RESEARCH NOTE

© *Academy of Management Journal*
1996, Vol. 39, No. 5, 1245–1264.

IS SLACK GOOD OR BAD FOR INNOVATION?

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This article suggests that there is an inverse U-shaped relationship between slack and innovation in organizations: both too much and too little slack may be detrimental to innovation. Two related mechanisms governing this relationship are proposed: Slack fosters greater experimentation but also diminishing discipline over innovative projects, resulting in the hypothesized curvilinear relationship. Comprehensive worldwide data on 264 functional departments of two multinational corporations support the prediction.

Innovation and slack are concepts at the very core of organization theory. Innovation has been an outcome of central interest to organization theorists because it is vital for organizational adaptation and renewal. Organizational slack has long been used to explain diverse organizational phenomena, including goal conflict, political behavior, effectiveness, and innovation itself. Both constructs have received much attention in recent years. In an increasingly dynamic world, firms are being forced to become more innovative. At the same time, organizational slack has come under sharp scrutiny as organizations facing increasingly intense global competition feel pressured to eliminate all forms of slack. These two countervailing forces suggest a potential paradox. If slack is a form of inefficiency but also essential for innovation, organizations run the risk of eliminating slack to a point that undermines their capacity to innovate.

This dilemma raises the research question that is at the heart of this work: What is the relationship between organizational slack and innovation? The literature provides no clear answers because theorists stand divided on whether slack facilitates or inhibits innovation. Proponents of slack argue that it plays a crucial role in allowing organizations to innovate by permitting them to experiment with new strategies and innovative projects that

The order in which authors appear was randomly selected. We would like to thank Christopher Bartlett and Sumantra Ghoshal, for providing us with the data used in this study; seminar participants at the J. L. Kellogg Graduate School of Management, Northwestern University, for helpful discussions; and three anonymous reviewers, for their comments.

might not be approved in a more resource-constrained environment (Cyert & March, 1963: 278). Opponents of slack counter that slack diminishes incentives to innovate and promotes undisciplined investment in R&D activities that rarely yield economic benefits (cf. Jensen, 1986, 1993; Leibenstein, 1969). According to this view, slack encourages the pursuit of pet projects by agents who show little regard for the interests of the principals they serve.

We argue that one way to reconcile this theoretical debate is to recognize that the relationship between slack and innovation is curvilinear—too little slack is as bad for innovation as too much slack. Building upon areas of agreement among the proponents and detractors of slack, we propose organizational slack's impact on experimentation and on the control placed on experimentation lead to the hypothesized relationship. Too little slack inhibits innovation because it discourages any kind of experimentation whose success is uncertain. Equally, too much slack inhibits innovation because it breeds complacency and a lack of discipline that makes it likely that more bad projects will be pursued than good. Taken together, these ideas suggest that an intermediate level of slack is optimal for innovation. Empirical support for these arguments comes from data on innovation and slack obtained from department-level managers in the subsidiaries of two multinational companies. We also examined the influence of contextual and organizational factors on this proposed relationship.[1]

WHAT IS SLACK?

We define slack as the pool of resources in an organization that is in excess of the minimum necessary to produce a given level of organizational output. Slack resources include excess inputs such as redundant employees, unused capacity, and unnecessary capital expenditures. They also include unexploited opportunities to increase outputs, such as increases in the margins and revenues that might be derived from customers and innovations that might push a firm closer to the technology frontier.[2] Further, slack can be deployed in various ways. A firm can use slack resources to respond to uneven performance (Kamin & Ronen, 1978) or to such contingencies as budget cuts or environmental jolts (Meyer, 1982), as well as to engage in slack search, or experimentation (Levinthal & March, 1981).

It is important, as Sharfman, Wolf, Chase, and Tansik (1988) urged, to specify slack in terms of ease of recovery or employability in the future. They contrasted high-discretion (easy-to-recover) and low-discretion (difficult-to-recover) slack. Similarly, Singh (1986) distinguished between unabsorbed slack, which is easy to recover, and absorbed slack—which is not easy to recover. Implicit in these distinctions is the time frame over

[1] A longer version of this article is available from the authors.

[2] Notions of what constitutes slack have varied widely (see Bourgeois [1981] and Lant [1985] for comprehensive reviews). The conceptual and empirical difficulties with defining slack have been an obstacle to research on this topic.

which resources can be redeployed. In this work, we focused on short-term slack: resources of any kind that can be recovered to influence performance over a typical temporal cycle to which managers' activities are entrained. Given that budgets and performance reviews typically follow an annual cycle, we defined short-term slack as excess resources that can be recovered within a year. Our focus was on short-term, or unabsorbed, slack because such resources should be more easily deployable in support of innovative activity than long-term, or absorbed, slack.

Even though the foregoing discussion has been primarily at the organization level, notice that our definition of slack applies across levels, because it captures the extent to which any unit (be it an individual, a department, a function, a division, or a firm as a whole) has excess resources that can be marshaled to meet internal or external contingencies.

The Case for a Positive Relationship between Slack and Innovation

Why does slack exist? Cyert and March (1963) provided the seminal answer to this question. They argued that slack exists because it plays a crucial and vital role in resolving latent goal conflict between political coalitions in organizations and thus prevents them from breaking apart. Building upon these original insights, scholars have argued that organizational slack is an important catalyst for innovation for two reasons—slack causes relaxation of controls and represents funds whose use may be approved even in the face of uncertainty. Slack allows pursuit of innovative projects because it protects organizations from the uncertain success of those projects, fostering a culture of experimentation (e.g., Bourgeois, 1981). Slack resources permit firms to more safely experiment with new strategies by, for example, introducing new products and entering new markets (Hambrick & Snow, 1977; Moses, 1992). Moreover, slack facilitates innovation by allowing slack search, or the pursuit of projects that don't appear to be justifiable in terms of internal market controls but have high potential in the view of scientists or other corporate champions (Levinthal & March, 1981; March, 1976). Although such projects often fail, they sometimes fortuitously yield positive results that can be of great benefit to a firm. The literature on innovation is replete with stories of chance discoveries that resulted from slack search, such as the much-celebrated discovery of Post-it notes at 3M (Mokyr, 1990).

Following such logical arguments in favor of slack, in most empirical studies on the organizational determinants of innovation, researchers have included slack as a variable and in some cases shown it to have a positive effect (cf. Damanpour, 1987; Delbecq & Mills, 1985; Lant, 1985; Majumdar & Venkataraman, 1993; Singh, 1986; Zajac, Golden, & Shortell, 1991; Zaltman, Duncan, & Holbeck, 1973).

The Case for a Negative Relationship between Slack and Innovation

Scholars, especially organizational economists such as Leibenstein (1969) and Williamson (1963, 1964), have adopted a more hostile view of

slack. They view it as synonymous with waste and as a reflection of managerial self-interest, incompetence, and sloth rather than as a buffer necessary for organizational adaptation. Like Cyert and March (1963), these scholars start by characterizing firms as coalitions of competing interests. However, they contend that the proper way of thinking about these competing interests is to view them as a system of nested principal-agent relationships in which agents may accumulate slack to pursue their own interests rather than act in the interest of the organizations (Antle & Fellingham, 1990; Jensen & Meckling, 1976).[3] The top managers of a firm can be thought of as agents acting on behalf of the shareholders, or principals. Similarly, divisional managers can be thought of as agents acting on behalf of top management, and so on throughout the management hierarchy.

Organizational economists generally have not viewed slack as useful for resolving principal-agent conflicts. They have argued that the right way to resolve these conflicts is to structure incentives in ways that align the interests of principals and agents. Slack, in their view, is an unnecessary cost that should be eliminated.

Opponents of slack thus view it as a sign of inefficiency that detracts from the overall value of a firm. Leibenstein (1969) even coined the felicitous term *X-inefficiency* to highlight the discrepancy that slack creates between actual output and maximum output for a given set of inputs. Moreover, unlike advocates of slack, its detractors argue that excess slack may actually hurt innovation, and hence adaptation. Jensen (1986, 1993), for instance, argued that firms that have a high amount of slack often invest it in dubious projects, such as pet R&D projects and unrelated acquisitions.

In sum, these theorists have suggested that although excess slack undoubtedly spurs R&D expenditures that lead to the pursuit of many new projects, very few of these projects actually translate into value-added innovations for firms, because the loose controls placed on these projects allow decision makers to make choices that "accord better with their own preferences than with economic considerations" (Child, 1972: 11).

An Argument for a Curvilinear Relationship between Slack and Innovation

Credible cases can be made for and against the innovation-enhancing benefits of slack. Rather than weigh in on one side of the debate or the other, we would like to propose a reconciliation of these perspectives. In short, we suggest that the relationship between innovation and slack is curvilinear, or inverse U-shaped.

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[3] In this model, conflict arises because agents do not always have the incentive to act in the best interests of the principals, who typically don't have all the information necessary to monitor their agents' performance accurately. Agents can take advantage of this information asymmetry and act in their own interests. Indeed, Williamson (1963, 1964) argued that, left to their own devices, agents are primarily motivated to build empires for themselves.

This proposition rests on the following series of interrelated observations and arguments. The first thing to observe is that both the advocates and opponents of slack agree that slack promotes experimentation and the pursuit of new projects. For innovation to occur, organizations must cope with the uncertainty associated with innovative projects (Mansfield, 1963). This intrinsic uncertainty makes it difficult to gauge ex ante the net present value (NPV) of such projects. Persistence and "patient money" can not only foster innovation, but can also provide the flexibility necessary to adapt resource allocation levels as projects progress over time. Slack provides a pool of resources that can ease adaptation to the ebbs and flows of the innovation process. Slack also frees managerial attention, another scarce resource (Cyert & March, 1963). In organizations that have little slack, managerial attention is likely to be focused first and foremost on short-term performance issues rather than on more uncertain innovative projects. For all the above-mentioned reasons, the number of new initiatives undertaken undoubtedly increases as slack increases. Of course, the relationship may not be linear over the entire range of slack. We expect diminishing returns from experimentation as slack increases because of diminishing availability of possibilities for innovation. The positive relationship between slack and experimentation is thus one factor that determines the relationship between slack and innovation.

An opposing dynamic that needs to be simultaneously considered is the diminishing discipline that is placed on increased experimentation as slack increases. As slack increases, the discipline that is exercised in the selection, ongoing support, and termination of projects becomes lax (e.g., Jensen, 1993; Leibenstein, 1969). With increasing slack, projects with high risk and negative NPV may be funded simply because the resources exist to indulge agents for whom these are pet projects. Not only may bad projects be initiated, continual, or escalating, commitment to these projects might occur because the existence of slack makes it difficult to justify termination of someone's pet project (Staw, Sandelands, & Dutton, 1981). As Cyert and March (1963) pointed out, in times of slack, negotiations are not as intense and managers tend to be less stringent in demanding that projects meet their forecasted milestones. The lax discipline around resource allocation that slack fosters increases both the risk that poor projects will not be terminated even in the face of negative information, and the risk that projects will be abandoned simply because someone ran out of energy, got bored, or ran into a tough problem. Thus, excess slack can result in both type I (selecting projects that should not have been funded) and type II (stopping projects that should have been continued) errors. In sum, we expected the relationship between slack and discipline to be negative.

Though we had no direct indicators of degree of experimentation or discipline in our study, theoretically we contend that if we put these two countervailing forces together, a curvilinear relationship between slack and innovation will emerge. Slack promotes greater experimentation but also

promotes diminishing levels of discipline. Since adequate levels of both experimentation and discipline are requisites for innovation, we expected slack to have a nonlinear influence on innovation. This prediction suggests that there is an intermediate level of slack in any given organizational setting that is optimal for innovation and leads to our main hypothesis.

> *Hypothesis 1: The relationship between organizational slack and innovation is inverse U-shaped.*

METHODS

Sample

A significant question associated with studying the relationship between innovation and slack is level of analysis. Measuring slack or innovation at the firm level, although useful in making cross-organizational comparisons, can mask vast differences that may exist within a firm. Prior research has shown that in large, multinational organizations, such as multinational corporations (MNCs), intraorganizational differences can be greater than interorganizational differences (Ghoshal & Nohria, 1989). Accordingly, we decided that the most appropriate level at which to study this relationship was organizational subunits with clearly defined financial and administrative boundaries, such as departments within multinational subsidiaries. Such settings are rife with classic competing coalition and agency problems (Nohria & Ghoshal, 1994). Department managers have local knowledge and are likely to know good projects from bad. But their interests may not always be aligned with those of their principals because the department managers may seek to accumulate slack, either to pursue their own pet projects or to build buffers against unexpected contingencies. Thus, we were likely to find considerable variance in amounts of slack across the departments of MNCs, making them a rich setting in which to explore the relationship between slack and innovation.

Data were obtained through a self-report questionnaire mailed to department managers at the national subsidiaries of two major multinational corporations, one European and the other Japanese. Both firms are among the largest and most diversified MNCs in the world, but we focused our study on the consumer electronics business, in which the two companies competed directly worldwide. In this business, the firms were broadly comparable in terms of size, geographic scope, and competitive position.

These data were collected as part of a larger study on the organization of MNCs described in detail elsewhere (Bartlett & Ghoshal, 1989). The response of 178 departmental managers from 14 national subsidiaries in the Japanese firm and 78 departmental managers from 8 national subsidiaries in the European firm were complete and usable. Each subsidiary had about the same number of departments, including manufacturing, marketing, R&D, finance,

and other administrative functions. Given that one of the major sources of variation in the characteristics of the departments in our sample was the subsidiary to which they belonged, for each corporation we chose a sample representative of the full range of the MNC's subsidiaries in consultation with three corporate managers from the firm responsible for the global consumer electronics business. These managers were also asked to complete a survey designed to capture differences among subsidiaries and their relationships with corporate headquarters. This selection procedure ensured that we had departments located in small and large subsidiaries, in advanced and developing nations, and in challenging and placid environments.

Drawing on lists furnished by the corporate headquarters, we mailed questionnaires to every departmental manager in each selected subsidiary. In both firms, these departments represented subunits with clear boundaries and independent budgets with specific goals and resources available. The response rate was 87 percent in the European firm and 93 percent in the Japanese firm. In no subsidiary was there a response rate of less than 83 percent.

Measures

As prior research has yielded no definitive measure of either innovation or slack, the issue of measuring both these constructs is mired in acrimonious controversy. Despite this challenge, we consider it important to empirically uncover some of the mysteries associated with slack and innovation. We are confident about the legitimacy of our measures (their pros and cons are discussed below) and hope this study brings new conceptual clarity to the vexing problems of measuring slack and innovation in organizations.

Innovation. Innovations are, by definition, unique—one is rarely commensurable with another (Damanpour, 1987; Kimberly & Evanisko, 1981; Van de Ven, 1986). Keeping these difficulties in mind, we defined innovative accomplishments very broadly to include any policy, structure, method or process, product or market opportunity that the manager of the innovating unit perceived to be new. This definition was first advanced by Schumpeter (1926) and has been employed subsequently in several studies, including the empirical work of Zaltman and colleagues (1973) and Kanter (1983). Although Daft (1982) suggested keeping technical and administrative innovations distinct, we joined with Van de Ven (1986), who argued that making such a distinction results in an unnecessarily fragmented classification of the innovation process. We adopted this very broad definition of innovation because our aim was to capture the extent to which each department was responsible for generating any form of new knowledge that could benefit an MNC. This definition also captures the spirit in which the concept of innovation has been used in the MNC literature (Ghoshal & Bartlett, 1988; Hedlund, 1986).

To address the problem of the incommensurability of the different types

of innovations that come under the ambit of our definition, we focused on the tangible economic benefits of innovations. We asked each respondent to describe and estimate the total economic impact (the yearly savings and or additional revenues generated in millions of dollars) of each of the three most significant innovations his or her department had introduced during the last year. We could thus compare the innovativeness of a finance department that came up with a new hedging instrument to protect its firm from exchange rate fluctuations with the innovativeness of an R&D department that came up with a process innovation that improved manufacturing yields by 3 percent (these are both real examples from the data).[4]

We also tested the robustness of our claims using more conventional measures of innovation, estimating each of our models against a dependent variable that measures the total number of distinct innovations reported by each department in the previous year (e.g., Damanpour, 1987; Delbecq & Mills, 1985).

Slack. It is difficult to measure slack directly because slack can be deployed at any time in a variety of ways. Most efforts have focused on determining conditions under which slack resources are likely to be available to an organization, using antecedents of slack as an indicator (e.g., Marino & Lange, 1982), for example, or relying upon standard financial data reported for a firm as a whole (e.g., Bourgeois, 1981; Bromiley, 1991; Davis & Stout, 1992; Lant, 1985; Majumdar & Venkatarman, 1993; Singh, 1986; Zajac et al., 1991). The only guidance for measuring slack at the subunit level comes from Bourgeois (1981: 31), who suggested that researchers try and ask organizational members such questions as "Suppose your organization were facing an economic crisis. By what percentage would you be willing to allow your salary (or wage) to be reduced before you would actively search for a position elsewhere?" and "How many perquisites . . . would you be willing to give up?" Lant (1985), who noted that slack may be most salient when it is taken away through interventions like tighter budgets, also suggested the value of such an approach. Bourgeois's approach also coincides with Leibenstein's (1966) notion of X-inefficiency, which he defined as the degree to which actual output is less than maximum output for a given level of inputs.

Following these recommendations, and building upon case research by Schiff and Lewin (1970) that showed that most budgets have some slack because managers routinely overestimate costs and underestimate revenues, we measured the degree of slack within each department by asking the

[4] This operational definition also gets around a thorny issue that could be raised by critics of slack. By focusing on the tangible economic benefits derived from the innovations introduced by a subsidiary, we bypassed the problem of measuring the intensity of innovative effort or the number of new projects being included whether or not they created any real value. Our measure still suffers, though, from not capturing the relative returns to investment in innovative projects, because some departments may simply have invested more than others.

departmental managers the following two questions: (1) ''Assume that due to some sudden development, 10% of the time of all people working in your department has to be spent on work totally unconnected with the tasks and responsibilities of your department. How seriously will your output be affected over the next year?'' (2) ''Assume that due to a similar development, your department's annual operating budget is reduced by 10%. How significantly will your work be affected over the next year?'' In both cases, managers were given five choices ranging from 1, ''output will not be affected,'' to 5, ''output will fall by 20% or more.'' The midpoint, 3, could be chosen to indicate that output would fall by about 10 percent, the same as the proposed reduction in resources. We then gave each choice the value of the reported loss in output. Across this range of responses, the higher the reported loss in output, the lower the slack. Thus, we reverse-coded these values for the actual analysis to create our measure of slack. Using these transformations, we created a slack measure corresponding to each question. Because the two measures were highly correlated, we added the two responses, constructing a composite measure of slack ($\alpha = .79$). In the final models, both linear and quadratic terms were introduced for this variable.

It is important to flag one problem with our approach to measuring slack. As Bourgeois (1981: 32) pointed out, there is some question as to whether individuals can accurately assess how much they would be affected by a sudden change and, even if they can do so, they may not be enthusiastic about making such a revelation. We believe that this is not a critical issue here. First, all our respondents were assured that their responses would be treated with the strictest confidence and would in no way be revealed to their senior managements. Additionally, we separated the questions about slack from those on innovation in the survey to avoid any hint that we were looking for a relationship between slack and performance and to prevent hypothesis guessing (Cook & Campbell, 1979). We have reason to believe that our promise of confidentiality worked because our responses were well distributed over the range of possible choices.

Controls

To reasonably assess the relationship between innovation and slack, it was essential to include as controls other variables known or expected to affect innovation. We tried to be as exhaustive as possible and included controls at various levels of analysis.

Environmental forces. A substantial literature addresses the environmental conditions that stimulate innovation (see Kamien and Schwartz [1982] for an exhaustive review). Implicit in most of these accounts is the notion that environmental conditions influence degree of organizational experimentation. Two of the most prominent variables in this literature are the degree of competition faced by an organization (cf. Majumdar & Venkataraman, 1993; Zajac et al., 1991) and the technological dynamism of the envi-

ronment in which a firm is embedded (cf. Lawrence & Lorsch, 1967). Since Schumpeter's (1926) classic treatise, competition has been seen as a vital spur to experimentation and innovation. Leibenstein (1976), for instance, argued that competition exerts strong pressures on managers to search for new alternatives superior to current production techniques. Similarly, Kamien and Schwartz (1979) argued that loss of market share and performance erosion in competitive environments induce managers to actively search for new ways to maintain or improve their competitive positions. As for technological dynamism, organizations embedded in dynamic technological environments are in the midst of active networks of information and people flows and recognize the importance of innovation for their success; they are hence also more likely to invest in innovative experiments (Burns & Stalker, 1961; Lawrence & Lorsch, 1967).

In each MNC, three senior headquarters managers responsible for the overall global consumer electronics business were asked to complete a survey that included measures of the degree of competition and technological dynamism confronted by each of the national subsidiaries in this sample. The degree of competition was measured by the question "On a scale of 1 (not much competition) to 5 (extremely intense competition), rate the intensity of competition faced by each of your following national subsidiaries." Similarly, the degree of technological dynamism in the environment was assessed by "On a scale of 1 (very slow) to 5 (very rapid), indicate the rate of technological change confronted by each of your following national subsidiaries in their local markets." There was a high degree of convergence across the three respondents in both firms (Cronbach's alpha was .76 in one firm and .84 in the other). Moreover, the measures of competition and technological intensity were highly correlated ($r = .70$). Accordingly, in our final analysis we measured environment as the sum of the average measures of the degree of competition and technological dynamism reported by our respondents for each subsidiary. Given that environment does not vary across the departments in a subsidiary, each department in a given subsidiary received the same overall subsidiary score.

Degree of control. The strength of an organization's internal control is the second factor that affects innovation. Jensen (1993) demonstrated the importance of strong control systems that ensure that R&D as well as other capital expenditures lead to real value-added innovations, providing compelling evidence that the internal control systems of most large organizations routinely fail to adequately discipline their resource allocation processes. A tight internal control system can increase the amount of discipline exercised over the selection of new projects. Of course, if the controls are too tight and employees have too little discretion, the organization may choke all entrepreneurial initiatives. Thus, we expected the strength of an organization's internal control system to have a positive but curvilinear effect on its innovativeness.

We included a number of measures that indicated the extent of control placed over a department's decisions. The first set of measures indicated the

degree to which key decision areas were centralized. Respondents within each functional unit were asked to estimate, on scales of 1 (low) to 5 (high), the influence they enjoyed in making five types of decisions: (1) the modification of an existing product, (2) the modification of a production process, (3) the restructuring of the subsidiary organization involving the creation or abolition of departments, (4) the recruitment and promotion of managers to positions below that of subsidiary general manager, and (5) the career development plans for department managers. These decision situations were adopted from an instrument developed and used by De Bodinat (1975). We used an additive scale ($\alpha = .73$) of these five indicators (reverse-scored) as a measured called centralization.

A second set of measures assessed the degree to which key areas of decision making were subject to formal controls. Each respondent was asked to indicate, on a scale of 1 (definitely true) to 4 (definitely false), the extent to which the following five conditions applied: (1) for most tasks there are well-developed rules and policies, (2) my decisions are closely monitored to ensure that rules and policies are followed, (3) for most situations, there are manuals that define the course of action to be taken, (4) for most jobs, there are written job descriptions, and (5) everyone has a well-defined and specific job to do.[5] These questions are in accord with the measures proposed by Pugh, Hickson, Hinings, and Turner (1968) to measure "the degree of employee behavior that is defined by specialist jobs, routines, procedures, and formal written records." Accordingly, formalization, an additive scale ($\alpha = .80$) of all five indicators (reverse-scored), was used to measure the degree of formal control over decision making.

Company. Since the data we collected were from two different MNCs, one European and the other Japanese, we included a dummy variable, company, to control for company-level effects (1 = European, 0 = Japanese).

Subsidiary resource levels. At a different level, we could expect the subsidiary in which a department was located to affect the variables under study. For instance, departments in resource-rich subsidiaries might be expected to be more innovative than those in resource-poor subsidiaries.[6] We thus included as a control a measure of the relative resource levels of the subsidiary to which a department belonged. This measure, subsidiary resource levels, which we expected to be highly correlated with subsidiary size, was also obtained from the headquarters-level respondents described above.

Function. Since the respondents were from departments in different functional areas, we included three dummy variables, R&D, manufacturing, and marketing, each indicating functional area identity. The default option included all other administrative functional areas, such as finance, legal, and

[5] Questions are paraphrased.

[6] This expectation contradicts Zajac and coauthors (1991), who found that resource scarcity fostered innovation in their particular context (hospitals).

TABLE 1
Descriptive Statistics and Correlations

Variables	Mean	s.d.	Range	1	2	3	4	5	6	7	8	9	10	11
1. Innovation size	1.83	5.48	0–39.35											
2. Innovation number	3.25	1.67	1–6	.10*										
3. Slack	27.36	10.89	0–60	.10*	.01									
4. Environment	6.54	1.91	3–10	.13*	.09	−.11*								
5. Centralization	11.47	4.10	5–25	−.03	−.05	.17**	−.05							
6. Formalization	14.06	2.71	7–20	−.11*	−.00	−.06	−.23**	.11*						
7. Company	0.31	0.46	0–1	−.02	−.06	.30**	−.11*	.28**	−.14*					
8. Subsidiary resource levels	3.37	1.02	1–5	.10*	.12*	−.03	.77**	−.13*	−.09	−.00				
9. R&D	0.05	0.22	0–1	.07	−.01	−.04	.03	−.09	.02	−.11*	.06			
10. Manufacturing	0.19	0.39	0–1	.02	.09	−.04	−.07	−.09	.10*	−.18**	−.07	−.11*		
11. Marketing	0.21	0.41	0–1	.20**	−.09	−.02	.06	.09	−.09	.10*	−.03	−.11*	−.25**	
12. Individual social capital	3.40	1.83	0–9.05	.08	.11*	.05	.30**	.16**	−.02	.18**	.25**	−.04	−.14**	.14**

* $p < .05$
** $p < .01$

human resources. Given that R&D and manufacturing may have greater responsibility for initiating innovative projects than other functions, we expected those areas to report more innovations than the others.

Individual social capital. We also controlled for individual differences in our study, recognizing that some department managers' characteristics and assets might influence the innovativeness of their departments. Following prior research (e.g., Ibarra, 1993; Kanter, 1983), we expected that the greater an individual's social capital, the more innovative his or her subunit was likely to be. Drawing on prior research (e.g., Edstrom & Galbraith, 1977) on the factors that contribute to the development of social capital in multinational organizations, we constructed a measure of individual social capital, defining it as the sum of the following normalized variables: (1) years at headquarters, which indicated the number of years a respondent had worked full-time at his or her firm's headquarters, (2) experience, which indicated the number of years the respondent had worked in the firm, and (3) connection, which indicated the number of days the respondent had spent in task forces, meetings, and training courses over the past year.

Data Analysis

Table 1 shows the descriptive statistics and correlation matrix for the variables in all periods. The correlation matrix suggests that the collinearity among the variables is low. The exception was, of course, the squared term for slack, which was correlated with the corresponding linear effect of slack.

The degree of innovation was modeled using an ordinary-least-squares (OLS) model available in the statistical package SAS. Since the dependent variable is continuous (the dollar value of innovations) and the data are cross-sectional, such a model appeared adequate. In a second set of analyses (results not reported here), we modeled the number of innovations using an ordinal logit model available in SAS. The results obtained with the ordinal logit were later checked against those from Poisson and negative binomial regression models. No differences in the directionality or significance of results were observed.

RESULTS

Table 2 reports the models explaining innovation. The first column reports the effects of the various firm, subsidiary, function, and individual covariates included as controls. This model served as a baseline from which the analysis proceeded. In model 2, we introduced slack to assess its possible linear effects on innovation. In model 3, we introduced the squared term for slack to assess the possibility of its nonlinear effects on innovation.

Several conclusions are immediately apparent from the baseline model. No significant differences in innovation across the two firms were observed.[7]

[7] To assess company differences further, we estimated unrestricted models for each company (these results are not reported here for the sake of brevity). The signs of the coefficients

TABLE 2
Results of OLS Regression Analysis[a]

Variables	1		2		3	
	b	s.e.	*b*	s.e.	*b*	s.e.
Constant	−0.87	8.07	−1.65	8.10	−2.01	8.05
Slack			0.08*	0.04	0.26*	0.09
Slack squared					−0.00*	0.00
Environment	−0.03	0.34	−0.05	0.34	−0.01	0.34
Centralization	0.27	0.47	0.30	0.47	0.32	0.47
Centralization squared	−0.01	0.02	−0.01	0.02	−0.01	0.02
Formalization	−0.08	1.06	−0.18	1.06	0.25	1.06
Formalization squared	−0.00	0.04	−0.01	0.04	−0.00	0.04
Company	−0.48	0.95	−0.94	0.97	−1.25	0.97
Subsidiary resource levels	0.76	0.62	0.66	0.62	0.74	0.62
R&D	3.40†	1.81	3.45†	1.81	3.36†	1.79
Manufacturing	1.26	1.01	1.21	1.02	0.96	1.02
Marketing	3.65*	1.00	3.68*	1.00	3.57*	0.99
Individual social capital	0.03	0.22	0.01	0.22	0.01	0.22
R^2	0.35		0.43		0.51	

[a] The dollar (U.S.) value of innovations is the dependent variable.
† $p < .10$
* $p < .05$

The results indicate that the environmental context of a subsidiary has no influence on the innovative capacity of the functional units within it. That is, the degree of competition and technological dynamism of the local environment appears not to influence innovation in subunits. Further, the directionality of the coefficients for internal controls is as expected but remains insignificant. The squared terms for centralization and formalization hint at the possibility of a nonlinear relationship between each of these controls and innovation, but the coefficients are inconsistent and insignificant, so no strong conclusions can be drawn. The variable for the resource levels of a subsidiary was positive but insignificant, suggesting that resources at this level do not influence innovation. The positive and significant coefficient of R&D and marketing suggest that the subunits from those functional areas were more innovative than those in the default category. We observed no effects of the degree of social capital possessed by a subunit's manager on the subunit's innovativeness.

From our perspective, the most important results are those in column 3 concerning slack. These results are consistent with the predicted nonmonotonic effects of slack on innovation and are significant. As postulated, slack has a significant, inverse U-shaped effect on innovation. We gathered further

indicated that the postulated main effects observed in the pooled sample held true in both companies. We tried this procedure with dummy variables for each subsidiary and found no differences in the results. Lastly, we also estimated the models separately for each functional area and again found consistent results.

evidence of the role of slack in explaining innovation by comparing the variance explained by the models. Including slack and its squared term in models 2 and 3 leads to an increase in the R^2 term, suggesting a better-specified model. An F-test on the change in R^2 resulting from the addition of the slack variable suggested that the difference is significant.

We plotted the relationship between slack and innovation using the estimates shown here in column 3 of Table 2. The point of inflexion at which innovation starts to diminish with increasing slack occurs at a slack score ranging from 32 to 34 (on a scale of 0 to 60). This pattern also suggests that the degree of reported innovativeness at this point is four times larger than it is when there is no slack. When slack equals the maximum possible in our survey, the level of innovation is once again a fraction of the maximum reached at intermediate levels and is about the same as when slack is at the minimum.

In order to test the robustness of our claims concerning the effect of slack on innovation, we compared the reported results against those obtained using an alternative measure of innovation: the number of innovations accomplished by a subunit. We observed that the main results for slack remain the same (results are not reported here for the sake of brevity). The robustness of this finding was assessed using ordinal logit, Poisson, and negative binomial regression models. The effects of the environment, the degree of control, and individual-level controls are consistent across the two measures but more significant for measures of number of innovations. It is of interest that the effect of the environmental context on the number of innovations was positive and significant, though its significance disappeared when we added measures for the degree of internal controls. These results confirm our intuition that the amount of experimentation (which is perhaps more closely tied to the number of innovations) increases as organizations confront competition and dynamic environments. However, our findings also coincide with those of Kimberly and Evanisko (1981) and confirm that organizational effects, such as degree of control, dominate environmental effects. Our results on the effects of the degree of internal control on innovation are also consistent with our argument that tighter control disciplines the experimentation that occurs and increases the chances that these experiments translate into careful innovations. These minor but theoretically interesting differences in the effects of some of our variables on different conceptualizations of innovation (i.e., dollar value and number) suggest that a finer-grained exploration of differences along these dimensions may be a fruitful avenue for future research.

DISCUSSION AND CONCLUSION

Our results provide strong support for the hypothesized inverse U-shaped relationship between slack and innovation. Our arguments and results help resolve the debate between those who say that slack encourages innovation and those who suggest that slack may in fact inhibit innovation.

The middle ground we advocate—that slack has an inverse U-shaped effect on innovation—provides a way out of this intractable debate. We propose two underlying mechanisms to explain this relationship. The first is the effect of slack on experimentation, and the second is the effect of slack on the discipline exercised over experiments. Too little slack is inimical to innovation because it discourages any kind of experimentation whose success is uncertain. Equally, too much slack is inimical to innovation because it breeds complacency and a lack of discipline that makes it possible that more bad projects will be pursued than good. Taken together, these arguments suggest that the proper way to think about the relationship between slack and innovation is to view it as having an inverse U-shape. Thus, the right question to ask is not whether slack is uniformly good or bad for innovation, but rather, What amount of slack is optimal?

Answering this question may depend upon a number of factors that we have not explicitly explored here. For instance, one might argue that optimal organizational slack is greater in a growing industry than in a declining industry because there are likely to be more positive-NPV projects in the former than in the latter (Jensen, 1993). Similarly, the optimal amount of slack may be determined by firm- and subunit-level factors, such as a firm's culture and internal control systems and the critical contingencies addressed by a subunit.

Relevant to determining the optimal slack in a given situation are questions regarding the antecedents of slack (Sharfman et al. 1988) and how the amount of slack in an organization can be changed. Although it is well established that good performance increases slack and bad performance decreases it, it is less clear what managers can do proactively to change amounts of slack. An additional future possibility would be to distinguish between absorbed and unabsorbed slack, each of which has been shown to have a different effect on the innovativeness and performance of organizations (Singh, 1986). It is also worth noting that we focused on functional subunits as our unit of analysis because they provided an ideal setting for studying the hypothesized relationships. We would hypothesize that a similar relationship between slack and innovation holds at the organizational level as well.

An additional direction for future research would be a longitudinal study that more fully explores the temporal dynamics of the various relationships we have studied. For instance, a shifting environmental context may alter the influences of contextual variables on innovation. A more dynamic model would incorporate risk-taking behavior into the framework and include important feedback links between innovation, firm performance, risk, and the level of slack in an organization. Prior researchers have emphasized such feedback loops, arguing that slack builds up when performance exceeds aspiration levels and gets consumed when performance falls short of expectations (Bromiley, 1991; Singh, 1986). Such accounts would suggest that slack is not only exogenous, but also endogenous when examined over time.

Even though our data limitations prevented us from exploring some of the aforementioned issues, we think they present some of the most exciting opportunities for future research on the determinants of innovation. To ignore this topic because of either polarized theoretical viewpoints or the challenges associated with the measurement of these constructs would be too much of a loss. We hope that our study has resurrected organizational slack and its effect on innovation as an important research topic and will inspire other researchers to follow suit.

In conclusion, we would like to reiterate that recognizing that slack has an inverse U-shaped effect on innovation is not only theoretically important, but also of great practical significance. In a world in which firms must confront simultaneous demands to be innovative and efficient (Bartlett & Ghoshal, 1989), it can be a challenge to maintain the slack that is necessary to stimulate innovation. As Hamel and Prahalad (1994) have cautioned, during the 1980s firms primarily invested in cost-cutting programs such as lean production, downsizing, and business process reengineering, sometimes at the expense of investing in the future. Underlying these efforts is the view that slack represents a reservoir of wasted resources that a firm needs to fully tap to succeed in a competitive global economy. We hope our results provide further warning against such a shortsighted view. Although there is no doubt room to reduce slack in many organizations, it is important to recognize that going too far can jeopardize a firm's capacity for innovation and renewal.

REFERENCES

Antle, R., & Fellingham, J. 1990. Resource rationing and organizational slack in a two-period model. ***Journal of Accounting Research,*** 28: 1–24.

Bartlett, C. A., & Ghoshal, S. 1989. ***Managing across borders: The transnational solution.*** Boston: Harvard Business School Press.

Bourgeois, L. J. 1981. On the measurement of organizational slack. ***Academy of Management Review,*** 6: 29–39.

Bromiley, P. 1991. Testing a causal model of corporate risk-taking and performance. ***Academy of Management Journal,*** 34: 37–59.

Burns, T., & Stalker, G. M. 1961. ***The management of innovation.*** London: Tavistock.

Child, J. 1972. Organization structure, environment, and performance—The role of strategic choice. ***Sociology,*** 6: 1–22.

Cook, T. D., & Campbell, D. T. 1979. ***Quasi-experimentation: Design and analysis issues for field settings.*** Chicago: Rand McNally.

Cyert, R. M., & March, J. G. 1963. ***A behavioral theory of the firm.*** Englewood Cliffs, NJ: Prentice-Hall.

Daft, R. 1982. Bureaucratic versus non-bureaucratic structure and the process of innovation and change. ***Research in the sociology of organizations,*** vol. 1: 129–166. Greenwich, CT: JAI Press.

Damanpour, F. 1987. The adoption of technological, administrative, and ancillary innovations: Impact of organizational factors. ***Journal of Management,*** 13: 675–688.

Davis, G. F., & Stout, K. 1992. Organization theory and the market for corporate control: A dynamic analysis of the characteristics of large takeover targets, 1980–1990. ***Administrative Science Quarterly,*** 37: 605–633.

De Bodinat, H. 1975. ***Influence in the multinational corporation: The case of manufacturing.*** Unpublished D.B.A. dissertation, Harvard University Graduate School of Business Administration, Boston.

Delbecq, A. L., & Mills, P. K. 1985. Managerial practices that enhance innovation. ***Organizational Dynamics,*** 14: 24–34.

Edstrom, A., & Galbraith, J. R. 1977. Transfer of managers as a coordination and control strategy in multinational organizations. ***Administrative Science Quarterly,*** 22: 248–263.

Ghoshal, S., & Bartlett, C. A. 1988. Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations. ***Journal of International Business Studies,*** 19: 365–388.

Ghoshal, S., & Nohria, N. 1989. Internal differentiation within multinational corporations. ***Strategic Management Journal,*** 10: 323–337.

Hambrick, D., & Snow, C. 1977. A contextual model of strategic decision making in organizations. In R. L. Taylor, J. J. O'Connell, R. A. Zawacki, & D. D. Warrick (Eds.), ***Academy of Management Proceedings:*** 109–112.

Hamel, G., & Prahalad, C. K. 1994. ***Competing for the future.*** Boston: Harvard Business School Press.

Hedlund, G. 1986. The hypermodern MNC—A heterarchy? ***Human Resource Management,*** 25(1): 9–35.

Ibarra, H. 1993. Network centrality, power, and innovation involvement: Determinants of technical and administrative roles. ***Academy of Management Journal,*** 36: 471–501.

Jensen, M. C. 1986. Agency costs of free cash flow, corporate finance, and takeovers. ***American Economic Review,*** 76: 323–329.

Jensen, M. C. 1993. The modern industrial revolution, exit, and the failure of internal control systems. ***Journal of Finance,*** 48: 831–880.

Jensen, M. C., & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency cost, and ownership structure. ***Journal of Financial Economics,*** 3: 305–360.

Kamien, M., & Schwartz, N. 1982. ***Market structure and innovation.*** Cambridge: Cambridge University Press.

Kamin, J. Y., & Ronen, J. 1978. The smoothing of income numbers: Some empirical evidence on systematic differences among management-controlled and owner-controlled firms. ***Accounting, Organizations, and Society,*** 3(2): 141–157.

Kanter, R. M. 1983. ***The changemasters.*** New York: Simon & Schuster.

Kimberly, J. R., & Evanisko, M. 1981. Organizational innovation: The influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations. ***Academy of Management Journal,*** 24: 689–713.

Lant, T. 1985. ***Modeling organizational slack: An empirical investigation.*** Stanford University research paper #856, Stanford, CA.

Lawrence, P. R., & Lorsch, J. W. 1967. ***Organization and environment.*** Boston: Harvard Business School, Division of Research.

Leibenstein, H. 1966. Allocative efficiency vs. X-efficiency. ***American Economic Review,*** 56: 392–415.

Leibenstein, H. 1969. Organizational or frictional equilibria, X-efficiency, and the rate of innovation. ***Quarterly Journal of Economics,*** 83: 600–623.

Levinthal, D., & March, J. G. 1981. A model of adaptive organizational search. ***Journal of Economic Behavior and Organization,*** 2: 307–333.

Majumdar, S. K., & Venkataraman, S. 1993. New technology adoption in U.S. telecommunications: The role of competitive pressures and firm-level inducements. ***Research Policy,*** 22: 521–536.

Mansfield, E. 1963. Size of firm, market structure, and innovation. ***Journal of Political Economy,*** 41: 556–576.

March, J. G. 1976. The technology of foolishness. In J. G. March & J. P. Olsen (Eds.), ***Ambiguity and choice in organizations:*** 69–81. Bergen: Universitetsforlaget.

Marino, K. E., & Lange, D. R. 1982. Earnings variation, inventory growth, and cost behavior under slack resource conditions. ***Academy of Management Proceedings:*** 2–6.

Meyer, A. 1982. Adapting to environment jolts. ***Administrative Science Quarterly,*** 27: 515–537.

Mokyr, J. 1990. ***The lever of riches: Technological creativity and economic progress.*** New York: Oxford.

Moses, D. O. 1992. Organizational slack and risk-taking behavior: Tests of product pricing strategy. ***Journal of Organizational Change Management,*** 5(3): 38–54.

Pugh, D. S., Hickson, D. J., Hinings, C. R., & Turner, C. 1968. Dimensions of organizational structure. ***Administrative Science Quarterly,*** 13: 65–105.

Schiff, M., & Lewin, A. Y. 1970. ***Behavioral aspects in accounting.*** Englewood Cliffs, NJ: Prentice-Hall.

Schumpeter, J. 1926. ***The theory of economic development.*** Cambridge: Harvard University Press.

Sharfman, M. P., Wolf, G., Chase, R. B., & Tansik, D. A. 1988. Antecedents of organizational slack. ***Academy of Management Review,*** 13: 601–614.

Singh, J. V. 1983. ***Performance, slack and risk-taking in organizational decision making: Test of a structural equation model.*** Unpublished doctoral dissertation, Graduate School of Business, Stanford University, Stanford, CA.

Singh, J. V. 1986. Performance, slack and risk-taking in organizational decision making. ***Academy of Management Journal,*** 29: 562–585.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. 1981. Threat-rigidity effects in organizational behavior: A multi-level analysis. ***Administrative Science Quarterly,*** 26: 501–524.

Van de Ven, A. H. 1986. Central problems in the management of innovation. ***Management Science,*** 32: 590–607.

Williamson, O. E. 1963. A model of rational managerial behavior. In R. M. Cyert & J. G. March (Eds.), ***A behavioral theory of the firm:*** 237–252. Englewood Cliffs, NJ: Prentice-Hall.

Williamson, O. E. 1964. ***The economics of discretionary behavior: Managerial objectives in a theory of the firm.*** Englewood Cliffs, NJ: Prentice-Hall.

Zajac, E. J., Golden, B. R., & Shortell, S. M. 1991. New organizational forms for enhancing innovation: The case of internal corporate joint ventures. ***Management Science,*** 37: 170–184.

Zaltman, G., Duncan, R., & Holbeck, J. 1973. ***Innovations and organizations.*** New York: Wiley.

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