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LEARNING ACROSS THE LIFE CYCLE: EXPERIMENTATION AND PERFORMANCE AMONG THE HOLLYWOOD STUDIO HEADS

DANNY MILLER[1]* and JAMAL SHAMSIE[2]
[1]*Ecole des Hautes Etudes Commerciales, Montreal, Quebec, Canada, and Graduate School of Business, Columbia University, New York, U.S.A.*
[2]*Anderson Graduate School of Management, University of California at Los Angeles, Los Angeles, California, U.S.A.*

Guided by notions from the literature on organizational learning, this paper investigates how product line experimentation and organizational performance change across the careers of top managers. Its subjects are the studio heads who ran all the major Hollywood film studios from 1936 to 1965. The study found first, that product line experimentation declines over the course of executive tenures; second, that there is an inverse U-shaped relationship between top executive tenure and an organization's financial performance; and third, that product line experimentation is more likely to benefit financial performance late in top executives' tenures. These findings are consistent with a three-stage 'executive life cycle'. During the early years of their tenures, top managers experiment intensively with their product lines to learn about their business; later on their accumulated knowledge allows them to reduce experimentation and increase performance; finally, in their last years, executives reduce experimentation still further, and performance declines. Copyright © 2001 John Wiley & Sons, Ltd.

The celebrated Darryl F. Zanuck took over as studio head of Twentieth Century Fox in the 1930s, full of energy and keen on experimentation. After a few years of searching and floundering, Zanuck hit his stride. Within a decade, by commissioning classic dramas such as *The Grapes of Wrath* and *How Green Was My Valley*, Zanuck brought Fox to second place in the industry, just behind powerhouse MGM. Zanuck learned fast about the kind of movies that would make Fox thrive. He enlisted superb writers such as John Steinbeck, masterful directors like John Ford and Joseph Mankiewicz, and an impressive roster of stars. He also began to emphasize and closely oversee the production of serious dramas, and was acknowledged, even by tough-minded directors like Ford, to be a genius at shaping his repertoire of films. For many years Zanuck performed brilliantly. But in the early 1950s he was becoming increasingly dogmatic, and more and more bored with his job. By 1955 he hadn't given Fox an artistic or commercial hit in years. In Zanuck's words: 'My mood was to escape, to get away from the . . . studio scene, and everything connected with it . . . I felt I would never be able to create anything again' (Gussow, 1971: 185; see also Mosely, 1984).

Career trajectories like Zanuck's are the stuff of executive lore and legend. We are all familiar with the rise and fall of leaders such as Henry Ford, Walt Disney, and even Harold Geneen. Each of these executives took some years to learn about their jobs, organizations, and competitive environments. Based on this learning, they were able to improve the performance of their companies for an extended period of time. Ultimately, however, as learning waned and became obsolete, performance fell. We wished to determine whether such life cycle transformations in learning and performance

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*Correspondence to: Danny Miller, Ecole des Hautes Etudes Commerciales, 4642 Melrose Avenue, Montreal, Quebec H4A 2S9, Canada.

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are merely the convenient fictions of biographers. And if they do occur, do executive life cycles represent typical tendencies, and do they have any significant consequences for organizations?

In addressing these questions, this paper argues that the notion of an executive life cycle—and the learning and knowledge that characterize its various stages—can indeed help to explain significant trends in the level of product line experimentation, in financial performance, and in the relation between the two. We examined the impact of executive tenure on each of these trends within the context of the U.S. motion picture industry. Although annual changes in the mix of film genres that are released by each studio are assumed to be driven almost exclusively by movie fads and fashion, we believe that the tenure of the production chief also has an important role to play. We show that the stage of the executive life cycle does influence product line changes that are made from year to year and that the evolutionary pattern of such experimentation also affects the studio's financial performance.

By studying the entire careers of all of the Hollywood studio chiefs during the period from 1936 to 1965, this study was well positioned to investigate important links between executive tenure, strategy and performance. First, the studios were a context in which one executive had an extraordinary amount of hands-on control over strategy—specifically over the films that got made and the amount of experimentation among film genres. Second, the mix of film genres was one of the most important aspects of strategy for the studios, one that had a profound influence on performance. Finally, we were able to examine every one of the major studios within the motion picture industry, and each of these for a 30-year period. This industry-encompassing, longitudinal design provided insights into the transitions that occur among top executives over long periods of time, and it ensured comparability among the members of the sample.

STUDYING THE EXECUTIVE LIFE CYCLE

Conceptual roots and scope of the study

A growing body of literature has identified important effects that leaders' characteristics can have on the strategies and performance of their organizations (Finkelstein and Hambrick, 1995). Unfortunately, although these effects take place and change over time, most of the literature on executive effects is static. It looks, typically, at cross-sectional data for concurrent relationships between leader traits, organizational characteristics, and performance; often it is hard to distinguish between cause and effect (Hambrick and Mason, 1984; Miller and Toulouse, 1986). The very few longitudinal studies in this realm have investigated only very short intervals of executive life—succession periods (Sonnenfeld, 1988), for example, or the times when a CEO first takes charge (Gabarro, 1987).

Hambrick and Fukutomi (1991), by contrast, have opted for a longer-term, more dynamic treatment of the changes that take place during the course of a top executive's entire tenure in office. They posit the notion of an 'executive life cycle' in which there are discernible phases of a top executive's tenure—phases that can be characterized by distinct patterns of thought, behavior, and performance. We believe that such a life cycle concept may be useful in accounting for important changes in managerial learning, knowledge, and strategic behavior that will have a vital impact on organizational performance.

This research attempts to advance our understanding of some central aspects of the life cycle of top executives. Specifically, it focuses on the product line experiments and performance outcomes that occur over the executive life cycle. Although there has been some insightful conceptual analysis of this life cycle, to date there is no longitudinal empirical work to show its existence, nature, or performance implications.

By using the literature on learning, our research also brings to the study of the life cycle integrative hypotheses that may serve to link its various stages. Specifically, it borrows notions from the conceptual work on learning to generate and test hypotheses on experimentation and performance over the length of the cycle. Its subjects are the studio heads who ran all of the major Hollywood studios from 1936 to 1965. Although there have been numerous conceptual, simulation and laboratory studies of organizational learning (Levinthal and March, 1993; Levitt and March, 1988; March, 1991), there are few longitudinal studies that look at the real-life experiments and outcomes of top managers over long periods of time.

Although many kinds of learning may take place over the life cycle, we focus on product line experimentation as a key source of learning, and on organizational performance as an indicator of how much has been learned. Clearly, regular changes in a firm's product line mix are likely to help top managers obtain a better understanding both of the organization and its environment. Furthermore, the focus on product line experimentation as a means of learning is becoming increasingly relevant to today's competitive industries, where product line renewal is a very key mode of competitive advantage and often a requisite for survival (Cringely, 1995; Tushman and O'Reilly, 1997).

Learning across the life cycle

Hambrick and Fukutomi (1991) and Miller (1991) have posited several broad evolutionary patterns across a top executive's tenure. They suggest that most top managers, early in their tenures, work at learning a strategy and the skills to implement it. In their initial efforts to 'learn the ropes', leaders engage in a good deal of experimentation (Hambrick and Fukutomi, 1991). After a few years have passed, these managers have typically acquired a good deal of knowledge about their businesses. They become more confident and feel less need to experiment with tactics and products (Miller, 1990, 1994). Finally, at the end of long tenures, many executives become stale: an increasing rigidity and overconfidence commits them to archaic product lines (Miller, 1991; Staw, Sandelands, and Dutton, 1981; Walsh, 1995). In short, the executive life cycle begins with the struggle to learn, progresses through increased competency, and, if leaders stay long enough, culminates in complacency and decline.

This study postulates three learning-related changes that occur over top managers' careers. First, we anticipate that as managers learn more about their jobs and environments they feel a decreasing need to explore (March, 1991). Product line experimentation will decline over the length of a top executive's job tenure. Second, the learning that takes place during the first several years of top managers' careers leads at first to increasing financial performance. But eventually complacency sets in, learning atrophies, and performance declines (Hambrick and Fukutomi, 1991; Levitt and March, 1988). Third, the relationship between experimentation and performance will change across the life cycle. Early learning, although it results in new knowledge, is costly and inefficient; learning later in the life cycle is more valuable as it occurs in the context of greater knowledge and experience, and may awaken managers from their complacency (Hambrick and Fukutomi, 1991; March, 1991; Walsh, 1995).

We should note that we are only looking to discover general tendencies. The aptness of our conjectures no doubt will depend on the situation facing each executive—for example, the talents and personality of the manager and the resources available for him or her to work with (Gunz and Jalland, 1996).

HYPOTHESES

Executive tenure and product line experimentation

Previous research, much of it cross-sectional or anecdotal, has suggested that as tenure increases, strategic change becomes rarer and less dramatic (Finkelstein and Hambrick, 1995: 86–89; Hambrick, Geletkanycz, and Fredrickson, 1993). Gabarro (1987) found that the most major changes made by CEOs occurred during the first 3 years of their tenures. Finkelstein and Hambrick (1990), in studying strategic persistence, discovered that such persistence kept increasing with the mounting tenure of top executives. Wiersema and Bantel (1992), moreover, found that early in their careers top managers felt free to change their firm's levels of diversification, but as their tenures increased, the managers behaved as though they were more constrained by company precedents and traditions. Finally, in examining the post-deregulation reactions of railroad executives, Grimm and Smith (1991) found the scope and vigor of these reactions to vary inversely with tenure. In short, managers tend to change quite a few things early in their tenures, and then move towards greater stability.

These results should also apply to the realm of product line experimentation. A decline in experimentation can be explained in part by the changes that take place over managers' careers in their felt need to learn and in their levels of knowledge. At first, managers alter products in an attempt to learn how to be effective. They want to find out more about their organizational strengths, the customers that can be targeted, and more generally about

what works. They may also experiment with products to hone the strategies of their firms (Gabarro, 1987). But with the accumulation of experience, most leaders become more informed about their markets, and confident about their offerings. Their growing knowledge and security render them less pressed to learn by experimenting (Hambrick and Fukutomi, 1991; Herriot, Levinthal, and March, 1985; Levitt and March, 1988; March, 1991).

Still later in managers' careers, nonrational factors may cause reduced experimentation (Sonnenfeld, 1988; Walsh, 1995). Some longer-tenured executives become convinced of the enduring merits of their knowledge (Kiesler and Sproull, 1982). Others get complacent about their markets and overconfident about their policies, and so resist making changes (Wiersema and Bantel, 1992). According to Hambrick and Fukutomi (1991: 724): 'in general, executives become more and more wedded to the correctness of their views with the passage of time in their positions. That is, beyond the early period in office, the CEO's commitment to his or her paradigm gradually increases.'

To summarize, during the early years, most top executives sense the need to learn about their jobs and their markets; they address this need in part by experimenting with their product lines. But with time, the cumulative effects of experimentation and other kinds of learning increase the manager's base of knowledge and skills. Their confidence grows and the level of experimentation falls. Later still in their careers, some top executives become overconfident in the status quo, and the level of experimentation declines still further. Hence:

> *Hypothesis 1: Product line experimentation will decline as the tenure of the top executive increases.*

Executive tenure and financial performance

Just as product line experimentation may vary over the life cycle, so may performance. And again, learning may play a central role in the expected change in performance. Some studies argue that experienced executives have learned to be effective, and that their knowledge of their organization and its ability to compete help them to contribute to better performance (Gabarro, 1987; Hambrick and Fukutomi, 1991). Long experience is also said to be associated with success because those who perform very poorly tend to be dismissed—mostly the strong survive (Boeker, 1992; Finkelstein and Hambrick, 1995: 199–201; Salancik and Pfeffer, 1985; Wagner, Pfeffer, and O'Reilly, 1984).[1]

Other research, however, shows that executives who stay on the job too long become 'stale in the saddle'—overly committed to the status quo and thus less effective (Finkelstein and Hambrick, 1995: 90; Fredrickson, Hambrick, and Baumrin, 1988; Hambrick and D'Aveni, 1992; Hambrick *et al*., 1993; Katz, 1982; Miller, 1990, 1991, 1994; Sonnenfeld, 1988; Walsh, 1995). Some of these studies support an inverse relationship between tenure and performance.

These distinct results can be reconciled: Executive tenure may be associated with both good AND poor performance—but at different stages of an executive's career. Specifically, we hypothesize that very early in their job tenures most executives are too inexperienced about their jobs, their companies, and their environments to choose the right strategy (Eitzen and Yetman, 1972; Hambrick and Fukutomi, 1991). They undertake experiments of discovery, but do not know enough at first to have a high success rate (Gabarro, 1987; Levitt and March, 1988; March, 1991). Over time, however, leaders begin to learn more from the decisions they make and the events that affect them. They also expand their sources of information and their network of contacts (Aguilar, 1967). So they acquire a better understanding of the abilities of their companies and the tastes of their customers (Gabarro, 1987; Greiner and Bhambri, 1989), and so performance improves (Hambrick and Fukutomi, 1991). As Hambrick and Fukutomi (1991: 732) argue, 'early in the tenure, the CEO's task knowledge is accumulating and is not yet at its peak.'

Eventually, according to some studies after 7 or 8 years on the job (Finkelstein and Hambrick, 1995: 83; Hambrick and Fukutomi, 1991), many managers become complacent or overconfident, and their performance begins to fall. They commit too firmly to established ways of thinking and doing, and so lose touch with their markets (Miller, 1991; Miller and Friesen, 1984; Norburn and Birley, 1988; Tushman and Romanelli, 1985; Wiersema and Bantel, 1992; Walsh, 1995). It has

[1] By contrast, some of the research on top management succession attributes performance not to experience but rather to having 'new blood' come in to revitalize an organization (Miller, 1993a, 1993b; Finkelstein and Hambrick, 1995: 193–200; Virany, Tushman, and Romanelli, 1992).

also been shown that long-tenured managers stop gathering data from outside their firms and rely increasingly on specialized, internal sources of information (Aguilar, 1967; Katz, 1982). This can commit them to an 'obsolete paradigm' (Hambrick and Fukutomi (1991: 732). Thus it is not surprising that Miller (1991) found that an organization's fit with its environment became especially poor after many years of a CEO's tenure; so too did company financial performance.

To summarize: during their early years, managers have not had the time to learn enough to make sound decisions; so the performance of their firms is relatively poor. After some years they begin to do better because of the greater knowledge and experience that learning brings them. Still later in their careers, however, in part because of top managers' increasing complacency and distaste for experimentation, performance begins to fall.

Hypothesis 2: There is an inverse U-shaped relationship between top executive tenure and financial performance, as performance first rises and then falls with increasing tenure on the job.

Tenure, experimentation, and financial performance

Having hypothesized a learning-related decline in experimentation over executive careers, and an inverse U-shaped performance curve, it remains explicitly to relate experimentation to performance. Again changes in experimentation can be tied to changes in performance through use of the construct of learning.

Early in managers' tenures, product line experimentation has ambiguous implications for performance. On the one hand, inexperienced managers need to learn more about their firms and markets, and this process can be hastened by product line experimentation (Argyris and Schon, 1978; March, 1991; Walsh, 1995). On the other hand, inexperienced managers may know too little about their organization and its market to succeed with their changes—their early product line experiments are apt to be error prone and costly (Herriot *et al*., 1985; March, 1991). In short, for less experienced managers, product line experimentation is very much a two-edged sword with ambiguous implications for performance.

More experienced leaders, by contrast, are apt to have learned enough about their company's skills and markets to avoid most expensive blunders. Consequently the product line changes they make are more likely to meet with success than would the changes made by their novice counterparts (March, 1991). Product line changes also may be more rewarding later in a tenure because experimentation makes it less likely that long-tenured managers will become overconfident of their policies and products (Miller, 1991; Hambrick and Fukutomi, 1991). This attitude may be mitigated by feedback from markets that may come, at least in part, from regular product line experiments (Aguilar, 1967; Argyris and Schon, 1978; Katz, 1982).

To recap, experimentation in the early years is apt to be a mixed blessing: On the one hand, it contributes to learning; on the other, because it is done by inexperienced managers, it is costly (Levitt and March, 1988; March, 1991). In the later years, however, experimentation may have a more positive relationship with performance—managers will have learned a good deal about their jobs and are less prone to making errors. Also, experimentation and the feedback it brings may prevent overconfident managers from losing touch with their markets (Argyris and Schon, 1978).

Hypothesis 3: Product line experimentation is more positively associated with financial performance later than earlier in top managers' tenures.

METHOD

The Hollywood studios

The motion picture industry, as it existed from 1936 to 1965, provides a highly appropriate setting for our study. All the major film studios needed to offer many new films each year, and this gave them ample opportunity to experiment with their product mix. Furthermore, a single executive, the studio head, oversaw all of the films that were made by a studio, and was held responsible for their success or failure.

We decided to study *all* of the studio heads—formally called production heads—of *all* the major studios of that 30-year era. These people decided which films would be produced, and just

how to change the mix of films from year to year. The studio chiefs studied included legendary figures such as Louis B. Mayer, Dore Schary, Jack Warner, Harry Cohn, Y. Frank Freeman, Darryl F. Zanuck, Edward Muhl, and other luminaries. Indeed, one benefit of studying these executives comes from the public records of their words and deeds. We could use these qualitative accounts to better understand and illustrate our quantitative findings.

Our period of analysis extended from 1936 to 1965. Before 1936 there had been growing consolidation in the film industry (Bordwell, Staiger, and Thompson, 1985: 403). But the last significant merger took place between Fox and Twentieth Century in 1935. Around the same time, Paramount reemerged from bankruptcy as a new organization. Thus by 1936 the industry had matured into the oligopoly that became known as the studio system. We terminated our period of analysis in 1965, as after that conglomerates began to buy up many of the studios. Also, by the late 1960s the studio system had been replaced by one dominated by independent producers and directors (Bohn, Stromgren, and Johnson, 1978).

The seven major Hollywood film studios during the years 1936 to 1965 comprised MGM, Twentieth Century Fox, Warner Brothers, Paramount, United Artists, Universal, and Columbia. The only other potential major, RKO, was deleted from the sample because it terminated operations in 1956, a full 9 years before the end of our study. But even long prior to that, RKO had gone through frequent reorganizations and changes in form and management (Lasky, 1989).

All of these studios developed their own stables of talent by signing a wide variety of producers, directors, stars, screenwriters, and others to exclusive long-term contracts. Four of the studios also owned or leased theaters in significant locations across the country. These included the preponderance of first-run cinemas in big cities that drew 75 percent of the national box office (Balio, 1985; 255).

Variables

The production head and his tenure

Our sample includes the entire population of production heads at work at the major Hollywood studios between 1936 and 1965. These people were responsible for the total output of those studios for that period. We concentrated on the production heads, also known as the studio heads or studio chiefs, because they made the decisions that had by far the greatest impact on company financial performance. Although all of the studios had a president, it was the studio heads who had complete control over the slate of films that their firms would release from year to year (Dick, 1993: 75–76; Gussow, 1971: 140). Based in New York, the presidents were chiefly preoccupied with capital expenditures, assisting only with the promotion and distribution of films once they were ready for release. But the studio heads, based in Los Angeles, decided which movies to make and who should make them. Film historian Bernard Dick (1993: 58) wrote: 'They were like the great newspaper publishers or directors of symphony orchestras who set the tone for the group and were therefore responsible for its success or failure.'

Most production/studio heads followed closely the films that they approved. Typically, they helped create the concept for a film, found people to work on it, and oversaw its production until release time. Darryl Zanuck, for example, personally supervised every film project from early script development to final cutting and editing. In his own words:

> Every creative decision was either authorized, or okayed, or created by me. There was no individual, no executive, between me and the back lot. I was The Executive. I decided whether we made something or we didn't make it. I was a One Man Show. (Quoted in Gussow, 1971: 140)

By the 1960s, many films were being made outside the studio system by independent producers. For the most part, however, these films were either put into production or picked up for distribution by a studio production head. For the films they commissioned from independents, the studio heads would have a say in the talent that would be used, but were typically less involved with the film development process.

In spite of these changing circumstances, there is no question that the studio production heads remained the central driving force behind the mix of movies released each year by their studios. In all, we were able to follow 31 heads of production who ran the seven studios during the 30 years of our study; these men had tenures that ranged from 1 to 33 years. Many production heads had long tenures: 12 of them stayed on the job for at least

7 years and 5 of them lasted for over 15 years. The tenure of the heads of production for each studio was measured in number of years since their appointment to that position. This information was obtained from several accounts of the histories of the major studios (Finler, 1988; Gomery, 1986; Shiach, 1995; Steinberg, 1980).

Studio performance

We wished to find a measure of studio performance that would most clearly reflect the success of the production head's product mix decisions. There were obvious problems with measures such as return on assets (ROA) since some firms rented their facilities and equipment, while others owned theirs. Also, physical properties and equipment represent only a small fraction of the assets the studio heads used to make their films.

In searching for a more appropriate measure, we found that the Hollywood film industry has for decades evaluated the performance of its production heads based on the profits their films made. In the very short run, this is the profit of individual films, and in the longer run the profit performance of a roster of films made over a year or more (Armour, 1980; Balio, 1985; Bordwell *et al*., 1985; Gomery, 1986). The uncertainty of the movie business makes it appropriate to evaluate studio heads based on the performance of their annual slate of productions rather than on the performance of individual films.

We measured the performance of each studio for each year by using an annual measure of average profits per film. Naturally, the profits of each film are to some extent a function of their production costs: blockbusters with the highest profits are often the most expensive to make. But rather than express profits as a fraction of production costs and have a volatile and skewed ratio variable, we took the analytically conservative route and controlled for production costs by incorporating them as an independent variable (Stimpert and Duhaime, 1997). As expected, costs do have a positive and significant association with profits, but the variance explained is not overwhelming.

To establish the robustness of our findings we also used annual return on sales (ROS) as a measure of aggregate profitability (cf. Appendix 2). While important for confirmation purposes, the ROS measure is imperfect because a studio could earn a high ROS in spite of poor revenues.

Data on production costs, sales, and profits for each studio were obtained from Moody's Industrial Manuals and from company financial reports. All figures were adjusted for the consumer price index to control for inflation. For studios that also participated in other businesses, production costs, sales, and profits were adjusted to reflect only those obtained from the production and distribution of films.[2] The number of films released by each studio for each year was obtained from Steinberg's *Film Facts* (1980). Annual lists of top box office performers were scanned to ensure that revenues were not affected significantly by re-releases of films made in earlier years. Finally, because studios could only have a single production head at any given time, our measure allowed us to assess the performance of each studio head for each year.

Product line experimentation

Product line experimentation can be measured in a number of ways in the film industry. It may perhaps best be reflected by annual changes in the emphasis given to each type of genre in the films released by each studio. For the major studios, each genre represented a different product in terms of structural components such as plot, character, setting, thematics, and style (Buscombe, 1977: 27–31; Solomon, 1976: 2–4; Schatz, 1981: 15–18). The genres allowed studios to quickly and poignantly communicate the essential features of each of their films. Thus each genre represented a distinct product variation as its films possessed many common elements and appealed to the same segment of the audience.

We categorized for this study 7124 films. These comprised *all* feature-length releases by the seven leading studios from 1936 to 1965. The genre for each film was provided by the authoritative *The Motion Picture Guide* (Nash and Ross, 1985). In cases where a film was classified into more than

[2] The firms in our sample identified themselves as being primarily in the motion picture business. However, four of the firms in our sample also ran theaters. This required that we adjust performance figures to reflect only performance from film production and distribution activities. By the late 1950s, some of our firms branched out into television and music. Firms such as Columbia and Universal, which made significant inroads into the television and music business, established separate subsidiaries to reflect the performance of these. For the remaining firms, television and music together typically accounted for no more than 15 percent of revenues even as late as the early 1960s.

one genre, the leading categorization was used. For example, a film classified as a musical/comedy was categorized as a musical. The Nash and Ross (1985) classifications corresponded very closely to those of Hanson and Gevinson (1993) in their *American Film Catalogue*.

The extensive literature on film genres identifies as many as 15 distinct classical genres of film. These consist of action/adventure, comedy, crime/gangster, drama, fantasy, historical/biographical, horror, musical, mystery/detective, romance, romantic comedy, science-fiction, thriller/espionage, war, and western (Armour, 1980; Grant, 1977, 1986; Gomery, 1991; Schatz, 1981).

We measured each studio's product line experimentation by the annual change in the distribution of films across the 15 genres. Our first measure of experimentation simply sums the absolute values of the interyear differences in the percentage of films made in each genre (the percentage of films in each genre is the number of films made in each genre divided by the number of films made by that studio X in year Y). This annual percentage change (APC) measure reflects all of the shifts in the distribution of films across genres from one year to the next. It is our broadest measure of experimentation.

While the APC measure encompasses all changes in the distribution of films across genres, including changes to focus on fewer genres, some measures of experimentation should reflect only a studio's embarking on *new* film genres. We developed two such measures. The first simply counts the number of new film genres that a firm takes on in any given year (NEWGEN). To rule out trivial departures in the film mix, a genre was counted as a new one for the studio only if it included at least two films for the year. A new genre was counted as one in which the studio had not made any films in the prior year.

We complemented this measure by another one that would indicate the relative emphasis that the studio had placed on the films in these new genres. To obtain this measure of experimentation, we counted the total number of films in all genres that had not been used in the previous year for each studio for each year. We then expressed this number as a percentage of the total number of films produced by that studio in that year (PCNEW).

Control variables

As noted above, it was important to control for the average annual production costs per film for each studio. In predicting performance and product experimentation, it was also important to control for the munificence of the environment. This was reflected in the annual percentage of the family entertainment budget that went into films, a figure that could have an important impact on average profitability. We obtained this data from the U.S. Department of Commerce, Social and Economic Statistics Administration (Steinberg, 1980).

Studio size might also influence profitability and inertia (Hannan and Freeman, 1984), so we controlled for the log of studios' annual film revenues in all of our analyses. We also controlled for the age of the studio as it has been argued that organizational experimentation declines with age, as do liabilities of newness (Hannan and Freeman, 1984). Size and age data were obtained from Annual Reports and from Moody's Industrial Manuals. We also controlled for a quadratic age term as the declining liabilities of newness may eventually be overtaken by increasing dangers of staleness, bureaucracy, and inertia (Hannan and Freeman, 1984).

It might also be argued that whether a production chief has been promoted to his position from within the studio may affect his or her job performance as well as the desire to change the product mix (Helmich and Brown, 1972; Haveman, 1993). So we controlled for this factor with a binary dummy variable (1 if an insider, 0 otherwise). For the same reasons we also controlled for the prior production experience of each production head. This information on the production heads was gathered from Finler (1988), Gomery (1986), Shiach (1995) and Steinberg (1980).

Theaters and stars were also, at times, important sources of studio profitability (Dick, 1993; Miller and Shamsie, 1996; Solomon, 1988). Thus we also controlled for the number of stars under long-term contract and for the number of theaters under long-term lease or ownership. Annual information on the number of stars under 4-year-plus contracts was obtained from Shipman (1972, 1979). We also collected information on domestic theaters owned or under long-term lease for each studio for each year from figures provided in annual reports and in Moody's Industrial Manuals.

As a further test of model sufficiency, we controlled for the possible effects of the tenure in office of the studio president on the results of our analysis. The rationale was that perhaps the time in office of this largely financial executive might account for some of our findings. The results showed that in no cases did the inclusion of this new tenure variable attain significance or explain additional variance in any of our models. Nor did it change any of the results of our hypothesis tests. Thus for parsimony this variable was omitted from our analyses.

Analyses

We studied the same time period for each studio and used pooled time-series cross-sectional analysis (Kmenta, 1986: 616–625). Our data consisted of 30 years of observations across seven studios ($N = 210$). One year was lost due to the lagged profit and change variables. Given the longitudinal nature of the study, it was necessary to guard against problems of autocorrelation and heteroscedasticity. The pooled time-series procedure we used first adjusts the data for autocorrelation using the Prais–Winsten iterative transformation. To establish the adequacy of a first-order autocorrelation adjustment we inspected the correlograms for the analyses. These declined rapidly at higher lags, confirming both the stationarity of the time series process and the adequacy of a first-order correction. To ensure more accurate estimation, separate autocorrelation adjustments were done for each firm.

A second transformation of the data was then employed to correct for heteroscedasticity. We divided the dependent and independent variables by the firm-specific error variances obtained from the regressions on the autocorrelation-corrected data. The data could then be pooled and analyzed using ordinary least squares (see also Sayrs, 1989). Plots of residuals were inspected to establish the absence of patterns due to heteroscedasticity or autocorrelation. We also ran Durbin H statistics to ensure the absence of autocorrelation.[3]

[3] Error component or 'random effects' models are inappropriate for this study as they are non-autoregressive: that is, they make an assumption, inaccurate for our data, that correlations among observations are constant regardless of how far apart they are in time (Fuller and Battese, 1974; Kmenta, 1986: 626). A rapidly declining correlogram indicates that this assumption is invalid for our data base.

To test Hypothesis 3 we employed product terms between tenure and our product line experimentation measures to determine whether change had a more positive impact on performance later rather than earlier in managers' tenures (see Table 4). The significance of this interaction term was assessed according to the variance it explained over and above the full model.

The correlation matrix shows some strong relationships among a few of the independent variables of our models: studio age, stars, and number of theaters. These, however, are all control variables for which we were not seeking precise beta estimates; rather the controls were included to guard against specification error. The results of our hypothesis tests only became stronger when the collinear variables were deleted. But to be conservative, we present the results for the full models.

Finally, in order to establish the robustness of our findings we reran all of our analyses using fixed effects models. These models, presented in Appendix 1, are similar to those above, but they contain dummies for each studio to capture firm-specific effects.

FINDINGS

Tables 1a and 1b provide the descriptive statistics and correlation matrices for the variables that were

Table 1a. Descriptive statistics

	Mean	S.D.
Tenure of production head	8.970	7.840
Av. profit/film ($MM)	0.135	0.189
Product-line change measure (APC)	0.578	0.188
Number of new genres added (NEWGEN)	0.675	0.798
% Films in new genres (PCNEW)	0.110	0.092
Av. production costs/film ($MM)	0.357	0.226
Number of theaters	112.93	186.79
% Consumer spending on films	13.01	7.06
Stars under contract	8.71	8.49
Studio size (log of film revenues)	3.54	0.42
Studio age	32.72	9.32
Insider/outsider	0.74	0.43
Prior production experience of head	0.64	0.48

used in the study. We report the tests for each of our hypotheses in the following sections.

Tenure and experimentation

Table 2 shows that production head tenure was associated with a decrease in the amount of product line experimentation. Thus Hypothesis 1 was supported by all three of our measures: percentage change in the films made in each genre, number of new genres added, and the percentage of films made in new genres. These findings were confirmed in the fixed effect models (Appendix 1A), and in the models using lagged return on sales (ROS) instead of lagged APF as a control (Appendix 2). There is little doubt that over their careers production heads did less experimenting with their product lines. Inertia did increase with tenure.

Tenure and financial performance

In confirmation of Hypothesis 2, an inverse U-shaped relationship was found between the tenure of the production head and financial performance. Table 3 shows significantly positive main terms and significantly negative squared terms for tenure. This finding was consistent no matter which measure of experimentation we controlled for in the models. The same results were borne out using return on sales (ROS) as the measure of performance (Appendix 2), and using fixed effects models (Appendix 1). All performance models revealed inflection points between 14 and 16 years of tenure: performance rose before that, and fell thereafter. The benefits of learning and experience appear to endure for a very long time before decline sets in. It is notable too, however, that over 20 percent of our 210 observations fall beyond 15 years of tenure; in fact, 5 of the 31 chiefs we followed stayed on the job for more than 15 years. It is also interesting that performance declined by over 5 percent between years 15 and 20 of the study, by over 30 percent between years 15 and 25, and by over 70 percent by year 30—still within our range of observation. This systematic decline in performance in the

Table 1b. Pearson correlation matrix ($N = 203$)

		Tenure	Profit	APC	NEWGEN	PCNEW
1.	Tenure	1.00				
2.	Profit/film	0.12	1.00			
3.	APC	−0.20	0.14	1.00		
4.	NEWGEN	−0.19	0.09	0.30	1.00	
5.	PCNEW	−0.12	0.14	0.58	0.68	1.00
6.	Av. production cost	−0.11	0.03	0.40	0.19	0.45
7.	N theaters	0.02	0.38	−0.17	−0.03	−0.13
8.	ConSpending	0.04	0.30	−0.21	−0.19	−0.32
9.	Stars	−0.09	0.34	−0.16	−0.05	−0.18
10.	Studio size	−0.02	0.43	0.11	0.14	0.09
11.	Studio age	−0.16	−0.13	0.32	0.21	0.34
12.	Insider/outsider	0.25	0.23	0.01	−0.06	0.05
13.	Production experience	0.13	0.01	−0.09	−0.02	−0.08
		APrdCst	NThtrs	CSpend	Stars	Size
6.	Av. prod. cost	1.00				
7.	N theaters	−0.20	1.00			
8.	ConSpending	−0.73	0.48	1.00		
9.	Stars	−0.23	0.47	0.48	1.00	
10.	Studio size	0.42	0.31	−0.22	0.44	1.00
11.	Studio age	0.68	−0.42	−0.84	−0.58	0.23
12.	Insider/outsider	−0.06	0.29	0.16	0.10	0.03
13.	Production experience	−0.28	0.16	0.42	0.33	−0.05
		Age	I/O	P Exp		
11.	Studio age	1.00				
12.	Insider/outsider	−0.22	1.00			
13.	Production experience	−0.52	0.15	1.00		

Table 2. Autoregressive heteroscedastic regressions of experimentation measures on production head tenure and control variables (using average profits/film)

	Standardized beta coefficients Dependent variables: three experimentation measures		
	Product line change (APC)	Genres added (NEWGEN)	% Films in new geners (PCNEW)
Tenure of production head	−0.14*	−0.20***	−0.11*
Control variables			
Profit/film ($t-1$)	0.06	0.13+	0.21*
Av. production costs/ film	0.44***	−0.06	0.33***
No. of theaters owned	−0.18*	0.03	−0.03
Consumer spending	0.23*	−0.17+	−0.16
Stars under contract	−0.10*	−0.06	−0.01
Studio age	0.23	0.12	0.19
Studio size (log revenues)	0.05	0.06	−0.21*
Insider/outsider	0.02	−0.01	0.09
Production experience	0.02	0.19**	0.14*
d.f.	10, 192	10, 192	10, 192
Buse R^2	0.29	0.17	0.34
F	7.64**	3.86*	9.87***
Partial F from adding tenure to the full model	10.77**	10.90**	10.51**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

Table 3. Autoregressive heteroscedastic regressions of profits per film on experimentation measures, production head tenure and control variables

	Standardized beta coefficients Dependent variable: average profit per film		
Tenure of production head	0.41**	0.37*	0.40*
Tenure squared	−0.35*	−0.30*	−0.32*
Control variables			
Product line change (APC)	0.03		
Genres added (NEWGEN)		0.01	
% Films in new genres (PCNEW)			0.03
Av. production costs/film	0.13+	0.15*	0.14+
No. of theaters owned	0.05	0.05	0.06
Consumer spending	0.54***	0.53***	0.55***
Stars under contract	0.07	0.08	0.08
Studio age	0.28	0.34	0.43
Studio age squared	0.01	−0.06	−0.13
Studio size (log revenues)	0.31***	0.29***	0.30***
Insider/outsider	0.15**	0.14*	0.14*
Production experience	−0.02	−0.04	−0.04
d.f.	12, 190	12, 190	12, 190
Buse R^2	0.32	0.34	0.36
F	7.78**	8.39**	9.18**
Partial F from adding tenure squared to the full model	10.05**	10.36**	10.25**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

later years of tenure is impressive given that some poor performers may be forced out of their companies.

Table 3 also indicates that some of our control variables were significant: profits per film were enhanced by higher production costs per film, by a munificent environment (high consumer spending on cinema entertainment), by studio size and by whether the production head was an insider.

Tenure, experimentation, and financial performance

Our results so far show almost no relationship of performance with product line experimentation. But the tenure–experimentation interaction analyses tell a different story. As shown in Table 4, the three interaction variables that are products of each of the three experimentation measures and production head tenure all attained significance. Such convergence in the findings is impressive considering how different the three measures of experimentation are. Again similar results were obtained from the models that used return on sales (ROS) as the measure of performance (Appendix 2), and by the fixed effects models (Appendix 1).

Hypothesis 3 is thus supported: experimentation is more apt to enhance profitability later in a top manager's career than earlier. Change in the early years may lead to errors; in later years it can put experienced leaders in closer touch with a changing market. Thus it may not be experimentation itself, so much as when in a leader's career it occurs, that matters most to performance.

DISCUSSION

This research borrowed notions from the 'micro' literature on the life cycle and managerial learning to advance our understanding of the 'macro' issues of product line experimentation and organizational performance. Although it is one of the first longitudinal studies of executive life cycles, this research discovered important relationships

Table 4. Autoregressive heteroscedastic regressions of profits per film on experimentation–tenure interactions and control variables

Interaction terms (see partial F statistics below)	Dependent variable: average profit per film		
Tenure times			
• Product line change (APC)	0.10*		
• Genres added (NEWGEN)		0.06+	
• % Films in new genres (PCNEW)			0.10*
Control variables			
Tenure	0.35*	0.37*	0.36*
Tenure squared	−0.29*	−0.30*	−0.29*
Product line change (APC)	−0.03		
Genres added (NEWGEN)		−0.02	
% Films in new genres (PCNEW)			−0.02
Average production costs/film	0.14+	0.15+	0.14+
No. of theaters owned	0.06	0.05	0.05
Consumer spending	0.52***	0.53***	0.52***
Stars under contract	0.04	0.07	0.06
Studio age	0.11	0.33*	0.30+
Studio age squared	0.13	−0.05	−0.04
Studio size (log revenues)	0.30***	0.30***	0.32***
Insider/outsider	0.13*	0.14*	0.14*
Production experience	−0.03	−0.03	−0.03
d.f.	13,189	13,189	13,189
Buse R^2	0.34	0.36	0.38
F	7.47**	8.01**	8.79**
Partial F from adding the tenure-change interaction to full model	13.91**	13.56**	14.82**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

among top executive tenure, experimentation, and performance. These relationships indicate how top executives learn over their tenures and they highlight possible performance consequences of this learning.

The findings of this study also suggest that it may be useful to characterize learning and performance over the course of executive tenures by proposing three life cycle stages: we call these Learning, Harvest, and Decline.[4] To make the discussion of these stages more memorable, we will go beyond our quantitative findings, and examine some telling anecdotes about the studio heads and their careers.

The Learning stage

The first few years of an executive's tenure are often characterized by learning and experimentation. Many managers 'test the waters' and try to establish the tone for their tenures. They make great efforts to find out more about market opportunities and organizational strengths by experimenting broadly (Gabarro, 1987; Greiner and Bhambri, 1989). Thus during the learning stage, strategies and product lines change a great deal (Hambrick and Fukutomi, 1991; Katz, 1980; Keck and Tushman, 1993).

Histories of the Hollywood studios and biographies of their production heads show that many such managers embarked on early periods of experimentation—trying out various types of new talent, film genres, and modes of film making. For example, Jack Warner, very early in his career, lured Al Jolson back from the stage to star in *The Jazz Singer*, a movie that ushered in the new 'sound' era of films. Darryl Zanuck early in his career gambled with Norwegian Olympic skater Sonja Henie. Henie, who had no acting experience, went on to become a top-ten box office draw for 3 years running, performing in musicals such as *Thin Ice* and *Happy Landing*.

The Learning stage, however, shows relatively modest financial returns because novice managers tend to make many mistakes. Dore Schary, for example, battled hard for the opportunity to make the costly historical drama *Red Badge of Courage*—a film with strong moral values but no known stars. These early 'message pictures' of Schary's flopped, costing MGM a small fortune.

The Harvest stage

For most executives, the Learning stage is followed by a Harvest stage, during which managers work to capitalize on their past learning and their knowledge and experience. They experiment less with their products and begin to garner more confidence in a particular way of thinking and doing things (Miller, 1993a, 1993b; Miller and Chen, 1996). This, in other words, is a period of convergence and consolidation (Tushman and Romanelli, 1985). Using March's (1991) terms, if the learning phase is one of experimentation, the Harvest phase is one of exploitation. Moreover, because of prior learning, the Harvest phase produces the best financial performance. There are fewer failing experiments or useless diversions, and some managers have learned to concentrate on what matters most.

Many production heads ultimately achieved success by focusing on certain types of films. Under Louis B. Mayer, MGM became famous for its outstanding musicals developed by distinguished directors such as Busby Berkley and Vincent Minelli. Jack Warner's 'factory,' on the other hand, commissioned a popular succession of gritty crime and gangster films including *Angels with Dirty Faces* and *The Roaring Twenties*. Indeed, Warner himself developed a magic touch: for *The Maltese Falcon* he insisted the film start with a gripping prologue and a sinister gloved hand (Silke, 1976: 126). For over 10 years at Paramount, Y. Frank Freeman oversaw a series of successful 'road pictures' featuring Bing Crosby and Bob Hope. Finally, Harry Cohn developed the concept of 'screwball comedy' with films such as *It Happened One Night, Mr. Deeds Goes to Town, You Can't Take it With You*, and *The Awful Truth*. In each instance, the studio chiefs, in their maturity,

[4] Although our scope was more limited, our findings are consistent with some of those postulated by Hambrick and Fukutomi (1991). Hambrick and Fukutomi suggested five executive life cycle stages based on transformations along many different attributes. Our results are based on two of these: experimentation and performance. This more limited scope distinguished only three career life cycle stages. Broadly speaking, our first 'Learning' stage is comparable to Hambrick and Fukutomi's first two phases, Response to Mandate and Experimentation, our second 'Harvesting' stage corresponds to Hambrick and Fukutomi's third Selection of an Enduring Theme phase, and our final 'Decline' stage corresponds to Hambrick and Fukutomi's fourth and fifth Convergence and Decline phases.

had honed their skills and found the genres and casts that would cause their studios to thrive.

The Decline stage

The final Decline stage typically occurs after executives have been in office for a very long time—about 15 years in our study, considerably longer than reported by Hambrick and Fukutomi (1991) and Miller (1991). Now many managers become more complacent—they assume much and question little (Levinthal and March, 1993). Some are unwilling to learn and lose touch with their markets; others get defensive about their past commitments (Kiesler and Sproull, 1982; Staw, 1976). Such executives stick to an obsolete formula or extend it beyond its utility. So product lines tend to be more inertia laden than in the Harvest stage (Miller, 1990, 1993b, 1996; Miller and Chen, 1994), increasing the threat of obsolescence and eroding financial performance.

Studio heads such as Darryl Zanuck, Dore Schary, Jack Warner, and Harry Cohn, after years at the top, had 'had the course.' They got tired, became reactionary, and fell back on past habits instead of adapting to changing realities (Mosely, 1984: 268; Silke, 1976: 301–320; Thomas, 1967: 291–292). Zanuck, for example, turned down *On the Waterfront* in his obsessive focus on wide-screen adventures. Gussow (1971: 179) writes: 'It was easily the best movie of 1954, the kind of controversial, timely, exciting picture that the old Zanuck would have given anything to call his own.' The picture, of course, went to another studio and made history with its treasury of Academy Awards. A subordinate summarizes the close of Zanuck's tenure at Fox: 'You would notice it in the meetings. You would go in and sit there in silence for long periods. He wasn't sparking ... The genius of the studio ... was dim now' (quoted in Solomon, 1988: 106).

To improve profits in the face of increasing competition from television and foreign films, Jack Warner embarked on a cost-cutting program that ultimately hurt his studio. In order to reduce expenses he dramatically cut the number of films made, got rid of many of his best writers, producers, and directors, and prematurely sold off his greatest films to United Artists Television. Warner presumably also railed against any suggestions from his new directors and producers to adapt his films to a more sophisticated audience (Silke, 1976: 300–306).

CONCLUSIONS AND IMPLICATIONS

We have used the notions of learning and career life cycle to integrate our analysis of executive tenure, product line experimentation and financial performance. It appears that as our top executives learned about their jobs, firms, and environments, they became more effective at using the resources available to them to make successful film choices. These benefits of learning and experience lasted a very long time as performance only began to decline very late in the tenures of our executives. It was interesting too that learning via product line experimentation declined with years in office and that the performance implications of experimentation seemed to improve with time.

Conventional wisdom suggests that it is mainly industry fad and fashion that drive the mix of pictures that each studio makes each year. In other words, the studios are most likely to produce and release films in the genres that have garnered the most attention and generated the greatest revenues over the last few years. It is difficult to deny that recent successes are apt to influence the mix of pictures that a studio head decides to make. But this study suggests that the tenure of the production head also plays a significant role in this selection process. When we looked across studios in any given year at the changes in the distribution of genres, it was clear that firms evolved very differently. Some of them changed their product mix significantly, perhaps to keep up with market trends, while others made very few changes. Our multivariate analyses suggested that these differences—and their performance implications—could be attributed in part to the career stage of the production head.

Our findings are quite aggregate, however. Clearly, the duration of each of the life cycle phases will differ among managers: our results suggest only average tendencies. In this study, even the great studio chiefs such as Louis B. Mayer, Jack Warner, and Darryl Zanuck went through the three life cycle stages, but they staved off decline longer than their counterparts. A few others retired before any decline occurred.

It is important to note also that the life cycle may vary across different environments and industries. In stable industries, the learning phase may be quite short and uneventful, while the harvest phase might be long. In uncertain and competitive environments the learning phase may be lengthy and the harvest phase much shorter. We would urge scholars to undertake multi-industry studies to test these conjectures. Also, because this research was focused on learning it examined product line experimentation. There are, however, many other important life cycle transitions that subsequent scholars might choose to study: these range from changes in executive information sources to shifts in the power of leaders across their tenures (see Hambrick and Fukutomi, 1991; Kets de Vries *et al*., 1984).

Although these results are tentative and based on the experiences of fairly large companies, they do suggest that executive learning is slow, but tends to last a long time. It is common for managers to grope and experiment early in their careers, and it takes some time for performance to increase. Thus it might be useful for boards of directors to allow for this learning period when assessing CEOs during the first years of their tenure. We found also that it is common for managers' performance to decline later in their careers. Although some might argue for CEO term limits to counter this tendency, we found that decline occurred quite late, usually after 15 years in office. Moreover, this decline was associated with a fall in experimentation, a trend that might be combated by greater awareness of the problem.

Of course, troubled companies wishing to increase their levels of innovation may be able to achieve this through a change in the leader; but our results also indicate they might have to wait awhile for their results to improve. No doubt further research in different industries into how managers change and learn over their careers will lead to greater insights to guide their selection, training, and appraisal.

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APPENDIX 1

FIXED EFFECTS MODELS:

Section A: **Autoregressive heteroscedastic regressions of experimentation measures on tenure and control variables**

	Dependent variables: three experimentation measures		
	Product line change (APC)	Genres added (NEWGEN)	% Films in new genres (PCNEW)
Tenure of production head	−0.22**	−0.19**	−0.14*
Profit/film ($t-1$)	0.04	0.13+	0.18+
Av. production costs/film	0.19	−0.25	0.11
No. of theaters owned	−0.14	0.08	0.05
Consumer spending	0.60**	−0.19	0.05
Stars under contract	−0.20	−0.09	−0.13
Studio age	0.82**	0.70**	0.59**
Studio size (log revenues)	0.02	−0.02	−0.19+
Insider/outsider	0.10	0.00	0.19**
Production experience	0.17	0.19+	0.31**
Cross-section dummy variables			
CS 1	−0.27	−0.25	0.16*
CS 2	−0.45	−0.51	0.01
CS 3	−0.38	−0.41	0.00
CS 4	−0.64	−0.49	−0.23
CS 5	−0.50	−0.45	−0.15
CS 6	−0.75	−0.75*	−0.20
CS 7	−0.45	−0.49	0.04
d.f.	17, 186	17, 186	17, 186
Buse R^2	0.34	0.22	0.43
F	151.3**	20.62*	41.65**
Partial F from adding tenure to full model	15.99**	15.61**	15.59**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

Section B: **Autoregressive heteroscedastic regressions of profits per film on tenure, and experimentation–tenure interactions**

	Dependent variable: average profit per film		
Tenure	0.39*	0.39*	0.38*
Tenure squared	−0.33*	−0.34*	−0.34*
Interactions of tenure with:			
• Product line change (APC)	0.11*		
• Genres added (NEWGEN)		0.07+	
• % Films in new genres (PCNEW)			0.10*
Product line change (APC)	−0.04		
Genres added (NEWGEN)		−0.02	
% Films in new genres (PCNEW)			−0.03
Average production costs/film	0.11	0.12	0.11
No. of theaters owned	0.10	0.07	0.07
Consumer spending	0.65***	0.64**	0.65***
Stars under contract	0.01	0.01	0.01
Studio age	0.27	0.44	0.41
Studio age squared	0.13	−0.05	−0.03
Studio size (log revenues)	0.35***	0.35***	0.36***
Insider/outsider	0.13*	0.15*	0.14*
Production experience	0.03	0.03	0.03
Cross-section dummy variables			
CS 1	−1.80**	−1.94**	−1.96**
CS 2	−1.80**	−1.91**	−1.93**
CS 3	−1.83**	−1.95**	−1.97**
CS 4	−2.05**	−2.17**	−2.19**
CS 5	−1.80**	−1.96**	−1.96**
CS 6	−1.88**	−1.99**	−2.02**
CS 7	−1.87**	−2.00**	−2.01**
d.f.	20, 183	20, 183	20, 183
Buse R^2	0.39	0.39	0.41
F	11.29**	11.49**	12.12**
Partial F for adding tenure squared to full model	15.69**	15.98**	15.98**
Partial F for adding tenure-change interactions to full model	20.31**	20.52**	21.51**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

APPENDIX 2

Autoregressive heteroscedastic regressions of experimentation measures on production head tenure and control variables (using return on sales)

	Standardized beta coefficients Dependent variables: three experimentation measures		
	Product line change (APC)	Genres added (NEWGEN)	% Films in new genres (PCNEW)
Tenure of production head	−0.13*	−0.20***	−0.09+
Control variables			
Return on sales ($t-1$)	−0.02	0.09	0.12+
Av. production costs/film	0.46**	−0.02	0.39**
No. of theaters owned	−0.17*	0.05	−0.02
Consumer spending	0.29*	−0.15	−0.12
Stars under contract	−0.10	−0.06	0.00
Studio age	0.26+	0.13	0.19
Studio size (log revenues)	0.02	0.08	−0.19+
Insider/outsider	0.02	−0.01	0.10+
Production experience	0.01	0.18*	0.12*
d.f.	10, 192	10, 192	10, 192
Buse R^2	0.29	0.16	0.30
F	7.71**	3.69*	8.38***
Partial F from adding tenure to full model	9.10**	10.29**	7.20*

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.

Autoregressive heteroscedastic regressions of return on sales on tenure, experimentation–tenure interactions and control variables

	Dependent variable: return on sales		
Tenure	0.37*	0.36*	0.37*
Tenure squared	−0.31*	−0.29*	−0.31*
Interaction terms			
Interactions of tenure with: (see partial F statistics below):			
• Product line change (APC)	0.05+		
• Genres added (NEWGEN)		0.04	
• % Films in new genres (PCNEW)			0.08*
Control variables			
Product line change (APC)	−0.03		
Genres added (NEWGEN)		0.02	
% Films in new genres (PCNEW)			0.01
Average production costs/film	−0.13	−0.13	−0.16
No. of theaters owned	−0.08	−0.08	−0.08
Consumer spending	0.62***	0.63***	0.63***
Stars under contract	0.00	0.02	0.00
Studio age	0.38**	0.40**	0.40**
Studio size (log revenues)	0.43***	0.43***	0.46***
Insider/outsider	0.15*	0.16*	0.16*
Production experience	0.06	0.05	0.06
d.f.	13, 189	13, 189	13, 189
Buse R^2	0.37	0.38	0.40
F	9.10**	9.89**	10.51**
Partial F for adding tenure-squared to full model	11.40**	11.71**	11.32**
Partial F for adding tenure-change interactions to full model	12.92**	13.11**	13.60**

+, *, **, and *** indicate p-values beyond the 0.10, 0.05, 0.01 and 0.001 levels of significance.