The Japanese Economic Review
Vol. 52, No. 1, March 2001

WHY HAS THE UNEMPLOYMENT RATE BEEN SO LOW IN JAPAN? AN EXPLANATION BY TWO-PART WAGE BARGAINING*

By SHIGERU WAKITA
Tokyo Metropolitan University

The Japanese wage payment system is considered from a perspective of two-part tariff pricing. Using the "amusement park" analogy, Shunto wages can be regarded as an "entrance fee", whereas bonuses are a "variable charge". Empirical investigation showed that a qualitative difference exists between these two types of wage: Shunto sets the coordinated wage rate by focusing on the whole labour market condition, while bonuses respond to idiosyncratic shock. Based on the standard prediction of two-part wage tariff pricing, such a unique combination is the ultimate source of Japan's low unemployment.
JEL Classification Number: J51.

1. Introduction

Despite a severe recession in recent years, Japan's unemployment rate has remained low compared with that of European countries. Although this low unemployment rate has received relatively little attention in recent years, many researchers examined Japan's wage determination system in the 1980s. Among others, Weitzman (1984) and Freeman and Weitzman (1987) stress the wage flexibility attained by awarding biannual bonuses, the amount of which varies with individual firms or with a particular industry's profit. Although Weitzman's argument received a wide coverage and was mentioned in major macroeconomics textbooks, some other studies (Shinkai, 1980; Taylor, 1989; Grossman and Haraf, 1989; Ueda and Okazaki, 1989; Koshiro, 1991) instead stressed the importance of the centralized, annual nationwide wage bargaining over contractual *wages* occurring each April in Japan, the so-called *Shunto*.[1]

When evaluated from a cross-sectoral perspective, the nominal wage rate increase per year that occurs under Shunto would seem to show artificial smoothing (Figure 1), especially after the first oil crisis period. Although macro bargaining is generally considered to be a source of stagflation, especially in many European countries, such

* I would like to thank Tsuneo Ishikawa, Kazuo Koike, Jiro Nakamura, Michio Nitta, Hiroshi Yoshikawa, seminar participants at the University of Tokyo (Department of Economics and Institute of Social Science), the Tokyo Metropolitan University, the Tokyo Centre for Economic Research and Kansai Labour Meeting, and an anonymous referee for their valuable comments.

[1] The wage payment system in Japan is characterized by a higher frequency of wage negotiations as well as by annual synchronization. Although the formal participant rate for Shunto is only about 30%, which is not so large in comparison with other countries (see Bruno and Sachs, 1985, and Layard *et al*., 1991, for international comparisons), during the period under study wage revisions occurred at 99% of Japan's plants. Hence Shunto is literally nationwide, and also influences non-union and public-sector workers. For an English summary of institutional behaviour in the Japanese labour market, see Shirai (1983), Aoki (1988), and Ito (1992). For the mechanism and evolution of Shunto, Koshiro (1983) offers some detailed explanations.

Published by Blackwell Publishers, 108 Cowley Road, Oxford OX4 1JF, UK.

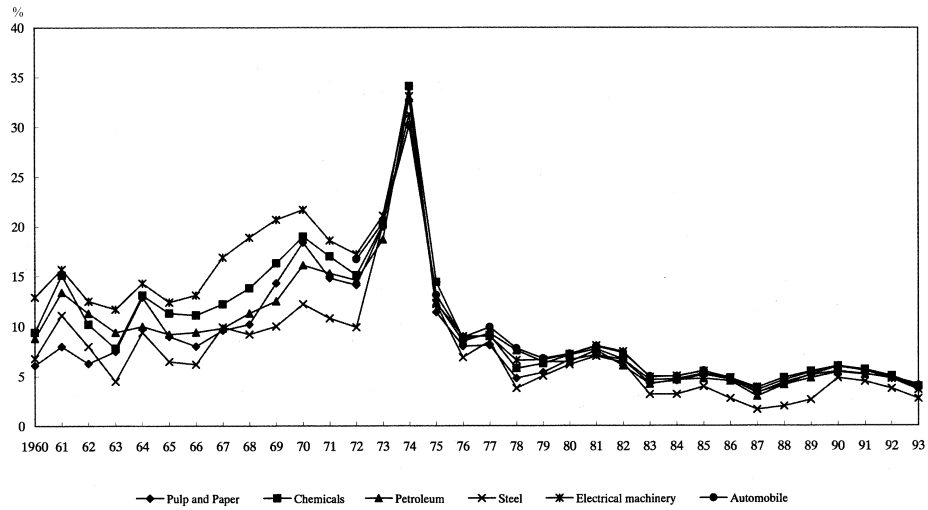

FIGURE 1. Shunto wage bargaining results, by industry, 1960–1993

smoothing under Japan's Shunto is carried out with regard to the overall macroeconomic condition, and this has been considered by some to be the reason for the good performance of the Japanese labour market.[2]

Although this argument is quite convincing and is generally accepted, a problem arises in that this unique feature of Shunto is logically and empirically (Okina *et al*., 1989) cancelled out at the total wage level if the *ex post* idiosyncratic adjustment by *bonuses* is considered (Figure 2). In actuality, under so-called *macroeconomic-consistent wage*

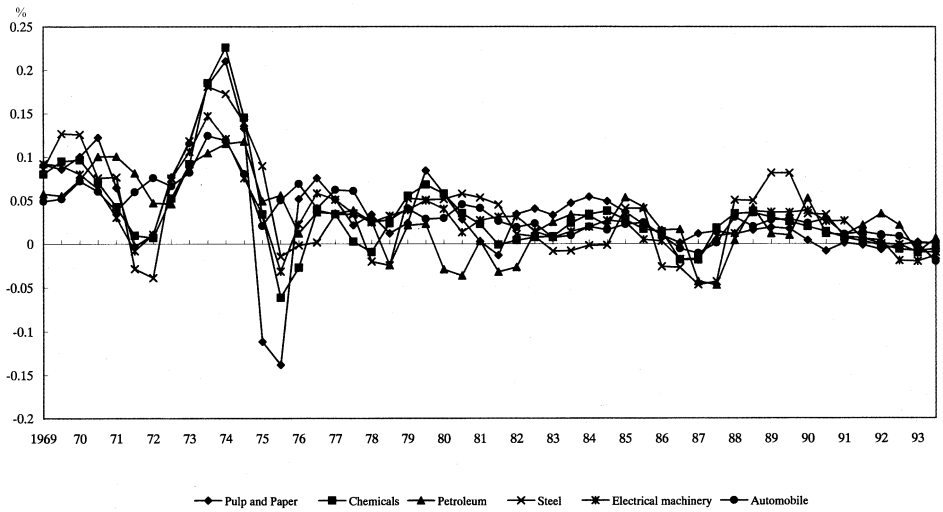

FIGURE 2. Bonuses: resulting wage increases/decreases, by industry, 1969–1993

[2] Calmfors and Horn (1986) analysed the combination of stagflation and rapid expansion of the public sector under centralized wage-setting based on evidence from smaller European countries.

demand tactics (see e.g. Aoki, 1988, p. 178), the coordination at Shunto appears too artificial, which may lead some firms to increase the share of bonuses by up to 40%. Such a tendency naturally raises two questions: (1) Why are wages separated into contractual wages and bonuses? and (2) Is coordination at Shunto really effective?

To answer these questions, the following facts should be noted. First, Japan's labour market is characterized by the large-firm-size effect on wages and working conditions.[3] Second, the relative share of bonuses is larger in the large-firm sector. (See e.g. table II of Nakamura and Nakamura, 1991, or p. 234 of Ito, 1992.) In light of these two facts, higher bonuses prevail for workers who are privileged and protected under the lifetime employment convention, while Shunto is more influential over the small-firm sector where employment is unstable.

On this point, most Japanese labour economists are sceptical of Weitzman's "share economy" hypothesis, which states that firms paying higher bonuses increase employment, since in fact such firms generally accept only new university graduate workers after strict screening (*Teiki-shinsotsu-saiyo*) and observe fairly rigid employment practices. Many previous studies on Japan's wage flexibility since Gordon (1982) have ignored the above institutional features, which produced quite unsatisfactory results; i.e., that no evidence exists for Japan's wage flexibility (see e.g. Nakamura, 1995).

This paper will argue that studies emphasizing *either* the role of Shunto *or* that of bonuses have provided only a partial explanation of why Japan's wage determination system has produced such a low unemployment rate. The combination of Shunto and bonuses can easily be understood when considering an "amusement park" analogy of two-part tariff pricing (Oi, 1971): i.e., *ex ante* agreement on low-level wages at Shunto determines an "entrance fee" for the labour market (entering the amusement park), which is dependent on the whole macroeconomic condition, while *ex post* adjustment in the large-firm sector using bonuses can be regarded as a "variable charge" (number of rides in the amusement park), which makes up for any loss incurred by the relatively low-level Shunto wages. Unless bonuses exist, large firms may not participate in Shunto, which imposes low-level wages to eliminate unemployment. Hence it is this relationship between the two, rather than the existence of either macro bargaining or bonuses alone, that is a unique feature in Japan, reducing unemployment under the standard prediction of two-part tariff pricing.

To investigate this hypothesis, the present study empirically analyses Japan's wage determination system using the following procedure. If the hypothesis is true, at least two qualitative differences should exist between Shunto and bonuses. First, the entrance fee should be cross-sectorally smoothed in spite of any idiosyncratic shock, and second, the variable charge should not be. By modifying the test for aggregate consumption insurance developed by Mace (1991), Cochrane (1991), and Townsend (1994), I will test for the *existence* of such cross-sectoral real-wage smoothing.

Next, I investigate the *range* of participants for wage smoothing by performing a non-nest comparison based on the familiar Phillips curve over the following two models: (i) the "large-sector model", in which wage smoothing is done by limited and privileged participants, namely the incumbents in large firms ("insiders", in the terminology of

[3] Ishikawa (1991) argued that Japan's labour market is segmented into large and small-firm sectors, i.e., the *primary* and *secondary* sectors, in the terminology of Doeringer and Piore (1971). In the present study, the existence of segmentation is not an essential factor to analyse the wage determination system. See also McDonald and Solow (1985) for a general equilibrium treatment of "dual labour market".

Lindbeck and Snower, 1988), and (ii) the "whole market model", in which the participants in wage insurance are all workers (including outsiders, who work in the secondary sector).[4] If wages under Shunto are the entrance fee, they should be low enough to enable a firm to hire as many workers as possible and the latter model should apply. On the other hand, the range of wage smoothing that takes place with bonuses should be narrower, because their role is a *variable part* in response to idiosyncratic shock.

Section 2 investigates the existence of coordination, while in Sections 3 and 4 a non-nested comparison is performed over models (i) and (ii) to search for the range of coordination under Shunto and bonuses, respectively. Section 5 provides a summary and concluding remarks.

2. Existence of coordination

As is well known, the two-part tariff model argues that monopoly firms set two kinds of charge: lump-sum charges, and a variable charge for the quantity. The "amusement park" analogy shows that a lower "entrance fee" attracts more entrants, and that therefore lower Shunto wages may reduce unemployment. Hence the hypothesis presented here simply implies that Shunto determines lump-sum charges (entrance fee), while bonuses are variable charges. However, the empirical testing of this leads to a problem, in that the level of both charges may not be uniform, instead responding to the macroeconomic stochastic shock, as well to the differences of (initial) human capital.[5] To incorporate this intertemporal and cross-sectoral fluctuation in the standard two-part tariff model, I postulate a benchmark economy in which two-part *wage* insurance prevails by modifying the test for aggregate *consumption* insurance by Mace (1991), Cochrane (1991), and Townsend (1994).[6]

The economy is divided into a finite number of sectors ($i = 1, \ldots, I$) whose population of workers is normalized at 1. It is assumed that the human capital level of workers is the same *within* sectors, but different *across* sectors.[7] The problem will be described in three steps. First, a simple two-part tariff problem of individual sector for wage determination is considered. The total utility of workers in the ith sector at t, X^i_t, is

$$X^i_t(\theta^i_t) \equiv W^i_{ct}(\theta^i_t) + W^i_{bt}(\theta^i_t) - e^i_t(\theta^i_t)n(W^i_{bt}(\theta^i_t)), \tag{1}$$

[4] Following Sano (1979), the wage smoothing under Shunto has been interpreted not only as spillover but also as an explicit coordination mechanism. Sano and others, however, produced evidence for firms within specific industries. This paper extends such a hypothesis to a macroeconomic level, and emphasizes the role of bonuses, which is a key factor making the coordination under Shunto possible.

[5] Kuhn (1988) introduced non-uniform pricing into the union contract model to explain the seniority within a *single* firm–union setting, which is different from our multi-sector setting.

[6] Wage insurance is emphasized by the implicit contract theory, and the equivalence between the complete market allocation and an optimal labour contract has been shown by Rosen (1985), Wright (1988), and Boldrin and Horvath (1995). My empirical procedure is parallel to the work of Mace and others, although they considered cross-sectoral *consumption* smoothing instead of intertemporal consumption smoothing, whereas I investigate cross-sectoral *wage* smoothing instead of intertemporal wage smoothing.

[7] For a detailed explanation of price discrimination, see e.g. Varian (1988).

where the contractual wage rate of the ith sector in tW^i_{ct}, the bonus W^i_{bt}, and the disutility of harder work intensity e^i_t are a function of states of the world θ^i_t.[8] The (extra) working hours of workers n is a function of W^i_{bt}, in that Ohashi (1990) argued that bonuses are empirically explained by unobserved work intensity. The reason that e^i_t is considered separately, in addition to working hours, is that the average labour productivity is more volatile than the number of working hours, which indicates the existence of chronic labour hoarding; this is recognized as one prominent major property of business cycles in Japan.[9]

Next, to introduce aggregate wage insurance, consider a nationwide union leader, instead of a social planner such that the following expected indirect utility of composite workers maximized:[10]

$$\max_{W^i_{ct},W^i_{bt}} \sum_i^I \omega^i \int u[W^i_{ct}(\theta^i_t) + W^i_{bt}(\theta^i_t) - e^i_t(\theta^i_t)n(W^i_{bt}(\theta^i_t))]\,\mathrm{d}\theta, \tag{2}$$

where the weight ω is for holding initial human capital instead of initial wealth under the social planner approach.

The budget constraint of nationwide aggregate wage insurance is

$$\sum_i^I Y^i_t \geqslant \sum_i^I [W^i_{ct}(\theta^i_t) + W^i_{bt}(\theta^i_t) + \pi^i_t(\theta^i_t)], \tag{3}$$

where $Y^i[\equiv F(n)]$ is the real product, F is the production function, and π^i_t is the real profit in the ith sector at t.

Furthermore, the bonus as a "variable charge" should fulfil the following incentive constraint for the union to participate in the nationwide wage insurance:

$$W^i_{bt}(\theta^i_t) \geqslant e^i_t(\theta^i_t)n(W^i_{bt}(\theta^i_t)), \qquad i = 1, \ldots, I. \tag{4}$$

Note that other interpretations for this constraint, e.g. asymmetric information, are quite possible.

Third, to derive the empirically testable conditions, a dynamic model is considered. Assuming the time-separable utility function, the problem of union leader is

---

[8] It is assumed that workers cannot choose their own work intensity. If this is not the case, however, it does not affect the following analysis.

[9] The possibilities of layoffs and unemployment are ignored in this paper in order to concentrate on an empirical analysis of Japan's system. To investigate such possibilities theoretically, the heterogeneity of workers derived from seniority rule or human capital level within a sector, and the existence of an alternative opportunity for workers, should be introduced as in Kuhn (1988). Furthermore, although the efficiency wage interpretation of bonuses is possible in the above problem following Ohashi (1990), I will not pursue this issue here.

[10] Although the model is based on the maximization problem of a nationwide union leader, I do not argue that actual union leaders in Japan are altruistic as in the model. Several labour economists have suggested to me that smoothing across and within industries is established by the political process among enterprise-specific and/or industry-wide union leaders. Following this explanation, if some unions should fail to increase the wage rate compared with their reference group, they will lose their position. Although I think that this is a plausible explanation, the purpose here is to check the welfare implication of the outcome of wage systems.

$$\max_{W^i_{ct},W^{ii}_{bt}} \sum_i \omega^i \sum_{t=0}^{\infty} \beta^t \int u[W^i_{ct}(\theta^i_t) + W^i_{bt}(\theta^i_t) - e^i_t(\theta^i_t) n(W^i_{bt}(\theta^i_t))]\, \mathrm{d}\theta, \tag{5}$$

subject to (3) and (4), where β is the discount factor. The first-order necessary conditions are:

$$W_{ct}: \qquad \omega_i u'(X^i_t) - \lambda_t = 0, \tag{6}$$

$$W_{bt}: \qquad \omega_i u'(X^i_t)\left(1 - e^i_t \frac{\partial n^i_t}{\partial W^i_{bt}}\right) + \lambda_t \left(\frac{\partial Y^i_t}{\partial n^i_t}\frac{\partial n^i_t}{\partial W^i_{bt}} - 1\right) + \mu^i_t = 0, \tag{7}$$

and the constraints (3) and (4), where λ_t is a Lagrange multiplier associated with the resource constraint (3) and μ^i_t a Lagrange multiplier associated with the incentive constraint (4).

Before considering the implications for empirical testing, it should be noted that the result of the above problem does not mean Pareto efficiency. Substituting (6) into (7) yields

$$\frac{\partial n^i_t}{\partial W^i_{bt}}\left(\frac{\partial Y^i_t}{\partial n^i_t} - e^i_t\right) = -\frac{\mu^i_t}{\lambda_t}, \tag{8}$$

which shows that $\partial Y^i_t/\partial n^i_t > e^i_t$ (or $\partial Y^i_t/\partial n^i_t > W^i_{bt}/n^i_t$, using (4)). This inequality suggests that the marginal product of working hours is smaller than the disutility of harder working intensity under constraint (4), suggesting a lower production level than optimal, unless $\mu^i_t = 0$.[11]

Assuming that constraint (4) is binding, we get $X^i_t = W^i_{ct}(\theta^i_t)$ and $W^i_{bt} = e^i_t n(W^i_{bt}, \theta)$. Here, I assume the isoelastic form of utility function; i.e.,

$$u(X) = \frac{X^{1-\delta} - 1}{1 - \delta}. \tag{9}$$

The testable implications can be easily derived from the first-order conditions,

$$\log X^i_{t+1} - \log X^i_t = \log X^j_{t+1} - \log X^j_t$$

or

$$\log W^i_{ct+1} - \log W^i_{ct} = \log W^j_{ct+1} - \log W^j_{ct}, \tag{10}$$

which indicate the smoothing of utilities, or contractual wage increase rates, across various sectors in spite of stochastic shock and differences in initial human capital.

The empirical tests of coordination can be directly performed using the above. Following Mace (1991), I estimate that

$$\Delta_4\left(\frac{w^i}{p}\right) = \text{constant} + \alpha\Delta_4\left(\frac{w^a}{p}\right) + \beta I^i, \tag{11}$$

where w^i is the individual industry's nominal wage rate, w^a is the average nominal wage rate, and I^i is the individual component that may affect wages. Throughout this paper, lower-case variables are the natural logarithm of their counterparts $\log(X)$ and $\Delta_1 x$ is $\log(X_t) - \log(X_{t-1})$.

[11] If $\mu^i_t = 0$, the bonus is also smoothed across sectors, again depending on e. In this situation the testable equation cannot be derived.

The model predicts that (a) there is no effect caused by individual components ($\beta = 0$), and (b) to obtain complete wage insurance, wages are determined solely at an aggregate insured level ($\alpha = 1$). If the hypothesis of two-part tariffs is true, the empirical results should be different; i.e., the entrance fee should be smoothed whereas the variable charge should not be.

Hence, in this empirical test the critical problem is the choice of I_t. Here, I use subjective labour hoarding survey data, taken from a short-run survey of major Japanese enterprises conducted by the Bank of Japan.[12] The survey contains only qualitative responses, i.e. "excessive", "normal", and "deficient", and therefore the data are converted into a quantitative series, termed hereafter the "labour hoarding judgement index (*DKM*)". Since no firms answered "excessive", especially in periods following the first oil crisis, a uniform distribution is assumed for the aggregate distribution of the survey. The exact conversion formula is[13]

$$DKM = \frac{(\%\ \text{“excessive”}) - (\%\ \text{“deficient”})}{\%\ \text{“normal”}}.$$

The advantage of using *DKM* is that it reflects all available information on the condition of the internal labour market and is independent with respect to the specific hypothesis, in contrast to profit or overtime hours.

Table 1 summarizes the estimation results for an aggregate, cross-sectoral *real*-wage increase rate under Shunto on an annual fiscal basis, while Table 2 gives similar results for bonuses, which is a seasonally differenced variable taken on a half-yearly basis.[14] The dependent variables are obtained from a survey conducted by Japan's Ministry of Labour (Roudou-syo Rousei-kyoku) for firms having more than 1,000 employees, and are deflated by the consumer price index (*cpi*).[15] Note that Table 1 still shows the apparent coordination that occurs in the Shunto real-wage increase rate for the six indicated industries. In spite of the large dispersion of *DKM* shown in Figure 3,[16] note that the individual component *DKM* is not significant at a 5% level in *any* of the industries.

[12] This unique survey asks more than 500 large firms about their judgement on such factors as the current/expected level of employees, business conditions, output and input prices, capital stock and inventory stock. Although the number of surveyed firms may seem limited, this sample includes about 70% of the firms in Japan whose capital is greater than ¥1 billion. Consequently, a good description is obtained of typical Japanese large-firm management practices. See Wakita (1997b) for a non-stationary time-series analysis of these survey data.

[13] The conversion formula is different from that applied in usual balance statistics, i.e., "Excessive"–"Deficient", because dividing the balance statistics with "Normal" allows the range to be varied to obtain a uniform distribution over time (see Pesaran, 1987, pp. 214–15). Moreover, many studies since Carlson and Parkin (1975) have employed an additional step to obtain the exact expectation series in order to compare the actual series such as the inflation rate. This paper, however, does not need more steps, because the labour hoarding index represents a manager's subjective judgement, which cannot be compared with an actual series.

[14] The estimation period in Table 1 is longer than that of Table 2 in order to ensure the degree of freedom, because the number of data for Shunto (once a year) is half that for bonuses (twice a year). The estimation results are unchanged when the starting period is changed to 1976.

[15] Because the industrial classification of data for Shunto wages is different from that of *DKM*, only six industries can be matched. This is the rationale for the selection of industries.

[16] This paper focuses on the intra-industry coordination leading to macroeconomic implications, whereas inter-industry coordinations were emphasized by Sano (1979) for Shunto, and by Brunello and Ohtake (1987) for bonuses.

TABLE 1
CROSS-SECTORAL REAL-WAGE SMOOTHING AT SHUNTO LEVEL

	Pulp and Paper	Chemicals	Petroleum	Steel	Electrical Machinery	Automobile
Constant	−0.003	0.003*	0.002	−0.004	−0.002	0.005*
	(0.003)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)
$\Delta_2 ave$	1.007***	1.006***	0.918***	0.757***	1.134***	0.938***
	(0.042)	(0.024)	(0.038)	(0.079)	(0.030)	(0.054)
DKM^i	−0.003	−0.003	−0.003	−0.006	0.006*	0.000
	(0.006)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)
Adjusted R^2	0.968	0.989	0.966	0.847	0.985	0.935
S.E.	0.007	0.004	0.006	0.012	0.005	0.009
LL	84.717	97.696	86.248	70.834	91.495	78.145
DW	1.540	1.390	1.821	1.503	0.621	1.439
$\chi^2_{SC}(1)$	0.177	2.452	0.068	0.240	12.907	2.126
$\chi^2_{FF}(1)$	1.660	2.817*	2.880*	0.166	1.025	0.024
$\chi^2_{N}(2)$	2.947	13.773***	6.779**	5.453*	0.486	9.740***
$\chi^2_{H}(1)$	7.285	0.190	0.004	15.928	3.318	7.108
$\chi^2(2)$ $(\alpha, \beta) = (1, 0)$	0.460	0.769	4.630*	9.413***	20.100***	1.418

Note: OLS, $T = 1971$–93, $N = 23$. $\Delta_2 ave$ is average of real wage increase rate, S.E. the standard error of regression, DW the Durbin–Watson statistic, LL the maximized value of the log-likelihood function; and χ^2_{SC}, χ^2_{FF}, χ^2_{N}, and χ^2_{H} are diagnostic statistics distributed as chi-square variates with degrees of freedom in parentheses for a test of serial correlation, functional form misspecification, non-normal errors, and heteroscedasticity, respectively. $\chi^2(2)$ $(\alpha, \beta) = (1, 0)$ are Wald test statistics for the joint hypothesis. *** (**) (*) respectively indicate significance levels at 1% (5%, 10%).

TABLE 2
CROSS-SECTORAL REAL-WAGE SMOOTHING FOR BONUSES

	Pulp and Paper	Chemicals	Petroleum	Steel	Electrical Machinery	Automobile
Constant	0.029**	0.015	−0.027	0.018	0.006	0.027***
	(0.011)	(0.015)	(0.020)	(0.022)	(0.007)	(0.007)
$\Delta_2 ave$	−0.585*	0.623*	0.895*	1.098**	0.701***	0.018
	(0.290)	(0.321)	(0.474)	(0.469)	(0.191)	(0.221)
DKM^i	0.045**	−0.081*	0.017	−0.066**	0.012	0.001
	(0.022)	(0.045)	(0.037)	(0.030)	(0.020)	(0.013)
Adjusted R^2	0.176	0.221	0.050	0.266	0.281	−0.066
S.E.	0.040	0.041	0.066	0.063	0.024	0.029
LL	60.863	59.898	44.672	45.935	77.676	71.390
DW	0.996	0.903	0.984	1.228	1.227	1.425
$\chi^2_{SC}(2)$	9.054	8.010	8.960	6.870	3.776	2.712
$\chi^2_{FF}(1)$	4.115**	7.774	0.022	1.564	0.262	0.022
$\chi^2_{N}(2)$	0.649	1.479	2.947	0.921	14.469***	0.919
$\chi^2_{H}(1)$	0.059	2.551	0.040	0.026	0.265	0.084
$\chi^2(2)$ $(\alpha, \beta) = (1, 0)$	35.416***	3.487	0.275	5.407*	4.312	22.109***

Note: OLS, $T = 76H2–92H2$, $N = 33$.

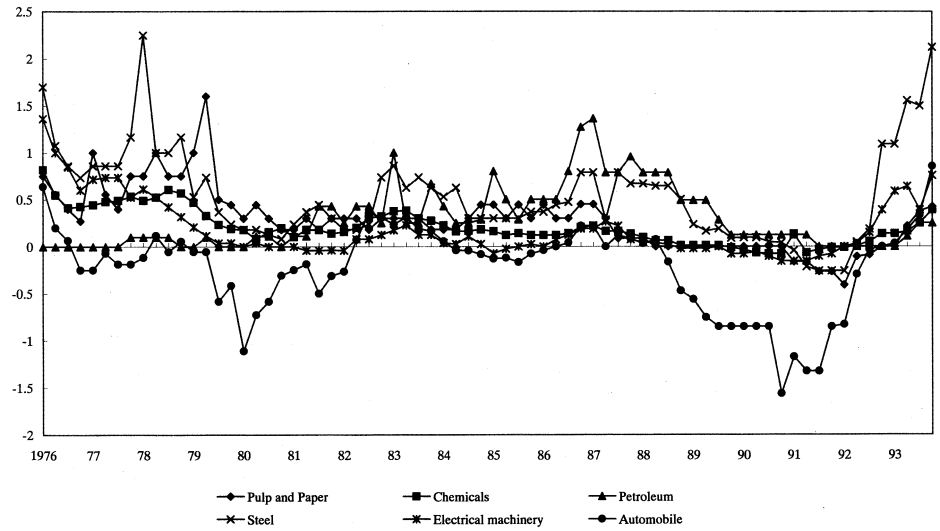

FIGURE 3. Labour hoarding judgement indices, 1976–1993

Although this test is more restrictive than that of Cochrane (1991), owing to the isoelastic form of the indirect utility function, three industries none the less pass the joint Wald test of $(\alpha, \beta) = (1, 0)$, while wages in the other industries show a greater effect of the average wage increase rate.

Furthermore, the adjusted R^2 values are above 95% in almost all the Shunto estimations (Table 1), whereas those for the bonuses are only about 20% (Table 2), though the number of industries passing the joint Wald test is the same. This indicates that the degree of coordination for bonuses is weaker than that for Shunto wages. Interestingly, since five industries passed the test for either Shunto or bonuses, this suggests that the coordination at bonus level is stronger when that at the Shunto level is weak.

3. Range of coordination at Shunto

Although the Shunto real-wage increase rate is strongly coordinated across industries, two problems remain. First, the data apply only to Shunto, which is an *ex ante* loose agreement of contractual wages among firms, and therefore *ex post* results should be verified using other data (see Sano, 1989, p. 175). Second, the result only verified the *existence* of coordination, while it is more important to know the *range* of wage smoothing in order to elucidate macroeconomic implications. If the coordination is restricted to insiders, this behaviour does not necessarily contribute to eliminating unemployment, and may instead be the source of stagflation in many European countries. Hence, this section performs a non-nested comparison based on the familiar Phillips curve form (Sargan, 1964, 1980) in order to investigate the range of coordination using the *ex post* data.

Specifically, I will focus on the labour market indicator that big union leaders decide to pay attention to. The "*large-sector model*" is first considered, using the expected (one-quarter-ahead) labour hoarding judgement index of whole manufacturing (*EDKM*), which

is formulated by the same survey as in the last section and reflects the *average* internal labour market condition of the large-firm sector.[17] Next, the "*whole-economy model*" is examined, using the job offer–applicant ratio obtained from the Public Employment Security Office (*ESRAO*: Yuukou-kyuuzin-bairitsu), which represents the labour market condition of the small-firm sector. This in principle indicates the "external market" for big unions under Japan's dualistic labour market structure. Consequently, if the latter model applies, strong evidence is obtained showing coordination over the whole labour market in Japan.

3.1 Estimation

I first estimated the traditional form of the Phillips curve using first-differenced quarterly data, but the results indicated substantial serial correlation. (These principal results, however, coincide with the following empirical analysis.) Because this correlation may be caused by Shunto's periodic annual intervention, I took the seasonal difference of all variables, and then employed econometric modelling similar to the so-called DHSY model proposed by Davidson *et al*. (1978), i.e.,

$$\Delta_4 w_t = \text{constant} + \alpha \Delta_4 lidx_t + \beta lidx_{t-4} + \gamma \Delta_4 p_t + \delta(w_{t-4} - p_{t-4}), \tag{12}$$

where *lidx* is the labour market index (*esrao* or *EDKM*), p is the consumer price index, the error correction term $\beta lidx_{t-4}$ ($\equiv Sig(L)$) represents the *initial disequilibrium* effect for the labour market condition and $\delta(w - p)_{t-4}$ ($\equiv Sig(I)$), that for inflation. Both error correction terms can naturally be interpreted as signals of two major concerns at the Shunto bargaining process: (i) the inflation rate that makes up for the cost of living and (ii) the labour market condition avoiding unemployment. Hence, the following estimations do not need to be based on the various models forming the micro foundation of the Phillips curve.[18]

Moreover, by separately considering the error terms, the steady-state solution can easily be obtained. In (12), for any steady-state growth path along which

$$\Delta_4 w_t = \Delta_4 p_t = g, \qquad \Delta_4 lidx_t = 0, \tag{13}$$

the solution is

$$g = \text{constant} + \beta lidx_{t-4} + \gamma g + \delta(w_{t-4} - p_{t-4}), \tag{14}$$

or

$$W_t = \exp\left(\frac{(1-\gamma)g - \text{constant}}{\delta}\right) lidx_t^{\beta/\delta} P_t, \tag{15}$$

which means (a) long-run money neutrality and (b) a steady-state growth path that is independent of the labour market condition if $\alpha = 0$.

---

[17] Although many studies on Japanese wage bargaining (Okina *et al*., 1989, Ohashi, 1989, and Koshiro, 1991) have focused on the relation between wages and firms' profits under the influence of Weitzman (1984) or Aoki (1988), I will instead focus on the relation between wages and the principal labour market indicator, since the main interest here is the macroeconomic implications of the wage system, especially the low unemployment rate.

[18] For a similar procedure, see Pichelmann and Wagner (1986); they analysed the Austrian wage negotiation system, which is close to that in Japan and had a similarly low unemployment rate.

3.2 Results

The estimation results are summarized in Table 3, where in columns (1) and (2) the dependent variable is the seasonal-differenced, nominal contractual wages of male workers in all manufacturing sectors ($\Delta_4 SWAGE$), derived from Japan's monthly labour survey (Kimmatte sikyuusareru kyuuyo).[19] Because *SWAGE* includes overtime wages, the equation will be estimated using *SWAGE* in connection with controlling overtime hours (*OHOUR*). In columns (3) and (4) the dependent variable is the contractual wage rate per hour excluding bonuses, termed the basic wage rate (*BASW*), which is constructed as

$$BASW = \frac{SWAGE}{SHOUR + 1.28\ (OHOUR)},$$

TABLE 3
ESTIMATION OF CONTRACTUAL WAGES

	(1) Whole-market model $\Delta_4 swage$	(2) Large-sector model $\Delta_4 swage$	(3) Whole-market model $\Delta_4 basw$	(4) Large-sector model $\Delta_4 basw$
Constant	1.995***	0.715***	0.311***	0.132
	(0.203)	(0.194)	(0.096)	(0.092)
$\Delta_4 lidx$	−0.01	0.021**	−0.043***	0.031***
	(0.008)	(0.008)	(0.007)	(0.010)
$lidx_{t-4}$	0.043***	−0.001	0.026***	−0.027**
	(0.006)	(0.010)	(0.007)	(0.011)
$\Delta_4 cpi$	0.211***	0.63***	0.489***	0.738***
	(0.058)	(0.052)	(0.063)	(0.067)
$\mathrm{Sig}(I)_{t-4}$	−0.245***	−0.087***	−0.1***	−0.038
	(0.025)	(0.024)	(0.034)	(0.033)
$\Delta_4 swage$	0.113***	0.079***		
	(0.014)	(0.012)		
Adjusted R^2	0.966	0.942	0.812	0.709
S.E.	0.005	0.007	0.009	0.012
LL	269.581	250.902	230.597	215.357
DW	1.26	0.9	1.263	0.857
$\chi^2_{\mathrm{SC}}(4)$	8.783*	22.144***	12.447**	29.712***
$\chi^2_{\mathrm{FF}}(1)$	4.891**	3.031*	0.205	5.114**
$\chi^2_{\mathrm{N}}(2)$	1.893	0.209	4.221	1.327
$\chi^2_{\mathrm{H}}(1)$	0.974	1.834	3.453*	0.458
J	1.024	7.367***	−0.907	6.801***

Note: OLS, $T = 76Q1$–$93Q2$, $N = 70$. $Sig(I)$ is $(swage - cpi)$ in columns (1) and (3) and $(basw - cpi)$ in columns (2) and (4). J is J-test statistics for the *whole-market model* against the *large-sector model* in columns (1) and (3), and *large-sector model* against *whole-market model* in columns (2) and (4).

[19] In the monthly labour survey, the category of male workers in large firms does not exist. The wages and working hours of males and those of large firms (over 1,000 workers) are too strongly correlated, but this causes no important differences in the subsequent analysis.

where *SHOUR* is straight time number of hours worked and 1.28 is the average premium for overtime work, according to Ohashi (1990). I employ the two dependent variables mentioned above because the simplistic conversion formula for *BASW* may ignore the lump-sum part that is not proportional to hours.

Regarding both dependent variables, since the whole-market model dominates the large-sector model with respect to the log-likelihood value, from the Akaike information criteria the whole-market model is preferred. Moreover, J-test results show that the whole-market model cannot be rejected against the large-sector model, whereas in both estimations the latter can be rejected at a 1% level against the former. Second, the coefficients of $\Delta_4 lidx$ are not significant in column (1), which is the best model, whereas in contrast those of the signals for the labour market ($Sig(L)$) are strongly significant. This suggests that the effect provided by the labour market condition affects the contractual wages through Shunto.

4. Bonuses

Although the attention given the macroeconomy at the Shunto level may be unique to Japan, it is not clear why it is impossible in other countries. Is it because Japanese workers are so altruistic? I suspect that the determination process that occurs at the Shunto level is not sufficient to describe the *total* wage determination system, and that the biannual bonuses in Japan can make up for the loss of relatively low-level wages, which is the reason why many insiders in the large-firm sector are willing to accept the coordination and low-level wages arrived at under Shunto.[20]

Using a similar procedure to that in the last section, I will now investigate the *range* of wage smoothing that occurs with bonuses. Because bonuses are actually negotiated and paid in terms of monthly contractual wages, the employed estimation equation will be slightly modified.[21] Substituting *basw* for *cpi* in (12) gives

$$\Delta_2 bonus_t = \text{constant} + \alpha \Delta_2 lidx_t + \beta lidx_{t-2} + \gamma \Delta_2 basw_t + \delta (bonus - basw)_{t-2}, \quad (16)$$

whose solution is

$$BONUS_t = \exp\left(\frac{g_b - \gamma g_w - \text{constant}}{\delta}\right) LIDX_t^{\beta/\delta} BASW_t, \quad (17)$$

[20] My hypothesis is not a substitute for, but rather is a complement of, almost all existing models of bonuses; i.e., it has been argued that the role of bonuses is to effect a return of firm-specific human capital (Hashimoto, 1979), a deferred payment method of unobservable work intensity (Ohashi, 1990), or a risk premium (Nakamura and Nakamura, 1991). These factors are said to be the source of labour hoarding, and therefore the hypothesis presented here is not contradictory. Such arguments, however, are based on the individual firm's or worker's problems, and consequently the reason for nationwide wage bargaining is not given. Brunello (1991) argued that bonuses present an opportunity to shorten the contract length against industry-related shock, though their implication for the low unemployment rate in Japan was not offered.

[21] Determination of the amount of biannual bonuses is basically negotiated, and therefore the bargaining in Japan is done at most three times a year. Actually, only 40% of the large firms bargain three times, while the others determine the two successive bonuses at one time. (See Ohashi, 1990, and Brunello, 1991, for this convention.) Although a part of the bonuses is adjusted on the basis of individual effort, this proportion is small, and as a result the bonus increase rate is smoothed across workers, at least those within an individual firm, although it does not always move together with the Shunto increase rate.

where g_b is the growth rate of bonuses and g_w is the growth rate of *BASW*. In this formulation the "target" for adjustment is *BASW*; i.e., firms maintain a constant ratio between bonuses and contractual wages.

Before presenting results using industry data, the estimation results using aggregate data from the same monthly labour survey used in the previous section are provided for purposes of comparison. As shown in Table 4, estimation results of bonuses at the aggregate level (Tokubetsu-ni-shiharawareru-kyuuyo) for the large-sector model clearly dominate those for the whole-market model regarding the log-likelihood value and J-test results, and are in contrast to the *contractual wages* estimation results presented in Table 3.

Table 5 gives the estimation results using industry data, where DKM^i is individual industries' labour hoarding judgement indices (individual-sector model). The J-test shows that the whole-market model is rejected against the individual-sector model in all industries except the chemical industry, while the latter is rejected only in the petroleum industry. These results indicate that bonuses respond to idiosyncratic shock to play the role of a "variable charge", and are important because a *qualitative* difference exists between contractual wages and bonuses, rather than a *quantitative* one as presented in almost all previous studies.[22]

5. Summary and concluding remarks

This paper considered the Japanese wage payment system from a perspective of two-part tariff pricing. Using an "amusement park" analogy, Shunto wages can be regarded as an "entrance fee", whereas bonuses are a "variable charge". Empirical investigation showed that a qualitative difference exists between these two types of wage: Shunto sets the

TABLE 4
ESTIMATION OF BONUSES AT THE AGGREGATE LEVEL

(1) Large-sector model

$$\Delta_2 bonus = \underset{}{0.572} - \underset{(0.517)}{0.166}\Delta_2 DKM^{***} - \underset{(0.019)}{0.006} DKM + \underset{(0.017)}{0.688}\Delta_2 basw^{***} - \underset{(0.141)}{0.094}(bonus - basw)_{t-2} \quad (0.087)$$

Adjusted $R^2 = 0.807$; S.E. $= 0.016$; DW $= 1.525$; LL $= 95.20$;
$\chi^2_{SC}(2) = 3.73$; $\chi^2_{FF}(1) = 2.76$; $\chi^2_N(2) = 0.998$; $\chi^2_H(1) = 4.80^{**}$;
J-test statistics of *large-sector model* against *whole-market model* $= 1.48$.

(2) Whole-market model

$$\Delta_2 bonus = \underset{}{0.126} + \underset{(0.575)}{0.175}\Delta_2 esrao^{***} - \underset{(0.022)}{0.013} esrao + \underset{(0.015)}{1.41}\Delta_2 basw^{***} - \underset{(0.179)}{0.025}(bonus - basw)_{t-2} \quad (0.096)$$

Adjusted $R^2 = 0.766$; S.E. $= 0.018$; DW $= 1.45$; LL $= 91.93$;
$\chi^2_{SC}(2) = 8.89^{**}$; $\chi^2_{FF}(1) = 0.480$; $\chi^2_N(2) = 0.795$; $\chi^2_H(1) = 1.294$;
J-test statistics of *whole-market model* against *large-sector model* $= 2.91^{***}$.

Note: OLS, $T =$ 76H1–92H2, $N = 34$.

[22] Freeman and Weitzman (1987) and Koshiro (1991) showed that the estimated elasticity of bonuses against a firm's profit is slightly larger than that of contractual wages.

TABLE 5
ESTIMATION OF BONUSES AT THE INDUSTRY LEVEL

	Pulp and Paper	Chemicals	Petroleum	Steel	Electrical Machinery	Automobile
Constant	−0.510***	−0.685***	−0.238*	−0.632***	−0.563***	−0.318***
	(0.102)	(0.080)	(0.121)	(0.124)	(0.102)	(0.078)
$\Delta_2 DKM^i$	−0.071	−0.203***	0.022	−0.065**	−0.082**	−0.015
	(0.044)	(0.044)	(0.052)	(0.024)	(0.032)	(0.010)
DKM^i_{t-2}	−0.092**	−0.218***	−0.030	−0.108***	−0.115***	−0.017
	(0.039)	(0.030)	(0.060)	(0.023)	(0.019)	(0.013)
$\Delta_2 basw$	−1.390**	1.096***	1.310	2.273***	1.203***	0.616*
	(0.593)	(0.243)	(0.908)	(0.401)	(0.242)	(0.316)
$(basw - bonus^i)_{t-2}$	−0.643***	−0.826***	−0.236**	−0.603***	−0.582***	−0.387***
	(0.115)	(0.093)	(0.100)	(0.114)	(0.107)	(0.099)
Adjusted R^2	0.460	0.800	0.133	0.673	0.714	0.771
S.E.	0.062	0.026	0.061	0.045	0.024	0.020
LL	48.966	78.192	49.711	59.776	80.736	87.598
DW	0.994	0.871	0.986	1.491	2.118	1.770
$\chi^2_{SC}(2)$	6.138**	10.338***	8.230**	2.250	3.168	0.791
$\chi^2_{FF}(1)$	13.524***	0.133	1.451	0.776	7.614***	2.242
$\chi^2_{N}(2)$	2.135	0.882	1.572	1.229	1.100	1.058
$\chi^2_{H}(1)$	4.860**	1.365	1.730	0.108	0.378	0.332
J (W against I)	0.97728	−2.6161***	1.2538	0.55966	−0.69334	−0.77172
J (I against W)	1.7774*	7.7869***	1.0301	3.0393***	5.5716***	2.1353**

Notes: OLS, $T = 76H1–92H2$, $N = 34$. J (W against I) is J-test statistics for the *whole-market model* against the *individual-sector model*, while J (I against W) is J-test statistics for the *individual-sector model* against the *whole-market model.*

coordinated wage rate by focusing on the whole labour market condition, while bonuses respond to idiosyncratic shock. Although Shunto directly affects factors influencing low unemployment, the indirect role of bonuses is also important: insiders in the large-firm sector recognize the adjustment caused by bonuses, which is why they are willing to bear the coordination and the relatively low-level Shunto wage rate increases. Hence, even if total wages vary among firms, the coordination at Shunto level is effective as a uniformed "entrance fee". In addition, on the basis of the standard prediction of two-part wage tariff pricing, I conclude that no single element, i.e. Shunto or bonuses, but instead a unique *combination* of them, is the ultimate source of low unemployment.

I realize that one limitation of this paper is the welfare implication of such a two-part tariff system. In general, the welfare implication of this system in general-equilibrium environments depends on specifications of models (see Brown *et al*., 1992, and Kamiya, 1995, for recent studies), and consequently the results presented here do not imply Pareto efficiency, even without the incentive constraint.

Next, the *wage drift* phenomenon (see Holmlund, 1986, and Holden, 1989, for examples) is frequently pointed out as an obstacle to sustaining centralized collective bargaining. Although such a phenomenon can be interpreted as a similar mechanism to the model presented above, in order to clarify the difference between actual performance in countries, the introduction of the administrative power of the "union center" (see Freeman and Gibbons, 1995) and/or "new Keynesian features" (e.g. de la Croix, 1994) may be required.

Furthermore, the above model is based on the monopoly power of a union's wage setting, and the actual bargaining situation is not considered here; therefore the result may vary quantitatively with the firm's objective function, which is under active discussion for Japan's big firms, e.g. labour-managed (Komiya, 1990) or rent-sharing (Aoki, 1988) firms. Finally, because of high operation costs, some unions have sought a new method of bargaining. To analyse this aspect, it may be necessary to distinguish between a social optimum and an individual one (Wakita, 1997a). Nevertheless, in spite of these factors, a clear contrast is empirically shown between Shunto and bonuses. This represents another important factor in explaining Japan's better macroeconomic situation and suggests a possible way of improving macroeconomic wage bargaining methods in other countries.

Data Appendix

BASW	Basic wage rate (contractual wage rate per hour without including bonuses)
Bonuses	(dependent variables in Table 2): from a survey conducted by Japan's Ministry of Labor (Roudou-syo Rousei-kyoku) for big firms having more than 1,000 employees.
Bonuses	(dependent variables in Table 5): from Japan's monthly labour survey, Tokubetsu-ni-shiharawareru-kyuuyo
CPI	Consumer price index
DKM	Current-level labour hoarding judgement index: from a short-run survey of major Japanese enterprises conducted by the Bank of Japan

EDKM	Anticipated (one-period-ahead)-level labour hoarding judgement index: from a short-run survey of major Japanese enterprises conducted by the Bank of Japan
ESRAO	Job offer–applicant ratio (yuukou-kyuuzin-bairitsu): from the Public Employment Security Office
LIDX	Labour market indices (ESRAO or EDKM)
OHOUR	Overtime hours: from Japan's monthly labour survey
Shunto	(dependent variables in Table 1): from a survey conducted by Japan's Ministry of Labor (Roudou-syo Rousei-kyoku) for firms having more than 1,000 employees.
SWAGE	Contracted wages including overtime wages (kimmatte-sikyuusareru-kyuuyo): from Japan's monthly labour survey
WPI	Wholesale price index

Final version accepted 25 March 1999.

REFERENCES

Aoki, M. (1988) *Information, Incentives, and Bargaining in the Japanese Economy*, Cambridge: Cambridge University Press.

Boldrin, M. and M. Horvath (1995) "Labor Contracts and Business Cycles", *Journal of Political Economy*, Vol. 103, No. 5, pp. 972–1004.

Brown, D. J., W. P. Heller and R. M. Starr (1992) "Two-Part Marginal Cost Pricing Equilibria: Existence and Efficiency", *Journal of Economic Theory*, Vol. 57, pp. 52–72.

Brunello, G. (1991) "The Length of Bonus Contracts in Japanese Manufacturing", *Journal of the Japanese and International Economies*, Vol. 5, pp. 226–238.

—— and F. Ohtake (1987) "The Relation between Wages, Bonuses and Employment in Japan", *Osaka Economic Papers*, Vol. 37, pp. 28–41 (in Japanese).

Bruno, M. and J. D. Sachs (1985) *Economics of Worldwide Stagflation*, Cambridge, Mass.: Harvard University Press.

Calmfors, L. and H. Horn (1986) "Employment Policies and Centralized Wage-Setting", *Economica*, Vol. 53, pp. 281–302.

Carlson, J. A. and M. Parkin (1975) "Inflation Expectations", *Economica*, Vol. 42, pp. 123–138.

Cochrane, J. H. (1991) "A Simple Test of Consumption Insurance", *Journal of Political Economy*, Vol. 99, pp. 957–976.

Davidson, J. E. H., D. F. Hendry, F. Srba and S. Yeo (1978) "Econometric Modelling of the Aggregate Time Series Relationship between Consumers' Expenditure and Income in the United Kingdom", *Economic Journal*, Vol. 88, pp. 661–692.

de la Croix, D. (1994) "Wage Interdependence through Decentralized Bargaining", *Journal of Economic Surveys*, Vol. 8, No. 4, pp. 371–403.

Doeringer, P. B. and M. J. Piore (1971) *Internal Labor Markets and Manpower Analysis*, Armonk, NY: M. E. Sharpe.

Fay, J. A. and J. L. Medoff (1985) "Labor and Output over the Business Cycle", *American Economic Review*, Vol. 75, pp. 638–655.

Freeman, R. B. and R. S. Gibbons (1995) "The Decline of Centralized Collective Bargaining", in R. B. Freeman and L. F. Katz (eds.), *Differences and Changes in Wage Structure*, Chicago: University of Chicago Press, pp. 345–370.

—— and M. L. Weitzman (1987) "Bonuses and Employment in Japan", *Journal of the Japanese and International Economies*, Vol. 1, pp. 168–194.

Gordon, R. J. (1982) "Why US Wage and Employment Behaviour Differs from that in Britain and Japan", *Economic Journal*, Vol. 92, No. 365, pp. 13–44.

Grossman, H. I. and W. S. Haraf (1989) "Shunto, Rational Expectations, and Output Growth in Japan", *Empirical Economics*, Vol. 14, pp. 193–213.

Hashimoto, M. (1979) "Bonus Payments, On-the-Job Training, and Lifetime Employment in Japan", *Journal of Political Economy*, Vol. 87, pp. 1086–1105.

Holden, S. (1989) "Wage Drift and Bargaining: Evidence from Norway", *Economica*, Vol. 56, pp. 419–432.
Holmlund, B. (1986) "Centralized Wage Setting, Wage Drift and Stabilization Policies under Trade Unionism", *Oxford Economic Papers*, Vol. 38, No. 2, pp. 243–258.
Ishikawa, T. (1991) *Income and Wealth*, Tokyo: Iwanami Syoten (in Japanese).
Kamiya, K. (1995) "Optimal Public Utility Pricing: A General Equilibrium Analysis", *Journal of Economic Theory*, Vol. 66, pp. 548–572.
Komiya, R. (1990) "The Structural and Behavioral Characteristics of Japanese Firms", in R. Komiya, *The Japanese Economy: Trade, Industry and Government*, Tokyo: University of Tokyo Press, pp. 159–191.
Koshiro, K. (1983) "Developments of Collective Bargaining in Postwar Japan", in T. Shirai (ed.), *Contemporary Industrial Relations in Japan*, Madison: University of Wisconsin Press.
—— (1991) "The Analysis of Bonus in Private Railroad Company", *Nihon Roudou Kenkyuu Zassi*, Vol. 375, pp. 20–25 (in Japanese).
Kuhn, P. (1988) "A Nonuniform Pricing Model of Union Wages and Employment", *Journal of Political Economy*, Vol. 96, pp. 473–508.
Layard, R., S. Nickell and R. Jackman (1991) *Unemployment: Macroeconomic Performance and the Labour Market*, Oxford: Oxford University Press.
Lindbeck, A. and D. J. Snower (1988) *The Insider–Outsider Theory of Employment and Unemployment*, Cambridge, Mass.: MIT Press.
McDonald, I. M. and R. M. Solow (1985) "Wages and Employment in a Segmented Labor Market", *Quarterly Journal of Economics*, Vol. 100, pp. 1115–1141.
Mace, B. J. (1991) "Full Insurance in the Presence of Aggregate Uncertainty", *Journal of Political Economy*, Vol. 99, pp. 928–956.
Nakamura, J. (1995) "Are Japan's Real Wages Flexible?" in T. Inoki and Y. Higuchi (eds.), *Employment System and Labor Market in Japan*, Tokyo: Nihon Keizai Shinbunsha (in Japanese).
Nakamura, M. and A. Nakamura (1991) "Risk Behavior and the Determinants of Bonus versus Regular Pay in Japan", *Journal of the Japanese and International Economies*, Vol. 5, pp. 140–159.
Ohashi, I. (1989) "On the Determinants of Bonuses and Basic Wages in Large Japanese Firms", *Journal of the Japanese and International Economies*, Vol. 3, pp. 451–479.
Oi, W. Y. (1971) "A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly", *Quarterly Journal of Economics*, Vol. 85, pp. 77–90.
Okina, K., Y. Takeuchi and H. Yoshikawa (1989) "On the Determination of Real Wages in Japan", *Keizaigaku Ronsyuu*, Vol. 55, pp. 77–85 (in Japanese).
Pesaran, M. H. (1987) *The Limits to Rational Expectations*, Oxford: Basil Blackwell.
Pichelmann, K. and M. Wagner (1986) "Labour Surplus as a Signal for Real-Wage Adjustment: Austria, 1968–1984", *Economica*, Vol. 53, pp. s75–87.
Rosen, S. (1985) "Implicit Contracts: A Survey", *Journal of Economic Literature*, Vol. 23, pp. 144–175.
Sano, Y. (1979) "The Mechanism of Wage Determination: A Critique of the Phillips Curve", *Kikan Roudouhou*, Vol. 104, pp. 177–190 (in Japanese).
—— (1989) *Internal Labor Markets*, Tokyo: Yuuhikaku (in Japanese).
Sargan, J. D. (1964) "Wages and Prices in the United Kingdom: a Study in Econometrics Methodology", in P. E. Hart, G. Mills and J. K. Whitaker (eds.), *Econometric Analysis for National Economic Planning*, London: Butterworths Scientific.
—— (1980) "A Model of Wage–Price Inflation", *Review of Economic Studies*, Vol. 47, pp. 97–102.
Shinkai, Y. (1980) "Spillovers in Wage Determination: Japanese Evidence", *Review of Economics and Statistics*, Vol. 62, pp. 288–292.
Shirai, T. (ed.) (1983) *Contemporary Industrial Relations in Japan*, Madison: University of Wisconsin Press.
Taylor, J. B. (1989) "Differences in Economic Fluctuations in Japan and the United States: The Role of Nominal Rigidities", *Journal of the Japanese and International Economies*, Vol. 3, pp. 127–144.
Townsend, R. M. (1994) "Risk and Insurance in Village India", *Econometrica*, Vol. 62, pp. 539–591.
Ueda, K. and K. Okazaki (1989) "Efficiency Wage Model and Wage Structure in Japan", *Keizai Kenkyuu*, Vol. 40, pp. 204–210 (in Japanese).
Varian, H. R. (1988) "Price Discrimination", *Handbook of Industrial Organization*, Vol. 1, Amsterdam: North-Holland, pp. 597–654.
Wakita, S. (1997a) "Coordination Failure and Japanese Employment Practice", *Nihon Rodo Kenkyu Zasshi*, Vol. 447, pp. 19–28 (in Japanese).
—— (1997b) "Chronic Labor Hoarding: Direct Evidence from Japan", *Japanese Economic Review*, Vol. 48, pp. 307–323.
Weitzman, M. L. (1984) *Share Economy*. Cambridge, Mass.: Harvard University Press.
Wright, R. D. (1988) "The Observational Implications of Labor Contracts in a Dynamic General Equilibrium Model", *Journal of Labor Economics*, Vol. 6, pp. 530–551.