. Perhaps social and historical aspiration levels are not the only goals that can be active in an organization. Upward-striving goals can also be activated, leading to high risk taking, even for organizations that are doing better than expected and better than their peers. The most important argument made here is that risk taking is guided by the performance relative to the goal currently active in the organization. The second is that historical and social aspirations have high predictive power and, hence, are likely to be active for many organizations much of the time. Third, since some behavior occurs that would be difficult to explain only by these aspiration levels, other change mechanisms may be in place, such as attention to higher goals, slack search, or proactive change in response to anticipated changes in market demand.

The aspiration-level learning theory that these hypotheses were drawn from is an outgrowth of the behavioral theory of firms (Cyert and March, 1963) and, as such, has its propositions phrased at the organizational level of analysis. The findings are consistent with what the theory of individual decision making would lead us to expect (Kahneman and Tversky, 1979), which raises the question of whether the

aggregation from individual risk preferences to organizational decision making is straightforward. Research on how individual risk preferences aggregate to group decisions suggests that this is not so and that there are important gaps in our understanding of how organizational decision making happens. The simplest case of groups of people with similar aspiration levels leads to decision making similar to individual decisions, but more extreme (Davis, 1992). The problems start with the recognition that when organizational change is considered as a response to performance feedback, the members of the group deciding may have different aspiration levels (Kameda and Davis, 1990; Tindale, Sheffey, and Scott, 1993). Historical aspiration levels differ because members' individual histories are not equal to the organization's; their job experiences outside the organization are likely to affect their aspiration levels. Social aspiration levels differ because different functional backgrounds are likely to give different reference groups (Schurr, 1987). In radio broadcasting, for example, program directors have reference groups of similar-sounding stations, while sales managers have reference groups of stations with audiences of similar demographic profile. Differences in aspiration levels can lead to groups in which some members are above their aspiration level and others are below it, and the resulting decision-making process has proven difficult to model. Simple and fairly successful models include voting rules (Crott, Zuber, and Schermer, 1986; Kameda and Davis, 1990), which obviously means that extreme opinions have no effect on the decision, while some researchers have found a shift toward more risky alternatives (Tindale, Sheffey, and Scott, 1993).

While the group decision rule research suggests that the aggregation of individual preferences can be modeled as voting rules, translating this to organizations is problematic because of the differences between experimental settings and organizations. Experiments generally use temporary groups with no a priori differences in power or status characteristics that might lead to unequal influence in the decision making. Members of organizational decision-making groups often differ in general status characteristics, such as age, gender, and education, and specific status characteristics, such as abilities or skills relevant to the task, creating shared expectations that some members of the group will perform better than others (Berger, Rosenholtz, and Zelditch, 1980). In discussions, the members that are expected to perform better are deferred to, allowing them to dominate the decision making (Ridgeway, Diekema, and Johnson, 1995). In groups in which members have unequal status, group decisions may become similar to the decisions the highest-status members would have made individually, as they are allowed to set the aspiration level and determine what alternatives are acceptable (Whyte and Levi, 1994). Such processes are clearly a possibility in organizational decision making, where differences in hierarchical position reflect real power differences and are connected with general beliefs about competence and performance. As a result, we cannot be sure if group decision making is similar to that of individuals because of voting-style group decision rules or domination by high-status or powerful individuals. The difference between

group and organizational decision making adds another layer of complexity to this, as organizational communication, timing, and participation in decision making greatly affects the outcome (March and Olsen, 1976; Ocasio, 1995). Since the relation of individual decision making to organizational action may be moderated by group and organization level variables, further research should explore how organizational risk taking depends on the composition of management teams and the organizational structure.

An organization learns when its experience results in behavioral changes. Market position changes caused by performance shortfalls are clear evidence that learning models have predictive power when applied to risk-taking behavior and suggest that aspiration-level learning should get much more empirical attention. The main alternatives to learning models are models based on foresight, but such models suffer from conceptual and empirical problems. First, if managers' perceptions of their environment are formed by their experience, models of foresight that take the perception formation into account may differ little from learning models. Second, models based on foresight offer predictions that are much more weakly linked to observables than learning models, as the expectations of future payoffs thought to guide managerial action in such models are not easily accessible to the researcher. A learning model based on performance feedback judged against social and historical aspiration levels can be tested easily, as this paper shows. Its predictions are consistent with observed behavior, including forms of risk-taking behavior that models of foresight cannot easily explain, such as the importance of historical performance in determining future risk taking and the near-horizontal relation of performance to risk taking below the aspiration level. Aspiration-level learning is not just an alternative to models based on foresight, it is a more promising foundation for future research.

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