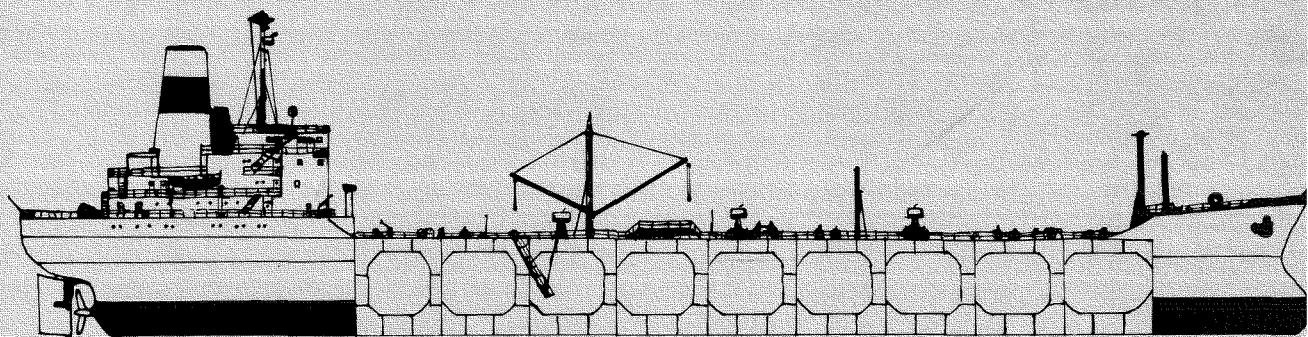


# FEDERAL RESERVE BANK OF SAN FRANCISCO ECONOMIC REVIEW



RESPONSES TO  
INTERNATIONAL INFLATION  
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# Wringing Out Inflation: Japan's Experience

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Charles Pigott\*

Over the last five years, Japan has succeeded in reducing her inflation rate to a degree that, from an American perspective, can only seem enviable. In 1974, Japanese consumer prices rose by nearly 25 percent. By 1978, CPI inflation had declined to 3 percent, and, despite sharp oil price increases, remained below 5 percent for 1979 as a whole. Japan's success in reducing inflation is all the more remarkable in view of its experience with two factors widely blamed for U.S. inflation: oil price increases and government budget deficits. Japan is substantially more dependent upon foreign oil than is the U.S., and so should have suffered more inflation from OPEC price increases. Moreover, Japan's budget deficit as a fraction of its GNP has been nearly twice the U.S. ratio since 1976.

Japan's real growth and unemployment performance over the last five years has been far less enviable than her inflation experience. Between 1965 and 1972, Japan's real GNP grew at a 10½-percent annual rate. After 1975, real growth averaged less than 6 percent, and in no year has it substantially exceeded that figure. Japan's unemployment rate—always remarkably low compared to other industrial countries—rose to nearly twice the 1965–72 average in the second half of the 1970's.

This paper reviews Japan's experience in reducing inflation, and examines several issues raised by it that are potentially applicable to other countries. Section I considers the factors accounting for the rise and fall of Japanese inflation over the 1973–78 period. We found that the 1973–74 surge in import prices, and in particular the 1974 oil price hike, was a major but

not the most important factor behind the upsurge in inflation. Instead, variations in Japan's money growth were the single most important factor in the 1973–74 rise in inflation, and in its subsequent abatement over the next four years.

Japan's experience is perhaps most interesting for what it reveals about the costs of reducing inflation. According to a common view, lowering inflation necessarily entails a very substantial and prolonged cost in terms of reduced real growth and higher unemployment. Japan's performance would at first seem to confirm that this cost is indeed very high and protracted, judging from both the severity of the 1974 recession and the exceptionally sluggish recovery that followed. The evidence cited in Section II suggests that Japan's attempts to reduce inflation through reduced money growth substantially aggravated the 1974 recession. However, it also suggests that the continuation of slow money growth may not have been primarily responsible for the sluggishness of the recovery. Instead, real growth may have lagged largely because of the undermining of investor confidence by the previous inflation and the ensuing recession. If this is so, the cost of reducing Japan's inflation, while high, was not as great as simple comparisons of its actual and pre-1973 performances might suggest.

Taken as a whole, Japan's experience thus suggests two lessons relevant for the U.S. and other industrial countries. First, lowering money growth can bring inflation down within several years' time. Second, other factors besides reduced money growth may produce periods of reduced real GNP growth, such as Japan experienced after 1973; the cost, that is, of reducing inflation in Japan was high, but not

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\*Economist, Federal Reserve Bank of San Francisco. David Parsley provided research assistance for this article.

so high as might appear at first. Other aspects of Japan's experience noted below—such as her ability to reduce money growth in the face of very large government budget deficits—may

also have wider significance. Further analysis of Japan's experience thus may define additional lessons of use to other industrial economies.

## I. Rise and Fall of Inflation

Economists generally agree that variations in average long-run inflation are nearly always caused by changes in domestic money growth. There are disagreements, however, about the impact of money growth on medium-term fluctuations in inflation, over periods of several years or so. According to one view, other factors—such as government budget deficits or imported-goods price changes—cannot have more than a small and temporary effect upon the level of domestic prices *unless* they are 'accommodated' by changes in the domestic money stock. According to an alternative view, such 'non-monetary' factors can independently and significantly affect inflation for a considerable time—although, because they tend to be sporadic and reversible, their influence diminishes with the lengthening of the time horizon. The first view implies that a policy of steady money growth will alleviate all but relatively small fluctuations in inflation; the second suggests that substantial variability in inflation may remain even after money growth is stabilized.

During the last seven years, prices in Japan (as in other countries) have been buffeted to an unusual degree by external shocks largely unrelated to her domestic money growth. These included the commodity-price increases of 1973–74, as well as the sharp exchange-rate fluctuations (appreciation and then depreciation) of the 1977–79 period. For this reason, it is worthwhile examining the sources of Japanese inflation to find an indication of the extent to which factors other than domestic money growth can affect inflation. As explained below, money was in fact the main factor accounting for the rise and fall of Japanese inflation, but traded goods' prices played a significant role as well.

### **Waxing & Waning of Inflation**

Beginning in 1973, Japan experienced its worst inflation since the early 1950's, with prices

rising at double-digit levels in that and the following year. Over that two-year period, the GNP price deflator increased by nearly 40 percent, compared with the 11-percent increase experienced over a typical two-year period during the 1960's. Increases in consumer and wholesale prices were even more dramatic, reflecting sharp increases in the prices of Japanese imports relative to non-traded goods and services.

Then, following Japan's first decline in real GNP in nearly twenty years, inflation abated nearly as fast as it had arisen. By 1975, inflation measured by the GNP deflator was virtually back to the 1960's average, although consumer price inflation remained high by historical standards through 1976. Inflation decelerated further during 1977 and 1978, with wholesale prices actually falling over that period. Thus the lessons drawn from Japan's inflation performance of the 1973–78 period are likely to be very important for other countries: no other major industrial country experienced a sharper surge in inflation during 1973–74, and none was as successful as Japan in reducing inflation thereafter.<sup>1</sup> What then accounted for the rise and fall of Japan's inflation?

Inflation, both in Japan and elsewhere, is often attributed to a variety of factors. The most prominent "candidates" include high government-expenditure levels and budget deficits, wage increases in excess of productivity gains, exchange-rate depreciations and/or import-price increases, *and* money-supply growth. As it happens, the list of factors substantially affecting Japan's inflation can be easily narrowed to the latter two.

Neither the government budget deficit nor accelerating government expenditures can plausibly be blamed for Japan's 1973–74 inflation surge. During the late 1960's, Japan's budget deficits were relatively modest, averaging about one percent of her GNP. The def-

icits then increased in 1972 and 1973 to about 1½ percent of GNP, but were still quite comparable to those in the U.S., where inflation was only about half as great as in Japan. Meanwhile, government expenditures as a fraction of GNP also remained relatively stable during the early 1970's. Indeed, Japan's budget deficit and government expenditures did not rise substantially until after 1975, when inflation was

declining. Japan in 1977 and 1978 managed to keep inflation at or below the 1960's average, while incurring a budget deficit whose size (relative to GNP) was easily the largest of any major industrial country. Government fiscal policy, therefore, was probably not a major factor in Japan's inflation over this period.<sup>2</sup>

Likewise, it is very doubtful that 'excessive' wage increases led to the 1973-74 inflation.

**Table 1**  
**Basic Data Sheet for Japan<sup>1</sup>**

	<b>1962-70 Average</b>	<b>1971</b>	<b>1972</b>	<b>1973</b>	<b>1974</b>	<b>1975</b>	<b>1976</b>	<b>1977</b>	<b>1978</b>	<b>1979</b>
<b>GNP Growth Rate (%)</b>										
Nominal GNP	17.2	8.0	17.6	23.2	18.0	8.4	10.9	11.2	9.8	7.0
Real GNP	11.4	4.3	11.9	6.2	-1.5	3.4	5.0	5.8	6.1	6.0
<b>Inflation Rate (%)</b>										
Consumer	5.8	5.5	4.6	16.5	24.5	8.5	9.4	6.2	3.1	4.9
Wholesale	1.7	-1.0	4.0	24.0	23.3	0.7	6.1	-1.0	-3.2	16.0
GNP Deflator	5.2	3.7	5.7	15.5	18.3	5.0	5.9	5.4	3.7	1.0
Wage Rate	12.1	13.9	16.5	19.5	26.1	13.4	11.3	9.3	5.3	6.0
<b>Money Supply Growth (%)</b>										
M-1 <sup>5</sup>	17.1	29.9	25.0	17.1	11.8	11.1	12.5	8.2	13.4	3.0
M-2 <sup>5</sup>	17.4	24.4	24.8	16.8	11.5	14.4	13.6	11.1	13.1	8.4
<b>Change in Exchange Rate (%)</b>										
Dollar Exchange Rate	0	13.6	4.2	7.8	-7.0	-1.4	4.2	22.0	23.3	-18.9
Trade-Weighted Rate <sup>4</sup>	na	na	11.8	7.6	-6.4	-3.2	3.6	10.6	24.2	-6.7
Real Exchange Rate <sup>6</sup>	na	-3.7	6.6	10.8	2.3	-12.0	3.8	3.4	11.6	-11.6
<b>Government Deficit/GNP (%)</b>	1.3	0.2	1.6	1.6	1.3	4.4	2.0	6.1	6.5	5.3
<b>Foreign Exchange Reserves (\$ billion)</b>	1.8	13.8	16.5	10.2	11.3	10.6	13.9	20.1	28.9	1
<b>Change in Unit Labor Costs (%)</b>	1.7	10.7	2.6	6.0	41.0	9.1	-4.2	4.1	-4.9	-3.0 <sup>2</sup>
<b>Unemployment Rate (%)</b>	1.3	1.2	1.4	1.3	1.4	1.9	2.0	2.0	2.2	2.1
<b>Average Output Gap<sup>3</sup> (%)</b>	-1.2	-3.0	-5.8	0.1	-8.4	-24.5	-19.2	-19.9	-18.6	-15.4

<sup>1</sup>All growth rates are computed fourth-quarter-over-fourth-quarter unless otherwise indicated.

<sup>2</sup>Figure refers to 1979.3/1978.3.

<sup>3</sup>The output gap is defined as the percentage difference between actual and potential industrial output. Data are taken directly from Artus (1978) for 1960-77, and then estimated using his potential-output figures and industrial-production series from *International Financial Statistics* for 1978-79.

<sup>4</sup>The trade-weighted exchange rate is an *average* of the value of the dollar against foreign currencies taken from *International Financial Statistics*; the 'real' exchange rate is a trade-weighted average of the dollar-denominated wholesale prices of Japan relative to those of her competitors (Source: IFS).

<sup>5</sup>Figures are year-end over year-end; for 1979, considerable distortion exists due to year-end window dressing or some other factor. The *average* M-1 level in December 1979 was about 9 percent higher than the average of December 1978.

<sup>6</sup>The 'real' exchange rate is a trade-weighted average of the dollar-denominated wholesale prices of Japan relative to those of her competitors (Source: IFS). The figures in the table are percentage changes in yearly averages. For 1977, 1978, and 1979, the fourth-quarter over fourth-quarter percentage changes are 8.1%, 9.6%, and -22.0% respectively.

During the 1960's, Japanese wages typically increased at more than twice the general inflation rate. This pattern reflected rapid advances in productivity, as the increase in unit labor costs was very modest. Unit labor costs accelerated in 1971 in line with that year's cyclical downturn, but then decelerated again in 1972. Thus the 1973-74 surge in prices was not *preceded* by wage increases large enough to account for the ensuing inflation. And the sharp 1973-74 increases in wage rates are, for reasons cited below, most plausibly regarded as symptoms of inflationary pressures generated by other factors.

In fact, only money growth and sharp import-price increases were large enough to have led to an acceleration in inflation of the magnitude observed. And, aside from money growth, only the yen's sharp 1977-78 appreciation could have contributed substantially to the ebbing of inflation after 1974. The question now is, what was the relative importance of each of these in Japan's inflation?

### **Was Inflation Imported?**

The obvious interdependence among national economies revealed by the events of the 1970's has led to increased concern that a country may 'import' price increases from abroad to the detriment of its anti-inflationary policies at home. Much of this concern originates in the 1973-74 period, when a sharp run-up in world commodity prices was associated with an inflation surge in *all* industrial countries, not simply in Japan. These extraordinary commodity price rises accounted for perhaps as much as half of the acceleration in U.S. inflation in that period.<sup>3</sup> Since Japan is even more dependent than the U.S. upon international trade, it is reasonable to ask if her 1973-74 inflation was largely imported.

Certainly, the increase in prices of Japan's traded goods was spectacular. During that two-year period, the average price of Japan's imports of goods and services rose by 87 percent, while her export prices increased by roughly 45 percent. Exchange-rate movements had very little influence on these increases, and indeed the average foreign currency value of the

yen did not change appreciably over the period as a whole. Instead, the general rise in Japan's traded-goods prices can be traced to conditions prevailing in world markets—conditions which were largely external to Japan's economy.

Probably the most important of these was a general acceleration in money growth in the industrial countries, which led to a sharp rise in world aggregate demand. In addition, supply shortages, low inventory levels, and other 'special' factors led to severe rises in prices of key raw materials, the most spectacular of which was the early-1974 four-fold increase in the price of oil.<sup>4</sup> These increases accounted for a nearly 30-percent decline in Japan's terms-of-trade (the price of her exports relative to her imports), and represented a substantial loss of real income to her citizens.

There was, however, another potential cause of the price upsurge—the 1971-72 acceleration in money growth. Over that two-year period as a whole, M-1 rose by 62 percent and M-2 by 55 percent. (M-1 includes currency plus commercial-bank demand deposits, and M-2 includes the same plus time deposits.) These increases were at least half again as large as the average increases of the 1960's. Most of the acceleration stemmed from Japan's massive purchases of dollars, undertaken in an effort to stabilize the foreign-exchange value of the yen, which accompanied the December 1971 devaluation of the dollar. These purchases swelled domestic bank reserves, allowing the subsequent sharp increase in bank deposits. Despite this, the increase in money growth cannot meaningfully be termed 'imported.' After 1971, Japan was subject to no international obligation to maintain the pre-1971 foreign-exchange value of the yen. Moreover, this rise in money growth in response to dollar purchases can be traced largely to a deliberate policy choice of the authorities; six years later, equally massive purchases of dollars did *not* lead to any significant acceleration in money growth.<sup>5</sup>

Despite the unusually rapid growth in money during 1971 and 1972, Japan's prices did not begin to accelerate until 1973. This delay in money's impact is not unusual; be-

cause of contracts and other impediments to commodity-price changes, the effects of money-growth variations usually take at least a year to become manifest, and often considerably longer. In addition, the impact upon inflation could have been even further delayed because the surge in money growth was unusually severe *and* prolonged.<sup>6</sup>

Which factor, then, money growth or increases in traded-goods prices, was mainly responsible for Japan's 1973–74 inflation? A recent study by Spitaeller (1978) suggests that the extra inflation was attributable principally to the increase in import prices. He found that Japan's wholesale-price index tended to rise by nearly 30 percent of any increase in import prices. This would suggest roughly a 30-percent rise in 1973–74, resulting from the doubling of import prices—or almost two-thirds of the actual increase in wholesale price inflation over that period. However, this and similar findings reveal primarily the association between import- and domestic-price increases over the estimation period, and thus reflect in part the monetary policies followed by the authorities. For this reason, such estimates can provide a very misleading indication of the independent contribution of traded-goods prices to domestic inflation—that is, of their impact with a *given* path of domestic money.<sup>7</sup>

In fact, a simple calculation—which effectively treats the terms-of-trade deterioration as a tax—shows that traded goods' price hikes *at most* could have had only a quite modest impact on the price level in the *long-run*. This approach involves calculating the extra amount Japan's residents paid to foreigners, versus the additional amount received, as a result of the 1973–74 increases in traded-goods prices. Specifically, Japan's imports in 1972 amounted to 10 percent of her GNP, so that the 88-percent increase in import prices over the following two years required an additional payment for the *same* volume equal to 8.8 percent of annual GNP; likewise, the increase in export prices transferred additional income to Japan equal to 4.5 percent of annual GNP (10 percent of the 45-percent increase). The total effect upon income available to residents was the differ-

ence between the additional payments and receipts, or about 4 percent of GNP. This provides a rough estimate of the reduction in Japan's purchasing power that resulted from the external price increases.

Assuming proportionality between real money demand and real income (as was generally the case prior to 1973), Japan experienced about a 4-percent reduction in the demand for money. This reduction, given the level of the money stock, would have required a 4-percent increase in Japan's price level to bring real money demand and supply into balance.<sup>8</sup> An ultimate price effect of this magnitude is clearly significant, but it plainly is very modest compared to the actual acceleration in inflation observed during 1973 and 1974. In contrast, since an increase in money tends to lead eventually to a proportionate rise in domestic prices, the 1971–72 money growth had a much larger ultimate impact upon prices.

Normally, however, the long-run impact of external price increases, which may take several years to be completed, will be smaller than the short-run effects. A rise in import prices raises the domestic price level directly and fairly immediately. The resulting fall in real money balances (given an unchanged path for the nominal money stock) *later* depresses the prices of other domestic goods, although this process can be quite protracted. Hence the impact of external price increases upon the 1973–74 inflation could have been substantially greater than the above calculation would suggest. For this reason, it may be useful to compare the price effects of two alternative money-growth scenarios—one assuming the historical growth rate, and the other assuming the actual 1971–72 growth path of the money stock. (In each case, we assume that the external price increases of 1973–74 had not occurred.) The difference implied by these two hypothetical scenarios provides a crude but nonetheless revealing indication of the extent to which the 1971–72 acceleration in money growth contributed to the 1973–74 inflation.

To begin, assume that both real income and the M-2 money stock had grown at their historical averages during the 1971–72 period—

that is, 38 percent for M-2 and about 24 percent for real GNP (and thus real money demand). This growth of nominal money relative to real money demand would, in turn, have resulted ultimately in an 11-percent increase in the GNP deflator (Table 2). On the other hand, M-2 actually grew by 55 percent, which would suggest a 25-percent increase in the deflator given the same growth in real GNP. In either case, virtually all of the price increase resulting from the 1971-72 money growth probably would have occurred in 1973-74 because, as indicated earlier, virtually no effect of the earlier money expansion was in fact evident until 1973. (For the same reason, the 1973-74 money and output growth is ignored for this calculation.) Thus, this reasoning suggests, inflation during 1973-74 would have been nearly 14 percentage points higher than the historical rate as a result of the 1971-72 acceleration in money growth alone. This accounts for more than half of the actual 1973-74 acceleration in the deflator. And this estimate may be conservative, because when M-1 is used for the calculation, two-thirds of the additional inflation appears attributable to money.

It would also be misleading to attribute all the remaining inflation not accounted for by this calculation to the 1973-74 external price increases. The reason is that real output, and thus real money demand, grew by six percent-

age points less than the historical average over the 1971-72 period. This reduction in real money demand could have added a further six percentage points to the deflator over the 1973-74 period.<sup>9</sup>

On balance, then, the 1971-72 acceleration in money growth probably accounted for more than half the surge in Japan's GNP deflator over the subsequent two years, and possibly for as much as two-thirds. This would certainly be true if we include the effect of 1971's slower real growth, which may itself have resulted from the 1969-70 mild reduction in money growth. Japan, that is, would have had double-digit inflation in 1973-74 even without the increase in external prices. However, variations in money growth probably had considerably less impact on consumer and wholesale prices than they did on the deflator, because traded-goods prices have substantially more weight in those two indices than in the deflator.<sup>10</sup>

Our analysis thus shows that the 1973-74 increase in traded-goods prices accounted for less than half, and quite possibly no more than one-third, of Japan's inflation increase. This conclusion is fairly consistent with the experience of other industrial countries. For example, a study for the Joint Economic Committee of the U.S. Congress (1975) estimated that import-price increases raised U.S. consumer prices about 5 percent annually between the

**Table 2**  
**Contribution of Money Growth to 1973-1974 Inflation<sup>1</sup>**

	<u>M-1</u>	<u>M-2</u>
Total Money Growth, 1971-1972 (%)	62	55
Less: Secular Real Output Growth during 1971-1972 (%)		24
Equals: <sup>3</sup> Predicted rise in GNP Deflator, 1973-1974 (%)	31	25
Less: Secular Inflation implied by historical average Money Growth (%)		11 <sup>4</sup>
Equals: Additional Inflation due to higher 1971-1972 Money Growth (%)	20	14
Plus: Additional Inflation from lower Real Output Growth in 1971 <sup>2</sup>	6	6
Equals: Additional Inflation from accelerated Money <i>and</i> lower Real Output Growth, 1971-1972 (%)	26	20

MEMO: Actual total rise in GNP deflator in 1973-74: 37 percent (26 percent above the secular rate).

<sup>1</sup>Based on the assumption that price increases resulting from the growth of nominal money relative to demand (excess money) in 1971-72 occurred in 1973-74, whereas the impact of excess money growth in 1973-74 was evident *after* 1974.

<sup>2</sup>Real output growth over 1971-72 totaled 18 percent, and thus real money demand at the end of 1972 was roughly six percent below the level implied by the historical trend.

<sup>3</sup>Figures are not precisely equal to the arithmetic difference between money and real output growth because of compounding.

<sup>4</sup>This is the figure implied by the historical pattern for M-2 and inflation; for M-1, the implied secular inflation rate is 10 percent.

end of 1972 and mid-1974—about one-quarter of the actual increase. The effect upon Japan's CPI might be expected to be substantially greater—Japan's ratio of imports to GNP was about 40 percent higher than the U.S. ratio in 1972, and her relative dependence upon oil imports was even greater. However, the estimate given earlier does not seem substantially out-of-line with that suggested by America's experience.<sup>11</sup> It is also worth noting that no other major industrial country (except Italy) experienced nearly as sharp an increase in money growth during this period, and none experienced nearly as sharp an acceleration in inflation.<sup>12</sup>

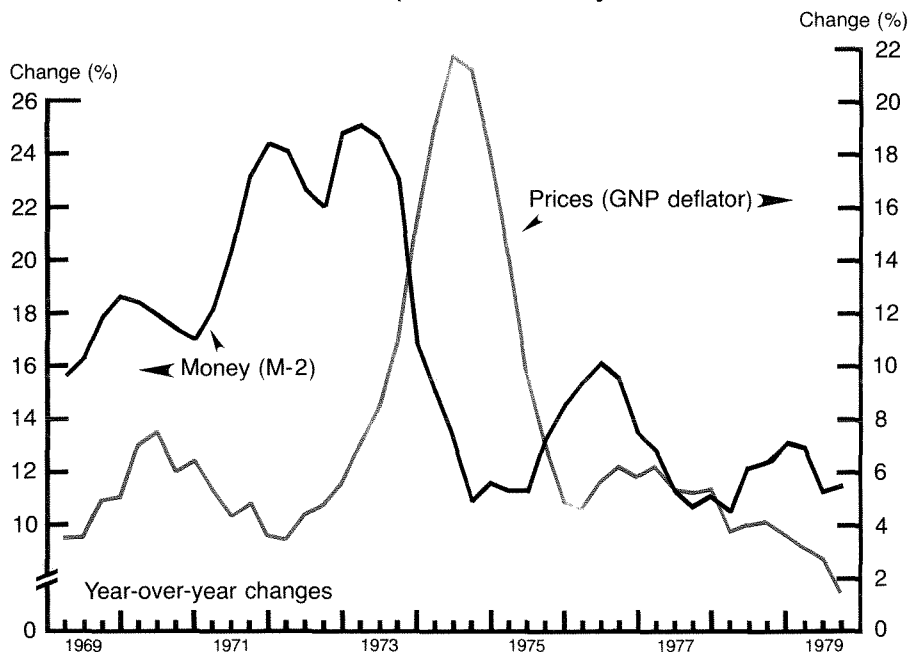
both the GNP deflator and wage rates were increasing at or even below the average pace of the 1960's, although comparable deceleration was not evident in the CPI until 1977.<sup>13</sup> Inflation fell still further in 1978, to well below the historical rate. In no other major industrial country, except possibly Germany, was the reduction in inflation so substantial and steady.

As the previous discussion suggests, Japan's money growth was the key to her success in lowering inflation. Money growth began to fall sharply in 1973 (Chart 1), and continued to decelerate in 1974. Thus the delay between the deceleration of money and the decline in inflation (roughly two years) was consistent with the lag observed during the previous upsurge. This again demonstrates that money growth takes a considerable time to affect domestic prices. After 1974, both M-1 and M-2 grew at average rates of 12–13 percent annually, nearly one-third less than during the 1960's. While the abatement of import price increases after

### Waning of Inflation, 1973–78

The fall in Japanese inflation from 1975 to 1978 was nearly as spectacular as the previous increase. The CPI began to decelerate steadily during the last half of 1974, and by 1975 inflation was back to single-digit levels. By 1975,

Chart 1  
Growth Rates of Japanese Money and Prices





mid-1974 almost surely speeded the initial decline in inflation, the later continuation of that trend may plausibly be attributed to the reduction in money growth.

The other factor often credited with helping to reduce Japan's inflation in 1977 and 1978—the nearly 40-percent appreciation in the average foreign-currency value of the yen—was itself probably a *result* rather than a cause of Japan's lowered money growth. The yen's appreciation far outstripped the contemporaneous gap between Japanese and foreign inflation, so much so that Japan's wholesale-price level, in *dollar* terms, rose almost 20 percent more than her trading partners' average price level during this period. This increase in the real value of the yen led many observers to conclude that Japan's 1976–78 current-account surpluses were causing the currency appreciation, and depressing Japan's inflation rate in the process. However, as Keran (1979) has argued, most of Japan's surplus was the result of her incomplete recovery from the 1974 recession. Normally, business cycle variations in trade balances do not have such substantial effects upon exchange rates.<sup>14</sup>

Also, as Keran has shown, the yen's 1977–78 appreciation may plausibly be attributed to the differential growth of Japan's money supply relative to other nations. In 1973, money growth slowed in Japan, but so did that of most other industrial countries. By late 1976, however, Japan's money (adjusted for demand) was growing substantially more slowly than abroad—especially in comparison with the U.S. acceleration—and the yen's appreciation followed soon after. The yen's ability to far out-strip contemporary inflation trends can be explained by the tendency of exchange rates to respond more quickly than prices to money changes, because exchange-rate adjustments (unlike price adjustments) are not constrained by contracts and other institutional impediments. Thus there is a 'monetary' explanation of the rise in the real, as well as the nominal, value of the yen.<sup>15</sup>

### Deficits, Intervention, and Money Slowdown

Japan's reduction in money growth was particularly remarkable in view of two factors that have often considerably complicated money-supply control—government budget deficits and foreign-exchange market intervention. No other major industrial country ran budget deficits as large in relation to GNP as Japan did during this period; none engaged in heavier foreign-exchange market intervention. Yet these factors, which are often asserted to make money-supply control virtually impossible, did not prevent money growth from remaining relatively low during this period.

The sharp expansion of Japan's budget deficit, beginning in 1975, resulted primarily from an expansion of public-works expenditures aimed largely at stimulating the private economy. In effect, the Japanese authorities decided to maintain money growth at a level thought to be compatible with reducing inflation, while using fiscal policy to stimulate the economy. By 1978, this endeavor had brought the government budget deficit to over six percent of GNP—well above the rate in any other major industrial nation. Indeed, in that year, government borrowings amounted to nearly one-third of total expenditures. According to a widely held view, substantial deficits make it nearly impossible for the authorities to avoid excessive money expansion. In this view, containment of money growth in the face of expanding deficits tends to "squeeze out" smaller borrowers in politically powerful sectors, such as agriculture and housing. However, Japan's experience demonstrates clearly that there is no inexorable link between expanding budget deficits and money growth.

Similarly, Japan showed during 1977 and 1978 that heavy foreign-exchange market intervention can be sterilized—that it need not necessarily lead to an acceleration in money growth. In that period, Japan's foreign-exchange reserves more than doubled, from less than \$14 billion to nearly \$29 billion. (That increase was nearly as great as the 1971–72 rise.) These purchases of dollars resulted from the authorities' efforts to slow the sharp ap-

preciation of the yen. But during 1977 and 1978—and in sharp contrast to 1971–72—Japan’s authorities largely offset the increase in bank reserves resulting from their foreign-ex-

change intervention by reducing Bank of Japan lending to the banking sector. As a result, average money growth was no higher during 1977–78 than during the previous two years.<sup>16</sup>

## II. Cost of Reducing Japan’s Inflation

Japan’s success in reducing inflation was accompanied by a reduction in real growth and a rise in unemployment. The 1974–75 recession was easily Japan’s most severe of the post-war era, with real GNP falling for the first time in over twenty years. Moreover, the subsequent recovery was exceptionally sluggish by Japanese standards, so much so that unemployment and underutilized capacity still remain historically high.

According to a widely held view, Japan’s reduced real growth over the 1974–79 period was the natural consequence of her policies to reduce inflation. In this view, a substantial lowering of inflation necessarily entails reduced real growth and increased unemployment for several, possibly many, years.<sup>17</sup> This interpretation of Japan’s experience is not likely to be encouraging to U.S. policymakers, because it suggests that *only* by tolerating high inflation was it possible to substantially reduce unemployment here after 1974—and that bringing inflation back down is a very painful and protracted task.

An alternative view of Japan’s experience, however, implies that its sluggish growth *after* the recession was more the consequence of the 1973–74 surge in inflation and oil-price increase, than of subsequent anti-inflationary policies. This view attributes the continued sluggishness primarily to the depressing effect on spending, particularly private investment, of the uncertainty engendered by the previous inflation and “oil-shock.” This suggests that real growth would have remained slow after 1974 even if the government had not continued to restrain money growth.

### Severe Downturn, Anemic Recovery

As with the inflation surge, Japan’s worst post-war recession began before the oil crisis of late 1973. Real growth slowed markedly in

the second and third quarters of 1973, following the deceleration of money growth by roughly one-quarter. Indeed, had real growth recovered after the fourth quarter, Japan would have recorded a “growth recession” comparable in both magnitude and timing with those experienced earlier. It seems clear that the oil embargo and subsequent oil-price hikes were mainly responsible for transforming a fairly ordinary downturn into the debacle of 1974.<sup>18</sup> Output declined nearly 2½ percent between the fourth quarter of 1973 and the recession trough in the first quarter of 1975—an impressive decline for a nation whose average annual real growth had previously exceeded 10 percent.

The sluggish recovery following the recession trough was as troubling as the downturn itself, and rather less understandable (Chart 2). Real output growth rebounded sharply in the last three quarters of 1975, but unlike previous recoveries, it remained *below* the secular average. The recovery then effectively petered out, with growth falling back somewhat in 1976 and settling at slightly below a six-percent annual rate over the next two years. By the end of 1978, Japan’s unemployment rate was actually higher than at the recession trough. Also, the gap between actual and potential industrial output, while narrowing, remained near 15 percent. Even this narrowing cannot have comforted the authorities, as it reflected mainly a decline in capacity growth resulting from the depressed state of investment.<sup>19</sup>

Historically, Japan’s real growth has been led by her private-investment sector, and this sector played an equally prominent role in the sluggish recovery after the 1973–75 recession. In fact, private investment was largely moribund after the recession, with no real signs of recovery evident until 1978. Indeed, private non-residential investment did not attain the

real level of 1973 until the end of 1978, while residential investment in the latter year remained below the 1973 peak. It is hard to resist the conclusion that private investment substantially retarded the recovery in Japan<sup>20</sup>—and perhaps in other industrial nations.

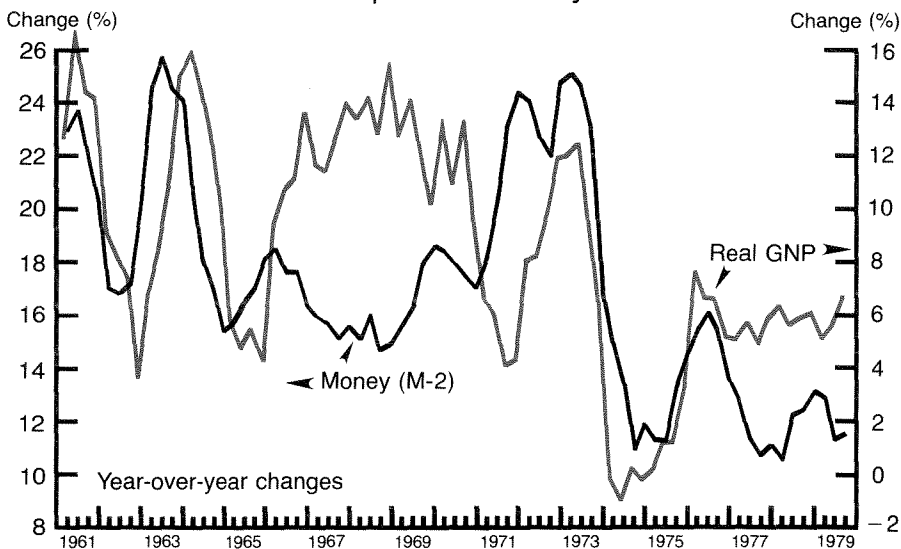
The unusually severe recession, combined with the increase in oil costs, depressed corporate profits to an unprecedented degree, discouraging investment expenditures that in any case were made less pressing by the extraordinarily high levels of excess capacity. Perhaps even more important were the uncertainties about the future engendered by the previous inflation and oil-price increases, events which seemed to many to mark a “watershed” in Japan’s economic “miracle.” The violent fluctuations of money growth and inflation in the 1971–75 period were a marked departure from the 1950’s and 1960’s, when variations in inflation were fairly modest and fluctuations in money growth were comparably predictable and understandable. Consequently, substantial uncertainty about future government policies and inflation probably could have been expected to prevail for some time.

The increase in the price of oil also tended

to discourage investment. First, because capital goods are generally complementary to energy inputs in the *short-run*, the return to investment in the near-term may have been reduced by the oil-price increase. Moreover, uncertainty about the future price of oil (and security of supply) created doubts about the payoff to investment in particular productive techniques, because of the possibility that they might later be rendered obsolete. In any case, signs of the discouraging investment climate were evident from a high rate of corporate bankruptcies and a high level of pessimism recorded in business surveys.<sup>21</sup> Indeed, the poor investment climate was substantially responsible for the view, then widely held in Japan, that real growth in the medium-term was likely to be well below the pre-1974 average, in fact probably no higher than six percent.<sup>22</sup>

These factors would suggest a longer-than-usual recovery in investment spending after 1974. But can such factors explain the continued sluggishness of private investment nearly *three years* after the recession trough? This raises the question whether Japan’s monetary policy substantially delayed the recovery.

Chart 2  
Growth Rates of Japanese Money and Real GNP



### Monetary Policy Influence

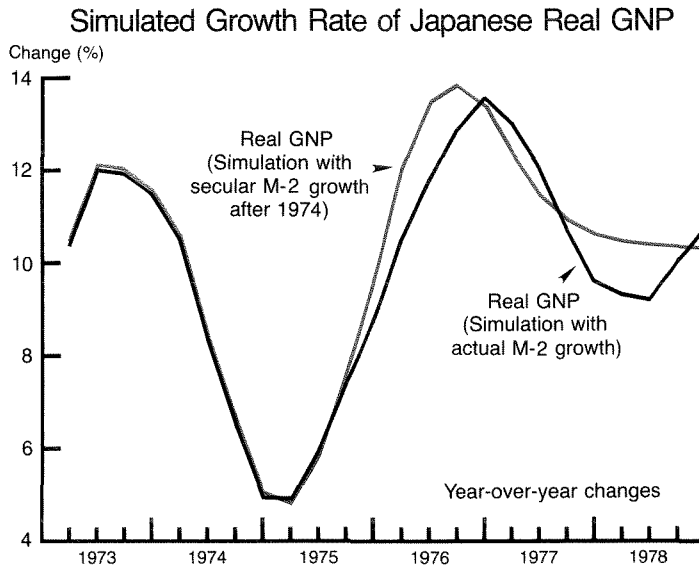
Most economists agree that reducing inflation entails significant costs in terms of lowered real growth, but they disagree about their magnitude and duration. Japan's pre-1973 experience certainly suggests that reduced money growth helped slow inflation, but was also responsible, at least in part, for reduced real growth thereafter. Prior to 1973, policy-induced fluctuations in Japan's money growth were followed fairly regularly by cyclical variations in real output growth; indeed, variations in money growth were probably the most important influence on income fluctuations during this period. Typically, balance-of-payments deficits developed during cyclical upturns leading the authorities to reduce money growth below the secular average. The resulting squeeze on corporate liquidity, manifested by a deceleration in real-money balances (Chart 4) and rising real interest rates, generally led within several quarters to a decline in real

growth. Then, once the balance of payments returned to equilibrium, the growth of the money stock (and of real balances) accelerated once again. Real output then recovered, growing for a time at *above* the long-run average, and this reduced the excess capacity developed during the previous slowdown.<sup>23</sup>

This pattern suggests a monetary interpretation of Japan's recession and recovery; specifically, it suggests that the 1973 reduction in money growth caused the recession, while the continuation of slow money growth prevented real GNP from recovering fully thereafter. But as indicated above, other important factors—including the oil embargo and OPEC price increases—also influenced output during this period. In assessing the cost of Japan's anti-inflation efforts, we should ask how much of the reduced real growth in the 1974–78 period was due to slower money growth, rather than to these other factors.

The 1973 slowing of money growth clearly

Chart 3



Notes: The plots are based upon the following regression:  $\Delta q(t) = a + \sum_{j=0}^7 b(j)\Delta m(t-j) + c_1\Delta q(t-1) + c_2\Delta q(t-2)$

where  $q(t)$  is the logarithm of real GNP and  $m(\ )$  is the log of M2. Data are quarterly and seasonally adjusted. In estimating the  $b(\ )$ , a third degree polynomial with 'far' constraint was used, with lags from 0-7 quarters.

a: .025 (1.33)     $\sum_{j=0}^7 b(j)$ : -.16 (-.44)    Adjusted R<sup>2</sup>: .16    Period: 1962.1-1972.4  
 c<sub>1</sub>: -.11 (-.64)    c<sub>2</sub>: .36 (2.31)    Observations: 44

Both simulations depicted are dynamic *after* 1972. The black line gives the predicted effect on real income growth of actual M2 growth over the period 1971–1978; the colored line simulates the impact of a return to the average rate of M2 growth prevailing before 1971, starting in 1975. For comparability with the previous charts, the quarterly growth rates predicted in the simulations were converted to year-over-year changes for the plots.

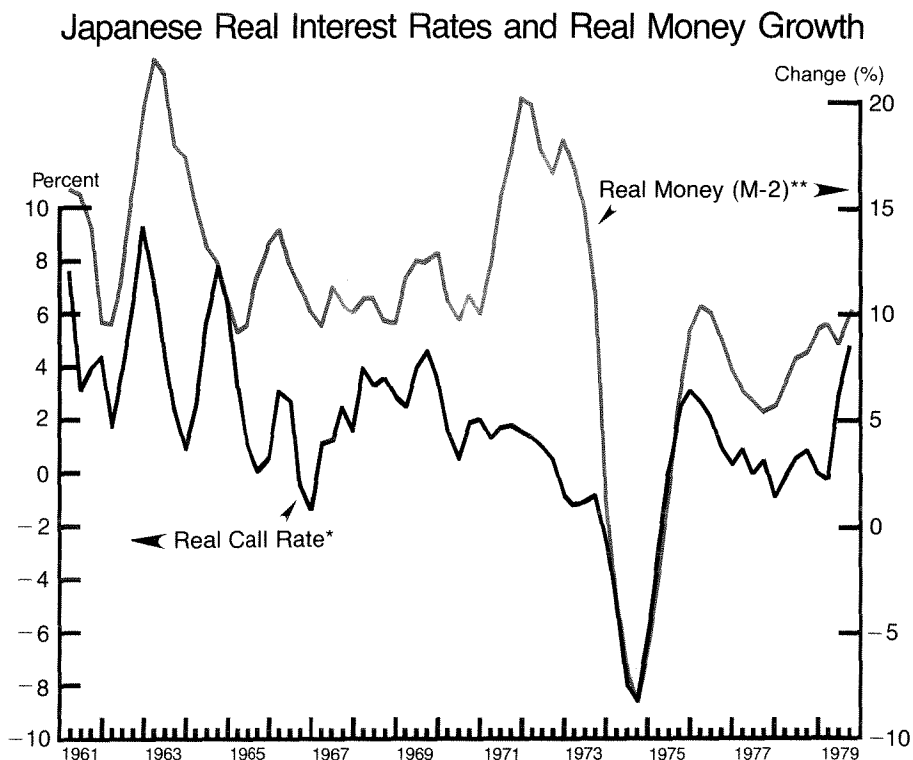
was at least partly responsible for the subsequent recession. Money growth began decelerating, both in real and nominal terms, early in 1973, while output growth slowed shortly afterward. By the third quarter of 1973—even before the oil embargo—a fairly typical Japanese “growth recession” was already evident. In its early stages, this recession resembled the 1965 recession, which was preceded by an almost comparable slowing of money growth. This similarity can be seen from the relation between money and real-output growth over the 1962–72 period, as summarized in the notes to Chart 3.<sup>24</sup> Dynamic simulation of this relation after 1972 (i.e., with simulated values substituted for the lagged values of real GNP growth) suggests that the reduction in money growth would itself have resulted in a deceleration of output growth quite comparable to the 1965 decline. The greater severity of the 1974 recession is an indication of the substantial effect of the oil shock in depressing real

output. In other words, both money growth and oil contributed to the unprecedented slowdown of 1974–75.

The primary controversy about Japan’s monetary policy during this period centers about its role during the recovery, instead of during the recession. This concerns the extent to which the traditional relation between money and real-output growth could have been “exploited” by the authorities after 1974. According to one “historical” view, the failure of money growth to return to its historical average after the recession trough restrained the recovery. In this view, had money growth been maintained at a higher rate, real growth would have been higher—although perhaps at some cost in additional inflation.<sup>25</sup>

But according to an alternative interpretation, the post-1974 recovery was not primarily a manifestation of the earlier relation between money and output, so that higher money growth primarily would have contributed to

Chart 4



\*Current quarter’s call rate deflated by GNP deflator (average of preceding three quarters).

\*\*Year-over-year growth in nominal M-2, deflated by GNP deflator.

inflation without substantially increasing real growth.<sup>26</sup> In this view, various factors discouraging investment led to an autonomous decline in the demand for investment goods corresponding to given levels of current and expected future output, interest rates, and other traditional investment determinants (i.e., the investment *schedule* shifted downward). Thus, investment during this period would have been relatively unresponsive to traditional measures of monetary ease. Because of the importance of investment in Japan's total output, then, a prolonged sluggish recovery was likely even if money growth had been substantially greater.

If this account is correct, then the authorities' 1975–78 reduction in money growth was an appropriate policy response, because of the likelihood that real output growth (and thus real money-demand growth) would remain substantially below the historical average for a considerable period of time. If they had followed the historical trend of money growth, they would simply have kept inflation high; because inflation-created uncertainties can discourage investment, such a policy could have been counterproductive.

This interpretation is not as inconsistent with Japan's past record as might at first appear. During previous cycles, investment and output growth generally recovered only after an adjustment period of several quarters following the easing of money growth; thus, in the case at hand, this period was greatly prolonged by the severity of the recession and by the uncertainties engendered by the previous inflation and oil-price increase. Still, this interpretation does *not* absolve pre-1974 monetary policy of some responsibility for the sluggish recovery; indeed, to the extent that the post-1974 investment weakness was the result of the severity of the downturn, prior monetary policy was partly responsible for that protracted recovery.

It is difficult to determine which of these explanations is most correct, considering that their differences center around the hypothetical consequences of different monetary-growth paths. Conceptually, the issue in dispute is one of cause and effect: the first view asserts that

slow money growth impeded the recovery, whereas the second implies that slow money growth was necessary to contain inflation because demand growth was *autonomously* depressed by other factors. Traditional measures of monetary ease or tightness, such as interest rates, provide ambiguous evidence, because they are influenced both by policy and by the actual level of aggregate demand. Nevertheless, the post-1974 recovery apparently differed in several important respects from the pattern observed during previous business cycles. In particular, the interactions between money and output growth implied by the pre-1973 historical record suggest that slow money growth should *not* have depressed real growth for as long as actually was the case. This evidence, at the least, raises doubts about the first interpretation.

The behavior of both interest rates and real balances tended to refute the argument that monetary policy restrained an otherwise robust recovery. At the least, their post-1975 behavior was not characteristic of previous periods of monetary restraint during cyclical upswings. In Japan, the (interbank) call-money rate has traditionally been free to vary with market forces, while the central-bank discount rate and the private-bank loan rate (which is partially tied to the discount rate) have usually been set below market-clearing levels. Typically, as money growth slowed during cyclical upswings, all interest rates increased, although the call-money rate rose relative to the loan rate—and in addition, the growth of real money balances decelerated sharply. Moreover, these trends normally tended to precede the slowing of real growth, especially prior to the 1965 and 1973 slowdowns. In addition, the call-money rate has often risen in real terms, that is relative to the recent inflation trend, during periods of monetary restraint—with the exception of the sharp inflation-related decline of 1973.

The 1974 recession and early recovery also conformed, roughly, to the historical pattern, although the same cannot be said of subsequent developments. The call-money rate, both relative to the loan rate as well as in real

terms, fell sharply during the downturn and then recovered substantially for several quarters following the early-1975 recession trough; this pattern was fairly typical of previous cycles, although more pronounced. But during most of the 1976–78 period, both indicators remained relatively low by historical standards; in fact, their levels were more characteristic of previous downturns than of recoveries. Indeed, Japan's real interest rate was actually lower during most of this period than during 1971–72, when monetary policy was “easy” by any normal standard.

Moreover, real-balance growth recovered sharply from the 1975 recession trough—although never again reaching the level attained in previous recoveries—and then fell back in 1976. However, the 1976 decline *coincided* with a fall-off in real GNP growth; indeed, a sustained decline in nominal M-2 growth was not really evident until the end of 1976. This timing suggests that the decline in the growth of real balances was the *result* of the deceleration in growth of real money demand induced by the fall in output growth. Such a pattern is more consistent with the second interpretation than the first. These patterns together tend to refute the idea that strong investment demand was “choked-off” by credit rationing in response to a stringent monetary policy. However the evidence may also be consistent with the first explanation, because the *prospect* of lower money growth quite possibly discouraged investment demand during this period.

More persuasive, perhaps, is the implication of the pre-1973 historical record, which suggests that slow money growth should *not* have depressed real growth after 1974 for nearly as long as it actually did. The apparent reason is the lack of a *permanent* “trade-off” between money and real output growth—in Japan as well as elsewhere. That is, despite the influence of money-growth fluctuations on cyclical variations in real output, permanent increases or decreases in money growth tend to affect only inflation, and not real growth, in the *long run*. This conclusion is supported by the

regression summarized in Chart 3 as well as other statistical evidence reported elsewhere.<sup>27</sup> Consequently, even permanent changes in money growth cannot cause output growth to deviate from the secular average indefinitely. The question then is, how much and for how long did the post-1973 reduction in money growth depress Japan's real growth?

The evidence (Chart 3) suggests that reduced money growth had a substantial but relatively short-lived impact on real output growth. As the solid line indicates, even with relatively slow money growth, real-output growth should have returned to the secular rate by mid-1976 if the historical relation had continued to prevail. With this simulation also, the fall-off in money growth beginning in late 1976 would have led to a sharp but fairly short decline in output growth—but output growth would have remained above the level actually recorded over these years. Finally, raising money growth beginning in 1975 back to its historical rate would have speeded the recovery somewhat, but not by a great deal (compare the dotted and broken lines of the chart).<sup>28</sup>

The evidence, although far from conclusive, on the whole raises considerable doubts about contentions that Japan's sluggish recovery was due mainly to slow money growth. We should not rule out the possibility that a sufficient expansion in money growth would have raised growth if the authorities had been prepared to accept a renewal of double-digit inflation. But the behavior of real balances and interest rates during the recovery suggests that monetary policy was not at all “tight” by historical standards. And the historical relation between output and money growth suggests that the recovery should have been substantially more robust than it was—and that the effects of reduced money growth should not have been nearly as long-lasting as the first explanation suggests they were. At the least, the evidence marks the post-1974 recovery as peculiar in several respects, and suggests a basis for the fear that a significant increase in money growth would mainly have raised the inflation rate.<sup>29</sup>

### III. Summary and Conclusions

Over the last ten years, inflation and recession have been the dominant economic problems of the major industrial economies. Their policy responses to these difficulties have often been quite similar, yet also different in important respects. But the uniqueness of each country's experience makes it difficult for policy makers to draw clear lessons from their own nation's record alone—always there is the question of "what if." Yet in principle, the paths taken by other industrial countries can provide a clue to "what might have been."

The present article has surveyed Japan's experience with inflation and recession over the 1973–78 period. We have attempted to determine the main causes of the rise and fall of Japanese inflation and to gauge, in a rough fashion, the costs it incurred in its successful effort to reduce inflation. This effort has yielded some tentative conclusions, and it has also raised some interesting questions.

Japan's experience confirms that the key to containing inflation is controlling money growth. Without the 1971–72 acceleration in money growth, Japan's inflation in 1973 and 1974 would have been much lower than it actually was. The relatively low inflation of the late 1970's was not the result of a fortuitous exchange-rate appreciation or government fiscal "discipline," but rather of a consistent policy of containing money growth. At the same time, Japan's record shows that substantial increases in the domestic price level sometimes reflect more than domestic money growth. Japan probably imported a significant amount of inflation in 1973 and 1974. In addition, Japan's monetary authorities have demonstrated graphically that high budget deficits and foreign-exchange market interventions need not inevitably destroy monetary control.

Japan's experience also confirms that inflation reduction can be both protracted and painful. Inflation fell back to the historical average only after two years in which money growth fell considerably below the pre-1973 rate. The reduction in inflation was associated with very heavy costs in terms of lowered real growth, excess capacity, and unemployment. A very substantial portion of these costs can almost certainly be attributed to anti-inflation measures. Also, monetary policy was probably primarily responsible for the fact that the downturn was more severe in Japan than in other major industrial countries. And the 1973–74 monetary restraint probably helped retard the recovery by aggravating the recession. It is much less clear, however, that monetary policy thereafter could have raised output growth substantially above that which actually occurred. At the least, such a policy entailed substantial risks of rekindling inflation.

Finally, there remain intriguing unanswered questions about Japan's experience. Why, for example, were Japanese authorities able to restrain money growth over the 1976–78 period? Were they simply willing to bear the political and social costs which frequently force monetary accommodation in the face of large deficits, or were these costs simply not important to Japan? And while it can be argued that the post-1974 reduction in money growth was not primarily responsible for the sluggish recovery, the question remains as to what factors precisely were responsible. As further research sheds light on these questions, policy makers in other industrial nations are likely to draw additional lessons from Japan's experience.



1. Italy's average CPI inflation over 1973–1974 was nearly the same as Japan's; in other major industrial countries, average inflation during this period was between one-half and two-thirds of the Japanese rate. In all major industrial countries except Germany and Japan, inflation rates have remained well above the 1960's average since 1976. Germany's performance is somewhat unusual, however, because average money growth since 1976 has actually been above the average of 1964–72. One reason may be an increase in international demand for the DM resulting (say) from decreased demand for the dollar. If so, Germany is perhaps the only major industrial nation to have benefited from a true "virtuous circle" induced by currency appreciation.
2. The growth of Japanese government nominal expenditure averaged about 12 percent during the 1960's, compared to 15 percent over 1971–72 and 14 percent over 1971–74 (figures are taken from **International Financial Statistics**). If the effects of government spending upon the domestic price level for Japan are at all comparable to those of other countries, these increases should have had a negligible impact on Japanese inflation. For example, William Dewald and Maurice Marchon (1979) found (long-run) elasticities of total nominal GNP with respect to government expenditures ranging from .05 for Germany and .28 for France (see Table 3). These suggest that only extraordinary accelerations in government spending have a substantial impact upon domestic inflation; in contrast, the elasticities of nominal income with respect to money are generally much higher than those for government spending.
3. Cagan (1980, p. 4) briefly reviews other results for the U.S. He notes that regression studies generally suggest a larger impact of import prices on domestic inflation than do direct computations of the effect upon domestic costs of external price hikes; as argued below, this is not surprising since regression results tend to reflect the monetary policy pursued in response. Cagan's own estimates suggest that about 40 percent of the increase in the prices of U.S. manufactures during this period (or about 16 percentage points) can be attributed to external price increases. His estimate is somewhat higher than would be suggested by Berner et al (1975), who calculated that about 25 percent of the increase in the personal-consumption deflator between mid-1973 and mid-1974 was due to external price hikes. The difference can be traced to the fact that Cagan also allowed for the impact of increases in export prices, whereas Berner et al did not—and to the fact that the latter estimates refer to consumer prices, which are less heavily weighted with traded goods than are wholesale prices of manufactures (see Cagan, p. 8).
4. Richard Cooper and Robert Lawrence (1975) discuss various factors in the 1973–75 commodity price fluctuations; see also "Aspects of World Inflation," OECD **Economic Outlook**, July 1974, pp. 25–37. Supply factors, as well as a surge in aggregate demand, seem to have influenced the surge in basic commodity prices. Michael Keran and Michael Riordan, "Stabilization Policy in a World Context," Fall 1976 issue of this **Review**, attributed these increases largely to a synchronized expansion of money supplies in major industrial countries. This view is not necessarily inconsistent with the fact that relative prices changed greatly in 1973–74, because certain basic commodity prices are often considerably more sensitive to variations in world aggregate demand than are traded goods in general. However, the OECD study also shows that the actual increase in metals and food relative prices, relative to the increased world (real) demand, was still much sharper than during previous cycles (see p. 28).
5. Precisely why the money supply was allowed to expand so sharply in 1971–72 is not entirely clear. It has been suggested that the authorities were worried about the allegedly deflationary effects of the yen's revaluation. Moreover, growth had already slowed in 1971, and traditionally money growth had been allowed to accelerate during recoveries. But the magnitude and duration of the money-growth expansion of 1971–72 were substantially greater than the norms characteristic of the 1950's and 1960's.
6. The only comparable prior surge was that of 1962–63, when M-2 increased at an annual rate of 22 percent, compared to 25 percent in 1971–72. I have argued (see Charles Pigott, "Expectations, Money, and the Forecasting of Inflation" in the Spring 1980 issue of this **Review**) that pricing decisions are likely to be based upon individuals' **forecasts** of money, and that prices will tend to respond more to money changes that are perceived as persistent than to those viewed as transient. Prior to 1971, decelerations of Japan's money growth normally followed accelerations in a fairly regular and comprehensible pattern. Hence the 1971–72 money changes may at first have been regarded as largely transient, delaying the price response.
7. Bijan Aghevli and Carlos Rodriguez (1979) find that about 18 percent of an increase in (commodity) import prices is reflected in the GNP deflator. Since the unit value of imports rose by nearly 100 percent over 1973–74, this suggests a total increase in the deflator of 18 percentage points as a result; this again is about two-thirds the actual rise above historical rates in this index. However, as is argued in Pigott, Rutledge, and Willett (1980), such regression estimates tend to reflect the extent to which external price increases are accommodated by money expansion. This contention is supported by the results of Dewald and Marchon (1979), whose findings suggest that the impact of import prices on the domestic price level is substantially lower for Canada than for Germany and the U.K.—despite the similarity of all three countries' ratios of imports to GNP. Indeed, most regression studies find that domestic prices rise **more** in the long-run than in the short-run in response to a rise in import prices. Because increases in import prices tend, with a given money stock, to lower real balances, the opposite pattern is more likely in the absence of monetary accommodation.
8. This calculation—which is intended to provide an **upper bound** on the ultimate effect—is based upon a procedure very similar to that used by the World Bank in computing "income attributable to changes in terms-of-trade," and which is included in the Bank's definition of "gross domestic income"; see, for example, their **World Tables 1976**, p.7. This income element has been used to explain fluctuations in consumption for LDC's, as well as

for other purposes. Its theoretical basis lies in the Slutsky-Hicks notion of compensated demand. In particular, in a two-good economy in which tastes are identical and homothetic, this calculation approximates the amount of income required to keep an individual's welfare (i.e. the level of his indifference curve) constant when the price of the good he sells (net) falls relative to that which he "imports."

Almost surely, however, the estimate in the text is somewhat larger than the true final effect. Implicit in the calculation is the assumption that the demand for money depends upon permanent real wealth or real income, which declines as the terms-of-trade fall. However, money is to a large extent desired for transactions purposes, and it is much less clear that a change in the terms-of-trade will lower transactions demand, or indeed even change it at all. In fact, Pierce and Enzler (1974), in assessing the effects of the oil price shock on the U.S. economy, relate money demand to a transactions index equal to GNP **plus** imports; the increase in the price of imported oil actually **raises** the transactions demand for money under this formulation, and hence ultimately leads to a **fall** in the domestic price level.

9. It should be emphasized that this calculation assumes that money, nominal income, and the price level vary roughly proportionately in the long-run. Although money and nominal income grew at virtually the same rate over 1962–70, a mild fall in velocity at a roughly 1-percent annual rate was observed for the 1960's as a whole. Allowing for such a trend would not substantially affect the estimate of the inflation due to the 1973–74 external price increase, provided the trend were the same under either money path.

In regression relations between Japanese inflation and money growth for the pre-1971 period, the adjusted R-square is generally found to be quite low, and the long-run impact of money on the price level is well below unity. I have argued—see Pigott (1980)—that this may reflect the tendency of money-growth accelerations to be offset by subsequent decelerations, so that money changes above or below the secular average may have been viewed as transient. It might then be expected that prices would not respond fully to actual money changes. This may also explain why the sharp acceleration in money growth over 1962–63 did **not** lead to nearly as sharp an increase in inflation. Indeed, average M-2 growth over these years was 22 percent, compared to 25 percent in 1971–72. However, inflation did not substantially change over 1964–65, in sharp contrast to the surge in the second episode. Keran (1970) points out that during the earlier period, the government had a well-established policy of tightening monetary policy soon after balance-of-payments deficits developed. It is quite possible, then, that even the money expansion of 1962–63 was expected to be reversed later, so that prices did not respond. By 1973, however, this pattern had disappeared, because Japanese international reserves had been substantially augmented, while the fixed exchange-rate system had broken down. Individuals may then have come to believe that the 1971–72 money expansion would **not** be subsequently offset, or at least not as much as in the past; hence prices may have responded more than in the previous period.

10. This indeed is why the increases were greater for the CPI and WPI than for the deflator. In addition, the WPI,

because it includes goods at different stages of processing, tends to "double-count" price increases of raw materials. The distortion in the WPI arising from this can be quite substantial, as William Nordhaus and John Shoven have shown ("Inflation 1973: The Year of Infamy," **Challenge**, May/June 1974, pp. 14–22).

11. Consider another "back-of-the-envelope" calculation. Suppose that half of **total** U.S. inflation recorded over 1973–74 was attributable to external price increases; this is at the upper bound of estimates in the literature, and implies that substantially more than half the additional increase in the U.S. CPI was due to commodity-price hikes. In any case, this implies that the U.S. CPI was raised by 9.5 percentage points as a result. Since the ratio of imports (and exports) to GNP is about 40 percent higher for Japan than for the U.S., it is reasonable to suppose that Japan imported somewhat more inflation. Suppose that commodity price hikes increased the Japanese CPI by 15 percentage points (nearly 60 percent more than for the U.S.). Since the actual increase in Japan's CPI—45 percent—was more than 30 percentage points greater than during a "typical" two-year interval during the 1960's, this suggests that at most half of Japan's CPI acceleration could have been due to external price increases. The fraction for the deflator, which is less heavily weighted with imported goods, was almost surely smaller; indeed, the deflator rose by nearly 8 percentage points less than the CPI during this period.

12. German CPI inflation averaged only 6.75 percent over 1973–74, despite money growth somewhat above the historical average in 1971–72. In fact, in all other major industrial countries except Italy, average annual CPI inflation in 1973–74 was below 12 percent (usually below 10 percent)—less than two-thirds the rate suffered by Japan. Several of these countries are substantially more dependent on trade than Japan is.

13. One possible reason why the CPI rate remained above the historical average was a delay in price increases in government-regulated sectors. The WPI movements were also probably somewhat distorted by the sharp fall in basic commodity prices during late 1974 and 1975. However, neither factor can account satisfactorily for the substantially higher rate of increase of the CPI compared to the GNP deflator during this period.

14. The yen's appreciation in real terms, in fact, exceeded the fall in the real value of the U.S. dollar after the December 1970 devaluation. Between 1970 and 1972, in fact, the dollar value of U.S. wholesale prices fell relative to those of her trading partners by about 12 percent; as noted in the text, the dollar value of Japan's wholesale prices rose relative to abroad by substantially more than 12 percent. However in 1970, the U.S. was clearly in a **chronically** imbalanced position in its current account; moreover, by 1973, the volume of both our exports and imports had responded quite sharply to the previous devaluation. In addition, most estimates of the price elasticities of demand for traded goods suggest that even a secular surplus of the size of Japan's would have required a far smaller change in relative prices than actually occurred over 1977–78. See Keran (1979) for further arguments that the Japanese surplus was largely a business-cycle imbalance. He also shows that the expansion of the surplus in 1978 was due entirely to price changes.

15. See Keran (1979), pp. 228–238 and especially Figure 2.

16. This performance is more impressive than might at first appear. Both Germany and Switzerland substantially overshot money-growth targets in 1978, in large part because of heavy dollar purchases.

17. The most pessimistic views are based upon a fixed relation between excess capacity and changes in inflation. These imply that reducing inflation requires maintaining unemployment well above its natural rate for many years. See, for example, Nigel Duck, Michael Parkin, David Rose, and George Zis, "The Determination of the Rate of Change of Wages and Prices in The Fixed Exchange Rate World Economy, 1956–1971," in Michael Parkin and George Zis (eds.), *Inflation in The World Economy*, 1977, especially pp. 134–136.

18. This conclusion is supported by the study by James Pierce and Jared Enzler (1974) of the effects of the oil-price increase on the U.S. economy. They found that real output was substantially depressed and unemployment raised as a result (see pp. 36–41). The effect on Japan was almost certainly larger, because of its much greater dependence on oil imports.

19. According to the potential-output series computed by Artus (1978), Japan's actual output was below potential by nearly 25 percent at the recession trough in 1975. The output gap for other major industrial countries was only about half as large. His figures also suggest that the gap remained very wide in all major industrial countries except the U.S. through 1978. In Japan, for example, the gap was almost certainly above 15 percent by the end of 1978. These statements are based upon extensions of his series using industrial-production data from *International Financial Statistics* (although the series are not strictly comparable). Artus' figures also show a slowing of potential-output growth to about 5 percent over 1976–78, compared to nearly 12 percent prior to 1973.

20. This statement is based, in part, on the extraordinary fall-off in private investment expenditures over 1974–77. Real private non-residential investment grew nearly 50 percent faster than real output over 1965–73, while it grew more slowly than output during 1974–77. Because this sector accounts for nearly one-fifth of total GNP, its slowing was bound to substantially retard the recovery. The depressed state of investment and reasons for it are extensively discussed in the *Economic Survey of Japan* for fiscal 1975/76 and 1976/77. See especially pages 37–46 of the 1975/76 issue and pp. 84–98 of 1976/77. These present an interesting contrast indicative of the uncertainties about the course of the economy: the earlier issue reflects the beginnings of an investment recovery in 1976; the subsequent issue focuses on why investment remains sluggish, reflecting the stalling of the recovery. These issues also indicate considerable divergence in conditions in various industries and among various-sized firms—a divergence that may have led to additional uncertainty about **relative** prices and demands. Other sectors also influenced the recovery as well, of course. Until 1978, real export growth exceeded that of imports, so the external sector contributed to Japan's growth. In 1978 this pattern was reversed, and indeed real GNP growth that year would have been well above 6 percent had real export and import growth been equal. Inventory investment fell

sharply in 1975, after remaining high in 1974—a pattern fairly typical of an unexpectedly severe downturn. Finally, while real private consumption certainly slowed compared to the 1960's, its behavior suggests a fairly passive adjustment to the slower growth of total output. Private and total savings rates actually fell after 1974, although this again is not surprising in view of the sharp downturn.

21. See *Economic Survey of Japan*, fiscal 1976/77, pp. 80–98.

22. There has, in fact, been considerable controversy about the future level of Japan's long-run secular growth rate. Projections of a 6-percent growth rate are to a large extent based upon the relatively sluggish investment of 1976–1978; in view of the continued very high savings rate, this seems unduly pessimistic. There is a consensus that Japan's future growth will be slower than in the pre-1973 period, because of a slowing of productivity increases. How much lower depends crucially upon the contribution to growth of capital and labor vis-a-vis that of technical progress. See M. Nishimizu and Charles Hulten, "The Sources of Japanese Economic Growth; 1955–1971," Research Memo #200 (June 1976) of the Econometric Research Program of Princeton University. On balance, it seems likely that Japan's secular growth rate is above 6 percent. Thus growth during 1975–78 has probably been below the secular average—and certainly has not been substantially above it as occurred during previous recoveries.

23. See Keran (1970) and Pigott (1978) for further discussion of this policy and its effects.

24. The procedure used here departs from my previous analysis of the relation between Japanese money and output—see Pigott (1978)—in that money growth is not decomposed into anticipated and unanticipated components in the regression. In the previous study, I considered mainly the effect of money growth on Japan's industrial production. The findings, in the sense that the long-run impact of an increase in money on Japan's industrial production was virtually zero, are consistent with those reported here. The relation summarized in Chart 3 is in fact, more "traditional." It can be viewed as a reduced form of a system in which money influences nominal income and prices, as well as real income. Although the relation used here allows only current and past money (up to seven quarters) to affect output growth **directly**, the effective lag from money growth to output is potentially much longer because of the inclusion of lagged output growth as regressors. These latter terms can, if large, allow a change in money growth to affect output for a considerably longer time than the lag on money alone would suggest. In fact, however, the coefficients of the lagged dependent variables were relatively small, and this largely accounts for the fact that output growth seems to "rebound" quickly even when money growth is substantially permanently reduced. This finding is also fairly similar to that reported in the earlier study. I experimented with alternative lag lengths for money, but found that allowing for a twelve-quarter lag length (compared to the eight for the regression reported) substantially reduced the adjusted R-square.

25. The U.S. experience appears to confirm this: U.S. inflation accelerated along with money growth after 1976, while U.S. output growth returned to the secular rate.

However, as is discussed later, this pattern is not nearly as clear when the industrial countries as a whole are examined.

26. This view is certainly consistent with the actions of the Japanese authorities, and it seems to have been held by some. As will become clearer below, it was obvious by 1976 that the recovery was already rather different from previous episodes. The **Economic Survey of Japan** issues at the time placed considerable emphasis on **structural** shifts needed in response to higher oil prices and other factors—which further suggests that this was not an ordinary recovery, and hence may not have been as malleable (via monetary expansion) as those in the past.

27. See Pigott (1978). The results there also imply that there is no permanent effect of money growth on real-output growth.

28. A static regression, using the actual values of real GNP growth during 1973–74 (at least) might have been

more appropriate here, although space prevents its presentation. However, the pattern is essentially the same, except that income growth falls lower during 1974 than under the dynamic simulation. The difference between the simulations with actual money growth versus the average rate of the 1960's is virtually the same in either case.

29. Again, the record of other industrial countries is suggestive, although far from conclusive. Output gaps in all major European countries apparently remained substantial through 1978 (based upon my extension of Artus' actual output figures and his estimates of potential output). None of these countries, however, succeeded in reducing money growth (or, except in the case of Germany, inflation) back to the pre-1973 average. In France, for example, inflation remained nearly twice as high in 1975–78 as in 1964–72, while her output gap averaged over 10 percent. This evidence may be suspect, however, because real wages apparently rose in excess of productivity after 1973 in many European countries, which may have helped to retard the recovery and keep unemployment high.

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