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**Monetary Transmission at Low Inflation:  
Some Clues from Japan in the 1990s**

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**Monetary Transmission at Low Inflation:  
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Allan H. Meltzer\*

Abstract

The paper analyzes the performance of the Japanese economy from 1985 to 1999. It compares different explanations of slow growth and prolonged recession. Using both bivariate comparisons and statistical tests, the paper concludes that the maintained growth rate fell after 1992. Also the data suggest that the recession early in the 1990s was induced by a decline in money growth. In contrast, the recent recession was induced mainly by a fall in real exports. Failure to allow the nominal exchange rate to depreciate forced deflation and increased the costs of adjusting to reduced export demand. The main policy conclusion calls on the Bank of Japan to pursue a more expansive policy to end deflation. This policy would depreciate the yen, but it would end the deflation that is costly to Japan and its neighbors.

JEL classifications: E51, E52, E58, E65

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## **I. Introduction**

Compared to its performance from the 1950s through the 1980s or to the U.S. economy in the 1990s, Japan's growth rate has been sluggish. Growth declined from an average of 10 percent for the mid-1950s to the early 1970s, to 4 percent for the 1970s and 1980s, to about 1 percent for the 1990s. For the first time since the very early postwar years, Japan's growth rate has been below U.S. growth for a protracted period. The convergence of the economies that had become a stylized fact of the postwar era has ended, at least temporarily.

Several very different explanations have been offered. One common explanation cites changes in banks' willingness to lend as a major cause of sustained sluggishness of investment. Motonishi and Yoshikawa (1999) present evidence suggesting that this explanation applies mainly to small firms. They show that the decline in lending explains only a small part of the slowdown in growth of investment and income. These authors conclude that real factors are more important than financial factors, but they do not explain which real factors are most important or why they declined.

I find the argument about banks' unwillingness to lend puzzling for two reasons. First, it does not fit well with another common argument about Japanese banking---that banks went heavily into real estate lending in the 1980s because, after deregulation, corporate borrowers greatly reduced their reliance on banks. Second, evidence from many countries suggests that loans, including very risky loans, increase in weakened financial systems with many insolvent banks. This is the familiar moral hazard argument.

Both of these arguments suggest that much of the decline in lending reflected reduced demand for loans. Below, I present some modest evidence that supports Motonishi and Yoshikawa's finding that an autonomous shift in banks' willingness to lend is not a principal factor affecting recovery.

There is no shortage of alternative explanations. Widely discussed explanations include overvaluation of the yen or the expectation of future appreciation (McKinnon [1999]), a liquidity trap that eliminates the effectiveness of monetary policy (Krugman [1999]), collapse of the bubble in stock or land prices affecting investment and housing (many authors), and pessimism about future pensions and job security (Nakayama [1999]), cited in Motonishi and Yoshikawa (1999). I consider some of these below. Before doing so, it seems useful to present some basic data both to show what happened to the economy and to dispel the frequent, mistaken claim that the economy is in a deep depression, similar to the 1930s depression in the United States.

Behind the many suggestions about the causes of slow growth and recession lie different implicit or explicit ideas about the transmission process. For example, those who suggest that weakness of the financial structure and bank failures are causal must believe that restrictions by banks lowered investment and output. Whatever power this explanation may have is limited to the last half of the decade, so it is at most a partial explanation.

The liquidity trap explanation can apply, at most, to the last two years. Short-term interest rates remained above 2 percent until 1995 and did not approach zero or fall below the Bank of Japan's discount rate until 1998. It is easy to prove existence of a liquidity trap in a model with one interest rate. It is more difficult in a multi-asset world unless all asset prices reach an equilibrium consistent with the zero short-term interest rate (Brunner and Meltzer [1968]).

McKinnon (1999) makes a related claim. He argues that Japan cannot depreciate its exchange rate. He notes that, except for 1980-85, the yen has appreciated against the U.S. dollar and other currencies. Everyone anticipates long-term yen appreciation, in part because depreciation would arouse the ire of the United States, which would retaliate by restricting imports from Japan. Since

everyone believes the yen cannot depreciate, the Bank of Japan cannot depreciate its currency. With the short-term rate near zero, depreciation does not offer an alternative channel by which monetary expansion could end the recession.

At best, McKinnon's argument is incomplete. It applies to the nominal exchange rate, not the relevant, real exchange rate. If everyone believed and acted as McKinnon assumes, the Bank could deflate to adjust an overvalued real exchange rate. Or, it could end deflation and depreciate its currency. U.S. threats cannot prevent that.

In fact, the real exchange rate shows no evidence for the 1990s of the persistent appreciation that McKinnon's reasoning requires. The real, trade-weighted yen exchange rate in 1997-98 differs little from the rate in 1985-86 and in many intervening years. The rate fluctuates but shows no evidence of persistent appreciation or depreciation since the mid-1980s.

Many explanations of the 1990s attribute slow growth to "bursting the bubble." Some of these explanations attribute a large role to asset prices--- particularly equity, land, and housing prices. I have long held that these prices have an important role in the transmission process, so I welcome the attention they receive (Brunner and Meltzer [1968], and Meltzer [1995]). I note, however, that housing and land prices continue to decline, a finding that is more consistent with deflationary policy than with a liquidity trap. Asset prices respond endogenously to productivity, policy, and other impulses. I comment briefly on the role of asset prices below.<sup>1</sup>

The theme of this conference is "The Role of Monetary Policy under Low Inflation." Divergent explanations of slow growth and recession based on lending,

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<sup>1</sup> Figure 10 of Okina et al. (2000) shows that other countries experienced sizeable reductions in stock market indexes without having prolonged recessions. Claims that "bursting the bubble" caused slow growth and recession have to consider why Japan differs in this respect.

interest rates, exchange rates, asset prices, or other variables suggest that economists hold different views about that theme. Japan in the 1990s provides a case study from which we can learn. I begin by presenting some of the principal facts. The data suggest that the transmission process has several familiar features. I do not attempt a complete model of the economy. I have limited my inquiries to the modest objective of looking for clues about some of the forces at work in Japan during the 1990s.

The data suggest some reasons for slow growth and recession and suggest a role for policy. The Bank of Japan is not responsible for choosing the exchange rate and, judging from its discussion and analysis, it does not give much attention to the exchange rate. I conclude that this is a costly oversight that reflects an institutional constraint that should be removed.

## **II. Some Facts and Interpretations**

The data in this chapter help to dispel a common assertion, call attention to some apparent regularities, and suggest what needs to be explained. Contrary to frequent comments, Japan is not in a depression comparable to the Great Depression of the 1930s. Japan's GDP did not decline by 25 to 30 percent over four years, as in the U.S. in 1929-33. The largest decline is 3 percent in 1998, the year in which many of Japan's principal customers had deep recessions.

Figure 1 compares GDP growth in the U.S. for 1930-39 to growth in Japan during 1989-98. U.S. real GDP fell at a 10 to 15 percent annual rate for more than three years before making a strong recovery. Japan's growth rate is positive in most years, but there is no sign to date of a strong recovery. Including recessions, growth averaged about 1 percent from 1991 to 1998. This compares to average rates of growth of about 10 percent from the mid-1950s to the early 1970s and 4

percent from 1973 to 1990. Some evidence suggests that part of the reduction in growth rate will persist.

**Figure 1**  
**Real Per Capita GDP Growth**

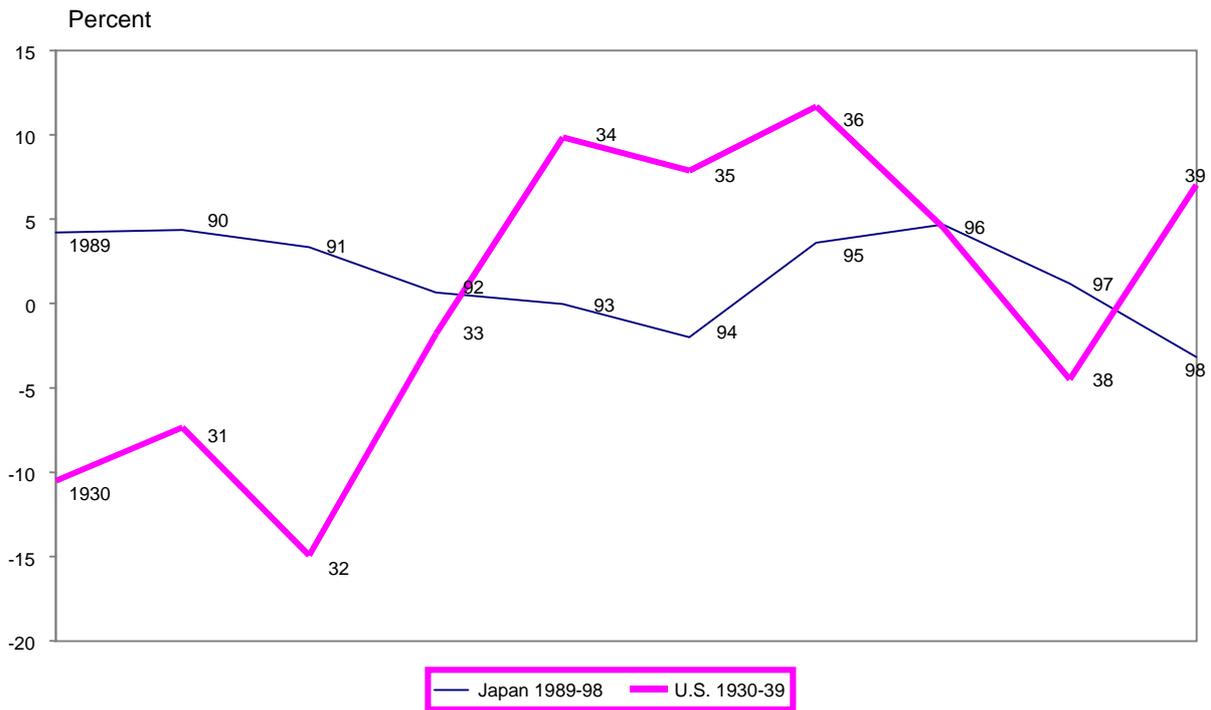
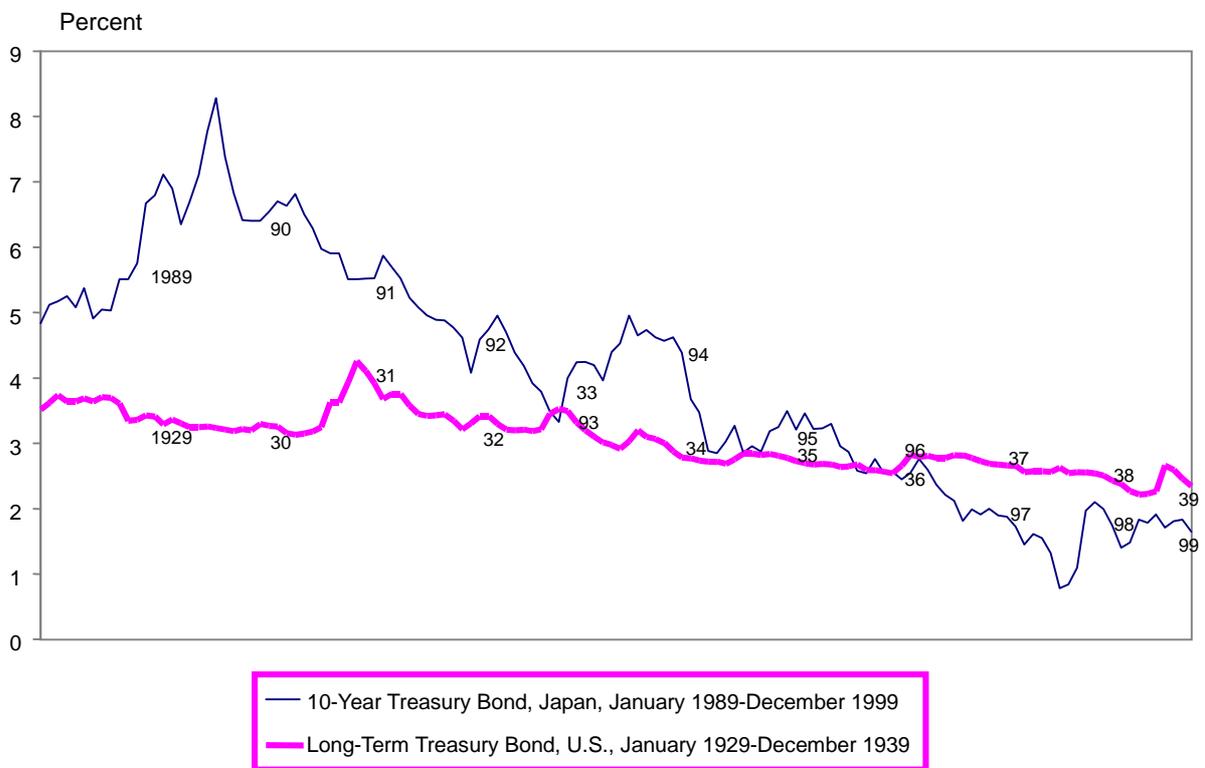


Figure 1 suggests that Japan experienced two distinct declines in the 1990s. One ended in 1993. A mild recovery followed with rates of GDP growth below the rate of earlier recoveries. A second, deeper recession began in 1997 and deepened in 1998 and 1999, at the time of the Asian crisis.

One challenge is to explain the two recessions. A second challenge is to explain why the growth rate has remained comparatively low for a decade. Recession is not the main answer to the second challenge. Even if we exclude the three years with zero or negative growth rates of per capita GDP, average growth for 1991 to 1998 rises only to 2.6 percent, well below previous recoveries.

Figure 2 compares long-term interest rates for the United States in the 1930s to Japan in the 1990s. Despite the deeper depression in the United States, long-term rates reached a lower level and fell much more in Japan, in part a reflection of the higher level they reached, in part the influence of the continuing decline in many price indexes after 1992. Long-term rates and the term spread rose in 1994, suggesting that near the start of the recovery markets anticipated that the recovery would continue. The movement of long-term rates and the term spread suggests that the public may have believed that the economy had completed its adjustment to the bubble. The real rate of interest remained modest after the early years of the decade.

**Figure 2**  
**Nominal Long-Term Interest Rates**

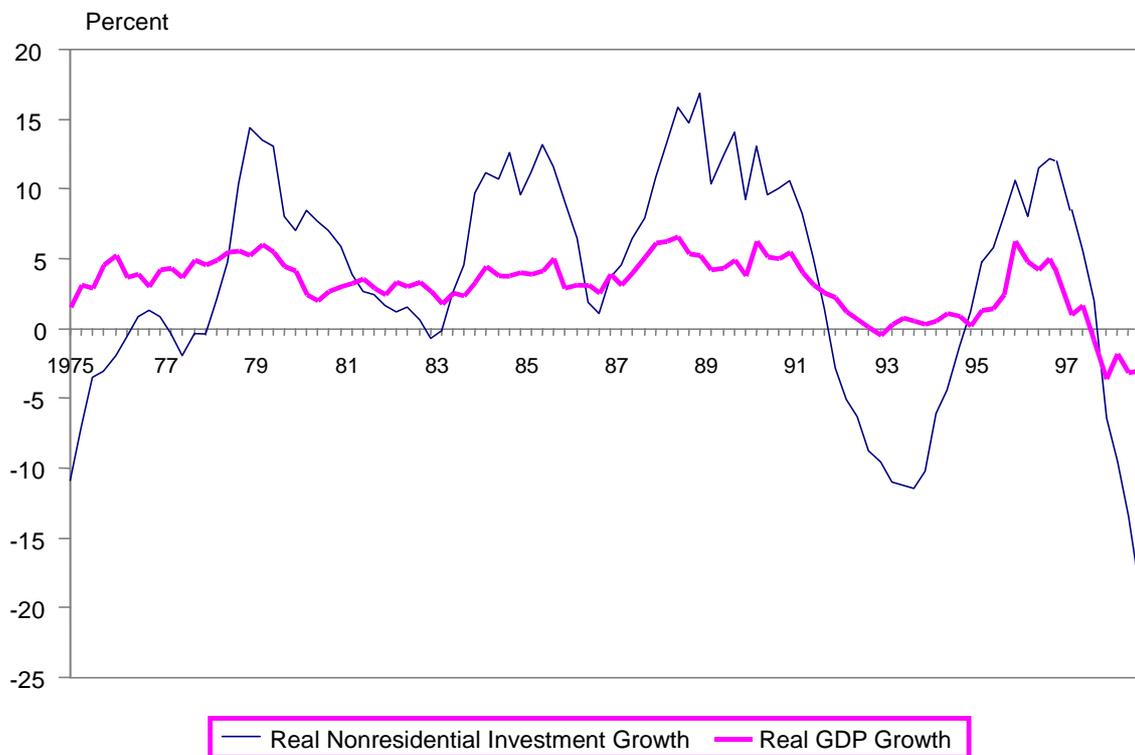


Japan in the 1990s had higher growth and milder recessions than the United States in the Great Depression. It also had more deflation and lower long-term interest rates at the end of the decade. Further comparison to the United States in the 1930s finds more differences than similarities. The rest of the data in this chapter are for Japan in the 1990s.

Figure 3 compares growth of real, nonresidential investment to GDP growth since 1975. The two series generally move together for the entire quarter-century. The synchronous movement continued in the 1990s; qualitatively, the decade does not seem exceptional. However, the duration and amplitude of the rise in investment in the 1990s are both smaller than in earlier cycles, and the declines are much deeper and longer. Average investment for the decade is much lower as a consequence.

Figure 3

Real Nonresidential Investment Growth and Real GDP Growth, Japan, 1975/I–1998/IV

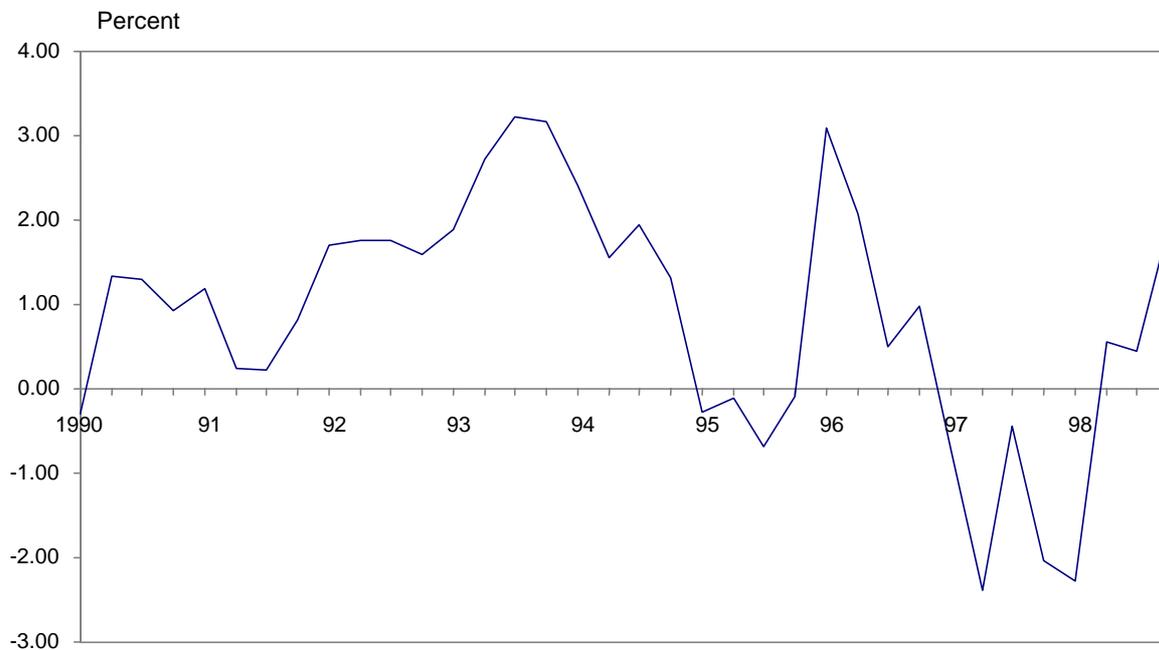


The preliminary conclusions I draw from Figure 3 are that the two recessions in the 1990s were deeper than earlier declines and lasted longer. The recovery in mid-decade was milder. Investment rose less rapidly and did not repeat the rates of increase sustained in the two previous decades. Slower growth of both real, nonresidential investment and GDP suggests that the 1990s are not a unique period unrelated to earlier experience. If this inference is correct, it focuses attention on low investment as a main reason for slower growth.

To pursue this inference, I estimated a simple production equation using quarterly values of four-quarter moving averages for the period 1975 to 1989. The basic equation relates output per worker to capital per worker. The estimation uses logarithmic first differences; growth of GDP per worker depends on investment (growth of capital) per worker. Figure 4 shows out-of-sample differences between actual and predicted real GDP growth per worker in the 1990s. The equation is shown in the Appendix.

Figure 4 has three distinct periods. First, in 1990-91, actual and predicted GDP growth are similar. The past relation continues out of sample. Investment rose at an annual rate of 10 percent or more and GDP growth fluctuated around 3.5 percent. Second from 1991 to 1997, the equation generally underestimates growth of real GDP. GDP growth per worker falls less in 1991-93 than the past relation to growth of capital per worker. The strength of the expansion in 1996 is greater than predicted. Third, in 1997-98, the equation overestimates. GDP growth fell more than predicted in the recession that includes the Asian crisis.

**Figure 4**  
**Difference Between Actual and Predicted GDP Growth per Worker with Predicted Growth Based**  
**on Per Capita Investment, Japan,**  
**1990/I–1998/IV**



Notes: Sample period for model 1975/I-1989/IV. Growth rates measured year on year.

Let me turn now to some possible explanations of these differences. I selected two variables to represent monetary actions and external events or shocks. Growth of the real value of the monetary base is the monetary variable. In my (unfinished) work on the history of the Federal Reserve and elsewhere, I have found that growth of the real monetary base affected real income growth even in periods with nominal interest rates close to zero (Meltzer [1999]). To represent external events, I chose growth of real exports.

Movements of the two variables are highly suggestive about the differences between actual and expected real GDP growth in the 1990s. Figure 5 shows monthly values of annual rates of change in the real value of the monetary base.

The consumer price index converts nominal to real values. Changes in nominal base growth dominate movements of the series. Four distinct periods are visible.

**Figure 5**  
**Year-on-Year Real Base Growth, Japan, 1985/I-1999/IV**



First, the base accelerated under exchange rate management following the Plaza and Louvre agreements of 1985 and 1987. The yen appreciated against the U.S. dollar and other currencies in 1985-86 under the Plaza Agreement (and before). The trade-weighted real exchange rate rose 37 percent in five quarters as the U.S. dollar depreciated. The Louvre Accord in 1987 temporarily ended nominal yen appreciation; instead of permitting the capital inflow to appreciate the yen, the Bank of Japan, acting under the political agreement, purchased U.S. dollars, raising the growth of the monetary base. The nominal and real value of Japanese equities soared. The real value of the Nikkei index rose at 20 to 40

percent annual rates. Investment and GDP expanded rapidly beginning in 1987 (see Figure 3).

The agreements were partly based on a faulty economic premise and partly on a possibly correct political premise. Politically, the U.S. current account deficit raised the possible threat that the U.S. Congress would restrict Japanese, and perhaps other, imports. The nominal U.S. current account deficit was US\$125 billion in 1985 and rose to US\$150 billion in 1986. It has since doubled in nominal value and increased as a percentage of GDP.

The economic rationale was faulty. The nominal exchange rate has, at most, a temporary influence on the real value of exports and imports. Nominal depreciation of the U.S. dollar cannot permanently reduce the U.S. current account deficit or Japan's surplus. The United States continues to have greater investment opportunities than it can finance with its own saving, so it borrows and sells assets. Japan has a relatively high saving rate, both compared to the United States and compared to its domestic investment opportunities, so it exports capital and has a trade surplus. This symbiotic relation between the United States and Japan continues.

Second, the principal effect of the Plaza and Louvre agreements was to shift Japanese policy first to appreciation of the yen and then to inflation. The Bank of Japan was not willing to tolerate the inflation. Monetary policy shifted direction in 1991. Real base growth fell to zero from the 6 to 10 percent annual rate of increase realized in 1988-90. Interest rates rose. The yield curve inverted; the economy went into recession from 1991 to 1993, and the stock market boom collapsed. The Nikkei average fell 50 percent from its peak in two years.

Third, in 1992, the period of zero or negative real base growth ended. Real base growth began to rise gradually until it reached 8 percent in 1996. As shown

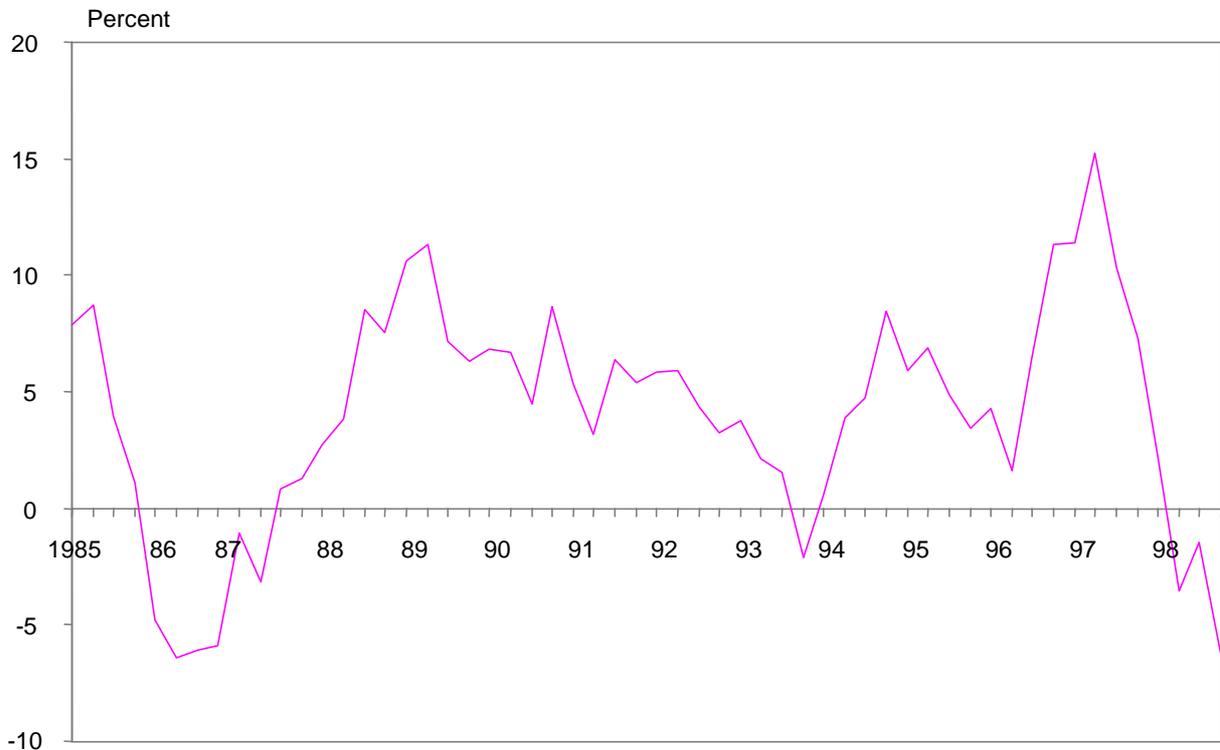
in Figure 3, the turning point in the economy was in 1993, a few months after real base growth began to increase.

Fourth, monetary actions contributed to the start of the recession at the end of the decade, but they are not the main cause. From 1996 to 1999, annual growth of the real base fluctuated within two percentage points of 6 percent. There are notable periods of sharp decline, especially in early 1999 and in 1997, when the government increased tax rates to reduce the budget deficit. Below, I consider the role of monetary policy in this period.

Falling exports are the major shock of the late 1990s affecting Japan. Real exports fell from a 15 percent annual rate of increase in the spring of 1997 to negative values a year later. Exports fell for several quarters, an unusual event in postwar Japan. The decline in real exports follows the collapse of several Asian economies. The export decline worsened after the Asian recession reached the Republic of Korea, a large purchaser from and supplier to Japan. With the recovery in several Asian economies, export growth resumed. Figure 6 shows these data.

Falling exports also contributed to the decline in real GDP in 1987. However, export growth did not fall in 1991-92; exports helped to reduce the contractive effects of monetary policy in this period. Falling export growth may have prolonged the recession in 1993 after the monetary base started to expand.

**Figure 6**  
**Year-on-Year Growth, Real Total Exports, Japan, 1985/I-1998/IV**



While changes in exports contribute to growth and decline, turning points in export growth typically follow, rather than precede, turning points in growth of investment and real GDP in these years. Real export growth responds both to autonomous or policy induced changes in foreign demand and to changes in Japanese policies affecting the real exchange rate. There are, in addition, changes in Japan's foreign aid, grants and loans to developing countries. Often foreign aid finances exports.

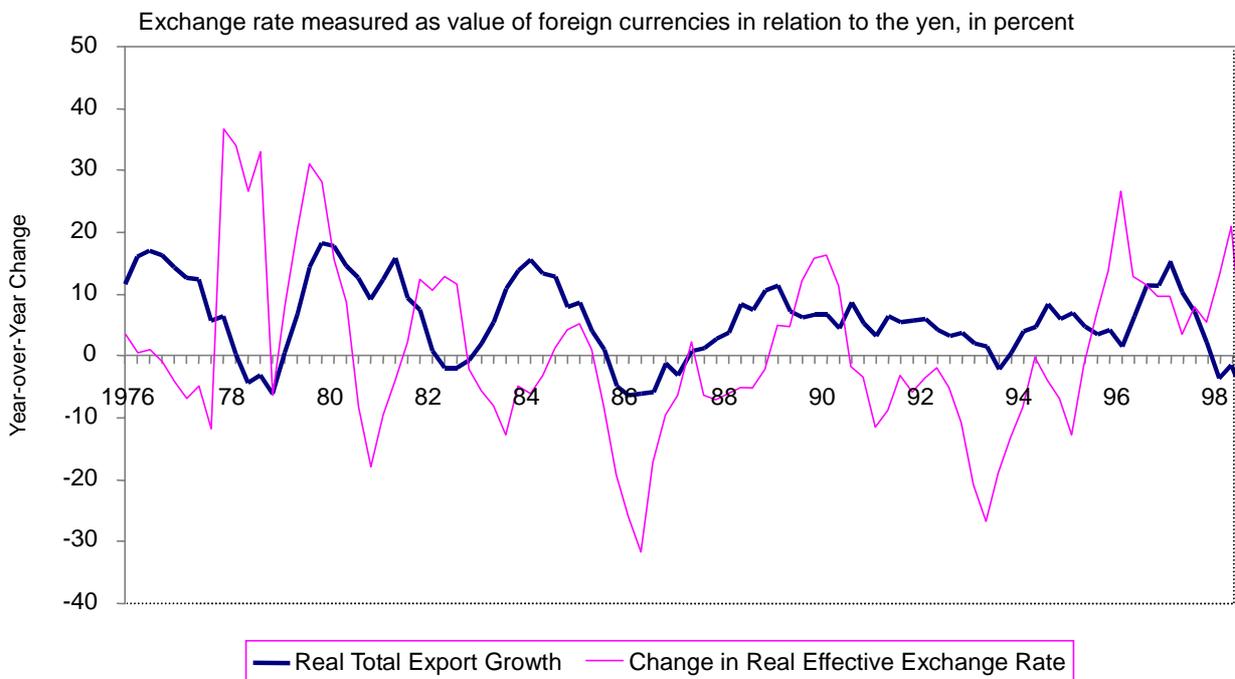
The 1997 recession started early in the year, following the tax increase and a sustained decline in growth of the real monetary base.<sup>2</sup> Growth of real exports

<sup>2</sup> From a peak of 8.74percent in June 1996, the growth rate of the real base fell to 4.5percent in April 1997. Quarterly averages shown in Figure 5 show a much smaller drop.

turned negative in third quarter 1997 and remained negative through most of 1998. The annual moving average fell from above 15 percent to -6 percent in six quarters.

Figure 7 shows the relation between year-over-year changes in real exports and the real exchange rate. Changes in the real exchange rate are inverted (foreign currency per yen) in this figure; a falling line is a depreciation of the yen.

**Figure 7**  
**Real Total Exports Growth versus Rate of Change of Real Effective Exchange Rate, Japan, 1976/I-1998/IV**



The figure shows no uniform pattern over the period. In 1979, 1986-87, and 1994, export growth fell as the yen depreciated. In 1976-77, 1991, and 1998, export growth moved opposite to the exchange rate; depreciation accompanied rising exports and conversely.

Let me sum up these preliminary findings. I find that real GDP growth is closely related to growth of real nonresidential investment. The data suggest that

the 1990s were not very different from earlier periods in this regard. Two principal differences are that recessions in the 1990s were deeper and longer than in previous decades and, on average, the maintained growth rate of real GDP declined.

Two factors, ---one monetary, one real--- appear to have had a major role in the two recessions and possibly the slower growth of non-recession years in the 1990s. The monetary explanation seems most important for the beginning and end of the so-called bubble period. Large changes in nominal and real base growth preceded the economic boom of the late 1980s and the recession in the early 1990s. A decline of more than 20 percent in real export growth was a main factor deepening and prolonging the recession at the end of the decade. Recovery in export growth in 1999 and 2000 helped to end the recession.

Of the two factors, the monetary factor has a straightforward interpretation. The Bank of Japan, acting under Ministry of Finance direction, was too slow to raise interest rates and lower base growth in the late 1980s, and it tightened too much in the early 1990s. At the end of the decade, the Bank followed a gradual policy of monetary expansion but did not prevent deflation. Influenced for a time by the Ministry of Finance, the Bank moderated or prevented yen depreciation and at times permitted appreciation.

Real export growth responds to domestic and foreign influences. The recession that started early in 1997 would likely have remained brief and mild if the Asian economies had continued to grow. Recessions in the countries of principal Asian customers lowered real GDP growth. Policy permitted investment to fall sharply at the same time. To move the analysis forward, we need to go beyond the binary comparisons shown in the figures.

### **III. Growth of Real Investment, Real Exchange Rate, and Real Balances**

This chapter uses some of the relations in the previous chapter to study how the growth of real investment and the real exchange rate respond to policy actions and other variables. Since investment and income change together, it is convenient to work with growth of real, nonresidential investment as a measure of economic fluctuations. Unless otherwise noted, all variables are quarterly observations measured as relative rates of change from the previous year and expressed as annual rates of change.

Table 1 shows two estimates of an equation relating growth of real investment to the growth in real long-term interest rate on government bonds, real GDP, and the real trade-weighted exchange rate. The first set of estimates uses overlapping four-quarter moving averages. The second uses only the four-quarter moving average for the fourth-quarter. Since the variables are all measured as year-to-year annual rates of change, there is considerable serial correlation in the error terms in the full set of estimates. The coefficient on the AR(1) correction suggests the extent of serial correlation. The estimates for the fourth quarter give less weight to the AR(1) correction.

The fourth-quarter estimates suggest that growth of investment is elastic with respect to the rate of change of long-term interest rates. Both sets of estimates suggest strong response to GDP growth, as suggested by Figure 3. The dramatic changes in the real exchange rate have neither a large nor a reliable effect, given growth of interest rates and GDP. The findings for investment growth are consistent with a neoclassical framework and the standard transmission process.

Table 1  
Real Nonresidential Investment,  
Japan, 1975-98

	Quarterly	Fourth quarter
Constant	-1.13 -0.42	-3.84 -1.26
Real long rate	-0.54 -1.64	-1.43 -2.24
Real GDP	1.61 6.51	3.45 6.14
Real GDP <sub>t-1</sub>	0.66 2.78	1.20 2.17
Real exchange rate	-0.02 -0.73	-0.06 -0.82
Real exchange rate <sub>t-1</sub>	0.02 0.81	0.00 0.03
AR(1)	0.90 18.01	0.48 2.67
R <sup>2</sup> /DW	0.90/1.44	0.88/1.88

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Note: All variables are annual growth rates of real values. t-statistics are below the coefficients.

Changes in the monetary base are linked to the economy through a number of channels. An increase in the base lowers the short-term interest rate, depreciates the exchange rate, and changes expectation about future prices and spending. The size of the responses depends critically on the anticipations held in the market before the change occurs and, therefore, on the central bank's transparency and credibility. In principle, the central bank's actions may be fully anticipated; in practice, there is uncertainty at least about timing. In Japan, investors must take account also of the Ministry of Finance's control of the exchange rate. The Ministry and the Bank may have different objectives, so that policy shifts between inflation and exchange rate targets.

The Bank of Japan was not fully independent during the 1990s. If the Bank's decisions to change interest rates and growth of the monetary base resulted in more change in the exchange rate than the Ministry would accept, the Ministry told the Bank to control the exchange rate. Revision of the Bank of Japan Law to increase the Bank's independence left the Ministry responsible for exchange rate policy.

For current purposes, the importance of this arrangement is its effect on the market's belief about the Bank's actions. The Bank may have been committed to end deflation, but it could be effective only if its actions were consistent with the Ministry's exchange rate target or target zone. When the two objectives were inconsistent, the Bank had to yield to the Ministry.

Table 2 presents evidence that the rise or fall of the real exchange rate depends on the difference between growth of Japan's monetary base and the U.S. monetary base. Both bases are in real terms, deflated by respective consumer price indexes. Ideally, growth of the trade-weighted monetary base should replace the U.S. monetary base. Many of Japan's principal trading partners had exchange rates pegged to the U.S. dollar during much of the period considered, however.

The results in Table 2 suggest that increases and decreases in the growth of Japan's monetary base, relative to growth of the U.S. monetary base, have relatively large, persistent effects on the rate of change of the exchange rate. Holding differences in interest rates and output constant, the rate of depreciation increases when the Japanese real base accelerates relative to the U.S. real base.

Table 2  
Percent Changes in the Real Exchange Rate,  
Japan, 1979-98

	All observations		Fourth quarter only
	(1)	(2)	(3)
Constant	3.85 (0.98)	2.46 (0.82)	4.13 (1.08)
Diff. in base growth (t)	1.25 (2.95)	1.04 (1.97)	1.93 (2.55)
Diff. in base growth (t-1)	1.19 (2.78)	0.71 (0.98)	0.24 (0.33)
Diff. in real GDP growth (t)	0.13 (0.25)	-0.04 (0.06)	-0.58 (0.58)
Diff. in real GDP growth (t-1)	0.20 (0.41)	0.68 (1.12)	-0.37 (0.37)
Diff. in change in real int. rate*	-0.34 (0.53)	0.49 (0.98)	0.81 (1.11)
AR(1)	0.82 (10.21)	0.68 (8.18)	0.26 (0.88)
R <sup>2</sup> /DW	0.78/1.69	0.63/1.87	0.47/1.85

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Note: All variables are quarterly values of year-to-year percentage changes. Differences are taken relative to the United States. t-statistics are in parentheses.

\* Column (1) uses short-term rates; columns (2) and (3) use long-term rates. Columns (1) and (2) use overlapping four-quarter moving averages. Column (3) uses fourth quarter annual moving averages only.

The table reports responses to differences in rates of change of short-term interest rates in column (1) and long-term rates in columns (2) and (3). Responses to acceleration of the domestic interest rates relative to U.S. rates are not significant. This result may be due to neglect of simultaneity, or use of U.S. interest rates to proxy for world rates, or failure to distinguish anticipated and unanticipated changes. The data suggest that the relative growth rate of the base adequately summarizes the information in monetary action and that acceleration or deceleration of the base is unanticipated to a considerable extent at least as to timing.

Table 2 also relates rates of change of the trade-weighted real exchange rate to differences in rates of GDP growth between Japan and the United States.

Properly, multi-country averages should replace U.S. rates of change on the right side of the estimation. An index of real growth for Japan's trading partners might strengthen the effect of differences in real growth rates.

A major issue in Japan at the end of the 1990s concerns the effect of monetary policy when the short-term interest rate is close to zero. A broader issue, raised in the theme of the conference, is how monetary policy works in a period of low inflation or deflation. The evidence in Table 2 suggests that monetary actions affect the exchange rate. Table 3 considers whether changes in the exchange rate affect the demand for money and, by inference, other variables.<sup>3</sup>

Table 3  
Growth of Demand for Base Money,  
Japan, 1979-98

	All observations	Fourth quarter only	
Constant	5.27 (3.04)	5.58 (3.12)	7.53 (3.84)
Short rate	-0.32 (1.32)	-0.28 (1.24)	-0.84 (2.12)
Real GDP	0.37 (2.22)	0.35 (2.29)	0.65 (1.78)
Nom. exchange rate		-0.10 (4.25)	-0.09 (1.36)
AR(1)	0.87 (14.91)	0.89 (16.54)	0.51 (2.01)
R <sup>2</sup> /DW	0.82/1.46	0.86/1.79	0.58/1.64

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Note: All variables are quarterly values of annual rates of change. t-statistics in parentheses.

As shown in the table, I estimated the equation with and without the rate of change of the nominal exchange rate. Not shown are similar estimates with changes in long-term rates in place of changes in short-term rates. The interest rate variable reaches the customary 5 percent significance level using annual rate of change for the fourth quarter only. Growth of the nominal exchange rate has a coefficient of about -0.1. On average, increased exchange rate appreciation

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<sup>3</sup> The short-term rate is available in the data source only from 1979/IV.

increases growth of the demand for money, and conversely. Taken together, tables 2 and 3 suggest that the exchange is relatively elastic in response to the base, but the demand for base is relatively inelastic with respect to the exchange rate. This is consistent with the relatively large observed changes in the exchange rate.

The data suggest that a 10 percent greater depreciation of the nominal trade-weighted yen reduces growth in demand for real base by about 1 percent on average. Annual changes in the exchange rate of 10 to 20 percent in both directions are not unusual. Large-scale appreciation of the yen in 1985-86 increased growth of the demand for real base money; large-scale depreciation in 1978, 1989-90, and 1996 reduced growth of demand for real yen balances. The Sakakibara policy of appreciating the yen in 1998, after it had fallen, increased the demand for money.

The findings in this chapter contribute to an understanding of the transmission of monetary policy in Japan. The exchange rate appears to be an important variable in the transmission of monetary and other changes. The results suggest monetary action is not adequately summarized by changes in a short-term interest rate. Investment depends on the long-term rate. Real base growth affects growth of the real exchange rate, given real interest rates, and changes in the nominal exchange rate affect growth of the demand for base money.

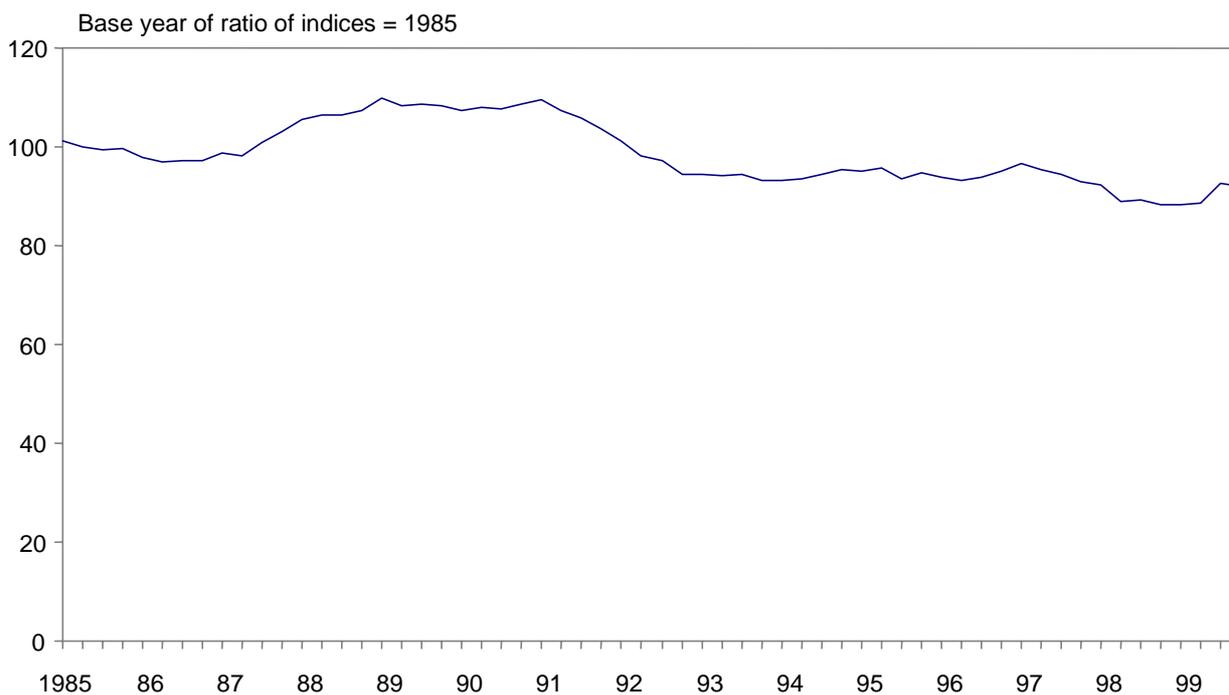
#### **IV. Other Parts of the Story**

Preceding chapters suggest some possible ways in which cyclical and other changes in Japan during the low inflation or deflation of the 1990s affected growth of investment, output, and the demand for money. This chapter briefly considers two questions. Is there a basis to conclude that the maintained rate of real GDP growth slowed in the 1990s? What role did fiscal actions and variables such as stock prices, housing prices, and bank lending take? I have not attempted a full

analysis of these variables but have limited my comments to suggestions for further analysis.

Japan is the second-largest economy in the world. It competes with the largest economy (and others) in third countries and in home markets. Figure 8 shows one of the principal factors affecting that competition. In the 1990s, the index of unit labor costs fell in the United States relative to Japan. The slope of the change appears modest after 1993, but the only evidence of possible reversal is in 1999, and that evidence is tenuous.

**Figure 8**  
**Ratio of Indices of Unit Labor Costs, U.S. versus Japan, 1985/I-1999/IV**



The data show that, on a 1985 base, relative cost changes moved in favor of Japan by 9 percent in the 1980s and early 1990s. The relative cost advantage disappeared in 1992. By mid-1993, the United States had increased its (relative)

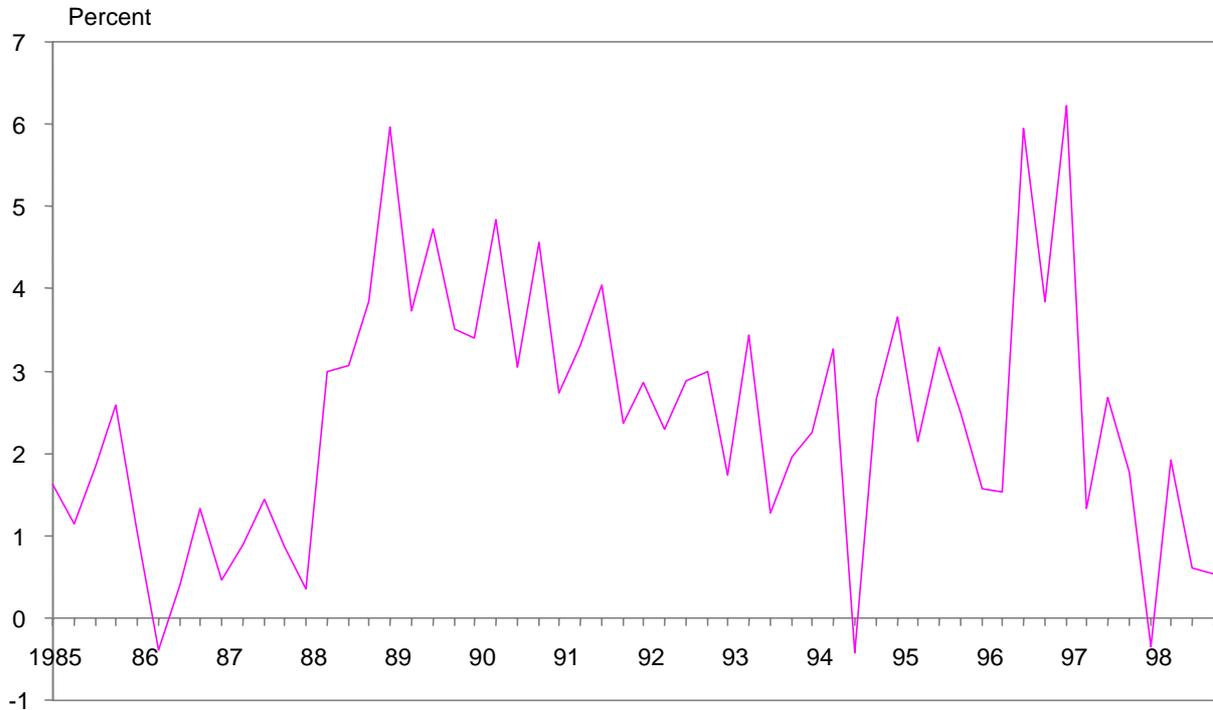
cost advantage by 5 to 6 percent and in 1998 by more than 10 percent. The real exchange rate did not depreciate to offset the change in costs. This evidence suggests that the terms of trade became less favorable to Japan.

A likely reason is that, after a long period of slow growth and adjustment, the U.S. economy changed in the 1990s. New technologies, response to deregulation that began in the 1970s, and the shift of the labor force from old to new and less regulated industries, raised U.S. productivity growth. Japan has been slower to make that transition. Rising productivity and slow growth of real and nominal wages in the United States shifted the competitive advantage toward the United States.

Reduction in real wage growth slows growth of unit labor costs. Figure 9 shows that hourly real wage growth in Japan remained below 3 percent after 1992. If bonuses are included, the decline is greater, and the change in real compensation turns negative in 1998-99. Falling nominal and real wages appear to be a deflationary response to slower relative productivity growth and deflationary monetary policy.

Many discussions of the Japanese economy in the 1990s focus on the fall in bank lending. The argument is that the unwillingness of banks to lend retarded growth of spending and GDP.

**Figure 9**  
**Real Wage Growth, Japan, 1985/I-1998/IV**



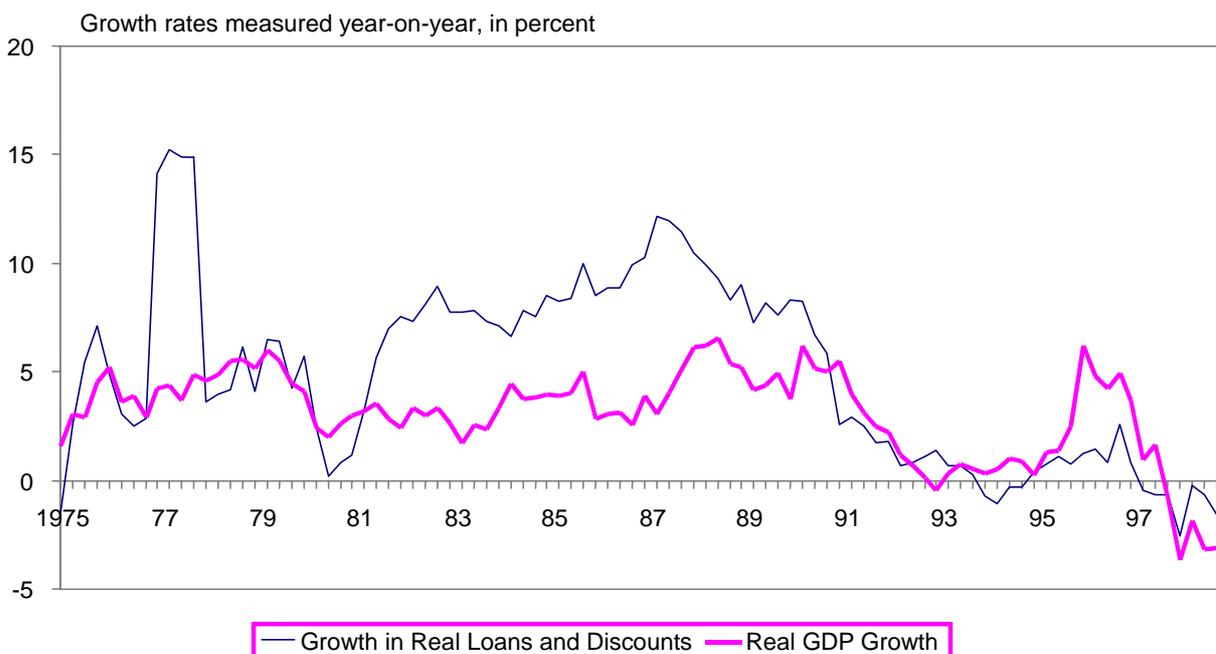
This argument is incomplete. Japan is an open economy with a fluctuating exchange rate. Capital flows vary over a wide range. Large Japanese corporations can borrow abroad, and they do. Borrowing abroad declined in the 1990s suggesting that the decline in lending reflected reduced demand to borrow. Consumption lending by banks has been relatively small, or nonexistent, during most of the postwar era. Further, Japanese households have maintained a high saving rate throughout the decade. Lending gives less support to consumption spending in Japan than in the United States. Studies of investment by small firms show, at most, a small effect of lending on investment expenditure, as noted in the introduction (Motonishi and Yoshikawa [1999]).

Reported loan losses by Japanese banks reached 5 percent of GDP. A large part of the financial system is insolvent. Some suggest that delay in closing or

merging insolvent banks slowed lending and delayed recovery. This is an unusual argument. The more common argument is that insolvent banks lend actively and make risky loans, responding to the moral hazard inherent in de facto or de jure deposit insurance protection and negative net worth.

For these reasons, I am skeptical that reluctance to lend was a powerful factor in Japan's slow growth and recession. The basic data give little support. Figure 10 shows that growth of lending can either lead or lag growth of real GDP. In 1997-99, lending growth lagged behind GDP growth. This suggests that, with a lag, borrowers became less willing to borrow when income declined. The figure also suggests that there is not much relation between growth of lending and output after the middle of the decade. Lending growth remained close to zero during the economic recovery in 1995-97. The binary comparison cannot rule out a marginal affect of lending on output, but it shows no evidence of this channel.

**Figure 10**  
**Growth in Real Loans and Discounts versus Real GDP Growth,**  
**Japan, 1975/I-1998/IV**



To test the lending effect, I added growth of the real value of loans and discounts to the investment equation shown in Table 1: The coefficient on loans is negative and not significant. The Appendix shows the estimate. This finding could change in a more complete analysis that separates the presumed positive effect of lending growth on investment growth from the effect of expected income or GDP growth on lending growth.

Some economists claim Japan is in a liquidity trap. With the short-term interest rate close to zero, they claim, monetary action is powerless to change the price level or economic activity. This claim implies that central bank purchases of long-term debt, equities, foreign exchange, or other assets would have no effect on nominal GDP, investment or other variables of interest.

In a static model of a closed economy with only three types of assets--- money, bonds, and capital---the model solves for one relative price, typically the interest rate on bonds or bills. If this price cannot be reduced ---for example, below zero--- increases in money do not affect the economy by changing interest rates. The real balance effect on spending is small, so real balance or wealth effects on spending introduce only a minor qualification.

I have argued that the liquidity trap proposition depends on the assumption that all asset prices have fully adjusted to the zero rate of interest.<sup>4</sup> No one in the economy is willing to change their mix of current and future consumption or current and future production in response to an increase in money achieved by purchasing some asset or assets. The central bank cannot raise any asset price by buying more of that asset in exchange for money.

Evidence from deflations in 1937-38 or 1948 in the United States does not support the liquidity trap. Instead, the data suggest that, with deflationary monetary policy and the short-term rate close to zero, the price level continued to

fall. The fall was similar to the fall in 1920-21 under deflationary monetary policy with a non-zero interest rate (Meltzer [1999]). Falling prices increase the value of real balances, producing a small direct effect on spending. A much larger effect comes through changes in the relative prices of assets and output, in long-term real interest rates, and the exchange rate. All that is required for these effects to operate is that all asset markets are not fully adjusted to the zero interest rate. Evidence from many studies supports the claim that the term structure, uncovered interest parity, or bond and equity markets do not satisfy the condition that information is always and everywhere fully exploited.<sup>5</sup>

During the recession at the end of the decade, the Japanese government engaged in expansive fiscal policy. Fiscal policy shifted from the goal of closing the budget deficit, or providing a surplus, to a policy of promoting recovery by public investment and consumption spending. The spending policy leaves Japan with a relatively large stock of outstanding debt and a large unfunded liability for future pensions and health care. The longer-term effect of the policy on growth and capital formation has been the subject of considerable discussion.

A puzzling feature of the heavy reliance on continued fiscal expansion is the relatively small response of GDP. The reported government deficit has moved from close to balance in 1990 to more than 10 percent of nominal GDP in 1999. The decline is steady, except for the small reversal following the 1997 tax increase.

Data from the family income and expenditure survey show that the average propensity to consume fell as the deficit to GDP ratio rose. I can offer two, non-competing explanations. One is Ricardian equivalence. The public does not distinguish between personal and public debt; as the public debt rises, saving rises. This process may have been at work, but I suggest another.

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<sup>4</sup> Notably in Brunner and Meltzer (1968) and Meltzer (1999).

A growing segment of the population is approaching retirement. This postwar generation saved at a comparatively high rate for its retirement and invested in housing and equities. The 40 to 50 percent decline in equity prices from the stock market peak, and the similar decline in prices of housing and other assets, lowered the wealth of this generation. The public has been told repeatedly about the importance of budget surpluses to provide for the pensions and health care that the government promised. Instead, the government ran very large deficits.

As public debt mounted, the risk increased that the government would have to renege partially on its pension and healthcare promises. The public responded by increasing saving relative to GDP, offsetting part of the effect of fiscal stimulus. Believing their pensions were threatened, households tried to restore personal wealth. The more they responded this way, the smaller the effect of fiscal expansion on GDP. The government's response was to further increase the fiscal deficit absolutely and as a percentage of GDP.

Further, much of the fiscal stimulus took the form of public works with low contribution to productivity and high maintenance cost. A rational person could not believe that today's government spending would yield higher future incomes which would pay the unfunded liabilities for pensions and health care or service the debt. Perhaps tax cuts that helped the public to restore its desired wealth position would have helped the public to achieve its goal and, thus, slow the increase in the saving rate. Deregulation that increased efficiency and productivity would have had a positive effect also. If correct, the conjectures would relate fiscal actions and asset prices to saving and consumption in this period.

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<sup>5</sup> McCallum (2000) develops this argument rigorously for the exchange rate on the assumption that uncovered interest parity does not hold at every point.

## **V. Conclusion: The Transmission Process at Low Inflation**

During most of the 1990s, the measured rate of change in the GDP deflator remained below a 2 percent annual rate. For much of the period after 1994, the deflator fell modestly on average. By 1998, all short-term interest rates were 0.5 percent or lower. Although there were additional reductions to zero, the central bank's ability to reduce short-term rates meaningfully ended.

If the transmission of monetary impulses depends on first changing short-term interest rates, monetary expansion would have no effect in the circumstances of Japan in the late 1990s. Although it is often useful to think of monetary actions as working through a single interest rate, this is a property of the models we use, not an empirically verified proposition about Japan or any other economy at a zero or near zero interest rate and perhaps elsewhere. The available evidence suggests that relations such as the pure expectations theory of the term structure, uncovered interest parity, the effect of interest rates on stock prices, and of changes in reproduction costs equal to changes in asset prices do not hold always and everywhere. Prices determined in active markets adjust most rapidly, other prices more slowly. All price and asset adjustments are part of the transmission process by which monetary (and other) impulses respond to current and anticipated future actions of the monetary authority.

Based on my preliminary examination of evidence from Japan in the 1990s, two types of change occurred. The maintained growth rate slowed. Japan's cost of production rose relative to U.S. production costs. To restore the 1980s growth rate required either increased productivity growth, real currency depreciation, or deflation. Japan's policy makers, by choice or accident, chose deflation over currency depreciation. Growth of the real and nominal monetary base remained positive after 1993, but monetary growth was not high enough to avoid deflation as a means of adjusting asset prices and the real exchange rate.

In a deflationary environment, households and businesses increase real cash balances to earn the return from deflation. Japan in 1996-97 illustrates that outcome. Real balances rose absolutely and relative to income and output. The real, trade-weighted exchange rate fell (depreciated), and real GDP recovered at rates of 4 to 6 percent year on year. The expansion ended in a mistaken fiscal action followed by collapse of export growth as several Asian economies went into deep recession and the world economy slowed. Monetary growth was a supporting force on average but was insufficient to prevent real and nominal exchange rate appreciation in 1998, to depreciate the exchange rate in 1999, or to satisfy the increased demand for base money as the risk of financial failures rose.

I suggest that exchange rate policy is the main reason that monetary policy has been deflationary. The Bank does not control exchange rate policy; the Ministry of Finance has that responsibility. The data show that if the Bank increases money growth relative to U.S. money growth, exchange rate depreciation increases. During most of the 1990s, the Ministry of Finance did not permit sustained depreciation of the nominal yen/U.S. dollar exchange rate. Growth of the monetary base had to satisfy the exchange rate constraint. The public understood the constraint on monetary expansion. The Bank's fault was to ignore, at least publicly, the constraint on its actions and, later in the decade, to oppose purchases of foreign exchange.

Monetary policy cannot generally achieve two goals, an exchange rate band and price stability. The exchange rate goal imposed deflation on Japan. Prices had to fall enough to reduce real wages, the real exchange rate and other real variables. With monetary expansion limited by exchange rate policy, deflation enabled the public to satisfy its increased demand for money, the latter induced in part by financial fragility and banking failures, in part by the return from deflation.

I draw four policy implications. First, the government and Bank should decide on a single goal for monetary policy, either control the exchange rate or the rate of inflation. Monetary policy can achieve either goal at low social cost, but it cannot generally reach both goals. Either goal is preferable to the current policy of shifting without warning from one to the other.

Second, increased money growth after the middle of the decade would have raised the actual and expected price level. Asset prices would have increased instead of falling. Rising real estate and stock prices would have increased the asset values underlying bank loans, thereby reducing losses to banks, improving banks' balance sheets and reducing the demand for real money balances. Stable or rising real estate prices would have stopped the decline in households' wealth and changed the expectation that housing and other assets would be cheaper in the future, thereby increasing demand for these assets.

Third, an adaptive rule for growth of the monetary base would have responded sooner to deflation, to the slower average rate of real growth and to the increased demand for money per unit of income. Even if not rigidly followed, the rule, or policy guide, would have led the Bank to respond sooner and more effectively to the deflation and recession that followed the decline in exports in 1997-98.

Fourth, an adaptive policy rule for price stability meets the objective expressed in the Bank of Japan law. At a zero short-term interest rate, the Bank should buy foreign exchange to expand monetary growth until deflation ends. The Ministry of Finance should accept the currency depreciation or appreciation needed to meet the Bank's objective of zero or low inflation.

The alternative policy is to control the exchange rate. The main difficulty that this policy faces is the choice of an appropriate exchange rate anchor. Japan has a chronic excess of saving over investment. If the exchange rate is not free to

respond to changes in the excess supply of saving, the price level must rise or fall to adjust the real exchange rate. Influenced partly by pressure from abroad, the Ministry has insisted on a nominal exchange rate in recent years that requires deflation. The social cost has taken the form of slow or negative growth, wasteful or unproductive government expenditure, financial sector weakness, and rising unemployment.

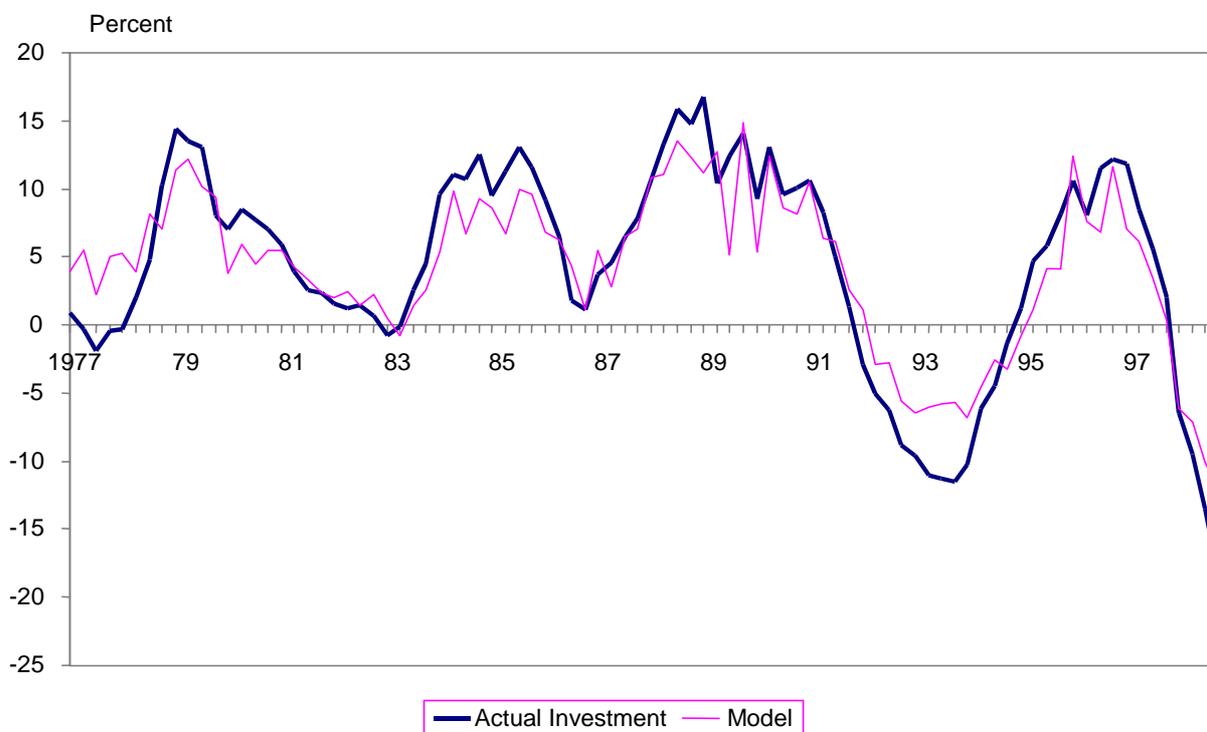
Although the findings that I report require more careful empirical work than I have attempted, the preliminary results are familiar. The exchange rate responds to differences in rates of money growth. Investment responds to the long-term interest rate, and the demand for money responds to both interest rates and exchange rates. The policy transmission process works through short- and long-term interest rates, exchange rates and other relative prices. Expectations of future prices of assets and output are part of the transmission process also. The estimates suggest that the interest elasticity of the demand for money is relatively large in Japan. The elasticity may have increased at low interest rates. Qualitatively, and perhaps quantitatively, other elements of the transmission process continued to function as before.

Figure 11 shows predicted and actual growth rates of investment. The predictions are the values generated by the regression estimates shown in Table 1. All the predicted values are within sample. The data suggest that the errors did not increase in recent years. The same is true of the equations for the rate of change of the real exchange rate in Table 2 and the rate of change of the demand for money in Table 3.<sup>6</sup>

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<sup>6</sup> Copies of the last two figures are available on request.

**Figure 11**  
**Actual Investment versus Table 1 Model**



I close by noting two puzzling outcomes. First, the difference in interest rates between the United States and Japan has persisted for several years. Deflation in Japan and modest inflation in the United States makes the real difference smaller than the more widely reported nominal difference. Is the expectation of continued appreciation the answer? The difference remains to be explained. Second, the standard prescription is to rely on expansive fiscal policy when the nominal short-term interest rate is close to zero. Fiscal policy has been highly expansive for more than two years, but the effect has been modest. I suggested an explanation for Japan based on low productivity of public investment, demographic changes, and wealth losses. Careful research on this problem would increase understanding of the operation of fiscal policy as a supplement to monetary policy when market interest rates are low.

**Appendix: Estimation of Growth of Output per Worker,  
1975-89, Quarterly**

Constant	0.0006 (0.14)
Investment per worker	0.27 (4.92)
R <sup>2</sup> /DW	0.28/3.22

**Estimation of the Effect of Lending Growth on Investment Growth,  
February 1976-April 1998**

Constant	-1.04 (-0.38)
Real long rate	-0.48 (-1.42)
Real GDP	1.64 (6.43)
Real GDP <sub>t-1</sub>	0.66 (2.75)
Real exchange rate	-0.02 (-0.84)
Real exchange rate <sub>t-1</sub>	0.02 (0.78)
Real lending	-0.07 (-0.53)
AR(1)	0.90 17.87
R <sup>2</sup> /DW	0.91/ 1.45

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