
Rent-sharing or incentives? Estimating the residual claim of average employees

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The rent-sharing literature and the agency literature both predict a link between pay and performance. The rent-sharing literature relies on short-term market power to explain this link, while the agency literature bases its prediction on the importance of incentives in principal-agent relationships. Annual data from an unbalanced panel of US manufacturing firms indicate that the performance-elasticity of average employee pay is approximately 0.127271 in small firms while it is not significantly different from zero in large firms. The relative lack of incentive pay in the group of large firms demonstrates that the pay-performance link evident in US manufacturing firms is inconsistent with the exclusive truth of the rent-sharing hypothesis.

I. INTRODUCTION

The rent-sharing and agency literatures both predict a link between pay and performance. The rent-sharing literature predicts this link based on the presence of short-term market power for employees while the agency literature relies on the importance of incentives in a principal-agent relationship. Both literatures provide evidence of a pay-performance link, but previous work has not distinguished between the hypotheses. It is possible that both hypotheses account for some portion of the pay-performance link, but this paper presents evidence that is inconsistent with the exclusive truth of the rent-sharing story.

There are many agency models predicting a pay-performance link, and I will not describe them all. For this paper, it is enough to recognize that agency models incorporate an information asymmetry that generates the possibility of opportunistic employee behaviour. Employers can respond by linking employee pay to performance, thus inducing a positive correlation between employee utility and firm performance. The ultimate magnitude of this link depends on the relative costs and benefits to the employer. The benefits of incentive pay are measured by firm performance, and the costs can be divided into measurement and comparison costs.

Comparison costs are those costs associated with employee perceptions of pay structure equity. Each increase in the pay of one employee causes other employees to re-evaluate their pay

compared with the new relative structure. Thus each pay increase in a firm with N employees spawns $N(N-1)$ comparisons.¹ Measurement costs are the costs of measuring employee performance. Williamson (1975, 1985) and Holmstrom (1989), among others, argue that small firms have measurement cost advantages over large firms. Greater opportunities for manipulation of evaluations and the sheer scale of the evaluation problem make it more difficult for large firms to determine the sources of performance changes. This is based on the notion that the observability of effort is not a binary variable. There are degrees of observability, and the relatively high measurement costs in large firms discourage the use of incentive pay. Thus both measurement and comparison costs increase with firm size, and so the agency literature predicts the use of incentive pay should decrease as firm size increases.

The rent-sharing literature predicts a pay-performance link based on short-run market power exercised by employees, particularly through unions. Such market power allows employees to extract extra-marginal pay. Christofides and Oswald (1992), among others, describe rent-sharing behaviour as a division of economic rents between employees and owners. The final division of rents depends on the relative bargaining strength of the parties. There are two components to this link. The first component is the size of the rents available for division between employers and employees. The second component is the relative bargaining power of the firm.

¹ Zinger (1994)

The size of economic rents available for division depends on many factors, but the size of the rents is not an important issue for this paper. This paper examines the share of these rents directed to employees through wage, salary and bonus adjustments. The degree of competition the firm faces in input markets and output markets, the elasticity of output demand, the extent of debt financing, etc., are important factors in determining the level of rents subjected to rent-seeking behaviour, but this paper examines the division of the existing rent – whatever their size. An anonymous referee has pointed out that the probability of sharing rents is an increasing function of their size. However, the size of rents is also an increasing function of firm size. Thus large firms would be expected to have larger rents and be the subject of more rent-sharing behaviour than small firms.

The relative bargaining power of employers and employees is also influenced by many factors. Unemployment decreases the negotiating power of employees because rising unemployment decreases the attractiveness of other jobs. Similarly, increases in alternative wages increase the power of employees by increasing the attractiveness of other jobs. These effects are unlikely to have differential effects by firm size because both factors reflect opportunity costs. The extent of unionization also increases employee negotiating power. Although the degree of unionization increases with firm size, this effect is probably negligible in this sample. Brown *et al.* (1990) find that the degree of unionization increases rapidly as firm size increases, but these increases taper off as establishments approach 1000 employees. There are over 6000 employees in the median small firm in this paper. Characteristics of output markets may also affect employee negotiating power, but separating firms into size classes by industry group can control these effects. This approach is effective insofar as product market conditions have industry-specific determinants.

Taken together, these factors indicate that the relative negotiating power of employees in large firms should remain unchanged (or increase) as firm size increases. Consequently, rent-sharing explanations for the pay-performance link predict that the use of incentive pay, and thus the observed magnitude of the pay-performance link, should be an independent (or increasing) function of size.

The range of potential empirical findings cannot rule out either the rent-sharing or the incentive hypotheses. If there were evidence that large firms link pay more closely to performance than small firms, then such findings would provide evidence that rent-sharing behaviour influences the pay-performance link. Even so, it would be possible that some portion of the pay-performance link was the result of agency motivations, but that the rent-sharing behaviour dominated the agency effects. The size hypothesis represents the clearest distinction between agency and rent-sharing theories, and

while the size hypothesis can not end the debate about whether the pay-performance link reflects rent-sharing or incentives, the size hypothesis can verify the importance of one of these theories.

II. EMPIRICAL MODEL

This paper examines the link between growth in firm value and growth in pay using a simple log-linear model. The regression equation is

$$\ln\left(\frac{w_{i,t}}{w_{i,t-1}}\right) = \Psi_{SIC,t} D_{SIC,t} + \beta_0 r_{i,t} + \beta_1 r_{i,t-1} + \omega_{i,t} \quad (1)$$

The dependent variable is the growth rate of average hourly pay, w , for the i th firm in year t . The primary dependent variables are growth rates of firm value, r , defined as the rate of return to common stock. Jensen and Murphy (1990) multiply this measure with beginning-of-period firm value to obtain the level change in firm value. This paper uses growth rates because rates of change are preferable to level changes when firms differ in size.² The coefficients are directly interpretable as elasticities, and the lag structure allows two years for changes in firm value to alter employee pay. The sum of the return coefficients is a measure of the alignment of shareholder and employee objectives. See Rayton (1995a, 1996) for variations from this specifications.³

The use of firm-level panel data allows imposition of disaggregated fixed time effects. These fixed effects, imposed at the two-digit industry level, control for industry-specific changes in omitted variables over time. Examples of such changes include cost shocks and industry-specific changes in market value. Other authors find significant cross-industry and time series variation in pay-performance sensitivities.⁴ The use of disaggregate fixed time effects in this model means that only time-varying shocks entering the model below the two-digit industry level of disaggregation can bias parameter estimates. Regressions using four-digit industry-year fixed effects yield similar results.

Endogeneity of contemporaneous stock returns

Rational stockholders account for the existing contractual structure in their valuation of shares. This means the market will downwardly adjust firm valuation in response to unexpected performance increases if employment contracts use performance incentives. Abowd (1989) documents the endogeneity of current labour costs and current value. He finds a dollar-for-dollar trade-off between unexpected changes in collectively bargained labour costs and changes in the value of common stock.

² There are greater opportunity costs associated with owning large firms. See Rayton (1995b) for further explanation.

³ These specification changes include extensions of the lag structure, and the inclusion of changes in employment and the capital stock.

⁴ Joskow *et al.* (1993), Kruse (1993), etc.

This paper uses a two-stage least-squares model to correct for this endogeneity, and the instruments are taken from an empirical model of accounting profit employed by Bhargava (1994). Bhargava uses changes in sales, historical firm performance, and industry-specific fixed time effects as the independent variables in a regression on changes in accounting profit.⁵ This paper uses three years of sales growth, two lags of the returns to common stock, and industry-specific fixed time effects to instrument current period common stock returns.

III. RESULTS

I define large firms as companies with total employment greater than median industry employment. The number of employees seems an appropriate benchmark for separation because both measurement and comparison costs are directly related to the number of employees.⁶ I use industry-specific medians as benchmarks so the group of large firms and the group of small firms will contain representatives from each industry. This avoids the separation of firms based on purely technological factors, and this also means that other industry-specific factors can not account for differences in point estimates across the resulting sub-samples. This industry-specific separation also limits the ability of output market characteristics to influence the relative size of the point estimates in the two groups.

Small firms appear to tie the pay of average employees to firm performance (Table 1). The coefficient for the impact of contemporaneous firm growth on changes in pay is 0.106490. This coefficient is significant at the 1% level. The coefficient for the impact of the first lag of firm growth is 0.020781, and this is significant at the 5% level. The sum of these coefficients equals 0.127271, and it is significantly different from zero at the 1% level. These results indicate that small firms link the pay of the average employee to firm performance, and that over 6.3% of changes in firm value are directed to employees through wage, salary, and bonus adjustments.

Table 1. *Small firms: selected firm characteristics, 1974–1992. 141 firms*

Characteristic	Mean	Median
Number of employees	10 146.44	6255.00
Total assets (in millions)	\$1667.31	\$556.78
Annual per-employee compensation	\$30 706.07	\$29 861.34
Hourly compensation	\$13.66	\$13.34
Change in logarithm of hourly pay	0.015	0.016
Firm value (in millions)	\$1233.55	\$376.94
Returns to common stock %	5.24	2.33

Note: Dollar figures reported in constant 1987 US dollars.

The regression for large firms yields positive point estimates, but these estimates are insignificant. (Table 2, 3). The coefficient sum is 0.046743, and this sum is insignificant. Inclusion of an additional year of lagged performance has no significant impact on the point estimates.⁷ These results appear to reflect the high costs of linking pay and performance in large firms. The results may also point to differences in the relative prices of compensatory and non-compensatory incentive alignment techniques. The tournament literature predicts that large firms have a greater ability to exploit promotion ladders as incentive alignment mechanisms. A firm characterized by a stable 'up or out' tournament structure could exhibit a zero pay-performance relationship in this data, but it may have substantial incentives associated with the promotion potential for each employee. Consequently, these results may not indicate that incentives are 'worse' in large firms. These results indicate that large firms use wage, salary, and bonus tools less than small firms.

Table 2. *Large firms: selected firm characteristics 1974–1992. 129 firms*

Characteristic	Mean	Median
Number of employees	66 886.88	40 783.50
Total assets (in millions)	\$9071.73	\$3468.15
Annual per-employee compensation	\$31 503.97	\$31 587.80
Hourly compensation	\$14.08	\$14.11
Change in logarithm of hourly pay	0.015	0.018
Firm value (in millions)	\$4769.54	\$1999.04
Returns to common stock (%)	4.24	2.51

Note: Dollar figures reported in constant 1987 US dollars.

Table 3. *Estimates of performance elasticity of per-employee hourly compensations*

Independent variable	Small firms	Large Firms
Number of firms	141	129
Sample size	1442	1440
R-squared	0.2594	0.3076
Return to common stock (<i>t</i>)	0.106490 (2.983)	0.038708 (0.915)
Return to common stock (<i>t</i> – 1)	0.020781 (2.138)	0.008035 (0.922)
Estimated performance elasticity	0.127271 (3.106)	0.046743 (1.052)

Note: Two-stage least-squares regressions. The dependent variable is the change in the natural logarithm of hourly compensation. All regressions include fixed time effects at the two-digit SIC average level of disaggregation. *T*-statistics in parentheses.

⁵ Bhargava (1994) also includes a binary variable indicating the presence or absence of a profit sharing system. This data is not available at this time for the firms in this sample.

⁶ Jensen and Murphy (1990) separate firms into size classes based on market value. See Rayton (1995a) for separations based on market value.

⁷ The addition of another lag of performance in the small firm regression also has no significant effect on the point estimates.

IV. CONCLUSION

Small firms link the pay of average employees more closely to performance than large firms. The relative lack of compensatory incentives for employees of large firms is the best evidence that these coefficients reflect incentives, and are not simply the result of rent-sharing. Rent-sharing theories predict a zero (or perhaps positive) relationship between firm size and the extent of rent-sharing behaviour. As such, rent-sharing theories alone can not account for the empirical facts reported in this paper. An incentive explanation of the pay-performance link is consistent with the results of this paper.

There is no data on the institutional structures used to direct changes in pay to employees. Even so, these pay changes arrive, and their arrival creates significant incentives. Whether firms use explicit formulas to link bonuses to performance measures, or whether managers use their knowledge of performance in the administration of wage and salary increases, is immaterial to the question at hand. The fact that employee pay increases with firm performance creates significant incentives. Agency theories predict that the use of such incentives should decline with firm size, and rent-sharing theories do not. These results do not reject the validity of the rent-sharing hypothesis, but they indicate that some portion of the pay-performance link results from an attempt to align incentives.

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APPENDIX: DATA

The Compustat database, compiled by Standard and Poor's, is the primary data source for this paper. Compustat includes information from the disclosures of publicly traded US firms. This paper focuses on manufacturing industries. I use Compustat's labour and related expenditures variable combined with the number of employees to construct per-employee compensation. I supplement this with industry level data on hours and overtime from the Bureau of Labor Statistics. Failure to correct for changes in hours and overtime over the business cycle could induce spurious correlation between compensation expenses and firm value, both of which vary procyclically. This control is imperfect, but it should prove effective if cyclical variations in hours have industry-specific components. This data allows measurement of the link between firm performance and average pay in the same way the rent-sharing literature has employed the Exstat data.⁸

⁸ See Gregg and Machin (1992) for a description of the Exstat data.