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**Abstract**
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**Keywords**
Morale Theory of Nominal Wage Rigidity

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# TESTING THE MORALE THEORY OF NOMINAL WAGE RIGIDITY

DAIJI KAWAGUCHI and FUMIO OHTAKE*

This paper tests the morale theory of nominal wage rigidity, according to which firms resist making nominal cuts to workers' pay even in adverse economic conditions because such cuts hurt worker morale and productivity. The authors analyze data from an employer-employee survey they conducted in Japan in 2000. That year coincided with a rare spell of deflationary recession, which, the authors argue, is a good setting in which to study how nominal pay cuts affect morale. They find that a nominal annual pay freeze, experienced by 21% of the sampled workers, demoralized workers by reducing their trust in the firm, and that even greater demoralization—not wholly attributable to reduced trust—was associated with a nominal pay cut, which affected 17% of the workers. The observed negative relationship between nominal pay cuts and morale persists even when the estimation includes controls and firm fixed effects.

Downward nominal wage rigidity has attracted many economists' interest, mainly due to its important implications for monetary policy. A number of recent studies have found that the phenomenon is common.[1] All of these studies have examined the distribution of nominal wage changes using panel data on workers and have found an asymmetric distribution skewed to the right, with a sharp spike at no nominal wage change. The observed distributions are consistent with the existence of downward nominal wage rigidity. However, few previous studies have investigated *why* nominal wages tend not to fall, mainly because the data used did not contain enough information on workplaces or on workers' emotional reactions to wage cuts.

The reasons for downward nominal wage rigidity have been investigated mainly through interviews with employers, asking them why they do not cut wages, even during a recession. Bewley (1999) interviewed more than 300 business executives and labor leaders in the northeastern region of the United States during the recession of the early 1990s and found that employers avoided cutting pay because they feared that doing so would demoralize workers and reduce their effort. Similar findings have been reported

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The data and Stata code used for this study are available upon request for the purpose of replication. Contact the first author at Faculty of Economics, Hitotsubashi University, Naka 2-1, Kunitachi, Tokyo 186-8601, JAPAN; Kawaguch@econ.hit-u.ac.jp.

[1]For the United States, for example, see McLaughlin (1994), Kahn (1997), Card and Hyslop (1997), Altonji and Devereux (2000), and McLaughlin (2000); for Britain, Smith (2000); and for Japan, Kuroda and Yamamoto (2003a, 2003b). Kondo (2003) considered possible explanations for well-documented, marked downward nominal wage rigidity among Japanese youth.

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*Table 1.* Time Series of the General Consumer Price Index for Japan. (Year 2000 = 100)

| *Year* | *CPI* |
|---|---|
| 1995 | 98.5 |
| 1996 | 98.6 |
| 1997 | 100.4 |
| 1998 | 101.0 |
| 1999 | 100.7 |
| 2000 | 100.0 |
| 2001 | 99.3 |
| 2002 | 98.4 |
| 2003 | 98.1 |
| 2004 | 98.1 |
| 2005 | 97.8 |

*Source:* Monthly consumer price index report, Table 9.

by Kaufman (1984) and Blinder and Choi (1990) based on smaller-scale employer interviews. Another line of research by Loewenstein and Sicherman (1991) and Frank and Hutchens (1993) offered evidence that workers prefer an increasing wage profile. In particular, Loewenstein and Sicherman (1991) found that workers perceive wage cuts as a sign that their employers do not appreciate their efforts. This evidence indirectly establishes the link between wage cuts and workers' morale. Few studies, however, have attempted to establish a direct, causal relation between wage cuts and workers' morale using a sample of workers who actually experienced wage cuts.

One exception is Smith (2002), which examined the relation between wage cuts and workers' satisfaction with their wages. Using the British Household Panel Study to examine the effect of wage cuts and freezes on workers' self-reported satisfaction with their pay, Smith found that wage cuts and freezes negatively affected workers' satisfaction with their pay by almost the same degree. Because the inflation rate was about 8–9% at the beginning of the 1990s and about 2–3% after 1993, the nominal wage freeze in the 1990s in the United Kingdom implied a real wage cut. From the finding that wage freezes and cuts affected workers' pay satisfaction in a similar fashion, Smith concluded that workers' pay satisfaction is deteriorated by real wage cuts rather than by nominal wage cuts.

The morale theory of nominal wage rigidity is powerfully tested in a deflationary economy. In part, this is because nominal wage cuts, which are very rare in inflationary economies, occur more often in periods of deflation. In addition, in a deflationary environment a nominal wage cut can constitute a real wage cut, or freeze, or even increase; in an inflationary environment, in contrast, a nominal wage cut is always, necessarily, a real wage cut as well. Thus, if the point of a study is to investigate the effects on workers' morale of a purely nominal cut in compensation, regardless of the real-wage impact of the cut, a deflationary environment is the preferred setting.

Opportunities to test Bewley's (1999) morale theory of wage rigidity by examining how nominal wage cuts affect workers' pay satisfaction or morale during a deflationary recession have been rare because episodes of deflation have themselves been quite rare. One such unusual deflationary spell occurred in the late 1990s and early 2000s in Japan. As evidenced in Table 1, Japan experienced a general price decline beginning in 1998, and this trend continued until at least 2005.[2] An employer-employee survey we conducted in Japan in July 2000 allows us to examine how workers' pay satisfaction and work morale were affected by nominal pay cuts and freezes.

## Data

The Institute of Industrial and Labor Policies, Chubu (*Chubu Sansei Ken* in Japanese), conducted a survey covering 123 companies and their employees in the Chubu area of Japan, which is the area around Nagoya. Included in the survey were an automobile assembler and its subsidiary parts suppliers, an electric power supply company, a department store, a private railway, and other companies.

The survey consisted of a firm question-

[2]An overview of the recent deflation in Japan is available in Ahearne, Gagnon, Haltmaier, and Kamin (2002).

naire and an employee questionnaire. Human resource departments were asked to complete the firm survey questionnaire. Where workers were unionized, the employee survey questionnaires were distributed and collected by labor unions; where they were not, by human resource departments. To encourage candid responses and safeguard employees' privacy, the employee questionnaires were collected in sealed envelopes. The questionnaires were distributed July 5–7, 2000, and were collected at the end of the same month. The Institute distributed 123 firm questionnaires and collected 90 of them, for a response rate of 73.2%. Of questionnaires distributed to 2,000 randomly chosen employees, 1,838 were collected, for a response rate of 91.9%.

Employees' response rate was quite high for this type of survey, and the sample presumably represents the population: all employees of the 123 firms, in this case. We dropped female observations due to their small number.[3] We also restricted our sample to observations for which all of the following information was available: educational background, income (which is defined as basic pay plus bonus), industry, occupation, and changes in basic pay, bonuses, and annual income. This sample restriction reduced the sample size to 1,557.

Descriptive statistics on the respondents appear in Table 2. Workers' average age was about 37 years, and their average tenure about 17 years. High school graduates comprised 51% of the sample; college graduates, an additional 29%. Given the distribution of years of education and age, the average job tenure was, by the standards of most countries, remarkably long; it reflects the long-term employment relationship that is typical in Japan, as described by Hart and Kawasaki (1999). More than half of the sample earned between 5,000 and 7,990 thousand yen annually. (One dollar was traded for 105–110 yen in July 2000.) Like most earnings distributions, the earnings distribution for this sample was skewed to the right. Table 2 also shows the distribution of responses to a question asking workers how they thought their annual compensation compared to that of colleagues of the same sex, age, educational background, and occupation. Relative compensation perceptions are biased toward the median. We also report, in column (2), the comparable national figures taken from Japan Institute of Labour (2002). Compared with these national average figures, workers in the analysis sample had longer job tenure, more education, and higher earnings. It is important to bear in mind that our sample over-represents workers in "good jobs."

### Wage Change in Deflation

By way of three separate questions, the employee survey investigated changes in (i) basic pay, (ii) bonus pay, and (iii) annual compensation over the previous year, and in each case the three possible responses were (a) decreased, (b) frozen, or (c) increased. The responses to this question by age category appear in Table 3. Except among those 50–59 years old, only a small number of workers experienced a basic pay decline. For example, 6.45% of respondents 40–49 years old reported a basic pay cut, compared to 30.77% reporting a basic pay freeze. This pattern of basic pay change is consistent with Bewley's finding that there is a spike at zero nominal wage change. The same pattern of a much higher incidence of pay freezes than pay cuts characterized the other age groups as well, except for the 50–59-year-old group. Thus the distribution of the change in nominal basic pay indicates that nominal basic pay was downwardly rigid. Even for the change in bonus payment, respondents less frequently experienced a decrease than a freeze, except, again, for those who were 50–59 years old.[4] Overall, Table 3 confirms that nominal wage rigidity was present even in a time of deflation.

Given the overall pattern of downward nominal wage rigidity, it is striking that about 17% of the workers in the sample did in fact experience an annual compensation decline.

[3]Of the original 1,838 observations, only 92 were female.

[4]A "bonus freeze" occurs when the current year's bonus is the same as the previous year's.

*Table 2.* Descriptive Statistics.

| *Variable* | *(1) Analysis Sample* | *(2) National Figures for Male Workers* |
|---|---|---|
| Age | 37.49 | 39.7 |
| | (7.34) | |
| Tenure | 16.99 | 11.8 |
| | (7.92) | |
| Education (Category Dummies) | | |
| Junior High School | 0.04 | 0.16 |
| High School | 0.51 | 0.29 |
| Technical College | 0.02 | |
| Tech. College Attached to the Firm | 0.06 | } 0.08 (Technical Coll. + Junior Coll.) |
| Junior College | 0.02 | |
| College (Humanities and Social Sciences) | 0.14 | } 0.29 (College + Graduate School) |
| College (Engineering and Natural Sciences) | 0.15 | |
| Graduate School | 0.06 | |
| Annual Pay (10 Thousand Yen) (Category Dummies) | | |
| –299 | 0.01 | Average Annual Pay (10 Thousand Yen) |
| 300–399 | 0.05 | |
| 400–499 | 0.14 | College Graduates 522 |
| 500–599 | 0.17 | |
| 600–699 | 0.17 | Tech. Coll. + Junior College 382.8 |
| 700–799 | 0.17 | |
| 800–899 | 0.11 | High School Graduates 448.3 |
| 900–999 | 0.08 | |
| 1,000–1,099 | 0.05 | |
| 1,100–1,199 | 0.02 | |
| 1,200–1,299 | 0.01 | |
| 1,300–1,399 | 0.01 | |
| 1,400–1,499 | < 0.00 | |
| 1,500+ | < 0.00 | |
| Relative Pay | | |
| Top 20% | 0.10 | |
| 21–40% | 0.22 | |
| 41–60% | 0.35 | |
| 61–80% | 0.12 | |
| 81–100% | 0.03 | |
| Don't Know or Missing | 0.18 | |
| N | 1,557 | |

*Notes:* Our survey was implemented in July 2000. Age, education, and annual compensation are category variables. Means of the variables are reported and standard errors are reported in parentheses. All national figures are taken from the Japan Institute of Labour (2002). Average age and tenure of workers are based on Table 16 from that source, and figures are for 1999. The distribution for educational background is based on Table 15, which contains figures for 1997. Average annual compensation for each educational background is based on Table 38, which contains the amount of scheduled case earnings for 2000. We imputed annual compensation assuming that workers receive 4 months' salary as a bonus in a given year. Receiving a bonus equivalent to 4 months' salary is roughly consistent with the national figures reported in Table 37.

The distribution of changes shows that bonus pay was more likely than basic pay to be frozen or to have decreased, which may reflect the fact that bonus pay is more vulnerable to a firm's performance. The age decomposition shows that decreases and freezes in basic pay and bonuses were more likely to occur among older workers, particularly those between ages 50 and 59.[5] Among workers between ages 40 and 49, 6.45% experienced a decline

[5]The high frequency of basic pay decline among workers in this particular age group may be partly due to the "position-retirement" that is a widely observed

*Table 3.* Descriptive Statistics: Change in Pay in the Past Year (as Reported by the Worker) and Change in Work Morale in the Past Three Years.

| | *Age Group* | | | | |
|---|---|---|---|---|---|
| *Variable* | *20–29* | *30–39* | *40–49* | *50–59* | *Total* |
| *Basic Pay* | | | | | |
| Decrease | 2.06 | 5.51 | 6.45 | 16.38 | 6.17 |
| Freeze | 13.92 | 14.52 | 22.35 | 30.77 | 17.98 |
| Increase | 84.02 | 79.97 | 71.20 | 53.85 | 75.85 |
| *Bonus* | | | | | |
| Decrease | 13.40 | 13.77 | 16.13 | 38.46 | 16.44 |
| Freeze[a] | 23.20 | 23.78 | 26.78 | 24.62 | 24.60 |
| Increase | 63.40 | 62.45 | 57.14 | 36.92 | 58.96 |
| *Annual Compensation* | | | | | |
| Decrease | 12.89 | 14.02 | 18.43 | 30.77 | 16.51 |
| Freeze | 17.53 | 19.52 | 23.27 | 28.46 | 21.07 |
| Increase | 69.59 | 66.46 | 58.29 | 40.77 | 62.43 |
| N | 194 | 799 | 434 | 130 | 1,557 |
| *Work Morale Trend over the Past Three Years* | | | | | |
| Declined | 7.22 | 7.55 | 4.38 | 3.08 | 6.25 |
| Declined Somewhat | 20.62 | 20.50 | 18.89 | 21.54 | 20.15 |
| Hard to Tell | 30.93 | 34.97 | 39.40 | 31.54 | 35.42 |
| Increased Somewhat | 32.47 | 30.82 | 32.49 | 39.23 | 32.20 |
| Increased | 8.76 | 6.16 | 4.84 | 4.62 | 5.99 |
| N | 194 | 795 | 434 | 130 | 1,553 |

[a]"Bonus freeze": receipt of the same bonus amount in the current year as in the previous year.

in basic pay, and 16.13% a decline in bonus pay. In total, 18.43% of workers in this age range experienced a drop in total annual compensation. The proportion experiencing such a decline was 14.02% among workers between ages 30 and 39 and 12.89% among workers between 20 and 29. In general, a comparison of the percentages reveals that an annual compensation decline was more prevalent among older workers. Decreases in basic pay were particularly rare among workers between ages 20 and 29.

To examine the effect of age on the probability of experiencing a decline or freeze in total annual compensation, holding educational background, compensation level, industry, and occupation constant, we estimated a multinomial logit model:

$$(1) \qquad P(y = j|x) = exp(x\beta_j) / [1 + \sum_{h=1}^{2} exp(x\beta_h)], \; j = 1,2$$

where $y$ equals 1 if annual compensation declined and 2 if it increased. The vector $x$ includes age, educational background, compensation level, industry, and occupation. The dependent variable $y$ takes the value 0 when annual compensation is frozen, and this category is used as a base category whose probability is defined as follows:

$$(2) \qquad P(y = 0|x) = 1/[1 + \sum_{h=1}^{2} exp(x\beta_h)].$$

The results of the estimation appear in Table 4. These results show that older work-

employment custom in Japan. Since large firms in Japan tend to adopt up-or-out career systems during the late stages of workers' careers, workers in administrative (white-collar) or foreman (blue-collar) positions who fail to be promoted to a higher position are asked to leave the company with some premium on their retirement allowance. If a worker prefers to stay in the firm, he is asked to retire from his current position and work in a lower one; a basic pay cut is usually associated with this transition.

*Table 4.* Employee-Reported Annual Pay Change from the Previous Year.

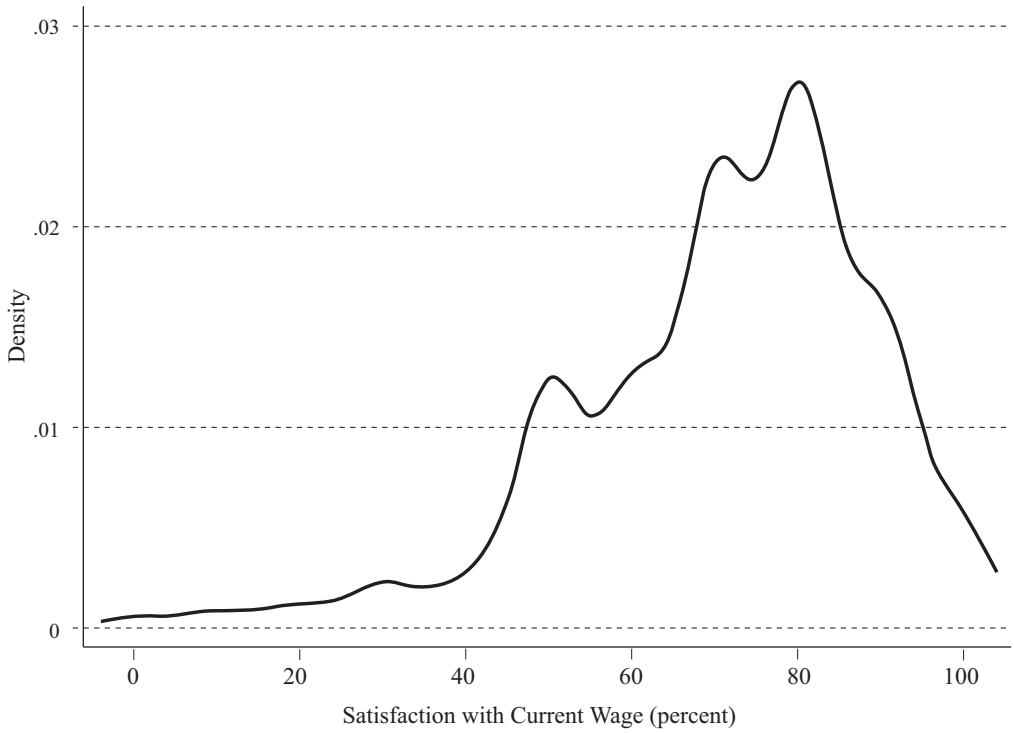
| *Dependent Variable* | *(1) Increased* | *(2) Decreased* | *(3) Increased* | *(4) Decreased* | *(5) Increased* | *(6) Decreased* |
|---|---|---|---|---|---|---|
| Age | –0.06 | 0.03 | –0.07 | –0.01 | –0.05 | 0.04 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| | [–0.02] | [0.01] | [–0.01] | [0.00] | [–0.01] | [0.01] |
| $Age^2$ | — | — | 0.00 | 0.00 | — | — |
| | | | (<0.00) | (<0.00) | | |
| | | | [–0.00] | [0.00] | | |
| Tenure | –0.01 | 0.02 | –0.03 | 0.10 | –0.03 | –0.00 |
| | (0.03) | (0.03) | (0.09) | (0.08) | (0.03) | (0.03) |
| | [<–0.00] | [0.00] | [–0.01] | [0.01] | [–0.01] | [0.00] |
| $Tenure^2$ | — | — | 0.00 | –0.00 | — | — |
| | | | (<0.00) | (<0.00) | | |
| | | | [0.00] | [0.00] | | |
| High School | –0.11 | –0.40 | –0.06 | –0.35 | –0.00 | –0.27 |
| | (0.41) | (0.30) | (0.44) | (0.29) | (0.40) | (0.27) |
| Technical College | 1.95 | 2.05 | 1.97 | 2.12 | 2.08 | 2.00 |
| | (1.26) | (1.15) | (1.26) | (1.17) | (1.25) | (1.15) |
| Firm Tech. | 0.29 | 0.46 | 0.33 | 0.51 | 0.51 | 0.73 |
| | (0.46) | (0.31) | (0.48) | (0.33) | (0.45) | (0.32) |
| Junior College | 1.12 | 0.33 | 1.17 | 0.43 | 1.19 | 0.04 |
| | (0.76) | (0.71) | (0.74) | (0.70) | (0.74) | (0.76) |
| College (B.A.) | –0.19 | –0.89 | –0.14 | –0.69 | –0.11 | –0.81 |
| | (0.67) | (0.50) | (0.71) | (0.50) | (0.67) | (0.53) |
| College (B.S.) | –0.10 | –0.26 | –0.06 | –0.12 | 0.14 | –0.09 |
| | (0.59) | (0.40) | (0.61) | (0.44) | (0.61) | (0.44) |
| Graduate School | –0.08 | –1.20 | –0.08 | –1.02 | 0.01 | –1.13 |
| | (0.61) | (0.59) | (0.64) | (0.67) | (0.61) | (0.59) |
| Sales Growth in Last Three Years | — | — | — | — | 0.47 | –3.68 |
| | | | | | (0.67) | (1.79) |
| | | | | | [0.17] | [–0.31] |
| Income, Industry, Occupation Dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,557 | | 1,557 | | 1,474 | |

*Notes:* Multinomial logit estimation. The dependent variables are Increased, Frozen (the base category), and Declined. Estimations are based on a single-year cross-section taken in the year 2000. Standard errors, which are robust with respect to firm-level clustering, are reported in parentheses. Marginal effects, evaluated at the sample mean, are in brackets.

ers were less likely than younger workers to experience an annual compensation increase even after the analysis controls for covariates, as reported in column (1), but once the effects of covariates are controlled for, age does not explain the annual compensation decrease, as reported in column (2). To check the appropriateness of the linear specification with respect to age and tenure, we estimated the specification that includes squared age and tenure terms. The results are reported in columns (3) and (4). Those two terms do not enter the equation at statistically significant levels, however, and the linear specification is sufficient to capture the effects of age and tenure on annual compensation change.

To conclude, after we condition on the covariates, including compensation level, we find that older workers were less likely than others to experience an annual compensation increase, but they were not more likely to experience a compensation decrease. Thus our tentative conclusion, based on estimates that condition on an array of covariates in-

*Figure 1.* Distribution of Subjective Satisfaction with Current Wage (0-100 scale).




*Note:* Kernel density estimation using Gaussian kernel and bandwidth = 4.

cluding current compensation level, is that workers in all age ranges were equally likely to experience a pay decrease.

### The Effect of Pay Cuts on Workers' Pay Satisfaction

This section analyzes how cuts and freezes in pay affected workers' pay satisfaction. To measure pay satisfaction, we analyzed responses to the following question: "Are you satisfied with your current annual compensation? Please answer using a percentage, where 100% means that you are completely satisfied with your annual compensation." The result of a kernel density estimation of this response appears in Figure 1. The mode of the distribution is around 80%, indicating that workers generally had a high level of satisfaction with their annual compensation.

We assume that the response to the compensation satisfaction question is determined by

$$y_i = \beta_1 Increase_i + \beta_2 Decrease_i + x_i\gamma + u_i, \quad (3)$$

where $y_i$ is worker $i$'s satisfaction with his pay and $Increase_i$ and $Decrease_i$ are dummy variables that equal 1 if worker $i$ experienced a compensation increase or decrease, respectively. The vector $x_i$ contains sets of covariates that can affect the workers' pay satisfaction and can be correlated with the event of a pay increase or decrease. Most important, $x_i$ contains compensation category dummy variables to control for the effect of compensation level on pay satisfaction.

A caveat regarding this research design is that we do not know how much the pay

*Table 5.* OLS and Firm-Level Fixed Effects Estimation of Satisfaction Determination.

| *Variable* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* |
|---|---|---|---|---|---|---|---|
| Pay Increase | 8.04 | 6.62 | 7.35 | 4.52 | 5.12 | 5.35 | 5.25 |
| | (1.18) | (1.13) | (1.21) | (1.13) | (1.31) | (1.09) | (1.07) |
| Pay Increase * | — | — | — | — | — | –0.35 | –0.32 |
| (Age – Mean[Age]) | | | | | | (0.11) | (0.14) |
| Pay Decline | –3.13 | –3.45 | –2.26 | –2.96 | –2.11 | –2.29 | –2.20 |
| | (1.35) | (1.25) | (1.18) | (1.10) | (1.08) | (1.01) | (1.39) |
| Pay Decline * | — | — | — | — | — | 0.00 | 0.02 |
| (Age – Mean[Age]) | | | | | | (0.18) | (0.17) |
| Age | –0.14 | 0.02 | –0.)0 | 0.26 | 0.14 | 0.31 | 0.23 |
| | (0.25) | (0.27) | (0.25) | (0.28) | (0.25) | (0.21) | (0.21) |
| Tenure | 0.18 | 0.12 | 0.27 | 0.02 | 0.16 | 0.16 | 0.29 |
| | (0.22) | (0.24) | (0.22) | (0.24) | (0.20) | (0.20) | (0.19) |
| Annual Pay: | 1.76 | 2.33 | –9.64 | 4.42 | –6.16 | –5.43 | –4.97 |
| 3–3.99 Million Yen | (11.02) | (10.96) | (7.00) | (8.91) | (5.09) | (5.36) | (5.42) |
| Annual Pay: | 6.21 | 6.40 | –5.60 | 8.54 | –2.62 | –1.35 | –0.95 |
| 4–4.99 Million Yen | (10.34) | (10.22) | (7.10) | (8.27) | (5.13) | (5.47) | (5.25) |
| Annual Pay: | 10.30 | 9.45 | –2.15 | 8.99 | –0.95 | 0.43 | 0.89 |
| 5–5.99 Million Yen | (10.78) | (10.78) | (6.76) | (8.30) | (4.72) | (4.98) | (5.27) |
| Annual Pay: | 13.08 | 11.78 | –0.59 | 11.48 | 0.43 | 1.95 | 2.29 |
| 6–6.99 Million Yen | (11.40) | (11.20) | (7.47) | (8.76) | (5.50) | (5.75) | (5.32) |
| Annual Pay: | 16.25 | 14.39 | 1.74 | 12.35 | 1.32 | 2.90 | 2.47 |
| 7–7.99 Million Yen | (10.84) | (10.68) | (7.16) | (8.23) | (5.42) | (5.78) | (5.40) |
| Annual Pay: | 18.97 | 16.46 | 3.97 | 13.48 | 2.65 | 4.54 | 3.59 |
| 8–8.99 Million Yen | (11.53) | (11.20) | (8.00) | (8.40) | (5.89) | (6.23) | (5.56) |
| Annual Pay: | 23.18 | 20.22 | 7.03 | 16.70 | 5.44 | 7.19 | 6.12 |
| 9–9.99 Million Yen | (11.31) | (11.14) | (7.53) | (8.20) | (5.39) | (5.78) | (5.69) |
| Annual Pay: | 20.85 | 18.19 | 4.81 | 13.00 | 1.66 | 3.59 | 2.16 |
| 10–10.99 Million Yen | (12.20) | (12.01) | (8.05) | (8.90) | (6.00) | (6.26) | (5.95) |
| Annual Pay: | 25.29 | 20.99 | 8.22 | 16.03 | 5.28 | 7.17 | 5.21 |
| 11–11.99 Million Yen | (11.51) | (11.54) | (7.55) | (8.74) | (5.78) | (6.18) | (6.33) |

*Continued*

increased or decreased. Several theories of downward nominal wage rigidity predict that workers' satisfaction is more sensitive to a 1% nominal wage decline than to a 1% nominal wage increase. This implies $|\beta_1| < |\beta_2|$. This is a very strong empirical prediction of the theory that we would wish to test if we knew the degree of compensation change. Without having the percentage pay change in our data, however, we cannot compare the sizes of the coefficients. We instead limit our attention to the sign and statistical significance of $\beta_2$.

The results of the estimation controlling for education, compensation class, industry, and occupation appear in column (1) of Table 5. Compared with the case of a compensation freeze, a compensation increase boosted workers' satisfaction with their annual pay by about 8 percentage points, while a decrease diminished their satisfaction by about 3 percentage points. Those who earned higher compensation tended to have higher pay satisfaction.

An annual compensation decline may reduce workers' satisfaction with their pay through several channels. As Clark and Oswald (1996) discussed, relative pay, rather than absolute pay, determines workers' satisfaction. Thus, it may be compensation decline compared with a reference group, rather than absolute compensation decline, that negatively affects workers' pay satisfaction.

To address this possibility, we used a

*Table 5.* Continued.

| *Variable* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* |
|---|---|---|---|---|---|---|---|
| Annual Pay: | 24.11 | 21.72 | 7.90 | 16.22 | 4.62 | 6.65 | 4.87 |
| 12–12.99 Million Yen | (11.46) | (11.60) | (8.27) | (8.80) | (6.14) | (6.55) | (6.76) |
| Annual Pay: | 30.48 | 26.84 | 13.33 | 16.29 | 5.01 | 6.50 | 4.65 |
| 13–13.99 Million Yen | (11.50) | (11.38) | (8.23) | (8.13) | (6.19) | (6.61) | (7.07) |
| Annual Pay: | 32.61 | 27.78 | 13.66 | 23.93 | 11.83 | 13.29 | 11.68 |
| 14–14.99 Million Yen | (12.77) | (12.62) | (9.00) | (11.69) | (9.64) | (8.99) | (8.95) |
| Annual Pay: | 26.79 | 19.12 | 6.12 | 14.85 | 4.57 | 6.55 | 4.62 |
| 15 Million Yen or Above | (11.78) | (11.69) | (7.73) | (8.29) | (5.01) | (5.47) | (9.97) |
| Relative Pay: Top 20% | — | –3.84 | 3.51 | 2.16 | 1.70 | 1.93 | 1.79 |
| | | (1.51) | (1.39) | (1.13) | (1.01) | (1.06) | (1.70) |
| Relative Pay: 21–40% | — | –0.50 | 0.02 | –0.03 | –0.37 | –0.23 | –0.59 |
| | | (1.17) | (1.16) | (1.19) | (1.18) | (1.19) | (1.33) |
| Relative Pay: 41–60% | — | –0.02 | –0.73 | –0.19 | –0.79 | –0.76 | –1.13 |
| | | (1.51) | (1.56) | (1.34) | (1.39) | (1.36) | (1.19) |
| Relative Pay: 61–80% | — | –7.14 | –7.17 | –4.39 | –4.10 | –3.88 | –4.35 |
| | | (1.48) | (1.70) | (1.33) | (1.49) | (1.39) | (1.60) |
| Relative Pay: 81–100% | — | –15.68 | –15.41 | –10.63 | –10.46 | –10.04 | –10.74 |
| | | (5.01) | (5.25) | (3.61) | (3.79) | (3.76) | (2.56) |
| Education Dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry & Occupation Dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Trust in Firm | No | No | No | Yes | Yes | Yes | Yes |
| Firm Growth | No | No | Yes | No | Yes | Yes | Yes |
| Firm Fixed Effects | No | No | No | No | No | No | Yes |
| Observations | 1,552 | 1,552 | 1,457 | 1,524 | 1,432 | 1,432 | 1,432 |
| R-Squared | 0.22 | 0.26 | 0.28 | 0.39 | 0.40 | 0.40 | — |

*Notes:* Expressed in percentages. Mean = 70.93. The dependent variable is Satisfaction with Current Annual Income. Estimations are based on a single-year cross-section taken in the year 2000. Standard errors, which are robust with respect to firm-level clustering, are reported in parentheses for the OLS estimates. Usual standard errors are in parentheses for the fixed effects estimates. The base category for the annual compensation dummy variables is 3 million yen or less. The base category for relative income dummy variables is the dummy variable for missing values.

question asking workers how they thought their annual compensation compared with that of colleagues having the same sex, age, educational background, occupation, and so on. Workers were asked to choose one of six responses: (1) upper (≥80th percentile); (2) upper middle (in the 60th to 79th percentile range); (3) middle (40th–59th percentiles); (4) lower middle (20th–39th percentiles); (5) bottom (≤20th percentile); or (6) do not know. The distribution of the answers to this question is shown in Table 2.

The estimation results of the model that includes dummy variables for each of these categories appear in column (2) of Table 5. This inclusion of the relative compensation-position dummy variables, however, does not essentially change the results from column (1). Those who perceived themselves as being in the high relative compensation category tended to have higher satisfaction with their pay.[6]

If workers' accumulation of firm-specific

[6]As an alternative test of the relative income hypothesis, we included the firm-level average incidence of pay increases and decreases in the regression without relative compensation category dummy variables. The estimated coefficients for the mean incidence of pay increases and pay cuts are, respectively, –8.25 (standard error = 7.87) and –16.51 (standard error = 8.01). The coefficients for own pay increases and decreases do not change substantially from their values in the specification with relative income dummy variables. These results indicate that the percentage of a worker's colleagues in the firm who experience pay cuts is negatively associated with the worker's pay satisfaction, even after the analysis

human capital strongly attaches them to their firms, they have good reason to care about their firms' growth. Firms' growth may affect workers' satisfaction with their pay because workers with poor future prospects may require higher current pay to compensate for their future lower expected pay. Compensation declines and freezes may be correlated with firms' growth, and the coefficient on the compensation decline variable or freeze dummy variable may be subject to omitted variable bias. To deal with this issue, we included firms' sales growth between 1996 and 1999 (fiscal years) and employment growth between 1997 and 2000 (calendar years) as proxy variables for the firms' expected growth. The estimates appear in column (3) of Table 5. Sales growth positively affected workers' pay satisfaction, and the coefficient on the compensation decline dummy variable grows to two-thirds the size of the coefficient reported in column (2); however, the coefficient is only marginally significant ($t = -1.91$, p-value = 0.06).

According to Lazear's long-term contract theory (Lazear 1979, 1981), a practice by which firms try to maximize worker effort when that effort cannot be perfectly observed is to pay young workers below their marginal product and older workers above theirs. As mentioned in Lazear's original work and formalized in Kanemoto and MacLeod (1992), this type of long-term contract depends critically on employees' trust that the under-payment early in their work careers will be compensated for by over-payment when they age. Thus, pay cuts may damage workers' trust in their firms and reduce their pay satisfaction. Alternatively, as Bewley (1999) discussed, wage cuts may subvert workers' trust in their firms and their pay satisfaction more directly, by destroying their sense of identification with the firm. Both theories predict that wage cuts will reduce workers' satisfaction with their wages via diminished trust.

If wage cuts affect pay satisfaction only through the destruction of trust between employers and employees, then they should not affect pay satisfaction once "trust" is held constant. However, if wage cuts directly affect pay satisfaction through a channel other than the destruction of trust, then they should be found to negatively affect work morale even after the analysis controls for the "trust" between employers and employees.

To evaluate these two possibilities, we include several variables to capture the transparency of each firm's wage-determining mechanism and workers' trust in their firms. The firm survey asked human resource officers whether the firm provided explanatory material to workers on five subjects: the wage schedule; the worker evaluation sheet; the set of standards for worker evaluation; the mechanism by which worker evaluations were used to determine wages and bonuses; and the mechanism by which worker evaluations were used to determine promotions. For each of the five questions, the answer options were "Yes," "No," or "We do not have one." We created three dummy variables corresponding to each answer and included two of these three dummy variables as explanatory variables in equation (3). These dummy variables are intended to capture the level of trust between firms and workers as inferred through the transparency of wage/bonus/promotion determination.

In addition, responses to several questions in the employee survey were included as explanatory variables. First, employees were asked whether their trust in the firm had increased or decreased over the past three years, with response choices ranging from 1 (decreased very much) to 5 (increased very much). This index is directly included in the regression. Questions about workers' perceptions of the firm's fairness in promotion and wage determination also were used. One question asked whether the respondent felt that the firm's promotional decisions were fair. Possible responses were 1 = unfair, 2 = rather unfair, 3 = neither fair nor unfair, 4 = rather fair, and 5 = fair. This response is directly introduced in the regression. The employee questionnaire also asked for each worker's subjective satisfaction, on a scale between 0 and 100, with the firm's evaluation

conditions on the worker's own experience. We found a similar pattern of coefficients in the specification with work morale as the dependent variable.

of his work performance. This variable is also directly introduced in the regression. The other question aimed at capturing employees' trust in the firm asked each worker how he was most likely to express a work-related complaint. Ten response options were offered: (1) consult the labor union at your workplace; (2) consult colleagues at your workplace; (3) consult a superior at your workplace; (4) tell people in the human resource division; (5) file a complaint with the complaint bureau at your workplace; (6) complete an opinion survey administered by your company; (7) consult an external organization dealing with labor issues; (8) consult a lawyer; (9) do not tell anyone and try to be patient; (10) consider a job change; (MISC.) rely on other methods (specify). One dummy variable, set equal to 1 if the respondent chose alternative (1), was designed to measure the worker's trust in his labor union; a second dummy variable, equal to 1 when the worker chose at least one of the alternatives between (3) and (6), was designed to capture the worker's trust in his firm.

The regression results, including all of the variables explained above that are designed to capture each worker's trust in his firm, appear in column (4) of Table 5. The coefficients indicate that an increase in compensation boosted workers' satisfaction by about 5 percentage points, and a compensation decline diminished satisfaction by about 3 percentage points, compared with the level of satisfaction associated with a compensation freeze. Thus, the speculation that compensation reductions decrease workers' pay satisfaction by destroying their trust in the firm is at best weakly supported by the data.

The results of a regression that includes variables for both the firm's growth and the worker's trust in the firm appear in column (5) of Table 5. These results do not essentially differ from those reported in column (4). Even after we control for several factors, we find that compensation decline continues to have a negative effect on pay satisfaction; indeed, among younger workers the negative effect is stronger than in the specification with fewer controls.

As confirmed in Tables 3 and 4, the estimation with controls for demographic variables shows that older workers were less likely than other workers to experience a pay increase, but equally likely to experience a pay decline. One possible explanation is that the effect of a compensation freeze on pay satisfaction varies by workers' age. To examine this possibility, we estimated a specification that includes the interaction between age and the dummy for a compensation increase or decrease. The results are reported in column (6) of Table 5. The coefficient on the interaction between compensation increase and age is negative, implying that a compensation increase is associated with a smaller uptick in pay satisfaction among older workers than among younger workers. Conversely, this result can be interpreted as suggesting that a pay freeze will more strongly erode the pay satisfaction of young workers than of older workers—probably because young workers more confidently expect a compensation increase.

One interesting result is the zero coefficient for the term interacting a compensation decrease with age. This result, which implies that a given decrement in compensation negatively affects workers' pay satisfaction by the same degree regardless of the workers' age, explains why older and younger workers are equally likely to experience a pay decline, assuming that firms make the decision to cut pay based partly on reliable knowledge of how workers' pay satisfaction is likely to change in response to that action.

Thus far, the analysis has ignored firms' heterogeneity, which could be correlated with the event of a compensation increase or decrease. Failing to control for firms' heterogeneity could potentially bias the estimates. On the one hand, the firms that cut workers' compensation may have been experiencing financial hardship that was not captured by the observed variables. This financial hardship may have poisoned the atmosphere at the workplace, negatively affecting workers' pay satisfaction. The adverse effect of a pay cut on workers' pay satisfaction might thus operate through a bad workplace atmosphere. On the other hand, if a firm tells workers that it is resorting to pay cuts in order to avert layoffs, workers may react less negatively. In this case, the negative effect of a pay cut on pay satisfaction will be

*Table 6.* Ordered Probit Estimation of the Change in Workers' Morale.

| *Variable* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* |
|---|---|---|---|---|---|---|---|
| Pay Increase | 0.19 | 0.14 | 0.12 | –0.01 | –0.02 | –0.01 | –0.01 |
| | (0.07) | (0.07) | (0.07) | (0.09) | (0.09) | (0.10) | (0.11) |
| Pay Increase * (Age – Mean[Age]) | — | — | — | — | — | 0.00 | –0.00 |
| | | | | | | (0.01) | (0.01) |
| Pay Decline | –0.20 | –0.22 | –0.23 | –0.15 | –0.18 | –0.16 | –0.15 |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.08) | (0.09) |
| Pay Decline * (Age – Mean[Age]) | — | — | — | — | — | 0.01 | –0.01 |
| | | | | | | (0.01) | (0.01) |
| Age | –0.02 | –0.01 | –0.01 | –0.01 | –0.01 | –0.01 | –0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Tenure | –0.00 | –0.01 | –0.01 | –0.01 | –0.01 | –0.01 | –0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Annual Pay: 3–3.99 Million Yen | –0.72 | –0.66 | –0.89 | –0.65 | –0.78 | –0.78 | –0.75 |
| | (0.30) | (0.30) | (0.20) | (0.31) | (0.23) | (0.22) | (0.23) |
| Annual Pay: 4–4.99 Million Yen | –0.83 | –0.79 | –1.19 | –0.79 | –1.07 | –1.08 | –1.04 |
| | (0.29) | (0.30) | (0.19) | (0.26) | (0.19) | (0.19) | (0.19) |
| Annual Pay: 5–5.99 Million Yen | –0.50 | –0.51 | –0.93 | –0.64 | –0.90 | –0.91 | –0.86 |
| | (0.27) | (0.30) | (0.17) | (0.24) | (0.18) | (0.17) | (0.18) |
| Annual Pay: 6–6.99 Million Yen | –0.51 | –0.55 | –0.97 | –0.72 | –0.97 | –0.98 | –0.94 |
| | (0.29) | (0.30) | (0.17) | (0.28) | (0.22) | (0.22) | (0.22) |
| Annual Pay: 7–7.99 Million Yen | –0.34 | –0.40 | –0.82 | –0.56 | –0.80 | –0.82 | –0.81 |
| | (0.29) | (0.30) | (0.16) | (0.26) | (0.20) | (0.20) | (0.20) |
| Annual Pay: 8–8.99 Million Yen | –0.18 | –0.25 | –0.64 | –0.60 | –0.78 | –0.80 | –0.79 |
| | (0.33) | (0.35) | (0.22) | (0.28) | (0.26) | (0.26) | (0.27) |
| Annual Pay: 9–9.99 Million Yen | –0.12 | –0.24 | –0.67 | –0.50 | –0.71 | –0.73 | –0.72 |
| | (0.30) | (0.32) | (0.20) | (0.27) | (0.24) | (0.23) | (0.22) |
| Annual Pay: 10–10.99 Million Yen | 0.37 | 0.26 | –0.14 | –0.01 | –0.16 | –0.18 | –0.18 |
| | (0.26) | (0.27) | (0.16) | (0.23) | (0.21) | (0.20) | (0.19) |
| Annual Pay: 11–11.99 Million Yen | 0.06 | –0.08 | –0.49 | –0.36 | –0.54 | –0.56 | –0.56 |
| | (0.26) | (0.28) | (0.19) | (0.24) | (0.22) | (0.21) | (0.21) |
| Annual Pay: 12–12.99 Million Yen | 0.35 | 0.25 | –0.14 | –0.28 | –0.39 | –0.42 | –0.43 |
| | (0.27) | (0.30) | (0.25) | (0.31) | (0.30) | (0.30) | (0.28) |

*Continued*

underestimated because of a failure to hold firms' employment policies constant. To deal with these possible biases, whose sign cannot be determined *a priori,* we adopted a firm-level, fixed-effects estimation. The results, shown in column (7) of Table 5, are virtually identical to those reported in column (6). Thus, any bias linked to firm heterogeneity would seem to be minimal.

### The Effect of Pay Cuts on Work Motivation

In this section, we attempt to directly recover the causal relation between compensation change and the change in workers' morale. The employee survey asked about the change in the individual worker's morale and general workplace morale over the past three years. To the question, "How has your individual and your colleagues' workplace morale changed in the past 3 years?" employees responded by choosing one of five options: (1) decreased; (2) decreased somewhat; (3) hard to tell; (4) increased somewhat; and (5) increased. Responses to this question allowed us to relate the change in compensation to the change in the individual worker's morale.

Using this question has two merits. First, the question directly asked about individual workers' morale, making it possible for us to

*Table 6.* Continued.

| *Variable* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* |
|---|---|---|---|---|---|---|---|
| Annual Pay: | 0.45 | 0.31 | –0.09 | –0.45 | –0.57 | –0.60 | –0.66 |
| 13–13.99 Million Yen | (0.31) | (0.33) | (0.23) | (0.30) | (0.30) | (0.31) | (0.32) |
| Annual Pay: | 0.47 | 0.31 | 0.02 | 0.02 | –0.10 | –0.12 | –0.15 |
| 14–14.99 Million Yen | (0.61) | (0.57) | (0.53) | (0.45) | (0.49) | (0.47) | (0.54) |
| Annual Pay: | 1.44 | 1.21 | 0.89 | 0.14 | 0.01 | –0.01 | –0.02 |
| 15 Million Yen or Above | (0.29) | (0.35) | (0.28) | (0.34) | (0.35) | (0.35) | (0.36) |
| Relative Pay: Top 20% | — | –0.25 | 0.26 | 0.23 | 0.24 | 0.24 | 0.26 |
| | | (0.10) | (0.08) | (0.15) | (0.14) | (0.15) | (0.15) |
| Relative Pay: 21–40% | — | –0.28 | 0.26 | 0.24 | 0.22 | 0.22 | 0.24 |
| | | (0.09) | (0.10) | (0.10) | (0.11) | (0.11) | (0.11) |
| Relative Pay: 41–60% | — | –0.15 | 0.11 | 0.13 | 0.12 | 0.12 | 0.12 |
| | | (0.07) | (0.06) | (0.08) | (0.08) | (0.08) | (0.09) |
| Relative Pay: 61–80% | — | –0.23 | –0.27 | 0.00 | –0.03 | –0.03 | –0.02 |
| | | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Relative Pay: 81–100% | — | –0.31 | –0.39 | 0.04 | –0.00 | –0.01 | –0.02 |
| | | (0.11) | (0.11) | (0.09) | (0.09) | (0.09) | (0.08) |
| Education Dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry & Occupation Dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Trust in Firm | No | No | No | Yes | Yes | Yes | Yes |
| Firm Growth | No | No | Yes | No | Yes | Yes | Yes |
| Firm Fixed Effects | No | No | No | No | No | No | Yes |
| Observations | 1,553 | 1,553 | 1,456 | 1,523 | 1,430 | 1,430 | 1,430 |
| Log Likelihood | –2,100 | –2,082 | –1,917 | –1,816 | –1,681 | –1,681 | –1,655 |

*Notes:* The dependent variable is the change in the worker's morale over the previous 3 years (declined, declined somewhat, hard to tell, increased somewhat, increased; mean = 3.11). Estimations are based on a single-year cross-section taken in the year 2000. Standard errors, which are robust with respect to firm-level clustering, are reported in parentheses for the OLS estimates. Usual standard errors are in parentheses for the fixed effects estimates. The base category for the annual compensation dummy variables is 3 million yen or less. The base category for relative income dummy variables is the dummy variable for missing values.

directly test Bewley's (1999) morale theory. Second, the question's focus on the change in workers' morale rather than the current level of morale spared us from having to make an interpersonal comparison of subjective answers. In addition, we could relate the change in compensation to the change in worker morale. One drawback is that the compensation change question asked about the change over the previous year whereas the morale change question asked about the change over the past three years.[7] The latent variable of the change in workers' morale is specified as

$$m_i^* = \beta_1 Increase_i + \beta_2 Decrease_i + x_i\gamma + u_i, \tag{4}$$

where all the notations except $m_i^*$ are the same as in equation (3), while $m_i^*$ is the latent variable for the change in workers' morale. This latent variable is linked to the observed response by the equation

$$m_i = \begin{cases} 5 \text{ if } m_i^* \geq \mu_4, \\ 4 \text{ if } \mu_4 > m_i^* \geq \mu_3, \\ 3 \text{ if } \mu_3 > m_i^* \geq \mu_2, \\ 2 \text{ if } \mu_2 > m_i^* \geq \mu_1, \text{ or} \\ 1 \text{ if } \mu_1 > m_i^*, \end{cases} \tag{5}$$

[7]While the morale change in the past year is the "true" measurement, the measured variable is the change over the past three years. Thus this issue can be conceptualized as the measurement error in the dependent variable. If the morale change between t – 3 and t – 1 (measurement error) is not correlated with the pay cut in the last year, we still obtain a consistent estimator.

where $m_i$ is a categorical variable indicating worker $i$'s response to the morale question—from 1 ("decreased") to 5 ("increased")—and $\mu_k$ ($k$ = 1,2,3,4) are the thresholds of morale change that determine the answer to the morale question. The results of the estimation with standard covariates, shown in column (1) of Table 6, indicate that a compensation increase stimulated worker morale, while a compensation decrease demoralized workers. Both effects are statistically significant.

Compensation change can affect morale change through several channels. To identify these channels, we added sets of covariates to the morale change equation gradually, as in the analysis of the previous section. The first set of covariates corresponds to workers' perception of their relative compensation position. The results, shown in column (2), Table 6, are essentially identical to those of column (1), except for the size of the estimated coefficients. The second set of covariates consists of the proxy variables for the firms' growth: firms' sales growth between 1996 and 1999 and employment growth between 1997 and 2000. The results of the estimation, reported in column (3), do not differ drastically from those in column (2). The third set of covariates consists of the proxy variables for workers' trust in their firms: the transparency of firms' wage policy, the change in trust workers reported feeling toward their firms over the previous three years, their perception of the fairness of promotion and wage determination, and the parties (if any) to whom they directed their work-related complaints. The inclusion of this set of covariates drastically changes the estimated effect of compensation change on the change in worker morale, as reported in column (4). With conditioning on workers' trust in their firms, a pay increase no longer raises workers' morale. This changed result implies that the positive effect of a pay increase on workers' morale operates by fostering workers' trust in their employers. In contrast, the adverse effect of a compensation cut on workers' morale is estimated to be statistically significant even after controlling for the change in workers' trust in their employers. In column (5) are the results of an estimation including the proxy for firm growth in addition to the variables included in column (4). The addition of the proxy variables for firm growth does not appreciably change the estimation results.

Thus far, we have made no allowance for the possibility that the effect of a pay change on morale varies by worker age. To control for this possible heterogeneity, we augment the specification with a term interacting age with dummy variables for a pay increase and a pay decrease. The coefficients on these interaction terms (column 6, Table 6) are virtually zero, and the morale responses are homogeneous across age groups. Finally, we investigate whether unobserved firm heterogeneity is correlated with the event of a pay increase or decrease. The existence of correlated heterogeneity could bias the coefficient for a pay decrease in either an upward or a downward direction. A pay decrease may be more likely to occur in firms that use pay cuts to preserve jobs or in firms with a worsening workplace atmosphere. To address these possible heterogeneity effects, we introduced a dummy variable for each firm into the estimation. The results of the new estimation, in column (7), are virtually unchanged from the column (6) results.

The results reported in this section clearly indicate the negative effects of compensation cuts on workers' morale, even after we control for several factors that could occur simultaneously with compensation change, such as a change in workers' trust in their employers or unobserved employer heterogeneity. This pattern of results supports Bewley's (1999) morale theory of nominal wage rigidity.[8]

## Discussion

In a generally favorable review of Bewley's (1999) work, Howitt (2002) claimed that the downward wage rigidity Bewley reported might be attributable not to employers' reluctance to cut pay for fear of demoralizing workers and reducing their effort (as Bewley

[8]Alternatively, but not mutually exclusively, the findings can be interpreted as the loss aversion of workers originally proposed by Kahneman and Tversky (1979) and applied to determination of the age-wage profile by Loewenstein and Sicherman (1991).

argued), but rather to a "coordination game," which has a payoff structure. In this game, a worker's best response to the firm employing him is cooperation if the firm cooperates in turn, and non-cooperation if it does not cooperate. In this setting, a "cheerful" equilibrium (with high sustained worker morale and no pay cuts) and a "sullen" equilibrium (with demoralized workers and pay cuts) are both Nash equilibria. With this possibility in mind, Howitt suggested that researchers test refutable hypotheses that are specific to Bewley's morale (or reciprocity) theory. Because Howitt's reservations about Bewley's study also apply to our work, we tested one of the morale-theory-derived refutable hypotheses Howitt suggested.

One refutable hypothesis Howitt suggested is that pay cuts are less likely in profitable firms than in firms running a deficit. In particular, an implication of Bewley's theory is that a pay cut under profitable conditions is particularly apt to hurt workers' morale because workers in such circumstances are likely to view a pay cut as a betrayal. Note that the explanation based on the "coordination game" does not predict this outcome, because whether the "cheerful" or "sullen" equilibrium occurs is randomly determined and should be independent of sales growth.

Our data set does not contain information on firms' profits, but as a proxy we can use a firm's sales growth rate for the past three years. After we control for labor market conditions, such as the mean wage increase or decrease across the country, whether workers' wages increase or decrease should be independent of individual firms' sales growth, according to standard neoclassical theory.

Columns (5) and (6) of Table 4 show the results of the multinomial logit estimation of the wage change equations, including sales growth as an additional explanatory variable. The sales growth ratio is the difference between the sales totals for 1997 and 2000 divided by the sales total for 1997. Column (5) indicates that sales growth did not significantly affect the probability of a pay increase, while column (6) indicates that sales growth significantly reduced the probability of a pay decrease. The marginal magnitude of the latter effect is –0.31, which implies that workers in those firms that experienced 10% sales growth were 3.1 percentage points less likely to experience a total annual compensation decline than were workers in firms with zero sales growth. This statistically significant reduction in the probability of a compensation decline is consistent with the morale theory of nominal wage rigidity. Note that the effect of an industry- or occupation-level labor demand shock on pay change is captured by the industry and occupation dummies.[9]

## Conclusion

Using an employer-employee survey conducted in Japan in 2000, we have examined the effect of pay cuts on workers' pay satisfaction and morale during a period of deflation. The data show that about 17% of workers experienced a nominal annual pay cut. Workers who experienced pay cuts were less satisfied with their pay and had lower morale than those who did not experience pay cuts. We found that a compensation increase positively affected workers' morale by reinforcing their trust in the firm. In contrast, even after controlling for workers' trust in their firms, we find that pay cuts negatively affected their morale. These findings are very robust, persisting even after we control for workers' and employers' heterogeneity by using the rich information available in our survey.

Our results clearly indicate that workers are demoralized by nominal compensation cuts, even during times of deflation. The results obtained in this paper support the morale theory of wage rigidity articulated by Bewley (1999), although we are unable to say whether the pay cuts in our data were real or only nominal, given that the

[9]When we investigated whether firms' sales growth mediated the effects of pay decline on worker morale, we found no statistically significant difference between growing and contracting firms. This is probably because the sample of growing firms that made pay cuts is so small—growing firms being less likely than shrinking firms to make pay cuts—that only very large differences between growing and contracting firms could be identified by the estimation.

exact amounts of the nominal compensation cuts were unknown in our survey. We offer strong evidence that nominal pay decreases demoralized workers, while pay freezes did not, under deflation. This evidence explains why nominal pay is rigid in a downward direction and the wage change distribution has a spike at zero, even during a deflationary recession.

Whether our findings are generalizable to countries outside Japan is not yet clear. However, of all factors that might make Japan's case special, probably the most important is the strong attachment between employers and their employees, as pointed out in Hart and Kawasaki (1999) and Rebick (2005). Thus, we speculate that our results may carry over to workers outside Japan who have a relatively strong attachment to their employers.

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