

The Choice of Payment Schemes:
Australian Establishment Data

Robert Drago

John S. Heywood

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Abstract

This paper estimates the determinants of incentive schemes. Using Australian data, we analyze a relatively large variety of incentive systems using both the new economics of personnel and the literature on strategic choice to generate hypotheses. We find that monitoring issues, job security, product market competition, and the industrial relations climate rank among the most crucial determinants of incentive use, though this pattern varies across incentive schemes.

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Introduction

Pay systems linking workers' effort and earnings have attracted increasing attention from economists, industrial relations specialists, and practitioners (Blinder, 1990). As Mitchell, Lewin and Lawler note, it is only recently "that words such as *productivity* and *competitiveness* came into vogue..." because "employers and employees became concerned about their survival and welfare." (1990, p. 15) This concern has prompted empirical researchers to analyze wage incentive systems and their potential for improving economic performance. This paper contributes to that body of research by examining the incidence and importance of pay incentives among a sample of Australian establishments.

Our analysis is motivated in part by the 'new economics of personnel' literature and also by the recent interest in 'strategic managerial choice.' The new economics of personnel (Hart and Holmstrom, 1987; JOLE, 1987) suggests, *ceteris paribus*, that firms select incentive systems by comparing the respective costs and benefits given the nature of production technology and the composition of the workforce. This view suggests that as monitoring of worker effort becomes more costly and problematic, firms are more likely to adopt systems which formally link pay and performance. They are also more likely to favor formal group reward systems to the extent that product quality and teamwork are profitable. This view further posits that firms will tend to avoid more immediate wage incentives, such as piece rates, where the expected job tenure of workers is long, since increasing wages over the employees' life-cycle provides a less costly alternative. The latter argument further suggests women may be more often subject to formal incentive schemes. Surprisingly, however, the early notion of McKersie, et al (1964) that the degree of product market competition will influence incentive use has been largely ignored by economic theorists and analysts.¹ In what follows, we therefore construct our analysis to explicitly address the questions of monitoring, product quality, job tenure and job security along with the possible role of gender, and also of market competition.

A different view of pay schemes is found in the strategic choice literature, where managers are posited to select wage incentives as part of a larger system for managing and motivating the workforce (Kochan, Katz and McKersie, 1986). In this view, a mixture of stepped-up competition, changes in the composition of the workforce and technological developments have recently pressured firms, unions, and workers to engage in a transformation of industrial relations which may include an increased emphasis on pay incentives and particularly profit sharing. In general, it is posited that a cooperative industrial relations climate, or what may be termed a strong union 'voice' is a key to a successful transformation (Belman, 1992; Eaton and Voos, 1992). Thus, rational firms will tend to implement profit sharing in association with a cooperative climate or where unions are strong. This argument is complicated, however, by the possibility that profit sharing may not be so much a cause, as an integral aspect of workplace transformation (Levine and Tyson, 1990). In response to these arguments, we include a measure of union density and of cooperative relations in the workplace (i.e., employee involvement programs) and test both for direct and indirect effects on the choice of incentives.

In addition to drawing on the earlier research mentioned above, our analysis has two unique features. First, the data is Australian, thus permitting tests for whether relationships which hold for the U.S. and Western Europe are maintained outside of those settings. This comparative aspect of the analysis is particularly important given the unique aspects of the industrial relations system in Australia (Drago, Wooden and Sloan, 1992), and the unusual role of trade unions in that country. Relatedly, because the industrial relations system permits and promotes an explicit distinction between 'permanent' employees, who receive paid vacations, pension benefits, and due process rights regarding employment, and 'casual' employees who can be dismissed at will and receive few benefits, the data permit an additional avenue for considering the role of benefits and job security in relation to payment schemes.

Second, the specific survey used here -- the Australian Workplace Industrial Relations Survey or AWIRS -- allows us to examine a rank ordering of the performance-pay linkage. We can

examine a series of linkages starting from the most immediate, piece rates, through workgroup, workplace, and firm level systems including profit sharing. In each case, the estimations will measure the influence of the determinants on the prevalence within establishments of the particular performance-pay linkage.

The section below describes the hypotheses to be tested and summarizes evidence from previous studies. The subsequent section describes the data and testing framework. The next section provides the estimation results and the final section draws conclusions.

Hypotheses

To get at the theoretical issues of relevance to the incidence of pay incentives, we divide our discussion into hypotheses concerning worker effort monitoring, product quality, job security and job tenure, competition, and the industrial relations climate. In each case we consider the implications for incentives which vary from the individual up to the firm level.

Before proceeding, however, note that the presentation of reasonable hypotheses is complicated by the fact that the excluded category may capture a variety of alternative motivational schemes. If none of the types of incentive schemes we consider are present, the employer might be simply paying straight-time or may instead be motivating employees through threats of dismissal as in efficiency wage settings, or be using escalating time rates of the type described by Lazear (1979).² Therefore, while we can analyze the incidence of the formally identified incentive schemes, it is important to recognize that the lack of such schemes does not imply that alternative motivational schemes are totally absent.

Monitoring. Much economic research concerning wage incentives begins with the premise that monitoring of individual employee efforts is costly and imperfect (Hart and Holmstrom, 1987). Absent such monitoring difficulties, employers would pay each worker his or her value marginal product, offering individual-level piece rates or a merit pay system. In a very small workplace, such a system might take on very informal trappings, with the owner-manager

observing each employee during the day to day operations of the firm, and reaching pay and dismissal decisions in line with these observations. However, as the firm expands, it becomes increasingly difficult if not impossible for the owner to directly observe each employee. The employer might then explore various formal incentive schemes. The pay incentives addressed here are part of this group of incentive systems, allowing us to predict a positive correlation between firm or workplace size and pay incentives, consistent with Brown's (1990) findings.³ Relatedly, as the firm grows, so might the degree of hierarchy, leading to extensive chains of command between the employer and employees on the shopfloor. Such hierarchies create incentive problems in terms of 'monitoring the monitor' (Alchian and Demsetz, 1972). We might therefore conclude that monitoring difficulties will be associated with both the number of workers and the degree of hierarchy found in the firm (Oi, 1983; Garen, 1985). Both employment and hierarchy are then hypothesized to positively correlate with each of the formal incentive systems analyzed here.

Monitoring difficulties may also exhibit some relationship to production technologies. For example, Brown and Philips (1986) argue that the increasing capital intensity associated with the introduction of assembly lines into California canneries made monitoring less critical due to machine pacing, suggesting that capital intensity will be negatively related to pay incentives. Brown (1990) argues contrarily that capital intensity may be connected with even more severe monitoring difficulties, as it might reflect the amount of machinery entrusted to each worker. In addition to these static considerations, Piore and Sable (1982) argue that new technologies tend to increase worker skill requirements and monitoring difficulties, although Appelbaum and Albin (1988) respond with evidence suggesting monitoring can either become more or less problematic in the course of technological development. Given these opposing arguments, we make no firm prediction on the association between capital intensity, technical change and pay schemes, but believe it is important to control for these potential causal linkages.

Employment, hierarchies, capital intensity and technical change may, of course, have some

connection with pay incentives which is independent of monitoring issues. Taking these in reverse order, note first that technical change on the shopfloor may signal a managerial propensity to experiment and innovate; to the extent formal pay schemes are also considered innovative, we would predict technical change will positively influence the probability that formal pay schemes exist in the workplace. Second, the inverse of capital intensity -- labor intensity -- may be positively related to formal incentives since the share of labor in total costs may indicate the expected benefits for linking pay and performance (Slichter, Healy and Livernash, 1960). Third, large firms with extensive hierarchies may have more resources, particularly in terms of compensation specialists, to devote to the development of incentive schemes (McKersie, Miller and Quarterman, 1964). To the extent such schemes involve substantial fixed costs, we would also expect large employers to exhibit such initiatives as they can spread the costs over a larger number of workers (Oi, 1983; Garen, 1985). This argument seems particularly relevant to piece rates, since the fixed costs of such systems may be higher than those for profit sharing or other higher level schemes. We therefore predict that positive employment size effects will generally hold for the incidence of formal pay schemes, but the effects might be strongest for piece rates.

Quality. Part of the motivation for workplace transformation as explained by Kochan, Katz and McKersie (1986) is rooted in a perceived need by firms to improve product quality. In this context, profit sharing is often put forward as a key to obtaining high levels of product quality, in part because profit sharing promotes teamwork which in turn may be positively linked to product quality (Levine and Tyson, 1990).

Individual piece rates, however, are often held to reduce teamwork (Drago and Turnbull, 1988) or cause workers to focus on quantity over quality (Brown, 1990) such that in circumstances where product quality is crucial to profitability, we would expect firms to avoid piece rates. More generally, rewards at the individual, workgroup or even firm level which are solely based on output may cause workers to neglect crucial aspects of production, such as quality or the servicing of customers beyond the initial point of sale. Thus, in cases where either

product quality or responsiveness to customer needs is crucial to firm profitability we can expect a reduced prevalence of individual piece rates and of some types of higher level rewards (since these may be based on output). This ambiguity does not afflict group rewards in the form of profit sharing since we would expect employees under this scheme to respond appropriately to the dictates of the market in terms of optimal quality levels and responsiveness to customer needs.

This discussion of the quality problem suggests that indicators of the importance of quality to firm profitability will be negatively related to piece rates and positively related to profit sharing, while the relationship to intermediate level schemes is indeterminate. The strategic choice literature demands we qualify this logic by including the possibility that where quality is important, firms may respond with the simultaneous introduction of employee involvement programs and profit sharing in order to enhance teamwork and hence product quality (Levine and Tyson, 1990). In this case, employee involvement programs such as Quality Circles might appear to cause profit sharing even though both are caused by a third factor -- the underlying profitability of high product quality.

Job Security and Job Tenure. Substantial debate surrounds the issue of worker attachment to the job and work incentives. For the worker to be firmly attached to the job requires a commitment from both the worker and the firm to long-term employment relations. Such a commitment may take the form of job security provisions by the firm and is most clearly signalled *ex post* by lengthy job tenure for employees.

How will long-term employment influence the choice of work incentives? The new economics of personnel suggests that where job tenure is substantial, the firm can avoid formal incentives and the attendant costs of monitoring by offering a Lazear-type scheme with upward-sloping earnings profiles or deferred compensation. In the absence of long-term relations, however, the firm may rely on more immediate rewards for performance to motivate employee effort. This logic leads to the prediction that job tenure and job security should be negatively

associated with formal incentive schemes ranging from piece rates to profit sharing, consistent with McKersie, et al's (1964) finding of a positive association between layoff prevalence and incentive prevalence.

Recently, Goldin (1986) has applied this logic to the issue of gender, hypothesizing that because women exhibit higher quit rates, they will more often be subject to piece rates, while men will more typically receive deferred compensation. Although Goldin finds support for this hypothesis in historical data, Pencavel (1977) found women were only very slightly more likely to be paid by the piece in his study of Chicago punch press operators, while Brown (1990) finds virtually no evidence in support of Goldin's contention.⁴

Three points are worth noting. First, we might find both low tenure workers and women more often subject to immediate wage incentive systems if statistical discrimination exists. That is, whether or not women exhibit high quit rates, if the employer expects such behavior, women will be more likely to experience immediate wage incentives after controlling for job tenure. Moreover, such statistical discrimination may be self-reinforcing to the extent the absence of backloaded compensation discourages long tenure for women. Second, even if women are more likely to encounter such incentives, this result may have little or nothing to do with expected job tenure. If these formal incentive schemes reduce the opportunities for arbitrary and discriminatory behavior by supervisors, managers and co-workers, thereby limiting the scope for wage discrimination against women, women themselves would have cause for seeking employment where formal incentive schemes exist.⁵ Third, if a positive association between female workers and piece rates exists, there is little reason to expect that profit sharing results would differ by gender. The latter scheme may be somewhat less immediate (e.g. on a yearly rather than weekly or monthly basis), but is still quite distinct from incentives which function only over the employee's entire life-cycle.

The strategic choice literature provides alternative predictions. While the relevant works rarely address individual-level incentives, profit sharing is expected to be positively related to job

security and long-term employment. The rationale for this hypothesis is that profit sharing creates a free-rider problem where any individual can shirk without losing much pay, but it is in the collective interest of workers to eliminate shirking. Weitzman and Kruse (1990), as well as Levine and Tyson (1990), suggest that long-term employment, where the 'effort game' is repeated many times, can help end free-riding. To the extent firms are aware of this phenomenon, we should expect job security in tandem with profit sharing.

A slightly more complex view can be developed by considering the industrial relations climate. That is, profit sharing may link the interests of workers and owners, yet the overall strength of this linkage might depend upon mutual trust and shared objectives. Thus, workers might be more understanding of layoffs so long as they occur in a context which explicitly takes the interests of workers into account (see Katz, 1985, for examples). In particular, layoffs which occur through voluntary methods, such as attrition or early retirement programs, may signal a more productive industrial relations climate compared to the case of involuntary layoffs. This leads to the prediction that workforce reductions through attrition, rather than involuntary layoffs, may be positively associated with profit sharing.⁶ By the same token, however, the new economics of personnel suggests that if the firm can generate workforce reductions through attrition or early retirement programs, this will permit the maintenance of long-term employment relations and hence the avoidance of formal incentive schemes.

Finally, note that the widespread use of contingent workers might either represent assurances of job security for core workers, or instead pose a threat of cheap replacements for full time or long tenure employees. Thus, predictions on the influence of contingent workers are ambiguous. Nonetheless, it seems important both from an empirical and policy viewpoint that we explore the potential relationship between contingent workers and formal incentives. Following the logic of Weitzman and Kruse (1990) and Levine and Tyson (1990), if we find a positive (negative) relationship between contingent workers and profit sharing, we could conclude that core workers view contingent workers as enhancing (threatening) job security, and that the presence of

contingent workers therefore ameliorates (worsens) the free rider problem under profit sharing.

Competition. As noted earlier, the new economics of personnel has largely ignored the possible role of market competition in motivating firms to use work incentive systems,⁷ while research in a strategic choice vein typically traces the recent popularity of incentives in large part to increased market competition (Kochan, Katz and McKersie, 1986; Mitchell, Lewin and Lawler, 1990).

Where early research addresses competition, it is usual to argue that intense product market competition results in more frequent use of incentives as a means to control labor costs (McKersie et al., 1964). Implicit in that discussion is the contention that monopolistic industries have more managerial discretion and do not control costs as carefully as competitive industries. Literature addressing expense-preference behavior (Williamson, 1963) and x-inefficiency (Leibenstein, 1966) suggests this implication is well warranted. Somewhat differently, the costs of establishing an incentive scheme may include overcoming worker and management reluctance. The presence of an intensely competitive product market and the realization that low costs are the key to survival may help overcome this reluctance and make the establishment of such schemes more likely, an argument which fits Kochan, Katz and McKersie's (1986) understanding of conditions which facilitate workplace transformation. Relatedly, compensation researchers explicitly contend that the decline in U.S. 'competitiveness' will promote incentive schemes designed to link pay and performance (McLaughlin, 1986).

Given the hypothesized positive linkage between incentives and market competition, it is surprising that only the very early study of McKersie et al (1964) explicitly tested the issue. That study found no simple correlation between incentive plan prevalence and product market structure as measured by a four-firm concentration variable. Given the simple testing framework, the aggregation of the data, and the fact that the study has not been replicated, it is important to examine whether the hypothesized positive relationship holds in our data set.

Industrial Relations Climate. As discussed earlier in the context of job security, the strategic

choice literature suggests that a productive, trusting and cooperative industrial relations climate will be associated with profit sharing. Closely related to the notion of an industrial relations climate is the narrower issue of union presence or absence in the workplace.

Focussing on the latter, the traditional economics literature (of which the new economics of personnel is part) seems to suggest that unions may exert monopoly power to increase wages and decrease work effort, objectives which may lead unions to resist work incentive schemes (Dunlop, 1958). Similarly, unions may oppose incentive systems in favor of standard rates to promote solidarity and reduce arbitrary wage differences (Freeman, 1982). Brown, however, argues that incentive schemes need not be arbitrary and thus need not be objected to on this count by unions. Consistent with this argument, Brown finds that unionization does not influence the prevalence of individual or workgroup level incentives. Other research supports the traditional view, with Peetz (1988) finding that Australian unions decrease the use of group incentives, Brown and Philips (1986) discovering that unions accelerated the decline in piece rates in California canneries, and Eaton and Voos (1990) presenting U.S. evidence that unions are negatively associated with profit sharing plans.

The strategic choice approach admits that unions often resist wage incentive schemes, but suggests this mainly occurs where the industrial relations climate is adversarial. Where the climate is cooperative, wage incentives and particularly profit sharing may be found more often (Levine and Tyson, 1990). Working along related if not identical lines, researchers have recently explored the possibility that union effects on incentive prevalence may vary systematically depending upon union-management relations. For example, using British data, Gregg and Machin (1987) find that profit sharing is more common in the unionized sector than in the nonunion sector while individual value added schemes are less likely in the unionized sector. When they add a variable for closed shop provisions, however, they discover that performance linked pay schemes are less likely to be present if an establishment has a strong has such provisions, which they interpret as signalling a strong union presence. To the extent that unions with closed shops

are in fact adversarial, these findings would fit the strategic choice logic. Similarly, using Australian data, Drago, Wooden and Sloan (1992) find that union density increases the likelihood of work group incentives but that union closed shop requirements reduce the chance of having a profit sharing scheme.

Taken as a whole, the arguments suggest no simple hypothesis regarding the direct effect of unions on incentive prevalence, but rather that a productive industrial relations climate will be associated with higher level incentives and particularly profit sharing.

Finally, as noted in our earlier discussion of product quality, the strategic choice literature suggests it is important to permit the industrial relations climate to be viewed as simultaneous with work incentives, a possibility considered later.

Data and Methodology

The data used in this study are drawn from the Australian Workplace Industrial Relations Survey (AWIRS), a survey modeled on the two Workplace Industrial Relations Surveys undertaken earlier in the U.K. (for further description, see Callus, et al, 1991). This sample provides a random selection of workplaces drawn from the register of establishments provided by the Australian Bureau of Statistics (ABS) after stratification by location, size and industry, but excluding workplaces in the agriculture, forestry, fishing and hunting, and defense industries.⁸

The AWIRS team contacted 2,300 operating workplaces with at least 20 employees each between November 1989 and May 1990.⁹ A total of 2,004 responding workplaces comprise the main data set, yielding a gross response rate of 87% (2004/2300). The Employee Profile Questionnaire was pre-mailed to each workplace and was received from only 1,750 respondents, yielding a net response rate of 76%. This questionnaire asks for written responses regarding a variety of characteristics including employment figures, the proportion of women among employees, and the proportion of employees in various occupations. Because the theoretical

views outlined earlier apply to market economies, we further restrict our attention to "commercial" workplaces which "undertake activity for the purposes of making a profit," thereby reducing the sample to 1,453 workplaces. The examination of commercial rather than purely private sector workplaces permits us to include a number of workplaces associated with nationalized firms, such as banks and airlines. Some of these workplaces do report using each of the incentive schemes dealt with here. Moreover, some of these firms do "compete" in an active product markets and are hence subject to similar pressures as private sector commercial firms. Nonetheless, since these workplaces are not privately owned, a control for public ownership is included. This seems a reasonable compromise for dealing with the difficulties inherent in a the particularly mixed economy of Australia. Further limiting the sample to only those workplaces which responded to all pertinent questions resulted in a final working sample of 1,165 workplace observations.¹⁰

Some may be concerned that those workplaces which did not answer all the questions may be fundamentally different in their use of the various incentive schemes. This is not the case. The descriptive statistics for incentive use for the approximately 290 excluded firms cannot be meaningfully distinguished from those for the working sample with answers to all questions. While this does not prohibit the possibility of some selection bias, it does indicate that the use of incentives appears similar.¹¹

The AWIRS provides a series of questions addressed to employee relations managers concerning payment systems operating in the workplace (although at smaller workplaces, the general manager typically completed this portion of the survey). An initial question asks whether any non-managerial employees "receive payments based on some measure of performance," excluding profit sharing payments. Respondents answering affirmatively are then asked separate questions concerning whether such payments are based on "An individual's performance", "A workgroup's performance", "This workplace's performance", "Performance of other parts of the organization beyond this workplace", or "NONE OF THE ABOVE." While the question is not

entirely definitive, it seems likely that the individual-level schemes refer to piece rates and merit pay schemes which could take the form of merit raises or bonuses; the workgroup schemes are probably akin to a group piece rate or group bonus schemes; the workplace incentives are likely to be one of a host of reasonably well-known plans such as Scanlon, Rucker or Improshare; but it is difficult to know what is meant by schemes which are based on performance elsewhere in the organization which are not profit sharing, suggesting we treat this latter category with caution. There is also considerable overlap among responses to the various questions, suggesting possible confusion on the part of respondents. Nonetheless, these responses do adequately separate out the *level* at which performance is measured, running from the individual to the workgroup to the workplace and above.

Respondents are then asked a Likert-scaled question on the percentage of employees receiving such incentive payments during the last year. Since there is no obvious way to sort out which type of scheme is causing the payments (due to overlap), we treat this question as capturing all non-profit sharing incentive coverage within workplaces. The survey then asked "what percentage of their earnings did" the system "account for last year?" for "non-managerial employees receiving these payments." Out of the 481 respondents making such payments and answering the question, a majority of 307 (63%) claimed more than 5% of pay was so affected, though only 145 (30%) claimed more than 10% of pay was performance related. These figures suggest the absolute amount of incentive payments was not trivial.¹²

The survey next asks whether "there is a profit sharing scheme operating for *non-managerial* employees at this workplace?" and, if so, what percentage of employees received a payment from the scheme during the last year, again answered along a Likert scale.

Taking the raw responses from the questions detailed above yields seven dependent variables, four dichotomous variables for whether any employees received any of the non-profit sharing incentive payments during the previous year, one dichotomous variable regarding the existence of profit sharing, and two variables concerning the percentage of non-managerial employees

receiving related payments (one for profit sharing and one for nonprofit sharing incentives). In addition to these seven indicators, we construct an additive index for the number of incentive programs in the workplace, running from zero to five (all four levels of schemes and profit sharing). This indicator helps provide additional information on the incidence of incentives, but is perhaps most appropriately viewed as an indicator of incentive scheme complexity and sophistication.¹³

The dependent variables are described in Table 1. Individual level schemes are the most common with more than one third of workplaces reporting their use, while the least pervasive scheme is profit sharing, which exists in less than 10 per cent of the workplaces. Yet, while profit sharing is much less common than the other schemes, the workplaces that report using profit sharing are actually likely to cover a larger share of the workforce. Almost two thirds of workplaces with profit sharing report that most workers are covered, while less than one third of workplaces reporting a scheme other than profit sharing report that most workers are covered by the scheme. These differences suggest it is important to separate out the incidence of these schemes from the extent of employees covered by the schemes at each workplace. The relevance of analyzing the total number of schemes is also highlighted by the table, since we find that over one third of workplaces with any of the schemes use more than one of the pay systems analyzed here.

The independent variables are described in Table 2 and with the exception of the controls discussed shortly flow directly from the discussion of hypotheses in the earlier section. Considering monitoring issues, EMPLOYMENT captures workplace size, while the proportion of MANAGERS in the workplace serves to proxy the degree of hierarchy in the workplace. Both variables are predicted to positively influence incentive prevalence. The variables for labor intensity (LABINT) and for technical innovation (TECHCHANGE) are intended to capture the potential role of existing and changing technologies on monitoring and hence incentives, although no specific predictions on the influence of these variables was provided earlier.

Quality issues are dealt with through the following two variables. QUALITY captures the degree to which competitive success and hence profitability is dependent upon either product quality and responsiveness to customers' needs, and CIRCLES captures quality related employee involvement programs which may represent a response by the firm to high quality requirements. Both variables are predicted to negatively correlate with individual level schemes but positively correlate with high level schemes such as profit sharing.

Hypotheses on job tenure and job security dictated the inclusion of a large number of relevant variables. Most directly, a quadratic indicator of the average tenure of employees (TENURE, TENURE²) is used to proxy job tenure, and should be negatively related to incentives, though perhaps positively associated with profit sharing. The variable for the percentage of women in the workforce (WOMEN) is introduced to capture the shorter projected tenure of this group, and is predicted to correlate positively with formal incentives, although such a correlation might be attributable to factors other than expected tenure *per se*. The variables LAYOFFS and ATTRITION both proxy job insecurity, though ATTRITION signals attempts by the firm to maintain job security and long-term employment for remaining workers. Using the new economics of personnel logic, we would then predict that layoffs will be positively and attrition negatively associated with formal incentives, while the strategic choice view predicts quite differently that layoffs will be negatively and attrition positively associated with profit sharing. The CASUALS variable captures the extent of the contingent workforce, and no prediction was made on this variable since it may proxy either job security or insecurity.

Particularly novel to this study is the inclusion of a variable, COMPETE, which represents the degree of competition in the market for the workplace's product. In general, we predict this variable will be positively correlated with incentive systems.

To consider industrial relations issues, we use two variables. First, the percentage of union members among employees (DENSITY) will directly capture union effects. No specific prediction on union effects was provided above. Second, the variable for employee involvement

programs (CIRCLES) is conceived as an indicator for a productive industrial relations climate, in which case the variable should correlate positively with high level incentives and particularly profit sharing. Because CIRCLES may proxy both climate and quality aspects of the workplace, however, some caution in interpretation is called for. Further, as discussed earlier, it is important to check the extent to which this variable may be simultaneous with the dependent variables.

Turning to control variables, we introduce a mild control for the existence of alternative incentive systems in the variable PROMOTE, which indicates the proportion of managers promoted to their current position from within the workplace. This variable may control for the presence of internal labor markets, upward-sloping age-tenure profiles, or promotional tournaments in the workplace. The new economics of personnel literature suggests such alternative systems will be negatively related to formal incentives, although the strategic choice literature suggests to the contrary the internal promotions may signal a cooperative atmosphere with long-term relations, so may be related to incentives above the individual level. The variable PUBLIC measures whether the workplace is publically owned, and the final controls are for the manufacturing and mining industries (MANU and MINING, respectively). Each of these are potentially important control variables, but we make no predictions on their effects *ex ante*.

Descriptive statistics for the sample are shown in the right hand column of Table 2, and are typical for an Australian sample (see Callas, et al, 1991).

Our methodology examines the determinants of each of seven dependent variables from Table 1 using the variables from Table 2 as the relevant explanatory controls. As is appropriate, the exact functional form of the testing equation will vary with the nature of the dependent variable.

Results

Initially, the four dichotomous nonprofit sharing incentives and that for profit sharing are used as dependent variables in a probit specification. If the particular type of incentive was used in

the establishment, the dependent variable takes a value of one, and is zero if respondents claim the scheme is not used. The probit specification is designed for precisely this type of dependent variable and avoids the specification errors inherent in a linear probability model.

As Table Three shows, results on the four variables related to monitoring are generally consistent with predictions. Employment is positively and significantly correlated with the piece rate, group pay and higher than workplace level scheme variables, and the proportion of managers is positively and significantly related to four of the five incentive schemes. While these results support the hypothesis that increased monitoring costs are associated with formal incentives, the results are also consistent with scale economies existing for the schemes, either because an increased proportion of managers implies a higher probability that the firm will employ compensation specialists or because formal incentives involve fixed costs which are easier to cover in large firms. While we made no specific predictions on labor intensity or technical change, the results are supportive of a positive connection between technical change and workgroup level schemes, though the linkage is not strong. A stronger correlation is found regarding labor intensity and piece rates, which are positively and significantly related, consistent with the findings of Slichter, Healy and Livernash (1960). In conjunction with the size or employment results, the labor intensity finding could indicate that individual level incentives are the only ones that are subject to substantial scale economies, thus explaining the importance of both size and labor intensity.

Turning the two quality indicators, the variables for the importance of product quality and responsiveness to customer requirements is never significant, but flirts with a significant negative relationship in terms of piece rate and group pay, consistent with the hypothesis that rewards to output alone are inconsistent with high quality requirements. The variable for quality circles program is highly significant and positive in the high level schemes including profit sharing, as predicted.

Regarding job tenure and job security, the tenure variables are weakly significant in the two

low level schemes, piece rate and group pay, and in both cases are consistent with the hypothesis that low job tenure is associated with formal incentives.¹⁴ The coefficient for women is positive and significant for piece rates and profit sharing, as predicted by expected tenure considerations or by other arguments provided earlier, but is surprisingly negative for group pay, a finding at odds with predictions. Results concerning layoffs and attrition are more consistent. In the three lower level incentive equations, layoffs are positively and significantly related to incentive prevalence, as hypothesized, while in three of the five equations (including profit sharing) workforce reductions through attrition are negatively and significantly associated with formal incentives. To the extent workforce reductions achieved through attrition are intended to maintain long-term employment relations, these findings again support the contention from the new economics of personnel that long-term employment relations permit the firm to employ alternative incentive mechanisms such as upward-sloping earnings profiles, and avoid formal incentives of the type analyzed here. The results are inconsistent with the strategic choice hypothesis that job security and long-term employment are positively associated with profit sharing. The effects of contingent workers or casual employees are consistently negative and significant in three of the five equations. While we made no firm predictions on the casual employees variable, if the other job tenure and job security findings are correct, it is plausible to conjecture that contingent workers enhance job security for core workers, so that as the contingent component of the workforce increases, employers find it easier to implement long-term rewards for core workers. Alternatively, it may be that a sizeable contingent workforce makes any rewards system other than hourly wages too difficult and costly to administer.

We next consider results for the competition variable in the incentive equations. The results suggest that this could be an important relationship that deserves more study. In all but the broadest level nonprofit sharing scheme, being in a highly competitive product market correlates positively with the use of incentives. These partial correlations are highly significant for both profit sharing and individual incentives. The coefficients are routinely large and even in the

Group Pay and Workplace Pay equations, the coefficients are not far from significance at the ten percent level. To the extent that the use of incentive schemes are crucial means to control labor costs, these results support those who contend that firms in more monopolistic industries do not control costs as carefully or as completely as do those in more competitive industries.

Concerning industrial relations, the union density coefficient fails to yield a uniform sign and is never significant. As with Brown's U.S. data, unions in Australia do not seem to influence the prevalence of incentives. The fact that this absence persists across all types of incentives seems to contradict earlier contentions in Australia that unionization increases the chance of group incentives. Nonetheless, if we interpret the quality circles variable as proxying the industrial relations climate, our findings discussed earlier are consistent with the supposition that a healthy climate supports high level schemes and particularly profit sharing.

Regarding control variables, the promotion coefficient was expected to be negative for all equations, but is instead positive and significant in the group pay results. Less surprisingly, incentives seem somewhat less likely in the public sector, a result which fits with our results on product market competition. Government establishments, even those which are commercial, may be under less pressure to economize on labor costs and thus may be less likely to use incentives which link pay and performance. We also find that mining operations are more likely to link wages to workplace performance, while non-manufacturing workplaces are less likely to exhibit group pay schemes.

In general, results for the existence of either a piece rate or profit sharing scheme are sensible and fit the hypotheses presented earlier. However, relationships are generally much weaker for non-profit sharing schemes at the workplace level or above, and are difficult to explain in the case of group pay systems (i.e. the WOMEN, PROMOTE, and MANU findings). These peculiarities in the empirical explanation of the broader nonprofit sharing incentives remain a puzzle. It is worth noting, however, that these broader incentives have not been particularly well explained by any of the variables. In general, fewer of the coefficients are statistically significant

and the entire workplace equation does not reach the one percent level of significance in the log-likelihood test. Part of this may flow from the lack of an agreed upon set of schemes given the wording of the survey. The respondents might have been less sure of their answers to these survey questions and they may have had very different institutional features in mind when they did answer. For that reason, we place greatest confidence in the results for piece rates and profit sharing.

In sum, the individual specifications for piece rates and profit sharing are highly significant as indicated by chi-squared statistics and each seems to confirm a large portion of the hypotheses outlined in earlier sections. In particular the role of employment size, managerial hierarchies, women, competition and job security seem particularly strong. On the other hand, unions play no role though the industrial relations climate influences profit sharing as expected.

To further examine these patterns we return to the variables which measure the extent of the incentive use within the workplace, or the proportion of workers covered at each workplace. For the sum of all nonprofit sharing schemes and for profit sharing we know the category in which each establishment falls as presented in Table 1. We took the midpoint of each category and assigned it to the workplace. This became the dependent variable in a linear regression which used the same independent variables as the probit equations. This specification was used largely as a last resort. We first attempted to use the Likert scale information in an ordered probit specification. This estimation failed to converge despite exploration of a variety of specifications.

The first column of Table 4 is for the prevalence of nonprofit sharing incentives and the second is for the prevalence of profit sharing. The patterns shown earlier with the simple probit on the existence of incentive plans seem to remain in these results. For instance, of the monitoring variables, employment and labor intensity continue to positively influence lower level, non-profit sharing incentives, while managerial hierarchies are associated with profit sharing. The quality results, however, are distinct as circles loses significance for profit sharing, while the

quality variable is now positive and significant. For job tenure and job security variables, results concerning women, and workforce reductions through attrition and casual employees remain as before, though we here find a negative job tenure affect on profit sharing, a finding which fits the general hypotheses that formal incentives are related to short job tenure, and which does not fit the strategic choice hypothesis that lengthy tenure facilitates successful profit sharing. Results for the competition variable and for union density remain largely unchanged. These findings, particularly on the positive correlation between quality requirements and profit sharing, and the negative association between job tenure and profit sharing, suggest the importance of examining data on not just the existence but also the extent of profit sharing in order to understand the relevant causal linkages (Kruse, 1988).

The final examination focuses on the presence of more than one scheme in the workplace. Here we use as the dependent variable the number of schemes, of any sort, used in the workplace. As Table 1 highlighted, a substantial portion of the sample actually uses more than one scheme. The values for this variable, zero to five, become separate categories in an ordered probit specification which uses the same independent variables as before. In this case a positive coefficient indicates an increased likelihood of using a larger number of incentive schemes.

The results are presented in the final column of Table 4. They indicate a pattern that, to a large extent, reflects a mixture of earlier results. Size and managerial hierarchies maintain their positive influence, while quality requirements become negative (consistent with Table 3 results) and quality circles positively influence the number of incentive schemes. Results for women, layoffs, attrition, casuals and competition all attract reasonable significance and the expected sign, while union density remains insignificant and the public ownership variable exerts a negative influence.

The results presented to this point remain generally consistent with predictions. As monitoring of employee effort becomes more problematic, firms tend to implement formal incentive systems, although part of the relevant findings in this regard may reflect scale economies for formal incentives and particularly for piece rates. Expected and actual job tenure,

and employment security all seem negatively related to formal incentives, consistent with the hypotheses that the incentives analyzed here are alternatives to longer term rewards systems. However, for this hypothesis to be entirely consistent with the data requires that we interpret the employment of contingent workers as enhancing job security for core employees. Further, the finding that women are more often subject to incentives may not simply reflect expected tenure, but instead a response by women to discriminatory pay for alternative schemes. Perhaps most novel here is the finding that perceived product market competition has strong effects on the use of formal incentive systems, as hypothesized in the strategic choice literature.

It may be argued that our industry variables are not sufficient to capture the variation caused by true inter-industry differences. This is possible but finer industry breakdowns may proxy a number of the variables that theory suggests are important so that what would appear as simply industry effects are actually the influence of characteristics of the industry which the theory says should matter. In any event, we replaced our 2 dummies with a full set of 9 broad industry dummies (for 10 industries) and reestimated the eight equations shown in Table 3 and Table 4. The average number of the new dummies that were significant was 2.125 with more incentive prevalence particularly in the finance industry. Only the piece rate equation had new significant characteristics with circles entering positively and promotion entering negatively. On average 1.75 coefficients lost significance across the eight equations. In six cases these included the percent of managers. Excluding that variable the average was just one significant coefficient lost per equation with no particular pattern emerging and key results like those for competition and employment size unaltered.¹⁵ The full set of these results are available from the authors.

As discussed earlier, the strategic choice literature suggests that incentives are part of a larger pattern or management strategy, in which case the variables for union membership and circles programs might be simultaneous with many of the other independent variables. To investigate this possibility, we fitted the CIRCLES variable in the first stage of a two-stage regression procedure. Such procedures require identifying some variable or variables in the CIRCLES

equation which are excluded from the second stage incentive equation. Unfortunately, the effect of the fitted circles variable on incentives changed markedly depending upon the particular identification restrictions employed. Moreover, the fitted circles variable failed to consistently attract a significant coefficient for any of the eight incentive variables. Replication of this exercise with a fitted union DENSITY also found no uniform effect for any of incentive variables.¹⁶ We suspect the instability of these results is attributable to our inability with the variables in this study to provide adequate models for either circles or density. Our fitted equations showed only modest ‘explanatory’ power. On the positive side, our exploration with fitted values suggests that results presented earlier are not a product of simultaneity bias caused by the circles and density variables.

As a further exploration of these issues, we checked the simplest and most direct relationships concerning circles, unions and incentives. The results are presented in Table 5 which divides the sample according to whether workplaces have or do not have each of the five incentive schemes. The percentage of workplaces with circles and the average union density is there provided shown for each subsample. In every case except workplace level schemes, we find circles programs more pervasive in the sample with incentives. Nonparametric correlation tests reveal that the increased presence of circles is significant for higher than workplace level schemes and for profit sharing which mimics our earlier findings. On the other hand, we find that for every incentive scheme, union membership is higher where the scheme is absent. This result is highly significant for piece rates and weakly significant for workplace level schemes. The uniformity of these two results suggests that there may be colinearity between circles, unionization and the other included explanatory variables. The fact that the variables tend to move together may be seen as support for the general strategic choice view. Specifically, these findings suggest that Australian unions may as a general rule exhibit adversarial relations, and *that it is in the nonunion environment* where the industrial relations climate is cooperative and high level systems and particularly profit sharing plans are likely to be found.

The final set of figures in Table 5 limit the analysis further by only considering unionized workplaces. Within this subsample we examine the pattern of circles programs. Again, for all but the workplace level schemes, circles are more prevalent where formal incentives exist, and the relationship is significant for piece rates and higher than workplace level schemes. Thus, there remains considerable variance in the industrial relations climate even within the unionized sector of the economy and this difference seems to influence the incidence of incentives.

Conclusions

This investigation tested a series of theoretical hypotheses about the use of incentive schemes to conserve labor costs. While such tests have been performed before, this study sheds light on several unique facets of the phenomena. First, the use of Australian data allows a cross-cultural investigation in a country with very different labor market institutions than those of the U.S. or Europe. Second, the data source had unique variables which allow the examination of hypotheses mentioned but not thoroughly examined. These include the role of product market competition and the role of layoffs and attrition. Third, the data presented five different types or levels of incentives to examine. These include not just individual piece rates but group schemes, workplace schemes and profit sharing. The differences found across these schemes stand as an additional contribution of this study. Finally, we tried to explicitly take our hypotheses from both the new economics of personnel and the strategic choice literature.

Focussing particularly on the results we believe are most reliable -- concerning piece rates and profit sharing -- we find much evidence consistent with the new economics of personnel literature. Monitoring difficulties, job insecurity and female workers are typically associated with formal incentives. This is consistent with employers using formal incentive systems where monitoring difficulties are great and the hypothesis that long-term employment allows deferred compensation to replace formal rewards. Some of our results may reflect scale economies for formal incentives, and the fact that women may be more subject to formal incentives for reasons

aside from short expected job tenure (e.g., discrimination). The hypotheses from the strategic choice literature that product market competition promotes formal incentives and that a productive industrial relations climate increases the probability that a workplace will exhibit profit sharing are both supported by the analysis. We also uncover tentative evidence suggesting that the industrial relations climate is linked to overall managerial strategies. Specifically, an examination of the direct relationships between unions, quality circles as a proxy for the industrial relations climate, and formal incentives suggests that non-union environments with a productive climate also typically exhibit high level schemes such as profit sharing. Nonetheless, no evidence was found supporting the strategic choice hypothesis associating job security with profit sharing.

Some of the results presented here may not generalize to data drawn from beyond the shores of Australia. For example, the lack of a significant union effect in the main analysis might not hold elsewhere. Similarly, the use of casual workers which was negatively associated with incentives may not translate into a negative effect on incentive prevalence wherever firms employ contingent workers.

This paper therefore presents a plea for continued examination of both the new economics of personnel and strategic choice, both theoretically and in data sets from a variety of countries. At least in the present analysis, there exists confirmation for hypotheses from each of these two approaches.

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Endnotes

1. An exception is Drago and Turnbull (1993) who model the link between profit sharing and competitive market conditions.
2. For example, Drago (1991) does find evidence of efficiency wage behavior using Australian data.
3. Brown examines a variety of individual and workgroup level pay systems, but does not explicitly analyze workplace level schemes or profit sharing.
4. Brown does find that women are more likely to be covered by incentive schemes in his examination of individual workers while the remainder of Brown's work and that by Belman and Heywood (1992) find no association between women and the prevalence of incentive schemes.
5. Belman and Heywood (1988) find evidence of reduced discriminatory differentials by race under incentive schemes, though the parallel hypothesis regarding such effects for women has yet to be tested.
6. The argument here is that both profit sharing and layoffs by voluntary methods are indicators of an industrial relations climate with strong links between the interests of workers and the firm. We are not suggests a casual relationship but rather that such indicators should be grouped together.
7. However, in a standard principal-agent framework, Drago and Turnbull (1993) demonstrate that profit sharing should be related to uncertain and elastic product demand, suggesting such schemes will not be located in monopolistic industries.
8. Stratification by location was performed to generate a reasonably large non-urban sample, size stratification was intended to oversample workplaces with large numbers of employees, while stratification by industry was meant to prevent a few industries with many small workplaces (e.g., retail trade) from dominating the data.

9. Note that an additional 835 workplaces were considered for AWIRS administration but did not meet the administrative criteria of at least 20 employees and current operations.

10. The major culprits here all required responses on the Employee Profile Questionnaire, and were the proportion of women (227 missing observations), union density (224 missing), occupational data (214 missing), the employment of casuals (213 missing) and workplace employment levels (207 missing).

11. The descriptive statistics were virtually identical to those for the working sample. These are available from the authors for the interested reader.

12. We conduct no further analysis with this question for two reasons. First, it gives the percentage of affected pay for a group of individuals in the firm who cannot be sorted out along any dimension within the survey, so there is no obvious way to handle these responses at the workplace level. Second, we suspect responses are very noisy. If a respondent claims between 5 and 10% of pay is affected, this could mean year-end one-time bonuses equalled 5 to 10% of base pay, or that the firm allocated raises on base pay of between 5 and 10% solely on merit criteria.

13. Note we also attempted to combined the two measures of the percentage of workers covered by schemes, both additively (rounding figures above 100% down to 100) and by taking the maximum of the figures. Results reflected a simple mix of results reported below for the two separate indicators.

14. The projected maximum positive effect on incentive prevalence for the tenure quadratic is when the proportion of employees with at least 10 years experience is .171 for piece rates, and zero for group pay. The mean value of the tenure variable is higher than either of these figures, at .202 (see Table 2).

15. The only variable aside from percent managers that lost significance in more than one equation is the variable for percent female. In two cases in which it achieved significance at the 10 percent level, that significance was lost. It never lost significance if it originally met a 5 percent level.

16. A summary of all fitted results is available from the authors in an optional appendix to this paper.