NBER WORKING PAPER SERIES

COMPENSATION AND FIRM PERFORMANCE

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Working Paper No. 2145

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 1987

To appear in the 1987 IRRA Research Volume edited by Morris Kleiner, et al., Human Resources and the Performance of the Firm. We are grateful to numerous colleagues at Cornell and the editors for their comments on earlier drafts. The research reported here is part of the NBER's research program in Labor Studies. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

The relationship between the compensation policies a firm pursues and the firm's economic performance is of central importance to both researchers and practitioners. Yet, while a variety of theories exist about the effects of various compensation policies, surprisingly little evidence exists on the extent to which compensation policies vary across firms and, more importantly, on the effects of pursuing alternative compensation strategies. This paper attempts to summarize the available evidence, drawing on research from the economics, finance, and personnel literatures. It also lays out an agenda for future research.

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I. Introduction

The relationship between the compensation policies a firm pursues and the firm's economic performance is a central issue in industrial relations. Yet, while a variety of theories exist about the effects of various compensation policies, surprisingly little evidence exists on the extent to which compensation policies vary across firms and more importantly on the effects of pursuing alternative compensation strategies.[1] This paper attempts to summarize the available empirical evidence and to lay out an agenda for future research.

The study of employee compensation has a long history in the literatures of labor economics and personnel. Wages are at the core of employment relationships; consequently, their determination is a central issue of interest in both fields. At the risk of over simplifying to draw a contrast, economists have tended to focus on wage differentials and their correlates. Much of the work in the 40's and 50's examined employer's wage policies and their relationship to industry, union, regional and occupational characteristics.[2] During the 1960s and 1970s the association between human capital characteristics such as age, experience, education, gender and the like and wage differentials were studied. Only recently has economists' focus shifted to why alternative compensation policies might arise and their effects on firm performance.

In contrast, the study of personnel has traditionally dealt with the techniques involved in administration of employee compensation. Much of this work focuses on comparisons of the properties of various techniques, and their effects on employee work attitudes and

behaviors.[3] Compensation research in the personnel literature draws heavily upon economic and psychological theories. Studies report the relationships of pay with employees' satisfaction, as well as their decisions to apply, join and remain with a firm. Further, relying heavily on motivation theories, personnel research also examines compensation's role as a reward or incentive to influence employee performance. More recently, interest has expanded to examine the effects that strategic choices in compensation policies and practices may have on firms' economic performance, as well as employees' behavior and attitudes.

The effect of differences in compensation policies and practices on the firm's "bottom line" is perhaps the most important measure of their economic impact. While the literature in both fields speculates about the effects of various compensation policies and practices on firm performance, little research has been directed to assess this relationship. One reason for the lack of such research is that the data required, detailed individual compensation and performance data gathered across firms, is difficult to collect. Another reason is that relationship between any personnel system, be it compensation, staffing or training and a firm's economic performance is indirect. At best, personnel policies and practices operate directly upon other more intermediate variables such as employee behavior and perhaps on local plant or subunit performance. These in turn affect overall economic performance.

Granted some measures employed may be considered proxies for a firm's performance. Size, measured by number of employees, assets, or

sales revenues, is an example. But typically these measures are considered in terms of their effects on a firm's compensation decisions, such as its wage level and the shape of its employees' experience-earning profiles, rather than focusing on how compensation policies and changes in them affects a firm's financial performance and its value to shareholders.[4] As we shall discuss in the next section, most of the work on the direct effects of compensation policies has been limited to high-level executive compensation. Beyond executive pay, the plain fact is that we know very little about whether different employee compensation policies and practices affect firm performance. Speculation is rife; research rare.

At the onset, it is important to stress that compensation policies may vary on several dimensions. First, the "level" of compensation varies. From a policy perspective, the level refers to the average compensation paid by a firm relative to that paid by its competitors. Evidence suggests that firms pursue different policies, some lead, others match and still others pay less than their competitors. Why the level of compensation should vary across firms, has been the subject of considerable research by economists.[5] However, while the consequences of a firm's relative compensation level on its ability to attract, motivate and retain a stable workforce has received empirical attention, the consequences for the firm's financial performance has not been studied.[6]

Second, it is well known that the compensation structure varies across firms.[7] Structures refer to the distribution of rates or internal pay hierarchies. In some firms, the highest paid work

receives over 100 times the compensation of the lowest paid and the differentials in other firms may be less than 10 times. Of importance to us is the implications of these different structures for employees work behaviors and firm performance.[8]

A third dimension of a firm's compensation strategy pertains to the forms or the mix of various elements of total compensation. Total compensation may include base pay, a variety of incentive schemes, COLAs, various forms of stock options and an increasing array of benefits. Firms differ in terms of the number of pay forms offered, the degree to which employees are offered a choice among different forms, the relative importance of each form (e.g. base wage/total compensation ratio or incentive/base wage ratio,) and the proportion of the workforce eligible for each form beyond the legal requirements, (e.g. in some firms all employees receive profitsharing, in others only a handful of executives are covered). Various types of employee benefits, such as pensions, may have important incentive effects that can influence employee behavior and firm performance.[9]

Fourth, policies for granting compensation increases vary among firms and, even within a firm, among occupational groups. Some firms grant increases across the board, based strictly on time worked, while others base increases on incentive mechanisms such as profit-sharing, team awards, gain-sharing, or pay for individual performance. Such performance-based schemes vary widely. Some emphasize the short term, (e.g. merit pay increases and bonus awards to key performers) others long term (e.g. stock options). Some firms use subjective measure of performance (e.g. merit ratings, project completion), others used

quantitative measures (units produced, return on equity, stock value). The unit of analysis employed in performance measurement also vary (e.g. individual employee, work teams or cells and unit/organization wide). Some extend eligibility to cover all employees, others limit participation depending on the incentive plan involved. Once again, the effects of such differences on the performance of the firm is not well investigated.[10]

Finally, the process by which compensation is administered also differs. Administrative processes may vary on several dimensions. Among these are the extent to which pay information (e.g., rates, ranges, rationales, market data) is disclosed to employees, the nature of employee participation in the determination and administration of pay, the existence of dispute resolution procedures and the degree to which policy design and implementation is decentralized. Some firms have formalized job evaluation systems that aid in determining internal pay hierarchies, while other firms allow for considerable wage flexibility across positions. Some firms operate in a unionized environment: others do not. Similarly, some allow for employee participation and disclosure in compensation decisions, while others do not. Since several papers in this volume address these latter two differences, our treatment of them will be brief.[11]

These five basic dimensions of compensation policy--the level, reflecting the competitiveness of total compensation; the structure reflecting the internal pay hierarchies; the mix of different compensation forms; the nature of pay increases and the process employed to administer compensation--can serve as the framework for

examining the relationship between compensation and firm performance. But disentangling the effects of each of these dimensions will be a difficult and perhaps unfeasible task. It is possible that a firm's economic performance is affected by its compensation strategy *in toto*. If this is the case then we need to examine a firm's behavior on these policy dimensions simultaneously rather than treating each as discrete decisions. Empirically, a firm's compensation strategy needs to be measured as a *set* of interrelated dimensions.

Once the compensation policy variable is focused on, the next issue is how to measure firm performance. In general, one's concern should be with a measure of the overall economic well-being of the organization. So, as we shall see below, many studies,primarily those relating to *executive* compensation, focus on the total return (dividends + capital gains) on shareholders' equity. Others focus on accounting measures, such as reported profits. Still others argue that what is relevant is how stock market or accounting measures are doing after controlling for general and industry specific economic conditions; these studies often use relative (to other firms) in the industry performance measures. (A more complete discussion of the measurement of firm performance is found in the Becker-Olson paper in this volume.)

As noted earlier, studies of non-executive employee compensation have not examined how compensation policies or practices (or changes in them) affect the overall economic well-being of an organization. The unstated premise underlying these studies is that compensation systems can directly affect variables such as employee productivity,

absenteeism, turnover and job satisfaction. The issue of the indirect effects of compensation policies and practices on more general accounting or market return measures has been left unaddressed. It is possible that direct affects can be observed only for executive jobs where decisions may directly affect economic measures, while decisions by non-executive employees have at best very distant relationships to a firm's performance.

It is important to stress that a causal relationship between compensation policy and firm performance cannot be inferred directly from simple correlations of the two variables. So, for example, a positive correlation between wage levels and firm profitability might indicate that a high wage policy causes high profits or that high profits provide a surplus which workers can share in the form of high wages. While some of the studies we discuss below provide correlations between firm performance and compensation policies, very few actually provide convincing evidence that compensation policy affects firm performance.

We begin in the next section with a discussion of the evidence on the relationship between the compensation of high-level executives and firm performance. There is a substantial body of research findings here that draw heavily on both the finance and economics literature. Section III discusses the evidence on employee compensation and firm performance; in the main the research findings here draw heavily from the human resource and personnel literatures, although the economics literature also has something to add. Finally, section IV provides a

summary of what we have learned from these literatures and a discussion of research issues that still need to be addressed.

II. Executive Compensation

Given the widely (but as we will see below not always correctly) perceived separation between the ownership and management of corporations, concern has been expressed that corporate executives may pursue objectives such as sales maximization, growth maximization, or market share maximization that are not necessarily in the best interests of shareholders who are concerned with short run (accounting profits) and long-run (total stock market return) measures of the economic profitability of the corporation. Theoretical models that seek optimal ways to resolve this principal-agent problem, that is ways to provide incentives for executives to take actions that are in the best interests of shareholders, always come to the conclusion that executive compensation somehow should be structured to provide such incentives.[12]

Early empirical studies of executive compensation were cross-section in nature and focused on whether across firms, executive compensation was more highly correlated with sales or accounting profits. In the main the correlations with sales were highest suggesting, at first glance, that corporate executives' compensation was not structured in such a way to maximize stockholders' well-being.[13] However, these correlations may reflect only that large firms employ more able executives and thus must pay them more. These

correlations then, tell us little about the incentives facing any given executive at a point in time.

More recently, a number of studies have used longitudinal data and examined whether changes in top level executives' compensation tends to be correlated with changes in the economic performance of firms.[14] The definition of economic performance varies across studies, some use accounting measures like reported profits, while others use measures of the total return on a firm's securities; some use absolute performance measures while others use performance measures relative to other firms in the same industry (most theoretical models suggest that executive performance should be measured net of industry effects). The definition of compensation also varies; some use salaries and bonuses, while others try to include the values of stock options exercised and/or deferred payments.

Virtually all of these studies find, however, that changes in executive compensation are highly positively correlated with the economic performance measures. That is, corporate executives' compensation does seem to be at least implicitly structured in a way to provide them with incentives to maximize the economic performance of their firms. Several studies also show that relatively poor economic performance in one year is associated with a higher probability of executive turnover in later years; this further suggests that incentives that operate in the correct direction exist.[15]

Of course to say that a <u>correlation</u> exists between executives' compensation changes and their firms' economic performance is in itself not evidence that tying their compensation to performance will lead to

improved economic performance. One possibility is that corporations initially don't know what the true productivity of their executives are. However, to the extent that executives' productivity can be imperfectly signalled by corporate performance, relating their compensation to corporate performance is a way of "paying them what they're worth". If this is occurring, the compensation-performance nexus would reflect learning about executives' "true ability" over time, not necessarily any incentive arrangement to stimulate economic performance.[16] Furthermore, even if appropriate incentives do exist, it doesn't necessarily follow that they will have their intended effect.

Disentangling whether the observed correlation is due to "incentives" or "learning" is not an easy task. One study that attempted to do this used information on the stage of the executives' careers (presumably learning occurs primarily at early stages) and the variability of executives' compensation over their life cycles (if learning is driving the process, an executive's variability in earnings should decline over time) and concluded that while both "incentives" and "learning" may exist, there was some evidence that "learning" effects were most important.[17] Other studies, however, showed that the correlation of measures of performance and compensation growth were highest for better performing firms, which is at least suggestive that better incentives in executive compensation do lead to better corporate performance.[18]

Another strand of research, which draws heavily on the finance literature, focuses on particular provisions. of executive compensation

agreements and examines whether adoption of such provisions is associated with abnormally high stock market returns for shareholders. For example, studies of the adoption of executive stock option plans and executive incentive compensation agreements based on short-run or long-run accounting profits measures have all shown that the announcement of the plans lead to increases in shareholder wealth.[19] At least one study has also found that corporate capital investments tend to increase after the adoption of long-run executive incentive compensation (or performance plan) agreements.[20]

At least three explanations can be given for these findings. The first is that these provisions do have favorable incentive effects and that the increases in shareholder wealth reflect anticipated increases in profits that will occur due to the adoption of the provisions.

The second is that these provisions are proposed by management and adopted by boards of directors only when management believes management will benefit from the provisions. As such their adoption signals to the market that management expects good times are ahead; this would have a positive effect on shareholder wealth (since it conveys new positive information) even if no incentive effects were involved.

Finally, the provisions may be adopted for tax reasons. To the extent that capital gains historically have been taxed at lower rates than earned income (at least up until 1987), adoption of stock option plans may have allowed corporations to provide management with increased (or equal to preadoption) after-tax compensation levels at lower total costs to the corporation. If this occurred shareholder wealth would of course increase.

As above, disentangling which subset of these explanations is "correct" is a difficult task. One study has provided some evidence in favor of the incentive hypothesis.[21] Specifically, it found that the adoption of forms of stock option plans that do not have tax advantages led to increases in shareholder wealth, that boards of directors' statements often claimed anticipated incentive effects would result from stock option adoptions, and that privately held firms often have stock option plans for executives. The former two forms of evidence, however, do not enable one to strongly discriminate between the incentive and signalling hypotheses.

To take another example, a second set of studies has analyzed "golden parachute" agreements; agreements that provide for (often substantial) compensation for a corporate executive if a change in ownership of voting stock and/or shift in the majority of the board of directors of a corporation occurs that leads to the termination of the executive's employment. Two hypotheses have been put forth for the existence of these agreements. On the one hand, these arrangements may increase the costs of takeover bids and reduce their probability of occurring. This would make the executive's position more secure but would not necessarily be in the best interests of shareholders; in a sense it is argued then these agreements transfer wealth from shareholders to management.

On the other hand, one might argue that these plans help to align the incentives of executives and shareholders. By protecting management from harm, they encourage executives to negotiate takeovers that increase the value of shareholders' equity. This protection is

particularly important in situations in which management compensation has been structured so that compensation increases with tenure, with part of this increase being a deferred reward for prior performance. Such deferred compensation schemes prove to be optimal in a theoretical sense in situations in which estimates of an executive's performance are very "noisy" but improve with his tenure.[22]

In fact, the available empirical evidence suggests that on balance the second hypothesis is the correct one; the adoption of "golden parachute" agreements appears to be associated empirically with favorable security market response (i.e., positive excess returns in the short-run).[23] While such evidence cannot disentangle the incentive alignment hypotheses from the hypotheses that such adoptions simply signal situations in which takeover bids, and hence excess returns, are likely, it is interesting that another study found that executives' tenure-earning profiles were steeper in firms that had golden parachute agreements than they were in firms that did not, ceteris paribus.[24] That is, in situations where deferred compensation appeared to be more important, golden parachutes were more likely to exist.

One must caution, however, that all of the studies that find an association between the adoption of particular provisions of executive compensation agreements and abnormally high stock market returns are drawing conclusions about the effectiveness of executive incentive compensation agreements from short-run changes in stock market prices. Many of these provisions are designed to encourage executives to take the long-run interests of the firm into account when decisions are made. Yet surprisingly, save for Larker's (1983) study, it appears

that these studies do not address whether the adoption of these provisions actually alters executives' decisions in any systematic way or leads to higher long-run accounting profits.

In addition to the research described above on the relationship between executive compensation and firm performance in the for-profit sector of the economy, a number of studies have examined the relationship between executive compensation and "performance" in the public and nonprofit sectors of the economy. Of course, in the absence of a profit-maximizing objective, performance is much harder to define in these sectors. Essentially each of these studies defined what it considered to be a reasonable measure of performance and then sought to ascertain if executive compensation and/or turnover was related to this performance measure, ceteris paribus. That is, these studies asked if the compensation of executives in the public and nonprofit sectors was structured in such a way to encourage executives to try to improve the performance measure.

For example, one study of the compensation of chief business agents of local building trade unions, who are salaried officers resonsible (among other things) for negotiating contracts, found that their salaries tended to be positively related to the relative wage advantages their members had over members of the same union in other cities and over other building trades union members in the same city.[25] Thus, incentives appear to have existed for the business agents to try to maximize their members' wage increases.

A second study focused on appointed municipal government officials, specifically city-managers, and police and fire department

chiefs.[26] Performance in this study was defined in terms of how well the officials were doing relative to what might be expected given the socioeconomic characteristics of the city -- or more precisely, by residuals from estimated "output equations". Positive performance for the three officials were assumed to be, respectively, lower than predicted property tax rates but higher than predicted expenditure levels (which could occur simultaneously only if the city-manager was good at attracting aid from higher levels of government), lower than predicted crime rates, and better than predicted fire insurance ratings. For all three types of executives, salaries were positively correlated across areas, ceteris paribus, with the performance measures, again suggesting that some incentives for the officials to "perform" existed.

A third study of this type focused on public school district superintendents and defined school district performance using a residual approach as above.[27] Districts that were performing well were assumed to be those in which student test scores exceeded their predicted values, given the characteristics of the district, and where tax rates were lower than predicted, again given school district characteristics. In this longitudinal study both salary changes and the probability of moving to a better changing job were seen to be positively related to the performance measures. However, the magnitude of these relationships was sufficiently small that the authors concluded that no meaningful incentive to perform (as defined) existed.

While these three studies all tried to infer if the implicit structure of executive compensation in these public and nonprofit

sector positions provided incentives for the executives to pursue specified performance objectives, none actually examined if the existence of these incentives did lead to improved performance. One recent study, however, was able to observe several measures of performance of local social security administration offices both before and after the adoption of formal merit pay plans that partially tied managerial salary increases to these performance measures.[28] Using a quasi-experimental design and statistical procedures to eliminate trends and cycles in the performance measures, the study found that the adoption of the merit pay plans led to no short-run effects on performance. The authors noted, however, that the system was still in its early stages and that effects might possibly be observed after it became more institutionalized and better understood.

In concluding this section, it is interesting to note that there appear to be no studies in either the private-for-profit, nonprofit, or public sectors on how the level of executive compensation affects economic performance. Similarly, there are no studies of how the rewards for seniority, probabilities of promotion, or salary structure across executive positions within a firm affect economic performance. That is, we do not know whether paying high salaries to attract and retain high quality executives "pays", whether offering executives rewards for seniority "pays", whether offering within-firm promotional opportunities (e.g., from vice president to president or from president to chief executive officer), "pays" and whether the compensation levels across executives within a firm are structured in such a way to encourage improved firm performance.[29]

III. Employee Compensation

The purpose of this section of the paper is to examine the literature pertaining to a firm's compensation policies for employees not covered under executive pay systems and the relationship of these policies to the performance of firms.

Evidence of variations in the compensation policies and practices of firms can be found in several sources. Typically the data are incomplete, collected for other purposes, or of limited use for determining any direct effects of compensation on firm performance. Sufficient signs of differences in firm's policies do exist and they are considered in terms of the basic dimensions discussed earlier.

Certainly, differences in pay levels and the competitive position among firms is well established in both the economics and personnel literatures. Reports issued by private consulting firms that survey employer practices detail differences in pay levels by characteristics of the firm (e.g. industry, revenues, workforce size), job (e.g. function, description, job evaluation points and number of incumbents) and geography and Area Wages Surveys conducted by the Bureau of Labor Statistics also show wide variations in wages within narrowly defined job classifications in a metropolitan area.[30]

One study, which had access to a private consulting firm's survey data from aerospace companies, reported that after controlling for firm size (number of employees and revenues), substantial variations existed in the average salaries paid among these firms (e.g the two highest paying firms paid more than 16 percent above the market average which the average paid by the lowest two was more than 11 percent below

the market average).[31] These firms also exhibited different competitive positions for different functional specialties. For example, in one, the average pay for 9 of 13 functions exceeded the market average for each function, while in another the average pay exceeded the market average in only 5 of the 13 functions.

These data do not permit one to distinguish whether these differences across functions reflect differential contributions of the functions to the firm's objectives or to other factors such as differences in employee age or experience distributions across functions. Whether compensation level policies tend to be occupation-specific or company wide is unclear. It is possible that firms competing within an industry may have one policy for occupations critical to the firm's objectives and another for those less critical. Recent evidence found by Leonard (1986) tentatively agrees with the data reported above that occupation-specific as well as company wide policies exist.

Anecdotal accounts of different compensation policies are also available. A study of the personnel policies of large non-union firms, reports a variety of competitive policy statements about relative compensation level positions.[32] Some firms with centralized personnel systems reportedly adhere to corporate-wide compensation policies for all business units, others report that each of their business units adopt their own competitive posture in their markets. The former seem to be most common in firms with integrated lines of business, the latter is more common in conglomerates with multiple and unrelated product lines.

The efficiency wage literature in economics suggests various reasons why some employers might set higher wages than their competitors for employees of equal quality.[33] Examples include differences in turnover costs, differences in the need for close supervision (so-called "worker shirking") and difference in employee commitment. Evidence of different pay levels within a product market or industry is also widely available in studies of intra-industry wage differentials. Dunn's (1986) study of the effects of firm size on wage levels in the plastics industry, Groshen's (1986) study of employer effects on wage dispersion in plastics, industrial chemical and woolen yarn industries, and Leonard's (1986) study of wages in California's high-technology sector are recent examples.

Generally these studies confirm earlier findings. For example, it is well known that differences in intra-industry wage rates are correlated with firm size. Numerous explanations are commonly advanced to explain this relationship including (1) larger firms use more advanced technologies and require greater employee skills and discipline, (2) compensating differentials are required to offset the greater disutility of working in larger firms, (3) labor unions in larger firms have been able to appropriate some of the firm's higher profits, and (4) large firms pay higher wages to reduce employee shirking and thus supervision costs.[34] Note that these explanations imply that a firm's economic performance and the conditions it faces permit, or provide economic incentives for it to adopt a particular pay posture. Unless one tautologically accepts these explanations as valid, however, they do not provide any evidence that a firm's pay

level, as part of its overall compensation strategy, actually has had any effect on its economic performance.

Some survey evidence, though limited in coverage, compares the compensation policies of high tech firms with "traditional" firms.[35] In one study forty percent of both the high tech firms and traditional firms reported following policies in which their pay level matched their competition. About 20 percent in each group reported they lead their competitors and the rest followed ("less than market average"). Obviously caution needs to be exercised in interpreting these data: they are based on reports of compensation managers and the mechanics used to translate a policy into practice often vary. For example, two thirds of the firms reported they matched their range midpoints with the median rate paid in the market. However, the specific firms included in such calculation often vary, the surveys used differ, and differences in average rate paid by firms may be due to demographic differences in each firm's workforces (e.g. seniority) rather than any intended competitive policy differences.

Considered together, the consultant survey information, the anecdotal accounts, the economic research and the personnel surveys support the contention that employers' characteristics are related to the dispersion in pay level and to a firm's relative compensation position among its competitors. But we are interested in evidence on the effects of differences in relative compensation policy on firms' financial performance or shareholder value. And here the research literature is lean.

Our search of the literature yielded very few studies of the effects of different pay levels on performance measures such as compensation-to-revenue ratios, labor cost-to-total cost ratios or shareholder value. One Summers' (1986) case study of what happened to Ford Motor Company when Henry Ford introduced the $5/day wage in the early 20th century, found that while absenteeism, voluntary turnover, and discharges declined after the wage increase and productivity increased, these changes probably were not sufficiently large in themselves to allow one to conclude that the new policy "paid for itself". A second Abowds' (1985) study of recent union wage settlements, found that unexpectedly high union wage settlements were reflected virtually dollar for dollar in changes in shareholder value (see the Becker and Olsen piece in this volume for more details). Thus, higher than expected wage settlements do not appear to improve firm performance. Finally, interindustry studies of the determinants of wage levels that specify that high profits cause high wages rather than vice versa, typically do find that industry profit levels are an important explanatory variable in wage equations.[36]

A few studies do examine the effects of pay level on employee and employer recruiting and turnover behaviors. For example some evidence suggests that establishing a relatively high pay level increases the applicant queue permitting firms to select higher quality and thus potentially more productive employees. Evidence on the wage/recruitment expenditure relationship seems contradictory. One study reports that high pay levels and high recruiting costs are substitutes, while another suggests they are complements -- that

employers who offer relatively higher wages also exhibit relatively greater recruiting expenses.[37] Thus, employers that search more are likely to pay more. But the evidence here is drawn from limited low-level occupational groups and only limited industry and firm characteristics are considered. Obviously more work is needed, perhaps under certain conditions (e.g., critical jobs or long-term unfilled vacancies), pay levels and recruiting costs are complements, while under others they are used as substitutes.

Some evidence of the effects of pay level on job seekers and employees' choice behavior is also available. For example, studies of the correlations between wage levels and turnover and absenteeism have already been cited. Wage levels also appear to be an important factor when job seekers have a wide range of pay levels from which to choose and higher paid workers, ceteris paribus, report they put more effort into their jobs and are more satisfied.[38] Research also exists that shows that higher military pay levels increase the flow of volunteers to the armed forces.[39]

Another dimension of a firms' compensation strategy is its internal wage hierarchy. Wage hierarchies differ across firms in different industries that employ differing technologies. For example, breweries have relatively flat hierarchies compared to steel or automotive firms. But within an industry or firm, managers have considerable latitude in the design of wage structures. Relatively flat structures (e.g. fewer grades and wider pay ranges) tend to obscure differences in task and/or skill requirements and offer managers flexibility in deploying the workforce without necessarily

requiring pay changes. Greater hierarchical arrangements emphasize greater specification of work rules and skill requirements and tend to require pay adjustments more often.

Wage structures possess several characteristics, including the number of levels, the differentials between levels and the distribution of employees among the levels. There is a tendency, especially in larger organizations, for the number of employees being paid higher wages to be less than the number paid lower wages. Several attempts to examine this feature have been reported. For example, one study used the Lorenz curve as an analog and compared the distribution of annualized salaries by cumulative percent of the workforce across firms.[40] Others analyzed the nature of the differentials between levels in the hierarchy. At least one study found the functional form of differentials between hierarchical levels to be a constant proportion.[41] Another, based on the analysis of the discretionary content of work and norms ascribed to employees, reports pay ratios of 1.33 between adjacent managerial levels.[42]

Another feature of pay hierarchies is that wages often tend to be associated with jobs rather than individual employees. Thus deploying workers to new jobs often necessitates wage changes. The alternative system of wages being tied to workers, regardless of the job performed, underlies knowledge base pay schemes and maturity curve arrangements.[43] To date, no attempts to systematically examine the effects of job-based as compared to employee-based pay structures have been conducted.[44]

There is also a tendency, at least in larger firms, for a large proportion of employees in higher paid jobs to have been promoted from

lower paid jobs within the same firm and for new hires to enter at specific points in the hierarchy. Administrative procedures documented as part of internal labor markets serve to regulate these promotions and wage hierarchies.[45] Finally there is some evidence that pay rates rise with seniority and experience and that the variance of earnings increases with experience and age.[46]

The literature contains many explanations for these features of pay hierarchies. Theoretically, variations in internal wage hierarchies are seen as influencing a wide array of employees' behaviors.[47] These include their decisions to file grievances, invest in training, take on added responsibilities, improve their performance, turnover, form unions and the like. But to our knowledge no attention has been devoted to examining empirically the effects of variations in the pay hierarchies and workforce profiles on firms' performance.

Recent news reports do describe cases of employers' attempts to reduce labor costs and improve productivity by modifying their pay hierarchies. They report drastic reductions in the number of levels (grades) in the pay structure as well as workforce reduction schemes aimed not only at shrinking the overall workforce level but reconfiguring the distribution of employees within the structure (e.g. early retirement programs and demotions). But systematic study of the effects of these events has not been reported.

A renewed interest in wage hierarchies within firms has also occurred among labor economists. However, most of this work has been at the theoretical level; empirical research is much sketchier.[48] Economists have found that union policies produce reductions in the

dispersion at the plant level; wage dispersion within unionized firms (measured as standard deviations of the log of wages) averages 1/3 less than in non-union firms.[49] Considering the effects of within-firm wage differentials, this same study found that the wider the dispersion the more likely union certification drives will be successful. Studies of this type, however, provide little direct evidence on how wage differentials influence firm performance.

We turn next to research that addresses the impact that different methods used for determining pay increases have on performance. Much of this work focuses on comparing different methods (e.g. merit versus across the board) rather than comparing different combinations or mixes of approaches in total compensation. For example, a recent survey by the Conference Board reports that merit pay plans (performance appraisal based) are in widespread use for exempt employees.[50] Perhaps the most telling result of the survey, which was based on responses from compensation directors, is that there were no apparent differences in the features of the merit plans between those who claimed their plans were "very successful" and those claiming theirs to be a "failure."

Typical of the research studies are those that compared employee performance in organizational units with merit pay to those in which pay increments were based on COLAs and/or seniority. In studies comparing nurses in two hospitals (one with COLA and seniority based increases, the other with merit) and in two paper mills (one with COLA and seniority increases the other in which a merit plan replaced a COLA/seniority plan), the employees were reported to be more productive

in the merit based units.[51] In another study, the discontinuation of an incentive plan among welders in a manufacturing firm resulted in a temporary decrease in their productivity. And in a series of studies of tree planters, lumber jacks and fur trappers, incentive based plans were found to be increased performance over previous levels or when compared to hourly straight time pay with seniority based increases.[52]

Merit pay did not fare as well in studies in the public sector.[53] The most elaborate of these was the longitudinal analysis of the effects of the Federal Merit System in the Social Security Administration, which we discussed briefly in section II. Unit level performance data (e.g. monthly series of types of claims processed and time to process) were collected and while the results were not unambiguous due to court challenges that delayed the implementation of the merit plan and low merit budget funding, the authors concluded that the merit pay plan did not have any discernable affect on unit performance. Several reviews of merit pay plans in public education also concluded that there is no systematic evidence that the institution of merit pay plans for teachers lead to any improvements of teaching and, more importantly, to improvements in student performance.[54]

Unfortunately both the private and public sector studies utilize nonrigorous quasi-experimental designs and suffer from methodological and/or measurement problems (e.g. selection bias, uncontrolled variables). This leads us to conclude that we know very little about the effects of merit pay schemes on employee performance and even less about their effects on firms' financial well being.

It should be understood, however, just how great a gap exists between theories of pay for performance and how it actually gets practiced. Personnel researchers have long recognized this gap. Many "merit pay" schemes are underfunded, fail to offer pay increases that are meaningful to employees and fail to establish a clear relationship between performance and pay increments. Further, only a relatively small share of most employees' compensation is contingent on performance under these plans. So the poor showing of merit pay schemes should not come as too much of a surprise.

The gap between theory and practice appears to differ by occupation. Sales incentive plans appear to be more consistent with theory than the merit plans often used for managers or professionals. This suggests that sales jobs may offer an attractive opportunity to study the effects of various pay for performance approaches.

Another series of studies correlates earnings levels with previous earnings, experience, performance ratings, education and other factors.[55] Using data collected within firms, they all reached similar conclusions; that pay level is weakly or not significantly correlated with performance rating and is more strongly related to seniority and education. For example, one study reported that earnings were more attributable to experience than performance, but it failed to report if the three firms, which provided the data, used merit based pay.[56] Other studies reported low correlations between performance ratings and salary levels for managers in four private and three public organizations.[57]

Correlations in these studies reveal very little about the nature of pay-performance relationship. It is the increments in pay, not the pay level, that merit pay plans to use to affect performance. Not unexpectedly then, the correlation between the changes in pay for managers and their performance rating in one study was very much higher (.65) than the correlation between performance and pay level (.25).[58] Obviously, none of these correlation studies sheds light on the effects merit pay may have on individual or firm performance. However, in spite of the failure to distinguish between pay level and changes in pay, many still refer to the weak pay level-performance relationship as proof that merit pay does not affect performance.[59]

A few studies considered the effects of the mix of different forms of compensation on employee performance. In one, merit pay and bonuses (individual oriented pay increases), were found to be less effective than profitsharing, stock ownership, and team based bonuses.[60] Of the latter three, team based bonus were reported to be most effective. This study also suffers from limitations similar to most pay-performance studies; effectiveness was measured in terms of managers' perceptions of turnover, ability to attract and the like rather than by more objective measures. Further the authors recognize that the study is based on a convenient sample and that data limitations did not permit them to control for different provisions in the incentive plans such as size of awards, eligibility, timing etc.

Two other studies contrast the earnings of workers paid by the hour and those paid by a piece-rate scheme. The first found that among 183 male punch-press operators in Chicago, workers paid by the piece

received approximately 7 percent more, even after controlling for differences in schooling, experience, race, and union status.[61] The second, used Bureau of Labor Statistics data on the earnings of over 100,000 employees in 500 firms in the footwear and men's and boys' clothing industries and found that workers paid by the piece earned approximately 14 percent more, after controlling for differences in some (but not all) characteristics of workers and firms.[62]

It is unfortunately difficult to interpret what these estimated differentials mean. In part, they may reflect an intended incentive effect; workers employed under piece rates may work harder, produce more, and hence get paid more. In part, they may reflect a wage premium to compensate piece-rate workers for the risk of low earnings they face during times when their productivity is low (e.g., weeks when due to physical ailments they don't produce as much as usual). In part they may also reflect the most productive workers self-selecting themselves into jobs where their earnings opportunities are greatest. In the latter case, firms offering piece-rate plans potentially benefit not because the plans induce any given worker to work harder, but rather because they serve to help attract higher quality workers. Neither of these studies, however, draw any conclusions about the effects of such plans on the current profitability or stock market performance of firms.

A renewed interest in, and even popularity of, gainsharing and other productivity sharing schemes is evident in industrial relations.[63] Widely perceived as an approach through which pay increases can successfully affect group and unit performance,

proponents claim the plans hold considerable promise and even demonstrated success. The benefits ascribed to these plans include increases in employee and firm productivity and profitability, reduced costs, improved product quality, reduced absenteeism and tardiness, better use of capital assets and the facilitation of employee-management cooperation, commitment and trust.[64]

Conceptually the notion is straightforward and appealing, as part of an overall employee relations philosophy, sharing the returns from productivity gains will engender suggestions for further improvements, and motivate added performance. Typically these gains are shared in the form of bonuses and are not rolled into employees' base pay. Hence increases in compensation costs vary directly with performance levels.

Unfortunately, much of the literature on productivity sharing is testimonial and anecdotal. The substantive empirical evaluations of gainsharing have come in two waves. The first came from the Massachusetts Institute of Technology with its historical connections to proponents such as Scanlon and Lesieur, as well as Frost and his colleagues at Michigan State and Scanlon Plan Associates. Beyond dissertations and technical reports little of this work has been published.[65]

More recently, the question of the effects of gainsharing and other programs was the focus of two surveys conducted in the early 1980s.[66] The New York Stock Exchange survey revealed that approximately 15% of all US companies with 500 or more employees had some form of productivity sharing plan and that over 70% of these reported gainsharing lead to improving productivity. Based on the

opinion data of this type, the NYSE Office of Economic Research conclude "on the basis of the evidence and the theory (emphasis added), it appears that gainsharing can play an important role in motivating people to be more productive."

The other survey, a GAO Report, concluded that "the results of productivity sharing plans suggest that these plans offer a viable method of enhancing productivity and at the firm level." This conclusion was based on information obtained from interviews with 36 firms. However of these, only 24 firms provided some financial data, only 9 firms indicated they made any formal assessment of these plans and only 4 of these could document their analyses. Nevertheless, the oft quoted GAO results are that gainsharing improved performance by 17.3% at 13 firms with sales less than 100 million and in the 11 firms with sales of 100 million or greater, the average improvement was 16.4%. How seriously one should take these results is obviously open to question. Beyond these two surveys and some earlier evaluation studies, case descriptions of applications dominate the literature.[67]

Schuster's work (1984a, 1984b) is an exception. He reports longitudinal case studies of the effects of gainsharing schemes, the Scanlon plan, and the Rucker plan. In the most thorough study, productivity (measured as output per hour), employment, voluntary turnover, and suggestion rates by employees were collected on a monthly basis over approximately seven years. Based on a time-series design, the results revealed an immediate upward shift in productivity and suggestions upon implementation of a Scanlon plan, followed by a

slightly positive trend thereafter. In other studies of four Scanlon and two Rucker applications, similar findings were reported.

This "plateau effect," an abrupt positive shift in performance followed by a slight positive trend or steady performance level, is consistent with observations in the earlier descriptive literature. Schuster notes that other coincidental changes (e.g., capital improvements, new union or management leaders, etc.) may have affected productivity to a greater degree than the gainsharing schemes did. He attempts to account for these possibilities through rather exhaustive interviews of the parties involved and analysis of capital expenditure data during the study periods.

A number of monographs on profitsharing have been published by the Profit Sharing Research Foundation.[68] Most of them describe various profitsharing applications and their supporting philosophies. A few compare the financial performance of firms with profitsharing to "non-profitsharers". In one study by Howard and Dietz (1969), financial performance measures used include levels and trends in operating income, various rates of return, earnings per employee, earnings per share, dividends per share, and market price per share. Nine industries were selected using a four-digit SIC classification and data were collected from COMPUSTAT tapes for the 1948-66 period. The analyses compared the financial performance of profitsharers with non-profitsharers. Profitsharers exhibited superior performance in 50 percent of the cases and inferior performance in about 24 percent. Howard and Dietz concluded that "the financial performance of

profitsharing companies was clearly superior to non-profitsharers for the nine industries as a group."

Limitations in COMPUSTAT data did not permit accounting for systematic differences beyond profitsharing that could account for the observed performance differences. Beyond such obvious ones as capital expenditures, technological and product differences, a variety of critical compensation and personnel factors need to be considered. A few of the more obvious ones are differences in pay levels, employment levels, other incentive schemes and whether profitsharing was considered part of an employee's total compensation (thus placing a portion of it "at risk" in a manner similar to gainsharing) or a benefit (thus placing it along with pensions as an entitlement). Put another way, simple comparisons of mean outcomes tell us little about the effects of profitsharing.

Our overall conclusion in this section echoes the conclusion in our summary of the executive compensation literature. It is well known that the basic dimensions of employee compensation strategies differ widely across organizations. Yet there are few rigorous studies of whether these differences make a difference. We do not know if a firm's pay position relative to its competitors, the number of pay grades it offers, pay differentials between these grades, or the profile of employees in a firm's pay hierarchy make any difference regarding employee behavior or the firm's economic performance.

There is evidence that individual and group based incentive plans do affect employee performance but even it is not unambiguous. We do not know whether changes in the mix of total compensation pay off.

Does it pay to shift from a base pay system that emphasizes entitlements (emphasis on seniority, COLA's, across the board increases and economic security) to a contingency based system with emphasis on short and long term incentives such as gainsharing, team awards, and stock ownership. Under what conditions (e.g. stage of product life cycle, market share, etc.) might different compensation policies pay off and what are the performance implications of changing pay policies?

Considering the resources devoted to employee compensation and its management, we do not even know if the overall pay strategies adopted make any difference. That is, we simply do not know whether managing compensation pays off.

Perhaps one reason is that compensation strategies do not operate in a vacuum. Compensation is only one part, albeit an important part, of a firm's total human resources strategy. Some firms, for example, may emphasize contingent compensation while others may emphasize employment security. Disentangling the effects of one part of an overall pattern is difficult. But perhaps a more plausible reason for the dismal state of knowledge is that industrial relations researchers haven't attempted the research. It is to a suggested research agenda that we now turn.

IV. Concluding Remarks

Our survey of the literature on the relationship between the compensation policies a firm pursues and its economic performance leads us inevitably to the conclusion that we know very little about this relationship. Partially this is because compensation policies, by

their nature, are very complex. Firms differ in terms of the level of their wage offers relative to their competitors, the returns within an occupation that accrue due to seniority, their wage structures across and within occupations, the level and mix of fringes they offer, their use of individual or group incentive pay policies, the procedures by which wage increases are granted, and the processes employed to administer compensation. Moreover, within a firm different policies may be followed for high level executives, other managerial employees, professional employees, technical employees, office workers, and blue collar workers, and still further distinctions made among salaried and hourly, or unionized and nonunionized employees. Finally, compensation policies are often established at the individual establishment level rather than at the firm level; we return to the implications of this point below.

Developing an understanding of why firms pursue different policies for various occupations instead of a single consistent policy for all employee groups is important. On the one hand, it may be that certain strategically critical occupations, such as engineers in high technology firms, or executives in most firms, have greater effects on a firm's financial performance than do other occupations. Thus variations in pay policies for critical occupations are more likely to affect firms' economic performance than policies directed at other groups. On the other hand, executive compensation usually makes up a very minor portion of total labor costs. Consequently any pay schemes that shift portions of employees' labor costs from entitlements (e.g. COLA's or seniority based) to contingency based (e.g. gainsharing or

lump sum bonuses) seem likely to have noticeable effects on financial performance.

The vast majority of the studies we have surveyed have tended to focus only on a single dimension of compensation policy. However, a firm's economic performance is undoubtedly affected by its compensation policy in toto. Future research needs to examine a firm's policy about the various dimensions of compensation policy simultaneously rather than focusing on one policy to the exclusion of others. Empirically, a firm's compensation strategy needs to be measured as a set of interrelated dimensions. Developing a scheme to parmaterize such a complex policy in terms of a manageable number of dimensions will not be a simple task.

Of course, one might think that one could eliminate the need for such efforts by studying how changes in one dimension of compensation policy affect changes in firm performance. The studies cited in Section II on the relationship between the adoption of particular provisions in executive compensation agreements and performance, or those cited in Section III on the relationship between the adoption of merit pay and public sector productivity, fall into this class. Unfortunately, the inferences one can draw from such studies depend crucially on whether other aspects of compensation/industrial relations policy changes at the same time; unless other critical aspects are accounted for, causal inferences will be distorted. In addition, they depend crucially on one's ability to control for other forces besides compensation policy that might be expected to influence performance.

Since adoption of a particular provision may well be influenced by other forces, this is also not always easy to do.

An argument might be made that each pay policy dimension may affect a different outcome, thus diminishing the importance of analyzing all dimensions simultaneously. The pay level of a firm, for example, may principally affect its ability to attract and retain a stable work force and the price competitiveness of its products, while a firm's policy regarding the methods by which employees are compensated (e.g. team based incentives versus seniority) may directly affect their productivity. If such a separation of theoretical effects exists, then the need to consider simultaneously the entire pay strategy diminishes. Common sense suggests however, that some thresholds of all pay policies may have to exist for the separate pay dimensions to have any effect. Thus, for example, merit pay schemes may have little effect on performance if the pay level is relatively low.

The endogeneity of the adoption of particular provisions suggests another thorny issue. Not only are changes over time in compensation policy for a given firm likely to be nonrandom, but so are differences in compensation policies across firms at a point in time. There are long literatures in both economics and personnel that suggest the situations in which different compensation policies may prove optimal.

For example, the efficiency wage literature in economics suggests that situations in which turnover costs are high, or the costs of monitoring worker productivity are high, are the ones in which above market-clearing wages and/or earnings profiles that increase with

seniority may arise. The compensation literature in personnel suggests that business units that exhibit similar business strategies or operate in the same stages of product life cycles will adopt similar compensation policies, and that these policies will differ from those of firms in the same industry in different stages or with different business strategies.[69] Thus, variations in compensation policies across firms may reflect conscious decisions by firms; each trying to maximize its economic welfare.

At first glance, we appear to be left with two options. On the one hand, researchers can treat variations in compensation policy across firms as being randomly determined and ignore issues of possible simultaneity. On the other hand, researchers can acknowledge that at least some of the observed variations in firms' compensation policies are purposeful and designed to effect a firm's performance and then try to empirically model the determinants and effects of these variations. Given the latter, the effects of compensation policy on firm performance can be estimated only in the context of a model that treats these policies as being endogenously determined.

Our own preferences are to go the latter route. A start has already been made by some research. For example, economists have tried to see if empirical explanations exist for why the prevalence and strength of cost-of-living adjustment clauses vary across union contracts, why the fringe benefit/wage ratio varies over time and across areas, or why the probability of observing mandatory retirement provisions and above market clearing wages varies across individuals.[70]

These types of studies have only begun to scratch the surface and much more research is needed on the determinants of compensation strategies.

We must stress, however, that pursuing this type of research will not be easy for a number of reasons. On the one hand, it is not a trivial matter to parameterize any particular compensation policy. For example, knowledge of the incentive/nonincentive pay dichotomy is probably less useful than knowledge of the magnitudes of the incentives that exist (i.e., the marginal return to the workers from altering their behaviors). Similarly, how a plan is actually administered may be quite different from what is recorded in written plan statements. The mere process of collecting data on compensation policies will require considerable efforts.

On the other hand, once such data is collected, researchers must still develop empirical models to explain variations in compensation policies. Unless such models have a good deal of explanatory power, attempts to treat compensation policies as endogenous are unlikely to lead to statistically precise estimates of the effects of compensation policies on firm performance, both because of the imprecision of the "instruments" for compensation policies that would result and the indirect relationship between compensation policy and ultimate financial performance.

Indeed this problem is exacerbated by the fact that compensation policies are often set at the individual establishment level and are designed to effect establishment level variables such as absenteeism, the quality of new hires, turnover, and productivity. Yet the

financial performance (stock market or accounting) measures available are typically available only at the firm or corporate level.

These difficulties suggest a third option. Researchers might focus on the establishment level to estimate the effects of compensation policies on the outcomes that they are designed to directly influence, such as recruitment, absenteeism, and turnover and individual, group and business unit performance; all in the context of models in which one attempts to control for the endogeneity of these policies. Assuming that compensation policies are shown to influence these outcomes, establishment level data could then be used to estimate the effects of these outcomes on total costs of production and thus on underlying profitability. Related research on the effects of industrial relations type policies on establishments' costs and productivity in the automobile and paper mill industries has recently been undertaken and can serve as a starting point for these endeavors.[71] These related studies do not treat industrial relations variables as endogenous, however, and it is important that attempts be made to treat compensation policies as endogenous in future analyses.

Indeed, it may be that financial and stock market measures simply have too much "noise" in many situations to be useful measures of the direct effects of various compensation policies and practices. By considering only the "ultimate" performance measures and ignoring the intermediate outcomes of compensation systems, we run the risk of concluding "nothing" matters when in fact what matters depends on the outcomes and models selected. Research on the effects of compensation

policies on firm performance thus needs to focus on both firm-level performance measures and more intermediate level measures.

Footnotes

1. Compensation related theories come from a variety of sources; Thomas Mahoney (1979) attempts to integrate the perspectives of compensation from the economics, psychology, sociology and personnel literatures.

2. See Martin Segal (1986), for example, for a discussion of the post-institutionalist's labor market models of the 1940s and 1950s.

3. See, for example, George Milkovich and Jerry Newman (1984) or E.E. Lawler III (1971).

4. See, for example, Charles Brown & James Medoff (1985) or L. Dunn (1986). We discuss the various ways firm performance may be measured below.

5. Explanations for the existence of above market-clearing wages fall under the rubric of efficiency wage theories; recent summaries of the literature include Lawrence Katz (1986), Joseph Stiglitz (1984) and Janet Yellen (1984). Explanations often revolve around high wage policies being used to discourage shirking in situations where monitoring costs are high. This provides one explanation for the well-known fact that wages tend to increase with establishment and firm size (see Brown and Medoff (1985)).

6. For example, recent evidence on the relationship between quit probabilities and firms' compensation levels is presented in Mark Meitzen (1986). Earlier studies include John Pencavel (1970) and Kip Viscusi (1980). Evidence that high wages are associated with low absentee rates is presented in Steven Allen (1984).

7. See, for example, Milkovich & Newman (1984), Richard B. Freeman (1982).

8. Economists have also developed a variety of theories to explain why earnings should increase with seniority including those based on investments in training (e.g., Gary Becker (1975)) and those based on providing incentives (e.g., Edward Lazear (1979; 1981), Edward Lazear and Sherwin Rosen (1981), and Sherwin Rosen (1986).

9. For example, Donald Winkler (1980) shows that generous sick leave policies may encourage absenteeism. We do not discuss the effects of another important employee benefit, pensions, in our paper since they are the subject of another contribution (Steven Allen and Robert Clark) in this volume.

10. Theoretical models of payment by group or individual output also exist; a good survey of this literature is Lazear (1986).

11. See the papers in this volume by Brian Becker and Craig Olson on labor relations and Walter Gershenfeld on employee participation.

12. See Lazear (1986) for a survey.

13. See David Ciscel and Thomas Carroll (1980) for a survey of this literature.

14. See, for example, T. Coughlin and R. Schmidt (1985), Peter Kostiuk (1986), and Kevin J. Murphy (1985a; 1985b) (forthcoming a; forthcoming b) who focus on absolute measures of performance and Rick Antle and Abbie Smith (1986) who focus on performance measures relative to competitors.

15. See George Benson (1985) and T. Coughlan and R. Schmidt (1985). Benson also studied the income of executives in 29 conglomerates during the 1970-75 period and found that the annual gains (or losses) they incurred due to changes in the value of their stock holdings in their companies far exceeded their annual changes in salaries. This further ties their "fortunes" to their companies' fortunes.

Further confirmation that ownership matters comes from William Lewellen, Claudio Loderer and Ahron Rosenfeld (1985), and Randall Mørck, Andrei Shleifer and Robert Vishny (1986). The former examined the abnormal stock market returns experienced by "bidder firms" in mergers from the "bid" to the "approval" date. They found these returns positively related to the percentage of the "bidder firms" stock owned by senior management. Thus, executives' ownership of their firms' securities helped to align the interests of stockholders and managers, at least in this case. The latter found that corporate performance (in terms of both accounting profits and stock market performance) was highest when management owns between 5 and 20 percent of the corporation's stock. They hypothesize that when smaller amounts are owned, managers have less incentive to pursue a profit maximizing strategy, while when larger amounts are owned, managers may feel more secure and not work as hard.

16. For examples of such "learning" models, see Smith Freeman (1977), Milton Harris and Bengt Holmstrom (1982), and Glenn McDonald (1982).

17. Murphy (forthcoming, b).

18. See Robert Masson (1971).

19. See, S. Bhagat, J. Brickley and R. Lease (1985), J. Brickley, S. Bhagat and R. Lease (1985), D. Larcker (1983), and H. Tehranian and J. Waegelein (1986).

20. Larcker (1983).

21. Bhagat, Brickley and Lease (1985).

22. See Jonathan Eaton and Harvey Rosen (1983) for one theoretical model.

23. R. A. Lambert and D. F. Larcker (1985).

24. Charles Knober (1986).

25. Ronald Ehrenberg and Steven Goldberg (1977).

26. Gerald Goldstein and Ronald Ehrenberg (1976).

27. Ronald Ehrenberg, Richard Chaykowski and Randy Ann Ehrenberg (1986).

28. Jone Pearce, William Stevenson and James Perry (1985). Performance measures used here include the average length of time for claims to be approved or denied, the percentage of claims approved with accurate documentation, and the percentage of post-entitlement actions that took over 30 days.

29. In fact, little attention has been given to how the relative compensation levels of top executives within a firm are set and whether the structure across executives provides proper incentives. Edward Lazear and Sherwin Rosen (1981) do present theoretical arguments why it may be optimal to have compensation differences across "ranks" that far exceed the relative productivity differences across the positions but no empirical work on interfirm variations in executive salary

structures has been undertaken.

30. For a brief overview of the types of data collected by the leading private compensation consulting firm see Milkovich & Newman (1984). See any area wage survey, for example U.S. Bureau of Labor Statistics (1985) for a discussion of the publically collected data.

31. Kenneth E. Foster (1985).

32. See Fred Foulkes (1982) for a survey of the personnel practices of large non-union firms.

33. See Lawrence Katz (1986), Joseph Stiglitz (1984).

34. See, for example, Brown and Medoff (1985) and Walter O: (1983).

35. See, for example, Balkin & Gomez-Mejiz (1986). High tech firms were defined as those with R&D budgets reported to be 5% or more of sales. A total of 105 firms were in their sample, 33 were classified as high tech, 72 as traditional.

36. See, for example, William Dickens and Lawrence Katz (1986). As noted in the introduction, such a correlation between wages and profits provides little evidence that high wages cause high profits.

37. John Barron, John Bishop and William Dunkelberg (1986).

38. To be provided.

39. See, for example, Charles Brown (1985).

40. Ruth G. Shaeffer (1976).

41. Herbert Simon (1957).

42. Elliot Jacques (1965).

43. Under knowledge based pay plans, employees' salaries increase as additional training is acquired, whether or not those skills are used on the present job. Managers may then assign workers to any task, as long as the employees possess the required skills for that task and are paid at rates for the highest skill they possess regardless of the task they actually perform. Maturity curves pay employees according to some sense of "maturity" (years-since-degree is a frequent measure), type of degree, and a performance measure. Maturity curves are frequently used for engineers and scientists whose work is on group projects where individual contribution is difficult to assess.

44. Knowledge based pay schemes are described in Lawler (1985) and Jenkins and Gupta (1985).

45. See for example, Paul Osterman.

46. Analysis of earnings, experience, age profiles have been widely researched. See, for example, Katherine G. Abraham & Henry S. Farber (1986), James L. Medoff & Katherine G. Abraham (1980), Joseph Altonji & Robert Shakotko (1985).

47. For discussions of the effects of various wage differentials on employee work behavior see Lawler (1971) and Lazear (1979, 1981, 1986).

48. Examples of the theoretical work include the work of Lazear and Rosen (1981) and Rosen (1986) on "rank order tournaments", Lazear's work cited above, Malcomson's work on incentives and hierarchies within internal labor markets, and Frank's rediscovery that employees value their relative position in an internal pay hierarchy as well as their absolute compensation levels.

49. See, for example, James Medoff & Richard Freeman (1983).

50. See David Peck (1984).

51. See Charles Greene (1978), Charles N. Greene & Phillip M. Pedsakoff. For a general review of the literature see Robert Opshal and M.D. Dunnette (198), E. Lawler (1971), R.E. Kepelman & Leon Reinharth (1982) or Al Nash (1982).

52. G. A. Yukl and G. P. Latham (1975), G. F. Latham and D. L. Dessett (1978) and G. A. Yukl, G. P. Latham and E. D. Pursell (1975).

53. Jone C. Pearce & James L. Perry (1983) & Pearce, Stevenson & Perry (1985).

54 See Samuel Bacharach, David Lipsky, and Joseph Shedd (1984), David Cohen and Richard Murnane (1985), and Murnane and Cohen (1986).

55. These studies that regress earnings or pay levels on demographic factors are reported in both the labor economic and psychology literature. See, for example, M. Haire, E.E. Ghiselli, McGordan (19). E. Lawler (1971, 1981), Medoff & Abraham (1981).

56. See Medoff and Abraham (1980).

57. See E. Lawler (1971, 1981).

58. See H.G. Heneman (1973).

59. See Milkovich and Newman (1987).

60. See L. Gomez-Mejia & D. Balkin (1985).

61 John Pencavel (1977).

62 Eric Seiler (1984).

63. The literature on gainsharing is burgeoning. Most of it compares the procedures and administrative aspects of various approaches. See for example, Bert C. Metzger, (1980 & 1984), Brian E.

Moore (1982), or Institute of Industrial Engineers (1983). Some make a distinction between gainsharing, in which incentives based on team or unit level performance improvements and other forms such as profitsharing (total organization financial performance) stock ownership, bonus and the like. A further distinction is that gainsharing schemes permit wide definition of improvements--examples include measures of financials, production quantity and quality, accident and absentee rates and even workplace cleanliness.

64. For examples of proponents of gainsharing see, E.E. Lawler (1984 & 1985), Schuster (1985), Moore (1982).

65. For a brief review of these see Bullock and Lawler (1984).

66. See New York Stock Exchange Office of Economic Research (1982 and the General Accounting Office (1981).

67. See, for example, Paul Goodman & Brian Moore (1976) & Lawler (1985).

68. See, for example, Bert Metzger (1980).

69. See for example, George T. Milkovich (1987), "Compensation Systems in High Technology Firms" in A. Kleingardner, ed., Management of High Technology (Lexington Press, 1987).

70. See, for example, Ronald Ehrenberg, Leif Danziger and Gee San (1983), Stephen Woodbury (1983), and Robert Hutchens (forthcoming).

71. See, for example, Casey Ichniowski (1986), Harry Katz, Thomas Kochan, and Kenneth Gobeille (1983), and J.R. Norsworthy and Craig Zabala (1985).

References

John M. Abowd, "Collective Bargaining and the Division of the Value of the Enterprise," mimeo, Massachusetts Institute of Technology, October 1985).

Katherine G. Abraham and Henry S. Farber, "Job Duration, Seniority and Earnings", mimeo, Working Paper No. 1819, National Bureau of Economic Research.

George Akerlof, "Gift Exchange and Efficiency-Wage Theory: Four Views," American Economic Review, vol. 74, no. 2, May 1984.

Steven Allen, "Trade Unions, Absenteeism, and Exit-Voice," Industrial and Labor Relations Review 37, April 1984: 331-345.

Rick Antle and Abbie Smith, "An Empirical Investigation of the Relative Performance Evaluation of Corporate Executives," Journal of Accounting Research 24, Spring 1986, 1-32.

Samuel Bacharach, David Lipsky and Joseph Shedd, Paying for Better Teaching: Merit Pay and Its Alternatives (Ithaca, NY: Organizational Analysis and Practices, Inc., 1984).

David B. Balkin & Luis Gomez-Mejia, "The Relationship Between Short-Term and Long-term Incentives and Strategy in the High Technology Industry" mimeo paper 1986.

John M. Barron, John Bishop and William C. Dunkelberg, "Employer Search: The Interviewing and Hiring of New Employees," The Review of Economics and Statistics, 1986, 43-52.

Gary Becker, Human Capital: A Theoretical and Empirical Analysis, 2nd ed. (New York: Columbia University Press, 1975).

G. Benson, "The Self-Serving Management Hypothesis: Some Evidence", Journal of Accounting and Economics 7, April 1985, 67-84.

S. Bhagat, J. Brickley and R. Lease, "Incentive Effects of Employee Stock Purchase Plans," Journal of Financial Economics 14, June 1985, 195-216.

J. Brickley, S. Bhagat and R. Lease, "The Impact of Long-Run Managerial Compensation Plans on Shareholder Wealth," Journal of Accounting and Economics, April 1985, 115-129.

Charles Brown, "Military Enlistments: What Can We Learn From Geographic Variation," American Economic Review 75, March 1985: 228-234.

Charles Brown and James Medoff, "The Employer Size Wage Effect" (mimeo, November 1985).

R. J. Bullock and E. E. Lawler III, "Gainsharing: A Few Questions and Fewer Answers," Human Resource Management 5 (1984), 197-212.

David Ciscel and Thomas Carroll, "The Determinants of Executive Salaries: An Econometric Survey," Review of Economics and Statistics, February 1980, 7-13.

David J. Cherrington, H. Joseph Reitz & William E. Scott Jr., "Effects of Contingent and Non-Contingent Rewards on the Relationship Between Satisfaction and Task Performance," Journal of Applied Psychology, December 1971, 531-536.

David Cohen and Richard Murnane, "The Merits of Merit Pay," Public Interest, Summer 1985, 3-30.

T. Coughlin and R. Schmidt, "Executive Compensation, Management Turnover, and Firm Performance: An Empirical Investigation," Journal of Accounting and Economics 7, April 1985, 43-66.

William Dickens and Lawrence Katz, "Interindustry Wage Differences and Industry Characteristics" in Kevin Lang and Jonathan Leonard, eds., Unemployment and the Structure of Labor Markets (London: Basil-Blackwell, 1986).

Lucia Dunn, "The Effects of Firm Size on Wages, Fringe Benefits and Work Disutility," in Harvey Goldschmidt, et al., eds. The Impact of the Modern Corporation, Columbia Press, New York, 1984.

Lee Dyer and Donald P. Schwab, "Personnel Research" in T.A. Kochan, et al., eds. Industrial Relations Research in the 1970's: Review and Appraisal; 187-220 (Madison, Wis., IRRA, 1982).

Jonathan Eaton and Harvey Rosen, "Agency, Delayed Compensation and the Structure of Executive Remuneration," Journal of Finance 38, December 1983, 1489-1505.

Ronald Ehrenberg, Richard Chaykowski and Randy Ann Ehrenberg, "Merit Pay for School Superintendents?" (National Bureau of Economic Research Working Paper No. 1954, June 1986).

Ronald Ehrenberg, Leif Danziger and Gee San, "Cost of Living Adjustment Clauses in Union Contracts: A Summary of Results," Journal of Labor Economics 3, July 1983: 215-246.

Ronald Ehrenberg and Steven Goldberg, "Officer Compensation and Performance in Local Building Trade Unions," Industrial and Labor Relations Review 30, January 1977, 188-196.

Kenneth E. Foster, "An Anatomy of Company Pay Practices," Personnel, Sept. 1985.

Fred K. Foulkes, Personnel Policies in Large Nonunion Companies (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1980).

Robert H. Frank, Choosing the Right Pond, (New York: Oxford University Press, 1985).

Richard B. Freeman, "Union Wage Practices and Wage Dispersion Within Establishments," Industrial and Labor Relations Review, 36, No. 7, October 1982: 10-11.

Richard B. Freeman and James L. Medoff, What Do Unions Do? (New York: Basic Books, Inc. 1984).

Smith Freeman, "Wage Trends as Performance Displays Productive Potential: A Model and Application to Academic Early Retirement," Bell Journal of Economics 8, Autumn 1977, 419-433.

General Accounting Office, Productivity Sharing Programs: Can They Contribute to Productivity Improvements?, March 31, 1981.

Brian A. Giles & Gerald Barrett, "Utility of Merit Increases," Journal of Applied Psychology, 55, April 1971: 103-109.

Gerald Goldstein and Ronald Ehrenberg, "Executive Compensation in Municipalities," Southern Economic Journal 43, July 1976, 937-947.

Luis R. Gomez-Mejia & David B. Balkin, "The Effectiveness of Individual and Aggregate Compensation Strategies in an R&D Setting," mimeo 1986.

Paul S. Goodman and Brian E. Moore, "Factors Affecting Acquisition of Beliefs about a New Reward System," Human Relations, June 1976, 571-588.

Charles N. Greene, "Causal Connections Among Managers' Merit Pay, Job Satisfaction and Performance," Journal of Applied Psychology, 58, 1978; 95-100.

Charles N. Greene and Phillip M. Podsakoff, "Effects of Removal of a Pay Incentive: Field Experiment," Academy of Management Proceedings, 38, 1978, 206-210.

Erica L. Groshen, "Sources of Wage Dispersion: How Much Do Employers Matter?" mimeo paper, December, 1985.

M. Haire, E.E. Ghiselli and M.E. Gordon, "A Psychological Study of Pay," Journal of Applied Psychology, 1967, 51, 4, 636.

Milton Harris and Bengt Holmstrom,"A Theory of Wage Dynamics," Review of Economic Studies 49, 1982, 315-333.

Herbert G. Heneman III, "Impact of Performance on Managerial Pay Levels and Pay Changes," Journal of Applied Psychology, 1973, Vol. 58, No. 1, 128-130.

Bion B. Howard and Peter O. Dietz, "A Study of the Financial Significance of Profit Sharing" (Chicago: Council of Profit Sharing Industries, 1969).

Robert Hutchens, "A Test of Lazear's Delayed Payment Contracts," Journal of Labor Economics (forthcoming).

Casey Ichniowski, "The Effects of Grievance Activity on Productivity," Industrial and Labor Relations Review 40, October 1986, 75-89.

Institute of Industrial Engineers, Gainsharing: A Collection of Papers, 1983.

G. Douglas Jenkins, Jr. and Nina Gupta, "The Payoffs of Paying for Knowledge," Labor Management Cooperation Brief (Washington, D.C.: Department of Labor, August 1985).

Harry Katz, Thomas Kochan and Kenneth Gobelle, "Industrial Relations Performance, Economic Performance, and the Effects of Quality of Working Life Efforts: An Interplant Analysis," Industrial and Labor Relations Review 37, October 1983, 3-17.

Lawrence Katz, "Efficiency Wage Theories: A Partial Evaluation," National Bureau of Economic Research Working Paper No. 1906, April 1986.

Charles Knober, "Golden Parachutes, Shark Repellents, and Hostile Tender Offers," American Economic Review, March 1986, 155-187.

Thomas A. Kochan, Collective Bargaining and Industrial Relations, (Homewood, Illinois: Richard D. Irwin, 1980).

R.E. Kopelman & Leon Reinharth, "Research Results: The EFfects of Merit Pay Practices on White Collar Performance," Compensation Review, Fall Quarter 1982: 30-40.

Peter F. Kostiuk, "Executive Ability, Corporate Performance, and Managerial Income" (mimeo, Center for Naval Analysis, May 1986).

Alan Krueger and Lawrence Summers, "Efficiency Wages and the Wage Structure," National Bureau of Economic Research Working Paper 1952, June 1986.

R. A. Lambert and D. F. Larcker, "Golden Parachutes, Executive Decision-Making and Shareholder Wealth," Journal of Accounting and Economics 7, April 1985, 179-204.

D. F. Larcker, "The Association Between Performance Plan Adoption and Corporate Capital Investments," Journal of Accounting and Economics 5, 1983, 3-30.

G. P. Latham and D. L. Dessett, "Designing Incentive Plans for Unionized Employees," Personnel Psychology 31 (1978): 47-61.

E.E. Lawler III, "Gainsharing Research: Findings and Future Directions," Technical Report T 85-1(67): University of Southern California Center for Effective Organizations.

E.E. Lawler III, Pay and Organization Effectiveness (New York: McGraw-Hill 1971).

E.E. Lawler III, Pay and Organization Development, (Reading, Mass: Addison-Wesley, 1981).

Edward Lazear, "Why Is There Mandatory Retirement," Journal of Potential Economy 87, December 1979), 261-284.

Edward Lazear, "Agency, Earnings Profiles, Productivity, and Hours Restrictions," American Economic Review 71 (September 1981), 606-620.

Edward Lazear, "Incentive Contracts," National Bureau of Economic Research Working Paper No. 1917, May 1986.

Edward Lazear and Sherwin Rosen, "Rank-Order Tournaments and Optimal Labor Contracts," Journal of Political Economy 89, October 1981, 841-864.

Jonathan Leonard, "Carrots and Sticks: Pay, Supervision and Turnover" (mimeo, March 1986).

William Lewellen, Claudio Loderer and Ahron Rosenfeld, "Merger Decisions and Executive Stock Ownership in Acquiring Firms," Journal of Accounting and Economics 7, April 1985, 209-223.

E.A. Locke, D.B. Feren, V.M. McCaleb; & K.N. Shaw. "The Relative Effectiveness of Four Methods of Motivating Employee Performance," in Changes in Working Life, edited by K.D. Duncan, et al. (New York: Wiley & Sons, 1980).

Glenn MacDonald, "A Market Equilibrium Theory of Job Assignment and Sequential Accumulation of Information," American Economic Review 72, December 1982, 1038-1055.

Thomas A. Mahoney, Compensation and Reward Perspectives, (Homewood, Illinois: Richard D. Irwin, 1979).

James M. Malcomson, "Work Incentives, Hierarchy, and Internal Labor Markets," Journal of Political Economy, 1984, vol. 92, 3; 486-507.

Robert Masson, "Executive Motivations, Earnings and Consequent Equity Performance," Journal of Political Economy 79, November 1971, 1278-1292.

E. Meadows, "How Three Companies Increased Their Productivity," Forbes, 10, March 1980, 92-101.

James L. Medoff & Katherine G. Abraham, "Experience, Promotion and Earnings," Quarterly Journal of Economics, 95, December 1980: 703-36.

James L. Medoff & Katherine G. Abraham, "Are Those Paid More Really More Productive: The Case of Experience," Journal of Human Resources, Spring, 1981: 186-216.

Mark Meltzen, "Differences in Male and Female Job-Quitting Behavior," Journal of Labor Economics 4 (April 1986, 151-168.

Bert L. Metzger, "Gainsharing Plans: What They Are; How They Compare; and the Advantages and Limitations of Each," Profit Sharing, December, 1984.

Bert L. Metzger, Increasing Productivity Through Profit Sharing (Evanston: Profitsharing Research Foundation, 1980).

Bert L. Metzger, Profit Sharing in 38 Large Companies (Evanston: Profit Sharing Research Foundation, Vol. I (1976), Vol. II (1978)).

Bert L. Metzger and Jerome A. Colletti, Does Profit Sharing Pay? A Comparative Study of the Financial Performance of Retailers With and Without Profit Sharing Programs (Evanston, Profit Sharing Research Foundation, 1971).

George T. Milkovich, "Compensation Systems in High Technology Companies," in A. Kleingardner, ed. Management of High Technology Firms, (Lexington Press, 1987).

George T. Milkovich & Jerry Newman, Compensation, 2nd Edition (Plano, Texas: Business Publications Inc., 1987).

Brian E. Moore, Sharing the Gains of Productivity: Highlights of the Literature, Work in American Institute Studies in Productivity (New York: Pergamon Press, 1982).

Randall Mørck, Andrew Shleifer and Robert Vishny, "Management Ownership and Corporate Performance," National Bureau of Economic Research Working Paper No. 2055 (Cambridge, Mass., November 1986).

Richard Murnane and David Cohen, "Merit Pay and the Evaluation Problem: Why Most Merit Pay Plans Fail and Few Survive," Harvard Education Review 56, February 1986, 1-17.

Kevin J. Murphy, "Corporate Performance and Managerial Remuneration: An Empirical Analysis," Journal of Accounting and Economics 7, April 1985, 11-42. (a)

Kevin J. Murphy, "Can Theories of Wage Dynamics and Agency Explain Executive Compensation, Promotions, and Mobility" (mimeo, October 1985). (b)

Kevin J.Murphy, "Does Executive Compensation Make Sense?", Harvard Business Review (forthcoming, a).

Kevin J.Murphy, "Incentives, Learning and Compensation" (mimeo, August 1985), Journal of Labor Economics (forthcoming, b).

Allan Nash, Managerial Compensation: Highlights of the Literature, Work in America Institute, 1980.

J. R. Norsworthy and Craig Zaballa, "Worker Attitudes, Worker Behavior and Productivity in the U.S. Automobile Industry, 1959-1976," Industrial and Labor Relations Review 38, July 1985, 544-558.

Walter Oi, "The Fixed Employment Costs of Specialized Labor" in J. Triplett, ed., The Measurement of Labor Costs (Chicago: University of Chicago Press, 1983).

Robert Opshal & M.D. Dunnette, "The Role of Financial Compensation in Industrial Motivation," Psychological Bulletin, 66, 1966: 94-118.

Charles Peck, Pay and Performance: The Interaction of Compensation and Performance Appraisal, The Conference Board, Research Bulletin 155, 1984.

Jone L. Pearce & James L. Perry, "Federal Merit Pay: A Longitudinal Analysis," Public Administration Review, July-August 1983: 315-325.

John Pencavel, "Work Effort, On the Job Screening, and Alternative Methods of Remuneration," Research in Labor Economics 1, 1977, 225-259.

John Pencavel, An Analysis of the Quit Rate in American Manufacturing Industry (Princeton, N.J.: Industrial Relations Section, 1970).

Peat Marwick & Mitchell, Executive Compensation Strategies in the New England High Technology Industry, 1982, 83 & 84.

Jone Pearce, William Stevenson and James Perry, "Managerial Compensation Based on Organizational Performance: A Time-Series Analysis of the Effects of Merit Pay," Academy of Management Journal 28, 1985, 261-278.

E.T. Redding, "Myth vs. Reality: The Relationship Between Top Executive Pay and Corporate Performance," Compensation Review, Fourth quarter, 1981: 16-24.

Sherwin Rosen, "Prizes and Incentives in Elimination Tournaments," American Economic Review 76, September 1986, 701-715.

Michael Schuster, "Gainsharing: Issues for Senior Managers," mimeo paper: November, 1985.

Michael Schuster, "The Scanlon Plan: A Longitudinal Analysis," Journal of Applied and Behavioral Science 20, 1, 23-38 (1984a).

Michael Schuster, Union-Management Cooperation: Structure-Process-Impact (Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 1984).

Martin Segal, "Post-Institutionalism in Labor Economics: The Forties and Fifties Revisited," Industrial and Labor Relations Review 39, April 1986, 388-403.

Eric Seiler, "Piece Rate vs. Time Rate: The Effect of Incentives on Earnings," Review of Economics and Statistics 66, August 1984, 363-376.

Ruth G. Shaeffer, "Comparing Staffing Pattern," Management Review, July 1976, 41-47.

Herbert A. Simon, "The Compensation of Executives," Sociometry, 20, 1957, 32-35.

Joseph Stiglitz, "Theories of Wage Rigidity," National Bureau of Economic Research Working Paper No. 1442, September 1984.

H. Tehranian and J. Waegelein, "Market Reaction to Short-Term Executive Compensation Plan Adoptions," Journal of Accounting and Economics 7, April 1985, 131-144.

Kip Viscusi, "Sex Differences in Worker Quitting," Review of Economics and Statistics, August 1980.

Donald Winkler, "The Effects of Sick Leave Policy on Teacher Absenteeism," Industrial and Labor Relations Review 34, January 1981, 207-218

Stephen Woodbury, "Substitution Between Wage and Nonwage Benefits," American Economic Review 73, March 1983: 166-182.

Janet Yellen, "Efficiency Wage Models of Unemployment," American Economic Review Proceedings 74, May 1984, 200-205.

G. A. Yukl and G. P. Latham, "Consequences of Reenforcement Schedules

and Incentive Magnitudes for Employee Performance," Journal of Applied Psychology 60 (1975): 294-298.

G. A. Yukl, G. P. Latham and E. D. Pursell, "The Effectiveness of Performance Incentives Under Continuous and Variable Ratio Schedules of Reinforcement," Personnel Psychology 29 (1976): 221-231.

The New York Stock Exchange Office of Economic Research, People and Productivity: A Challenge to Corporate America, (New York: New York Stock Exchange, 1982).

U.S. Bureau of Labor Statistics, Area Wages Survey: Cleveland, Ohio Metropolitan Area September 1985, Bulletin 3030-45, November 1985.