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WHY U.S. WAGE AND EMPLOYMENT BEHAVIOR DIFFERS FROM THAT IN BRITAIN AND JAPAN

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ABSTRACT

This paper argues that rigid wages cannot provide the underpinnings of a universally valid theory of the business cycle, simply because wages are not universally rigid. Several different statistical techniques suggest that wage rates in the U.K. and Japan are between three and 15 times more flexible than in the U.S. during the postwar period. Corresponding to greater flexibility in wages, these two countries also exhibit more stable employment behavior over the business cycle.

In historical data covering the period between the late nineteenth century and 1940, U.S. wage behavior appears to be much more similar to that in Britain and Japan. The contrast between the prewar data and the postwar data, where the U.S. is a definite outlier, suggests that the 1948 invention of the three-year staggered U.S. wage contract may be the crucial factor underlying sluggish U.S. postwar wage dynamics.

A theoretical section attempts to distill from recent literature those features of labor market institutions that are regarded as optimal by economic theory. Japanese institutions exhibit more similarity to this theoretical paradigm than those in the U.S. or U.K. Economic theory predicts that long-duration contracts, like those in the postwar U.S., are more likely to emerge when the perceived cost of renegotiation is high, but we must appeal to history and cultural differences to explain why conflict avoidance plays a more prominent role in the development of Japanese labor market institutions than in the American case. In this comparison Britain is the odd-man-out, with well-publicized industrial strife, together with short contract durations. I appeal to history, the different legal tradition, and the nature of the British unions themselves to explain why the three-year contract became established in America but not in Britain.

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If a poll were to be conducted among American academic economists to select "The Most Mystifying Economic Phenomenon of Our Time," surely the sticky nominal wage rate would emerge at or near the top of the list. The slow and partial response of the nominal wage rate to changes in aggregate nominal spending has been a central postulate of macroeconomic theory for the past 45 years, from Keynes' *General Theory*, through the standard postwar textbook Keynesian paradigm, to the more modern fixed-wage-price models of Robert Barro and Herschel Grossman (1976), and Edmond Malinvaud (1977). Unwilling passively to accept nominal wage rigidity as an unexplained assumption, many labor-market theorists have followed the lead of Costas Azariadis (1975) and Martin Baily (1975) in building models to explain rigid wages and layoff unemployment as the rational outcome of a profit-maximizing calculus.

As I pointed out in an early critique of the Azariadis-Baily model (1976a) their assumptions cannot explain cycles in employment, but rather why workers would want fixed *incomes*, i.e., a fixed wage rate and fixed employment. Soon thereafter, Barro (1977) went one step further and argued that contract theory is a "facade" which cannot explain why workers would choose a rigid wage and variable employment in preference to the classical equilibrium quantity of employment that equates the marginal product of labor with the marginal value of time. Now an examination of the evidence has led me to the realization that rigid wages cannot provide the underpinnings for a universally valid theory of the business cycle, simply because wages are not universally rigid. I document below with postwar quarterly data that the share of fluctuations in the manufacturing wage bill taking the form of nominal wage changes,

as compared to changes in hours worked, is *five to ten times greater* in Britain and Japan than in the United States. I then argue that American economists, whose theoretical ingenuity is matched by their institutional chauvinism, have not succeeded in developing an adequate economic explanation of labor-market arrangements; their theories that purport to explain wage stickiness are mainly based on elements that do not differ across nations and thus have little potential for explaining why the degree of wage flexibility is much greater in some places than in others.

It seems remarkable that the modern American literature on labor-market contracts contains no mention of cross-country differences in the extent of wage flexibility, much less any explanation of these differences.[1] This paper begins the difficult task of providing such an explanation, concentrating on just three countries to limit its scope. It seems obvious to include my country (the U.S.), and yours (the U.K.). The choice of the third country is also easy, because the recent Japanese achievement of flexibility in both nominal and real wage rates has made possible the remarkable 2 percent rates of both inflation and unemployment experienced in 1979 and 1980, a "second Japanese miracle" to accompany the first and more widely recognized productivity-quality-export miracle.[2] Like any attempt to explain either miracle, this study of Japanese wage-setting and employment determination must ultimately come to grips with the history of institutions and with culture, i.e., shared customs and habits. Can we duplicate Japanese performance through the manipulation of policy tools and incentives that we usually classify as "economic," or must we explore the less familiar terrain of collectively remolding institutions and customs?

Barro's critique of contract theory argues that business cycles are due to "easily correctible malfunctions" in private market arrangements (1979). But his approach represents a dead end, because it exhibits no recognition that private market arrangements differ across countries, nor any explanation of such differences. This inquiry into the source of institutional differences asks, in essence, whether a decentralized free-market economy possesses a servomechanism that automatically reforms institutions and customs that lead to an inefficient macroeconomic performance, or whether it can become stuck in an inefficient Akerlof-type equilibrium (1978). Institutional constraints together with decentralized decision-making may leave individual agents in a "prisoners' dilemma," unable without collective action to loosen the institutional constraints that bind them.

Any economist who dares to mention institutions as central determinants of macroeconomic performance had better tread carefully, lest he be branded a dangerous renegade or traitor. One only has to recall the British debate of a decade ago between cost-push and monetarist theories of inflation to recognize that an appeal to institutional or social differences is likely to be labelled a distressing resort to "amateur sociology and politics" which can plan "no part whatsoever in the problem."[3] In my view inflation is basically a monetary phenomenon, in the sense that a monetary expansion is necessary to propogate inflation, but institutions can influence the willingness of the central bank to print money.[4] For instance, *ceteris paribus* a central bank would be less willing to engineer a monetary deceleration if existing institutions were likely to prevent a

rapid response of wages and prices, forcing output to take up the slack, than in an alternative society in which the same spending deceleration were likely to be rapidly absorbed by wages and prices with little output response. In this view inflation is the outcome of a genuine two-way interaction between the central bank and the wage-price adjustment process, in which both economic and non-economic aspects of the institutional environment determine the feasibility of slowing simultaneously the growth rates of money, wages, and prices.

The paper begins in Part I, which reviews a set of identities giving the conditions necessary for wage rigidity to imply fluctuations in employment, and then comments on the recent claims by Barro (1977) and Robert Hall (1980) that rigid wages do not imply or explain employment fluctuations. Part II displays and analyzes data on the flexibility of wages, hours, and employment in the U.K., U.S., and Japan, including both postwar quarterly and annual historical data prior to 1940. Part III develops the notion of "ideal" labor market institutions from the standpoint of macroeconomic efficiency, asking how wages, hours, and employment should be adjusted in response to nominal demand disturbances. Part IV then juxtaposes actual labor-market institutions in the U.K., U.S., and Japan with the ideal world of economic theory. Are there economic factors that can explain the inter-country differences, or must we appeal at least in part to politics, history, and/or culture to complete the explanation? Part V summarizes the conclusions.

This paper is complementary to the recent cross-country studies of Jeffrey Sachs (1979), and William Branson and Julio Rotemberg (1980), which document the contrast between nominal wage inertia in the postwar

U.S. and real wage inertia in Europe and Japan, and examine the theoretical and policy implications of this contrast. Here I begin with another procedure for documenting the difference in nominal wage behavior among the U.K., U.S., and Japan, and then concentrate on explaining its causes rather than its consequences. Real wage inertia plays no role in my analysis, reflecting my finding that the real wage rate in quarterly postwar data for the U.K. and Japan displays, if anything, more variability than in the U.S.

The paper's scope is broader than most, in its attention to three countries and to non-economic factors, but nevertheless is carefully circumscribed. I am concerned with the dynamic response of the aggregate supply curve to nominal demand fluctuations that are taken to be exogenous. No attention is given to cross-country differences in saving behavior, openness to foreign trade, or other factors that might explain why demand fluctuations have been more severe in one place than another. Feedback from inflation to nominal demand (e.g., through Pigou and expectations effects) and to investment and productivity growth are ignored. Although the response of the inflation process to nominal demand swings depends both on the firm's price-setting decisions in product markets and its wage- and employment-setting decisions in labor markets, the paper concentrates on the latter and refers the reader to a recent companion piece on the product market (1981a).

I. IS THERE A CONNECTION BETWEEN WAGE STICKINESS AND EMPLOYMENT FLUCTUATIONS?

Although most economists now accept as obvious the proposition that the sluggish adjustment of wages increases the variability of employment over the business cycle, nevertheless some have argued that wage stickiness is not a central issue. In this view the fixity of wages would not necessarily imply layoffs or fluctuations in employment, since "even in contracts that specify *ex ante* the value of nominal wages over some interval of time, it would be mutually advantageous for workers and firms to determine levels of employment in an efficient manner" (Barro, 1979, p. 54). There is, in short, a "limited allocational role of the wage payment for employment" (Hall, 1980, p. 92).

Adopting the practice of designating proportional growth rates as lower case letters, we can write down an identity that displays the relationship of the growth rate of nominal GNP (y) to that of the nominal wage (w), hours per man per week (h), employee-weeks per year (e), and nominal non-labor income (n):

$$(1) \qquad y \equiv \mu(w + h + e) + (1-\mu)n,$$

where μ is labor's income share. The cyclical behavior of the variables in (1) can be examined if we purge both sides of the equation of the influence of trend growth in real output (q^*), hours (h^*), and employment (e^*):

$$(2) \qquad y - q^* \equiv \mu[w - (q^*-h^*-e^*) + (h-h^*) + (e-e^*)] + (1-\mu)(n-q^*).$$

The simple truths contained in this expression become more obvious when

we combine terms, using ω to designate trend productivity growth ($q^*-h^*-e^*$), h' for the deviation of hours growth from trend ($h-h^*$), e' for the deviation of employment growth from trend ($e-e^*$), and a "hat" to designate the growth of nominal GNP and non-labor income relative to trend output ($\hat{y} = y-q^*$; $\hat{n} = n-q^*$):[5]

$$(3) \qquad \hat{y} \equiv \mu(w - \omega + h' + e') + (1-\mu)\hat{n}.$$

In the long run, when the cyclical hours and employment deviations are zero ($e' = h' = 0$), (3) states simply that output-trend-adjusted nominal GNP growth must be a weighted average of trend unit labor cost ($w - \omega$) and the growth of adjusted nominal non-labor income. But there are clearly no arithmetically necessary implications of nominal wage rigidity for the cyclical behavior of employment, because fluctuations in nominal GNP growth on the left-hand side of (3) can be offset by changes in hours (h') or in non-labor income ($\hat{n}$) even if both wages and employment are fixed.

The Barro-Hall argument cited above states that in principle there is nothing to prevent the firm from offering each employee a contract that fixes labor income, i.e., the wage rate, hours per week, and weeks of employment, with profit fluctuations ($\hat{n}$) taking up the slack. However, this proposition is valid only for very special sorts of firms that are risk-neutral and face perfect capital markets that are equally unperturbed by profit instability. The downward pressure on profits that occurs when a drop in nominal GNP is accompanied by a fixed wage bill must have allocative consequences if it persists for any length of time, by altering the market's expectations of the future net worth of the firm, and

consequently by raising its supply price of capital and reallocating capital elsewhere. The firm is thus under pressure to shift some of the burden of the adjustment from profits to the wage bill. There is surely some drop in nominal income large enough, or of sufficiently long duration, to force firms to adopt some combination of wage cuts, "work sharing" (reductions in hours per employee), or a reduction of employment.

We can go further and note that (3) contains some hints that might contribute to an economic explanation of cross-country differences in the stability of employment. First, profits will be able to absorb relatively more of a nominal GNP change, and thus the wage bill will be forced to absorb less, the larger is the normal profit share $(1-\mu)$. The larger share of non-labor income in Japan than in Britain or the U.S. might help to explain how large Japanese firms can afford to offer their employees lifetime employment. Further, to the extent that the Japanese bonus system can be regarded as a form of profit sharing, as is argued by Masanori Hashimoto (1979), the effective share of profit-type income is increased, and there is a larger buffer to insulate the remainder of the wage bill. If the change in wages (w) consists of the change in the wage base (v) and in the bonus (b) with weights ψ and $(1-\psi)$, and if the change in the bonus is a fixed fraction σ of the change in non-labor income ($b = \sigma n$), then (3) becomes:

$$(4) \qquad \hat{y} \equiv \mu(\psi v - \omega + h' + e') + [(1-\mu) + \mu(1-\psi)\sigma]\hat{n}.$$

A final difference among countries suggested by (3) and (4) is the nature of the link between firms and capital markets. British and American firms, financed largely by equity, may be more sensitive to fluctuations in share

values caused by profit instability, than debt-financed Japanese firms. The bankers who oversee loans to Japanese firms, with the Central Bank and Ministry of International Trade and Industry looking over their shoulder, may take a longer view than U.K. and U.S. shareholders.[6] The converse proposition, that debt finance makes profits less stable, may not matter for Japanese firms if far-sighted bankers and government agencies allow firms to look beyond the short run.

II. SOME EVIDENCE ON THE RESPONSIVENESS OF WAGES, HOURS, AND EMPLOYMENT

II.1 Postwar Quarterly Data for Manufacturing

This section analyzes postwar quarterly data on the volatility of wages, hours, and employment in the U.S., U.K., and Japan. Comparable data across countries seem easiest to obtain if we limit our attention to manufacturing. The wage data include fringe benefits for the U.S. and bonuses for Japan. Two measures of volatility are examined, the standard deviation of rates of change, and the coefficient of response of each variable to changes in nominal GNP. The standard deviations in Table 1 are calculated for two periods, ending respectively in 1972 and 1980, in order to determine whether the results for the period ending in 1980 are dominated by special features of the two oil shocks that occurred after 1972. The starting date of 1963:Q1 is determined by the 1960 starting date of the U.K. and Japanese data in our source, and by unusual behavior of the Japanese hours and employment series in 1961 and early 1962.[7] The computations are based on four-quarter overlapping rates of change, in order to minimize problems of seasonality and high-frequency quarter-to-quarter volatility. The procedure involves estimating a regression in which the only right-hand variable is a single constant for the period ending in 1972, and two constants (broken at 1972:Q4) for the period ending in 1980.

The qualitative differences among the three nations seem unaffected by the choice of the 1972 or 1980 termination date. The striking finding, presented in lines 3 through 6 of Table 1, is that a much larger

TABLE 1

Standard Deviations of Four-Quarter Percentage Rates of Change of Manufacturing Wage Rates, Hours, and Employment

	1963:Q1-1980:Q3[a]			1963:Q1-1972:Q4		
	U.S.	U.K.	Japan	U.S.	U.K.	Japan
	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
1. w + h + e	3.82	4.35	4.97	3.56	3.26	3.68
2. w	1.69	5.29	4.84	1.66	3.40	2.83
3. h + e	4.78	3.22	1.09	4.06	2.70	0.91
4. h	1.09	1.74	1.98	1.06	1.37	1.17
5. e	4.05	2.18	2.03	3.39	1.95	2.15
Addenda						
6. Ratio of line 2 to 3	0.35	1.64	4.44	0.41	1.26	3.11
7. Ratio of line 2 to 5	0.42	2.43	2.38	0.49	1.74	1.32
8. Real wage (w-p)	1.46	3.86	2.78	0.82	1.74	2.50

Note:

a. The full-period results include two constants defined respectively from the first observation to 1972:Q4, and from 1973:Q1 to the last observation.

fraction of the variability of the manufacturing wage bill takes the form of nominal wage changes relative to changes in hours worked (h+e) or employment (e) in Britain and Japan than in the U.S. The ratio exhibited in line 6 of wage variability relative to hours variability is only 0.35 in the U.S., but is 4.7 times larger in Britain and 12.7 times larger in Japan for the 1963-80 period. For the shorter 1963-72 period, the ratio is 3.1 times larger in Britain and 7.6 times larger in Japan, indicating that part but by no means all of the cross-country differences are associated with the extreme volatility of wage changes experienced in Britain and Japan at the time of the first oil shock in 1973-75.

A surprising finding on line 5 is that employment in the U.K. is no less stable than in Japan. Line 7 exhibits the ratio of wage to employment variability, and for the full period this ratio is 0.42 for the U.S., but is almost six times larger in both Britain and Japan. For the shorter period the British and Japanese ratios are 3.6 and 2.7 times larger, respectively. Why do these ratios differ more for Japan in line 6 than line 7, i.e., why is the volatility of hours worked (h+e) so much less than either of the components, hours per week (h) or employment (e)? The distributed lag analysis discussed below reveals that, more than in the other two nations, hours per week in Japan are a temporary buffer that absorbs part of the impact of a swing in nominal spending, but only for a single quarter. Then, over the next four or five quarters, employment begins to respond in the direction of the spending disturbance, while hours per week return to normal, thus creating a negative correlation between hours per week and employment changes during those quarters.

A final addendum in line 8 of Table 1 presents figures on the volatility of the real wage in the three countries for the two periods. The results show quite consistently, for both the long and short period, that the volatility of both real and nominal wage rates is greater in Britain and Japan than in the U.S. Here are the ratios of nominal and real wage variability relative to the U.S. for the other two countries:

	Nominal wage, from Table 1, line 2	Real wage, from Table 1, line 8
1963-80		
UK/US	3.1	2.6
Japan/US	2.9	1.9
1963-72		
UK/US	2.0	2.1
Japan/US	1.7	3.0

These simple calculations lead me to question the characterization by Sachs (1979) and Branson-Rotemberg (1980) of the U.S. as having stable nominal wage growth and variable real wage growth, and other major industrialized nations as having the reverse. For both sample periods, real wage growth in the U.K. and Japan was between two and three times more variable than in the U.S.

I recently presented evidence that the responsiveness of the aggregate U.S. price deflator to changes in nominal GNP has varied widely over time. Because price changes have ranged from very sticky to very flexible over U.S. history, I called attention to the absence of any explanation for this parameter shift in conventional macroeconomic theory (1981a, pp. 500-502). Just as that analysis was based on a regression of

quarterly changes in prices on a distributed lag of current and past changes in nominal GNP, so here in Table 2 I present a parallel characterization of differences in the labor-market adjustment process in the three countries, by regressing various components of the wage bill on current and past changes in nominal GNP. In contrast to Table 1, where four-quarter overlapping changes are calculated, here the data are one-quarter changes, expressed at annual rates (i.e., multiplied by four). All lag distributions are constrained to lie along a fourth-degree polynomial, with a zero end-point constraint. As explained in the notes to Table 2, all regressions also include a constant and a trend term. The long-period results for all countries include a variable to represent the influence of changes in food and energy prices in the 1970s, and all regressions for the U.S. also include dummy variables to capture the effects of the 1971-74 Nixon control program.[8]

Of all the sums of coefficients in Table 2 showing the response of each variable to changes in nominal GNP in the current and preceding eight quarters, the two sets that stand out are those on lines 1 and 2. First, the responsiveness of the manufacturing wage bill to nominal GNP in the U.K. and Japan is only half that in the U.S. Second, and more interesting for this investigation, nominal wages are much more responsive in the U.K. and Japan than in the U.S. for both sample periods. As shown on line 6, the ratio of the nominal wage rate response (line 2) to the wage bill response (line 1) is 10 percent or less in the U.S., and between 57 and 128 percent in Britain and Japan.

What accounts for the relatively high wage elasticities in Japan in the full period, and in Britain in the shorter period? The Japanese ex-

TABLE 2

Sums of Coefficients when Components of the Change in the Manufacturing Wage Bill are Regressed on Current and Eight Lagged Changes in Nominal GNP[a]

	1961:Q1-1980:Q3			1961:Q1-1972:Q4		
	U.S.[b c]	U.K.[b]	Japan[b]	U.S.[c]	U.K.	Japan
	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
1. w + h + e	2.16***	0.91**	0.95**	2.64***	0.84*	1.38***
2. w	0.06	0.59*	1.22***	0.28	0.87**	0.80***
3. h + e	2.10***	0.32	-0.28*	2.36***	-0.03	0.58***
4. h	-0.19	0.20	-0.31**	-0.20	-0.04	-0.25*
5. e	2.29***	0.12	0.03	2.57***	0.00	0.83***
6. Ratio of line 2 to line 1	0.03	0.65	1.28	0.11	1.04	0.57

Notes

a. All regressions include a constant and a trend term.

b. All regressions also include changes in the difference between the growth rates of the U.S. consumption deflator, respectively including and excluding expenditures on food and energy.

c. Regressions also include dummy variables for the impact of the Nixon controls.

Asterisks designate significance levels of sums of coefficients, as follows: 10 percent (*), 5 percent (**), and 1 percent (***).

perience is dominated by the 1974 wage explosion, in which the four-quarter change in wages reached 27 percent in 1974:Q2 and 1974:Q3, and which was partly but not completely accommodated by nominal GNP growth (with peaks of 20.5 percent in 1973:Q4 and 19.4 percent in 1974:Q3). Nominal wages and GNP growth dropped precipitously in 1975 to respective troughs of 7.7 percent (1975:Q2) and 8.0 percent (1975:Q3). Partly because wages accelerated more than nominal GNP in 1974, the four-quarter growth rate of manufacturing hours worked (h + e) fell from 1.6 percent (1973:Q1) to -5.2 percent (1975:Q1), and then rebounded to 1.2 percent (1976:Q1). This decline in hours in 1974, while nominal GNP was rising rapidly, accounts for the otherwise puzzling negative coefficients for Japan in column (3), line 3.[9] In the shorter 1963-72 sample period, the growth of hours worked (line 3) shows the expected positive response to nominal GNP changes. The large British wage response in the short sample period stems from the monetary accommodation of the 1970 wage explosion. Nominal wage growth, again calculated on a four-quarter change basis, accelerated from 5.0 percent (1969:Q2) to 12.5 percent (1971:Q1), and then jumped after a brief hiatus to 15.6 percent (1972:Q4). Nominal GNP growth displayed a similar pattern, increasing from 4.5 percent (1969:Q3) to 14.6 percent (1971:Q3), and then jumping after a short relapse to 18.4 percent (1973:Q1).

This chronology raises the issue of direction of causation. Did nominal GNP changes cause wage changes, or vice versa? Work by John Taylor (1980) stresses the central role of policy accommodation in determining the degree of inertia in the wage-price process. If nominal GNP is at least partly endogenous, and responds quickly to wage changes, then the sums of coefficients in Table 2 may be contaminated by simultaneous equations bias, with an upward bias if the reverse feedback to nominal GNP

is positive, and a downward bias if the reverse feedback is negative. A method introduced by Cliver Granger (1969) can be used to test for exogeneity in a two-way relationship. A variable, say y_t (nominal GNP change) is regressed on a constant, a time trend, its own lagged values, and lagged values of the other variable of interest, say, w_t (wage change):

$$(5) \qquad y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{M} \beta_i y_{t-i} + \sum_{j=1}^{N} \gamma_j w_{t-j} + \varepsilon_t$$

Now the variable $\underline{y}$ is exogenous with respect to $\underline{w}$ if the lagged $\underline{w}$'s fail to make a significant contribution to the explanation of $\underline{y}$ over and above the serial correlation process captured by the lagged values of $\underline{y}$. A symmetric test for the exogeneity of $\underline{w}$ with respect to $\underline{y}$ is available with the $\underline{y}$'s and $\underline{w}$'s in (5) reversed. Such a test for the exogeneity of wage change amounts to running the regressions of Table 2 with the current nominal GNP change omitted but the lagged values included.

The results of the Granter tests are exhibited in Table 3. Line A shows the sums of coefficients (γ_j) on lagged wage changes in the equations for nominal GNP change. The sums of coefficients are negative in both sample periods for the U.S., positive for the U.K., and mixed for Japan. Only in the short sample period for the U.S., however, does the significance level reach 5 percent. One would expect the negative feedback from wage to nominal GNP changes for the U.S. to cause the coefficients in Table 2 to be biased downward, and indeed the U.S. coefficients in line B of Table 3 are modestly higher. Nevertheless, the conclusion still emerges that the responsiveness of wage change to past nominal GNP changes is several times higher in Britain and Japan than in the U.S.

TABLE 3

The Two-Way Relation Between
Quarterly Changes in Nominal GNP
and Manufacturing Wage Rates

	1962:Q2 - 1980:Q3			1962:Q2 - 1972:Q4		
	U.S.	U.K.	Japan	U.S.	U.K.	Japan
	(1)	(2)	(3)	(4)	(5)	(6)
A. Nominal GNP Equations, Sum of Coefficients on Lagged Wages	-0.56	0.58*	0.07	-1.11**	0.91*	-1.48*
B. Wage Change Equations, Sum of Coefficients of Lagged Nominal GNP	0.11	0.70**	0.78	0.39	0.79**	1.25**
C. F Ratios for Inclusion of						
1. Wages in Nominal GNP Equation	0.31	0.83	0.76	1.18	5.89***	1.05
2. Nominal GNP in Wage Equation	0.92	2.21**	0.53	0.97	1.98*	1.47

Note: Asterisks designate significance levels of sums of coefficients, as follows: 10 percent (*), 5 percent (**), and 1 percent (***).

For this paper, however, the main issue is the unique nature of the sluggish wage response in the U.S. Is this a phenomenon that economic theory can help to explain, or must economists throw up their hands in despair, turning the question over to the speculations of historians and sociologists? Because the most obvious institutional feature of the U.S. manufacturing labor market is the three-year staggered wage contract, we proceed in the next section to examine differences between American, British, and Japanese wage responsiveness before 1940, that is, prior to the introduction of the three-year U.S. union wage contract.

II.2 Pre-1940 Data on Wage Rates and GNP Deflators

Prior to World War II comparable data on key labor market variables are harder to obtain than for the most recent two decades. I have simplified my task by concentrating on the response of wage changes to nominal GNP, in order to learn whether sums of coefficients analogous to those in Table 2, line 2, differ as much among the three countries before World War II as afterwards. It is possible to find annual nominal wage rate and GNP data going back to 1870 in the U.K., 1878 in Japan, and 1889 in the U.S. Allowing for first-differencing and lags, I have estimated response coefficients of wage rates to nominal GNP changes for sample periods ending in 1940 for each country, and beginning in 1873 for the U.K., 1881 for Japan, and 1892 for the U.S. And, although the main focus of the paper is on wages rather than prices, I also present analogous results for the response of the GNP deflator to changes in nominal GNP--in order to display for the U.K. and Japan results analogous to those discussed for the U.S. in two recent papers of mine (1980, 1981a).

Since the data are unfamiliar, simple means and standard deviations for three sub-periods are presented, as a basic introduction, in Table 4. The period of World War I and its aftermath is singled out for special attention, as a result of my finding (1981a) that U.S. prices were much more responsive to spending changes during that interval than before or afterwards. The U.K. and Japan data also share this feature of a much higher mean and standard deviation of wage and price change during 1914-22 than either before or after. Another finding is that Japanese spending growth was the most volatile before 1914, with the U.S. most volatile after 1922, and the British achieving the most stable demand growth in each period. But perhaps the most interesting conclusion to be drawn from Table 4 is that, in stark contrast to Table 1 for the postwar years, there was no tendency for U.S. wage changes to be more stable than in Britain and Japan. In fact the standard deviation of the year-to-year change in U.S. wage growth ranks first among the three nations before 1914 and after 1922, and is tied for second place during the World War I era. The GNP deflator generally mirrors the behavior of wages, with a tendency for prices in the U.S. to be less volatile relative to wages, whereas in the other two countries prices are either as variable or more variable than wages.

A more interesting set of results is presented in Table 5, which is analogous to Table 2. The top half of the table displays coefficients of response of annual wage changes to current and two lagged changes in nominal GNP. All regression equations also contain a constant term, and, to maintain consistency with my other papers, two dummy variables

TABLE 4

Means and Standard Deviations
of Historical Percentage Growth Rates, 1873-1940

	Starting Date[a] -1913	1914 -1922	1923 -1940
	(1)	(2)	(3)
Means			
Nominal GNP (y)			
U.S.	4.71	6.96	1.65
U.K.	2.39	6.12	2.19
Japan	6.68	12.23	4.71
Wage rate (w)			
U.S.	1.79	7.94	2.22
U.K.	0.48	7.59	0.25
Japan	4.63	12.27	0.73
GNP Deflator (p)			
U.S.	0.93	5.64	-0.73
U.K.	0.52	7.89	-0.16
Japan	3.79	7.85	1.09
Standard Deviations			
Nominal GNP (y)			
U.S.	6.77	15.58	11.65
U.K.	3.08	14.07	5.30
Japan	10.53	16.33	8.51
Wage rate (w)			
U.S.	4.46	13.21	6.71
U.K.	1.63	15.12	4.08
Japan	3.98	13.28	5.20
GNP Deflator (p)			
U.S.	2.87	12.36	4.20
U.K.	1.76	14.16	3.53
Japan	4.99	13.97	7.15

Note: a. Starting dates are: U.S. 1892; U.K. 1873; Japan 1881.

Source: See data appendix

for the U.S. The first captures the impact of price controls during the last year of World War I, and the second captures the marked but temporary impact of the National Recovery Act in raising wages and prices in 1933 and 1934. The dummy variables are defined in a special form that imposes the restriction that the termination of each program of government intervention completely reversed its effect on the price or wage level.[10]

The most important conclusion in Table 5 can be gleaned from column (4), which shows the sums of coefficients on current and two lagged values of nominal GNP. Here the three countries display roughly similar degrees of wage responsiveness, whereas, in Table 2 for the postwar period, the U.S. is a definite outlier. In Table 5, the smallest value for wages in column (4) is achieved by Japan during 1881-1913; this may reflect measurement error rather than a substantive difference (note the much higher responsiveness of the GNP deflator in Japan for this period in the bottom part of the table).[11] The other main patterns for wages are the uniform increase across countries in the degree of responsiveness during World War I, and the evidence of a substantial decline in responsiveness in the U.S. after 1922 as compared to pre-1914.

The results for the GNP deflator, displayed in the bottom half of the table, seem generally consistent with those for wages. In all countries price responsiveness increased during World War I, a phenomenon I have explained by formulating a theory in which people use common information on the variance of aggregate demand shocks to guess what will happen to their costs of purchased inputs (1981a, pp. 519-25). This theoretical explanation is also roughly consistent with the Japanese

TABLE 5

Regressions of Changes in Wage Rates and the GNP Deflator on Current and Lagged Changes in Nominal GNP, 1873-1940

	Coefficient on y_t	Coefficient on y_{t-1}	Coefficient on y_{t-2}	Sum of Coefficients	Dummy Variable	R^2	S.E.E.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wage Changes							
Starting Date[a]-1913							
U.S.	.376**	.413**	-.047	.742	---	.589	3.08
U.K.	.246**	.191**	.159**	.596	---	.635	1.14
Japan	.101**	-.037	.114**	.252	---	.223	3.87
1913-1922							
U.S.	.628**	.388**	.103	1.119	0.0	.962	3.65
U.K.	.376**	.764**	.442*	1.582	---	.911	5.71
Japan	.230	.468**	.242	.940	---	.879	5.82
1923-1940							
U.S.	.296**	.283**	-.111**	.468	12.2**	.844	3.02
U.K.	.376**	.215*	.153*	.744	---	.686	2.51
Japan	.314**	.124	.231**	.669	---	.820	3.35
Price Changes							
Starting Date[a]-1913							
U.S.	.275**	.193**	.032	.498	---	.501	2.19
U.K.	.346**	.118	.113	.577	---	.421	1.75
Japan	.475**	.124*	.213**	.812	---	.573	5.78
1913-1922							
U.S.	.644**	.374**	-.147	.871	-8.1**	.959	3.52
U.K.	.742**	.262*	.439**	1.443	---	.940	4.36
Japan	.774**	.097	-.033	.838	---	.812	2.48
1923-1940							
U.S.	.267**	.110**	-.019	.358	4.9**	.886	1.62
U.K.	.326**	.226**	.122*	.674	---	.754	1.93
Japan	.530**	.352**	-.070	.812	---	.820	3.35

Notes: a. Starting dates are the same as in Table 4.

Asterisks designate significance levels of sums of coefficients, as follows: 10 percent (*) and 5 percent (**).

results, which show a large but fairly stable price response in the three periods, since Table 4 reveals that the variance of Japanese nominal GNP growth was relatively high in all three sub-periods.

In a recent study of the Great Depression (with James Wilcox, 1981), I called attention to the greater flexibility of prices in Europe than in the U.S. as a partial explanation for the relatively milder and shorter Depression in Europe. Table 5 for the 1923-40 sub-period confirms that U.S. wages and prices, while sufficiently flexible to absorb (after a one-year lag) roughly half of the nominal spending change in the case of wages, and about one-third in the case of prices, nevertheless were less flexible than in Britain and Japan. It would thus appear that the phenomenon of sluggish wage and price responsiveness had begun to emerge in the U.S. before World War II, prior to the invention of the three-year staggered wage contract in 1948.

III. THE ORGANIZATION OF LABOR MARKETS

The empirical results in the preceding section establish, at least for the postwar period, that changes in the manufacturing wage bill were accompanied by greater changes in hours worked, and by lesser changes in nominal wages, in the U.S. than in Britain or Japan. Among the institutional arrangements that might help to explain these empirical phenomena are the postwar U.S. system of three-year staggered, overlapping, and imperfectly escalated wage contracts, the absence in Britain of written wage agreements, and the Japanese institutions of lifetime employment and bonus payments. To determine what elements economic theory can contribute to an explanation of these international differences, this section identifies a set of ideal institutions dictated by purely economic considerations. Then Part IV compares these to real-world practices in the three nations. Is an important element of inefficiency introduced because real-world labor-market institutions were invented spontaneously by decentralized and uncoordinated actions of economic agents, rather than by the firm hand of an up-to-date economic theorist?

The organization of the analysis corresponds to the central distinction between real shocks, i.e., innovations or oil cartels, and nominal shocks, i.e., changes in the supply of money. The recent theory of labor markets is amenable to a corresponding division between purely real factors that foster income stability and long-term attachments between firms and workers, and the interaction of real and nominal factors that determine the extent to which indexation will insulate the real economy from nominal disturbances.

III.1 Long-term Worker-Firm Attachments in the Face of Real Shocks

In the simple labor-market model of the elementary textbook, there are neither institutions nor long-term attachments. Supply equals demand, and there is a three-way equality between the real wage, the marginal product of labor, and the marginal value of time (or disutility of work). If the schedules have the usual shapes, a negative productivity shock reduces labor input and the real wage, but a shift in nominal demand has no effect on either real variable. There is no need to introduce formal indexation, since the freely adjusting wage automatically mimics the movements of the freely adjusting price. Two separate lines of intellectual development have emerged to explain long-term attachments between firms and workers. The first treats workers as homogeneous and was stimulated by the original models of Azariadis (1975), Baily (1974), and Donald F. Gordon (1974), each of which independently introduced the assumption that workers are more averse to risk than firms. The second introduces a training cost or "toll" that differentiates among members of the labor force, was invented by Gary Becker (1962), and has been the subject of innumerable papers, including the recent formal analysis of Mortensen (1979) and extended verbal treatment by Okun (1981).

The Quest for Real Income Insurance. The Azariadis-Baily-Gordon (A-B-G) model explains why firms would offer real income insurance to risk-averse workers. Seeking income stability, workers are willing to accept a smaller mean income over the cycle from a firm offering a stable income than from one offering a variable income, and competition forces all firms match the stable-income offer. Firms "sell" real income insurance to

workers, accepting greater instability in profits and, in conditions of a sharp leftward shift in the real demand for labor, standing ready to finance losses on the perfect capital market. Although initially heralded in corridor conversation as providing a microeconomic foundation of the Keynesian phenomena of rigid nominal wages and involuntary layoff unemployment, the A-B-G model--it soon became apparent--could explain neither.

Consider the standard version of the A-B-G model with risk-averse workers, risk-neutral firms, a known distribution of states of nature, an atemporal setting in which present choices have no future consequences, a prohibition on mobility of workers between firms after the invisible handshake, and a symmetric access by workers and firms to information about the state of nature that has actually occurred. Since all the elements of the model are stated in real terms, there is no impact of a purely nominal disturbance, which can be absorbed by a fully escalated nominal wage.

The effects of shifts in the real demand schedule depend on which of several assumptions are made about the preferences of workers and the nature of unemployment compensation, if any. With a utility function for workers that is separable in consumption and leisure, and with no unemployment compensation, firms offer a fixed income. A leftward shift in real labor demand causes firms to eliminate those hours each day or week which yield a marginal product below the value of time. Because all workers are identical, hours reductions are shared equally, and no worker is fully unemployed.

Now we add an additional assumption, which in the theoretical jargon is called "a lump-sum reward for unemployment." This must be funded by

some source besides the firm itself, e.g., a general tax. Now firms can offer workers a larger compensation package if they lay off individual workers to make them eligible for the lump-sum reward, instead of imposing an evenly shared reduction in hours. The individuals receiving the layoff notice are not at all unhappy about their lot, because the firm continues to provide them with a stable income by paying laid-off workers the difference between the wage of employed workers and the sum of (a) the unemployment reward and (b) the value of leisure. Thus the A-B-G model can explain layoffs only through the intervention of a special kind of outside-financed unemployment compensation system, and the resulting unemployment is not involuntary. Involuntary unemployment in this model requires the unsupported and arbitrary assumption that firms cut the pay packet of inactive workers (including leisure and the outside reward) below the packet of active workers.

When the assumption of symmetric information is dropped, then firms may be able to determine the true state of nature and to conceal it from workers. Once workers have agreed to work any required amount for a fixed income, firms have an obvious incentive to overstate labor demand and ask workers to supply (implicitly forever) an above-normal number of hours. Recognizing the incentive of firms to cheat, workers will insist on an arrangement that allows a change in hours to occur only if income responds positively. Guillermo Calvo and Edmund S. Phelps (1977), Robert E. Hall and David Lilien (1979), and Sanford Grossman and Oliver Hart (1980), have all shown that income and hours worked will vary in the same direction when information is asymmetric. Phelps (1977) was the first to capture the irony that in this context the A-B-G model yields just the same result

as the old-fashioned textbook model: "It is just as we always thought--prior to the advent of state-contingent contract theory!" (1977, p. 153).

Income variability can also be deduced with symmetric information, when the assumption of completely risk-neutral firms is dropped. Firms may not be able to absorb unlimited losses. While local supply shocks may be diversifiable, some risks are economy-wide and nondiversifiable. Herschel Grossman (1977) shows that there is some level of the marginal product of labor sufficiently low to prevent firms from absorbing all risk. A further and more complex analysis with the A-B-G model introduces dynamics. Firms attempt to assess the likelihood that employees may quit in good times to obtain a wage higher than the fixed income level. Dynamic analysis also erodes the significance of the asymmetric information assumption; firms are unlikely to cheat when they know that workers may soon learn the true outcome and shun them forever.

What, then, does the A-B-G model contribute to an understanding of international differences in labor-market arrangements? It cannot explain differences in nominal wage responsiveness, since it is stated entirely in real terms. It can explain the greater reliance on layoffs in the U.S. than in Britain and Japan as a result of differences in unemployment compensation systems, but the role of unemployment insurance can be discussed independently of the A-B-G model and assumptions. Finally, the A-B-G model does not explain long-term attachments between firms and workers, but rather assumes this outcome by basing its analysis on an atemporal world with no *ex post* mobility. Its main positive contribution within the context of this paper is to stress the potential role of firms as intermediaries providing real income insurance; the ability and willingness

of firms to stabilize incomes in a particular country, i.e., Japan, may depend on size of firms, diversification, attitudes toward risk in financial markets, debt-equity ratios, and other factors related to the A-B-G analysis.[12]

Firm Specific Human Capital and Seniority Rules. A more fruitful approach to the explanation of long-term worker-firm attachments was introduced by Becker (1962), who argued that the costs and returns from investments in firm-specific capital would be shared by the firm and its workers. For the firm to capture all of the return would leave the employee with nothing to "glue" him to the firm and would lead to excessive quits; for the worker to capture all of the return would leave the firm with no incentive to train him. In Okun's (1981) terminology the initial training and hiring investment can be likened to a "toll," collected at the beginning of the worker's attachment, the incidence of which must be divided between worker and firm. The resulting relationship, in which each party has an investment, is Okun's "career labor market." Since nothing in the career labor-market model prevents the resulting wage from being fully escalated to the price level, the Becker-Okun analysis should not be viewed as providing an explanation of business cycles, but rather of institutions like separation procedures and penalties, seniority rules, age-earnings profiles, compulsory overtime, and mandatory retirement.

Hashimoto (1979), Mortensen (1979), and Lorne Carmichael (1980) have analyzed the consequences for the human capital model of imperfect but symmetric information; the realized surplus available to be divided depends on productivity, which the firm knows more about, and job satisfaction, which the worker knows more about. Each party has an incentive to influence

the division of the surplus by cheating, with firms understating productivity and workers understating job satisfaction. An optimal arrangement would appear to involve separation penalties. A worker who is dissatisfied may quit, but must pay a separation penalty equal to the firm's lost training investment; a firm dissatisfied with a low-productivity worker can fire him, but must offer a severance payment.

The fact that these "symmetric separation penalty" contracts are not observed is attributed by Carmichael to moral hazard introduced by the need to distinguish between a quit and a fire in order to administer the separation penalties. Firms have an incentive to make workers unhappy and get them to quit, so that the "firing" penalty will be saved, and workers have an incentive to slack off until they get fired, thus earning the "firing" penalty. From this observation Carmichael proceeds to show that seniority rules for layoffs and promotions can reproduce the turnover incentives of the penalty contracts without the same exposure to moral hazard. Seniority rules allow inter-worker transfers, with junior workers "collecting" from senior workers who quit, in the form of promotion and protection from layoffs. The moral hazard problem disappears, because the junior worker moves up the ladder regardless of whether the separation is a quit or a fire.

The possibility that workers may featherbed on the job has an impact on the form of labor-market institutions. In a pair of papers, Edward Lazear (1979) (1981) has shown that it is possible to explain important features of existing institutions, particularly mandatory retirement and a positively sloped age-earnings profile, as optimal in a competitive labor market. A steep age-earnings relation alters a worker's incentives

to perform efficiently on the job. The productivity of each hour spent working is increased when the bulk of wage payments is delayed until relatively late in life, since the worker is more anxious to please the firm in order to avoid a job termination. Thus the wage schedule may rise with experience, even if productivity does not, a phenomenon that is consistent not just with the Japanese lifetime employment system, but also with recent findings by James Medoff and Katherine Abraham (1980) in a study of several U.S. firms.

An undesirable side effect of the steep age-earnings profile is that, if hours are freely chosen, young workers work too little and older workers work too much. Since there is only one degree of freedom, the wage rate adjusts the effort margin and quantity constraints (compulsory overtime; mandatory retirement) determine hours. Hence it is not surprising that we observe complaints by younger workers about compulsory overtime (which they may try to fight with absenteeism), while older workers complain about being prevented from working as much as they would like. Mandatory retirement goes hand-in-glove with a steep age-earnings profile, since the firm cannot afford to expose itself to a period of unpredictable length during which the worker receives more than his marginal product. This approach relies on the fact that it is easier to monitor the number of hours worked than the amount of effort expended, and for this reason belongs in the class of human capital models that incorporate imperfect information.

III.2 Contract Length and Indexation

In Arthur Okun's words, "there are more reasons than we need to explain why real-world employers care about retaining experienced workers"

(1981, p. 48). Risk aversion, monitoring costs, and training costs, can lead to long-term attachments between firms and workers. But now, to explain why real variables are not completely insulated from nominal disturbances, we must determine which contingencies, if any, should be included in the written or unwritten contracts binding workers and firms.

A basic idea that runs through the literature, e.g., Azariadis (1981), is that the choice of contract form can be posed as an economic tradeoff. "Naive" contracts that predetermine prices or wages without new information are cheap to write but expose agents to inefficient outcomes when unpredictable events occur. Contingent contracts that incorporate new information are more costly to write but can minimize or eliminate risk. The tradeoff is easiest to understand in Jo Anna Gray's (1978) analysis of optimal contract length.[13] If a fixed cost is incurred each time a contract is renegotiated, then amortization of the fixed cost calls for a long contract duration. But if the contract does not eliminate all conceivable risks, then a long contract duration exposes agents to a larger potential efficiency loss than a short duration. Thus contract length depends inversely on the expected level of uncertainty. If contracts can be written to eliminate all real consequences of purely nominal disturbances, then the variance of nominal aggregate demand is irrelevant for choosing the contract length, and only uncertainty about potential real supply shocks matters. The U.S. postwar three-year wage contract, as contrasted to shorter contract lengths in Britain and Japan, would be explained within the Gray framework as the consequence of relatively high perceived renegotiation costs and a relatively low level of uncertainty in the U.S.

What range of possible contingencies will be written into contracts? Asymmetric information mitigates against contracts contingent on "local" variables specific to the firm, e.g., firm sales, product price, or worker productivity. As in the Grossman-Hart and Hall-Lilien models, any informational advantage on the part of the employer leads to a moral hazard problem, that the firm has an incentive to understate the realization of the variable on which the wage is contingent, in order to minimize wage cost. Contracts are thus more likely to be contingent on aggregate nominal variables, i.e., the consumer price index and/or the money supply. But, as Gray's paper shows, indexation to a consumer price index rigidifies real wage growth over the life of the contract. While this is an optimal outcome if all disturbances are nominal, and the growth of productivity is perfectly predictable, full consumer-price indexation imposes an efficiency loss when an unpredictable supply shock (e.g., OPEC) changes the equilibrium real wage.

Since full indexation to the consumer price index has the fatal defect that it rigidifies the real wage, an appealing alternative is indexation to nominal GNP, since this allows the real wage to adjust automatically to unexpected changes in productivity growth (the advantages and disadvantages of indexation to a nominal monetary aggregate are treated below in paragraph (3)). Adopting the notation in Part I above, with changes in nominal GNP, prices, actual real GNP, and equilibrium real GNP designated respectively as y, p, q, and q^*, we have the identity:

$$(6) \qquad y - q^* \equiv p + q - q^*.$$

Let us assume for convenience that equilibrium labor input is constant, so labor productivity growth in equilibrium is the same as equilibrium real GNP growth (q^*). Then indexation of the wage rate to nominal GNP ($w = y$) implies, when substituted into (6):

$$(7) \qquad w - p \equiv q^* + (q - q^*).$$

Thus growth in the real wage ($w - p$) automatically reflects equilibrium productivity growth (q^*) as long as there are no fluctuations in real output relative to its equilibrium value ($q - q^* = 0$).

No matter how superficially attractive, nominal GNP indexing of wage contracts has never been observed. This occurs, I suggest, because four sets of barriers prevent agents from making the comfortable assumption that real business cycles have been vanquished ($q - q^* = 0$) and therefore in (7) that the growth of the real wage mimics the growth of productivity. The barriers are (1) pre-set prices and wages, (2) foreign trade, (3) information imperfections and delays, and (4) velocity shifts.

(1) *Pre-set prices and wages.* I have recently argued (1981a) that firms have a legitimate reason to fear that nominal GNP fluctuations will, at least initially, take the form of real GNP fluctuations. First, in many markets it is efficient for prices to be pre-set rather than established in auction markets, to save on the time and transportation costs that centralized auctions impose. Second, prices that are preset for even a short interval imply that firms will initially experience a nominal fluctuation as a real event--a decline in real purchases at the initially preset price. Their expectation that the real demand shock will soon be eliminated depends on the speed with which costs of inputs purchased from

other firms mimic the movement in nominal demand. If information on the nominal stock is imperfect, firms may, at least initially, interpret it as local rather than aggregate in nature and may believe that there is no reason for their input costs to move in proportion to the demand shift. Once it is admitted that individual product prices, and hence the aggregate price level, may adjust gradually to changes in nominal GNP, then workers will fear the consequences of nominal-indexed wage contracts. Consider a 20 percent decline in nominal GNP, accompanied initially by only a 10 percent decline in the aggregate price level. Workers having a wage contract indexed to nominal GNP would experience a decline in their real wage of 10 percent. Eventually prices would adjust fully in proportion to the nominal GNP change, but workers, particularly if they are risk averse, would object to the instability of real wages implied by nominal-GNP indexation in a world of gradual price adjustment.

The preceding paragraph is unconventional in that it deduces nominal wage stickiness from price stickiness, while it is more common to do the reverse. But in fact the argument works both ways. If nominal wages do not adjust instantly, then firms face nominal marginal costs that are less than unit elastic with respect to nominal GNP changes. The problem is properly treated as dynamic rather than static, in which several sources of resistance to full nominal indexation interact and reinforce each other.

(2) *Foreign trade.* When firms observe an increase or decrease in their real sales at the initially pre-set price, their choice of a new price depends on a guess about the fraction of the demand shift representing a nominal aggregate shock, as opposed to a real aggregate or real local shock, and, a guess about the extent to which suppliers of inputs recognize

the aggregate component of the shock. As will be recognized by economists in Britain, Japan, and other open economies, the perceived stickiness of marginal cost is a rational response when agents recognize that a substantial fraction of their inputs are imported from abroad, where suppliers may have been unaffected by an aggregate nominal demand shock that is national rather than international in origin. Full insulation of real sales from a perceived nominal *national* disturbance would require that each agent (a) assumes his national suppliers immediately perceive the same shock and (b) ignores the fact that suppliers of imports are unaffected by a national demand shock. Both (a) and (b) surely strain credulity.

(3) *Information imperfections and delays.* Prior to the postwar development of monetary aggregates and national income accounts, timely measures of nominal aggregates did not exist, as good a reason as any to explain why nominal aggregate indexation has never occurred. Even today, nominal GNP indexation would require a two-month average delay in the U.S., (data for the second quarter, entered on May 15, become available in the third week of July). Lags are considerably longer in some other countries. Wage contracts indexed to nominal GNP thus cannot prevent a short-run reduction in hours worked in situations when nominal GNP growth suddenly decelerates, as in the U.S. in 1980:Q2 and 1981:Q2. Profit-maximizing firms naturally resist the implications of nominal GNP indexation that, because of information lags in situations of temporary fluctuations of nominal GNP growth, they reduce prices just when the economy is recovering and raise prices just when it is collapsing.

(4) *Velocity shifts.* Information on monetary aggregates is available fairly promptly, but indexation to a particular monetary aggregate cannot insulate real variables even if information is contemporaneous. Stochastic disturbances in commodity and money demand functions, which may be serially correlated, lead to serially correlated fluctuations in the velocity of money. A price-setting agent choosing to index his product price to M1 in the U.S. would find that a slump in real sales would occur in any week or month in which velocity grows more slowly than the average written into the indexation formula.

III.3 Conclusions Regarding Optimal Labor-Market Arrangements

Contractual arrangements cannot obviate fluctuations of hours worked in response to fluctuations in real supply or in nominal demand. Firms and workers are both unwilling to accept the risk implied by a contract that is fully indexed to nominal spending or money. If it is impossible to eliminate fluctuations in nominal demand, then labor-market contracts should be of relatively short duration. Frequent contract renewals can partially substitute for the absence of nominal GNP indexation, by allowing the latest information on both real and nominal shocks to be incorporated into wage-setting and price-setting decisions.

Firms are not entirely indifferent about the extent of fluctuations in their profits. This being the case, contracts should not only be of short duration, but in addition should expire simultaneously across all firms. Simultaneous contract renegotiation is preferable to staggered contracts, because workers are more likely to accept a slower rate of wage growth in response to a nominal GNP slump if they are in the same boat,

than if one group of workers is asked to accept a sacrifice that was not required of another group whose contract was settled a month or two earlier.

Short contract durations, while minimizing allocational losses in the face of uncertainty, impose extra fixed costs of renegotiation. There is a shortage of degrees of freedom. Contract duration, a single institution, cannot perform two different functions--the achievement of macroeconomic efficiency and the resolution of conflicts over income shares. Efficiency requires short contracts, while the minimization of negotiation and strike costs requires long contracts. Thus an economic theorist designing institutions must simply decree that the initial income distribution is just, and is not to be the subject of disputes at contract renegotiation time, if he wants contract duration to be chosen to maximize macroeconomic efficiency.

Efficient labor-market institutions to achieve microeconomic efficiency would seem to involve an age-earnings profile that is steeper than the age-productivity profile, together with mandatory retirement, in order to induce efficient performance and avoid featherbedding by younger workers. Seniority rules should be instituted for promotions and hours reductions. Unemployment compensation should be paid proportional to hours of time lost, rather than days of full-time work lost, in order to encourage work-sharing. To the extent that it is actually necessary for firms to lay workers off, seniority rules should be adopted that concentrate job layoffs on junior workers, in whom there is likely to be a smaller cumulative training investment.

IV. ORIGINS OF LABOR-MARKET INSTITUTIONS IN JAPAN, THE U.K., AND THE U.S.

Many of the labor-market arrangements selected by the economic theorist to achieve macroeconomic efficiency and high productivity appear to correspond rather closely to well-known features of the Japanese labor market. Long-term attachments between workers and firms are formalized in the lifetime employment system, with wage flexibility encouraged through a semi-annual variable bonus. The seniority wage, or nenkō, system, in its purest form relates earnings solely to length of service and not to work performance. Wage renegotiations take place annually and are roughly simultaneous during the "spring wage offensive."

If Japanese labor-market institutions are more compatible with macroeconomic efficiency than those in the U.K. and U.S., we may naturally wonder whether the Japanese achievement occurred by design or historical accident. Andy, by comparing the historical background, we may try to identify those basic forces that inhibit change in the other two countries. My central theme is the differing role of labor-management and class conflict in the three nations, forcing labor-market institutions in the U.K. and U.S. to be geared mainly to the resolution of disputes rather than the achievement of macroeconomic efficiency. This theme parallels the theorist's demonstration that wage contracts cannot perform two functions at once, and that social conflict would simply have to be abolished by decree in order to allow contract renegotiations to concentrate on macroeconomic efficiency. In stressing the role of social conflict as an indirect explanation for cross-country differences in macroeconomic performance, I

have been influenced by Albert Hirschman's parallel finding that in Latin America:

> ". . . Various groups maintain and prize an attitude and phraseology of unbending opposition and hostility. . . The Chilean situation appears to be weighted more heavily with the avoidance of agreement, with the maintenance of a militant stance on the part of all contending groups. In a sense, this stance is the desired benefit and inflation is its cost" (1973, pp. 208-9).

IV.1 The Japanese System

Underlying Japanese institutions is a stratification system, based on nonoccupational criteria, that is deeply rooted in social relations. This tradition "suggests that vertical, that is, hierarchical, social relations rather than those based upon egalitarian norms represent the ideal" (Kazuo Okochi, Bernard Karsh, and Solomon Levine, 1974, p. 485). Analysts dating back to Thorstein Veblen have attributed the high degree of respect for authority to the rapidity of Japan's forced-draft transition from a feudal to an industrial society. "It is in this unique combination of a high-wrought spirit of feudalistic fealty and chivalric honor with the material efficiency given by the modern technology that the strength of the Japanese nation lies" (Veblen, 1915, p. 251-2).[14]

The lifetime employment system apparently developed after World War I with the introduction of belt conveyors and assembly lines. Previously Japanese skilled workers had been mobile and independent, but the new production processes required workers with narrow skills on particular machines rather than broad, easily transferable skills. This transition seems compatible with Becker's distinction between general and firm-specific

human capital, and implies that firms moved to the lifetime employment system in order to amortize their specific training investment. Worker loyalty was cemented by the seniority wage structure, combined (as in Lazear's model) with the rule of mandatory retirement at the age of fifty-five.

Since British and American factories had introduced similar production techniques earlier, the existence of firm-specific human capital is clearly insufficient to explain the unique features of the Japanese lifetime employment system. Walter Galenson and Konosuke Odaka argue that another necessary ingredient is homogeneity of the work force, since heterogeneity in worker ability makes it inefficient to base wage payments exclusively on seniority. While there is no doubt that the massive immigration into the U.S. during the main period of industrialization made American workers less homogeneous than the Japanese, this consideration does not seem to have much payoff in explaining differences between the Japanese and British systems.[15]

Differences in the degree of long-term attachment between workers and firms across the three nations should not be exaggerated. The Japanese lifetime employment system is mainly concentrated in large firms, ends at age 55, and does not apply to women or employees of numerous subcontractors and other satellites that act as a buffer during economic downturns. In the U.S., as Hall (1980) has shown, a surprisingly large fraction of U.S. workers hold what are essentially lifetime jobs (although not to the extent prevalent in Japan).[16] Thus what is unique about the Japanese system is not so much the average duration of the worker-firm attachment, but

rather the role of seniority rather than ability in determining payment. Galenson and Odaka consider the nenkō payment system an important way in which grievances are minimized in the Japanese system, and this fits in with our theme of conflict-minimization:

> "All employees, once hired, are entitled equally to all the rights and privileges of the organization to which they belong. There may be variations in individual talent, but it is assumed that everyone is doing his best to serve the company in his own way; no one should be discriminated against."[17]

Another ingredient in the Japanese system is the integration of economic and social life within the large firm. William Ouchi's discussion implies that this custom, which he attributes to the "historical accident" that Japan "rushed" from feudalism to a modern industrial society, plays a large role in conflict avoidance:

> "Intimacy of this sort discourages selfish or dishonest action in the group, since abused relationships cannot be left behind. People who live in a company dormitory, play on a company baseball team, work together on five different committees, and know the situation will continue for the rest of their lives develop a unique relationships. Values and beliefs become mutually compatible over a wide range of work-related and non-work-related issues."[18]

At the heart of conflict avoidance in the Japanese system is a greater degree of equality, with less influence of social class, so that

there is less to fight about. Nathan Glazer (1976, pp. 887-8), states flatly, "The Japanese factory or company is at present perhaps the most egalitarian in the world, outside China. . . Clearly, class is relatively less evident than in England, and even relatively less evident than in the United States." Glazer's summary of in-plant sociological studies cites the absence of any distinction of dress between white-collar and manual workers; the informal familiar level of speech used within the factory contrasted with the formal level of address used with those on the outside; the lack of distinction between annual salaries and hourly pay; the one-class company cafeteria (no executive dining room); and communality of access to sick pay, sports clubs, and vacation resorts.[19] It may seem paradoxical that the Japanese combine a greater respect for hierarchy with greater equality in the perquisites of managers and workers, but this seems to be explained by the non-occupational nature of Japanese attitudes toward hierarchy.[20]

I have stressed conflict avoidance, because I believe that this helps to explain why the Japanese have one-year wage contracts and why the U.S. has three-year wage contracts. But there are two other important features of the Japanese system that foster macroeconomic efficiency, the simultaneity of contract expiration dates in the spring wage negotiations, and the prevalence of flexible wages in the form of bonus payments. The spring wage offensive, or Shuntō, developed in 1955 at the initiative of the largest of the Japanese labor federations. Despite the fact that the actual bargaining takes place between management and the enterprise union at each firm, the institution of the simultaneous offensive seems to have brought about some standardization of wage increases across firms

(Galenson and Odaka, pp. 644-5). The simultaneity of the offensive may be partially explained as an attempt by the Japanese trade union movement to compensate for its basic weakness and fragmentation.[21] The greater power and strike-proneness of American labor may help to explain the persistence of staggered contract expiration dates, in spite of its macroeconomic inefficiency, since government and management may have reason to fear that a simultaneous expiration date would make possible a nationwide general strike.

The bonus system is interpreted by Hashimoto as a form of profit sharing, which in turn makes another contribution to conflict avoidance. The practice developed along with the nenkō compensation system in order to "enhance the loyalty and commitment of employees to their firms" (1979, p. 1090). By studying cross-section differences among Japanese firms, Hashimoto concludes that high profitability and "the low costs of reaching agreements, that is, low transactions costs," help to explain the widespread use of bonusses. All the major elements of the Japanese system seem to interact together, acting as a "virtuous circle" from the standpoint of macroeconomic efficiency. Paternalism and relative equality encourage conflict avoidance, which in turn allows firms to maintain high profitability, while sharing part of the profits with workers in the form of cyclically sensitive bonus payments.

IV.2 The British System

The chief institutional features of British labor market institutions are class consciousness, class conflict, labor militancy, and weak management. These help to cause a low level and growth rate of productivity, which in

turn, has both aggravated the struggle over income shares and has fostered a macroeconomic policy that in the 1970s aggravated inflation through monetary accommodation.

The greater importance of class distinctions in Britain was cited above in Glazer's analysis of social equality in Japan. Dore (1973, p. 140) stresses the contrast between the refusal of British workers and management to accept the legitimacy of the power which the other enjoys, in contrast to Japan where "both sides look forward to an indefinite future in which their relations will not be very different from what they are now. Britain's is an Arab-Israeli situation with shifting frontiers which only constant vigilance can defend. Japan's is a Franco-German situation; there are memories of monumental disputes over Alsace and the Saar, but now the border is not an issue."

The sources of class consciousness go deep into Britisn history, stemming partly from the unparalleled historical continuity of the political and legal system and the absence of external conquest. In Mancur Olson's (1977) analysis, common-interest organizations like labor unions are difficult to form spontaneously, because they provide collective goods for their members and are subject to a free-rider problem, and once formed are difficult to change. He stresses the contrast between Britain, with its history of victory in war and entrenched institutions, and both Germany and Japan in which dictatorships and wartime defeat destroyed or weakened common-interest groups. Two other historical events helping to explain the minor role of class distinctions in Japan are the much more recent feudal period of relative cultural homogeneity, and the fact that at the end of the feudal period Japan created an almost completely universal school system

in which "bureaucrats' sons and fishmongers' sons absorbed a uniform curriculum in the same schools" (Dore, p. 284). In contrast the British three-way distinction between "public" (i.e., private), "grammar" (i.e., academic), and vocational secondary schools divided the population not just by intellectual level, but also by accent and culture. Finally, the class system fostered executive dining rooms and other barriers to shop-floor communication, which in turn caused class distinctions and working class distrust to become more firmly entrenched.

Lloyd Ulman (1968, pp. 331-2) notes that British workers tend not only to be class conscious, but suspicious of progress and to have "an atavistic opposition to redundancy" that is compounded of "an unfading memory of prewar unemployment and a deep-seated distrust of employer motives and capability." But management is not free of blame, failing to control overmanning as a result of "hereditary nepotism in family-owned concerns and backwardness in employing modern techniques for identifying the profitability of investment opportunities" (p. 335). To union "bloodymindedness" Ulman joins management "sleepyheadedness." "Labor efficiency readily becomes a casualty in a prolonged encounter between a management which is understaffed and inexpert in industrial relations and members of a plant work force who find little reason to discard their fathers' suspicion of class along with their fathers' ideology" (p. 338).

In the early postwar years Britisn labor relations were relatively quiescent, and days lost from strikes were comparable to those in Japan and far less than in the United States. But in the late 1960s labor militancy increased, and there was a substantial increase in the annual

average days lost from strikes per 1,000 employed (Smith, p. 109):

	1964-66	1967-71	1972-76
Japan	240	194	294
U.K.	190	608	968
U.S.	870	1644	1054

The increase in labor militancy manifested itself not only in more strikes, but in an acceleration in the growth of nominal wage rates that has been identified by Perry (1975) and myself (1977) as having an autonomous component rather than being entirely induced by prior episodes of monetary expansion or incomes policy. David Soskice (1978, p. 245) traces the rise in militancy in Britain to the interaction of the 1967 devaluation and incomes policies.

Ulman and Richard Caves (1980) both attribute low British productivity and slow economic growth in part to labor militancy and the industrial relations system. But what is the relationship of the system to the subject of this paper, the responsiveness of wages and employment to nominal demand disturbances? The empirical evidence in Part II above exhibits variability and responsiveness coefficients for British wages that are almost identical to those for Japanese wages, and a standard deviation of employment changes that is about half of the American experience. I believe that, in light of this evidence of wage responsiveness in Britain, the well-known problems of inflation through the decade of the 1970s and the difficulties of adjustment in 1979-81 are the result of perverse government policy rather than an innately rigid wage adjustment system.

Class conflict and labor militancy, together with the historical fact that British party lines coincide with class divisions, help to explain why British governments have propogated inflation through monetary accommodation of wage push. The Labour party is naturally averse to the temporary increase in unemployment that would be required by a failure to accommodate, and Conservative governments have often been in the position of trying to buy off the unions in the hope that they will be able to push through reforms in trade union law. The long history of accommodation of wage explosions by the Bank of England, at least before 1979, stems partly from its lack of political independence, but may partly be the result of a fear of confrontation between bankers and the unemployed that dates back to the interwar years and the General Strike of 1926.

Table 3 above documents the significant positive feedback from wage changes to nominal GNP changes that has existed in Britain (but not in Japan or the U.S.) as a result of monetary accommodation. The two-way feedback between wages and nominal GNP evident in Table 3, together with relatively high response coefficients, makes the British inflation process particularly unstable. And, as Smith emphasizes, an additional element in the vicious circle has been the feedback from inflation to trade union militancy itself.

IV.3 The American System

The central empirical result of this paper is the contrast between sluggish wage adjustment in the U.S. and a high degree of wage responsiveness in Britain and Japan. The historical evidence supports the interpretation that the invention of the U.S. three-year staggered wage contract in the late 1940s accounts for the inertia-bound character of U.S. postwar

wage behavior. Thus our remaining task is to explain why these contracts developed in the U.S., but not in Japan or Britain.

The 1948 contract between the United Auto Workers and General Motors established two key features of U.S. wage bargains, the multi-year agreement, and the inclusion of a cost-of-living escalator. Jo Anna Gray's analysis provides the key hint in understanding this development, since it was the high cost of negotiation, as perceived by managers beseiged during 1946-48 with annual strikes or threats of strikes in core industries, that led to the 1948 General Motors contract. Charles E. Wilson, GM President, had the idea of buying a long-term contract by offering unions cost-of-living protection. In 1950 the auto companies and the union signed a five-year contract, reopened in 1953, and since 1953 there have been nine three-year agreements.

In explaining why the U.S. developed three-year contracts, but the Japanese did not, differences in the perceived importance of industrial conflict must have played the major role. In Gray's model a higher degree of uncertainty leads to shorter contracts, but the U.S. had more unstable demand than Japan in the 1923-40 period, suggesting that negotiating costs are the dominant factor. The more interesting question seems to be why the British developed no such long-term contracts, since both the U.S. and U.K. have similar histories of labor strife. First, the U.S. unionized in a hurry, after the 1935 Wagner Act turned Washington's previous red light to green. Partly because unionization took the form of large industrial unions in key industries, especially coal, steel, and autos, there was a widespread perception that strikes were more costly in the U.S. than in Britain. And in fact strikes were much more widespread in the U.S., at

least until the 1970s. Second, the United States has a legal tradition dating back to its written Constitution. Partially because it is a more heterogeneous society than Britain, there has been a tendency to put everything into written agreements, and to establish an enormous legal profession to interpret and argue about the nuances of written contracts. The aversion to written agreements in Britain is attributed by Dore (1973, p. 145) to deep-seated tradition: "Another factor contributing to this situation is doubtless the ineffable British faith in the superior virtue of relying on ancestral wisdom and the accumulation of 'custom and practice,' rather than on the written constitutions which lesser breeds need as a crutch to help them manage their affairs." Third, firms in Britain did not have the same opportunity to buy off the unions in return for industrial peace, because they dealt with small craft unions rather than large industrial unions, and because negotiations tended to occur at the local plant level rather than at the national firm level. So the British had less strife to induce a three-year contract, less of a legal tradition to warrant a written contract as an escape from strife, and a less centralized union structure with whom to negotiate such an agreement.

V. CONCLUSION

The basic argument of this paper comes down to three main points:

1. Macroeconomic instability in the United States has been aggravated by the unusually sluggish behavior of nominal wages during the postwar era. Whether measured as the standard deviation of wages relative to hours worked, or the ratio of the respective response coefficients of wages and hours worked to changes in nominal GNP, wages in Britain and Japan are five to ten times more responsive than in the U.S. Thus, of any given fluctuation in aggregate nominal demand, a larger fraction takes the form of a change in real output and employment in the U.S. than in the U.K. or Japan.

2. The drastic decline of American wage responsiveness in the postwar period as compared to the years between 1892 and 1940, together with the 1948 invention of the three-year staggered wage contract in the American unionized industrial sector, seems to be more than coincidental. It is not only the long duration of U.S. contracts, but also their staggered nature, that makes wage changes relatively unresponsive to expansions or contractions in nominal GNP growth.

3. Japanese labor market institutions look much more like those suggested as optimal by recent economic theory than do American institutions. Economic theory predicts that long-duration contracts are more likely to emerge when the perceived cost of renegotiation is high, but we must appeal to history and cultural differences in order to explain why conflict avoidance has played a much greater role in the development of Japanese labor market institutions than in the American case. In this

comparison Britain is the odd-man-out, with well-publicized industrial strife, together with short contract durations. I appeal to history, the different legal tradition, and the nature of British unions themselves to explain why the three-year contract became established in America but not in Britain.

American economists for too long have sought purely economic explanations of wage inertia, without recognizing the much greater degree of wage responsiveness exhibited by Japan, Britain, and some other nations. They have been too narrowly concerned with monetary explanations of inflation, as if money were an autonomous variable, and have insufficiently understood that the dynamics of inflation emerge from a two-way interaction between, on the one hand, the monetary and fiscal institutions of government, and, on the other hand, society's wage- and price-setting institutions. The economic theory of contracts has performed a useful service in showing how the variance of nominal and real shocks interacts with costs of negotiation in determining contract form and length, but economists must defer to sociologists and historians (or unblushingly don the hat of amateur sociologist and historian) to learn why one society has a higher perceived cost of negotiation and conflict resolution than another. I hope that this fledgling exercise in comparative macroeconomic history will stimulate future investigators to tackle the many puzzles and unanswered questions that remain.[22]

FOOTNOTES

1. The index of the late Arthur M. Okun's much-discussed final book (1981) on wage and price adjustment contains only one reference to a foreign country, the U.K., and this is in connection with incomes policy rather than wage or price flexibility. In criticizing theorists for their sins of omission, I do not mean to slight the comparative empirical papers that have called attention to cross-country differences in wage behavior, especially Nordhaus (1972), Perry (1975), Gordon (1977), Sachs (1979), and Branson-Rotemberg (1980). Sachs (pp. 303-7) does a particularly good job of calling attention to labor market institutions as a source of differing dynamic wage behavior.

2. See also my recent cross-country analysis (1981b). As Walter Galenson has pointed out to me, the 2 percent Japanese unemployment statistic is misleading, since the government subsidizes firms to carry the unemployed on their payrolls.

3. The quotes are from Harry Johnson (1972, pp. 310-11). He was attacking those, like Aubrey Jones (1973), who argued (p. 40) that "a tightening of the money supply is not, therefore, a solution to the problem of rising prices."

4. This section summarizes an argument that is developed in full in Gordon (1975).

5. Equation (3) and some of the accompanying discussion overlaps Gordon (1981a), p. 498.

6. I owe this idea to V. V. Chari.

7. During this period Japanese employment grew very rapidly but hours fell, creating a strong negative correlation between hours and employment growth, and leading to an even greater discrepancy between the (h+e) and e results than appears in Table 1.

8. The dummy variables are those that I used in my latest detailed analysis of U.S. postwar inflation (1981c). I experimented with dummy variables for U.K. incomes policies, but decided that the details of the procedure might aggravate my present audience and detract their attention from the more important points in the paper.

9. Illustrating the greater volatility of growth in U.S. manufacturing hours worked, the corresponding peak-trough-peak figures are 6.3 percent (1973:Q1), -12.8 percent (1974:Q2), and 6.3 percent (1976:Q2). Because nominal GNP growth slowed down from 1973 to 1974, rather than staying high as in Japan, the U.S. coefficients exhibit the expected positive response of hours worked and employment to nominal GNP changes.

10. Through an error of omission, the World War I variable was not included in my paper using annual data (1980), but was included in the quarterly study (1981a). Here it is defined as +1 for 1918 and -1 for 1920. The NRA variable, following (1980), is defined as follows: 1933, +0.35; 1934, +0.75; 1935, -0.75; 1936, -0.25. For a justification of the use of dummy variables in the study of government intervention programs, see Frye and Gordon (1981).

11. There also seems to be a negative correlation between wage and nominal GNP changes during 1904-7, perhaps reflecting some program of government intervention, with which I am not familiar, during or after the Russo-Japanese war.

12. A question may be raised as to the justification for a discussion of the A-B-G model in the previous section, in light of its minor usefulness for students of macroeconomic fluctuations. In light of the substantial interest in this approach among economic theorists, I think it important to provide an overall evaluation of its relation to macroeconomics, just as I have previously done (1976b, pp. 205-7) for the search/island model of Alchian, Phelps, Mortensen, Holt, and others.

13. See also the explicitly dynamic analysis provided by Ronald Dye (1979).

14. Space does not permit a more extended quote from Veblen's fascinating piece, which is perceptive in its comparisons of Germany and England to Japan, although wrong in predicting that the distinctive characteristics of the Japanese system would soon be eroded by industrialization. Veblen explains the absence of feudal habits of thought in England as a result of its much slower transition to industrialization: ". . . the consequently changing state of the industrial arts among them [the English] had time and scope concomitantly to work out its effect upon the habits of thought of the community, and so to bring about a state of the institutional conventions answering to the altered state of the industrial arts" (1915, p. 154).

15. Koji Taira (1970, pp. 97-127) argues that the nenkō system was management's response to high labor turnover and absenteeism during the period of industrialization. See also Dore (1973, Chapter 13).

16. In 1966, 56 percent of males aged 35 to 39 had more than ten year's seniority in Japan, against only 34 percent of the same group in the United States, according to Robert E. Cole (1972, p. 618).

17. Galenson and Odaka, p. 610. The authors point out that economic pressures, including problems of dealing with low-quality workers, and the growing burden of high-cost older workers, have led to a modest degree of shifting toward an ability basis for pay.

18. William Ouchi, "Individualism and Intimacy in an Industrial Society," Technology Review, July 1981, p. 36.

19. Numerous qualifications can be made to this sentence without altering its validity as a statement about comparative equality across the three countries. For instance, both Glaser's text and Galenson in correspondence with me mention the fact that most of the benefits of the "expense account society" (limosines, meals, nights out on the town) go to management. Glazer also points out that education is beginning to play a larger role in determining status in the factory.

20. For more on the relative avoidance of conflict, see Galenson and Odaka, pp. 638-42.

21. Galenson and Odaka, while stressing the complexity of the background, provide a brief explanation of the weak union movement: ". . . the initial hothouse growth of unionism under the American occupation, the immediate factionalism along prewar lines, and the purge of communists in 1950 imparted an internal instability that has proved impossible to overcome" (1976, p. 629).

22. In particular I do not understand the high level of British unemployment in the 1920s in light of the suggestion of Table 5's high responsiveness coefficients that British wages should have adjusted promptly to the return to gold in 1925. Also, the decline in the U.S. wage and price responsiveness coefficients between the pre-1914 and 1923-40 period, as well as other shifts in coefficients identified elsewhere (1980), remain as tantalizing mysteries.

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DATA APPENDIX

Sources of Data Prior to World War II

U.S. All data come from U.S. Department of Commerce (1973)

Nominal GNP: Series A7, linked in 1909 to Series A8.

GNP deflator: Calculated as the ratio of nominal to real GNP, where the latter is series A1 linked in 1909 to Series A2.

Wage rate: "Total compensation per hour of work in manufacturing, production workers, in 1957 dollars," Series B70 times "Consumer Price Index" series B69.

U.K. All data come from Feinstein (1972)

Nominal GNP: Table 1, col. (11).

GNP deflator at factor cost: Table 61, col. (7).

Wage rate: "Average full-time weekly wage rate," Table 65, col. (1).

Japan

Nominal GNP: Ohkawa (1957), Table 3, col. (1), linked in 1905 to Ohkawa and Rosovsky (1973), Table 1, col. (6).

GNP deflator: Ohkawa (1957), Table 3, col. (1), divided by Table 4, col. (1), linked in 1905 to Ohkawa and Rosovsky (1973), Table 14, col. (3).

Wage rate: "Wage Index," Ohkawa (1957), Table 1, col. (1).

U.S.

Nominal GNP: Unpublished revised Department of Commerce data obtained in January 1981.

All other data refer to the manufacturing sector and come from a computer printout supplied by the Division of Productivity Research, Office of Productivity and Technology, Bureau of Labor Statistics, February 1981:

"Hourly compensation including fringe benefits"

"Hours of all persons"

"Employment"

U.K.

All data come from the following sources:

1957:1-1978:2: OECD, Main Economic Indicators: Historical Statistics, 1957-1966 and 1960-1979.

1978:3-1980:3: OECD, Main Economic Indicators, February 1981:

"GDP at factor cost"

"Hourly rates in manufacturing"

"Weekly hours of work in manufacturing for Great Britain"

"Employment in manufacturing, all employees"

Japan

Data sources are the same as those for the U.K.:

"GNP at current market prices, billion yen"

"Monthly earnings (including bonuses) in manufacturing by regular workers"

"Monthly hours of work in manufacturing by regular workers"

"Employment in manufacturing of regular workers"