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THE EFFECTS OF AMERICAN- AND JAPANESE-STYLE EMPLOYMENT AND COMPENSATION PRACTICES ON INNOVATION*

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Success in the global marketplace increasingly requires that firms develop capabilities in innovation. In this paper we argue that firms can use employment and compensation practices to foster innovation and support for innovation by employees. Conversely, some employment and compensation systems will inhibit innovation.

A system that allows gain sharing by employees and provides employment assurance will foster innovation in the firm. However, a system that compensates employees with a fixed wage and allows for termination at will contains anti-innovative incentives. The former system is the prototypical Japanese system (particularly in large firms), while the latter system is the prototypical American system.

The commercial success of Japanese firms is increasingly attributed to successful innovation, particularly in processes. We argue that this success is partly attributable to the Japanese-style system of employment and compensation.

None of this suggests, however, that the Japanese-style practices constitute a universally superior system of employment and compensation. The Japanese-style system will not necessarily be beneficial to firms, nor be preferred by employees. The preferences of both employees and firms will depend upon market circumstances.

In stable domestic markets in relatively full employment economies, companies derive competitive advantage from mass production and scale economies. Under such circumstances, the American-style system is likely to be preferred by both employees and firms. However, when the firm operates in a volatile international market the preferences of both employees and firms will shift toward the Japanese-style system. The employment and compensation systems of both countries were well suited to the market circumstances under which they evolved.

(COMPENSATION; JAPAN; INNOVATION)

Let it never again be said that the Japanese lack inventiveness... inventiveness [has become] a matter of necessity and Japanese industry strives ceaselessly to produce the next hit product, from textiles to electronics to detergent to beer... Recent commercially successful innovations include odor-free garlic, paper watches, rice cookers which respond to telephone commands, windows that close when they sense rain, vibration-resistant fax machines that attach to the car phone, and the world's first automatic breath sensor which lets one know if one's breath is good (green light), poor (yellow), or bad (red).¹

Overview

Management researchers have recently demonstrated the importance of the link between a firm's human resource policies and its strategic goals (see Lengnick-Hall and Lengnick-Hall 1988, and Hufnagel 1987, for reviews). We have also become more aware that the competitive success of firms in the global marketplace requires innovative abilities (Van de Ven 1986): organizational decline is linked to a curtailment of innovation and with employee resistance to change (Cameron, Kim, and Whetten 1987). We join these two ideas by examining the relationship between systems of employment and compensation and a firm's propensity to be innovative.

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¹Adapted from "The Motherland of Invention: Japanese Firms Smell Big Profits," *The Washington Post*, (30 March 1989), A33.

We develop a contingent claims theory to argue that (1) the propensity of a firm to innovate is related to the attitudes of its employees toward risk, and (2) these attitudes will vary systematically according to the compensation and employment structure in place. In particular, we find that commercial innovation will occur more often under the traditional Japanese-style system of employment and compensation than under the traditional American-style system.

In volatile markets, firms that use compensation strategies to motivate innovative behavior by employees will enjoy a competitive advantage over firms whose compensation systems contain anti-innovative incentives. Under stable market circumstances, however, firms and employees will instead prefer the American-style system over the Japanese-style system, despite its reduced incentive for innovation.

1. Innovation in the United States and Japan

Research in the United States tends to be publicly supported and knowledge motivated, while research in Japan tends to be privately supported and commercially motivated (Westney and Sakakibara 1985). In consequence, the United States excels in basic scientific research and invention, while Japanese firms have developed a comparative advantage over American firms in applied commercial innovation. For a number of products and processes, including automobiles, semiconductors, transistors, optical fibers, video cassette recorders, and manufacturing systems, the results of basic scientific research in the U.S. have been put to commercial use more quickly and more profitably by Japanese, not American, firms (Baily and Chakrabarti 1988, Bylinski 1981, Prestowitz 1988, Cusumano 1985, Rosenberg and Steinmueller 1988, Flaherty 1984).

Commercial exploitation of invention, rather than invention itself, fosters growth and promotes a country's relative economic standing. As evidence, note that technological change has contributed to economic growth in Japan at nearly twice the rate that it has contributed to growth in the U.S. (Jorgenson 1988). Dore (1986), Abeggan and Stalk (1985), and De Meyer, Nakane, Miller, and Ferdows (1989), among others, find that industrial adaptability and flexibility are among the primary sources of Japan's manufacturing success. Mansfield (1988) estimates that the rate of return to investment in applied research and development (versus basic scientific research and development) is significantly higher in Japan than in the U.S., even though U.S. firms invest relatively more in product research and development than do Japanese firms.²

During the postwar era, Japanese firms developed a comparative advantage in process innovation and in the rapid adoption of improved technology (Mansfield 1988, Baily and Chakrabarti 1988). Though this advantage persists, the innovative success of Japanese firms is no longer limited to process improvements relying on borrowed technology. As Japanese firms reached the "limits of followership," a general consensus emerged "that, in fields such as robotics, computers, materials science, and biotechnology, the Japanese are at the frontiers of existing knowledge" (Westney and Sakakibara 1985). As the *Economist* noted, during the 1980's, Japan became "an exporter of ideas" (20 May 1989, p. 91), which is reflected in the patent data in Table 1.

The evidence, then, is that the success of the prototypical Japanese firm is based on continuous incremental innovation, particularly in processes, which sometimes leads to "breakthrough" innovations (Nonaka 1988). Japanese success also follows from the rapid adoption of improved technology (Baba 1989, Aoki 1988), and, increasingly, from technological breakthroughs.

²American firms devote two thirds of their R & D expenditures to products, rather than to processes; the proportion is reversed in Japan (Mansfield 1988).

TABLE 1
 "The 10 Corporations That Received the
 Most US Patents in 1988"

Company	Country	Number
Hitachi	Japan	907
Toshiba	Japan	750
Cannon	Japan	723
General Electric	U.S.	690
Fuji Photo	Japan	589
Philips	Netherlands	581
Siemens	Germany	562
IBM	U.S.	549
Mitsubishi Denki	Japan	543
Bayer	Germany	442

From: *The New York Times*, (4 June 1989), p. F4.

The argument presented in this paper is that the success of Japanese firms in innovation, particularly process innovation, is due in part to Japanese-style human resource policies. In particular, we credit the employment and compensation systems in place for blue collar through middle-level employees in large firms. We will show that the American-style system has anti-innovative incentives that impede rapid innovation, whereas the Japanese system has pro-innovative incentives.

2. Related Prior Research

Our analysis follows from four strands of prior research that have examined (1) the differences in the employment and compensation systems (ECS) and other human resource policies in the United States and Japan, (2) the effects of these differences on employees, firms, and societies, (3) the likely causes of the differences in work practices and employment and compensation systems, and (4) the connection between firm human resource strategies and global market circumstances.

(1) For blue collar through to middle level employees of large firms, the first important difference between the ECS of the two countries is the lifetime employment system (or implicit job guarantee) common in large Japanese firms for their core employees versus the "employment-at-will" doctrine prevalent in most, though not all, American firms. The second important difference is the prevalence of the wage plus bonus system in Japan versus the straight wage system in the United States. In the Japanese system, employee compensation varies directly with firm performance (see Dore 1986, or Aoki 1988, for a description of the systems). In the language of agency theory, Japanese firms typically employ outcome based contracts whereas American firms usually employ behavior based contracts.

The structures of work and labor relations also differ along important dimensions (see Cole 1985; Lincoln and Kalleberg 1985; Lincoln, Hanada, and McBride 1986). These differences include the adoption of more "welfare corporatist" policies in Japan, and decision-making that is more consensual and participative, and less individualistic and hierarchical. Labor relations, at least since the 1950's, are characterized by higher levels of trust, information sharing, and cooperation than is common in the United States. Organizational learning is better developed in Japan (Nonaka and Johansson 1985), due in part to the more horizontal information flows within the firm (Aoki 1986, 1988). Nonaka (1988, p. 60) notes that, in contrast to US firms, "the systematic incorporation of the opportunity for creating information into

daily work at the operator level has been precisely the major characteristic of Japanese organizations.”

These differences are related to the structure of labor markets in the two countries. In general, the internal labor market is better developed in Japan, allowing for higher levels of intrafirm mobility, while the external labor market is better developed in the United States, allowing for higher levels of interfirm mobility (Mincer and Higuchi 1988). The Japanese practices serve as a “glue” between the employee and the firm, lowering the employee’s external mobility but increasing his or her internal mobility. The firm’s investment in training pays off owing to the long tenure of the typical Japanese employee, and the employee accepts firm-specific training, given this setting of lifetime employment.

(2) The effects of the Share plus Wage System (SWS) and the Japanese-style structure of work have been assessed from different perspectives. Economists have shown that macroeconomic variables will vary systematically with the employment and compensation system in place (Weitzman 1984, Meade 1986). Industrial relations specialists argue that treating employees as a fixed cost induces firms to move up the “value-added” chain and to employ flexible production processes (Sable 1982, Streeck 1985). Research in the sociology of work shows that the Japanese practices are associated with higher levels of socialization, goal congruence, increased employee commitment, and higher levels of skills (e.g., Lincoln and Kalleberg 1985; Hatvany and Pucik 1981). Japanese practices, especially those related to the internal labor market, have been credited with the adaptability and flexibility of Japanese firms. Aoki’s (1986) analysis of information flows suggests that the American-style system is more conducive to breakthrough innovation, while the Japanese-style system is more conducive to incremental innovation (p. 982).

(3) Scholars disagree on the origins of Japanese work practices. The culturist view suggests that the practices are an extension of a cultural tradition that values paternalism, loyalty, and commitment to the collective good over individualism (Abegglen 1958, Morishima 1982). The institutionalist view stresses the importance of certain Japanese political and economic institutions in shaping the practices (Aoki 1988, Dore 1973, 1986). Some economists and organization theorists argue, in contrast, that the Japanese system evolved as an efficient response to certain market imperfections and the transactions costs resulting from them (e.g., Hashimoto 1979, Ouchi 1980, Wilkins and Ouchi 1983). For these transaction cost theorists, the organization is an efficiency-seeking organism, rather than a social actor shaped by culture and tradition.³ What Ouchi describes as being essential to the Japanese firm—its clan structure—has, in his view, developed because a clan structure is the most efficient means of mediating exchange in Japan (Ouchi 1980); teleologically, another structure would emerge if the clan structure were not the most efficient. Japanese workers are socialized into other-interested and cooperative behavior (Ouchi 1980, p. 132). By achieving goal congruence through socialization, the firm is able to dispense with some expensive forms of employee monitoring.⁴ This debate matters for a discussion of the adaptability of Japanese-style practices to other settings, and we will return to this topic later in the paper.

(4) We may distinguish, loosely speaking, between two types of market circumstances: Schumpeterian and Keynesian (Noël 1987, Piore and Sabel 1984). Firm

³“Natural selection forces” are at work such that organizational forms “that have better transaction economizing properties will eventually displace those that have worse, *ceteris paribus*” (Williamson 1981, pp. 574–575).

⁴Burawoy (1985) gives a very different interpretation of this phenomenon, suggesting that a new form of “hegemonic despotism” is replacing the older forms of control.

product and production strategies will vary systematically with these two market circumstances.

In the 1940's, Joseph Schumpeter defined capitalism as a process of innovation in the context of unstable markets (1950, pp. 82–83). In unstable markets—"dematuring," export, or specialty product markets—investing in task-specific capital equipment is a riskier proposition for a firm than is the case in a stable market. Firms in unstable market situations will consequently rely upon flexible manufacturing, general purposed machinery, and diversely skilled labor. Firms in these markets derive competitive advantage from innovation rather than from cost efficiency (Hirst and Zeitlin 1988, Nemetz and Fry 1988, Piore and Sabel 1984).

In the 1930's, John Maynard Keynes offered another vision of modern capitalism, one which succeeded "in abolishing slumps and thus keeping us permanently in a quasi-boom" (1936, p. 322). A Keynesian economy is characterized by a large steady-growth economy with full employment and a relatively equitable distribution of resources, and this in turn will lead to a mass market and, at the firm level, a "fordist" production system characterized by large economies of scale (Piore 1980, Sabel 1982). Firms with the biggest production runs will, on average, be the most profitable (Scherer 1980). Productivity and efficiency matter more, innovation matters less. We will argue that the Japanese- and American-style ECSs are well suited, respectively, to Schumpeterian and to Keynesian market environments.

In summary, what we know from previous research is that American and Japanese firms, especially the larger firms of both countries, generally differ in the structure of work and in the structure of employment. These differences suggest that American firms are more likely than Japanese firms to be rigid in both hierarchy and information flows. This fosters a less cooperative attitude among American employees working under the Japanese system than among Japanese employees working under the Japanese system. We also expect that the importance of productivity to a firm versus the importance of innovation will vary with market circumstances.

The work of other scholars frames the first question we address—How is innovation related to the employment and compensation structure?

3. A Contingent Claims Framework for the Analysis of the Wage and Share Systems

We begin with a stylized description of two employment and compensation systems (ECS's) that vary on two dimensions: the security of employment and the variability of wages. The first, an American-style system, has a relatively high fixed wage, which is invariable with firm performance (Wage System, or WS). The firm may terminate the employee at will. The second system, a Japanese-style system, has a lower fixed wage, plus a bonus that is dependent on firm performance (Share plus Wage System, or SWS). Employees enjoy implicit lifetime employment guarantees.

The specifications we have proposed are not descriptive of the arrangements covering all Japanese or American workers. For example, Japanese women and employees of smaller Japanese firms are typically not granted employment guarantees (Weiner 1987). In the U.S., approximately three percent of manufacturing employees have participatory compensation arrangements whereby cash bonuses vary with firm performance (Swoboda 1988), and some firms allow shared profits among "intrapreneurs." In addition, the "employment-at-will" doctrine is now being challenged in U.S. case law, and job security is frequently negotiated in collective bargaining actions in the United States. Some American firms (e.g., IBM, Hewlett Packard) are more "Japanese" than "American" in their use of ECS's. These two specifications are nevertheless useful and accurate generalizations regarding the structure of

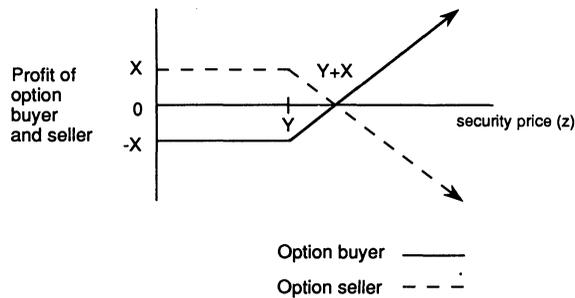


FIGURE 1

employment and compensation in the two countries, particularly in large manufacturing firms (Freeman and Weitzman 1986, Weiner 1987).

Reduced to their essence, these two ECS's mirror the positions of two parties to a contingent claims (or option) contract. In the next sections, we will establish the analogy to contingent claims, describe the likely effects of these contracts on employee risk preferences, and discuss the collateral sociological and organizational institutions that are associated with the two types of contracts.

(a) *Contingent Claims Theory, and Employees in a Contingent Claims Framework*

In financial economics, contingent claims theory is used to analyze assets and securities whose payoffs are determined by the occurrence of a subsequent state of nature. In a simple options securities transaction, the two parties are the option buyer and option seller: the option buyer pays a certain price, X , to the seller. In return, the option buyer receives the right to buy a security at the exercise price, Y , on or up to a prespecified date. Should the option buyer choose to exercise the right to buy, the seller must sell the security to the buyer at price Y . The profits of both the buyer and seller depend upon the subsequent outcome, or security price, Z .

The positions of the option buyer and seller are illustrated in Figure 1.

If the subsequent price of the security is less than the exercise price (that is, $Z < Y$) then the buyer will sustain a loss of X . If the subsequent price is greater than the exercise price but less than the exercise price plus the option price ($Y < Z < Y + X$), then the buyer will still sustain a loss but the exercise of the option will cause the loss to be less than X . If the subsequent security price is greater than $Y + X$, the buyer obtains a profit of $(Z - X - Y)$. For our purposes, the important characteristics of the buyer's position are limited losses (losses cannot exceed X , the price paid for the option), and potentially unlimited gains, because there is no theoretical upper limit on the price of the underlying security.

The option seller will enjoy a profit of X as long as the security price is less than Y ($Z < Y$). When the security price is greater than the exercise price but less than the exercise price plus the option price ($Y < Z < Y + X$), the seller will have a profit less than X because the seller must sell at a price below the market price. When the market price exceeds the exercise price plus the option price, the seller will incur losses of $(X + Y - Z)$. The important characteristics of the seller's position are limited profits (the highest possible profit is X) and unlimited losses, again, because there is no upper limit on the price of the underlying security.

In summary, the buyer foregoes current income of X in exchange for the possibility of (unlimited) future gains. The seller, in turn, receives current income of X in exchange for bearing the risk of (unlimited) losses.

The position of the employee under the Japanese SWS is analogous to the position of the buyer of a contingent claim. Let us use our stylized description of the Japanese

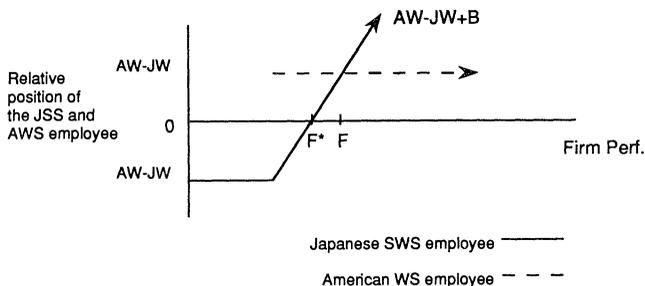


FIGURE 2

and American systems to illustrate. The Japanese worker receives current income of JW (the fixed Japanese wage) and the possibility of future income, B , where B denotes the (variable) bonus compensation that is positively related to firm performance. The implicit lifetime employment system assures the Japanese employee of continued compensation at least at the level of JW , barring firm bankruptcy.

In contrast, the American employee will receive wages at the rate of AW (the fixed American wage). The employee, however, has no assurance that this compensation will continue because the American WS allows for termination at will.

JW is less than AW . For example, the average hourly straight manufacturing wage in 1985 was \$7.00 in Japan and \$9.53 in the U.S.⁵ But, the Japanese employee enjoys a contingent claim on the firm—in 1985 production workers’ bonuses averaged 20 percent of total compensation in Japan, but less than 0.5 percent in the U.S.⁶ Therefore, it may be argued that the Japanese worker gives up current income of $AW - JW$ in exchange for job security and a contingent claim on the firm. The Japanese worker is in a position analogous to that of the option buyer. The positions of the Japanese and American worker are illustrated in Figure 2.

At low levels of firm performance (below firm performance point F) the income of the Japanese worker is less than that of the American worker. At levels of firm performance above F , the income of the Japanese worker will exceed that of the American worker. Like the buyer of a contingent claim, the Japanese worker enjoys downside protection. The worker is assured of wage JW ; in the worst case, income of $AW - JW$ is foregone. Variability is present only on the upside. Losses are limited and potential gains are theoretically unlimited; there is a wide range of possible outcomes but none of the outcomes is catastrophic.

In contrast, the position of the American employee is analogous to the seller of the contingent claim. The employee receives wage AW (or wage differential $AW - JW$) as long as firm performance is above point F^* , and employment continues. The wage is fixed and does not vary with firm performance. The compensation accorded for working under the WS instead of the SWS (that is, bearing unemployment risk and foregoing “upside” potential) is the fixed wage differential $AW - JW$. The American worker faces only two possible outcomes—wage AW or unemployment. We might characterize the unemployment outcome, which occurs below firm performance point F^* , as a catastrophic outcome. Like the option seller, the American worker faces fixed gains, or upside potential (the highest possible income is AW). But the downside outcome is catastrophic, i.e., unemployment.

The similarities between the parties to an option transaction and employees under the two ECS’s, though useful, are not exact. First, American unemployment insur-

⁵Japanese Working Life Profile, Japanese Institute of Labor (1987).

⁶Japan Productivity Center (1987).

ance serves to blur the distinction between the American WS and the Japanese SWS. Termination in the U.S. is not catastrophic to the extent that wages are partially replaced by unemployment benefits. Second, to the extent that the external labor market in the United States is efficient, the American worker will not face a catastrophic outcome because unemployment will be transitory. Third, Japanese firms cannot guarantee employment in the event of firm bankruptcy, though bankruptcy for large firms is exceedingly rare in Japan (Zysman 1983), which makes both the risks and consequences of unemployment in Japan appreciably smaller than in the U.S.⁷ Finally, the entrepreneurial tradition is better developed in the United States than in Japan. Therefore, an American employee may obtain upside potential by leaving his or her employer voluntarily and starting his or her own business.⁸ These caveats of practice will alter the magnitude, but not the direction, of our conclusion.

(b) *Risk Tolerance and Preferences in Contingent Claims Theory*

Contingent claims theory gives us a framework for understanding risk preferences and risky behavior. The buyer of a contingent claim or option on a security will prefer that the underlying security be risky, i.e., exhibit a high degree of volatility. This preference results from the characteristics of the buyer's position: possible losses are limited to X and do not vary with security performance. The gains, however, are unlimited and vary positively with the performance of the underlying security. Therefore, if risk is defined as variability or dispersion around an expected outcome,⁹ the buyer of the contingent claim prefers more risk to less.

We may draw the same conclusion for the employee under the Japanese SWS. Envisioning a bell-shaped distribution of outcomes for firm performance, we can see that the employee gains from outcomes towards the right side of the bell curve but does not lose from outcomes toward the left, except in the case of firm bankruptcy. The employee will prefer or support risk-taking by the firm as he or she has little to lose and much to gain from higher variability in firm performance.

The risk preferences of the worker under the American WS or here, the seller of the contingent claim, are the opposite of those of the Japanese worker, or the contingent claims buyer. Again, examining the bell-shaped performance curve of the firm, the American WS employee sustains catastrophic losses (unemployment) if outcomes are on the left, but no benefit if outcomes are toward the right. Employees will not support or prefer risk taking on the part of the firm; they will be resistant to change. The employee has nothing to gain and much to lose.

In summary, we may deduce that employees under the Japanese-style system will be in favor of a higher level of risk, and will be less resistant to changes in firm operations, and this preference results from both the lower downside risk and the higher upside potential. Employees under the American share system will be averse to risk and resistant to change, and this results from the high downside risk and the absence of upside gain.

⁷Historically, both the unemployment rate and the volatility of the unemployment rate in the U.S. have been roughly triple that of Japan (Weiner 1987). Further, the Japanese unemployment insurance scheme is considerably more comprehensive than its American counterpart. Thirdly, the Japanese constitution contains a right to employment provision. Finally, the rate of firm failure is appreciably lower in Japan. *Employment and Employment Policy*, Japan Institute of Labor, annual.

⁸This solution, however, is problematic at several levels. At the individual level, the employee may be unwilling or unable to bear the associated downside risk. At the firm level, an innovative employee is lost. At the national level, competitiveness may suffer because large firms, not small entrepreneurs, have the capital and scale necessary to compete in international markets.

⁹This is the definition commonly used in financial economics; see, for example, Brigham and Gapenski (1988, pp. 170–179).

One crucial point about our argument, which we will develop more fully in the “Implications” section, is that *both* the bonus system and the employment assurance are necessary to obtain pro-innovative effects. For the individual employee, the relative importance of lower downside risk versus higher upside potential will depend upon individual preferences and demographic characteristics. For instance, the Japanese-style system does not eliminate risk to the employee. Instead, the employee bears wage risk rather than employment risk. A worker close to retirement, for example, may prefer employment risk to wage risk.

We do not make specific behavioral predictions for individual employees. In some cases, the SWS will induce employees to innovate proactively. Nonaka (1988) finds that innovation by lower level employees is a source of competitive advantage for Japanese firms. Mansfield (1988) reported that Japanese production workers are the source of product and process innovation suggestions twice as often as are American workers. In other cases, employees may be less proactive—they will support change rather than initiate it. In either case, innovation will be fostered.

(c) *Market Circumstances and Contingent Claims*

The Japanese-style system will neither be universally beneficial to firms nor universally preferred by employees. The effectiveness of management practices will depend upon the degree of market stability (Burns and Stalker 1961). Furthermore, the preferences of both the firm and the employee will depend upon the market environment. A volatile, Schumpeterian marketplace will benefit firms employing the Japanese SWS, while a stable, Keynesian marketplace will benefit firms employing the American WS.

In volatile markets, a firm cannot assume stability in market share or product line. A premium is placed on process and product innovation and on the commercial development of technological advances. In such an environment, the advantages of the pro-innovative Japanese SWS to both the firms and the employee are evident.

Let us put this analysis in a historical context. Firms in post-war Japan were forced to evolve in a volatile Schumpeterian market. Japan’s industrialization strategy required firms both to export and to produce increasingly sophisticated products. A strategy of jointly increasing product quality and aiming to export generally is, as Adam Smith noted several hundred years ago in his famous passage on the invisible hand (Bk IV, Chapter 2), inherently riskier for a firm than is a strategy of relying on domestic markets. In line with this joint strategy, Japanese human resource policies were targeted at developing the firm-specific skill and commitment of employees. They also allowed firms to adapt to the demands for innovation (Shimokawa 1987), and to use capital equipment in ways which would amplify the product line and product quality, but not replace employees (Watanabe 1986). To borrow a biological metaphor, the systems of production found in Japan and the pro-innovative Japanese SWS were well suited to the ecology of a Schumpeterian marketplace.

By the 1950’s, in contrast, the United States had adopted Keynesian macroeconomic stabilization policies (Shonfield 1965). Under such market and production circumstances, firms and employees will prefer the American WS. Efficiency, rather than innovation, is rewarded. Employees receive a comparatively high fixed wage, and the full employment consequences of Keynesian policies minimize the likelihood of job losses.

U.S. firms evolved a rigid system of production that emphasized economies of scale and not innovation (Abernathy, Clark, and Kantrow 1983; Piore and Sabel 1984). The system also underutilized human resources (Hill 1981). But the American system of production achieved capital intensive scale economies in many product lines, thereby offsetting some of the disadvantages of a Taylorist system of production. American

society, substantially insulated from international economic forces, experienced high wages, high employment, high profits, and high levels of industry concentration. To continue the biological metaphor, this system appears to be optimally suited for the ecology of a Keynesian marketplace.

A volatile marketplace rewards innovation, while a stable marketplace rewards economies of scale. Historically, these two systems coexisted in different product markets and in different countries for much of the post-war era. The ecology in which the American WS developed—stable product markets, stable growth, full employment—was breached in the turmoil of the 1970's.

In the 1990's, we clearly live in a world of dynamic and shifting markets more resembling the environment faced by Japanese firms in the 1950's and 1960's than that faced by American firms at the same time. For the United States, distributing the wealth of stable economic growth can no longer be the preoccupation of American government, management, and labor. Creating new products, new processes, and new wealth must be. The American WS, with its anti-innovative tendencies, is now maladapted to the new international business environment.

Figure 3 depicts the positions and preferences of employees and firms under Keynesian and Schumpeterian environments. The Japanese SWS will tend to be preferred by both groups in a Schumpeterian environment, whereas the American WS will tend to be preferred by both under Keynesian conditions.

(d) *The Role of Other Japanese-style Work Practices*

Other Japanese-style human resource policies reinforce the pro-innovative effects of the ECS. In fact, absent certain social elements, systems of the Japanese SWS variety are open to job shirking, free ridership, and other collective goods problems that threaten the viability of the system. The SWS must be embedded in an organizational setting that discourages opportunism through the promotion of reciprocity, trust, and goal congruence (Fitzroy 1988). Without goal congruence and trust, employees would only initiate change to the extent that they could quantify, and contract to receive, individual benefits. Indeed, prior empirical work has shown that in low trust environments, employees prefer straight wages to profit sharing systems (Cable and Fitzroy 1980), and hierarchies to participation (Alexander 1987). For example, General Motors has found that it is no longer advantaged by the American WS, and has attempted to reorganize and restructure itself by eliminating much of the past practices of rigid wage and rigid production systems, and adopting, in places, aspects of the SWS (Quinn 1988a). But employees at all levels are suspicious of, sometimes hostile to, these changes. GM has discovered that ECS's are embedded in social settings resistant to change through the manipulation of Human Resource Management techniques.

The economic incentives for innovation of the Japanese-style ECS are reinforced by social aspects of Japanese human resource management, which have been discussed by many authors (see, for instance, Cole 1979, Dore 1973, Lincoln, Hanada, and McBride 1986). Participative decision-making, skills development, and collective values have been found to foster goal congruence, trust, and employee commitment (Cole 1979, Keys and Miller 1984, Odagiri 1982). The tenor of labor relations, more cooperative in Japan than in the United States, increases the effectiveness of the Japanese ECS in promoting innovation.¹⁰ In manufacturing, process innovation often entails the introduction of automation or labor saving devices to improve efficiency. In general, U.S. unions are resistant to this type of process innovation while Japanese unions support it (Cusumano 1985, Odagiri 1982, Quinn 1988b, Walton 1987), and

¹⁰Union activity in Japan is reviewed in Japan Institute of Labor (1983) and in Shirai (1984).

	Schumpeterian Market	Keynesian Market
	-volatility -high returns to innovation	-stability -high returns to scale economies
Japanese SWS Business Firm	risk sharing by employees; pro-innovative incentives	high wage costs as volume increases; productivity gains through replacing capital with labor precluded
American WS	risk averse employees; anti-innovative tendencies	higher profit at high volumes; high cost labor replaced by capital; productivity gains and continuous division of labor
Japanese SWS Employee	minimum guaranteed wages; potential major gains from innovation; risk seeking preferences	lower volatility lessens chances for major gains
American WS	high wages, but high risk of job loss; no gains from innovation	high fixed wage; full employment policies reduce consequences of job loss; Taylorism

FIGURE 3. Summary of Major Effects of ECS and Markets on Employee and Firm.

union activity in the U.S. has been shown to impede innovation (Hirsch and Link 1987). The most likely explanation for the differences is that the structure of the internal labor market in Japanese firms—the employment guarantees and integrative versus task specific learning—gives the displaced worker mobility. The worker can move to a new (usually more interesting, less repetitive) job within the firm, while the American worker is threatened by the introduction of labor saving devices. Further, the bonus system implies that the increased profits from automation will be shared

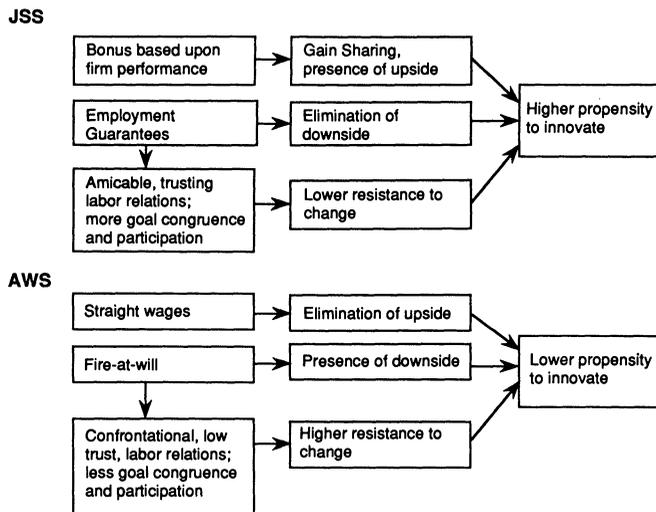


FIGURE 4

with workers. In sum, the pro-innovative incentives of the Japanese-style ECS are reinforced by other human resource policies and practices, as reflected in Figure 4.

4. Implications for Research

Our analysis has implications for both extant research and for future empirical work. We have two objectives in this section. First, we discuss the implications of our work for existing research regarding the links among innovation, business strategy, and human resource policies. Our second objective is to note some of the empirical implications of our argument.

(a) *The Contributions of Contingent Claims Theory for Research in Innovation and Compensation*

The question we have posed—how do employment and compensation systems affect the innovative propensity of firms?—has not been addressed directly by management theorists. We believe that the question and its answer are important to management theory, and our work has a number of implications for related research.

(1) Prior research has examined the organizational attributes that foster innovation. Many of these attributes are aspects of organizational culture. Innovation is fostered by an orientation toward risk and opportunity, by long-term time horizons, and by organizational flexibility (Hagge and Dewar 1973, Kanter 1988, Quinn 1985). Other important attributes are related to organizational structure. Innovation is also fostered by broad and fluid job definitions, by flatter hierarchies, by active information flows, and by an effective balance between employee autonomy and hierarchical control (Aoki 1988, Feldman 1989, Kanter 1983, 1988). Our analysis suggests that employment and compensation systems deserve a top spot on the list of firm attributes that matter for firm innovation, and that future research should consider the ECS as an important independent variable in explaining innovation.

(2) Management research in the social psychology vein (for example, Amabile 1988) stresses the importance of individual employee attributes, and not organizational attributes, for innovation. These individual attributes include, for example, intelligence, persistence, and risk tolerance. In this research tradition, individual attributes are treated as being independent and exogenous variables in explaining innovation. Our analysis demonstrates that individual risk tolerance is a dependent and endogenous variable, which is explained in part by the ECS employed by the firm.

(3) The link between a firm's ECS and its strategic plans is now recognized as being crucial for firm success (Balkin and Gomez-Mejia 1987; Dyer, Faltman, and Milkovich 1985; Ehrenberg and Milkovich 1987; Kochan and Barocci 1985; Mahoney 1979). Balkin and Gomez-Mejia examine the variables that explain the ratio of fixed to outcome-based pay for a sample of U.S. firms. Higher levels of outcome-based pay are found for firms that are (1) smaller, (2) more "high tech," and (3) at an earlier stage in their product life cycle. Similarly, Kochan and Barocci argue that employment security is well suited to firms in the growth phase of their life cycle.

We have several contributions to make here, the first of which is to suggest that the stage of a product in the product cycle can also become a dependent variable of the compensation system (instead of the independent variable) as new innovation is spurred by the employment and compensation system. Put more concretely, we note that neither the Balkin/Gomez-Mejia nor the Kochan/Barocci findings fit the Japanese case, where large firms in all product lines and all growth phases employ the Share plus Wage System. The pro-innovative effects of the ECS employed by Japanese competitors will shorten product life cycles, thereby endangering the stable market circumstances historically enjoyed by American firms. Hence, business strate-

gists need to consider the ECS's employed by a firm's competitors in doing market analysis. It also raises the national competitiveness issue as it is the large firms that have the capital and scale necessary to compete in international markets, but it is the small American firms that employ the pro-innovation compensation strategies.

(4) Our analysis addresses the literature in compensation research that is concerned with effects of compensation policy on some employee behavior or result, such as productivity, absenteeism, attitude, motivation, or turnover. Although some systematic effects of compensation systems (e.g., profit-sharing) on employee behavior (e.g., productivity or motivation) have been found (Guzzo, Jette, and Katzell 1985), in general the findings in the field have been criticized for being anecdotal or for suffering from methodological flaws (Florkowski 1987). Our contribution to this discussion is in response to Ehrenberg and Milkovich (1987), who are critical of the findings to date because "the vast majority of studies [surveyed] have tended to focus on only a single dimension of compensation policy" (e.g., profit-sharing) whereas they believe that the effects of compensation are to be found in the overall system of compensation (p. 114).

Our analysis shows that Ehrenberg and Milkovich are right to be skeptical of single-variable analysis. The two aspects of the ECS that we examine—job security and outcome-based pay—have ambiguous effects on innovation when examined in isolation, but have very clear effects when examined in tandem. Consider Table 2.

The effects of job security on innovation propensity are unclear because, from the social psychology perspective, security is necessary for risk taking (Amabile 1988, Walton 1987), but from the economic perspective, job security offers no incentive for risk taking. That is, security fosters inertia because it offers no "upside" benefits. Although employment security is necessary for innovation, it is not sufficient. The effects of an outcome-based pay system such as profit sharing are similarly ambiguous as they depend upon individual risk tolerance. Although some employees may be more motivated toward innovation because of the presence of "upside" benefits, evidence has been reported that a fixed wage is more pro-innovative because it eliminates "downside" risks to employees (Amabile 1988).

Only when the ECS characteristics are examined in tandem do the effects upon innovation become clear. Job security with a fixed base wage plus profit sharing gives employees both the security and the incentive to innovate and accept change. In contrast, when the fire-at-will doctrine is coupled with straight wages, neither security nor the incentive necessary for innovation is present. Examining systems of employment and compensation, rather than studying an individual attribute of an ECS, will prove more fruitful for management research.

(5) Our argument avoids several of the difficulties associated with the application of Transaction Cost Theory to an analysis of the employment relationship in that (a) we address the question of the *effects* not the *origins* of ECS's and (b) we reject as an unsound assumption the acceptance of opportunism as a universal human trait.

(a) Jones (1983) argues that under routine and standardized mass production, as is found in a Keynesian environment, it is inefficient to confer rights upon workers.

TABLE 2
Aspects of the ECS and Innovation

ECS Characteristic	Effects on Innovation
Job Security	?
Outcome-based Pay	?
Job Security with SWS	clearly positive
Fire at will with WS	clearly negative

Although the lack of rights encourages shirking, the production process facilitates monitoring. As “nonroutineness” increases, however, teamwork and diverse skills are required, and it becomes efficient to confer more valuable rights upon employees. But extensive employee rights also encourage shirking; thus, an optimum level of rights is implied. The level and type of rights conferred defines the organization’s culture. Thus, Jones concludes that culture is determined by the form of the firm’s production function.

Our analysis is an attempt to explain the *effects* of an ECS whereas Jones’s analysis (and much of the work undertaken within the TCT framework) attempts to explain its *origins*. TCT suggests that social and cultural aspects of the employment relation, as well as the ECS itself, evolve as an efficient response to market imperfections. To quote Granovetter, “instead of economic relations being submerged in social relations, these relations become an epiphenomena of the market” (1985, p. 482). Because we predict specific effects, our theory is falsifiable, whereas TCT is a nonfalsifiable language of description (Granovetter, p. 482). TCT is more ambitious than is our analysis; we are advancing what Merton would describe as a “theory of the middle range” (Merton 1967, pp. 68–69).

Our analysis does not (and perhaps cannot) refute TCT’s analysis of the origins of an ECS. Our theory, however, is equally compatible with the reverse causality—some aspects of an ECS have political or legal, rather than economic, origins. For instance, many authors suggest that the emergence of the system of lifetime employment in Japan in the 1950’s (and co-determination in Germany in the same period) resulted from political and social bargains struck among firms, employees, and governments, not from the production function of firms (Johnson 1982, Cusumano 1985, Streeck 1985). Maitland’s comparison of a German and an English factory reveals deeply rooted institutional and political differences (1983). Similarly, the American doctrine of fire-at-will has its root in medieval English common and statutory law, which long predates the emergence of American firm compensation strategies. Other aspects of the ECS may have social and cultural origins (Cole 1979). When firms are, for political or social reasons, unable to terminate employees at will, different labor and capital strategies follow (Streeck 1985, Willman and Winch 1985), and contingent claims contracts may arise even though TCT predicts that they would not (Williamson 1975, p. 67). Our analysis, then, is compatible with a variety of explanations regarding the origins of an ECS.

(b) Our analysis also differs from TCT in that we do not assume opportunism to be inherent to human nature. If the assumptions of TCT are accepted, it is difficult to understand how a contingent claim contract might emerge. Indeed, Williamson (1975, p. 67) specifically predicts that contingent claims contracts will not arise in the employment relation. Because all possible outcomes cannot be enumerated when the contract is written, only contracts that are incompletely specified are feasible, and thus “. . . given uncertainty, bounded rationality, and opportunism, contingent claims contracts will fail” (Ouchi 1980, p. 133). With a lack of trust or, its analogue, opportunism, a contract deemed equitable by both sides is impossible. So, for instance, the employee cannot trust the firm to interpret, and fairly reward, the outcome.

Yet, we do observe contingent claims contracts in the employment relation. In the case of Japanese firms, the contracts are incompletely, perhaps even minimally, specified. Apparently the requisite trust is present. The presence of trust, however, strikes at a key premise of TCT, though Ouchi’s version of TCT, unlike Williamson’s, does allow for norms of reciprocity (Maitland, Bryson, and Van de Ven 1985). If we allow the possibility that human nature is such that trust and goal congruence may

dominate self-interest and opportunism, we allow for the possibility that the problems addressed by TCT will not emerge.

(b) *Empirical Implications*

We have developed an inductive analysis in which we argue that the Japanese ECS may be causally related to Japanese firm success in innovation. The methods of induction allow us to demonstrate the correlation between the two phenomena, but not the causality, unless we have eliminated other types of variation. And many other types of variation between American and Japanese corporations are present that might contribute to this success. As we noted in the prior research section, managerial, cultural, and institutional explanations for Japanese success abound.

Our core argument is amenable to empirical testing, however, by holding other factors constant and examining, for example, the innovative behavior of employees in American firms that employ the Japanese-style ECS.

The measurement problems for testing this analysis are not severe. The “Japaneseness” or “Americanness” of a particular system may be assessed along several dimensions: the ratio of bonuses to straight wages; and the degree of explicit employment guarantees as well as implicit guarantees, which may be measured as the variability of employment under differing market conditions. Firm innovation can also be measured, though with greater difficulty. Baily and Chakrabarti (1988), for example, measured firm product and process innovation in the chemical, textile, machine tool and electricity industries through interviewing company employees and by examining trade periodicals. Griliches (1984) suggests that patents are a valuable indicator of innovative activity.

Our predictions are that (1) employees will be more innovative and more receptive to innovation under a Japanese-style system, and that firms employing such a system will be more successful innovators, and (2) firms will attempt to introduce a more Japanese-style system under higher levels of environmental turbulence and market uncertainty.

5. Summary and Concluding Comments

Our objective in this paper is to explore the relationship between the propensity toward commercial innovation and structures of employment and compensation. This is a positive, not normative, argument: we do not believe that the actual practices found within Japanese firms, particularly the treatment of women, minorities, and other “peripheral” workers, ought to be adopted by American firms, even assuming that American employees would settle for these arrangements. We are only arguing that employees under the idealized Japanese SWS are more motivated toward change—both economically and socially—than are their counterparts working under the American WS.

During the period 1960–87 the rate of growth in product output in Japan was more than double that of the United States, as was the rate of growth in firm R & D expenditures. The orientation to innovation that follows from the AWS might not have mattered for national economic success when the American domestic market was growing in a stable fashion, and was insulated from the international economy. But our markets are no longer isolated from international competition.

Given that change and innovation are the engines of growth, the disparity between the two systems of employment and compensation is a partial explanation for the differing levels of economic performance in the two countries. With tumultuous and interconnected world markets, innovative firms and nations prosper.

The Japanese version of the SWS is historically determined, and we have several reasons not to be optimistic about the widespread development of an indigenous version of this system in the United States. For one, institutions and traditions have strong inertial forces (Hannon and Freeman 1984), and the fixed job definitions, wage system, and fire-at-will doctrines of our existing system of production cannot change easily. Secondly, as we have shown, adopting any one aspect of another ECS will not necessarily be pro-innovative.

In a world of global competition, however, the difficulties of change cannot obscure the consequences of failing to change. Schumpeter (1950) noted that in global markets

... the competition (which counts) comes from the new commodity, the new technology, the new source of supply, the new type of organization—competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives. (p. 84)

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