

Differences in Economic Fluctuations in Japan and the United States: The Role of Nominal Rigidities*

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This paper examines the differences between economic fluctuations in the United States and Japan during the period from 1972 through 1986. During this period the size of the fluctuations in real output in Japan was much smaller than in the United States. This difference is independent of the method of detrending and shows up clearly in simple time series plots. Using vector autoregressions and their moving average representations, important differences in the dynamics of inflation and output are uncovered. These differences are examined using a macroeconomic theory that combines monetary factors and slow wage adjustment. The theory suggests that differences in wage determination and monetary policy can explain many of the differences in output and price fluctuations in the two countries. The difference in wage determination is attributed to the synchronized wage determination process in annual Shunto in Japan rather than to profit sharing via the bonus system. *J. Japan. Int. Econ.*, June 1989, 3(2), pp. 127-144. Department of Economics, Stanford University, Stanford, California 94305-6072. © 1989 Academic Press, Inc.

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1. INTRODUCTION

Fluctuations in real output have been far less severe in Japan than in the United States during the last 15 years. The difference is so great that it vividly emerges from simple time series charts of untransformed real

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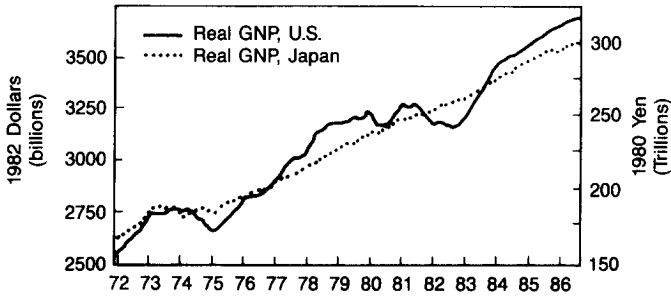


FIG. 1. Comparison of U.S. and Japanese output 1972.1–1986.4.

GNP data. In Fig. 1, for example, a dual scale is used to compare real GNP fluctuations in Japan and the United States during the 1970s and 1980s. As illustrated in this figure, real GNP fluctuations in Japan are so small compared to those in the United States, especially in the last 12 years, that *actual* GNP in Japan behaves much like the smooth *potential* GNP trend for the United States. For most macroeconomists, the goal of macroeconomic policy is to reduce the amplitude of the fluctuations of real GNP about potential GNP. Figure 1 shows that according to this criterion Japan has achieved this goal with a near perfect score during the dozen years since the first oil crisis. Compared to the United States, the Japanese economy completely avoided the boom in GNP in the late 1970s as well as the bust of the early 1980s.

Figure 2 tells a similar story about the Japanese economy when compared to the western European economies. The fluctuations in total real GNP for the OECD European countries as a group (at 1980 exchange rates and 1980 prices) are much larger than those in Japan, although

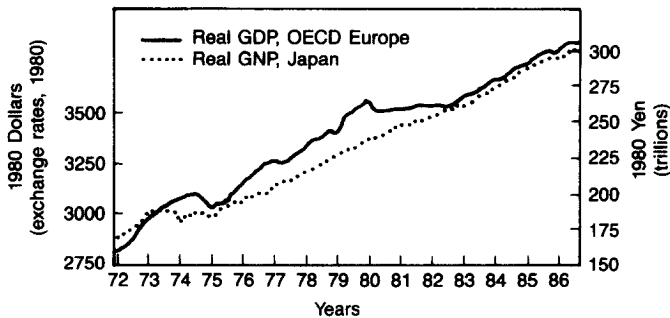


FIG. 2. Comparison of OECD Europe and Japanese output 1972.1–1986.4.

somewhat smaller than those in the United States. The difference with Japan is even larger when the comparison is made with individual countries in Europe because averaging over all the countries as in Fig. 2 tends to smooth out some of the fluctuations. As with the United States, the European economies underwent a comparatively large boom in the late 1970s and a bust in the early 1980s. Although the growth rate in Europe looks smooth in the 1980s compared to that in the United States, this is due to the very slow recovery from the recession. The chart as well as the high unemployment rates in Europe during these years suggest that most of the mid-1980s were a period when output was below potential.

Table I gives a numerical measure of these differences. It shows the standard deviation of percentage real GNP fluctuations around a constant exponential trend. Since 1976, the standard deviation of output fluctuations in Japan has been only about 1% of trend real GNP. By this measure, fluctuations in Europe have been 60% greater than those in Japan, and fluctuations in the United States have been two and one-half times greater than those in Japan. The statistics confirm the visual impression that there are very large differences in the size of the economic fluctuations in these countries.

The purpose of this paper is to apply a time series methodology that I have used previously for international and intertemporal comparisons (Taylor, 1980, 1986, 1987) in order to assess the reasons for these differences in macroeconomic performance. The empirical differences between Japan, the United States, and Europe are represented using simple reduced form autoregressions and their moving average representations. These reduced forms give a relatively objective characterization of the facts of the relationship between price and wage movements and output fluctuations in these countries. The reduced form facts permit a theoretical interpretation that suggests that differences in nominal rigidities, perhaps due to different wage setting institutions, are a significant part of the

TABLE I
MEASURES OF REAL OUTPUT STABILITY
(STANDARD DEVIATION OF OUTPUT GAP)

	Japan	Europe	United States
1976.1-1986.1	1.1	1.6	2.5
1972.1-1986.1	1.7	1.8	2.6

Note. The output gap is the percentage deviation of quarterly real GNP from an exponential time trend.

Source. (1986) "OECD, Quarterly National Accounts," No. 3.

explanation of the difference in performance in the countries. To the extent that my interpretation of the reduced form correlations is correct, the large international differences in economic fluctuations are broadly consistent with monetary business cycle theories based on nominal rigidities. Moreover, they are not easily reconciled with other theories of the business cycle.

Presently, there are many competing theories of macroeconomic fluctuations. In their current forms, most of these theories first emerged in the 1970s as part of the rational expectations revolution. Real business cycle theory, which emerged from the work by Kydland and Prescott (1980, 1982) argues that the macroeconomic fluctuations are set off by technological shocks and shifts to total factor productivity, and that the propagation of these shocks through the economy is due to non-monetary factors, such as optimal consumption smoothing by individuals and gestation lags in the construction of new capital. Monetary factors do not enter either as shocks or as part of the propagation mechanism.

Monetary theories of the business cycle, on the other hand, emphasize financial as well as technological factors as both impulses and propagators of economic fluctuations. Among macroeconomists focussing on monetary models, there are those who emphasize information lags and uncertainty about the source of shocks (Lucas, 1977, for example) and those who emphasize nominal rigidities due to temporary wage and price stickiness (Blanchard, 1983; Fischer, 1977; Phelps and Taylor, 1977, for example). It is the monetary model with nominal price and wage rigidities that is most consistent with the empirical results considered here. (It should be noted that the reference to several example papers in the previous two paragraphs is meant to help identify the different camps and is by no means exhaustive. There is no mention at all of papers that have aimed at providing microfoundations to the aggregate models used in the various camps. For example, in my view, the work on efficiency wages (Shapiro and Stiglitz, 1984, for example) or on credit markets (Stiglitz and Weiss, 1984) provides microeconomic foundations for the type of models I refer to here as "monetary models with sticky wages.")

There are also differing views about the effect of nominal rigidities on macroeconomic fluctuations. DeLong and Summers (1986a,b) argue that nominal rigidities tend to *decrease* the size of economic fluctuations, while according to most sticky price and wage theories such rigidities tend to *increase* the size of the fluctuations. These data on Japan, the United States, and Europe during the last 15 years provide some evidence that such rigidities tend to increase the size of economic fluctuations.

An understanding of the reasons for the superior macroeconomic performance in Japan is of course invaluable not only for sorting out alternative theories but also for evaluating what changes in policy should, or

should not, be adopted in other countries. At the least an analysis of the difference in performance serves as a reminder of the practical importance of progress in macroeconomic theory, policy, and econometrics. Just as Tobin (1980) argued that researchers should "take some encouragement from the [improved] economic performance of the advanced capitalist economies in the post World War II period," so also might they take encouragement from the macroeconomic performance of the Japanese economy during the last 15 years.

The paper is organized as follows. Section 2 compares the time series properties of the data using vector autoregressions of real output and inflation. I show that key differences in the dynamic behavior of output and inflation between the countries emerge when these vector autoregressions are converted to their infinite moving average form. Section 3 provides a theoretical interpretation for these correlations based on a monetary model with nominal rigidities. Section 4 examines some of the institutional reasons for the differences in nominal rigidities in the different countries. In particular, I examine whether the institution of large bonus payments, or the institution of synchronized wage adjustment in the annual spring Shunto is responsible for the greater nominal wage flexibility in Japan.

2. COMPARISON VIA BIVARIATE VECTOR AUTOREGRESSIONS

I focus on the performance of the Japanese, U.S., and European economies over the period from 1972.1 through 1986.4. Although the Japanese and U.S. economies are considered individually, the western European countries are considered as a block. As shown below, the European block adds important perspective to the simple bilateral comparison between the United States and Japan, while avoiding the difficulties of a full multilateral comparison of many individual countries that are closely linked together anyway.

This period covers both of the oil shocks and is after the end of the Bretton Woods exchange rate system. Although many of the European countries attempted to minimize exchange rate fluctuations among themselves during this period (especially under the European Monetary System during the later part of the period), exchange rates were fairly free to fluctuate between the United States, Japan, and Europe as a whole. This exchange rate flexibility gave monetary policies in each of these three areas greater independence from each other than during the Bretton Woods period. Econometric and simulation evidence (see Carlozzi and Taylor, 1985) seem to suggest that flexible exchange rates tend to isolate the effects of monetary policy in one country from those in another, so

TABLE II
AUTOREGRESSION ESTIMATES FOR PRICE INFLATION AND OUTPUT

Dependent variable	Lagged dependent variables				SE	R ²	r(1)
	p(-1)	p(-2)	y(-1)	y(-2)			
Japan (1972.4-1986.4)							
p	0.58 (4.5)	0.28 (2.2)	0.19 (1.8)	0.01 (0.1)	0.0071	0.77	0.07
y	-0.23 (-1.4)	0.09 (0.5)	0.97 (7.1)	-0.11 (-0.8)	0.0090	0.74	0.01
Correlation between residuals = -0.03							
United States (1972.4-1986.4)							
p	0.54 (3.9)	0.28 (2.1)	0.03 (0.6)	0.01 (0.2)	0.0043	0.62	-0.02
y	-0.21 (-0.7)	-0.12 (-0.4)	1.24 (9.6)	-0.35 (-2.6)	0.0100	0.86	-0.05
Correlation between residuals = 0.07							
OECD Europe (1972.4-1986.1)							
p	0.29 (2.0)	0.19 (1.5)	0.19 (1.9)	-0.06 (-0.6)	0.004	0.36	0.01
y	-0.21 (-0.7)	-0.34 (-0.4)	0.91 (9.6)	-0.02 (-2.6)	0.007	0.81	0.01
Correlation between residuals = -0.27							

Note. Each equation was estimated with a constant term. The variable p is the quarterly percentage rate of change (measured as a fraction) in the GNP deflator. The variable y is the percentage deviation (measured as a fraction) of output from a constant exponential trend estimated over the period 1972.1-1986.4. The numbers in parentheses are t ratios; SE is the standard error of the equation; and $r(1)$ is the first-order serial correlation coefficient of the residuals in the equation.

Source: (1986) "OECD, Quarterly National Accounts," No. 3.

that during this period it was feasible for Japan, the United States, and Europe to have different monetary policy rules while minimizing the impact abroad.

The variables that I focus on are (1) the output gap (y) defined as the percentage deviation of real output from the natural or potential rate of output, the latter measured as an exponential trend, and (2) the inflation rate (p) measured as the rate of change in the output deflator. The output and inflation observations are based on quarterly data. Real GNP for Europe is simply a sum of real GNP in all European OECD member countries. The sum is taken at 1980 exchange rates and at 1980 prices in each country. The deflator for the European block is simply the ratio of total nominal GNP to total real GNP.

Table II reports the autoregressions for the two countries, and for

Europe as a whole. Figures 3a through 3d plot the moving average representations for Japan and the United States as calculated directly from the coefficients of these autoregressions. Figures 4a through 4d plot the moving average representation for the European countries as a whole.

For each country, the autoregression is bivariate with the output gap and inflation rate the dependent variables. As the serial correlation indicates, two lagged values of the dependent variables are sufficient to eliminate the serial correlation of the residual. Adding more lagged dependent variables to these equations does not change the moving average representation. Although small, the two variable vector autoregressions can be viewed as a representation of a complete economy-wide dynamic system, much as a two-dimensional blackboard representation of “aggregate supply” and “aggregate demand” with p on the vertical axis and y on the horizontal axis is a complete economy-wide system. (If the money supply and other policy instruments are described by policy rules, they can be substituted out like any other endogenous variable in creating a two variable system.)

The standard errors of these equations can be interpreted as a measure of the size of the underlying impulses hitting the two economies. Note that the sizes of these impulses are quite similar. The standard error of the residual to the output equations in Japan and the United States are essentially the same. The standard error of the residual to the inflation equation

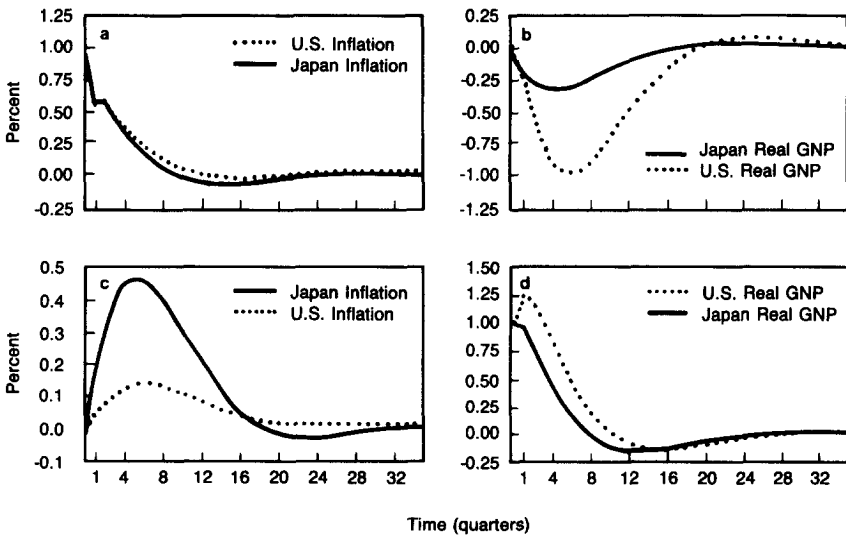


FIG. 3. (a) Effect of inflation shock on inflation. (b) Effect of inflation shock on real GNP. (c) Effect of output shock on inflation. (d) Effect of output shock on real GNP.

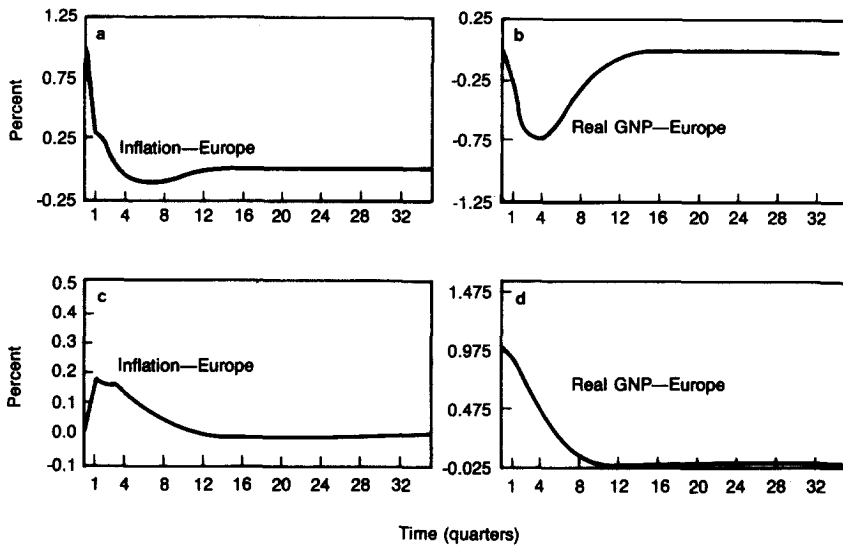


FIG. 4. (a) Effect of inflation shock on inflation. (b) Effect of inflation shock on real GNP. (c) Effect of output shock on inflation. (d) Effect of output shock on real GNP.

is a bit larger in Japan, perhaps reflecting the greater importance of imported oil in the Japanese economy.

As is typical, the moving average representations reported in Figs. 3 and 4 are easier to interpret than the autoregressions. The moving average representations can be calculated directly from the autoregressions as follows. Each set of autoregressions reported in Table II has the form

$$z(t) = A(1)z(t-1) + A(2)z(t-2) + e(t), \quad (1)$$

where $z(t)$ is the vector $(p(t), y(t))'$ and $e(t)$ is the vector of residuals to the $p(t)$ and $y(t)$ equations. The matrices $A(1)$ and $A(2)$ are the estimated coefficients. The moving average representation has the form

$$z(t) = e(t) + C(1)e(t-1) + C(2)e(t-2) + \dots, \quad (2)$$

where the sequence of matrices, $C(1)$, $C(2)$, $C(3)$, . . . , are functions of the estimated coefficients in $A(1)$ and $A(2)$. The moving average representation is calculated without orthogonalizing the error process $e(t)$ in the estimated autoregressions. As described in Taylor (1986), I find these untransformed errors easier to interpret, but the same general patterns exist with other transformations that I examined. Note that the correla-

tion between the residual to the $p(t)$ equation and the residual to the $y(t)$ equation is very close to zero for Japan and the United States.

Figure 3a gives the effect of a 1% shock to the residual in the inflation equation (see Table II) on inflation. This is simply the 1-1 element of $C(i)$ plotted against i . The effect of the same type of shock is shown for the United States and Japan on the same chart. Of course the elements of $C(i)$ are calculated separately for each country. Figure 3b gives the effect of that same shock on real output, again both in Japan and the United States. That is, Figure 3b shows the 2-1 element of $C(i)$ plotted against i . Figures 3c and 3d show the effect of 1% shock to the residual of the output equation. Figure 3c shows the effect on inflation (the 1-2 element of $C(i)$), and Fig. 3d shows the effect on output (the 2-2 element of $C(i)$). Again the results for both countries are shown in the same diagram. Figures 4a through 4d show the same results for the European countries. Note that the scales in Figs. 3 and 4 are the same.

Figures 3 and 4 reveal the "reverse dynamic" between inflation and output that I have emphasized as a major fact of modern business cycles in my earlier work (Taylor, 1980, 1986). The effect is evident for Japan, the United States, and Europe, but with quite a difference. The reverse dynamic is evident in a comparison of Fig. 3b with Fig. 3c, or Fig. 4b with Fig. 4c: the dynamic impact of an *inflation shock on output is negative*, while the dynamic impact of an *output shock on inflation is positive*. This same reverse dynamic cross correlation was shown to hold for several other individual countries using annual data through 1976 and a different detrending procedure in Taylor (1980).

Note, however, that the magnitudes of these reverse dynamic impacts are much different in Japan and the United States. In Japan, a shock to output has a much larger effect on inflation than in the United States. This difference can also be observed in the smaller coefficients on output in the inflation autoregressions in the United States. In the moving average representations the effect is almost five times greater in Japan than in the United States. In other words, inflation seems to be much more sensitive to fluctuations in the economy in Japan than in the United States. As shown in Fig. 4, the effect of an output shock in Europe is somewhat larger than in the United States, but still much smaller than in Japan.

On the other hand, the negative effect of an inflation shock on real GNP is much larger in the United States than in Japan. U.S. output falls by about four times as much in response to an inflation shock as does Japanese output. The size of the impact in Europe is in between the effects in Japan and the United States.

There is much similarity between the United States, Japan, and Europe in the other dimensions of the moving average relationship. The effect of shocks to the inflation equation on inflation is almost exactly the same in

Japan and the United States. The effects of shocks to the output equation on output display more overshooting in the United States than in Japan and Europe which could add to the variability of output in the United States.

3. INTERPRETATION

A formal structural cum policy interpretation of the reverse dynamic cross correlations was presented in my previous papers (Taylor, 1980, 1986). The interpretation can be represented algebraically using a combination of staggered nominal wage setting, mark-up pricing, a simple aggregate demand curve, and a less than fully accommodative monetary policy rule. Without repeating the details of these calculations, the workings of this formal model can be explained simply as follows.

Positive deviations of output from the trend level represent periods of excess demand. In other words, the trend level of output is viewed as potential GNP, and the actual level of output is viewed as demand determined. Hence, periods when real GNP is above trend are identified as periods where demand is greater than long-run supply. During periods of excess demand prices and wages are bid up gradually because of nominal rigidities. That is, wages and prices do not adjust instantaneously to the shift in demand as in a new classical model with perfectly flexible prices. After a lag, the rise in wages and prices begins to raise the inflation rate. It also works in the same way for negative deviations of output from trend. When output falls below trend, inflation begins to subside, but again with a lag. This Phillips curve type effect is thus a simple explanation of the positive relation between output shocks and inflation shown in Fig. 3c and Fig. 4c.

Positive shocks to inflation, on the other hand, bring about a decline in real GNP because the monetary authorities do not tolerate increases in inflation fully. With less than fully accommodated inflation, the economy goes into a recession, again with a lag. In Japan, the United States, and the European countries less than fully accommodative policies are activated by tightening monetary policy. The rate of growth of money (and credit) is not permitted to increase by as much as the increase in inflation. Real money balances thereby decrease, credit markets tighten, interest rates rise, and the economy goes into a recession. This is the explanation for the negative effects of inflation shocks on output as evidenced in Fig. 3b and Fig. 4b. It should be emphasized that this negative effect of inflation shocks on output is due to the fact that the monetary policy-makers have inflation control as one of their objectives. The relationship between

inflation and output is thus integral to this interpretation of business cycles.

Given this interpretation, a possible reason for the different behavior of the moving average representation in the United States and Japan is clear from Figs. 3b and 3c. Output drops by less in Japan when inflation rises because the Japanese macroeconomic policy-makers are more accommodative to inflation shocks. Inflation rises by more in Japan in response to demand because nominal wages are more flexible. This latter effect could be either because of the ability of wage payments to respond quickly because of the bonus system (as emphasized by Gordon, 1982 and Weitzman, 1986) or because the base wage can change more quickly in the Shunto, as suggested by the work on staggered contracts. I will try to address which of these two mechanisms is more important below. In any case, the fact that inflation is more sensitive to shifts in demand in Japan than in the United States is a possible explanation for the fact that real output fluctuations are smaller in Japan. Simply put, the smaller nominal rigidities mean that output does not need to fluctuate very much in order to achieve inflation control. (This result is easy to prove using optimal stochastic control methods (see Taylor, 1980).)

The finding that Japanese macroeconomic policy is more accommodative to inflation than U.S. macroeconomic policy may seem surprising. The result is similar to the finding of my earlier work (which I also found surprising), that U.S. macroeconomic policy under the gold standard seemed to be more accommodative to inflation than under the fiat standard of the post World War II era.

There is an optimal policy framework interpretation that can be applied to the case of Japan if not to the gold standard era. Because prices are more flexible in Japan, the monetary authorities do not need to respond by as much (in real output units) to changes in the inflation rate. In fact, the response of the Japanese macroeconomic policy-makers is attenuated relative to that in the United States by just about the same magnitude that prices are more flexible. The same inflation variability thereby results in smaller fluctuations in output. Given a social welfare function that tolerates about the same amount of inflation variability in both countries, it is necessary that output be more variable in the United States. The difference in nominal wage rigidity thereby gives an explanation both for the larger positive effect of output on inflation in Japan and the smaller negative effect of inflation on output.

In singling out differences in nominal rigidities as the source of the difference in the size of the output fluctuations, the role of an efficient monetary policy should be emphasized. In fact, the formal proof that more flexible prices lead to greater output stability requires that the

monetary authorities are not themselves causing large shocks to the system.

Other Theories

The interpretation presented above is based on a monetary model with nominal rigidities. Could the facts be explained by some of the other theories mentioned in the introduction to this paper? Real business cycle theories do not usually consider movements in inflation as a fact to be explained in the business cycle. Relative prices, let alone an aggregate price level, do not explicitly appear in the theory. In this sense, real business cycle theory is not equipped to give an explanation of the facts displayed in the infinite moving average representations.

However, even if one ignores the interaction between inflation and output, real business cycle theory would have difficulty explaining the large difference between the size of fluctuations in Japan and the other countries. According to the real business cycle theory, these differences would be due to differences in the size of the technology shocks or to differences in utility functions or technological factors like gestation lags. It is implausible that shocks to factor productivity in Japan are one-third the size of the shocks in the United States.

Other monetary models, such as those based on limited information, of course come closer than real business cycle models in explaining the dynamic correlations between inflation and output mentioned above. In particular, the Phillips curve effects, which I argued are the reason for the positive effect of output shocks on inflation, are explained in such models by informational confusion about whether demand shocks are local or global. It is not clear in such models, however, why the reverse dynamic from inflation to output should exist or why the size of the sensitivity of inflation to output shocks should be negatively related to the size of economic fluctuations.

The Delong–Summers Hypothesis

In my previous study (Taylor, 1986), I used this methodology to compare macroeconomic performance in the United States in the period from 1891 through 1914 with that in the period from 1952 through 1983 using annual data. In many respects this earlier intertemporal comparison has similarities with the present cross-sectional comparison. Output fluctuations were much less severe in the later period in the United States compared with fluctuations in the earlier period in the United States, just as output fluctuations are much less severe in Japan than in the United States in recent years. In the U.S. historical study, the vector autoregres-

sions uncovered much less rigid wage and price behavior in the earlier period than in the later period. Moreover, the vector autoregressions uncovered a much more accommodative macroeconomic policy in the earlier period in the United States. Both of these findings presented a puzzle, however. Less rigid wages and prices should lead to smaller fluctuations in real output according to most modern theories of economic fluctuations based on sticky wages and prices. Yet the U.S. historical comparison shows that fluctuations were larger when rigidities were smaller. I argued that the puzzle could be explained by smaller shocks to aggregate demand in the later period due to more financial stability and improved economic policy.

On the other hand, Delong and Summers (1986a,b) have suggested an entirely different explanation for the U.S. historical experience, arguing that more flexible wages and prices are a direct cause of the poor economic performance in the earlier period in the United States. The present comparison of Japan and the United States in recent years, when economic shocks to the two countries are probably similar (the vector autoregression results seem to suggest this), provides additional evidence that more rigid nominal wages and prices tend to generate greater instabilities in output. In other words, the evidence is contrary to the Delong–Summers hypothesis. For Japan, the United States, and Europe during this period, there is a clear negative relationship between price flexibility and output fluctuations. Of the three, Japan has the greatest price flexibility and the smallest output fluctuations. The United States has the least price flexibility and the largest output fluctuations. On average the European countries are in between the United States and Japan on both measures.

4. BONUS PAYMENTS OR SHUNTO?

There are two big institutional differences between Japan and the United States that might be the explanation for the great differences in nominal price rigidities that are evident in the reduced forms and that I have argued are the reason for the differences in macroeconomic performance. First, wage setting is much more synchronized in Japan than in the United States. Since the mid-1950s, the major labor unions in Japan have negotiated wage settlements during the spring in what is known as the Shunto. The wage settlements last for approximately 1 year. In the United States on the other hand there is little synchronization. Wage settlements for the major unions occur throughout the year, although the second and third quarters are more popular than the first and fourth quarters. According to the simple staggered contract model of wage determination, staggering of wage decisions as in the United States results in

slower wage adjustment and hence less average wage and price flexibility. Second, a significant fraction of wage payments in Japan are in the form of bonus payments in the summer and at the end of the year. Such bonus payments give added flexibility to wage determination, because the bonus, unlike the contractual base wage, can be changed immediately if business conditions change. Much work has been done investigating the effects of the bonus system on the Japanese economy. Ishikawa and Ueda (1984) examine the effects of the bonus system on savings. Weitzman (1986) and Freeman and Weitzman (1987) look at the sensitivity of bonus payments to profits for the purpose of determining the degree to which Japan behaves like a "share economy."

According to the model which underlies the interpretation of the empirical results presented in this paper, the bonus system will have the effect of making wage and price inflation more responsive to changes in demand if the bonus system increases nominal wage flexibility; that is, if it increases the responsiveness of inflation to changes in demand conditions. A brief examination of wage data in Japan suggests, however, that the bonus system does not increase nominal wage flexibility by very much. The difference between nominal wage rigidities in Japan and the United

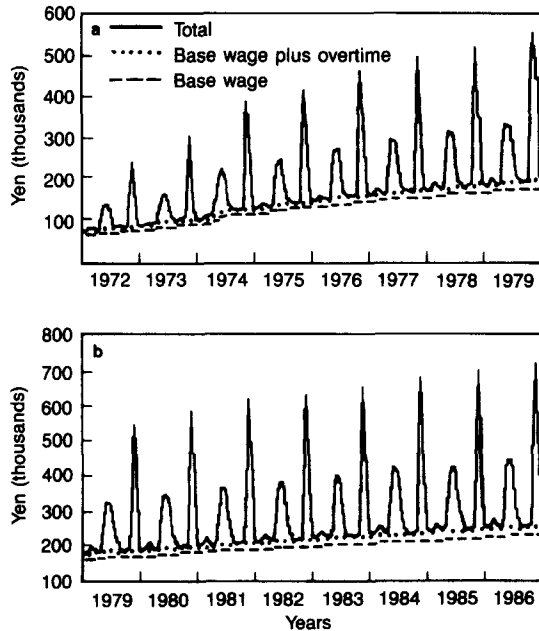


FIG. 5. (a) Monthly earnings: January 1972–December 1979. (b) Monthly earnings: January 1979–February 1987.

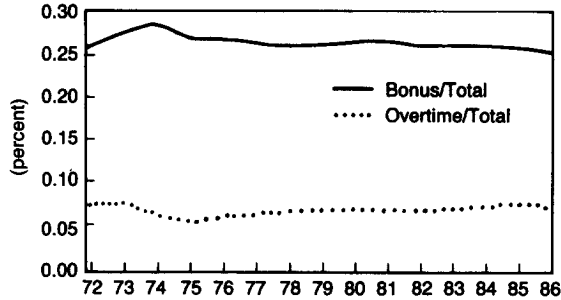


FIG. 6. Bonus and overtime payments as fraction of total monthly earnings.

States must, therefore, come from the existence of synchronized wage setting in Japan or from some other factor.

Figures 5a and 5b show the behavior of monthly wages in Japan during the last 15 years. The figures are for "all industries" as collected by the Ministry of Labor. The chart separates the bonus component of the monthly payment as well as the overtime component and the base wage. The most striking thing about these figures is the routine aspects of the bonus payments. The two main bonus periods show almost the same amount of increase each year. To be sure, such visual pictures can be deceiving, but one might have expected more cyclical variability in the bonus component.

The large seasonal fluctuations in the bonus make it necessary to consider the fluctuations in the annual averages. Figure 6 shows the ratio of the bonus and the overtime payments to total monthly earnings. In comparative terms, the fluctuation in the bonus is not large. Again, the numbers do not point to a big role for the bonus system in the flexibility of nominal wages.

The rate of wage inflation with and without the bonus and the overtime payments is shown in Fig. 7. As the chart indicates, there is very little difference in the rates of wage inflation.

Although there are very few annual observations, regression results show that nominal wages in Japan are more flexible as a result of the bonus system but that the bonus explains a relatively small part of the difference between Japanese and U.S. wage flexibility. Table III reports annual regressions for wages in Japan and the United States. In Japan there are three regressions: one for total monthly wages, one for the base wage plus overtime, and one for the base wage excluding overtime.

It is clear from Table III that the short-run effect of a change in demand as measured by the output gap has a larger effect on wage inflation in Japan than in the United States. A comparison of the U.S. wage with the base wage plus overtime in Japan shows the sensitivity to be about five

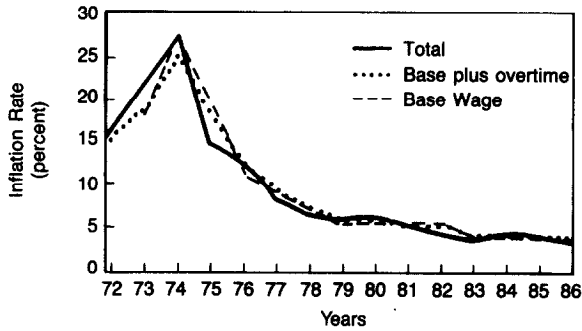


FIG. 7. Wage inflation: Effects of bonus and overtime.

times greater in Japan. Comparing the U.S. equation with the total wage payment gives a sensitivity six times greater. Hence it appears that changes in the base wage account for almost all of the differences between wage flexibility in the United States and Japan. In choosing between the bonus system and the Shunto, therefore, one must say that the Shunto process rather than the bonus is responsible for the greater nominal wage flexibility compared to that in the United States.

5. CONCLUSION

In recent years there have been several examinations of the Japanese economy in comparison with the U.S. and other economies. Several of

TABLE III
ANNUAL WAGE REGRESSIONS: JAPAN AND THE
UNITED STATES, 1973-1985

	CPI	Output gap	R^2	D.W.
Japan				
Total wage payment	0.98 (3.18)	2.48 (2.48)	0.53	2.1
Base wage plus overtime	1.03 (4.0)	1.97 (2.4)	0.61	2.0
Base wage	1.12 (3.9)	1.93 (2.1)	0.60	2.0
United States				
Average hourly earnings	0.42 (3.9)	0.39 (2.8)	0.63	0.6

Note. Wages and the CPI are annual percentage changes; the output gap is measured in percentage.

these studies have focussed on wage and price behavior as important differences between the countries (see Gordon, 1982; Komiya and Yasui, 1984; Sachs, 1979, 1983; Suzuki, 1981; Tachibanaki, 1987; for example).

In this paper I have argued that differences in price flexibility and the reaction to inflation by the monetary authorities as part of their price stability goal probably accounts for much of the observed differences in macroeconomic performance between Japan, the United States, and Europe. These differences were characterized through simple bivariate time series methods that capture the interactions between macroeconomic policy and wage and price rigidities. I have also argued that the differences in economic performance are evidence in favor of monetary models that emphasize wage and price rigidities. Finally, an examination of monthly wage data provided here seems to indicate that the synchronized wage setting (the Shunto) rather than the bonus system is the crucial feature of the Japanese economy that generates less rigid wages. According to staggered contract models of wage determination, such synchronization should reduce the serial persistence of wages; that is, make wages on average more sensitive to demand conditions.

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