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July 3, 1991

To: Members of the Executive Board  
From: The Secretary  
Subject: Japan - The Recent Past and Longer Term Prospects

This paper provides background information to the staff report on the 1991 Article IV consultation discussions with Japan, which was circulated as SM/91/126 on June 19, 1991.

Mr. Dicks-Mireaux (ext. 7308) is available to answer technical or factual questions relating to this paper prior to the Board discussion.

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JAPAN

The Recent Past and Longer Term Prospects

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Approved by the Asian Department

July 1, 1991

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1/ The authors would like to thank Ms. Heller for her invaluable editorial assistance.

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Japan--Basic Data

Area	145,800 square miles
Total population (mid-1989)	123.3 million
Natural rate of increase (1990)	0.4 percent
Life expectancy at birth (1989)	
Male	75.9 years
Female	81.8 years
Physicians per 1,000 inhabitants (1988)	1.6
GNP per capita (1989)	US\$ 24,000

	<u>1987</u>	<u>1987</u>	<u>1989</u>	<u>1990</u> <u>1/</u>
	<u>(Percentage change)</u>			
GDP at constant 1985 market prices	4.1	6.2	4.6	...
Of which:				
Agriculture, forestry, and fishing	3.2	-3.2	4.4	...
Mining and manufacturing	7.2	9.2	6.3	...
Construction	10.8	10.1	3.8	...
GNP				
At constant 1985 prices	344.3	365.8	383.1	404.7
At current prices	350.5	373.7	398.7	429.2
Real GNP	4.3	6.2	4.7	5.6
Domestic demand	5.1	7.6	5.7	5.8
Personal consumption	4.2	5.2	4.4	4.0
Residential investment	22.6	11.9	0.1	8.9
Plant and equipment investment	6.7	14.8	15.6	13.9
Government consumption	0.4	2.2	2.1	1.4
Government investment	7.3	5.2	-1.2	3.5
Stockbuilding <u>2/</u>	-0.3	0.6	0.2	-0.1
Foreign balance <u>2/</u>	-0.6	-1.1	-0.9	-0.2
Nominal GNP	4.4	6.6	6.7	7.6

(Percentage change except where indicated)

Prices, incomes, and employment				
Wholesale prices	-3.7	-1.0	2.5	2.0
Consumer prices	0.1	0.7	2.3	2.8
GNP deflator	--	0.4	1.9	1.9
Hourly compensation <u>3/</u>	2.6	3.8	6.4	6.6
Real hourly compensation <u>4/</u>	2.5	3.1	4.0	3.7
Real disposable income <u>4/</u> , <u>5/</u>	2.7	3.9	3.8	4.2
Savings rate (in percent)	14.7	14.3	14.2	14.6
Unemployment (in percent, period average)	2.8	2.5	2.3	2.1
Manufacturing				
Employment of regular workers	-1.5	0.6	1.8	1.9
Output	3.4	9.6	6.2	3.5
Productivity	4.4	7.6	5.4	3.5
Unit labor cost	-2.6	-3.0	0.4	-8.9
Inventory ratio to shipments	-6.4	-4.3	1.7	0.7

Basic Data (concluded)

	<u>1987</u>	<u>1987</u>	<u>1989</u>	<u>1990</u> <sup>1/</sup>
Financial aggregates (end of period)				
M2 plus CDs <sup>6/</sup>	11.5	10.4	10.6	8.5
Domestic credit	9.5	10.6	11.4	9.2
Public sector	0.2	8.2	10.2	9.2
Private sector	11.2	10.9	11.6	9.2
Fiscal aggregates				
	( <u>In trillions of yen</u> )			
Central government				
Revenue	49.0	53.9	58.9	...
Expenditure	56.7	58.7	63.4	...
Deficit (-)	-7.7	-4.8	-4.5	...
Deficit/GNP (-, in percent)	-2.2	-1.3	-1.1	...
General government				
Deficit/GNP (-, in percent)	0.5	1.5	2.4	...
( <u>In billions of U.S. dollars</u> )				
Balance of payments				
Exports	224.6	259.8	269.6	280.4
Imports	-128.2	-164.8	-192.7	-216.8
Trade balance	96.4	95.0	76.9	63.5
Services and transfers	-9.4	-15.4	-19.8	-27.8
Current balance	87.0	79.6	57.2	35.8
Net long-term capital	-136.5	-130.9	-89.2	-43.6
Basic balance	-49.5	-51.3	-32.1	-7.8
Net short-term capital <sup>7/</sup>	95.7	64.0	29.4	7.8
Errors and omissions	-3.9	2.8	-22.0	-20.9
Overall balance	-21.0	15.5	-24.7	-20.9
Export volume (percentage change)	0.3	5.1	3.8	5.5
Import volume (percentage change)	9.3	16.7	7.8	5.8
Gross official reserves, minus gold				
End of period, in billions of U.S. dollars	81.0	96.7	84.0	78.5
Exchange rates (period average)				
Yen per U.S. dollar	144.6	128.2	138.0	144.8
Nominal effective exchange rate (MERM; 1985 = 100)	136.9	151.8	145.2	130.1
Real effective exchange rate (relative normalized unit labor costs; 1985 = 100)	128.4	137.8	131.2	115.7

<sup>1/</sup> Staff estimates, or actual data if available.

<sup>2/</sup> Contribution to GNP growth.

<sup>3/</sup> Based on total employee compensation (N.I.A.), total employment (N.I.A.), and monthly hours index (Labor Force Survey).

<sup>4/</sup> Deflated by the consumer price index.

<sup>5/</sup> Disposable income deflated by the consumer price index.

<sup>6/</sup> On the basis of December averages.

<sup>7/</sup> Includes bank and nonbank flows.



## I. Introduction and Overview 1/

The sizable appreciation of the yen that began in 1985, and the associated movements in relative prices, set in motion forces that produced an abrupt shift in the pattern of aggregate demand and economic growth in Japan. At first, the economy experienced a severe slowdown during late 1985 and 1986 owing to the effects of the sharp decline in external competitiveness. Subsequently, however, the economy benefited from a number of favorable secondary effects of the yen's appreciation: in conjunction with weak international commodity prices substantial terms of trade gains were realized and domestic prices were stable or actually fell. These effects, in combination with supporting financial policies, proved to be the springboard for a strong upswing in economic growth, unsurpassed in the other major industrial countries, during 1986-90. The momentum of growth was driven by a vigorous expansion of domestic demand, while the external surplus declined sharply.

Over the course of the current upswing, the level of resource use rose considerably and domestic supply constraints became progressively more binding, particularly in the labor market. As a result, wage settlements accelerated steadily and, with productivity growth weakening, unit labor costs began to rise in late 1988. In turn, price inflation picked up in 1989. As these cost and price pressures became evident, financial policies focused increasingly on the containment of inflation.

During the past five years, structural issues have assumed a prominent role in policymaking, as exemplified by their central position in the Report of the Mayekawa Commission in 1986 and the Five-Year Economic Management Plan 2/ approved in 1988. Specifically, this plan highlighted the need to eliminate distortions in land management and housing, the tax system, the financial sector, the agricultural sector, and the trade and distribution systems.

This paper reviews some key policy issues that have arisen during the recent expansion, while also examining a number of questions of importance to the present policymaking environment as well as for longer term prospects in Japan. The notes in this paper build upon earlier work carried out by the staff that dealt with issues central to the dynamics of growth and external adjustment in Japan over the past five years, including important areas of structural reform (see Table 1). In Section II of this paper, a question that has attracted much attention, and has been the subject of a

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1/ It should be noted that the term "country" used in this paper does not in all cases refer to a territorial entity that is a state as understood by international law and practice. The term also covers some territorial entities that are not states but for which statistical data are maintained and provided internationally on a separate and independent basis.

2/ Covering the period FY 1988-FY 1992; the fiscal year begins on April 1.

Table 1. Japan: Staff Studies on Recent Economic  
Issues and Policies

- 
1. Recent Economic Developments (SM/90/121, Supplement 1)
    - a. Recent Trends in Business Fixed Investment
    - b. J-Curves and Japan's Declining Trade Surplus in 1989
    - c. The Changing Structure of Japanese Trade Flows
    - d. Recent Exchange Developments: An Empirical Analysis
  
  2. Recent Economic Developments (SM/89/84, Supplement 1)
    - a. Structural Policies
    - b. Financial Liberalization
    - c. Tax Reform, 1987-88
    - d. Recent Developments in the Trade System
    - e. Agricultural Policies and Their Economic Consequence
    - f. The Behavior of the Household Saving Rate
    - g. The Demand for Money
    - h. A Summary of the Current Account Model
    - i. Official Development Assistance
-

number of staff studies in the last few years, is revisited. The question at issue is to what extent historical trade relationships, as opposed to structural changes, can explain the reduction in Japan's external surplus during 1985-90. Examining that period as a whole, the narrowing of the current account surplus is found to be consistent with past relationships and movements in relative prices and economic activity, and it does not seem necessary to call upon explanations based on structural shifts. While the pace of adjustment was initially slow, this can be explained in terms of long lags in the response of import volumes to large relative price movements. Equally, the more recent surge in import growth can be viewed as a catch-up from the earlier delayed adjustment.

Since 1989, the containment of inflation has emerged as a key policy target. Judgements in this area of policy depend on a number of factors, some of which are the subject of Sections III and IV. Section III examines the influence of monetary conditions on aggregate economic activity in an effort to shed light on the current degree of tightness of monetary conditions in Japan. The behavior of broad money is found not to be a useful predictor of GNP growth or reliable indicator of the tightness of monetary conditions, possibly because of shifts in the demand for money induced by financial innovations. In light of this, we have constructed an alternative structural indicator of monetary conditions, based on the relationship between aggregate demand and economy-wide relative prices, namely, the real interest rate and the real exchange rate. This indicator suggests that, at present, monetary conditions in Japan will have a broadly neutral impact on GNP growth in the period ahead. Section IV provides evidence of the role of resource constraints on cost and price pressures. Measures of potential output and the natural rate of unemployment in Japan are estimated, and these indicate that the economy has been operating at a level of resource use above its supply potential during 1989-90.

Section IV also looks at medium-term prospects in Japan. The rate of potential output growth in the period 1991-96 is envisaged to remain broadly unchanged, on average, from its estimated rate of 4 percent during 1974-90. This projection also indicates the increasing importance that demographic change and its effect on labor supply will likely have on economic prospects. Over the course of the next five years, the aging of the population structure will contribute to a slowdown in the growth of labor supply that is expected to have a negative effect, albeit small, on potential output growth. Looking further ahead, the prospective rapid aging of the population structure in Japan over the next thirty years will imply somewhat larger adjustments in many areas of the economy.

The implications of this process of population aging for Japan's social security system and a number of related fiscal policy issues is examined in Sections V and VI. Section V describes the present social security pension and health system as well as the major cost-cutting reform efforts undertaken in the 1980s. Section VI focuses on the magnitude and nature of the substantial ongoing and prospective pressures on social security expenditures generated by the aging of the population structure, and considers some

policy measures to contain these pressures. Indeed, the prospective rise in outlays will be considerable--on the order of 10 percentage points of GNP over the next 20 years--and will claim an increasing share of national resources at a time when the aging of the population may weaken the economy's ability to generate these resources.

In 1990, international events threw energy once more into the center of the policy arena. Section VII sets out developments in energy policy in Japan since 1972 with particular attention to the policy actions during the past year. It also describes the various policy measures that contributed to the substantial reduction in the Japanese economy's dependence on oil since the first oil shock. Finally, in Section VIII an update on structural policies is given. A major reform initiative, which is described in detail, was the passage of a comprehensive land tax reform in early 1991. Reflecting concerns about the economic and social repercussions of the rapid growth in real estate prices, this reform, in conjunction with revisions in zoning and building regulations, is aimed at encouraging the supply of residential housing and putting downward pressure on land prices. Further progress was also made in a number of other areas. Of particular note in the financial sector was the considerable progress in preparatory work aimed at eliminating the institutional segmentation of financial activities. Also, as regards the distribution system, the relaxation of regulations on the market entry of large retail stores taken in the last two years has resulted in a sharp increase in both applications and openings.

## II. Revisiting Japan's External Adjustment, 1985-90

### 1. Introduction

The latter half of the 1980s witnessed a marked narrowing in the Japanese external imbalance that had emerged earlier in the decade. As shown in Chart 1, after starting the 1980s in deficit, the current account balance rose to a peak of over 4 percent of GNP in 1986. The steady decline thereafter reduced the surplus to only 1 1/4 percent of GNP by 1990. The reduction in the external imbalance, as measured in real terms, is even more dramatic: the real trade surplus declined from a peak of 4 1/4 percent of real GNP in 1985 to approximate balance in 1990.

The decline in the external surplus has been associated with two developments. The first is the sharp rise in the real effective exchange rate of the yen: as shown in Chart 1, the yen appreciated in real effective terms by over 40 percent from 1985 to 1988. The second factor is the more rapid growth of economic activity in Japan than in its industrial trading partners: in Japan, real domestic demand grew at an annual average rate of 5 1/2 percent during 1985-90, compared with a weighted average growth rate of 3 percent in industrial trading partners.

Although movements in relative prices and differences in demand growth have been large, their ability to explain the magnitude and timing of the decline in Japan's external surplus has been a source of controversy. Much of the debate hinges on the extent to which the behavior of the Japanese external balance can be explained by stable relationships between trade volumes and prices and their proximate determinants--aggregate economic activity and price levels. In the period following the Plaza Accord in September 1985, the debate was fueled by the apparent lack of adjustment of both the U.S. and Japanese nominal surpluses in the face of large exchange rate movements. In this context, Japan is sometimes regarded as a special case. Imports are thought to be insensitive to relative price movements, and instead depend primarily on explicit and implicit barriers to market access and shifts in tastes for imported goods. The behavior of exports is dominated by the desire of Japanese firms to maintain shares in foreign markets regardless of exchange rate movements. More recently, the sharp decline in the external surplus has led some observers to emphasize the role of structural changes in reducing the Japanese external surplus. Examples are the removal of impediments to imports, and the increased reliance of Japanese firms on offshore sourcing from foreign subsidiaries.

This note looks at the extent to which conventional trade relationships can explain the reduction in the Japanese external imbalance during the 1985-90 period. Specifically, we examine the ability of movements in aggregate prices and economic activity to predict trade flows in recent years. The reduction in the external imbalance during 1985-90 is shown to be, on the whole, consistent with past relationships and movements in relative prices and economic activity: it is not necessary to resort to more exotic explanations to understand the post-1985 experience. It

appears, however, that the adjustment was initially slow because of a long lag between the decline in the relative price of imports and the response of import volumes. The surge in import growth more recently may reflect a catch-up to the earlier delayed adjustment of import volumes. In addition, by 1990, Japanese import prices were higher than suggested by the pre-1986 experience, indicating an element of "pricing to market" on the part of foreign exporters.

## 2. Other studies on post-1985 external adjustment

In the period following the decline in the U.S. dollar in 1985, a large literature was spawned that studied the apparently slow adjustment of external balances--particularly those of the United States and Japan--to exchange rate movements. Part of the answer appeared to involve J-curve effects: the response of real trade flows to relative price movements was not large enough in the short run to offset changes in the terms of trade. Indeed, the existence of a J-curve for Japan is suggested by the experience following the large changes in the real exchange rate in 1978-79 and 1875-86. As illustrated in the top panel of Chart 1, while there were immediate adjustments in the real trade balance, in both cases the nominal current account responded with a lag of 1-1 1/2 years.

In addition to J-curve effects, however, it appeared that factors were also at work that hindered the adjustment of the real trade balance. For instance, Loopesko and Johnson (1987) found that "an econometric model of Japanese trade that tracks moderately well through 1984 veers substantially off track in forecasting both imports and exports over the 1985-86 period" (page 41). They attribute this both to a squeezing of profit margins on the part of Japanese exporters and a slow pass-through of lower import prices to consumer prices in Japan. In analyzing the U.S. experience, Hooper and Mann (1987) and Helkie and Hooper (1987) found evidence that adjustment was slowed because Japanese producers cut profit margins on exports to the United States following the dollar depreciation. Hooper and Mann (1989) found further evidence of pricing to market behavior on the part of Japanese exporters to the United States, but also observed that there appeared to be offsetting increases in profit margins on Japanese exports to other regions during 1985-88. Krugman and Baldwin (1987) found that biased technical progress in favor of exporting industries in Japan may have resulted in an overstatement of the change in real exchange rates that occurred in the mid-1980s, contributing to the slower-than-expected adjustment of real trade flows.

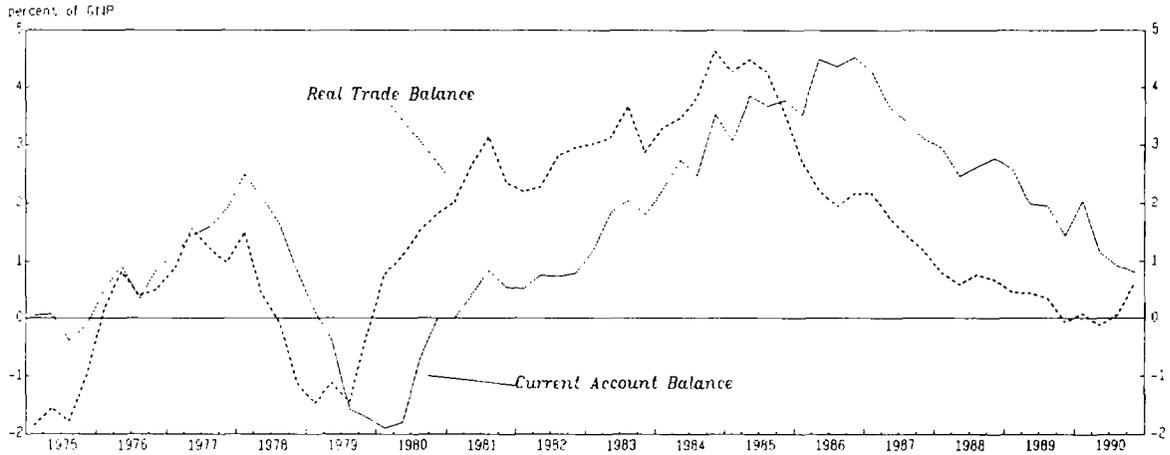
Other studies, however, indicate that the Japanese real external balance responded quickly in 1985 and 1986 to the appreciation of the yen. Corker (1989), in a model-based study of the Japanese external balance, finds that developments in 1986 and 1987 were broadly consistent with estimated relationships, and that the slow adjustment of the nominal balance was due to J-curve effects. A study by the Bank of Japan (1989) found that Japanese exports had behaved as expected following the yen appreciation,

Chart 1

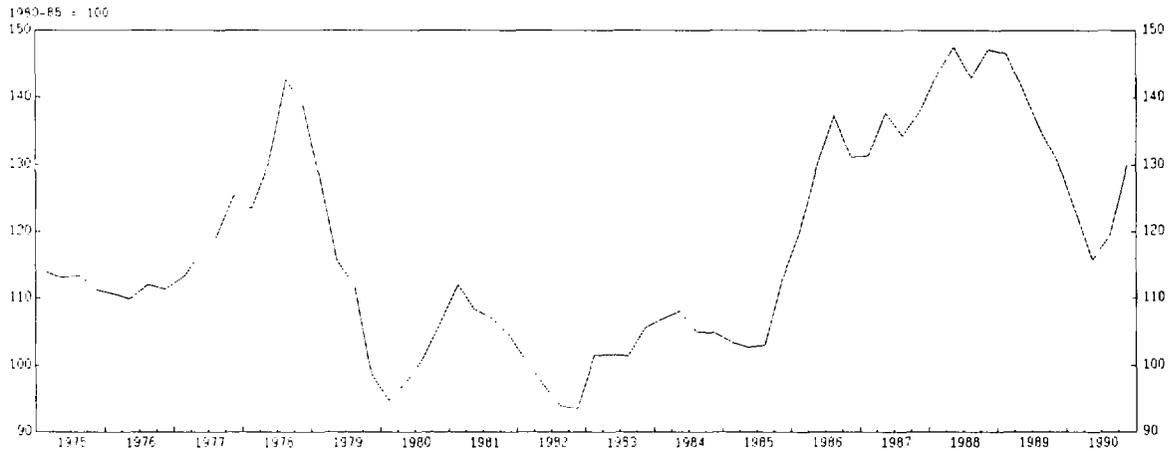
JAPAN

External Balance and Its Determinants: 1975-90

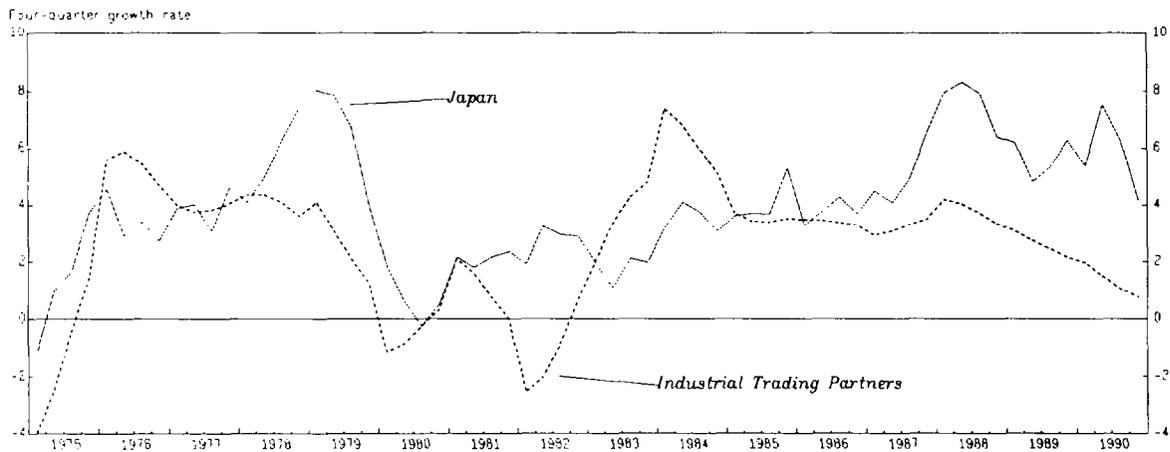
External Balances Relative to GNP



Real Effective Exchange Rate



Real Domestic Demand Growth



Sources: Economic Planning Agency, National Income Accounts; Bank of Japan, Balance of Payments Monthly; and staff estimates.



while imports had risen by considerably more than predicted through 1988 because of structural changes. Ueda (1988) finds a large response of the real trade balance in the 1986-87 period to exchange rate movements, while emphasizing the role that lower oil prices and J-curve effects had in boosting the (nominal) Japanese external surplus over this period.

The analysis presented in this note updates this earlier work on Japanese external adjustment to include data for the 1988-90 period, which was characterized by further large declines in the nominal surplus. We take a broader approach than in some previous studies in that the present study includes trade in both goods and nonfactor services, as opposed to specific components of traded goods such as manufactures. Finally, this study looks at external adjustment in a longer-run context, abstracting from short-run dynamic specifications for trade equations.

### 3. Estimates of Japanese trade elasticities

This section reviews the evidence on the effect of changes in economic activity and aggregate prices on Japanese trade volumes and prices. In addition, regressions are estimated over the 1975-85 period to shed further light on Japanese trade elasticities in the period preceding the reduction in the external imbalance. Representative elasticities based on this evidence are used in the next section to examine the consistency of the post-1985 adjustment with the earlier historical experience. We are concerned throughout with long-run relationships as opposed to short-run dynamics. This choice reflects the greater degree of consensus among studies on the long-run responses than on their timing. It also facilitates the subsequent analysis, which compares the long-run predicted behavior of trade variables with actual developments.

Table 2 summarizes several studies that report trade elasticities for Japan. Most of the estimates are based on sample periods that pre-date the yen appreciation in 1985, although some data extend to the end of 1988. Seven of the ten studies report estimates for trade in goods only; the others also cover trade in nonfactor services (i.e., services excluding income on investments abroad). In several cases it was necessary to aggregate estimates that were based on the components of imports and exports. In these cases, the weights were based on the average share during the 1980s of each component in the aggregate. The results of all of the studies are summarized in terms of unweighted average elasticities, as well as minimum and maximum values. 1/

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1/ It should be noted that there is some overlap in the coverage of the surveys by Goldstein and Khan (1985) and Chouraqui and others (1988). The summary measures from these studies reflect unweighted averages of the correctly-signed coefficients.

Table 2. Japan--Estimates of Long-Run Elasticities of Trade Flows

	Goods		Nonfactor Services		Total Nonfactor Trade	
	Relative Price	Activity	Relative Price	Activity	Relative Price	Activity
1. Corker (1989): 75Q1-87Q4						
- Exports . . . . .	-1.10	2.00	-0.40	1.01	-1.02	1.86
- Imports . . . . .	-0.55	1.38	-2.68	0.86	-0.72	1.24
2. Corker (1990): 75Q1-85Q4						
- Exports . . . . .	-0.67 1/	1.03 2/				
- Imports . . . . .	-0.48	0.96				
3. EPA (1986): 71Q1-81Q4						
- Exports . . . . .	-1.18	1.50	-1.00	1.15	-1.14	1.46
- Imports . . . . .	-0.85	1.10	-1.00	1.31	-0.89	1.16
4. EPA (1989): 80Q1-88Q4						
- Exports . . . . .	-0.68	1.52				
- Imports . . . . .	-0.60	1.28				
5. Masson and others (1990): 65Y1-87Y1						
- Exports . . . . .					-0.71	1.00
- Imports . . . . .					-0.77	1.00
6. Ueda (1988): 70Y1-87Y1						
- Exports . . . . .	-1.19	1.87				
- Imports . . . . .	-0.41	1.04				
7. Goldstein and Khan (1985): survey of estimates						
- Exports . . . . .	-1.40	2.60				
- Imports . . . . .	-1.00	1.20				

Table 2. Japan--Estimates of Long-Run Elasticities of Trade Flows (concluded)

	<u>Goods</u>		<u>Nonfactor Services</u>		<u>Total Nonfactor Trade</u>	
	<u>Relative Price</u>	<u>Activity</u>	<u>Relative Price</u>	<u>Activity</u>	<u>Relative Price</u>	<u>Activity</u>
8. Bank of Japan (1989): 75Q3-85Q3						
- Exports . . . . .	-0.76	1.03 2/				
- Imports . . . . .	-0.21	0.64				
9. Krugman (1989): 71Y1-86Y1						
- Exports . . . . .	-0.85	1.65				
- Imports . . . . .	-0.42	0.80				
10. Chouraqui and others (1988): survey of estimates						
- Exports . . . . .	-1.37	2.20				
- Imports . . . . .	-0.93	1.31				
<u>Unweighted Average of Estimates</u>						
- Exports . . . . .	-1.02	1.90 3/			-0.96	1.44
(Range: minimum, maximum)	(-0.67, -1.40)	(1.50, 2.60)			(-0.71, -1.14)	(1.00, 1.86)
- Imports . . . . .	-0.61	1.08			-0.79	1.13
(Range: minimum, maximum)	(-0.21, -1.00)	(0.64, 1.38)			(-0.72, -0.77)	(1.00, 1.24)

1/ Effect based on a reduced-form profitability term.

2/ Activity variable is a weighted average of the import volumes of trading partners using Japanese export weights.

3/ Excluding estimates based on the import volumes of trading partners.

Both the income and price elasticities for Japanese exports typically exceed those for imports. The mean price elasticity is about 1 for exports of goods, with a range of 0.67-1.40. This substantially exceeds the price elasticity of imports of goods, which has a mean of 0.61 and a range of 0.21-1.00. The activity elasticities are also much higher for exports than for imports, with mean values of 1.90 and 1.08, respectively. The estimated activity elasticity for exports, however, depends importantly on the definition of the activity variable. In most cases, this is either real GNP or real domestic demand in trading partners. The upward trend in imports relative to GNP for the industrial countries in the 1970s and 1980s is then reflected in a high activity elasticity for Japanese exports. In contrast, when the activity variable is a weighted average of the import volumes of trading partners, the high elasticity of demand for imports in these countries is already embodied in movements in the activity variable. Indeed, studies that define activity in terms of the volume of foreign imports tend to give elasticities much closer to unity, as shown Table 1.

Three studies provide elasticity estimates for total trade in goods and nonfactor services. The average elasticities are generally similar to those for trade in goods only, although the activity elasticity of exports is somewhat lower (1.44 versus 1.90), while the price elasticity of imports is higher (0.79 versus 0.61).

Fewer studies have estimated the response of Japanese trade prices to changes in domestic and foreign prices. In econometric models of Japanese trade (see, e.g., Corker (1989) and EPA (1986)) export prices respond to both domestic costs and foreign prices in the short run. In the long run, export prices are assumed to move one-for-one with domestic prices, indicating that the supply curve of exports is perfectly elastic at the domestic price level. In contrast, Citrin (1985) found that export prices for selected products depended on foreign prices in both the short and the long run, with a weight ranging from 0.20 to 0.85. Import prices for Japan are generally assumed to depend only on foreign export prices, implying that foreign producers do not price to market in the case of their exports to Japan.

To provide further evidence on Japanese trade elasticities, time-series regressions were run on trade prices and volumes for the 1975Q2-1985Q4 period. Import and export volumes were defined on a national accounts basis, including all external transactions except factor income flows. Prices were the associated national accounts deflators. Export volumes were specified as a function of the following variables: the price of Japanese exports relative to a weighted average of foreign export prices; a weighted average of foreign import volumes; and a lagged dependent variable. As discussed above, the use of foreign import volumes as the activity variable results in a lower elasticity than when foreign GNP is used. Unconstrained estimation yielded a long-run activity elasticity of 1.07. A constraint of unity easily passed an F test, and was imposed in further estimation. Import volumes depend on the import price relative to the consumer price

index, total domestic demand, and a lagged dependent variable. Again, unconstrained estimation indicated that the activity elasticity was close to unity, and this constraint was imposed.

Movements in the export and import deflators were initially modeled as a function of changes in domestic and foreign prices and a lagged dependent variable. Homogeneity of degree one of traded goods prices in aggregate prices--implying that the coefficients on all regressors sum to unity--was not rejected by the data. In the case of export prices, all lags were insignificant, leaving only contemporaneous movements in the domestic WPI and competitors' prices as regressors. The existence of the latter indicates an element of pricing to market on the part of Japanese exporters in both the short and the long run. Following a similar strategy for import prices yielded an equation with the following regressors: current changes in partners' export prices, current and lagged movements in the domestic WPI; and lagged changes in import prices. Again, the presence of the domestic WPI indicates pricing to market on the part of foreign exporters. The parameters on current and lagged growth in the WPI, however, were of almost the same size and of opposite signs. Imposing the constraint that they sum to zero gave an equation where domestic prices only affect import prices in the short run. Over time, the price of exports to Japan moves one-for-one with the total export prices of trading partners.

The constrained estimation results are shown in Table 3. On the whole, the results are satisfactory: the parameters all have the correct signs and are of a magnitude consistent with the results of other studies shown in Table 2. The equations for export volumes and prices both perform better in terms of overall fit over this sample period than do those for imports. The long-run price elasticity of exports of 1.12 is slightly higher than the unweighted mean of the other studies, while the (constrained) activity elasticity of unity is very close to that of the two other studies that use foreign imports as the activity variable. The long-run price elasticity of imports of 0.50 is lower than the average of other estimates: the studies on goods trade give a value of 0.61, while those on total imports give 0.79. The activity elasticity of 1 is only slightly lower than the average values of 1.08 for goods imports and 1.13 for total imports.

The price equations for exports indicate that traded-goods prices are affected by both domestic and foreign prices. In the case of exports, the weight on domestic prices is about 0.8, while that on competitors' prices is 0.2. For imports, the short-run weight on domestic prices is about 0.3, compared to that on the export prices of trading partners of 0.7. The constraint of zero on the sum of the parameters on current and lagged changes in domestic prices implies that, in the long run, import prices are homogeneous of degree one in foreign export prices.

Table 3. Estimation Results for Japan: Trade Prices and Volumes, 1975-85

(t-statistics in parentheses)

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1. <u>Export volumes:</u>	$x = -0.726 + 0.852 x_{-1} - 0.166 (px - pxx^*) + 0.148 m^*$ <p style="text-align: center;">(1.2)    (14.9)    (2.3)    (2.6)</p>
	$\bar{R}^2 = 0.991$ Std. Error = 0.0254      Durbin h = 2.5      Durbin-Watson = 1.26
	Long-run elasticities: price = -1.12, activity = 1.00
2. <u>Import volumes:</u>	$m = -0.720 + 0.831 m_{-1} - 0.085 (pm - pcpi) + 0.169 tdd$ <p style="text-align: center;">(3.3)    (8.7)    (2.6)    (1.8)</p>
	$\bar{R}^2 = 0.929$ Std. Error = 0.0277      Durbin h = 0.9      Durbin-Watson = 1.74
	Long-run elasticities: price = -0.50, activity = 1.00
3. <u>Export prices:</u>	$\Delta px = 0.783 \Delta pwpi + 0.217 \Delta pxx^*$ <p style="text-align: center;">(15.2)      (4.2)</p>
	$\bar{R}^2 = 0.893$ Std. Error = 0.0113      Durbin-Watson = 1.50
	Long-run elasticities: domestic prices = 0.78, foreign export prices = 0.22
4. <u>Import prices:</u>	$\Delta pm = 0.358 \Delta pwpi + 0.642 \Delta pxm^*$ <p style="text-align: center;">(4.3)      (7.7)</p>
	$\bar{R}^2 = 0.579$ Std. Error = 0.0219      Durbin-Watson = 1.12
	Long-run elasticities: Japanese prices = 0.00, foreign export prices = 1.00

F-tests of parameter constraints (distributed F(1,43), critical value at 99% significance level = 7.27):

Export volume: long-run parameter on foreign imports equals 1, test statistic = 0.82  
 Import volume: long-run parameter on domestic demand equals 1, test statistic = 0.13  
 Export price: parameters on domestic and foreign prices sum to 1, test statistic = 6.90  
 Import price: parameters on domestic and foreign prices sum to 1, test statistic = 3.87

Data definitions (all variables expressed in natural logarithms):

x ≡ national accounts exports in trillions of constant 1985 yen excluding factor income.  
 m ≡ national accounts imports in trillions of constant 1985 yen excluding factor payments.  
 m\* ≡ average of partners' import volumes weighted using Japanese export weights.  
 tdd ≡ total domestic demand in trillions of 1985 yen.  
 px ≡ national accounts deflator for exports in U.S. dollars.  
 pm ≡ national accounts deflator for imports in U.S. dollars.  
 pwpi ≡ wholesale price index for Japan in U.S. dollars.  
 pcpi ≡ consumer price index for Japan in U.S. dollars.  
 pxx\* ≡ average of partners' export prices weighted using Japanese export shares, U.S. dollars.  
 pxm\* ≡ average of partners' export prices weighted using Japanese import shares, U.S. dollars.

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4. Behavior of Japanese trade, 1985-90

Some commentators, notably Loopesko and Johnson (1987), have argued that there were significant shifts in Japanese trade relationships following the yen appreciation in 1985-86. To examine this hypothesis in light of more recent evidence, two approaches were adopted. One was to perform formal tests of parameter stability over the 1986-90 period on the equations estimated above. The principal disadvantage of this approach is that the results are likely to be sensitive to any misspecification of the original equations. To give a more broad-brush perspective on trade behavior since 1985, the second approach compared the predicted behavior of trade prices and volumes--using best guesses of the appropriate long-run elasticities--to their actual behavior.

To test for changes in the parameters shown in Table 3 in the post-sample period, the estimation period was first extended to the end of 1990. Variables were then added to each equation consisting of the original regressors multiplied by a dummy variable equal to 1 from 1986 on. A test of the significance of the parameters on these additional regressors, taken as a group, indicates whether the parameters changed in the post-1985 period. <sup>1/</sup> The results are shown in Table 4. In the case of the export volume equation and both price equations, the test statistics are well below their critical F values at conventional levels of significance. For import volumes, the test statistic is closer to--but still below--the critical value at the 95 percent significance level. These results, then, do not provide evidence of significant shifts in the structural relationships during the 1986-90 period.

Table 4. Japan: Tests of Changes in Trade Parameters, 1986-90

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	<u>Test Statistic</u>	<u>Critical F Value (95% level)</u>
1. Export volume	0.77	F(4,60) = 2.53
2. Import volume	2.27	F(4,60) = 2.53
3. Export price	0.39	F(2,60) = 3.15
4. Import price	0.84	F(4,60) = 2.53

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<sup>1/</sup> The primary difference between this test and the one proposed by Chow (1960) is that no assumptions are made here about the homoscedasticity of the disturbance term between the two sample periods.

To obtain a broader view of developments since 1985, the actual evolution of trade flows was compared to predictions based on long-run relationships to economic activity and prices. The responses of trade volumes and prices to their determinants reflect representative elasticities based on both the results of other studies, as described above, and the estimation results shown in Table 3. Specifically, the long-run relationships were:

$$\begin{aligned}x &= 1.0 m^* - 1.0 (px - pxx^*) \\m &= 1.0 tdd - 0.65 (pm - pcpi) \\px &= 0.8 pwpi + 0.2 pxx^* \\pm &= 1.0 pxm^* ,\end{aligned}$$

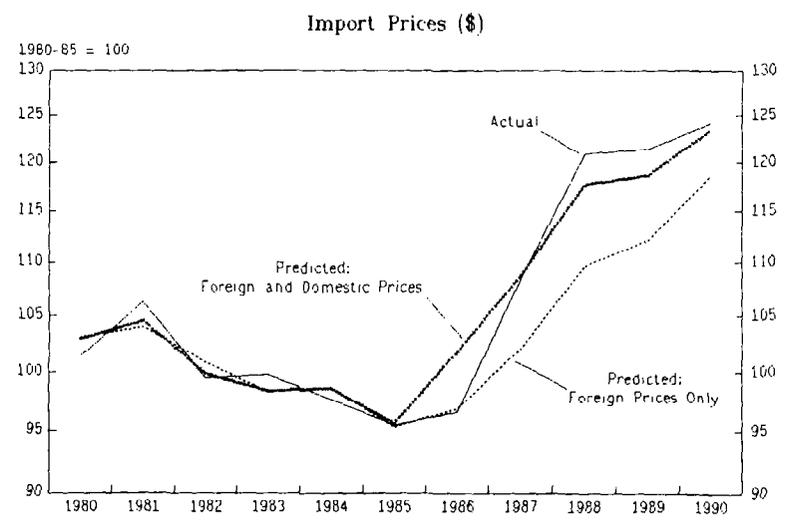
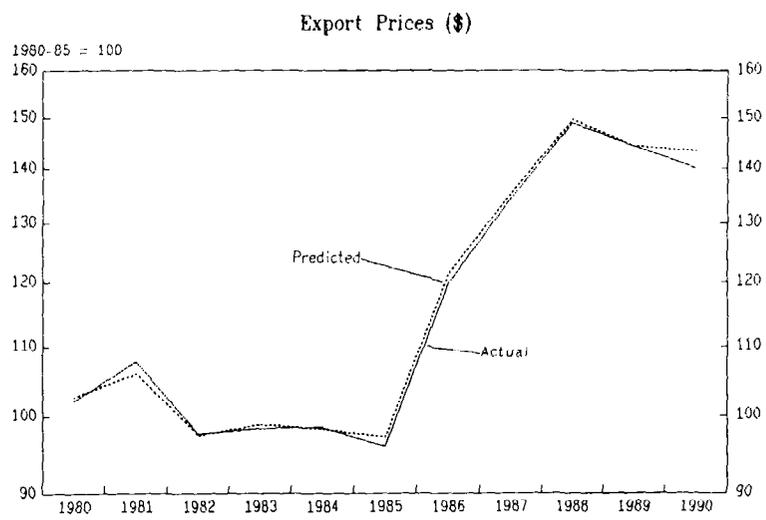
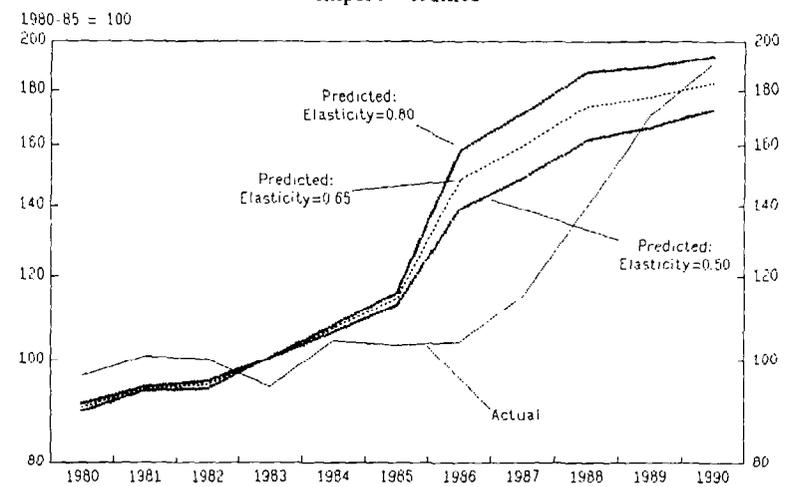
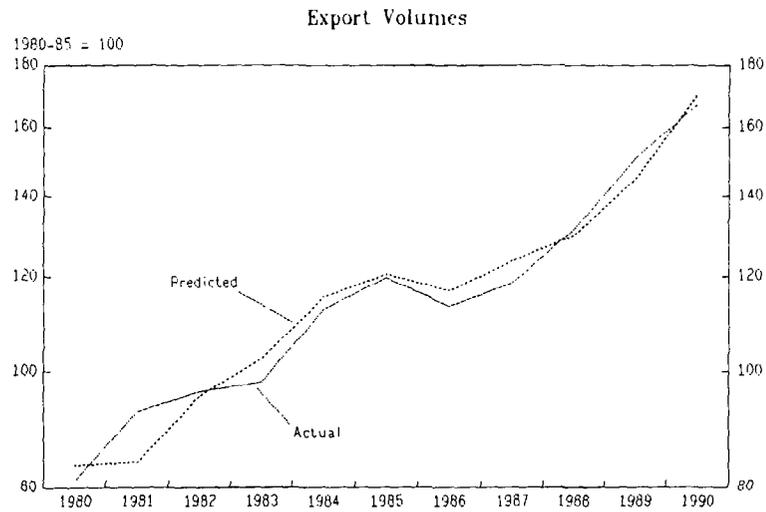
where the definitions of the variables are as in Table 3. The unit elasticities on activity in the export and import volume equations follow directly from the results discussed above, as does the unit price elasticity of export volumes. The price elasticity of 0.65 in the import volume equation lies midway between the estimated value in Table 3 (i.e., 0.50) and the average of other studies of aggregate imports shown in Table 2 (i.e., 0.79). Results for both lower and higher price elasticities are discussed below. The export price equation reflects an element of pricing to foreign markets as shown by the term in competitors' prices, while import prices depend only on foreign export prices, consistent with the long-run elasticities in Table 3.

The evolution of actual trade volumes and prices during 1985-90, as well as that of their principal determinants, is indicated in Table 5. Chart 2 shows actual developments during 1980-90 along with the predicted series given by the above relationships--the levels of both the actual and predicted series have been normalized to average 100 for the 1980-85 period. 1/ Looking first at export volumes, it is apparent from Chart 2 that growth during 1985-90 was consistent with its determinants. In spite of perceptions by some observers that Japanese exports were initially slow to react to exchange rate movements in 1985 and 1986, actual exports fell slightly below the long-run predicted value in 1986 and 1987. This was reversed in the 1988-89 period; by 1990 the actual and predicted series are almost identical. The cumulative growth in exports of 67 percent from 1985 to 1990 is entirely explained by the growth of 73 percent in the (non-oil) import volumes of trading partners. Indeed, Japanese export prices changed little

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1/ The predictions for trade volumes have been constructed using actual export and import prices, as opposed to the fitted values from the price equations. The errors, then, reflect shocks that are specific to the trade volume relationships.

Chart 2  
JAPAN  
Trade Volumes and Prices, 1980-90:  
Actual Values and Predictions Using Representative Elasticities



Sources: Economic Planning Agency, National Income Accounts; and staff estimates.

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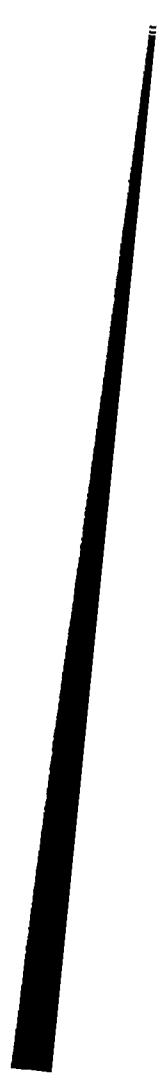


Table 5. Japan: Trade Volume and Prices, 1986-90 1/

(Cumulative percent change from 1985)

	1986	1987	1988	1989	1990
<b>Export volumes</b>					
Export volume	13.2	18.4	31.2	50.8	67.0
World non-oil import volume <u>2/</u>	29.1	39.9	53.3	63.9	72.6
Exports relative to world imports	-12.3	-15.3	-14.4	-8.0	-3.3
Domestic relative to foreign export prices	10.7	13.2	18.3	13.1	1.7
<b>Export prices</b>					
Domestic export price (U.S. dollars)	19.6	34.5	48.9	44.3	40.0
World export price (U.S. dollars) <u>2/</u>	8.1	18.8	25.9	27.6	37.7
Japanese WPI (U.S. dollars)	24.7	39.9	56.3	48.9	44.9
Domestic export price relative to WPI	-4.1	-3.9	-4.7	-3.1	-3.4
<b>Import volumes</b>					
Import volume	4.1	15.0	39.6	70.4	90.4
Real domestic demand	12.0	17.7	26.6	33.8	41.6
Import volume relative to domestic demand	-7.1	-2.2	10.2	27.3	34.4
Ratio of domestic CPI to import prices	53.7	59.9	62.8	54.0	48.0
<b>Import prices</b>					
Import price (U.S. dollars)	-3.4	8.3	20.9	21.4	24.1
World export price (U.S. dollars) <u>3/</u>	-3.2	2.1	9.6	12.1	18.6
Import price relative to world export price	-0.2	6.2	10.3	8.3	4.7
Japanese CPI (U.S. dollars)	48.5	73.2	96.8	87.0	83.7

Sources: Bank of Japan, Economic Statistics Monthly; Economic Planning Agency, National Income Accounts; and staff estimates.

1/ National accounts basis, excluding factor income.

2/ Calculated using Japanese export weights.

3/ Calculated using Japanese import weights, excluding oil.

over the period as a whole: while they originally rose relative to trading partners following the yen appreciation, the decline in the yen more recently has caused the relative price of Japanese exports to return close to its 1985 level. 1/

Similarly, the predicted series for export prices tracks the actual series very closely. In particular, export prices increased by almost exactly the same amount as predicted during 1986-88, the period of greatest yen strength. This indicates that the degree of pricing to foreign markets over this period was "normal" looked at in terms of the pre-1986 experience--there is no evidence of an asymmetrically small response of Japanese export prices to the appreciation of the yen. These results for export prices and volumes suggest that the market for Japanese exports was not importantly affected, on average, by structural shifts since 1985. For instance, a change in the effectiveness of voluntary export restraints (VERs) might have been expected to distort export volumes and/or export prices relative to their predicted levels. Neither effect is observed, suggesting that there was little change in the net impact of VERs over this period. 2/

The story for imports is less clear-cut. The sharp drop in relative import prices and strong growth in final domestic demand caused the predicted level of import volumes to rise sharply in 1986. Actual import volumes, however, grew by only 4 percent in that year. The absence of a short-run response of import volumes to its determinants cannot be justified purely by adjustment lags, as verified by simulations of the quarterly equation for import volumes shown in Table 3. The rise in import growth to 10 percent in 1987 did little to reduce the large gap between actual and predicted imports. The subsequent acceleration in import growth to over 20 percent in 1988 and 1989, however, combined with further strong growth in 1990, raised actual imports above their predicted level by the end of the period. One interpretation of these developments is that Japanese imports are not responsive to relative price movements, as reflected in the 1985-87 experience, while subsequent growth in imports was due to structural initiatives as opposed to changes in economic fundamentals. Chart 2 suggests an alternative interpretation: imports were unusually slow to respond to changes in fundamentals during 1985-87, while rapid growth from

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1/ This is consistent with the evidence discussed in Corker (1990), which indicated that aggregate merchandise exports were accurately predicted by past relationships up to 1989. The behavior of the aggregate, however, masked offsetting errors in equations for the individual components of exports.

2/ However, the period over which export volumes are slightly under-predicted--1983-87--corresponds roughly to the period that VERs on auto exports to the United States were binding.

1988 to 1990 was simply a "catch-up" to the earlier changes in relative prices and demand growth. 1/

Chart 2 also shows the predicted level of imports with alternative price elasticities. The "low" elasticity of 0.50 reflects the estimated value shown in Table 3, while the "high" elasticity of 0.80 reflects the average of other estimates for total imports in Table 2. Regardless of whether the price elasticity of imports is low or high, imports remained well below their predicted value from 1985 to 1988. By 1990, the actual value lay at the upper end of the range of predicted values consistent with these price elasticities. To the extent that the underlying price elasticity is toward the low end of these estimates, there is evidence that structural changes have had an impact in raising imports above the level implied by economic fundamentals. If the underlying elasticity is closer to 0.80, on the other hand, the cumulative growth in imports during 1985-90 can be explained simply by relative price movements and growth in domestic demand. 2/

The final panel of Chart 2 shows the behavior of import prices. In 1987 and 1988, actual prices rose more quickly than their predicted value based on an average of foreign export prices--the error has narrowed only slightly in 1989 and 1990. An alternative predicted series is also shown that represents a weighted average of foreign prices and the domestic WPI, with weights of 0.8 and 0.2 respectively. The weights have been chosen to closely track the actual series during 1986-90. It is apparent that incorporating an element of pricing to market on the part of foreign exporters helps explain import prices in Japan over this period. This is in contrast to the estimation results for the pre-1985 period, which indicated that Japanese import prices depended only on foreign export prices in the long run. This, then, appears to represent a change in behavior relative to the earlier period that may have limited the adjustment of the external balance: in its absence, the relative price of imports in Japan would have fallen by even more in recent years, and real imports would have risen by more. While this would have reduced the real trade balance, the nominal surplus might have risen slightly given estimates of import price elasticities of less than unity.

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1/ The slow adjustment of imports may reflect fixed costs to market entry combined, perhaps, with uncertainty about the longer-term direction of exchange rates in the wake of the sharp, unanticipated, movements that occurred in 1985 and 1986.

2/ Corker (1990) finds that actual merchandise imports fell below their predicted level in 1986-87 but had recovered by 1990. As in the case of exports, the behavior of aggregate imports reflected offsetting errors in the components.

5. Summary and conclusions

This study indicates that movements in the Japanese external balance between 1985 and 1990 are, for the most part, explainable in terms of the conventional determinants of trade flows. Using representative estimates of Japanese trade relationships for the period prior to the yen appreciation, the predicted values for trade volumes and prices are compared to their actual behavior. Movements in export prices and volumes correspond well to changes in aggregate prices and foreign economic activity. In particular, we have found little evidence that the reduction in Japan's external surplus was limited by an increase in the degree of pricing to market by Japanese exporters in the period following the yen appreciation. Neither is there evidence that changes in the impact of VERs significantly altered Japan's aggregate export performance during 1985-90.

In the case of import volumes, the initial response to the decline in their price was smaller than expected on the basis of relative price movements and growth in domestic demand. The subsequent surge in imports, however, raised them slightly above the long-run predicted level by 1990. One interpretation is that Japanese imports are insensitive to relative price movements, and their recent growth is attributable more to the removal of structural impediments. The post-1985 experience, however, can also be explained by long lags in the response of import volumes to relative price movements. In this context, recent institutional changes in areas such as import distribution channels may reflect the normal process of adjustment to the unprecedented size of the relative price movements that occurred over the 1985-90 period, as opposed to independent events that caused the surge in imports. The behavior of import prices is somewhat unusual in that an element of pricing to market is evident in the recent period that was not apparent prior to 1986. This may have limited the adjustment in real balances that has been observed, while having little effect on nominal balances.

### III. The Influence of Monetary Conditions on Aggregate Economic Activity: Evidence for Japan

#### 1. Introduction

Against the background of an intensification of inflationary pressures and strong economic growth, monetary policy in Japan has been progressively tightened since the middle of 1989. One reflection of this tightening is the cumulative increase in the official discount rate (ODR) from 2 1/2 percent in early 1989 to 6 percent currently (see Chart 3). Broader measures of monetary conditions also suggest a more restrictive environment. For instance, growth in M2 plus CDs has slowed to less than 4 percent (12-month basis) in April and May; the long-term government bond rate has risen by almost 2 percentage points from its 1987-89 average level; and the yen has appreciated vis-à-vis the dollar by about 10 percent relative to the trough in early 1990.

In spite of these developments, growth in real GNP has remained firm, registering 5 1/2 percent in 1990 and over 11 percent (annual rate) in the first quarter of 1991. This resilience of output suggests that monetary conditions may not be as restrictive as the above indicators imply. Indeed, the recent deceleration of money growth still leaves the level of broad money balances above that predicted by a conventional money demand function. While the nominal long-term interest rate has risen substantially, the real rate--defined as the nominal rate less the increase in consumer prices over the previous year--is actually little changed from its 1987-90 average. And, in spite of the appreciation in the second half of 1990, the real effective value of the yen remains below its 1987-90 average level.

To shed further light on the current degree of tightness of monetary conditions in Japan, this paper first examines the relationship between various indicators of monetary conditions and growth in real GNP during 1980-90. One conclusion drawn from this analysis is that broad money is not a useful predictor of GNP growth, possibly because of shifts in the demand for money induced by financial innovations. Since much of the recent behavior of broad money is not explained by a conventional demand function, the signals it is providing about the tightness of monetary conditions are suspect. The unreliability of monetary aggregates puts greater emphasis on the use of structural indicators of monetary conditions that directly affect aggregate demand, such as real interest rates and the exchange rate. A significant relationship appears to exist between these indicators of monetary conditions and real GNP growth for the 1980-90 period. The information contained in these variables is summarized in the form of a "monetary conditions index" (MCI) for Japan, which provides a measure of the effect on future output growth of variables influenced by monetary policy; conditions can be characterized on this basis as expansionary, contractionary, or neutral.

The MCI indicates that monetary conditions eased in 1989 and early 1990, reflecting the depreciation of the real effective value of the yen.

Subsequently, rising real interest rates and an appreciation of the yen caused conditions to tighten from mid-1990 to early 1991. As of the second quarter of 1991, monetary conditions reflect two offsetting influences: the lagged effects of the rise in the real effective value of the yen in the second half of 1990, and the fall in (real) interest rates in early 1991. These two factors are roughly offsetting. On the whole, monetary conditions are broadly neutral in terms of their expected effect on GNP growth for the remainder of the year.

## 2. Monetary indicators and real GNP growth: historical evidence

This section examines the historical relationship between various indicators of monetary conditions and real GNP growth. The candidates for indicators should both reflect the principal channels through which monetary policy operates, as well as bear a close relationship to aggregate demand conditions. A narrow definition--for instance, one limited to very short-term nominal interest rates--has the advantage that it is closely related to the tools of monetary policy. However, the link to demand growth may be weak, as spending decisions are likely to depend on broader measures of real interest rates. At the other extreme, indicators of monetary conditions could be defined to also include almost all financial variables, such as credit conditions, stock-market values and land prices. While a wide range of indicators is likely to better explain demand growth, many of these variables are largely influenced by factors other than monetary policy. In addition, data limitations make it difficult to estimate the independent impact of a wide range of factors on GNP growth.

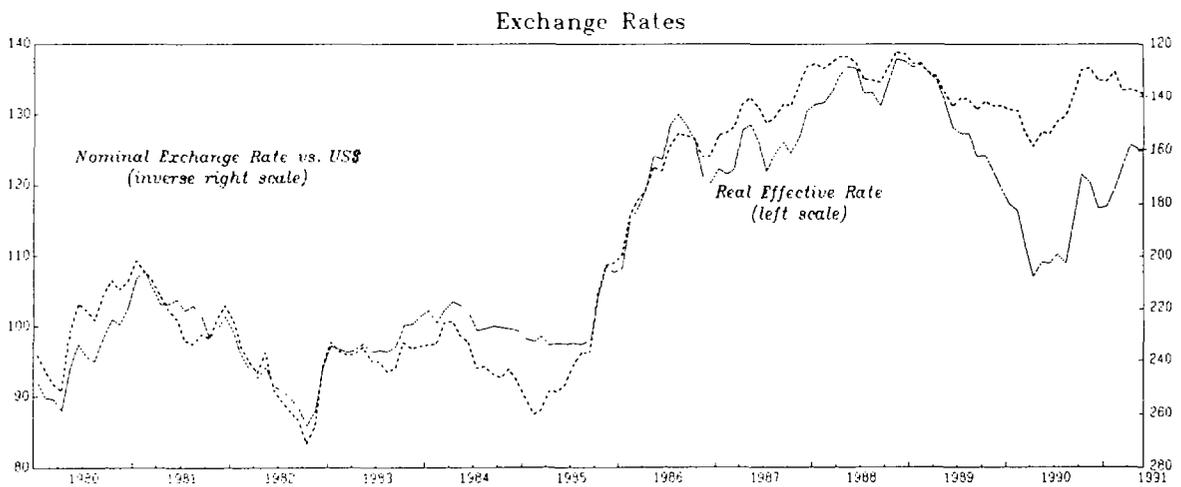
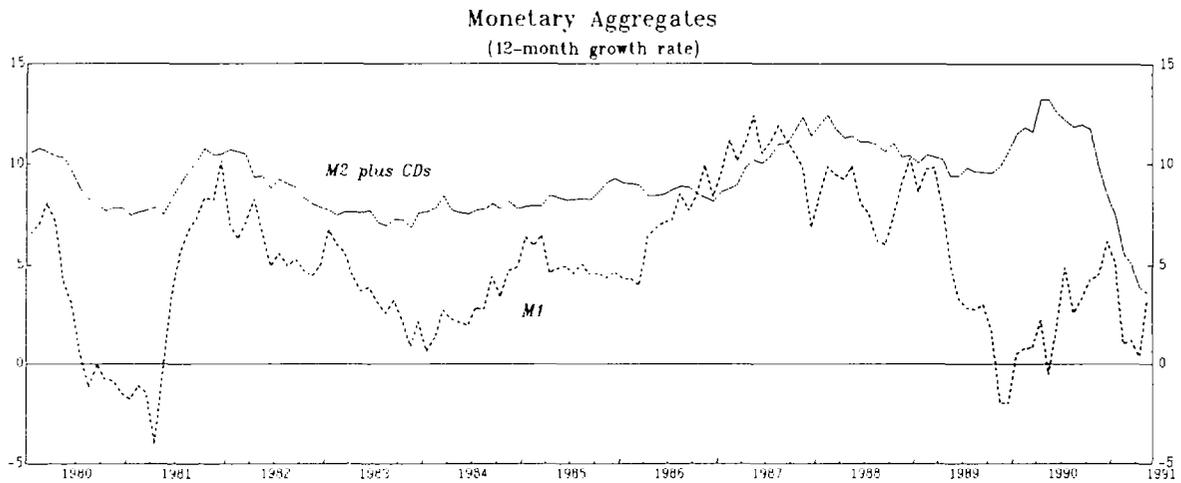
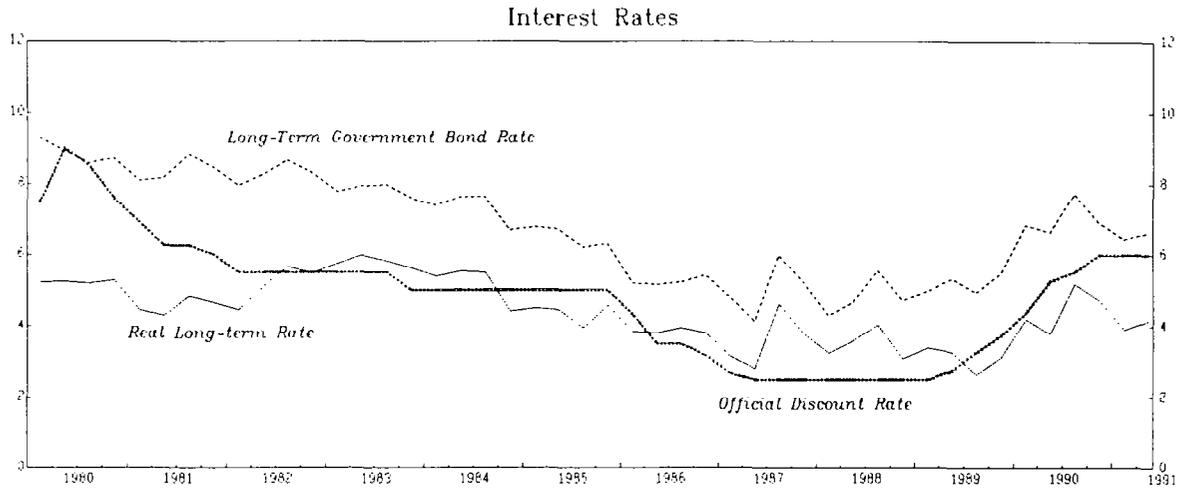
This study takes an intermediate approach, restricting the set of variables to include only those judged to be closely related to current (and expected future) monetary policy. At the same time, it includes the conventional determinants of output in IS-LM type models of aggregate demand. Four variables were considered: short- and long-term real interest rates, the real effective exchange rate, and a broad monetary aggregate. Real interest rates and the exchange rate were included because of their role in directly influencing aggregate demand--interest rates affect consumption and investment decisions, while the exchange rate affects traded goods flows. Inclusion of a monetary aggregate is consistent with a reduced-form version of the IS-LM model, as pioneered in the St. Louis models of the 1970s. In this sense, a monetary aggregate competes with as opposed to complements the structural determinants of aggregate demand. 1/

Prior to estimation of the indicator equations for GNP growth, it was necessary to construct proxies for the inflation expectations used to calculate real interest rates. Regressions were run over the historical period relating observed inflation to information available at the time expectations are formed. For the short-term interest rate--the 3-month CD

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1/ Annex I discusses the derivation of indicator equations from an IS-LM model.

# Indicators of Monetary Conditions, 1980-91



Sources: Bank of Japan, Economic Statistics Monthly; and staff calculations.



rate--the inflation variable was the growth from quarter t to t+1 in the CPI. For the long-term interest rate--the 10-year government bond rate--the inflation rate was the average growth rate in the CPI over the next 12 quarters. The regressions are as follows, where  $\pi_{+1}$  is the one-quarter ahead growth in the CPI at an annual rate,  $\pi_{+12}$  is 12-quarter ahead growth, RS is the short-term interest rate, REER is the real effective exchange rate,  $\text{movavg}(n,x)$  indicates a moving average of n periods on variable x,  $\Delta$  is the first-difference operator, and  $\ln(x)$  is the natural logarithm of x:

Short-term inflation:

$$\begin{aligned} \pi_{+1} = & 0.603 + 0.811*\text{movavg}(3,\pi) - 0.137*\Delta\ln(\text{REER}) \\ & (1.6) \quad (9.9) \quad (2.5) \\ & + 0.690*\Delta(\text{RS}/100) - 0.357*\Delta(\text{RS}_{-1}/100) \end{aligned} \quad (1)$$

Sample: 75Q4-90Q4                       $\bar{R}^2 = 0.641$                       S.E.R. = 1.83

Long-term inflation:

$$\pi_{+12} = 1.289 + 0.404*\text{movavg}(8,\pi) - 0.086*\text{movavg}(2,\Delta\ln(\text{REER})) \quad (2)$$

(3.9)      (5.5)                      (1.8)

Sample: 77Q1-88Q4                       $\bar{R}^2 = 0.402$                       S.E.R. = 1.32

The equation for the one-period ahead inflation rate has a coefficient of about 0.8 on a moving average of past inflation, indicating substantial short-run inertia in CPI growth. For the three-year ahead inflation rate, the coefficient on lagged CPI growth is cut in half, reflecting lower inflation inertia over a longer horizon. In both equations an appreciation of the real exchange rate is associated with lower future inflation. The one-period-ahead inflation rate also depends on current and lagged changes in the short-term interest rate. The fitted values of these regressions were used to proxy inflation expectations conditional on the observed right-hand side variables; ex-ante real interest rates were constructed by subtracting expected inflation rates from nominal interest rates.

The relationship between indicators of monetary conditions and GNP growth was estimated by regressing growth in both real and nominal GNP on lagged changes in: real interest rates; the natural logarithm of the real exchange rate; and the log of the broad money supply. In addition, lagged growth in real GNP and the GNP deflator were included in the initial set of regressors. The results for the 1980Q1-1990Q4 period are summarized in Table 6 in terms of the significance of lags on each of the regressors, both with and without the inclusion of lagged growth in real GNP and the GNP deflator. They indicate that lagged money growth has little predictive

Table 6. Japan: Tests of the Significance of Alternative Indicators of Monetary Conditions

(Sample period: 1980Q1-1990Q4)

	F statistic for the significance of 4 lags on:			
	$\Delta \ln(M2)$	$\Delta RSR$	$\Delta RLR$	$\Delta \ln(REER)$
<u>Dependent variable: real GNP growth</u>				
- With lagged growth in output and prices (- F(4,31)) . . . . .	0.60	4.59***	1.26	2.10*
- Without lagged growth in output and prices (- F(4,39)) . . . . .	0.39	3.61**	2.32*	1.93
<u>Dependent variable: nominal GNP growth</u>				
- With lagged growth in output and prices (- F(4,31)) . . . . .	0.26	1.18	0.85	1.30
- Without lagged growth in output and prices (- F(4,39)) . . . . .	0.39	0.84	0.89	2.16*
* Significant at 90 percent level.				
** Significant at 95 percent level.				
*** Significant at 99 percent level.				
$\Delta \ln(M2)$ $\equiv$ change in the natural logarithm of M2 plus CDs				
$\Delta RSR$ $\equiv$ change in the real short-term interest rate				
$\Delta RLR$ $\equiv$ change in the real long-term interest rate				
$\Delta \ln(REER)$ $\equiv$ change in the natural logarithm of the real effective exchange rate				

Source: Staff calculations.

power for either real or nominal GNP growth in the 1980s. 1/ In contrast, lagged changes in the real short-term interest rate are highly significant in the equations for real GNP growth, both with and without the presence of the other regressors. The significance of lags on both the long-term real rate and the real exchange rate is marginal, and depends on the whether lags on growth in real GNP and prices are included in the regression.

The lack of explanatory power of money growth contrasts with the results of the studies surveyed in Okina (1986). Most of those studies, however, were based on data for the 1960s and 1970s. Indeed, re-estimation of the above equations over an extended 1970-90 sample period yielded a significant effect from lagged money growth in all four equations for GNP growth. This agrees with the results in Meredith (1991), where it was found that money balances predicted GNP growth well in the 1970s, but that the relationship appeared to break down at the beginning of the 1980s. There did, however, appear to exist a stable relationship throughout the total sample period between GNP growth and lagged changes in fitted money balances, defined as the predicted value obtained from a conventional money demand function. 2/

Looked at in terms of a structural model (see Annex I), these results suggest that disturbances to money demand in the 1980s have reduced the link between lagged money growth and output fluctuations. As shown in Chart 4, much of the recent behavior of broad money--in particular the strong growth from 1988 to mid-1990 and the subsequent sharp slowdown--is unexplained by the demand function for M2 plus CDs. Instead, these movements are, at least partly, attributable to special factors affecting household and firm behavior: households have shifted between postal savings deposits and time deposits at banks, while firms took advantage of, and later unwound, the arbitrage opportunities that arose when the prime rate fell below large time deposit rates at major banks. 3/ This analysis does not indicate, then, that the slowing in growth in broad money since late 1990 signals weaker GNP growth in 1991.

Further estimation of the indicator equations focussed on the link between the structural indicators--real interest rates and the exchange rate--and GNP growth. As shown in Table 6, the results for the equations predicting nominal GNP growth are not encouraging; the only indicator that

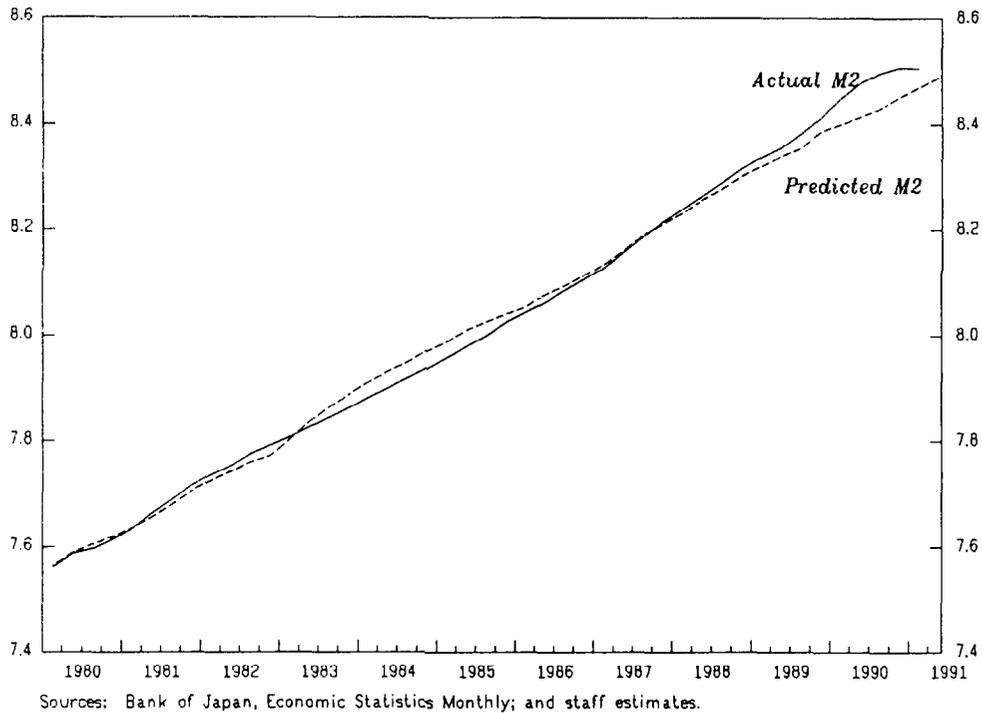
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1/ Similar negative results were obtained using both a narrow aggregate (M1) and a broader aggregate (M3 plus CDs).

2/ Specifically, the money demand function is that estimated by Corker (1989) with revised parameter estimates reflecting data up to the end of 1989, as discussed in Meredith (1991).

3/ While it might be possible to "rescue" the money demand function by including appropriate yield differentials that would capture these shifts, this would not alter the breakdown in the reduced-form relationship between observed money growth and GNP growth.

Chart 4  
JAPAN  
Actual Versus Predicted M2, 1980-91  
(Natural logarithm)



is (marginally) significant is the real exchange rate. <sup>1/</sup> The equations for real GNP growth, however, indicate a more robust link to the structural indicators. To obtain a multivariate indicator of monetary conditions, the structural indicators were included jointly in an equation for real GNP growth, along with lagged growth in real GNP and the deflator. Regressors were progressively eliminated based on tests of significance, and lag structures simplified in the form of moving averages to the extent allowed by the data. This yielded the following equation for real GNP growth (with t-statistics in parentheses):

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<sup>1/</sup> This is consistent with the model described in Annex I, where inflation depends only indirectly on these indicators. In the structural model, inflation is a function of lagged inflation, inflation expectations, and the level of the gap between actual and potential output. This implies a more complicated dynamic relationship between monetary indicators and nominal GNP growth than embodied in simple indicator equations. See Section IV of this paper for estimates of a structural price equation for Japan.

$$\begin{aligned} \Delta \ln(\text{GNP}) = & 0.0105 - 0.284 \cdot \Delta(\text{RSR}_1/100) - 0.811 \cdot \text{movavg}(4, \Delta \text{RLR}_1/100) \\ & (12.0) \quad (2.6) \quad (1.8) \\ & - 0.051 \cdot \text{movavg}(2, \Delta \ln(\text{REER}_2)) . \end{aligned} \quad (3)$$

(1.9)

Sample: 80Q1-90Q4                       $R^2 = 0.214$                       S.E.R. = 0.0061  
F(3,40) = 3.64 (2.84)\*                  DW(1) = 2.24                      AR(4) = 6.02 (9.49)\*\*

- \* F test for the joint significance of the slope parameters (critical value at 95 percent significance level in parentheses).
- \*\* LM test for autocorrelation of degrees 1 through 4,  $-\chi^2(4)$  (critical value at 95 percent significance level in parentheses).

Real GNP growth in equation (3) depends on the lagged change in the short-term real interest rate, a 4-quarter moving average of the lagged change in the long-term real interest rate, and a 2-quarter moving average of the second lag in the change in the real exchange rate (in logs); neither lags on growth in real GNP or the deflator were significant in the final specification. The parameters are statistically significant at conventional levels; their magnitudes were quite robust across a variety of lag specifications and are economically important. The sum of the coefficients on real interest rates implies that a rise of 1 percentage point results in a cumulative decline in real output of about 1.1 percent; a rise of 1 percent in the real effective value of the yen results in a cumulative decline in output of 0.06 percent. The constant term implies annual growth in trend GNP of slightly over 4 percent. The proportion of the overall variance in output growth explained by changes in monetary conditions is rather low: the  $R^2$  indicates that less than 1/4 of the total variance in quarterly output growth is explained by these indicators. This underscores the importance of looking at monetary indicators in conjunction with other information regarding aggregate demand and supply conditions. 1/

To compare these results with those from a structural model of aggregate demand, a simulation analysis was performed using the IMF's multi-regional macroeconomic model, MULTIMOD. The methodology (as described in Annex II) involved partial simulations of the demand side of the Japanese block of the model for shocks to the real interest rate and the real exchange rate. The results indicated that a rise of 1 percentage point in

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1/ It also raises the question of whether more efficient estimates could be obtained by including non-monetary variables in the set of regressors. Adding lagged growth in two such variables--real government spending and foreign GNP--to equation (3), however, yielded small and insignificant coefficients.

the real interest rate reduced real GNP by about 1 percent, while an appreciation of 1 percent in the exchange rate resulted in a 0.17 percent reduction in GNP.

The interest rate effect is similar to the time-series estimate shown above. The exchange rate effect, however, is considerably larger in MULTIMOD. The latter, in turn, is consistent with a rule-of-thumb calculation of the effect on traded goods flows of exchange rate movements given typical elasticity estimates for Japan. 1/ One reason why the estimated effect in equation (3) may be smaller than that implied by a structural model involves simultaneity bias. Specifically, market expectations of higher future output growth may cause the current exchange rate to appreciate, and vice versa. This can induce a positive correlation between movements in exchange rates and future output, offsetting the negative correlation associated with the effects on trade flows in a structural model. 2/ In any event, it should be noted that the parameter on the real exchange rate in equation (3) is not estimated precisely.

At the same time, the MULTIMOD simulations may not fully reflect Japan-specific aspects of the short-run relationship between the monetary indicators and real GNP (see Annex II). In the event, the divergence between the estimation results and the MULTIMOD simulations was addressed by constraining the parameter on the real exchange rate to a value two standard errors closer to the MULTIMOD result than its freely-estimated value: the implied coefficient of -0.1 lies roughly half-way between the unconstrained value and the MULTIMOD value. With this constraint imposed, the estimated equation for real GNP growth was:

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1/ See Section II of this paper for a survey of trade price elasticities for Japan. Typical elasticities are found to be about -1 for exports and -0.6 for imports. Combined with a share of traded goods in GNP of about 10 percent, this implies that a 1 percent rise in the real exchange rate reduces the real trade balance by 0.16 percent of GNP.

2/ One might ask whether an indicator model should reflect this channel of influence: is it preferable to estimate unconstrained reduced-form relationships without regard to the underlying structural model? While an argument can be made for an unconstrained approach in a forecasting context, here we are primarily interested in the partial effects of monetary conditions on GNP growth. A monetary tightening conventionally causes the exchange rate to appreciate and the trade balance to deteriorate in a structural model; this is the channel that should be reflected in the indicator model. Exogenous, non-monetary, shocks to expectations then show up in the residual in the indicator equation (and may induce a positive correlation between the residual and the real exchange rate).

$$\begin{aligned} \Delta \ln(\text{GNP}) = & 0.0106 - 0.350 \Delta(\text{RSR}_1/100) - 1.083 \text{movavg}(4, \Delta \text{RLR}_1/100) \\ & (11.4) \quad (3.5) \quad (2.6) \\ & - 0.100 \text{movavg}(2, \Delta \ln(\text{REER}_2)) . \quad (3') \\ & (\text{n.a.}) \end{aligned}$$

Sample: 80Q1-90Q4                       $R^2 = 0.180$                       S.E.R. = 0.0061  
F(2,40) = 4.52 (2.84)\*                      DW(1) = 2.14                      AR(4) = 6.57 (9.49)\*\*

- \* F test for the joint significance of the slope parameters (critical value at 95 percent significance level in parentheses).
- \*\* LM test for autocorrelation of degrees 1 through 4,  $-\chi^2(4)$  (critical value at 95 percent significance level in parentheses).

Apart from the constraint on the real exchange rate, this equation is similar to (3). The principal difference is that the sum of the coefficients on lagged interest rates is raised slightly in absolute value--a 1 percentage point rise in the real interest rate lowers output by 1.4 percent.

### 3. Monetary conditions and GNP growth: the recent experience

The fitted values of the right-hand side of equation (3') can be interpreted as an indicator of monetary conditions, or MCI, defined as the estimated impact of past changes in interest rates and exchange rates on current growth in real GNP. <sup>1/</sup> The historical relationship between this definition of the MCI and actual output growth from 1980 to the first quarter of 1991 is shown in Chart 5. The real GNP data have been expressed in terms of four-quarter growth rates to smooth out irregular quarterly movements in output growth; the corresponding MCI series is the sum of quarterly GNP growth rates as predicted by equation (3'). Data on the components of the MCI are provided for recent years in Table 7.

It is apparent from Chart 5 that there are episodes where real GNP growth has been closely related to changes in monetary conditions, and

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<sup>1/</sup> Because changes in monetary conditions will be affected by factors other than the actions of the central bank, the MCI is not intended to be a direct measure of the stance of monetary policy. Indeed, an exogenous contraction in monetary conditions could actually lead to an easing of monetary policy. In addition, monetary conditions are only one of several factors influencing output growth: a broader perspective requires using the MCI in conjunction with other information on, for example, supply shocks, fiscal policy, and demand growth in trading partners.

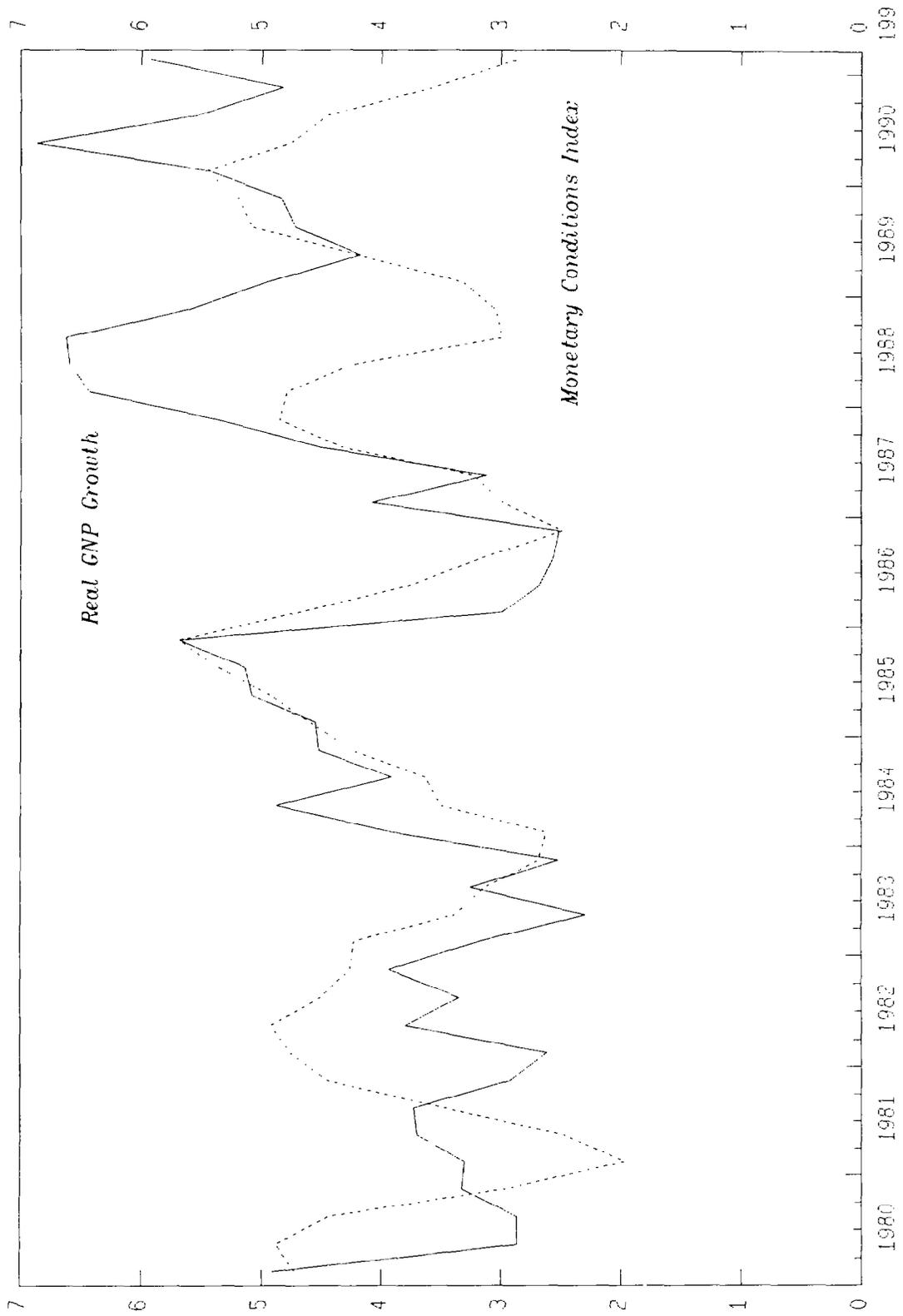
Table 7. Japan: Indicators of Monetary Conditions, 1987-91

	1987	1988	1989	1990	1990				1991				
					I	II	III	IV	I	II	III	IV	
Index of monetary conditions													
Impulse to real GNP growth	-0.6	-1.0	1.2	-0.5	1.0	-1.5	0.7	-2.1	-2.3	1.2	-1.9	0.3	1/
Interest rates													
Real short-term rate	3.4	3.6	1.9	4.5	3.4	3.8	5.0	5.6	3.6	3.6	...	...	
Nominal 3-month CD rate	4.1	4.4	5.3	7.6	7.1	7.3	7.9	8.2	7.9	7.7	...	...	
Expected inflation rate	0.8	0.8	3.4	3.2	3.7	3.5	2.9	2.6	4.4	4.1	...	...	
Real long-term rate	3.6	3.5	3.1	4.5	4.2	3.8	5.2	4.8	3.9	4.0	...	...	
10-year government bond rate	5.0	4.8	5.2	7.0	6.8	6.6	7.7	6.9	6.4	6.6	...	...	
Expected inflation rate	1.4	1.3	2.1	2.5	2.7	2.9	2.5	2.1	2.5	2.6	...	...	
Exchange rates													
Real effective exchange rate (1985=100)	128.4	137.8	131.2	115.5	116.5	109.6	113.0	122.8	121.9	124.6	...	...	
Bilateral exchange rate (Yen per U.S. dollar)	144.6	128.2	138.0	144.8	147.9	155.3	145.2	130.8	133.9	138.4	...	...	
Memorandum items:													
Real GNP growth rate (annual rate)	4.3	6.3	4.7	5.7	6.6	5.6	4.6	2.6	11.2	...	...	...	
Deviation from trend	-0.1	1.9	0.3	1.3	2.2	1.2	0.2	-1.8	6.8	...	...	...	

Sources: Economic Planning Agency, National Income Accounts; Bank of Japan, Economic Statistics Monthly; and staff estimates.

1/ Assuming unchanged real interest rates and exchange rates at June 1991 levels.

Chart 5  
JAPAN  
Real GNP Growth and MCI, 1980-91  
(Four-quarter percent change)



Sources: Economic Planning Agency, National Accounts; and staff estimates.



others where there have been large divergences. <sup>1/</sup> As an example of the former, the 1983-85 period was characterized by significant declines in long-term interest rates and relative stability of the real exchange rate. The resulting easing of monetary conditions was associated with an acceleration of output growth to over 5 1/2 percent by the end of 1985 led by a rebound in final domestic demand. In 1986, the sharp appreciation of the yen caused a tightening in monetary conditions, a deterioration in the external balance, and a plunge in GNP growth to 2 1/2 percent by the end of the year.

Since 1987 the relationship between monetary conditions and output has weakened. For example, the recovery in output growth through 1987 was much larger than that indicated by the mild relaxation of monetary conditions. The principal contributor was a sharp rise in growth in business investment; this, in turn, may have been due more to the collapse in world oil prices in 1986 than to monetary factors. In general, it appears that there has been a somewhat longer lag between changes in monetary conditions and movements in real GNP growth since 1987; there also appears to have been an upward shift in GNP growth relative to that indicated by the MCI. The fall-off in GNP growth in late-1988 and early-1989, for instance, followed the decline in the MCI by three quarters. A similar lag is observed between the easing of monetary conditions starting in the middle of 1988, and the rebound in growth that began in the second quarter of 1989.

Monetary policy has been tightened since mid-1989 in response to speculative pressures in asset markets, strong demand growth, and rising inflation. The Bank of Japan raised the official discount rate (ODR) from 2 1/2 percent to 3 1/4 per cent in May 1989; two further increases resulted in the ODR rising by a further 1 1/2 percentage points by the end of 1989. Long-term market interest rates rose only modestly through December 1989, however. The rise in nominal interest rates that did occur during 1989 was offset by a rise in both actual and expected inflation, causing real interest rates to fall. In conjunction with the weakening of the yen from the peak reached in 1988, monetary conditions continued to ease through 1989 and early 1990, while output growth rose to almost 7 percent on a four-quarter basis by mid-1990.

Markets finally responded to the tightening of policy following the third increase in the ODR in December, 1989; long-term interest rates rose by over 1 percentage point and equity prices plunged. Real interest rates also rose in the first half of 1990 following a leveling-off of inflation expectations. On the other hand, the yen continued to weaken until the

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<sup>1/</sup> A confidence interval can be constructed around the MCI that indicates when growth in real GNP is significantly different from that predicted by equation (3'). On a four-quarter basis, the 95 percent confidence interval is  $\pm 2.4$  percentage points on each side of the MCI. Using this guide, output growth differed significantly from that indicated by the MCI from 1988Q2 through 1988Q4, and again in 1991Q1.

last increase in the ODR to 6 percent in August 1990, after which time there was a sharp appreciation of the currency through the end of 1990. The combined effect of a rising real exchange rate and higher real interest rates caused monetary conditions to tighten from the second quarter of 1990 to the first quarter of 1991. Output growth weakened on a four-quarter basis to 4 3/4 percent by the end of the year. 1/

The first quarter of 1991, however, witnessed a surge in output growth that raised the four-quarter growth rate back to almost 6 percent. To some extent this reflected a combination of temporary factors: a reversal of the drop in consumption in the fourth quarter; a build-up in business inventories; and a surge in net investment income. Abstracting from these factors, however, the data suggest strength in demand in excess of that indicated by monetary conditions. Non-monetary stimuli to aggregate demand, then, appear to have more than offset the mild contraction in monetary conditions that took place in 1990 and early 1991.

Looking ahead, the effect of monetary conditions on real GNP growth is +1.2 percentage points (annual rate) in the second quarter and -1.9 percentage points in the third quarter (see Table 7). Assuming that interest rates and the exchange rate remain at their June levels implies a stimulus to GNP growth in the fourth quarter of +0.3 percent. Given the margin of error in predicting GNP growth for individual quarters, these data should be interpreted as indicating roughly neutral conditions for the remaining quarters of 1991 taken as a whole. This, in turn, reflects the offsetting effects of two factors--a decline in real interest rates in the first half of 1991, and the ongoing effects of the appreciation in the real exchange rate in the second half of 1990. 2/

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1/ Other factors contributing to the slowdown were uncertainty arising from the Gulf War, and the effects on consumption of unusual weather conditions in the fourth quarter.

2/ The recent depreciation of the yen versus the dollar has coincided with an appreciation of the yen versus the EMS currencies, leaving the effective value of the yen roughly unchanged.

IV. Potential Output and the Natural Rate of Unemployment:  
Recent History and Medium Term Prospects

1. Introduction

The analysis of aggregate supply conditions is particularly relevant in Japan at the present time. Rapid output growth averaging over 5 percent during 1987-90 has raised the degree of resource use to a high level. Indeed, in 1990, the operating rate in the manufacturing sector had increased to a level 5-6 percent above the previous two cyclical peaks registered in 1979-80 and 1985, and the unemployment rate had declined to its lowest rate since the mid-1970s. At the same time, cost and price pressures have intensified since 1989. In such circumstances, gauging the extent of tightness in both the labor and product markets is a key ingredient in the process of formulating short-term financial policies.

The analysis is also pertinent for longer term considerations. Assessing the prospects for growth of an economy's supply capacity is a critical ingredient in providing a medium term framework for economic policies. In that regard, Japan's exceptional growth performance of the past several years raises the question of whether medium-term growth prospects should now be reevaluated in a more favorable light, particularly in view of the positive supply effects of the sustained decline in oil prices in 1986. At the same time, the proportion of elderly people in the population is expected to rise rapidly in Japan over the next 25 years. In all likelihood, this aging of the population will be accompanied by a progressive slowing in the growth of the labor supply which, in turn, will have a negative impact on prospects for economic growth. <sup>1/</sup> Thus, efforts to examine the main influences of the supply side of the economy, and to help identify possible ways to improve its functioning, have become increasingly important from the viewpoint of maximizing per capita income and welfare over the long term.

Following the approach taken in several recent studies, <sup>2/</sup> this paper examines supply side conditions, as well as the medium term growth outlook, in terms of potential output and the natural rate of unemployment (UNAT). Potential output is defined as the maximum level of output, measured in terms of real GDP, that can be sustained without increasing inflationary pressures in the economy. This level of output is related, through a production function, to the potential levels of factor inputs and multifactor productivity. In particular, the potential level of labor input is determined, inter alia, by UNAT, which denotes the rate of unemployment

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<sup>1/</sup> An analysis of the effects of demographic transition over the longer term that also incorporates the effects of aging on the private savings rate and other aspects of the Japanese economy is presented in Annex II to the Staff Report.

<sup>2/</sup> See Adams and others (1987) and Adams and Coe (1990).

that would prevail when output is at its cyclically neutral level and when expectations about inflation are realized in wage settlements. UNAT is determined by the prevailing structural and institutional characteristics of the labor market; changes in these structural determinants of the unemployment rate can therefore cause shifts in the natural rate.

Both potential output and UNAT are unobserved variables for which empirical estimates must be constructed. The methodology used in this paper is based on that developed in Adams and Coe (1990), and is described briefly in section 2. <sup>1/</sup> This approach integrates wage and price data with real and structural data in the estimation of potential output and UNAT, and also encompasses many of the alternatives found in the literature. The estimation results are presented in section 3. The recent behavior of potential output and UNAT, along with implications for the extent of present resource constraints, as well as medium-term prospects, are discussed in section 4.

The main conclusions of the analysis may be summarized as follows. First, the growth of potential output in Japan has been steady at 4 percent during 1974-90, and the acceleration in output growth in the past several years appears to have entirely represented a cyclical recovery. Second, with this strong recent recovery, the economy is estimated to have been operating at a level of resource use in excess of its supply potential during 1989-90. The unemployment rate remains above the levels that prevailed in the early 1970s. However, this appears to reflect a rise in the natural rate of unemployment due mainly to the adverse effects of an aging work force and a rise in employers' contributions for non-wage labor compensation that were not fully offset by the impact of a decline in unionization of the labor force. Finally, over the medium term, potential output growth is envisaged, on average, to remain unchanged from its estimated rate during 1974-90. Over the course of the 1991-96 period, however, a projected decline in the growth of the working age population would lead to somewhat slower growth in potential output growth.

## 2. The theoretical model

The supply-side model to be estimated consists of four equations: a production function; an unemployment rate equation; a wage equation; and a price equation. The production function is used to determine expressions for potential output as well as labor productivity at potential output. The expression for potential output is substituted into the unemployment rate equation to determine UNAT that depends solely on its structural determinants. The expressions for potential output, UNAT, and labor productivity at potential are incorporated into the wage and price equations to complete the system of equations. The joint determination of this system implies that the structural estimates of potential output and UNAT are fully

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<sup>1/</sup> In addition to a fuller description of the methodology, the paper by Adams and Coe (1990) provides a review of the most common approaches used to estimate potential output and the natural rate of unemployment.

consistent with one another, as well as with wage and price behavior. In equilibrium, when the output and unemployment gaps are zero and expectations about inflation are realized, wage and price pressures are constant. Real wages increase at the same rate as labor productivity at potential; prices rise with unit labor costs; and profit shares are stable.

The production function is specified as Cobb-Douglas, with the coefficients on capital and labor constrained to be equal to their shares in national income. On this basis, the equation can be estimated in the form of a multifactor productivity equation. Multifactor productivity may be interpreted as a measure of the state of technological progress, and a key determinant is therefore the stock of research and development capital. A number of other factors that may affect multifactor productivity are: the relative price of energy, a rise in which may render part of the capital stock unprofitable; the quality of labor input; the share of output or employment in the services sector, where productivity has been said to grow more slowly; and the intensity with which labor and capital inputs are used. The multifactor productivity equation may be written as follows, with lower-case letters denoting natural logarithms:

$$y - \lambda h - (1-\lambda)k = \delta_0 + \delta_1 rd + \delta_2(U-UNAT) + \delta_3 Z1 \quad (1)$$

where  $y$  is total output;  $h$  is total hours worked;  $k$  is the stock of capital;  $\lambda$  is the share of labor in national income;  $rd$  is the stock of research and development capital;  $U-UNAT$  is the gap between the actual unemployment rate ( $U$ ) and the natural rate of unemployment ( $UNAT$ ), which captures the impact of cyclical fluctuations on the intensity of factor use; and  $Z1$  is a vector of variables that measures the other possible factors influencing multifactor productivity.

Smoothing the various long-run determinants of output to their trend values, and assuming a cyclically-neutral intensity of factor use, potential output ( $y^*$ ) may be defined as follows (with *italics* denoting trend values):

$$y^* = \lambda h + (1-\lambda)k + \delta_0 + \delta_1 rd + \delta_3 Z1 \quad (2)$$

The level of potential output is made consistent with  $UNAT$  by incorporating the natural rate into the calculation of trend hours worked. With  $E$  denoting total employment,  $L$  the labor force,  $POP$  the working age population, and  $PART$  the participation rate, trend total hours worked  $H$  can be expressed as:

$$H = (H/E)(E/L)(PART)POP \quad (3)$$

And since  $E/L$ , the employment rate, is equal to  $(1-U)$ ,  $E/L$  is equal to  $(1-UNAT)$ .

Equations (2) and (3) are also used to define labor productivity at potential output ( $q^*$ ):

$$q^* = y^* - h = (\lambda-1)h + (1-\lambda)k + \delta_0 + \delta_1rd + \delta_3Z1 \quad (4)$$

The natural rate of unemployment may be derived from an unemployment rate equation that relates unemployment to cyclical as well as structural factors. 1/ Possible cyclical factors would include, in addition to an output gap term, variables that measure the impact of supply shocks. Two such variables that may temporarily affect the unemployment rate are the terms of trade and the price of energy prices relative to producer prices. If real wages are not perfectly flexible, then a fall in the terms of trade or a rise in the relative price of energy may drive a wedge between real consumption wages--wages measured relative to consumption goods prices--and real product wages--wages measured relative to producer prices. This positive gap between the actual and "warranted" level of real wages will lower the demand for labor relative to its supply, and result in a rise in the unemployment rate.

Structural determinants of the unemployment rate would include those that could contribute to labor market rigidities: the degree of unionization of the labor force, the generosity of the unemployment insurance system, relative minimum wages, and employer contributions for nonwage labor compensation in relation to wages and salaries. Demographic factors also could affect the unemployment rate. If different demographic groups have different job search times, then changes in the demographic composition of the labor force will result in shifts in the overall UNAT.

The unemployment rate may be expressed in terms of its various determinants as follows:

$$U = \alpha_0 + \alpha_1(y-y^*) + \alpha_2\Delta tt + \alpha_3DEM + \alpha_4Z2 \quad (5)$$

where  $tt$  is the terms of trade (or the relative price of energy),  $DEM$  is a vector of demographic variables, and  $Z2$  is a vector of structural determinants. Setting the output gap and supply shock variables equal to zero, the natural rate of unemployment is calculated as:

$$UNAT = \alpha_0 + \alpha_3DEM + \alpha_4Z2 \quad (6)$$

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1/ A more common approach to determining UNAT is to derive it from the estimated coefficients of an estimated Phillips curve (see Adams and Coe, 1990, pages 236-237). That approach, however, does not allow the influence of structural features of labor markets on UNAT to be identified.

The wage equation is based on a standard expectations-augmented Phillips curve. The growth in nominal wages ( $\Delta w$ ) is related to the unemployment gap ( $U-UNAT$ ), expectations of consumer price inflation ( $\Delta pc^e$ ), a weighted average of actual labor productivity growth ( $\Delta q$ ) and labor productivity growth at potential output ( $\Delta q^*$ ), and the gap between the growth in consumer prices and that in output prices ( $\Delta pc - \Delta p$ ). Actual labor productivity growth is included in addition to trend labor productivity growth because firms may choose not to fully pass through to prices short-term movements in labor costs. The price gap term is included because workers are concerned with the real consumption wage, while producers are concerned with the real product wage, suggesting that wage settlements may be related to a weighted average of consumer prices and output prices. 1/ In the long-run, actual labor productivity growth will be equal to labor productivity growth at potential, and the price gap will be zero. The wage equation is specified as:

$$\Delta w = \beta_1(U-UNAT) + \beta_2(\Delta q - \Delta q^*) + \beta_3\Delta q^* + \beta_4\Delta pc^e + \beta_5(\Delta p - \Delta pc) \quad (7)$$

with equilibrium conditions implying  $\beta_3=1$  and  $\beta_4=1$ .

The price equation is specified as a dynamic version of a markup equation. Under this approach, value-added product prices are set in the long run as a constant markup over unit labor costs at potential. In the short run, however, the markup may vary with the degree of excess demand in product markets, the difference between actual and trend unit labor costs, and shifts in the terms of trade. 2/ With the level of the output gap ( $y-y^*$ ) measuring the degree of excess demand, the price equation is written in dynamic form as:

$$\Delta p = \psi_1(y-y^*) + \psi_2(\Delta ulc - \Delta ulc^*) + \psi_3\Delta ulc^* + \psi_4\Delta tt \quad (8)$$

with  $\Delta ulc = \Delta w - \Delta q$ ,  $\Delta ulc^* = \Delta w - \Delta q^*$ , and  $\psi_3=1$ . 3/

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1/ Particularly following a terms of trade shock, the wage settlement would be expected to be a compromise outcome that balances (expected) developments in both consumer and producer prices.

2/ The sign of the coefficient on the change in the terms of trade is expected to be positive: for example, following a negative terms of trade shock, producers concerned with protecting market shares would lower profit margins, at least temporarily.

3/ One important issue is whether the change in output prices should depend on the level or the change in the output gap. This is tested by including both gap terms in the estimation.

### 3. Estimation results

The estimated model included four behavioral equations: the multi-factor productivity equation (1); the structural unemployment rate equation (5); the wage equation (7); and the price equation (8). On the basis of national income accounts data, output was measured by real GDP (in 1985 prices), the nominal wage by total hourly compensation of employees, and the output price by the GDP deflator; the unemployment rate was defined in terms of economy-wide unemployment. Since potential output and UNAT are unobserved, the expressions for potential output (2), labor productivity at potential output (4), and UNAT (6) were substituted as required into the unemployment rate, wage, and price equations. Given the numerous cross-equation parameter restrictions, and in order to simplify the specification of the equation system, an iterative procedure was employed rather than substituting the expression for UNAT into that for potential output. 1/ Following Adams and Coe (1990), a consistent initial estimate for UNAT was used to calculate both "potential" hours worked (or labor input) and the unemployment gap, that in turn were used to provide an estimate of potential output. The results of estimating the model were used to obtain a new estimate of UNAT that was then used to calculate new measures of "potential" labor input and the unemployment gap; this procedure was repeated until the estimate for UNAT converged.

In view of the fact that many exogenous shocks would be expected to simultaneously affect the various dependent variables and result in correlation in the errors across the four equations, the system was estimated using nonlinear three stage least squares. 2/ The estimation results for a quarterly sample period from 1974:I to 1990:I are presented in Tables 8a-8c. 3/ Based on both the summary statistics as well as individual t-statistics, the model appears to fit the data well, with all coefficients correctly signed.

Looking first at the productivity equation, the results suggest that research and development expenditures have been the main long-run determinant of multifactor productivity, adjusted for cyclical variations,

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1/ Substituting the expression for UNAT into that for potential output, and then incorporating the expression for potential output into the unemployment rate equation, would result in a complex specification where the expression for the natural rate was entered back into the unemployment rate equation.

2/ Preliminary single equation estimates were used to determine the specification of lag distributions.

3/ The results shown are for the final systems simultaneous estimation, which excluded variables that were found to have statistically insignificant or incorrectly signed coefficients in preliminary regressions.

Table 8a. Three-Stage Least Squares Estimates:  
Equation System Specification 1/

$$(1:1) \quad U = \alpha_0 + \alpha_1 \text{RLOLD} + \alpha_2 \text{UIRR} + \alpha_3 \text{RUNION} + \alpha_4 \text{NWLC} \\ + \alpha_5 \text{ADLTT} + \alpha_6 (y-y^*) + \alpha_7 U_{-1}$$

$$(1:2) \quad \Delta w = \beta_1 (U - \text{UNAT}) + \beta_2 (\Delta q - \Delta q^*) + \beta_3 \Delta q^* \\ + \beta_4 (\Delta p - \Delta pc) + \beta_5 \Delta pc^e$$

$$(1:3) \quad \Delta p = \psi_1 (y - y^*) + \psi_2 (\Delta w^t - \Delta q^*) \\ + \psi_3 [(MA_2 (\Delta w - \Delta q)) - (\Delta w^t - \Delta q^*)] \\ + \psi_4 \Delta tt + \psi_5 MA_8 (\Delta tt)$$

$$(1:4) \quad y - \lambda h - (1 - \lambda)k = \delta_0 + \delta_1 rd + \delta_2 [(U - \text{UNAT}) - \\ \delta_3 (U - \text{UNAT})_{-1}] + \delta_3 [y - \lambda h - (1 - \lambda)k]_{-1}$$

where:  $y^* = \lambda h^* + (1 - \lambda)k^* + (\delta_0 / (1 - \delta_3)) + (\delta_1 / (1 - \delta_3))rd$   
 $\text{UNAT} = (1 / (1 - \alpha_7)) [\alpha_0 + \alpha_1 \text{RLOLD} + \alpha_2 \text{UIRR} + \alpha_3 \text{RUNION} + \\ + \alpha_4 \text{NWLC}]$   
 $q^* = y^* - h^*$

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1/ Note: Equations (1:1)-(1:4) were estimated over the sample period 1974:1 to 1990:1, with the expressions for  $y^*$ , UNAT and  $q^*$  substituted as appropriate.  $MA_i$  refers to an  $i$ -quarter moving average.

Table 8b. Estimation Results

Equation	(1:1)	(1:2)	(1:3)	(1:4)
Coefficients $\underline{1/}$	$\alpha_0 = -8.079$ (2.58)	$\beta_1 = -0.0100$ (0.0075)	$\psi_1 = 0.196$ (0.073)	$\delta_0 = -1.07$ (0.333)
	$\alpha_1 = 0.153$ (0.067)	$\beta_2 = 0.163$ (0.184)	$\psi_2 = 1.0$ (constrained)	$\delta_1 = 0.024$ (0.0073)
	$\alpha_2 = 0.078$ (0.027)	$\beta_3 = 1.0$ (constrained)	$\psi_3 = 0.991$ (0.093)	$\delta_2 = -0.024$ (0.012)
	$\alpha_3 = 0.125$ (0.041)	$\beta_4 = 0.809$ (0.238)	$\psi_4 = 0.033$ (0.015)	$\delta_3 = 0.780$ (0.069)
	$\alpha_4 = 0.076$ (0.046)	$\beta_5 = 1.0$ (constrained)	$\psi_5 = 0.071$ (0.027)	
	$\alpha_5 = 0.477$ (0.277)			
	$\alpha_6 = -4.518$ (-1.014)			
	$\alpha_7 = 0.598$ (-0.071)			
$\bar{R}^2$	0.963	0.728	0.778	0.974
SEE	0.073	0.010	0.006	0.006
DW (Durbin's h)	(1.566)	2.155	1.859	(-1.732)

$\underline{1/}$  Standard errors in parentheses.

Table 8c. Variable Definitions 1/

<u>Variable</u>	<u>Definition</u>
U	Unemployment rate.
RLOLD	Share of workers aged 55 and over in the labor force, 8-quarter moving average.
UIRR	Unemployment insurance replacement ratio adjusted for changes in share of labor force covered, 12-quarter moving average.
NWLC	Employer's contributions as a percent of total compensation, 8-quarter moving average.
RUNION	Labor force unionization rate, 4-quarter moving average.
ADLTT	Four-quarter moving average of absolute percent deviation in terms of trade.
y	Actual output--real GDP in 1985 prices.
y*	Potential output.
w	Hourly compensation.
UNAT	Natural rate of unemployment.
q	Output per hours worked.
q*	Output per hours worked at potential output.
p	Output price (GDP deflator).
pc	Private consumption deflator.
pc <sup>e</sup>	Expected consumption price.
w <sup>t</sup>	Trend hourly compensation, defined as 12-quarter moving average.
tt	Terms of trade.
λ	Share of worker compensation in total income.
h	Total hours worked.
k	Real stock of private capital.
rd	Stock of research and development expenditures.
h*	Potential labor input.
k*	Potential capital input, defined as four-quarter moving average of capital stock.

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1/ Lowercase letters denote natural logarithms.

in Japan. 1/ Variables intended to capture the impact of other possible factors--that is, changes in the share of the services sector in output or employment, changes in the relative price of energy, and changes in the quality of the labor force--were all found to have statistically insignificant or incorrectly signed coefficients. The estimated long-run elasticity of multifactor productivity, as well as potential output, to the stock of research and development capital is equal to 0.1. This result is almost identical to those recently obtained for the United States and the (former) Federal Republic of Germany, 2/ and at the top of the range of estimates for the United States cited by Griliches (1988). While differences in coverage and data construction do exist between this study and the others, the results suggest that differences in productivity growth among the three major countries could be related mainly to differences in the rate of growth of the stock of research and development capital, with the impact of changes in that stock on multifactor productivity broadly comparable among the three. 3/

The estimation results for the unemployment rate equation imply the following expression for the natural rate of unemployment:

$$\text{UNAT} = -20.10 + 0.38*\text{RLOLD} + 0.19*\text{UIRR} + 0.31*\text{RUNION} + 0.19*\text{NWLC}$$

The results suggest that the generosity of unemployment insurance, as measured by the ratio of the average unemployment insurance benefit payments to the average wage (UIRR), 4/ the share of unionized workers in the labor force (RUNION), and the share of nonwage labor compensation (NWLC), have all had an influence on the natural rate of unemployment in Japan. Among the various variables related to the demographic composition of the labor force, the share of workers aged 55 and over in the labor force (RLOLD) was found to have a significant positive impact on UNAT, an important result in view of the prospective rapid aging of the population in Japan.

With regard to the behavior of the unemployment rate when not at equilibrium, neither the level nor the change in the terms of trade was found to have a significant impact on unemployment in the expected negative

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1/ The stock of research and development capital is constructed on the basis of data on research and development expenditures, using the technique suggested in Goto and Suzuki (1989). The lag structure allows for lags in expenditures on research and development becoming fully productive, with the cyclical shocks to productivity transmitted instantaneously.

2/ See Adams and Coe (1990) and Coe and Krueger (1990), respectively.

3/ In particular, real output in this study is defined in terms of the overall economy, while it is defined in terms of the private nonfarm business sector in the two recent studies on the United States and the (former) Federal Republic of Germany.

4/ Adjusted for changes in the share of the labor force covered by unemployment insurance.

direction, that is, by changing the product wage relative to the consumption wage as discussed above. However, the results suggest that the absolute value of the deviation in the terms of trade (ADLTT), or either an improvement or a deterioration in the terms of trade, works to temporarily raise unemployment in Japan. This result could be due to the explanatory variable picking up cyclical effects--a positive terms of trade change related to an appreciation of the yen may increase unemployment temporarily because it would lower demand for exports. However, it could also reflect the fact that terms of trade shocks, in either direction, cause changes in the sectoral composition of output which create mismatches between labor demand and labor supply. Until labor is reallocated across sectors, the unemployment rate would tend to rise even if aggregate output was not affected, with sectoral imbalances between labor demand and supply being eliminated through changes in average hours worked and productivity. Finally, the estimated elasticity of the unemployment rate to the output gap is equal to -0.11. This estimated elasticity is only one third of that recently obtained for the United States, 1/ which is consistent with a priori expectations regarding the influence of lifetime employment practices in Japan.

Looking briefly at the wage and price equations, two interesting results stand out. First, the estimated coefficient on the difference between output prices and consumer prices of 0.81 in the wage equation suggests that wages in Japan are primarily determined by product prices. 2/ In other words, real wages appear to be almost fully flexible with respect to product prices, which would explain why neither the level nor the change in the terms of trade appears to influence the unemployment rate. Second, while output prices are determined by trend unit labor costs in the long run, the results also indicate that short-run shocks to unit labor costs are quickly passed on to output prices. 3/ One might expect producers to absorb shocks to labor costs in profit margins for somewhat longer than two quarters, as implied by these estimates. 4/ The results appear to suggest a high degree of price and wage flexibility in Japan, perhaps reflecting the annual renegotiation of a large proportion of wage contracts as well as the heavy reliance on adjustments in overtime hours in response to shifts in labor demand.

#### 4. The natural rate of unemployment and potential output

This section first discusses developments in potential output and the natural rate of unemployment in Japan during 1974-90, as well as the associated unemployment and output gaps, on the basis of the estimation

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1/ Adams and Coe (1990).

2/ A similar result was obtained by Chan-Lee and others (1987).

3/ The estimated coefficient on the difference between the two-quarter moving average of changes in unit labor costs and the trend change in unit labor costs is equal to one.

4/ For example, profit margins on Japanese exports appear to respond to changes in competitiveness for longer periods. See Corker (1989).

results reported in Table 8b. 1/ It then presents a scenario for the growth of potential output over the medium term (1991-96) that is based on a number of assumptions concerning the structural determinants of potential output and the natural rate of unemployment.

#### The Natural Rate of Unemployment

In the time since the first oil shock, Japan's unemployment rate increased from 1.3 percent at the beginning of 1974 to a peak of 3 percent in the second quarter of 1987, before declining during the current expansion to reach 2.1 percent by the first quarter of 1990 (Chart 6). The period when unemployment was rising may be divided into two phases. During the first phase, from early 1974 to mid-1979, a 0.7 percentage point rise in the unemployment rate may be attributed almost entirely to a rise in UNAT (Table 9). During the second, from mid-1979 to mid-1987, a 1 percentage point rise in the unemployment rate reflected mostly cyclical factors, with UNAT estimated to have risen only slightly further. During the past several years, while UNAT has declined somewhat, the drop in unemployment may be associated mainly with economic recovery--the natural rate of unemployment remains almost a percentage point above its estimated level in 1974.

Table 9 also shows the sources of changes in the estimated path of UNAT. The rise in the natural rate in the period up to mid-1979 is ascribed to two factors: a 10 percent increase in the unemployment insurance replacement ratio; 2/ and a large rise in employers' contributions in relation to wages and salaries, from 8 percent to 10 1/2 percent. During the 1980s as a whole, UNAT was unchanged. On the one hand, the aging in the work force that was already occurring during the 1980s--the labor force share of older workers (aged 55 years and over) rose by 4 percentage points--and a further strong rise in the nonwage labor costs, worked to raise UNAT. This was offset, however, by the effects of a sharp drop in the degree of unionization of the labor force--from about one third in 1979 to one fourth by 1990. Most recently, a halt in the rise in employer contributions has contributed to a slight fall in the natural rate.

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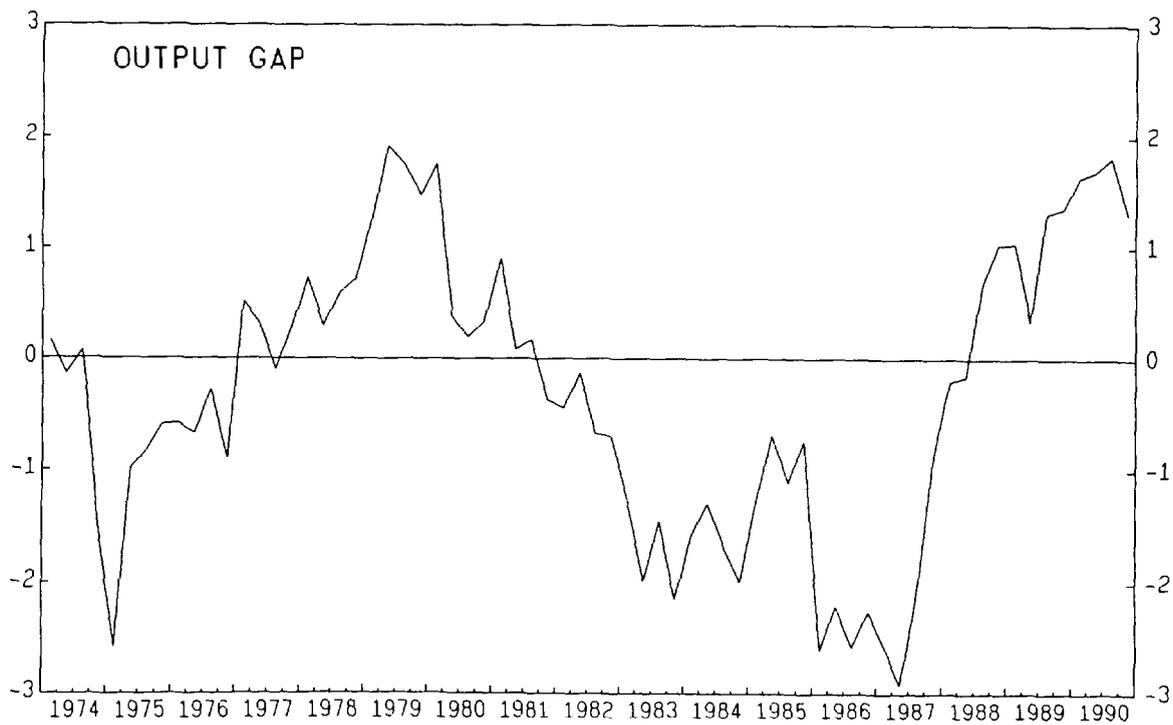
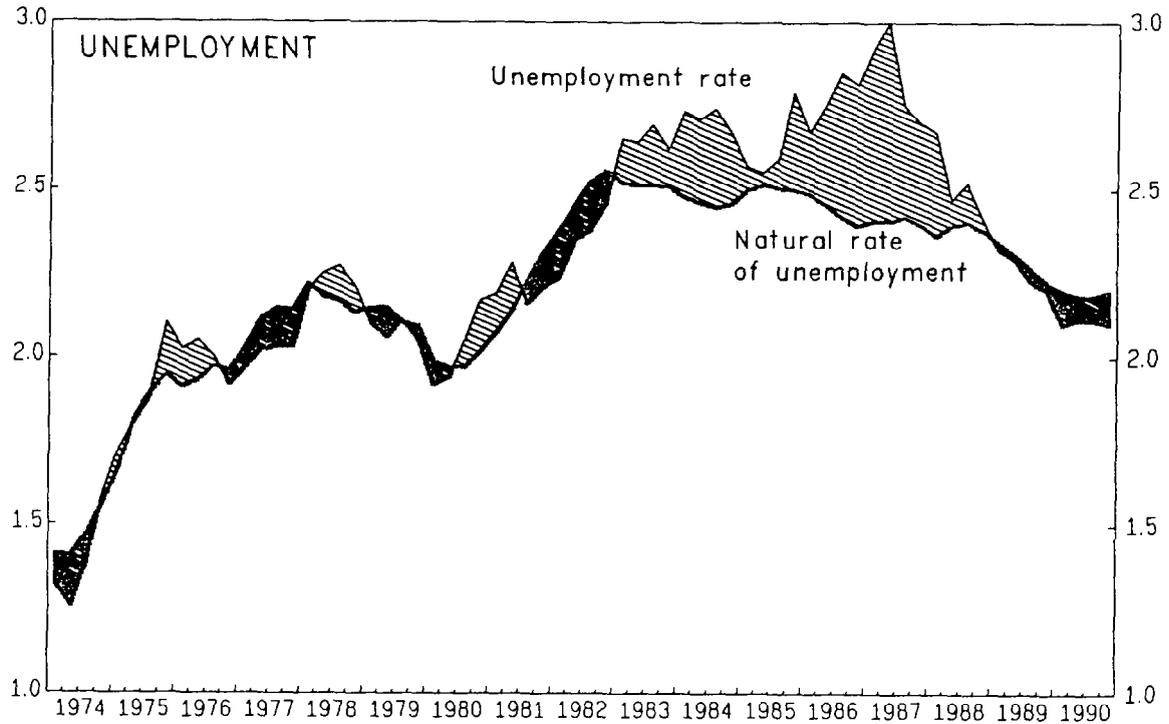
1/ While the sample period ended in the first quarter of 1990, estimates for potential output and UNAT were made through the fourth quarter of 1990 on the basis of the estimated coefficients and actual data or estimates for the exogenous variables. To calculate output gaps for the final three quarters of 1990, quarterly growth rates of real GNP were used to estimate real GDP, which was available only through the first quarter.

2/ This increase reflected both a rise in the share of the labor force covered by unemployment insurance as well as some increase in average benefits.

CHART 6

JAPAN

UNEMPLOYMENT AND OUTPUT GAPS, 1974-90



Sources: Data provided by the Japanese authorities; and staff estimates.



Table 9. Japan: Contributions to Changes in the Natural Rate of Unemployment, 1974-1990

(In percent)

Contributions	1974:I- 1979:II	1979:III- 1987:II	1987:III- 1990:IV
Changes in actual rate	0.7	0.9	-0.9
Changes in natural rate	0.7	0.3	-0.2
Owing to:			
Share of older workers	0.2	1.1	0.6
Unemployment insurance replacement ratio	0.5	-0.1	-0.1
Unionization	-0.4	-1.3	-0.8
Employers' nonwage contributions	0.4	0.6	0.1
Memorandum items: (end-period)			
Actual unemployment rate	2.1	3.0	2.1
Natural unemployment rate	2.1	2.4	2.2
Unemployment gap	-0.1	0.6	--

### Potential Output

Table 10 presents the estimates of potential output growth in Japan since 1974, along with the contributions to growth of capital and labor and multifactor productivity. On the basis of the estimation results reported above, potential output is calculated as:

$$y^* = -4.83 + 0.58*h + 0.42*k^* + 0.11*rd_1$$

where, again, the coefficients on labor and capital inputs are their average shares in national income over the sample period. The growth contribution of each factor is defined as the growth rate of the potential factor input times the elasticity of output with respect to that factor.

Table 10. Japan: Contributions to the Growth in Potential Output  
(Percentage changes at annual rates)

Contributions	1974:I- 1979:II	1979:III- 1987:II	1987:III- 1990:IV
Potential output	4.0	4.1	4.0
Labor	-0.1	0.7	0.6
Capital	3.2	2.6	2.6
Multifactor productivity	0.9	0.9	0.8
of which:			
Research & development capital	0.9	0.9	0.8
Memorandum items:			
Actual output growth	4.4	3.5	5.3
Output gap (in percent, end of period)	1.9	-2.9	1.3

Note: The output gap is defined as actual minus potential output.

The estimates suggest that potential output growth in Japan has been virtually unchanged at about 4 percent since the mid-1970s. <sup>1/</sup> Indeed,

<sup>1/</sup> This rate of potential growth is substantially lower than that estimated for the postwar period prior to 1974. Adams and others (1987) estimated that potential output growth averaged 8 1/2 percent during 1966-73, compared with 3 3/4 percent during 1974-85. In that study, the sharp slowdown in potential growth in the mid-1970s mainly reflected a 4 percentage point reduction in the contribution of multifactor productivity growth. While the factors that caused that reduction were not precisely identified, the authors concluded that it was probably due to the completion of the process of postwar reconstruction and a reduced scope for productivity gains through technological catch-up with the United States. While the rise in oil prices was estimated to have reduced the level of potential output in the mid 1970s by rendering a portion of the capital stock obsolete, it was not judged to be a factor in reducing productivity growth thereafter. To the extent that relative energy prices or the terms of trade were not found to have a permanent effect on productivity growth or the natural rate of unemployment, the results of this study do not contradict that conclusion.

the exceptional growth performance in Japan during the past several years appears to be entirely cyclical in nature.

Looking back at the contributions of the various factors between the first and second oil shocks, the capital stock increased at an average annual rate of  $7 \frac{3}{4}$  percent and accounted for over three fourths of the growth in potential output. Labor input made a slight negative contribution to potential output growth, as a substantial fall in average hours worked, as well as a modest decline in the participation rate, offset the growth in the population of working age. The rise in UNAT also reduced the contribution of labor, by 0.1 percentage point per annum, during this period. In the 1980s, growth in the capital stock continued to be the main source of potential output growth, but the annual contribution of capital declined by over  $\frac{1}{2}$  of a percentage point. This was compensated, however, by a modest positive contribution from labor that reflected the growth of the working age population, while average working hours and the participation rate were broadly unchanged. For the last decade as a whole, because UNAT was unchanged it had a neutral impact on potential output growth.

The estimation results also suggest that the contribution of multifactor productivity growth, or namely, research and development expenditures, has been broadly constant over the last decade and a half. During the latter part of the 1970s, the stock of research and development capital rose at an annual rate of  $9 \frac{1}{4}$  percent. The pace of increase slowed only a little to  $8 \frac{1}{4}$  percent during the 1980s, leading to only a 0.1 percentage point decline in multifactor productivity growth.

The results obtained above, along with those recently obtained for the United States (Adams and Coe, 1990) and the (former) Federal Republic of Germany (Coe and Krueger, 1990), suggest that the rate of potential output growth in Japan is  $1 \frac{1}{4}$  percentage points higher than in the United States and  $1 \frac{3}{4}$  percentage points higher than in the (former) Federal Republic of Germany. 1/ This superior growth performance of Japan can be explained according to the following factors. With respect to the United States, it can be traced mainly to a higher capital contribution in Japan, reflecting a higher level of investment and therefore faster growth in the capital stock. With respect to the (former) Federal Republic of Germany, it may be attributed to both a greater capital contribution as well as a large differential in the labor contribution, with hours worked declining in the (former) Federal Republic of Germany owing to a rise in the natural rate of unemployment as well as a trend decline in average hours worked. In

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1/ The discussion in this paragraph abstracts from differences in coverage and sample periods. In particular, as noted above, output in the two studies on the United States and (former) Federal Republic of Germany was defined in terms of the nonfarm business sector. During 1974-90, however, real GDP in the nonfarm business sector rose only 0.1 percent per year faster than overall real GDP in Japan.

addition, research and development expenditures have contributed about 1/4 percent more to potential output growth in Japan compared with both the United States and the (former) Federal Republic of Germany. While, as noted above, the estimated elasticity of output with respect to research and development capital is comparable among the three countries, the growth in the stock of such capital has been substantially more rapid in Japan. During 1974-90, the growth rate was 8 1/2 percent in Japan compared with 5 1/2 percent in the United States and 4 1/2 percent in the (former) Federal Republic of Germany.

#### Unemployment, Output Gaps, and Inflation

As shown in Tables 9 and 10, the strong economic expansion during 1987-90 appears to have brought the Japanese economy to a level of resource use in excess of its long-term supply potential. The estimates indicate that output appears to have been above its supply potential since the second half of 1988, with the unemployment rate just below its natural rate since the first quarter of 1989. Indeed, the output gap is estimated to have risen to a peak of 1 3/4 percentage points in the third quarter of 1990, before declining to 1 1/4 percentage points in the following quarter. According to the estimated price equation in this study, excess demand pressure of 1 1/2 percentage points would imply direct upward pressure on product price inflation of about 1 1/4 percent on an annual basis. 1/ Moreover, along with the elimination of any unemployment gap, this excess demand is contributing to significant upward pressures on wages. Of course, the ultimate impact of excess demand on wage and price inflation depends on the response of inflationary expectations.

#### Medium-Term Prospects

We may now use the empirical results presented above, as well as assumptions regarding the behavior of the exogenous structural determinants, to evaluate prospects for the growth of potential output and the natural rate of unemployment for the 1991-96 period.

The medium-term outlook for potential output will depend on the assumed path of potential factor inputs. The projected growth of the capital stock over the medium term is based on the assumption that following the substantial rise in investment spending in 1988-90, the ratio of gross business fixed investment to value added stabilizes in nominal terms. Assuming further a modest continued decline in the relative price of capital goods, 2/ business fixed investment is projected to rise at an average

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1/ The changes in prices and wages in the system estimation are defined on a quarterly basis, and thus the coefficient estimates in the price and wage equations determine quarterly inflation rates.

2/ Largely reflecting declines in computer prices, the deflator for business fixed investment fell in relation to the overall value-added deflator at an annual average rate of 2 1/2 percent during 1981-90.

annual rate of 5 3/4 percent over the projection period. This projected growth in business investment represents a significant slowdown from that registered during 1988-90. However, the increase in the level of investment during the past three years implies that the growth of the capital stock would still accelerate somewhat in the period ahead. Indeed, potential capital input--the four-quarter moving average of the capital stock--is estimated to increase at an average annual rate of 7 percent over the medium term, compared with 6 percent during 1987-90 and the average growth of 6 3/4 percent registered during 1974-90.

Research and development expenditures are assumed to grow in line with business fixed investment in real terms. Under this assumption, the stock of research and development capital is projected to grow at an average annual rate of 7 1/2 percent over the medium term. This would be down somewhat from the 8 1/2 percent pace registered over the 1974-90 period as a whole, but only slightly lower than the estimated average increase of 7 3/4 percent registered during 1987-90.

The projected behavior of labor input will depend on assumptions regarding the growth of the population of working age, the labor force participation rate, and average working hours, and on assumptions regarding the structural determinants of UNAT. Projections for the growth of the working age population are based on the most recent long-term population projections prepared by the Japanese Government. 1/ According to these estimates, the growth rate of Japan's adult population (15 years and over) is projected to slow steadily to average 3/4 percent per annum over the medium term, compared with 1 1/4 percent on average during the last 15 years. With regard to the labor force participation rate, after rising since 1987 due to a rise in female participation in response to a tightening of labor market conditions, it is projected to decline modestly in the period ahead owing to the effects of population aging. Specifically, while the participation rates of 5-year age cohorts are all assumed to remain constant at levels registered in early 1991, the projected rise in the share of workers aged 55 years and above with lower participation rates leads to a fall in the overall participation rate--from 63 1/2 percent in 1991 to 63 percent by the end of 1996.

With regard to average hours worked, they declined by about 1 percent per annum during 1989-90, and the Government's medium-term objective of reducing working hours to 1800 hours a year (that has been in place since 1988) would represent a further decline of 10 percent. Also, recent labor contract settlements have included general provisions for reductions in working hours. However, it should be noted that the recent decline in average working hours was associated, at least partly, with a rise in the female labor force participation rate and the fact that a substantial

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1/ See Government of Japan, Ministry of Health and Welfare (1987).

portion of new female participants were entering on a part-time basis. <sup>1/</sup> Furthermore, with long working hours a major factor deterring the participation of married women and older workers, the continued shortening in hours should spur a further rise in labor force participation. Finally, in the context of the recent contract negotiations, specific timetables for reductions in working hours have not been set, and firms have stressed that such reductions would need to be accompanied by improvements in productivity. Given these uncertainties regarding the timing and effects of lower working hours, it is assumed that a further fall in average hours would be accompanied by increases in the participation rate or labor productivity, leaving effective working hours unchanged at the average level in 1990.

The projections for UNAT are derived on the basis of the following assumptions regarding its structural determinants. First, on the basis of the official long-term population projections, and on the assumption of constant age-specific labor force participation rates as described above, the share of older workers (aged 55 years and over) in the labor force is assumed to rise by about 1 3/4 percentage points over the 1991-96 period. Second, the rate of unionization of the labor force is assumed to continue to decline by 1/4 of a percentage point a year, about the same pace of decline registered during 1985-90. This further decline could be consistent with a continued rise in the importance of the service sector and, in addition, with the increasing share of older workers in the labor force, a relatively larger proportion of whom would be expected to participate in the labor force on a non-union or self-employed basis. With regard to employer contributions, their share in total labor compensation has been broadly unchanged since 1988, and the ratio is assumed to remain constant over the medium term. Finally, the generosity of unemployment insurance, as measured by the replacement ratio, is assumed to also remain unchanged in the period ahead.

A medium-term scenario for potential output growth and the natural rate of unemployment implied by these various assumptions is shown in Table 11. For the 1991-96 period as a whole, potential output growth is projected to average 4 percent, unchanged from its estimated rate during the 1980s. The capital deepening resulting from the sharp rise in the share of investment in value added during 1988-90 is projected to raise the contribution of capital input substantially. This offsets a decline in the contribution of potential labor input, which would be due mainly to the projected slowdown in the growth of the working age population. The adverse effects of the envisaged increase in the share of older workers on the aggregate

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<sup>1/</sup> In 1986, 32 percent of all new female entrants were estimated to have been hired on a part-time basis (Government of Japan, 1988).

Table 11. Japan: Medium-Term Scenario for Potential Output Growth and the Natural Rate of Unemployment, 1991-96

	1991-96	1991-94	1995-96
	<u>(Percentage changes at annual rates)</u>		
Potential output	4.0	4.1	3.8
Contributions of:			
Labor	0.2	0.3	0.2
Employment rate	--	--	--
Growth of working age population	0.4	0.5	0.3
Participation rate	--	--	--
Average work hours	-0.1	-0.2	--
Capital	3.0	3.1	2.8
Multifactor productivity	0.8	0.8	0.7
	<u>(In percent)</u>		
Change in natural rate of unemployment	0.2	0.1	0.1
Owing to:			
Share of older workers	0.7	0.5	0.2
Unemployment insurance replacement ratio	--	--	--
Unionization	-0.5	-0.3	-0.2
Employers' nonwage contributions	--	--	--
Natural rate of unemployment (end-period)	2.4	2.3	2.4

Source: Staff estimates.

participation rate and UNAT exert a marginal negative impact on potential output growth. 1/

While the assumptions imply unchanged average growth of potential output over the medium term, they also imply a modest slowing toward the end of the projection period. The contribution of labor declines steadily, reflecting a progressive slowing in the growth of the working age population and a decline in the aggregate participation rate. At the same time, the assumed path of business investment implies that the rate of increase of the capital stock slows over the medium term, resulting in a small decline in the contribution of capital.

The high level of investment spending that is assumed to be sustained over the medium term is sufficient to keep potential output growth at 3 3/4 percent during 1995-96, the last two years of the projection period. Nevertheless, the projections do show that demographic transition will be working to lower potential growth in Japan in the years to come. It should be emphasized, however, that any assessment of medium-term prospects for potential output and the natural rate of unemployment depends critically on the assumptions made concerning the various exogenous or structural determinants. 2/ In particular, assumptions about these determinants may not fully take account of the inter-relationships among them. For example, a progressive slowing in available labor may induce firms to increase their efforts to incorporate new technologies and raise productivity. Also, a rise in the proportion of older workers in the labor force would be expected to encourage changes in labor market practices that would facilitate the increased participation of the elderly. On the other hand, as noted above, the projections do not assume a further decline in average hours worked. If average hours were to continue without offsetting increases in the participation rate or labor productivity, potential output growth clearly would be lowered.

Thus, the projections presented above represent a conditional scenario based on specific assumptions regarding the exogenous determinants. Alternative assumptions would lead to a different assessment. It seems likely, however, that given the high rate of investment at present, and the relatively rapid pace of multifactor productivity growth in the past, the potential growth rate of the Japanese economy over the 1991-96 period will remain close to 4 percent, its estimated rate during the past 15 years.

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1/ While the contemporaneous values for the participation rate and average working hours were assumed to remain unchanged, defining potential labor input in terms of their trend (moving-average) levels implied that they made small contributions, positive and negative, respectively, at the beginning of the projection period.

2/ The outlook will also depend on the production function that is used, and in particular, on the elasticity of substitution between labor and capital. The higher (lower) the elasticity of substitution, the greater (lesser) the scope for capital deepening to offset the effects of lower growth in the labor force.

## V. The Social Security Pension and Health Insurance System

### 1. Introduction

This note describes the medical care and pension schemes of Japan's social security system. The medical care insurance system was introduced in the 1920s and 1930s, and the pension system in the middle of the century. During the late 1950s, 1960s, and 1970s policymakers expanded the scope, coverage, and level of benefits under these two systems in line with Japan's rapid growth and emergence as a major industrial country. Following the sharp rise in social security outlays during the 1970s, and in anticipation of further major demographic-related increases, policy efforts shifted in the 1980s toward cost containment through the rationalization and adjustment of benefits and greater cost-effectiveness. Two milestones were the medical care reforms of 1984 and the pension reform of 1985.

Sections 2 and 3 of this note describe the main aspects of present day public and private pension schemes in Japan, as well as the major measures taken under the pension reform of 1985 and more recently. The inclusion of private pension plans in this note reflects their increasing role in retirement planning, as well as their close integration with the public system in several respects. 1/ The final section provides an overview of the public medical care system. 2/ This note also serves to provide background material for Section VI "Demographic Change and the Outlook for Social Security Expenditures", of this paper, which considers prospects for the social security system in the light of the substantial demographic change expected over the next 30 years.

### 2. Public pension system

Japan's public pension system was initiated in 1941, and by 1962 most workers were covered by one of three schemes: the National Pension Scheme (NPS) or kokumin, the Employees' Pension Insurance (EPI) or kohsei, and four groups of Mutual Aid Associations (MAAs) or kyosai. 3/ In 1985, a fundamental reform of the system was enacted, and became effective in April 1986. The reform had four principal objectives: the introduction of a universal flat-rate basic pension; the adjustment of benefit formulas to gradually lower future benefit levels in order to ensure the long-term financial soundness of the pension system; the introduction of independent pension rights for all women; and the elimination of cases of multiple coverage involving double subsidies. As a result of the reform, the pension system

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1/ In fact, as explained below the two major categories of private pension plans are classified as part of the social security sector in the national accounts data.

2/ The description of the contribution and benefit provisions of the public pension and medical care system is drawn from several Japanese Government publications--see references to this section.

3/ The four MAAs primarily cover public sector employees.

can now be broadly characterized as providing a universal flat-rate basic pension together with an earnings-related benefit. The reform also was intended to be a first step toward the unification of the various pension schemes by 1995. This unification would give the different plans a common contribution-benefit structure and eliminate differences in the degree of their subsidization by the Government, while preserving their administrative independence. Also, to ensure the continued financial health of the pension system, actuarial reviews of the two major schemes, the NPS and EPI, are carried out every five years. The latest such review was carried out in 1989. 1/

a. National Pension Scheme (NPS)

The NPS was originally established in 1961 as a contributory scheme to provide a flat-rate pension for the self-employed and others not covered by any other public pension schemes; participation by spouses was voluntary. The 1985 pension reform expanded the scope of the NPS to provide a universal flat-rate basic pension to all covered persons effective April 1986, 2/ and it now covers some 65 million persons (contributors), of which about 30 percent are self-employed. At present, the number of beneficiaries is about 11 million, giving a beneficiary-to-insured (dependency) ratio of about 17 percent (Table 12).

The NPS is financed by participants' contributions and government subsidies. The monthly contribution rate is ¥ 8,800 (effective April 1, 1991), and is to be raised in annual increments of ¥ 400 to ¥ 9,800 by April 1, 1994. The contributions are paid directly by the self-employed and for all others are collected as part of their contributions to the other pension schemes. The government subsidy is equivalent to one third of the contributions.

In an effort to contain the ongoing and prospective rapid rise in pension outlays, the 1985 reform adjusted the benefit formula with the effect of cutting the benefit level (with transitional provisions) by 25 percent. 3/ In order to receive a pension under the NPS, recipients must be at least 65 years old and have been insured for a minimum of 25 years. The pension benefit is a fixed amount based on the length of the

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1/ A detailed examination of the public retirement system can be found in Clark (1991).

2/ The system insures, on a compulsory basis, all persons between the ages of 20 and 60 years, except students and pensioners aged 60-65 who may participate on a voluntary basis.

3/ Persons born before April 2, 1926, that is were 60 years old when the NPS was amended, receive a pension in accordance with the rules in force prior to the reform. For those persons born between 1927 and 1941, that is were at least 40 years old at the time of the reform and therefore had satisfied the minimum contribution period of 25 years, the benefit calculation under the post-reform rules is subject to transitional provisions.

Table 12. Japan: Public Pension System

	Enrollment <u>1/</u> (thousands)		Beneficiaries <u>1/</u> <u>2/</u> (thousands)		Dependency Index <u>3/</u> (In percent)		Average monthly pension benefits (thousand yen)		Average cash earnings <u>4/</u> (thousand yen)		Average Pension-Earnings Ratio (In percent)	
	1975	1988	1975	1988	1975	1988	1975	1988	1975	1988	1975	1988
National pension	25,884	64,929	2,819	9,315	10.9	13.5	13.8	25.7	177	341	7.7	7.5
Employees Pension Insurance <u>4/</u>	23,893	28,769	1,535	6,946	6.4	24.1	44.1	90.8	177	341	24.9	26.6
Mutual Aid Associations	5,678	5,840 <u>5/</u>	829	1,945 <u>5/</u>	14.6	33.3 <u>5/</u>	88.4	185.1 <u>5/</u>	177	336 <u>5/</u>	49.9	55.1 <u>5/</u>

Sources: Ministry of Health and Welfare, Annual Report on Health and Welfare, 1989; and staff calculations.

1/ End of fiscal year (March 31).

2/ Includes old age pension and aggregate old age pension beneficiaries.

3/ Defined as a ratio of the number of beneficiaries to the number of enrollees.

4/ Establishments with over 30 regular employees, includes bonuses and overtime pay.

5/ 1987.

individual's contributory status, with a maximum monthly benefit of ¥ 50,000 (in 1984 prices) for an individual with 40 or more years of contributions. The pension is also indexed to the consumer price index. Until April 1, 1990 inflation-induced adjustments to the benefit level were triggered by cumulative increases in the price index of over 5 percent. Since then inflation adjustments have been made automatically on an annual basis, and in FY 1990 (April 1-March 30) the maximum monthly benefit was ¥ 55,500.

b. Employees' Pension Insurance

In addition to the NPS, private sector employees receive an earnings-related pension benefit under the EPI; currently about 29 million people are enrolled under the EPI with 9 million receiving benefits giving a dependency ratio for the EPI of 15 percent. The EPI is essentially a compulsory scheme, although firms in agriculture, forestry, and fishing, restaurants and hotels, certain professions, and the entertainment industry can choose to participate on a voluntary basis. As described below, this scheme can either be administered directly by the Government or by larger firms themselves. Prior to the 1985 pension reform, the EPI scheme paid a flat and an earnings-related benefit. With the reform, the flat benefit component was replaced (with transitional provisions) by the lower NPS benefit 1/, and the remaining earnings-related benefit was reduced (with transitional provisions) by 25 percent.

Contributions to the EPI are calculated on the basis of insured remuneration, which in turn is based on average earnings excluding bonuses and overtime; the same base is used in calculating benefits. The contribution rate, which also includes the NPS contribution, is 14.5 percent for men and 14.1 percent for women (as of April 1, 1991), shared equally between employee and employer. 2/ Prior to the 1985 reform, the EPI system received a subsidy from the central government equal to 20 percent of costs, but now receives no subsidy. 3/

To be eligible for a retirement benefit, participants must have at least 25 years of insured coverage and be at least 60 years of age for males and 56 years of age (to be raised to 60 years by the year 2000) for females. The monthly benefit depends on the number of years of insured employment, and the lifetime average monthly insured remuneration adjusted for increases in the average wage of workers covered under the EPI. As noted earlier, the

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1/ For an employee who was covered for 40 years, the new flat rate benefit would be about one half of the old benefit under the pre-reform EPI.

2/ The contribution rate for female workers is to be gradually raised by annual steps of 0.15 percentage point to the same level as male workers by 1994.

3/ The elimination of the subsidy was in line with the flat rate component of the EPI being replaced by the NPS. In fact, because payments of the flat-rate element of the EPI are still being made to participants who retired before the reform, the EPI still receives some subsidy.

1985 reform cut the benefit by 25 percent, with a 20-year phase-in period. 1/ The pension benefit is indexed to the price level along the same lines as under the NPS.

The adjustment in benefits under both the NPS and EPI was designed to contain the future rise in pension costs that would have occurred as the average length of insured coverage increased with the maturing of the pension system. In 1986, the average retiring married employee had 32 years of covered employment and received a combined NPS and EPI pension benefit equal to 68 percent of (gross) average lifetime earnings. Under the pre-reform system, the replacement rate would have increased to 83 percent for a married worker with a contributory period of 40 years (the projected average length of contributory status when the pension system reaches maturity). Instead, the restructuring of the pension benefits was designed to maintain the replacement rate at 69 percent for those contributing for 40 years.

c. Mutual Aid Associations

The four groups of MAAs cover employees of the central government and public enterprises, local governments, private schools, and agricultural, forestry, and fishery cooperatives. There are just under 6 million insured persons under these schemes and some 2 million receive pensions, giving a beneficiary-insured ratio of 35 percent. The dependency ratio and consequential financial health of the individual MAAs, however, varies considerably; the Japan Railways MAA has a dependency ratio of 166 percent compared with 6 percent for the private school employees' MAA.

The MAA pension plans are broadly similar to the EPI in terms of contributions and benefits. They are financed entirely by participants' contributions; earlier government subsidies amounting to 16-18 percent of costs were eliminated under the 1985 reform. The rates of contribution (which also cover contributions to the NPS) differ among the various MAAs, with rates ranging from 10.2 percent to 17.1 percent (as of March 1990). Contributions are shared equally by employer and employee. The age of pension eligibility is 58 years at present, but is to be raised to 60 years by 1995 to bring it into line with the EPI. As part of the 1985 pension reform a common benefit formula was established for the MAAs and the EPI. However, the calculation of the earnings base (or average remuneration) under the MAA schemes results in a benefit some 20-30 percent higher than under the EPI. This premium is often viewed as a supplemental occupational benefit comparable with that available to most private sector employees through employees' and tax-qualified pension funds (see below).

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1/ The 20-year phase-in period also applies to the pre-reform flat-rate benefit component that has now been replaced by the new lower NPS benefit.

d. National Pension Fund (NPF)

The National Pension Fund (NPF) system was established in FY 1991, as part of the 1989 pension reforms. The aim of the scheme is to provide a pension instrument to the self-employed similar to those available to employees, to supplement the basic pension. Regional pension funds will be set up in each prefecture with a minimum membership of 1,000 and may also be established on a national vocational basis (with a minimum subscribership of 3,000). The pension scheme is a defined benefit plan, with payments made after the participant has reached 65 years of age. There is a minimum monthly benefit of ¥ 30,000, but members can buy additional monthly benefits in increments of ¥ 10,000 up to a combined total of ¥ 90,000. Contribution rates depend on the benefit level chosen and the length of the period of contributions. The NPF scheme is given favorable tax treatment, which is not available for individual retirement plans, and thereby gives the self-employed access to a tax-privileged pension instrument similar to those available to employees.

3. Private pension plans

Most companies provide some additional retirement payment alongside the EPI and NPS. 1/ Historically, companies mainly provided a lump-sum payment at retirement. However, in the 1960s legislation was enacted that encouraged firms to set up tax-qualified pension plans (TQPPs) and employee pension funds (EPFs), and now almost half of the employees covered under the EPI are also part of one of these private plans. In fact, most firms now offer either an annuity and or a lump-sum severance payment under these pension plans. 2/, 3/ The EPFs are coordinated with the EPI, and they operate in part as a "contracted out" substitute for the EPI. Both the TQPPs and the EPFs (kikin funds) are subject to government supervision, and, because of their close relation to the social security system, they are classified as part of the social security sector in the national accounts data. In addition to these two types of pension plans, which account for the bulk of corporate pension schemes, firms may also provide pensions from specified reserves held within the company. These reserves are funded from company revenues and do not benefit from any tax advantages. Also, such retirement reserves are usually held as book reserves, thereby providing no guarantee to employees of receiving their pension in the event of the firm's bankruptcy.

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1/ Virtually all firms with 300 or more employees provide some type of retirement plan.

2/ A detailed description of private pension plans in Japan is given by Clark (1991).

3/ Public sector workers also receive lump-sum severance payments.

a. Tax-Qualified Pension Plans

TQPPs were introduced in 1962, and may be established by companies with at least 15 employees and Ministry of Finance approval. By March 1989, 78,555 such plans existed with 8 1/2 million participants. These plans are defined benefit plans, with benefits determined by years of service and either a flat benefit factor or earnings-related formula. Payment of benefits is made upon retirement or severance and can take the form of a lump sum or an annuity; most annuity plans are for a fixed term. 1/ Workers who leave the company prior to normal retirement receive a lump-sum payment as there is no provision for a deferred annuity. Employees are typically not required to contribute to TQPPs, and (employer) contributions are required to maintain full funding of pension liabilities; the plans are subject to actuarial review every five years. The assets of the plan must be held outside the company and are treated as the property of current workers and retirees.

b. Employee Pension Funds

Since 1966, large corporations have been permitted to establish EPFs 2/, and, as of March 1989, there were 1,259 such funds covering some 8 1/4 million workers. The EPF is required to serve two functions: it administers an equivalent substitute for the earnings-related component (EPI) of the public pension system, and must also provide additional benefits to the EPI of at least 30 percent. The additional benefit may be offered as either an annuity or a lump-sum payment. At a minimum, therefore, such a plan would have provided the average married worker retiring in 1986 with a total retirement benefit (including the NPS) equivalent to 78 percent of final earnings compared with 69 percent under the EPI.

The substitute EPI component of the private retirement benefit is fully vested and portable. Accordingly, when an employee leaves a firm, assets sufficient to meet the firm's future (EPI) pension obligations are transferred to the Pension Fund Association which assumes responsibility for paying the benefit. For the supplemental benefit, vesting provisions vary among EPFs. Typically, the EPF plans pay no benefit to workers who leave with fewer than three years of contributions; pay a lump-sum benefit to those with 3-20 years coverage; and pay a pension annuity to those with 20 or more years service.

Contributions to finance the privatized EPI substitute of the EPF pension are shared equally by the employer and employee. Because the firm

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1/ Reflecting the fixed term of these plans, the payments are typically higher than under open-ended annuity plans.

2/ In order to establish an EPF a firm must employ at least 500 people (or 3,000 for a multicompany plan), receive the consent of more than half its employees and the employees' union, and be granted approval by the Ministry of Health and Welfare.

now bears the cost of managing the contracted-out EPI benefit, the joint employer-employee contribution rates to finance this benefit are some 3 percentage points lower than if contributions were made to the public EPI system. The Government, however, still bears the cost of this contracted-out benefit in two respects. It pays the costs of indexing the benefit to pre-retirement wage growth (arising from adjusting the average lifetime remuneration for increases in the wage level), as well as the costs stemming from the indexation of the pension to the cost of living. As regards financing the additional benefit, employer contributions must be at least as great as those of the employees. However, post-retirement cost of living adjustments to the supplemental benefit are typically not granted in the EPF plans.

c. Tax treatment

A key factor in the adoption of private pension plans (as opposed to lump-sum severance payments) by firms is the preferential tax treatment accorded to them that places the plans on a par with the social security system. Thus, employer contributions under both types of private plan are a tax deductible expense, and neither these contributions nor the earnings of the plan itself are considered current taxable income of the employees. Employee contributions to the TQPPs, which are rare in any case, are only taxed above a prescribed level, while those to EPFs are untaxed. While the earnings of the pension plans are not taxed the assets of the plan are subject to a small annual national and local tax. For the corporation, the tax treatment of its contributions to the TQPPs and EPFs is more favorable than that for reserves set aside for future lump-sum severance payments. This tax advantage has been an important stimulus to the shift by firms from lump-sum payments systems to pension plans; in practice, however, lump-sum payments can, and frequently are, still made from these plans. Prior to 1988, pension benefits received as an annuity (including those from the social security system) were taxed as part of employment income. However, since then such annuities have been taxed as miscellaneous income and are eligible for a separate tax deduction. Lump-sum payments are taxed as retirement income for which substantial tax deductions are also provided.

d. Other advantages of private pension plans

Corporate pensions also offer a number of other financial advantages to both the employer and employee. First, for the employee the private pension benefit bridges the gap between the time of retirement, typically 55-60 years of age, and the eligible age (65 years) for public pension benefits. Second, the private plans offer additional benefits above that of the public pension. Third, for the employer the pension plans flatten the time profile of retirement payments when employees choose the annuity option. This shift in the timing of payments has become increasingly important for corporate pension finances because of the aging of the companies' work forces. However, as noted below, in practice this particular advantage has not been realized to a great extent.

While the EPFs and TQPPs are similar in many respects, there are a number of differences both in structure and practice. First, and perhaps foremost, EPFs are only available to firms covered by the EPI system--that is, firms that employ at least 500 people. Second, since 1989 EPFs have been backed by a pension guaranty system to ensure the payment of the supplemental benefit, while no comparable insurance is available for TQPPs. Third, as a matter of practice, most employees withdraw their pension benefit from TQPPs in the form of a lump-sum payment. By contrast, only about one half of employees take their supplemental benefit under the EPFs as a lump-sum payment.

#### 4. Public medical care

Japan's public medical care system comprises medical insurance as well as medical care provided under the safety net of the public assistance programs. The insurance system was founded in 1926, and over time was progressively expanded so that, by 1961, nationwide coverage had been established. The system consists of four major schemes. Employees are covered under two schemes: Health Insurance for private sector employees 1/; and three groups of Mutual Aid Associations (MAAs), primarily for public sector employees. A National Health Insurance (NHI) scheme covers all others, primarily the self-employed, farmers, and retirees. Once an individual reaches 70 years of age (65 if bedridden) he or she is covered by a separate scheme, the Health and Medical Services for the Aged (HMSA), within the framework of the NHI.

In response to the sharp increase in national (and social security) medical expenditures during the 1970s, 2/ the Government implemented a reform of the health care insurance system with the passage of the HMSA Act in 1982 and the Health Care Reform Act of 1984. These reforms were intended to place the health care system on a firmer financial footing, through a restructuring of the elderly health care system, an expansion of partial cost-sharing by patients, and a redistribution of the financial costs of the NHI.

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1/ There is also a separate scheme for seamen with contribution and benefit provisions similar to those under the Health Insurance scheme.

2/ Social security medical expenses increased from the equivalent of 2 1/4 percent of GNP in FY 1970 to 3 3/4 percent of GNP in FY 1990, while national medical expenditures rose from 3 1/4 percent of GNP to 5 percent of GNP over the same period. This increase reflected in part the effects of measures introduced by the Government which expanded the scope of insurance coverage, lowered the share of co-payments by beneficiaries, and abolished all co-payments for the elderly.

a. Insurance schemes for employees

Participation in the Health Insurance system is compulsory for employees and their dependents and covers about 65 million persons, over half of the total population (Table 13). Under this system, employees of smaller enterprises are primarily insured through a government-managed scheme, while those employed in larger corporations are insured through similar private group-managed schemes; about half of those covered by the Health Insurance system are insured by either of the two types of plans. The establishment of a private scheme requires the approval of the Ministry of Health and Welfare and must provide benefits at least equivalent to those available under state-run plans. 1/

The Health Insurance system is financed by contributions and government subsidies. Contributions are based on regular earnings and are shared equally by employer and employee. Under the government-managed plans the combined contribution rate amounts to 8.3 percent, while in the private schemes employee contributions are subject to a ceiling of 4.5 percent and most combined rates range between 7 and 9 percent. 2/ The central government bears the administrative costs of the Health Insurance system and also pays a subsidy to the state-run plans equivalent to 16.4 percent of paid benefits. Privately managed schemes that are financially weak also receive discretionary fixed subsidies from the central government; in FY 1987 these subsidies amounted to ¥ 7 billion compared with some ¥ 6 billion received by the state-run plans. The major medical benefits in both Health Insurance plans include 90 percent coverage of the insured's medical costs and 70 percent for outpatient and 80 percent for inpatient treatment of dependents; additional benefits are available in the private schemes. There is also a ceiling to the co-payment of ¥ 57,000 (a lower limit applies for low-income patients) per month. Prior to the Health Care Reform Act of 1984 there was no cost-sharing by the insured, although co-payments for dependent care were required.

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1/ A group-managed insurance plan can be set up by a firm or firms that employ at least 300 employees in total with the consent of more than half of the employees and the Ministry of Health and Welfare. The Ministry can also order a firm with at least 500 employees to establish such a scheme. Reflecting the government supervision of these private schemes and their similarity to the state-run schemes, they are classified under the social security sector, rather than the private sector, in the national accounts data.

2/ The contribution rates are calculated on the basis of the employees' monthly standard remuneration, which excludes bonuses and overtime pay. This is the same base as that used for pension contribution and benefit calculations. An additional contribution equivalent to 1 percent of bonus payments is also paid under the government-managed Health Insurance plans, with the Government subsidizing 40 percent of employees' payments. This additional contribution is optional under the private Health Insurance schemes.

Table 13. Japan: Medical Care Insurance

	Persons covered (millions) <u>1/</u>		Contribution per covered person (thousand yen)		Medical care expenses per covered person (thousand yen)		Self- financing index (in percent)	
	1975	1986	1975	1986 <u>2/</u>	1975	1986	1975	1986 <u>2/</u>
National health <u>3/</u>	44.0	45.5	13.8	50.4	49.0	159.8	28.2	31.5
Health Insurance <u>4/</u> (employees)	67.8	75.7	105.1	225.1	95.4	150.3	69.9	149.8
Government-managed	28.8	32.9	95.1	217.7	101.9	158.1	93.3	137.7
Privately-managed	26.1	30.1	112.9	257.2	85.7	138.1	131.7	186.2
MAAs	12.2	12.3	107.7	240.1	97.8	155.2	110.1	154.7
Total <u>4/</u>	<u>111.8</u>	<u>121.2</u>	<u>69.2</u>	<u>159.7</u>	<u>77.1</u>	<u>154.0</u>	<u>89.8</u>	<u>103.7</u>
Memorandum item:								
Old age medical care	4.7	8.5	--	--	184.0	523.0	...	...

Sources: Management and Coordination Agency, Japan Statistical Yearbook, 1988; and staff calculations.

1/ End of fiscal year (March 31); includes contributing member and dependents.

2/ With the introduction of the health and medical services for the aged (HMSA) in 1983, part of the contributions go toward financing the cost of medical care for the elderly under the HMSA scheme.

Therefore, the self-financing index is overstated.

3/ Includes co-payments by the insured.

4/ Includes seaman's medical insurance scheme.

The three MAA medical care insurance schemes cover national and local public servants, public corporation employees, and private school employees; some 12 million employees and dependents are insured under the MAAs. These schemes provide similar benefits to those under the Health Insurance scheme, and combined employer-employee contribution rates, which are equally shared, range from 6.5 percent to 12 percent. The MAAs do not receive government subsidies.

b. National Health Insurance

The National Health Insurance (NHI) system is administered by the local governments and covers some 45 million persons, mainly farmers, the self-employed, retirees, and their dependents, who fall outside the scope of other medical insurance schemes described above. Contributions are means-related and are based on income and assets, with a maximum annual contribution of ¥ 400,000 per household. In addition, the central government subsidizes 32-52 percent 1/ of paid benefits, pays all administrative costs, and provides grants amounting to 10 percent of benefit expenses to financially weak local governments. The major medical care benefits include 70 percent coverage of inpatient and outpatient care for both the insured and dependents, with the same maximum monthly co-payment as that under the Health Insurance system.

The retirees' medical insurance (RMI) system was introduced in 1984 in order to remove discontinuities in an individual's insurance coverage as he or she moved from a Health Insurance plan to the National Health Insurance system upon retirement. Before 1984, an employee joining the NHI system upon retirement was faced by a cut in medical care benefits. Meanwhile, Health Insurance plans for employees were running financial surpluses. Therefore, under the RMI system, benefits are higher than for other subscribers in the NHI system and, at present, retirees receive 80 percent coverage and their dependents 70 percent and 80 percent for outpatient and inpatient care, respectively. At the same time, retirees pay the same contributions as other insurees in the NHI system, and the difference between paid-out medical care costs and premiums received is funded from the Health Insurance plan in which the retiree was enrolled before retiring. In effect, medical insurance for an employee was shifted in the direction of a single lifetime plan.

c. Health and Medical Services for the Aged

A major reform of the elderly health care system for people 70 years old or over (65 if bedridden) was implemented in 1983 with the introduction of the HMSA. One of the main objectives of the reform was to strengthen the financial basis of the elderly health care system in the face of the rising

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1/ The subsidy amounts to 50 percent for benefits paid to agricultural workers and 32-52 percent for those paid to the self-employed. No subsidy is paid for benefits to retired employees.

level of per capita medical expenditures and growing size of the elderly population. At the same time, in view of the growing share of the elderly in the population, the reform expanded the scope of the insurance coverage to include certain services particular to the needs of the elderly and preventative care.

Before the HMSA, the elderly had received medical care free of charge since 1973 through their insurance plans, with the cost of any required co-payment being paid by the Government. In practice, this policy placed great financial strains on the NHI system which, because it was an insurance scheme for retirees, had the largest share of aged persons among its participants. As a result, the NHI system was in need of substantial and growing subsidies from the central government. In fact, the share of non-working subscribers (mainly pensioners) in the NHI system rose from 6 1/2 percent in 1965 to 8 1/2 percent in 1975, but then increased sharply to 30 percent in 1988. More generally, the rising proportion of the elderly in the population, in conjunction with their relatively high per capita medical expenses, had led to growing financial pressures on all the insurance schemes. Between 1973 and 1981, average per capita medical care costs for the elderly quadrupled and rose from being 280 percent higher than the national average to 360 percent greater.

Three key financial reforms were implemented with the MHSA: the financing of the elderly health care system was centralized; the costs borne by each medical insurance scheme were spread more evenly; and partial cost-sharing by patients was introduced. Since 1983, the health benefits provided by the various insurance systems to the elderly have been centralized and paid for through a new fund. The fund itself is jointly financed: the various insurance schemes (Health Insurance, National Health Insurance, and the Mutual Aid Associations) provide 70 percent of the cost of total paid-out benefits; the central government pays 20 percent; and local governments pay 10 percent. The contribution of each insurance plan is adjusted in line with the number of elderly enrollees. This new arrangement has had the effect of spreading the financial cost of health care for the elderly more evenly across the insurance schemes and the general taxpayer. Furthermore, the free provision of medical care was replaced by a system of small deductibles--¥ 800 per month for outpatient care and ¥ 400 per day for inpatient care.

## VI. Demographic Change and the Outlook for Social Security Expenditures

### 1. Introduction

Shifts in population age structure have become the predominant source of demographic change in the major industrial countries. While the average rate of population growth in the seven major industrial countries declined from 1.2 percent to 0.4 percent between 1950 and 1980, the average elderly dependency ratio rose from just over 11 percent to 20 percent between 1950 and 1990. 1/ Looking ahead, these trends are expected to continue with average population growth coming to a halt in the next 20-40 years, and the elderly dependency ratio rising further to 35 percent by 2030 (see OECD 1988a). In Japan, this population aging phenomenon is taking place far more rapidly than elsewhere, and the magnitude of the prospective demographic change implies substantial adjustments in many areas. These adjustments, in turn, have brought to the forefront a number of important policy issues. 2/ This paper focuses on one particular area, namely the social security system and the considerable increase in pension and health expenditures that will occur as the population ages. 3/ In fact, this aging process already has contributed to the rapid growth of social security outlays during the past twenty years. The prospective rise in expenses will inevitably claim an increasing share of national resources, yet at the same time the aging of the population, by slowing the supply of labor and reducing savings, may weaken the economy's ability to generate these resources. The financing of social expenditures is also an important fiscal issue, which encompasses questions concerning the appropriate level of intergenerational transfers, tax and debt policy, and the extent to which the Government should be the provider of these social services.

This note describes developments and prospects for the aging of the population structure in Japan. The impact of this aging and changes in the structure of benefits on past and future social security expenditures is then examined together with the impact of the major reform measures implemented in the 1980s. Finally, some key related fiscal policy issues are touched upon.

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1/ The elderly dependency ratio is defined here as the ratio of the population of 65 or more years of age to those 15-64 years of age.

2/ The effects of the aging population structure on longer-term economic growth is examined in Annex II of "Japan - Staff Report for the 1991 Article IV Consultation" (SM/91/126).

3/ Social expenditures that will be affected by the aging of the population also include unemployment insurance and welfare assistance (both part of the social security system) and education. This paper, however, focuses only on social security pension and medical care expenses which are the two largest social expenditure programs in Japan.

## 2. Demographic change

The sharp rise in the proportion of the elderly in Japan's population is well documented, and we will simply note here some of its more striking dimensions. Between 1970 and 1990 the share of the aged (those of age 65 years and older) in the population rose from 7 percent to 12 percent (Table 14); this was double the largest increase recorded by any other of the group of five major industrial countries. Looking ahead, the rise in the proportion of the population in Japan that reaches age 65 and above will accelerate considerably and outstrip that of the other major industrial countries, before stabilizing by the year 2020. By that year, the share of the elderly in the population is projected to rise by 11 1/2 percentage points above its 1990 level, 1/ and Japan would jump from having the youngest population structure to having the oldest among the major industrial countries. Moreover, this transition will occur at more than twice the speed previously experienced by these countries.

This demographic transition is due to a decline in the fertility (birth) rate which has been below the level required to sustain zero population growth since the 1970s, as well as a substantial lengthening in average life expectancy. Whereas the increase in longevity before the 1970s was largely accounted for by improvements in infant mortality, since then the main contributory factor has been a lengthening in life expectancy during retirement. Over the period 1950-87, the average life expectancy at birth of males increased from 60 years (about the age of pension eligibility) to 76 years, and for women from 63 years to 81 years. Life expectancy at age 65 also lengthened significantly during this period, from 11 years to 16 years for men, and from 13 years to 20 years for women.

The timing of developments in fertility and mortality rates has meant that, until now, Japan's total dependency ratio (the share of the population below 15 years of age and above 64 years in the total population) has been declining; indeed it is one of the lowest among the major industrial countries. However, with the continued rise in the share of the elderly, the total dependency ratio is projected to increase sharply from 44 percent to 63 percent over the next 20 years, and at that level would be the highest among industrial countries.

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1/ The projection for population growth cited is the official middle forecast prepared in 1986 (see Government of Japan, (1986)), which assumes a recovery in the fertility rate to a level that would maintain the population roughly at its current size; and a slight lengthening in life expectancy of about 3 years between 1985 and 2025 for both male and females. This middle population forecast is also the basis of the official projections of the social security system's finances discussed later.

Table 14. Japan: Population Structure and Dependency Ratios

	1970	1975	1980	1985	Projected <sup>1/</sup>				
					1990	2000	2010	2020	2050
<u>(Millions)</u>									
Total population	104.7	111.9	117.1	121.0	124.2	131.2	135.8	135.3	128.7
(Annual growth rate) <sup>2/</sup>	(1.1)	(1.4)	(0.9)	(0.7)	(0.4)	(0.5)	(0.3)	(--)	(-0.2)
<u>(In percent)</u>									
Population structure by age group									
0-14	24.0	24.3	23.5	21.5	18.6	18.0	18.6	16.5	17.1
15-64	68.9	67.7	67.3	68.2	69.4	65.8	61.4	59.9	59.4
65 and older	7.1	7.9	9.1	10.3	11.9	16.3	20.0	23.6	23.5
Of which:									
75 and older	(2.1)	(2.5)	(3.1)	(3.9)	(4.8)	(6.4)	(9.2)	(11.3)	(13.2)
Elderly dependency ratio <sup>3/</sup>	10.3	11.7	13.5	15.1	17.2	24.7	32.5	39.3	39.6
Total dependency ratio <sup>4/</sup>	45.1	47.6	48.4	46.7	44.0	52.1	62.8	66.8	68.4

Sources: Ministry of Health and Welfare, Health and Welfare Services in Japan 1988; and Management and Coordination Agency, Monthly Statistics of Japan.

<sup>1/</sup> Projections made in 1986; population data for 1989 are in line with projections for 1990.

<sup>2/</sup> Compound annual average growth over preceding interval.

<sup>3/</sup> Ratio of population aged 65 and older to population aged 15-64 years.

<sup>4/</sup> Ratio of population aged below 15, and 65 and older, to population aged 15-64 years.

### 3. Developments in social security expenditures

The population aging process has had a sizable impact on the financial situation of the public medical and pension system, and in turn on fiscal and budgetary policy over the past 20 years. With the more intense aging and associated rise in the dependency ratio that is projected, the need for policy adjustments to absorb or contain the likely financial pressures associated with sustaining the social security system has been magnified. Medical and pension expenditures have already increased rapidly. 1/ Between FY 1970 (April 1-March 30) and FY 1989 these outlays rose from some ¥ 2 trillion to over ¥ 36 trillion. As a share of total general government expenditures they expanded from 15 1/2 percent to 29 percent, and in terms of GNP grew from 3 percent to 9 percent (Table 15). Growth in pension outlays was the major source of this expansion.

The increase in pension and medical expenditures occurred not only because of the rise in the share of the aged in the population, but also because of the substantial expansion in benefits in the 1960s and early 1970s and the maturing of pension programs. The scope of the public pension system was substantially expanded in 1961 with the establishment of the National (flat-rate) Pension Scheme (NPS) for the self-employed and farmers. 2/ In 1964, the fixed flat-rate benefit provided under the Employees' Pension Insurance (EPI) scheme--then the largest pension plan in Japan--was made a function of the number of years of service (thereby bringing it into line with the NPS benefit). In 1973, benefits under both the NPS and the EPI scheme were raised substantially. First, pension benefits were indexed to consumer prices. Second, the profile of lifetime earnings used to calculate the earnings-related benefit provided under the EPI was henceforth adjusted to take into account the rise in average earnings during the contribution period. Third, there was a significant discrete upward adjustment in benefits.

The maturity of a pension system is directly related to the age of the system, its minimum and maximum contribution periods, and the age structure

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1/ The data and text discussion refer to medical and pension outlays classified under social security benefits and exclude relatively small amounts of expenditures of a similar nature made under other categories (social assistance grants and unfunded welfare benefits) of social security transfers. The figures also exclude certain central government pension and health-related expenditures, such as capital expenditures for hospital construction.

2/ A detailed description of the public pension and health insurance system can be found in Section V, "The Social Security Pension and Health Insurance System," of this paper. Descriptions of the social security system can also be found in several Japanese Government publications--see references to this section.

Table 15. Japan: General Government Social Security Transfers, 1970-89

	Fiscal Year				
	1970	1975	1980	1985	1989
	(In trillions of yen)				
Pension	0.5	2.9	8.4	14.4	20.1
Medical	1.8	4.9	9.4	13.2	16.5
Other	1.2	4.0	7.2	8.1	8.4
Total	3.5	11.8	24.9	35.8	45.1
Of which:					
Social security funds	(2.6)	(9.0)	(19.6)	(29.8)	(38.7)
	(In percent of total general government outlays)				
Pension	3.4	7.1	10.6	14.0	15.9
Medical	12.1	12.1	11.9	12.8	13.1
Other	8.8	9.8	9.1	7.9	6.7
Total	24.4	29.0	31.5	34.7	35.7
Of which:					
Social security funds	(17.8)	(22.2)	(24.8)	(28.8)	(30.6)
	(In percent of GNP)				
Pension	0.7	1.9	3.4	4.4	4.9
Medical	2.3	3.2	3.8	4.0	4.1
Other	1.7	2.6	2.9	2.5	2.1
Total	4.7	7.8	10.2	11.0	11.1
Of which:					
Social security funds	(3.4)	(5.9)	(8.0)	(9.1)	(9.5)
Total general government outlays <u>1/</u>	19.3	26.8	32.2	31.7	31.0

Source: Economic Planning Agency, Annual Report on National Accounts, various issues.

1/ Includes current and investment expenditures.

of the population at the time the pension scheme was introduced. 1/ Also, adjustments in the benefit structure and coverage during the life of the pension system will affect the time it takes for the system to reach maturity. In the case of Japan, some elements of the pension system are still relatively young--the EPI system was reconstructed in 1954 and the NPS was introduced in 1961. Also, reforms implemented since the mid-1980s have considerably altered the scope of the system. As a result, Japan's pension system is one of the most immature of the major industrial countries. Estimates by the OECD (see OECD (1988b), Chapter 3) suggest that full maturation of the EPI, excluding the effects of the comprehensive reforms introduced in 1985, will not be attained until about 2030.

More generous benefits also contributed to the growth in medical outlays, but to a lesser degree than in the pension system. In 1973, a cap was placed on the partial cost-sharing that existed for treatment of an dependent under the public Health Insurance scheme 2/, and the elderly were exempted from any co-payments for medical care. In addition to their direct impact on medical outlays, evidence indicates that these limits on cost-sharing increased the demand for medical treatment. Similarly, a generous reimbursement scheme contributed to a substantial rise in drug expenses. 3/

The medical insurance system also has experienced a sharp rise in average per capita costs, most notably for the elderly. This reflected the general improvement in medical treatment associated with the rapid pace of medical technological innovation; a higher level of incidence of medical treatment for the elderly; relatively higher costs of treatment for geriatric ailments; and the growing share of the elderly in the population. During the period 1973-81, prior to the overhaul of the medical care system for the elderly in 1983, per capita national medical expenditures (NME) for the elderly almost quadrupled and rose from being 2.8 times higher than the

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1/ A program is considered to be mature when every retired person has accrued the maximum potential pension possible under the scheme, given his or her earnings. Equivalently, maturity is a state in which the share of resources transferred from the working to the retired population remains constant through time, given a stable population structure.

2/ Up to the ceiling on the co-payment, the amount of the co-insurance for dependents was 30 percent of the costs of out-patient care and 20 percent for in-patient costs. At the time, the insured employee received 100 percent coverage of major medical care costs.

3/ In Japan, doctors dispense medical drugs directly to patients at virtually no charge and therefore the demand for drugs is price-insensitive. The demand for drugs is also encouraged by the practice of pharmaceutical companies offering drugs to doctors at discounted prices compared with the subsequent reimbursement received by the doctor from the public health insurance scheme.

national average to 3.6 times greater. 1/ Following the establishment of the Health and Medical Services system for the Aged (HMSA) in 1983, the rate of increase in average medical costs for the elderly decelerated sharply from an average annual rate of 19 percent during 1973-81 to 6 percent during 1983-87. 2/ Still, for the period 1973-87 the share of medical expenses for the elderly in NME expanded from 11 percent to 27 percent. At the same time, the share of NME in GNP increased from 3 1/2 percent in 1973 to 5 1/4 percent in 1987; much of this increase was concentrated in the 1970s.

#### 4. Financial outlook and reforms

The financial consequences of the continuing expansion in social security outlays in Japan are considerable, particularly for the pension system. In order to contain the large projected increase in social security expenditures, the Government implemented a number of major reforms in the mid-1980s. These reforms also included measures to better meet the needs of the growing elderly segment of the population with respect to medical and long-term outpatient care.

The various reforms undertaken are described in detail in Section V of this paper. To briefly summarize, the 1985 pension reforms reduced benefits by some 25 percent, raised contribution rates, and reduced abuse in benefit claims. On the purely financial side, managers of pension funds were granted greater freedom in their choice of investments with a view to raising the rate of return on their assets. 3/ In the medical care system, the degree of cost-sharing by patients was increased; measures to increase efficiency and reduce unit cost incidence encouraged; and subsidies for drugs reduced. At the time of the reforms, the Government announced the goal of containing the level of NME in relation to GNP at its then current level of 5 percent. Notwithstanding the prospective demographic pressures on costs, this goal was considered feasible in light of the scope for eliminating slack in the medical system. While the reform measures are expected to have a sizable impact on expenditures, the future rise in social security outlays will outstrip the increase in contributions and user charges (at current rates) by a large margin. Therefore, at some point further adjustments are likely to become necessary. In this regard, in 1990 the Provisional Council for the Promotion of Administrative Reform set target ceilings for the combined incidence of tax and social security contributions to below 50 percent of GNP in 2020 (the current level in several major European countries), compared with 40 percent of GNP in 1989.

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1/ The coverage of NME is broader than that of social security medical benefit payments. The latter amounts to slightly over 80 percent of NME.

2/ The introduction of the MHSA was associated with a significant rise in the average cost of medical care for the elderly of 12 percent during 1982-83, which partly reflected a change in entitlement rules.

3/ The portfolio composition of both the public and private pension funds is subject to regulation.

Official projections (prepared by the Ministry of Health and Welfare) clearly indicate the large changes that the financial structure of the social security system will undergo in the course of the next 40 years. Financial projections for the two major pension programs and for national medical care expenses are described below, together with some discussion of the factors generating the expansion in outlays. Also, the future finances of private pension plans are briefly examined. In addition, some financial projections for the social security system as a whole are described. Of course the various financial projections are sensitive to changes in assumptions, some of which are policy instruments. However, these changes would not alter the basic prospect of substantial increases in social expenditures and the need to devote a larger share of national income to finance them. It is, however, worth noting that, in any discussion of the future funding of the social security system, an equally important issue is the sensitivity of long-term growth rates of national income to changes in basic nondemographic assumptions.

a. Pension system

The two major components of the public pension system are the National Pension Scheme (NPS) and the Employees' Pension Insurance (EPI) scheme, which cover some 90 percent of participants in the public pension system. The EPI scheme was set up in 1942 to be operated on a fully funded basis, but within a few years of its inception this funding principle was abandoned. In addition, as noted above, adjustments in benefits, as well as the unforeseen size of the increase in life expectancy, have reduced the degree of funding of the EPI. By 1985, official estimates (Government of Japan (1985)) indicated that some 80-90 percent of the cost of future benefits would have to be borne by later generations. Although outlays have grown rapidly, until the 1990s the immaturity of the system ensured that on a year-to-year basis the financial situation of the EPI was healthy, and reserve funds accumulated steadily. Nevertheless, since the minimum eligibility period of contributory status (20 years) began to be fulfilled from the 1960s onward, these reserves declined from the equivalent of over 20 years of annual expenses to below 7 years by the mid-1980s.

The magnitude of the intergenerational transfer implicit in the contribution-benefit structure of the EPI scheme (as well as the NPS) prompted the comprehensive reform effort of 1985. Official calculations at the time (see Government of Japan (1985)) illustrated that even after allowing the EPI to shift effectively to a pay-as-you-go system, a rise in the contribution rate from 10.6 percent (in FY 1985) to almost 39 percent in

FY 2030 1/ would have been required to finance projected outlays. 2/ Even after the 1985 reforms, which effectively cut future benefit levels by some 25 percent, similar calculations indicated that the contribution rate would still need to rise to almost 29 percent by 2020. A gradual extension in the eligible age for retirement benefits from 60 to 65 years would lower this peak rate to 23.9 percent. 3/ This particular reform proposal, however, was not approved in 1985. In the most recent (1989) actuarial review of the pension system the peak contribution rate in 2020 was revised slightly upward to 31.5 percent, largely on account of changes in the population projections. 4/ An upward adjustment in the eligibility age, which thus far has not been approved, would lower the peak rate to 26.1 percent.

By the mid-1980s, the financial outlook of the NPS had deteriorated significantly raising the prospect of a substantial increase in government subsidization. Despite the immaturity of the system, during the first half of the 1980s, not only did the ratio of reserves to annual benefits fall to the equivalent of one year, but also the absolute level of reserves began to decline. Indeed, it was estimated that over 90 percent of future NPS benefits would have to be financed by later generations (see Government of Japan (1985)). This deterioration reflected, in part, the shift in Japan's industrial structure away from agriculture and self-employment which eroded the contributory base of the scheme. In order to place the NPS on a sounder financial footing, the 1985 reforms expanded the system to provide nationwide coverage, thereby creating a more stable revenue base, while cutting the level of benefits.

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1/ These rates are in percent of workers' standard remuneration, that is regular earnings excluding overtime and bonus payments. During the 1980s, the monthly standard remuneration was some 70 percent of actual cash earnings.

2/ These calculations were based on a profile of contribution rates that envisaged a relatively modest increase from 10.6 percent to 16 percent between FY 1986 and FY 2000, and then a steep rise to 36 percent in FY 2020 and to 39 percent by FY 2030. The amount of reserves would continue to rise until FY 2000, then level off, before rising again around FY 2020. The ratio of reserves to annual benefit payments would, however, decline from the equivalent of 5 1/2 years in FY 1986 to 1 year by FY 2020.

3/ The pensionable age would be raised gradually from 60 years to 65 years over the period 1998-2010 for males and 2003-2010 for females.

4/ In the 1984 actuarial projections, the standard remuneration rate (the base for the pension benefit calculation) was assumed to rise in nominal terms by 5 percent a year, and the nominal interest rate was assumed to be 7 percent. In the 1989 projections, these two rates were revised downward to 4 percent and 5 1/2 percent, respectively. These adjustments alone would imply a lower level of future pension expenditures and therefore also a lower peak contribution rate.

Without the reduction in benefits implemented in 1985, the monthly insurance contribution would have had to rise almost threefold from ¥ 6,740 to ¥ 19,500 (in 1984 prices) by FY 2115 to maintain the existing benefit in real terms. This rise in premiums also would have maintained the ratio of financial reserves to annual benefits at about 2 1/2. With the reduction in benefits introduced in 1985, the peak monthly contribution was projected to be some 30 percent lower at ¥ 13,000 than it would otherwise have been from FY 2010 onward. In the 1989 actuarial review of the NPS, the peak rate was estimated to rise steadily to ¥ 16,100 by FY 2010 (1989 prices); adjusting for the increase in consumer prices, the peak rate would be about ¥ 15,200 in 1984 prices.

b. Private pension plans

The two major types of private employee pension plans--employee pension funds (EPFs) and tax-qualified pension plans (TQPPs)--are required to operate on a funded basis. 1/ Therefore, in principle, the future aging of of the work force should not create strains on corporate financial resource flows. In practice, however, some pressures are likely to emerge owing to the actuarial rules used to determine appropriate funding levels. The calculation of liabilities and funding rules for the TQPPs and EPFs are subject to similar government guidelines. 2/ Liabilities are determined using service-to-date and a projection of earnings based on the current tenure-earnings relationship in the company. This method does not, therefore, take into account future increases in earnings owing to inflation and productivity growth. Liabilities are calculated using an interest rate set by the Government--for some time this has been 5.5 percent--and funding is limited to 100 percent of these liabilities. An actuarial review of the plan must be conducted every five years. These practices imply that, for most plans, firms are limited to funding at a termination value of pension liabilities. For TQPPs this limitation is reinforced by the requirement that excess funds be returned to the employer at the time of the actuarial reviews. 3/ In contrast, EPFs are not allowed to transfer excess assets to the parent firm, but instead can reduce employer contributions or improve plan benefits subject to the approval of the Ministry of Health and Welfare.

In addition to pension plans, many firms provide retirement allowances which are paid as a lump sum upon retirement. Reserves built up to pay these allowances are usually held as book reserves, and therefore, the financing of these allowances is effectively on a pay-as-you-go basis. Consequently, the aging in the structure of a company's work force will be accompanied by a rising claim on the firm's current income. This prospect,

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1/ Both of these private plans are classified as part of the social security sector in the national accounts data.

2/ TQPPs fall under the auspices of the Ministry of Finance and EPFs under the Ministry of Health and Welfare.

3/ In this regard, it should be noted that in virtually all TQPPs employee contributions are not required.

as well as certain tax advantages, has contributed to the increasing adoption by firms of TQPPs and EPFs which are both funded and offer retirement annuities, thereby spreading the burden of funding over a longer period of time.

c. Medical insurance system

By comparison with the pension system, the effect of demographic factors on future growth of medical expenses in relation to GNP is relatively modest. In the absence of the reforms introduced in 1984, simple calculations based on age-specific average medical costs in FY 1982 indicate that the projected shift in the age structure of the population between 1982 and 2020 would raise the level of total NME from ¥ 14 trillion to ¥ 20 trillion in 1982 prices; as a ratio of FY 1982 GNP, total NME would rise from 5 percent to 7 percent, 1/ which would be above the official target ceiling. Correspondingly, taking into account the shrinking share of those of working age in the population, this rise in expenses would imply a threefold increase in the transfer of resources from the contributors to those of 65 years of age or more.

In fact, after rising during the 1970s, the share of NME or medical social security benefits in GNP has been virtually constant at about 5 percent. This suggests that the 1984 reforms and subsequent cost-cutting efforts have helped offset the upward demographic pressures on medical expenses. In the long-run, however, as noted below, some increase in the share of GNP devoted to medical care is likely on the basis of the present structure of costs, benefits, and incidence of treatment.

d. Social security system as a whole

Taking the various elements of the social security system together, official projections prepared in 1988 illustrate, in broad terms, the impact of prospective demographic changes on the size of social security transfers. 2/

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1/ Allowing for the projected increase in the population level between 1982 and 2020, NME would rise by an additional Y3 trillion or 1 percent of FY 1982 GNP. These calculations are based on figures given in Government of Japan (1985), Appendix 3-3, and the official middle population forecast (see Government of Japan (1986)).

2/ The projections are in terms of total social security transfers which include certain outlays other than pensions or medical care. However, the bulk of both outlays and contributions is related to pension and medical care, which are also the major categories of population-sensitive expenses. Also, it should be noted that the social security system includes the private employee pension funds and tax-qualified pension plans.

On the basis of the benefit structure in place in 1988, 1/ and assuming annual GNP growth of 4-5 1/2 percent, the share of social security transfers in GNP, which stood at 11 1/4 percent in FY 1988, would increase by 10 1/2-13 1/2 percentage points by FY 2010. Of this increase, pension benefits would account for 7 3/4 percentage points; the remainder would principally reflect a rise in medical expenses.

In order to finance the projected rise in transfers, both contributions and central government subsidies (as provided for in the various pension and medical schemes) would have to increase substantially. The required increases in contribution rates (expressed in terms of standard remuneration) to maintain the solvency of the major public pension schemes were noted above. More broadly, the share of total social security contributions in GNP, which was 8 1/2 percent in FY 1988, would have to rise by 5 1/2-7 1/2 percentage points by FY 2010--the increase in pension contributions would amount to 4 percentage points. Subsidies from the Government, in other words the burden on general tax revenues, which amounted to 2 3/4 percent of GNP in FY 1988 would increase by some 2-3 percentage points of GNP, primarily to fund the medical care system. 2/ In total, the share of national income transferred through the social security system would more than double over the next 20 years reaching 18 3/4-24 3/4 percent of GNP.

##### 5. Social security outlook and policy issues

Notwithstanding some variation in the projected levels of pension and medical outlays over the next 25 years, it is clear that the increase will be considerable and will account for a substantially larger share of GNP. 3/ The steepest increase will be generated by the pension system and, despite some rundown in the relative size of reserves, will imply a significant rise in contribution rates and/or government subsidies in the absence of any reduction in benefit levels. As for the medical system, the

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1/ More precisely, for pensions the projections effectively assume that the relative level of real benefits is maintained at its current level. This is in line with the use of lifetime earnings adjusted for average nominal wage growth in calculating pension benefits as well as the indexation of post-retirement benefits to prices. As a result, changes in assumptions for the rate of growth of productivity, prices, and GNP do not alter the projected share of pension benefits in GNP.

2/ The difference between social security outlays and receipts of contributions and transfers received from the Government is accounted for by property income earned on the assets of the social security funds, which amounted to almost 2 percent of GNP (or almost 15 percent of total current receipts (including subsidies)) in FY 1988.

3/ Work by others, for example see Feldman (1987), Heller and others (1986), and Hagemann and Nicoletti (1989), show projected increases in social security expenditures of similar orders of magnitude as the official projections.

rise in costs is expected to be substantially less, but will be particularly sensitive to developments in the relative price and incidence of medical treatment.

The social security system plays a prominent role in Japanese society-- by 1985 over 50 percent of elderly households relied on pensions for 80 percent or more of their total income. Concomitantly, efforts to make the financing of the system more consistent with demographic developments will have wide-ranging and important socioeconomic consequences. Balancing the future demands of the social security system on national resources and the needs of its beneficiaries raises two fundamental questions. First, what share of resources should be transferred from the working age population to the elderly? Second, how should this first question be addressed during a relatively sharp transitional period of demographic change? The first question raises up policy issues concerning the level of contribution rates, benefits, and the need to make adjustments in the share of resources taxed and spent in other areas of the public sector. The second question brings up several transition issues such as the timing of any adjustments and the consequent impact on the outstanding stock of public debt and debt service payments. These, in turn, will influence the distribution of the intergenerational burden of future developments in social security expenditures.

We will explore some of the fiscal issues raised by the first question, but will not address directly the timing issues posed by the second question that perhaps lie more comfortably in the realm of political and social choice. The policy option of raising contribution rates (or other taxes) to finance the rise in social security expenses would involve a considerable increase in premiums over the next 30 years. This rise may increase distortions in labor demand and supply decisions as well as in consumption-saving choices and result in a reduction in welfare and efficiency. To some extent, this adverse impact can be reduced by smoothing the rise in contribution rates; in the official projections discussed above, the increases were back-loaded reflecting the initial rundown in the ratio of reserves to annual expenditures. Hagemann and Nicoletti (1989) show that adopting a smoother profile of over time of contribution rates, and assuming the system ultimately ends up operating on a pay-as-you-go basis, can lead to a lower peak contribution rate (by a few percentage points) during the period of demographic transition; obviously, the steady state premium is unchanged. However, when the macroeconomic effects of the initially higher level of savings generated (and buildup of reserves) by this smoothing strategy are taken into account, a permanently lower contribution rate may result. 1/

On the benefit side, one way of reducing outlays that has been considered by the Government is to raise the statutory age of pension

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1/ See Annex II, "Long-Run Projections of Demographic Transition" of the staff report for the 1991 Article IV consultation with Japan (SM/91/126).

eligibility. As noted earlier, an increase in the pensionable age from 60 to 65 years would allow pension premiums in the EPI system to be reduced by some 4 percentage points from about 30 percent of the monthly standard remuneration (or from 23 percent to 20 percent of actual earnings). 1/ Another option would be to lower benefits. With respect to the pension system, one approach would be to define the official target replacement rate (69 percent) in net (excluding pension contributions) rather than gross terms. Clark (1991) reports that the net replacement rate for a retiring married worker amounts to about 80 percent, and following the 1985 pension reforms is likely to approach 100 percent in the future if the system continues to operate on a pay-as-you-go basis, compared with the official target gross replacement rate of 69 percent. Switching to a net target would have the effect of sharing demographically induced increases in contributions between workers (whose net wages fall because of higher premiums) and pensioners (whose benefits are lower than if they were linked to gross wages). It would also reduce distortions in the work-retirement decision. Hagemann and Nicoletti (1989) estimate that an immediate switch to a net replacement target could lower contribution rates (as a percentage of total earnings) by some 3 percentage points. Another approach to containing the prospective rise in pension benefits would be to reduce the extent of indexation. In this regard, it is important to note that, when productivity gains are passed through in the accrual of pension benefits, as is the case in the EPI system, increases in output per worker will not reduce the burden of financing a pay-as-you-go system, unless the working age population is growing more rapidly than the number of pensioners.

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1/ Similar results were found by Hagemann and Nicoletti (1989).

## VII. Energy Policy

### 1. Introduction

Japan has limited natural energy resources and relies heavily on imported sources of energy, mainly petroleum. The potential risks of this high level of import dependence on a key input to growth were forcefully underscored by the first oil shock in 1973. Since then, Japan's energy policy has aimed at reducing its vulnerability to fluctuations in world petroleum supplies. This policy has embraced two primary goals. First, to guard against short-run disturbances in petroleum supplies, Japan began to stockpile oil in 1975. Second, in the long run, it aimed at reducing dependence on petroleum, especially on imports from the Middle East, through conservation and diversification. Success in these efforts made it easier for Japan to cope with the sharp oil price movements registered in 1979 and more recently, in the wake of the Middle East crisis that began in August 1990.

Section 2 of this paper gives some recent history on energy use and supply in Japan, focusing on the reduction in its dependence on petroleum. Section 3 describes policy developments after the first oil shock, and Section 4 describes more recent developments in policy, and in particular the response to the recent Middle East crisis.

### 2. Overview of energy use and supply

The Japanese economy's dependence on petroleum has been reduced sharply since 1972, reversing the rapid increase that had taken place during the preceding decades. Petroleum consumption declined by about 2 percent a year between 1972 and 1985, falling by half in relation to GNP (Table 16). During 1985-90, however, petroleum consumption began to increase again, owing to the slump in world oil prices and strong domestic economic growth. As a result, the improvement in the efficiency of petroleum use in relation to GNP slowed considerably.

The gains in oil efficiency were achieved through a combination of energy conservation and a shift toward alternative sources of energy. Progress in energy conservation has been considerable. Overall energy consumption per unit of GNP was cut by one third between 1972 and 1989 (Table 17). Efficiency gains in the industrial use of energy also have been

Table 16. Oil Consumption in the Seven Major Industrial Countries, 1972-89

(In percent of GNP)

	1972	1985	1989
	(Volume) <u>1/</u>		
Canada	3.4	1.8	1.8
France	2.3	1.3	1.2
Germany <u>2/</u>	2.1	1.3	1.1
Italy	2.4	1.4	1.4
Japan	2.1	1.1	1.0
United Kingdom	2.4	1.4	1.2
United States	3.0	2.0	1.9
	1972-85	1985-89	1972-89
	(Average annual percentage change)		
Canada	-4.8	--	-3.7 (-47.1) <u>3/</u>
France	-4.3	-2.0	-3.8 (-47.8)
Germany <u>2/</u>	-3.6	-4.1	-3.7 (-47.6)
Italy	-4.1	--	-3.1 (-41.7)
Japan	-5.8	-2.4	-4.3 (-52.4)
United Kingdom	-4.1	-3.8	-4.0 (-50.0)
United States	-3.1	-1.3	-2.7 (-36.7)

Source: IMF, World Economic Outlook, October 1990.

1/ Oil is measured in 1989 prices. Real GNP is measured in 1989 prices and converted into U.S. dollars using exchange rates in 1989.

2/ Data pertain to the (former) Federal Republic of Germany.

3/ Cumulative percentage change during 1972-89.

Table 17. Energy Consumption in the Seven Major Industrial Countries, 1972-89

(In percent of GNP)

	1972	1985	1989
	(Volume) <u>1/</u>		
Canada	7.7	5.9	5.6
France	3.5	2.8	2.6
Germany <u>2/</u>	3.8	3.1	2.7
Italy	3.3	2.3	2.3
Japan	2.8	2.0	1.8
United Kingdom	4.8	3.5	3.1
United States	6.7	4.9	4.8
	1972-85	1985-89	1972-89
	(Average annual percentage change)		
Canada	-2.0	-1.3	-1.8 (-27.3) <u>3/</u>
France	-1.7	-1.8	-1.7 (-25.7)
Germany <u>2/</u>	-1.6	-3.3	-2.0 (-28.9)
Italy	-2.7	--	-2.1 (-30.3)
Japan	-2.6	-2.6	-2.6 (-35.7)
United Kingdom	-2.4	-3.0	-2.5 (-35.4)
United States	-2.4	-0.5	-1.9 (-28.4)

Source: IMF, World Economic Outlook, October 1990.

1/ Energy is measured in oil equivalent terms in 1989 prices. Real GNP is measured in 1989 prices and converted into U.S. dollars using exchange rates in 1989.

2/ Data pertain to the (former) Federal Republic of Germany.

3/ Cumulative percentage change during 1972-89.

significant, with the energy required to produce one unit of industrial output falling by almost one half from 1973 to 1986. 1/

As part of the overall improvement in Japan's energy efficiency, the share of petroleum in energy use declined from almost 75 percent in 1972 to less than 60 percent in 1988. This reduction contrasts sharply with the rapid increase in the share of petroleum recorded previously following World War II. Savings in the use of oil fell particularly on Middle Eastern sources: Japan's imports of oil from the Middle East dropped by more than 40 percent between 1973 and 1988, while imports from the rest of the world changed little. As a result, the share of Middle East oil in Japan's total petroleum imports declined from 78 percent to 68 percent during the same period. At the same time, the shares of petroleum imports from Mexico and China increased by about 5 percentage points each. 2/

The increased use of natural gas accounted for a large part of the decline in petroleum usage: imports of liquefied natural gas (LNG) increased more than 12 times between 1973 and 1988, and the share of LNG in total energy supply expanded from less than 2 percent to 10 percent. The share of nuclear power also grew rapidly over this period, rising from less than 1 percent to about 10 percent, with nuclear-generated electricity increasing at an average annual rate of 18 percent. Geothermal and other newer sources of energy do not yet play major roles in Japan's energy supply, and their combined share has remained at about 1 percent. While a limited amount of low-grade coal can be produced, domestic coal has long since ceased to be a significant source of energy because of economic and environmental considerations. 3/

Several characteristics of Japan's energy situation stand out from an international perspective. First, the improvements in energy efficiency recorded since 1972 have been the largest in the seven major industrial countries, resulting in one of the lowest levels of either per capita or per unit GNP energy consumption. This, in turn, has helped Japan achieve levels of carbon dioxide emissions per capita and per GDP that are among the lowest among the seven countries (Table 18). However, Japan remains one of the most highly dependent of the industrial countries on imported sources of energy, with over half of its energy supplied from oil (Table 19).

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1/ This measure of energy efficiency is calculated as the ratio of the industrial use of energy to the index of industrial production. By this measure, the improvement in efficiency recorded in the major industrial countries during 1973-86 was: 28 percent in France; 26 percent in the (former) Federal Republic of Germany; 35 percent in Italy; 46 percent in Japan; 44 percent in the United Kingdom; and 40 percent in the United States.

2/ Comprehensive data on Japan's petroleum use can be found in MITI, 1990a.

3/ Detailed data on Japan's energy resources can be found in MITI, 1990b.

Table 18. Carbon Dioxide Emissions in Selected Countries, 1985

	Total carbon dioxide emission <u>1/</u>	Carbon dioxide emission per capita <u>2/</u>	Carbon dioxide emission per GDP <u>3/</u>
United States	1.18	4.9	0.29
Japan	0.23	1.9	0.15
Germany <u>4/</u>	0.19	3.1	0.30
United Kingdom	0.15	2.6	0.33
France	0.10	1.8	0.19
U.S.S.R.	0.90	--	--
China	0.53	--	--

Source: Ministry of International Trade and Industry, Japan; IMF, International Financial Statistics; and staff calculations.

1/ Data for 1985 in billions of metric tons.

2/ Metric tons per capita.

3/ Metric tons per \$1,000 GDP. Real GDP/GNP measured in 1985 prices converted into U.S. dollars using exchange rates in 1985.

4/ Data pertain to the (former) Federal Republic of Germany.

Table 19. Japan: Primary Energy Sources and Import Dependence, 1988  
(In percent)

	Japan	OECD Average	World
Petroleum	56.6	42.7	37.6
Coal	18.5	24.0	30.1
Natural gas	9.5	18.5	20.2
Nuclear power	10.0	8.4	5.4
Hydraulic, etc.	5.4	6.4	6.7
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Import dependence	82.3	25.8	n.a.

Sources: Data provided by the Ministry of International Trade and Industry; IEA (OECD 1990); and staff calculations.

### 3. Policy developments following the first oil shock

The impact of the first oil shock on the Japanese economy was immense: consumer prices rose by 25 percent in 1974, and wholesale prices even more, while output fell for the first and only time since the end of World War II. There was a clear need for a strong policy response. An increase in the domestic petroleum supply was not an option: domestic output has never exceeded 1 percent of national consumption. Instead, policies were aimed at reducing Japan's vulnerability to short-term supply disruptions by establishing a precautionary stockpile, and lowering its long-term dependence on petroleum through conservation and diversification. To finance the new energy policy measures, as well as to promote conservation, the Government raised taxes on energy products. At the same time, considerable changes were made to the regulatory environment of the domestic petroleum sector.

#### a. Safeguards against short-term supply disruptions

Before the first oil shock, there was no active public policy on oil stockpiling. Oil companies held inventories to meet their normal working needs, which amounted to the equivalent of about 67 days of consumption at the time of the oil shock. With less than this (minimum) level of inventories, refining operations would suffer from production cutbacks and resulting cost pressures. Thus, as the oil crisis took hold, concerns about the adequacy of these stocks led Japanese oil firms to undertake large-scale purchases in world spot markets. In addition to provoking international criticism for putting upward pressure on oil prices, these heavy purchases also increased the procurement cost for Japanese oil companies and hurt their profitability significantly. Indeed, the petroleum and coal products sector suffered a sharp deterioration in its operating balance, from a profit of ¥ 700 billion in 1973 to a loss of ¥ 500 billion in 1974, a swing equivalent to 1 percent of GNP or 70 percent of the sector's value added in 1973. In 1975, the Government enacted the Petroleum Stockpiling Act, which required oil refiners, primary wholesalers, and importers to increase their inventories to the equivalent of 90 days' consumption by end-1979 (Table 20). The Government also introduced subsidies to help pay for holding the higher required level of inventories. 1/ The 90-day target was in line with the recommendation of the newly formed International Energy Agency (IEA) and was comparable to targets in the United States and Western Europe. In addition, the Government introduced a minimum inventory requirement for liquefied petroleum gas (LPG) in 1981, with the aim of gradually stockpiling 50 days of LPG consumption; this was achieved by FY 1988. 2/

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1/ The Petroleum Corporation, a public sector corporation, extends subsidized loans to oil companies. The Government, in turn, reimburses the Petroleum Corporation for the negative margin between the cost of its funds and the interest rate it charges on its loans.

2/ The fiscal year begins on April 1.

Table 20. Japan: Oil Stockpile, 1977-89 1/

(Number of days' consumption)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Private <u>2/</u>	90	81	88	90	101	93	94	97	92	94	92	94	89
National <u>2/</u>	-	7	7	10	17	20	26	31	35	44	48	53	55
Total	90	88	95	100	118	113	120	128	126	128	140	147	144

Source: Ministry of International Trade and Industry.

1/ Figures refer to the actual level of inventories at end-fiscal year, i.e., 1977 refers to March 31, 1978.

2/ Private stockpiles consist of crude oil, work-in-process inventory, and final products. The national stockpile is held in the form of crude oil.

In 1978, the Government initiated a national stockpile scheme to supplement private inventories with the goal of gradually stockpiling 30 million kl. of crude oil. <sup>1/</sup> This target was achieved by the end of FY 1988. With a cumulative expenditure of ¥ 3 trillion, and an additional ¥ 276 billion (less than 0.1 percent of GNP) allocated for FY 1991 for adding a further 3 million kl., the national stockpile program has been the most costly of the Government's energy programs. In 1987, as part of its efforts to deregulate the oil sector, the Government revised its stockpiling policy with a view to shifting the burden of holding precautionary oil inventories from the private sector to the public sector. Accordingly, the Government raised the national stockpile target to 50 million kl., to be achieved by the mid-1990s. The required minimum level of private inventories was reduced to 86 days' consumption in 1989 and will be brought down further to 70 days' consumption by the mid-1990s.

There has been no drawing down of the national stockpile to date. The existence of a national stockpile, however, has helped to maintain price stability at times of crisis by providing assurances of an adequate supply. In fact, on several occasions, the energy authorities have raised the possibility of drawing upon the national stockpile, in concert with efforts of other IEA member nations, in an effort to stabilize prices. Private inventories, however, have been used more actively. The first drawdown of this stockpile occurred in late 1978 during the second oil shock, and most recently in January and February 1991. On each of these occasions, the amounts actually drawn were not large--the equivalent of about nine days' and four days' consumption, respectively--but the drawdown did help absorb supply disruptions as well as calm expectations.

b. Long-term policies on energy security

(1) Conservation

Legislation enacted immediately after the first oil shock established a comprehensive framework for energy conservation. Measures implemented under the Energy Consumption Efficiency Act of 1974 included setting energy efficiency standards for factories, buildings, automobiles, and air conditioners; encouraging research and development in conservation technology and its diffusion; providing fiscal and monetary incentives for conservation; and introducing conservation regulations. Under this act, the Government has designated some 4,600 large-scale factories as energy management models and obliged them to appoint government-qualified engineers to oversee energy management; these factories account for about 70 percent of industrial energy consumption.

The Government also inaugurated the Moonlight project in 1978, which aims at developing technologies with enhanced energy efficiency over the

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<sup>1/</sup> One kl. of crude oil is equivalent to 6.3 barrels or 264 U.S. gallons.

longer term. Technologies developed through the project include recouping previously wasted heat through heat pump systems, as well as storing and utilizing off-peak electricity surpluses through fuel cells. In order to encourage energy saving investment, tax incentives and subsidized loans from public financial corporations were introduced. Increases in energy taxes have also encouraged conservation in energy consumption. In addition, since 1974, the Government has promoted a progressive rate structure for electricity charges. The Government has also sought to encourage energy conservation during the peak summer months by announcing each year voluntary guidelines for certain categories of energy consumption. These guidelines cover office and business air-conditioning and lighting as well as a recommended maximum highway speed; similar rules are also enforced in government buildings.

(2) Diversification

In 1974, the Government started the Sunshine Project, which plays a central role in efforts to develop alternative sources of energy. The project's aim is to raise the combined share of solar, geothermal, nuclear, and other alternative sources in total energy use to 20 percent by 2000. This target was endorsed again in 1987, with the share of nuclear energy in total energy supply to increase to 16 percent, and the combined share of geothermal, solar, and other alternative sources to expand to 5 percent. Correspondingly, the share of petroleum would decline to 45 percent. In spite of considerable progress in developing alternative technologies, such sources, with the exception of nuclear power, have supplied little energy to date, because of lags in their commercial application and low oil prices.

c. Energy tax policy

Petroleum-related taxes have been employed to support the costs of government-sponsored energy programs as well as to finance transport infrastructure projects. The direct effect of these taxes on energy users also has encouraged conservation and diversification. Taxes levied on petroleum and its derivative products in Japan are multilayered, 1/ and the revenues from each of these taxes, except the consumption tax, are earmarked

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1/ For example, gasoline is taxed at several levels: at the crude oil level, there is a tariff on imported crude (¥ 350 per kl.) and a petroleum tax (¥ 2,040 per kl.); at the refinery, there is a gasoline tax (¥ 45,600 per kl.) and a local road tax (¥ 8,200 per kl.); and at the retail level, there is a 3 percent consumption tax. As for electricity, on top of the tariff and petroleum tax on its crude oil input, a levy, called the Electric Power Resources Development Tax, is assessed at the utility company level (¥ 445 per 1,000 kwh.), and the consumption tax at the retail level. For details of each tax see Ministry of Finance (1990).

earmarked for specific programs. 1/ For FY 1989, revenues from petroleum related taxes, excluding the consumption tax, totaled ¥ 3.4 trillion (1 percent of GNP). On the expenditure side, energy-related fiscal outlays totaled ¥ 1 trillion (1/4 percent of GNP). The balance, corresponding to the revenues from the gasoline tax, the local road tax, and the aviation fuel tax, is used to finance the construction of highways and airports. In addition, the total amount of tax subsidies for energy-saving investments was in the order of ¥ 0.1 trillion (less than 0.1 percent of GNP). There are, however, no price subsidies for energy products.

The level of each of these taxes is based on the revenue requirement of the specific program supported by the tax. For example, the petroleum tax was first introduced in 1978 with the inception of the national petroleum stockpile, and was raised significantly in 1988, when the stockpile goal was revised upward. The gasoline tax and the local road tax have been increased three times since the first oil shock: by 20 percent in 1974, and a further 25 percent in both 1976 and 1979. The overall tax burden on gasoline, about \$0.40 per liter in 1989, is broadly in line with most other OECD member nations. The share of taxes in the retail price of gasoline at 47 percent, however, is the third lowest (above that of the United States and Canada) among OECD countries (IEA, 1990), partly reflecting a higher share of distribution costs.

d. Regulation of the oil industry

The Japanese oil industry is subject to extensive nonprice regulation, as well as informal guidance, as part of official efforts to promote the rationalization of the domestic oil sector. The stagnation of demand for petroleum products in the wake of the first oil shock contributed to the emergence of a sizable surplus in refining capacity in Japan. In turn, this market environment led to severe price competition and the industry's profitability deteriorated significantly. In response, the regulatory authorities assumed a central role in encouraging an orderly rationalization of the industry's refining capacity and, since the early 1980s, some consolidation of capacity has taken place. 2/ As part of this restructuring, regulations were placed on entry into the refining industry (or additions to capacity) and the petroleum importing and retail business.

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1/ Revenue from the petroleum tax is used mainly to finance the stockpiling of petroleum and partly for subsidizing resource exploitation. Revenue from the Electric Power Resources Development tax is used for subsidizing municipalities that accommodate power plants and subsidizing the development of alternative sources of energy including the Sunshine and the Moonlight projects. Revenues from tariffs on imported crude oil and petroleum products are earmarked for structural adjustment programs and unemployment assistance in communities severely affected by coal mine closures.

2/ The primary regulatory agency is the Ministry of International Trade and Industry.

Also, informal annual production quotas were imposed (at the company level) on specific products as well as on overall crude oil refining. For national security reasons, regulations also have aimed at preventing the major multinational companies from dominating the domestic oil sector.

In the context of the general move toward greater deregulation in the Japanese economy, in 1987 the Ad Hoc Committee for Administrative Reform, 1/ called for substantial deregulation of the petroleum industry. Following the recommendation of the committee, the controls on increases in refining capacity were removed and the product-specific output quotas abolished in FY 1988. The committee also called for the abolition of the informal quotas on overall crude oil refining by the end of 1992, except under critical situations.

#### 4. Recent policy developments

##### a. Policy response after the Middle East crisis

At the outbreak of the crisis in August 1990, Japan had the equivalent of 142 days' petroleum consumption in stockpile: 88 days in private inventories--6 days above the minimum required level--and 54 days in the national stockpile. The stockpile level was more than three times the combined annual imports from Kuwait and Iraq in 1989, which accounted for about 10 percent of total oil imports.

The primary policy response to the crisis was to monitor the supply and demand situation in the domestic energy market and avert any sharp panic-induced irregularities. The Government refrained from applying its power to take emergency measures, including direct price controls to minimize extraordinary price movements. Instead, it chose to exert its influence on the domestic oil market through informal means.

While the price of petroleum products remained unregulated during the Middle East crisis, the Government asked the oil companies in August 1990 "not to engage in practices that would be criticized as taking advantage of the situation." 2/ Following this guidance, the oil companies did not change their product prices during August on the grounds that the actual historical costs of their products for sale during August were not affected by events in the Middle East. Also, the Government held monthly hearings with the oil companies during September 1990 and March 1991 on their procurement costs for crude oil. Concurrently, the oil companies used a new pricing system based on actual procurement costs during the preceding month. Under this system, domestic prices broadly followed global oil price

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1/ The final report of the committee was issued in 1988 (see Ad Hoc Committee for Administrative Reform (1988)).

2/ This quote is from a press release by the headquarters of the Ad Hoc Committee on Measures to Deal with the Middle East Crisis on January 17, 1991, which listed all the domestic measures taken since August 1990.

movements with a month's lag (Table 21). The structure of oil-related taxes, which is specific rather than ad valorem, mitigated the corresponding fluctuations in retail prices, especially for gasoline.

The Government also asked the oil companies to refrain from buying in the spot market, in order to alleviate price pressures in the world petroleum market. To facilitate the oil companies' compliance with its request, the Government brought forward a planned reduction in the minimum required level of private inventories from the equivalent of 82 days' consumption to 78 days on January 17, 1991; 1/ other IEA members nations took similar measures. As of end-February 1991, reserves in private stockpiles were reduced from their pre-August 1990 level of 88 days' consumption to 84 days.

Following the outbreak of the Middle East crisis, the average world price of refined petroleum products rose by 30 percent, twice the rate of increase for crude oil. This was due, in part, to the associated loss of worldwide refining capacity as well as to the increased demand for aviation fuel for military purposes. In order to help contain the rise in the price of refined petroleum products, the Government authorized Japanese oil companies that had spare refining capacity to increase their domestic refining by 11 percent during September 1990 and March 1991. For the April-September 1991 semester, oil companies are being permitted to continue to make full use of their refining capacity.

b. Long-term objectives

The General Energy Research Committee, an advisory committee on energy to the Minister of International Trade and Industry, issued a report on long-term energy policy in June 1990 (MITI 1990c). The report's energy policy objectives through 2010 are essentially the same as that which have guided policies since 1973, namely to contain the rise in energy demand through gains in energy efficiency and to shift energy use away from petroleum to non-fossil sources of energy. Compared with the previous energy policy goals, greater emphasis is placed on environmental concerns and active participation in international energy policy coordination.

As working criteria for these broad objectives, the report called for (1) a further reduction in energy consumption per unit of GNP at an average annual rate of 2 percent between 1988 and 2010; and (2) an increase in the combined share of non-fossil energy to 26 1/2 percent of total primary energy supply in 2010. Consistent with this, Japan's import dependence for its energy supply would be cut by 10 percentage points. Reflecting the greater weight to be placed on environmental concerns, carbon dioxide emissions are targeted to remain at the same level from 2000 through 2010.

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1/ The reduction had originally been planned for April 1, 1991 as a step in the gradual shift in reliance from private inventories to the national stockpile.

Table 21. Japan: Retail Prices of Petroleum Products, 1990-91 1/

	<u>Gasoline</u>		<u>Diesel</u>		<u>Kerosene</u>		<u>Tax Adjusted Crude Crude Oil Price 2/</u>	
	Y/liter	Index	Y/liter	Index	Y/liter	Index	Y/liter	Index
1990								
August	121	100.0	72	100.0	44.5	100.0	72.5	100.0
September	133	109.9	83	115.3	56.3	126.5	77.2	106.5
October	138	114.0	88	122.2	61.6	138.4	82.7	114.0
November	138	114.0	88	122.2	61.6	138.4	85.9	118.4
December	135	111.6	85	118.1	58.7	131.9	85.7	118.1
1991								
January	132	109.1	82	113.9	56.1	126.1	82.0	113.1
February 4	131	108.3	82	113.9	55.8	125.4	78.0	107.5

Sources: Data provided by the Ministry of International Trade and Industry and the Japan Institute for Energy Economy; and staff calculations.

1/ Data are end-of-month prices, except where otherwise indicated.

2/ This price is intended to represent a tax adjusted domestic price of crude oil at the refinery. The price is calculated as the average monthly cost of imported crude oil (on a customs clearance basis), plus the petroleum tariff and tax after making allowance for a normal wastage factor for handling crude oil of 6 1/2 percent, plus the gasoline and local road taxes; excludes the 3 percent consumption tax.

## VIII. Structural Policies

### 1. Introduction

The reform of structural policies has been a high priority of the Japanese Government in recent years, and this note describes the major reform measures that were implemented during 1990 and early 1991. <sup>1/</sup> Particular attention is given to the land tax reform which was approved by the Diet in early 1991. This reform represents an important milestone in the Government's comprehensive reform of land management and taxation which was prompted by growing concerns with the social and economic repercussions of the rapid growth in real estate prices, and their high level relative to income and other prices.

### 2. Financial liberalization

Building upon the progress made in the 1980s, interest rates on deposit-type instruments were deregulated further in 1990 and early 1991 (Tables 22 and 23 ). The minimum denomination of small-denomination money market certificates (MMCs) bearing market-determined rates of interest was cut from ¥ 3 million (about \$21,000) to ¥ 1 million (\$7,000) in April 1990, and to ¥ 500,000 (\$3,500) in March 1991. Also, the ceilings and floors that had applied to interest rates on small-denomination MMCs were removed in November 1990. Reflecting the progressive liberalization of interest rates, deposits with market-determined rates accounted for almost 85 percent of bank time deposits (including MMC accounts) at end-1990, up from about 65 percent a year earlier. With the reduction in the minimum denomination of the MMC's, the share in time deposits held by individuals bearing market-determined interest rates increased substantially, by about 30 percentage points to 75 percent, during 1990. <sup>2/</sup> In June 1990, the Ministry of Finance (MOF) announced its intention to fully liberalize interest rates on all time deposits as early as possible within three years. Also, a MOF advisory committee issued a report <sup>3/</sup> in May 1991 calling for the phased deregulation of interest rates on most demand deposits.

In 1990, the authorities took further measures to promote the development of short-term money markets in Japan. As a part of these efforts, and in line with the growing size of these markets and increased arbitrage between them, the Bank of Japan (BOJ) announced that it would make its operations more market-oriented. Thus, the BOJ would make more use of market operations in securities, while reducing its use of direct lending,

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<sup>1/</sup> Descriptions of structural policy measures taken in the past few years (up to early 1990) can be found in Japan - Recent Economic Developments (SM/89/84, Supplement 1 and SM/90/121).

<sup>2/</sup> For corporations, the share of time deposits with market-determined interest rates expanded further from 90 percent to 95 percent.

<sup>3/</sup> On Interest Rate Liberalization of Non-Time Deposits by the Study Group on Financial Issues, published on May 21, 1991.

Table 22. Japan: Liberalization of Interest Rates on Large Bank Deposits, 1985-89

	Large Time Deposits (Introduced in 1985)		Certificates of Deposit (Introduced in 1979)		Money Market Certificates (Introduced in 1985)		
	Minimum size (In millions of Yen)	Maturity	Minimum size (In millions of Yen)	Maturity	Minimum size (In millions of Yen)	Maturity	Interest Rate (In percent)
October 1985	1,000	3 months - 2 years	100	1-6 months	50	1-6 months	CD rate - 0.75
April 1986	<u>500</u>	3 months - 2 years	100	<u>1 month - 1 year</u>	50	<u>1 month - 1 year</u>	CD rate - 0.75
September 1986	<u>300</u>	3 months - 2 years	100	1 month - 1 year	<u>30</u>	1 month - 1 year	CD rate - 0.75
April 1987	<u>100</u>	3 months - 2 years	100	1 month - 1 year	<u>20</u>	1 month - 1 year <u>1 year - 2 years</u>	CD rate - 0.75 CD rate - 0.5
October 1987	100	<u>1 month - 2 years</u>	100	1 month - 1 year	<u>10</u>	1 month - 1 year 1 year - 2 years	CD rate - 0.75 CD rate - 0.5
April 1988	<u>50</u>	1 month - 2 years	<u>50</u>	<u>2 weeks - 2 years</u>	10	1 month - 1 year 1 year - 2 years	CD rate - 0.75 CD rate - 0.5
November 1988	<u>30</u>	1 month - 2 years	50	2 weeks - 2 years	10	1 month - 1 year 1 year - 2 years	CD rate - 0.75 CD rate - 0.5
April 1989	<u>20</u>	1 month - 2 years	50	2 weeks - 2 years	10	1 month - 1 year 1 year - 2 years	CD rate - 0.75 CD rate - 0.5
October 1989	<u>10</u>	1 month - 2 years	50	2 weeks - 2 years	10	1 month - 1 year 1 year - 2 years Lapsed <u>1/</u>	CD rate - 0.75 CD rate - 0.5

Source: Data provided by the Japanese authorities.

1/ Interest rates on LTDs are more market-related and competitive than those on MMCs. With the reduction in the minimum size of large time deposits (LTDs) to ¥ 10 million, MMCs of ¥ 10 million or more ceased to be offered.

Table 23. Japan: Small Denomination Money Market Certificates (MMCs), 1989-91 1/

	Minimum Size (In millions of Yen)	Maturity	Interest Rate (In percent)
June 1989	3	6 months 1 year	CD rate <u>2/</u> - 1.25 CD rate - 0.75
October 1989 <u>3/</u>	3	<u>3 months</u> 6 months 1 year <u>2 years</u> <u>3 years</u>	CD rate - 1.75 CD rate - 1.25 CD rate - 0.75 CD rate - 0.5 10 year GB yield <u>4/</u> - 0.7
April 1990	<u>1</u>	3 months 6 months 1 year 2 years 3 years	CD rate - 1.75 CD rate - 1.25 CD rate - 0.75 CD rate - 0.5 10 year GB yield - 0.7
November 1990 <u>5/</u>	1	3 months <u>6/</u> 6 months 1 year 2-3 years	LTD rate x 0.80 (0.85) <u>7/</u> LTD rate x 0.83 (0.88) LTD rate x 0.86 (0.91) LTD rate x 0.89 (0.94)
April 1991	<u>0.5</u>	3 months <u>6/</u> 6 months 1 year 2-3 years	LTD rate x 0.80 (0.85) <u>7/</u> LTD rate x 0.83 (0.88) LTD rate x 0.86 (0.91) LTD rate x 0.89 (0.94)

Source: Data provided by the Japanese authorities.

1/ Small denomination MMCs were first introduced in June 1989.

2/ Interest rate on certificates of deposit.

3/ Effective October 1989-November 1990, interest rates on MMCs with maturities of two years or less could not exceed interest rates on three-year MMCs.

4/ 10-year government bond yield.

5/ The Bank of Japan started to publish average rates on Large Time Deposits (LTDs) of city banks in November 1990 and smaller MMCs are now pegged to the LTD rates.

6/ Maturity can be set freely between 3 months and 3 years.

7/ The higher interest rate factors in parentheses apply to the MMCs of ¥ 3 million or more.

as a means to provide liquidity to financial institutions. To facilitate this shift, in January 1990 the BOJ began using Treasury bills in addition to Financing bills and commercial paper (which the BOJ had recently begun to employ) in its open market operations. To increase efficiency and effective arbitrage in the call market, the quotation system for collateralized call transactions was changed in November 1990 to a competitive offer-bid system.

With a view to increasing transparency in the stock market, the authorities introduced disclosure requirements for large equity holders in June 1990--those who control more than 5 percent of the outstanding shares of publicly-held companies are now required to reveal information on their holdings. At the same time, the authorities overhauled existing regulations on the tender-offer (or takeover bid) system, which had hardly been enforced before, with the aim of making procedures more explicit and more in line with those of other industrialized nations.

Work has also proceeded on the reform of the institutional segmentation of activities in the financial system aimed at increasing competition in the financial services sector. In June 1991, two MOF advisory committees published their final reports on the framework of such a reform, 1/ and the authorities intend to draft legislation by the end of FY 1991 (April-March). Under the approach supported by these reports, both banks and securities companies would be able to set up independent subsidiaries to carry out either banking or securities activities. Banks would be allowed to establish dedicated subsidiaries to enter the securities underwriting business, but for the time being would not be able to engage in brokerage business. Also, within the banking sector the segregation between short and long-term banking business would be virtually eliminated through a similar subsidiaries approach. These deregulation measures, the reports noted, should be implemented in a phased manner, albeit at a reasonably prompt pace, to maintain orderly markets. They also should be accompanied by effective firewalls to avoid conflicts of interest.

### 3. Agricultural policies

In 1990, the Government took further steps toward the reform of agricultural policies and lowered administered prices on a number of products 2/ and relaxed import restrictions. However, the reductions in administered prices were small--in the range of 1-5 percent (Table 24)--and the gap between domestic and world prices was generally unchanged and

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1/ On the New Financial System, by the Financial Systems Research Council published on June 25, 1991, and How the Basic System Regarding the Capital Market Ought to be Reformed, by the Securities and Exchange Council, published on June 19, 1991

2/ In July 1990, for the first time (and henceforth) The Government excluded cost data for the highest cost rice growers in its calculation of costs that form the basis for the administered producer price of rice.

Table 24. Japan: Administrative Prices of Major  
Agricultural Products, 1980-91

(In yen per kilogram)

	1980	1985	1986	1987	1988	1989	1990	1991
Rice (husked)								
Government purchase price	295	311	311	293	279	279	275	...
Wheat								
Government purchase price	178	185	183	174	166	160	154	...
Barley								
Government purchase price	162	167	165	156	148	138	132	...
Sugar								
Government purchase price	246	241	235	213	206	194	188	...
Soybeans								
Standard price	280	287	282	266	251	251	240	...
Manufacturing milk								
Guarantee price	89	90	88	83	80	80	78	77
Butter								
Stabilization indicative price	1,253	1,276	1,225	1,100	1,080	1,092	1,065	1,051
Skimmed milk powder								
Stabilization indicative price	501	541	541	527	521	527	513	507
Beef (dairy steer)								
Lower stabilization price	1,105	1,120	1,090	1,020	995	995	985	960
Pork								
Lower stabilization price	588	600	540	455	410	400	400	400

Source: Ministry of Agriculture, Forestry and Fisheries.

remains large. In the area of trade measures, import quotas for ice cream, frozen yoghurt, grape juice, pineapple juice, and sugar products were abolished. The quotas on imports of beef and fresh orange were increased by 18 and 13 percent, respectively, as provided under the Government's 1988 liberalization plan and tariffs on processed cheese were reduced.

Wholesale rice exchanges were opened in Tokyo and Osaka with the support of the Government and the first auctions were completed in October 1990. Prior to the opening of these exchanges, the formal distribution or government-controlled channels for rice were administered virtually entirely by the Zen-Noh (National Federation of Agricultural Cooperatives) acting as agent for the Government, which decided, brand by brand, distribution to buyers at prices it set on a yearly basis. 1/ The new system aims to provide market-oriented incentives to rice farmers by allowing demand and supply conditions to determine the price of rice, albeit only for a portion of rice distributed through government-controlled channels. 2/ Since the opening of the wholesale exchanges, the weighted average price of rice sold in these markets has declined by 2 percent. 3/

Overall, in 1990 the level of support to domestic agricultural producers fell. As measured by OECD calculations of the producer subsidy equivalent, 4/ assistance to producers fell from 71 percent of producer income in 1989 to 68 percent of producer income; still total assistance to the agricultural sector remained over 1 1/2 times, or well above, the OECD average. However, this reduction mainly reflected a rise in border prices in domestic currency terms due to the depreciation of the yen.

#### 4. Distribution, trade, and foreign direct investment

During 1990 and 1991 the Government initiated a number of reforms of the distribution system aimed at improving market access. One important area of reform concerned regulations under the Large-Scale Retail Store Law (LSRSL) on the market entry of large retail stores. As a first step, in May 1990 the Government took measures to shorten the application and approval

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1/ Domestic production of rice amounts to about 10 million metric tons. Of this, about 70 percent is distributed through government-controlled channels, 25 percent is consumed by rice growers and their relatives, and the balance is distributed through "irregular" channels.

2/ About one million metric tons of rice a year are auctioned through the wholesale exchanges, accounting for some 15 percent of rice distributed through government-controlled channels and 10 percent of total rice production.

3/ The price of three fifths of the brands of rice fell while that of the remaining brands increased.

4/ This is defined as the subsidy that would be necessary to compensate producers for removing government support under existing support programs. The latest estimates may be found in OECD, Agricultural Policies, Markets, and Trade, Monitoring and Outlook, 1991 (Paris: OECD, 1991).

process to open a large retail outlet to one and a half years--typically this had taken 3-5 years--, as well as to increase the transparency of the process. Also, large retailers were henceforth allowed to add up to 100 square meters of floor space for sales of imported goods without going through the approval process. Since then, the pace of new applications has increased and, as of March 1991, the number of outstanding applications for approval had risen to over 2,500, significantly more than before the reform. In a second phase of reforms, the LSRSL was revised in May 1991 to further shorten the application process to one year. Also, a part of the approval process that had been perceived to be the least transparent will be abolished, 1/ and the upper limit for expanding floor space for sales of import goods without approval was raised to 1,000 square meters. These revisions are to be put into effect within nine months, and will be subject to review after two years.

To facilitate imports, the Government committed itself to expedite customs clearance procedures so that the time taken from the presentation of an import declaration to the issuance of import permit would be less than 24 hours (for normal cargos) by the end of 1991. In order to meet this goal, several new or upgraded systems related to customs clearance of imports were added in 1990. Funding for further upgrading of the system was approved in the FY 1991 Budget.

An amendment to the law governing foreign direct investment was passed in April 1991. Under the revised law, foreign investors are required to report only ex post facto, except for cases related to national security interests and four industries as reserved under the Capital Movements Liberalization Code of the OECD. 2/ The Government announced that it would publish a positive list of those kinds of investment for which only ex post facto reports are required, so that the required legal procedures would be clear to investors.

#### 5. Consumption tax

In May 1991, the Government approved revisions to the consumption tax that was introduced in FY 1989 as part of a comprehensive tax reform. The purpose of these revisions, which are to go into effect in October 1991, is to eliminate certain elements of the tax that were considered to be unduly regressive, and to strengthen the collection of taxes from small businesses.

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1/ The Sho-cho-kyo (Local Councils for Coordinating Commercial Activities) in which the opinions of local businesses were heard will be abolished. The views of this interest group will be heard instead, along with those of consumers and academic experts, at the regional level Large-Scale Retail Store Councils.

2/ These four sectors are agriculture, forestry and fishery; mining; petroleum industry; and leather and leather products industry. For the foreign direct investment into these sectors, prior notification is still required.

Accordingly, tax exemptions were introduced for housing rent, educational fees and textbooks, burial fees, and certain goods and services for the elderly and handicapped. A proposal to reduce the consumption tax on food was not approved.

Prior to the May 1991 revisions, in order to mitigate compliance costs, small businesses with annual sales of ¥ 500 million or less were allowed to estimate their deductions for consumption taxes paid on intermediate inputs as 80 percent of the tax paid on their sales; wholesalers could use a ratio of 90 percent. In addition, businesses with annual sales of ¥ 30-60 million were partially exempted from the tax. These provisions were considered to be too generous and inequitable, and therefore the following revisions were made: (1) the simplified tax assessment system was made available only to small enterprises with annual sales of ¥ 400 million or less; (2) the simplified tax assessment ratios were reduced to 90 percent for wholesalers; 80 percent for retailers, 70 percent for manufacturers, agriculture, forestry, and fishing, mining, construction, and regulated utility companies; and 60 percent for all others; and (3) partial tax exempt status is now only granted to businesses with annual sales of ¥ 30-50 million. Also, the frequency of tax payments by businesses was increased.

#### 6. Land management and tax reform

In early 1991, the Government implemented a reform of land taxes. The aim of the reform is to improve efficiency and equity in land use--in line with the principles laid out in the Basic Land Act 1--by encouraging the transfer of land to residential uses and putting downward pressure on real estate prices.

The Government has long recognized that tax factors have affected the level of residential land prices, particularly by discouraging the reallocation of land from agricultural to other uses. An important reason is that agricultural land is typically taxed more lightly than residential land. In general, this reflects the fact that the cadastral value of agricultural land understates the market value by a greater proportion than for residential land. Under the local (municipal) property (or fixed assets) tax, in the three largest metropolitan areas (Tokyo, Osaka, and Nagoya), agricultural plots in residential or commercial areas are supposed to be taxed at the residential rate if the appraisal value is more than 30,000 yen (about \$200) per 3.3 square meters--well below current market prices. However, plots larger than 990 square meters are exempted from the higher rate if the owner intends to continue farming for a period in excess of 10 years. This exemption is widely claimed, and it is estimated that only about 15 percent

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1/ The 1989 Basic Land Act emphasizes the public nature of land and prescribes that land use should be properly planned, that land speculation should be restrained, and that those who benefit from the appreciation of land should bear the appropriate burden of taxes and improvement costs.

of the agricultural plots that should be subject to the higher residential rate are actually taxed at that rate.

The inheritance tax system also provides preferential treatment for agricultural plots: the tax burden is considerably reduced if the heir continues to use the lot for agriculture for 20 years. Furthermore, the land owner could borrow on the strength of the underlying market value of the land, and thereby effectively realize the capital gain (without a corresponding tax liability) that would have accrued if the land had been sold or developed. This matching of an asset and a liability also offered additional tax advantages under the inheritance tax which is levied only on the net worth of an estate.

The 1991 land tax reform comprises several measures (described below) passed into law in March and May 1991, which are to come into effect in FY 1991 and FY 1992. The purpose of the legislation is to strengthen the taxation of landholding and property transactions, and achieve a greater balance between the taxation of income, consumption, and assets. In particular, they are designed to reduce the tax advantages available to urban farmland. As part of the comprehensive reform of land management, zoning and building legislation 1/ also was revised in November 1990 to encourage the supply of housing in large metropolitan areas. These revisions aim at (i) encouraging the conversion of farmland in urban areas into medium and high rise residential buildings; (ii) promoting the supply of housing in mixed residential and commercial areas by relaxing regulations that limit the maximum permitted floor space on a building site; and (iii) promoting the effective use of unused or underutilized land. Other actions geared to putting downward pressure on prices include endorsing, in January 1991, the relocation of government functions out of Tokyo, and restrictions on bank lending to the real estate sector.

a. The land value tax

A key element of the Government's land tax reform is a new land value tax (LVT) to take effect on January 1, 1992. The LVT is a national tax on individuals and corporations that are owners or lessees of land in the country, with assessments based on ownership or leasehold values used for the inheritance tax. Several tax exemptions and deductions are provided under the LVT. Exemptions are granted to land held by central and local governments and public corporations or used in the public interest (for example, schools and hospitals); owner-occupied residential property of up to 1,000 square meters; land with an assessment value of no more than ¥ 30,000 per square meter; and agricultural land outside Urban Promotion Areas (see below). 2/ In addition, a basic deduction amounting to either

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1/ The Town Planning Law and the Building Standard Law.

2/ This zoning classification is for areas in which urban development and redevelopment is permitted and in which the conversion of farmland does not require approval, in contrast to Urban Control Areas where it is not.

¥ 1 billion or ¥ 30,000 per square meter (excluding exempted land), whichever is larger, is allowed; small and medium-sized businesses are eligible for a larger deduction of ¥ 1.5 billion. Taxes paid under the LVT are also a deductible business expense in calculating tax liabilities under the individual (business income) income tax and corporation tax. The tax rate will initially be set at 0.2 percent in January 1, 1992, and then subsequently be raised to 0.3 percent.

b. Taxation of agricultural land in urban areas

The LVT exemption for agricultural land will lapse after five years for land within an Urbanization Promotion Area in the three major metropolitan areas which does not fall within a Productive Green Tract Area (PGTA). 1/ Also, this category of land will cease to benefit from the deferment of inheritance tax on January 1, 1992. For land within a PGTA the exemption of the deferred inheritance tax liability after 20 years of continuous agricultural operation will be abolished, and the verification of continuous agricultural operation will be made more strict. In addition, from FY 1992 onwards, agricultural land outside a PGTA will be subject to the same local property tax rates as residential land, while restrictions on the rezoning of residential land to agricultural land use within a PGTA will be tightened.

c. Taxation of idle land

A system was introduced to identify idle land, promote its utilization, and discourage speculation. The measures include levying the existing Special Landholding tax on plots larger than 1000 square meters--this is a lower tax threshold than usual--within designated areas. 2/ Within the three metropolitan areas, for a period of 10 years, the minimum threshold of taxable area will be lowered and the number of land uses granted exemption will be reduced. Also, local authorities may require designated land to be used more effectively or otherwise be subject, after an interval of two years, to purchase. 3/

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1/ This zoning classification is for land deemed to be kept under agricultural use; any change in land use is subject to approval.

2/ The Special Landholding Tax is a local (municipal) tax on property. The tax rate is 1.4 percent for land held for more than one year, and 3 percent for land acquired in the past year. Normally, property of area smaller than 2,000-10,000 square meters (the threshold depends on the municipality) is exempt. The local property and real property acquisition taxes can be credited against this tax; their standard tax rates are 1.4 percent and 4 percent, respectively.

3/ After the local authority had negotiated the purchase of the land the property would be converted to residential use.

d. Revaluation of land for tax purposes

The valuation of land for tax purposes will be brought closer into line with actual market values in stages. 1/ As regards the inheritance tax, the ratio of the assessed property value to the posted or published public price 2/ was raised from 58 percent in FY 1988 to 62 percent in FY 1989 and then to 65 percent in FY 1990. The present goal is to raise the valuation ratio to 70 percent and then to 80 percent eventually. This increase may be accompanied by rate and threshold adjustments in order to avoid an unduly large increase in the tax burden. The valuation date will be made more current, and will be changed from July 1 in the preceding year to January 1 of the applicable tax year. Also, to encourage a more consistent and closer market-related valuation of land for the local property tax the publication of property road rating assessments 3/ will be expanded. These assessments provide an independent publicly available property valuation that could help free local governments from local pressures in making tax assessments. Additional revenues generated from these changes would be used to make offsetting reductions in local income taxes in order to achieve more balance in the taxation of income and assets.

e. Taxes on the transfer of land

A number of modifications were made under several taxes to promote the supply of high quality residential land. As regards the taxation of capital gains from the sale of property the following changes were made; unless otherwise noted, these changes will come into effect on January 1, 1992. Under the individual capital gains tax, the lower tax band (with a tax rate of 10 percent) applying to owner-occupied residential property held for longer than 10 years will be enlarged from ¥ 0-40 million (after deductions) to ¥ 0-60 million. The capital gains tax rate on individual property held for more than five years will be raised from 20-25 percent to a single rate of 30 percent. By contrast, the reduced flat-rate on the sale of land (held for longer than 5 years) by individuals for large-scale housing development sites or to the central and local governments was cut from 20 percent to 15 percent, effective January 1, 1991. Capital gains on corporate property held for longer than five years will now be subject to additional taxation at the rate of 10 percent; previously only land held for less than five

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1/ Tax assessment values of land are significantly lower than market values. In the Osaka and Tokyo metropolitan areas it is believed that the cadastral value of land is only about 5 to 10 percent of market value.

2/ Posted land prices are published--they are reported in newspapers--by the National Land Agency, which surveys the price of selected fixed sites in each municipality on an annual basis.

3/ Road rating assessments are land values for roadside property calculated by the National Tax Authority. These assessments are also used as benchmarks for appraising property values for sites of different quality or at a distance from the road. These values are publicly available in contrast to local property tax valuations which are not.

years had been subject to additional taxation. Also, corporate super short-term capital gains (on property held less than two years) will be separately taxed at 67.5 percent. Previously, such gains were subject to the corporate income tax rate of 30 percent plus an additional tax rate of 37.5 percent. Separate taxation raises the effective tax rate on capital gains in cases where corporations could previously offset the gains with losses on other income under the corporate income tax.

A number of other tax provisions designed to encourage the relocation of industrial activity, the transfer of land through eminent domain, and the consolidation of agricultural plots were also expanded or converted from temporary to permanent measures. Also, measures were introduced to reduce tax avoidance related to real estate business transactions. Accordingly, the offsetting of real estate profits and losses with income from other sources, and the tax deductibility of interest on loans used to finance real estate purchases, will be abolished in 1992.

The land tax reform will raise the effective rate of taxes on land, mainly on corporate and large individual landowners in urban areas where increases in land prices and the scarcity of residential land had been greater than elsewhere in recent years. A central aim of the tax reform, together with the revisions in land management regulations, is to dampen land price pressures. Data limitations and the large degree of uncertainty about the fundamental determinants of recent land price increases in Japan, and the wide-ranging nature of the tax changes, make it difficult to quantify the impact of the tax reform on land prices. Nevertheless, to the extent that it results in an increase in the effective rate of land taxation, it will, in principle, translate into a capital loss for landholders. This will tend to exert downward pressure on land prices.

A Structural Interpretation of Reduced-Form Equations for GNP Growth

This Annex interprets the indicator equations for GNP growth in the main text in terms of a structural model. Equations for GNP growth are derived as a function of structural indicators, i.e. interest rates and the exchange rates; the role of monetary aggregates in reduced-form equations is then discussed.

A Structural Model of Output and Prices

The price equation can be derived from a general model of overlapping wage contracts with either forward- or backward-looking inflation expectations (see Chadha and others (1991)):

$$\Delta p = \alpha \Delta p_{-1} + (1-\alpha) \Delta p^e + \gamma(y-y^*) + \delta \Delta(y-y^*) + \sigma \Delta \text{reer} + \epsilon_p, \quad (1)$$

where lower-case letters denote natural logarithms,  $p$  is the GNP deflator,  $y$  is real GNP,  $y^*$  is potential real GNP,  $\text{reer}$  is the real effective exchange rate, and  $\epsilon$  is a disturbance term. Output is determined by an aggregate demand relationship, where  $z$  is a composite indicator of the effects of real interest rates and the real exchange rate on aggregate demand (with a coefficient normalized to unity):

$$y = y^* + z + \epsilon_y. \quad (2)$$

Taking the first difference of equation (2) gives an expression for real GNP growth:

$$\Delta y = \beta + \Delta z + \Delta \epsilon_y, \quad (3)$$

where  $\beta$  is the growth rate (assumed constant) of potential output. In the equations estimated in the main text,  $\Delta z$  is represented by distributed lags on changes in the real interest rate and the real exchange rate. The properties of the error term in equation (3) depend on the process underlying (unexplained) innovations in real output. If this process exhibits a unit root,  $\Delta \epsilon_y$  will be serially uncorrelated; if the root is less than unity,  $\Delta \epsilon_y$  will be negatively autocorrelated. Inclusion of lags on  $\Delta y$  in the regressions for real GNP growth yielded coefficients that were small and insignificant, suggesting that the unit-root hypothesis is a reasonable approximation.

The equation for nominal GNP growth can be obtained by adding equation (3) to equation (1):

$$\Delta p + \Delta y = \alpha \Delta p_{-1} + (1-\alpha) \Delta p^e + \beta + \gamma z + (1+\delta) \Delta z + \sigma \Delta \text{reer} + \Delta \epsilon_y + \epsilon_p. \quad (4)$$

Lagged and expected inflation in equation (4) are proxied in estimation by a distributed lag on growth in the GNP deflator, while the terms in  $z$  and  $\Delta z$  are proxied, as in equation (3), by distributed lags on both the levels and changes in interest rates and the exchange rate. However, the estimated parameters on the levels of these variables were insignificant in equation (4), while those on their changes are similar to those in equation (3). This suggests that  $\gamma$  and  $\delta$  are small: interest rates and the exchange rate affect nominal GNP growth largely through changes in real GNP as opposed to the GNP deflator.

### Monetary Aggregates

A monetary aggregate can be added to the analysis by specifying equations linking money to interest rates and the exchange rate. Here these are represented by a simple money-demand function and an interest-rate arbitrage condition:

$$m = (y+p) - \lambda (r+\Delta p) + \epsilon_m , \quad (5)$$

$$\text{reer} = \rho r + \epsilon_r , \quad (6)$$

where  $\lambda$  is the semi-elasticity of money demand with respect to the nominal interest rate, and  $\rho$  is the response of the real effective exchange rate to a change in the domestic real interest rate. The variable  $z$  in equation (4)--which in turn reflects the effect of  $r$  and  $\text{reer}$  on nominal GNP growth--can be substituted out using equations (5) and (6) to obtain a quasi-reduced-form expression relating nominal income growth to inflation and the money supply. Supposing, in addition, that expected future inflation is a linear function of past inflation and growth in the money supply, gives an equation of the following type:

$$\Delta p + \Delta y = A(L)\Delta p + B(L)\Delta m + \epsilon , \quad (7)$$

where  $A(L)$  and  $B(L)$  are polynomials in the lag operator  $L$ , and  $\epsilon$  is a composite error term reflecting the disturbances in all four structural equations. It can be shown that the sum of the coefficients in  $A(L)$  is zero, while that in  $B(L)$  is unity: growth in nominal income should be homogeneous of degree one in lagged growth in the money supply.

Reduced-form relationships for nominal income such as equation (7) may be more robust than structural relationships such as equation (4) when money growth is exogenous and the money demand function is stable. Even if the money demand function is unstable, i.e. the disturbance in equation (5) is characterized by a unit root process, equation (7) will yield consistent estimates of the reduced-form model as long as money is exogenous.

Financial innovations that cause shifts in money demand, however, are typically accommodated by monetary authorities in the form of (temporarily) higher or lower growth rates of the monetary aggregates. This induces a negative correlation between the error term in equation (7) and the monetary

aggregate that obscures the estimates of the structural parameters. This appears to have been the case during the 1980s for Japan, as evidenced by the unsatisfactory performance of monetary aggregates as indicators of nominal GNP growth.

MULTIMOD Simulation Results

Partial simulations were performed on the Japanese block of the IMF's multi-region simulation model--MULTIMOD--to identify the effect of changes in real interest rates and the real exchange rate on aggregate demand. The simulations were performed by (permanently) raising the short-term nominal interest rate by 1 percentage point, and then increasing the nominal exchange rate by 1 percent. As the aggregate price level was held constant, this implies equivalent shocks to the real interest rate and the real exchange rate. Given forward-looking expectations, the increase in the short-term interest rate generated an equal rise in the long-term rate-- i.e., the term structure of interest rates was held "flat" for the purposes of these simulations. This assumption is convenient because certain aspects of MULTIMOD's specification, in particular the discounting of income flows to calculate current-period wealth, make it difficult to disentangle the independent effects of changes in short- and long-term interest rates.

These simulations yielded the following relationship between real GNP growth and the structural indicators of monetary conditions:

$$\% \Delta \text{ real GNP} = -1 \Delta R - 0.17 \% \Delta \text{REER} , \quad (1)$$

where R is an average of short- and long-term real interest rates in percentage points, REER is the real effective exchange rate, and  $\Delta$  indicates deviations from an exogenous baseline path. The weights imply that an increase in the real interest rate of 1 percentage point reduces aggregate demand by one percent, as does a 6 percent appreciation in the real exchange rate. This means that the effect on aggregate demand of an autonomous depreciation in the exchange rate of 6 percent would be offset by a 1 percentage point rise in the average real interest rate. 1/

There are a few practical problems, however, with using the MULTIMOD results to directly construct an MCI for Japan:

- MULTIMOD assumes model-consistent expectations of future inflation in constructing the real interest rate, which are unobservable in practice.
- It is difficult to simulate the independent effects of short- and long-term real interest rates.

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1/ An "autonomous" change in the exchange rate could be caused, for instance, by a change in the risk premium on domestic assets.

- The timing of the response of GNP growth to the MCI cannot be identified at a quarterly frequency given the annual nature of MULTIMOD.
- Some parameters in MULTIMOD reflect pooled estimation for the G-7 countries that may not fully reflect Japan-specific aspects of the relationship between monetary conditions and output.

For these reasons, the MULTIMOD simulations were used in conjunction with the time-series estimation results discussed in the text to construct the MCI.

Table I. Japan: Real GNP and Demand Components, 1986-91 <sup>1/</sup>

(In billions of yen)

	1986	1987	1988	1989	1990	1989			1990				1991
						II	III	IV	I	II	III	IV	I
Private consumption	195,079	203,336	213,983	223,297	232,235	219,178	224,266	228,741	229,493	233,095	233,453	232,842	234,617
Private gross fixed investment	69,825	77,002	87,811	98,174	110,706	94,816	99,214	102,316	105,509	109,162	112,483	115,168	116,875
Residential	15,778	19,349	21,644	21,661	23,581	21,400	21,598	21,786	22,080	23,239	24,616	24,219	23,527
Equipment	54,047	57,654	66,167	76,513	87,125	73,416	77,616	80,530	83,429	85,924	87,867	90,950	93,348
Final private domestic demand	264,904	280,338	301,794	321,471	342,942	313,994	323,481	331,057	335,002	342,257	345,936	348,010	351,492
Government consumption	31,986	32,124	32,815	33,510	33,983	33,587	33,453	33,647	33,902	33,902	33,946	34,185	34,495
Government fixed investment	22,446	24,091	25,336	25,042	25,921	25,097	24,969	25,295	25,697	25,958	26,019	26,046	26,148
Final domestic demand	319,336	336,554	359,945	380,024	402,846	372,677	381,902	389,998	394,602	402,118	405,901	408,241	412,136
Stockbuilding	1,780	876	2,979	3,597	3,068	4,865	3,779	3,240	2,384	3,782	4,116	1,986	3,197
Private	1,197	825	3,218	3,684	2,940	4,571	3,800	3,961	2,181	3,349	3,513	2,710	3,027
Government	583	51	-240	-88	128	294	-20	-721	203	434	603	-725	169
Total domestic demand	321,116	337,429	362,924	383,621	405,914	377,543	385,681	393,239	396,986	405,900	410,017	410,227	415,332
Foreign balance	8,905	6,903	2,900	-528	-1,259	-566	379	-2,091	462	-3,022	-2,584	-206	5,683
Exports	49,400	51,668	57,213	65,779	72,943	64,674	66,904	68,977	73,637	74,053	70,837	73,259	77,431
Imports	40,495	44,765	54,313	66,307	74,202	65,240	66,524	71,068	73,175	77,075	73,422	73,465	71,748
Real GNP	330,022	344,333	365,823	383,093	404,655	376,977	386,061	391,148	397,448	402,877	407,433	410,021	421,016
Memorandum items:													
Government expenditure <sup>2/</sup>	54,432	56,215	58,151	58,553	59,904	58,684	58,422	58,942	59,599	59,860	59,965	60,231	60,643
Nominal GNP	335,838	350,479	373,731	398,693	429,173	392,325	401,226	411,737	418,267	426,860	430,922	438,872	452,565
GNP deflator (1985=100)	101.8	101.8	102.2	104.1	106.1	104.1	103.9	105.3	105.2	106.0	105.8	107.0	107.5

Sources: Economic Planning Agency, Annual Report on National Accounts; and data provided by the Japanese authorities.<sup>1/</sup> At 1985 prices.<sup>2/</sup> Government consumption and investment.

Table II. Japan: Changes in Industrial Production, 1986-91

(Seasonally adjusted data; percentage changes from preceding year or quarter)

	Weight	1986	1987	1988	1989	1990	1989			1990				1991
							II	III	IV	I	II	III	IV	I
All industries	100.0	-0.2	3.4	9.5	6.1	4.6	0.3	-0.1	0.8	0.7	2.1	2.2	1.7	-0.1
Manufacturing	99.3	-0.2	3.4	9.6	6.2	4.6	0.4	--	0.8	0.7	2.1	2.2	1.7	-0.1
Iron and steel	8.2	-5.6	2.0	9.0	1.7	1.9	0.4	--	0.1	-0.6	1.1	2.0	1.7	1.3
Fabricated metals	5.1	-0.3	3.5	7.6	4.6	3.8	1.3	-0.1	-0.2	0.6	1.5	3.0	1.2	1.4
Machinery and equipment	38.1	0.1	3.7	13.9	8.9	6.1	1.1	-0.1	1.1	0.7	2.9	2.9	2.5	-0.4
Industrial	12.0	-4.4	0.3	15.0	10.8	4.8	-0.2	0.2	1.4	1.4	1.2	2.1	1.4	-0.1
Electrical	13.8	4.2	9.1	16.4	7.4	5.3	1.9	-1.2	0.8	0.2	2.1	4.1	3.3	1.5
Telecommunications apparatus	0.9	16.1	43.9	39.6	5.9	1.2	-0.0	-4.5	-3.5	0.8	2.9	5.1	3.4	-5.2
Telecommunications, electronic apparatus, and parts	2.0	6.4	9.7	12.9	6.8	10.5	1.8	-1.1	1.9	2.2	4.4	4.5	3.3	3.2
Radios, television sets, and audio equipment	2.3	3.2	-5.0	9.5	-1.0	8.9	-1.0	-1.3	-2.4	0.4	9.2	5.5	3.7	2.3
Integrated circuits		-4.5	8.2	29.1	18.4	-1.0	4.6	-0.3	0.4	-6.7	2.0	4.5	3.1	4.0
Computers	2.0	17.1	13.0	11.2	8.2	1.6	6.0	-4.3	3.4	3.5	-6.7	0.7	4.6	5.8
Transport equipment	10.6	-1.9	-1.3	9.0	10.1	8.2	2.0	2.3	0.3	-0.5	6.6	2.5	1.2	-4.4
Passenger cars	3.7	2.2	1.9	4.9	13.3	10.6	5.5	2.3	1.9	1.6	3.7	2.4	2.2	-4.8
Ships	1.7	-11.8	-37.8	17.5	19.8	25.1	2.8	12.4	0.9	1.6	8.3	11.9	6.8	-7.1
Precision instruments	1.7	4.5	0.9	8.3	5.9	12.6	-5.3	2.8	3.8	2.6	7.0	0.6	3.9	-2.5
Ceramics	5.9	-0.3	7.7	12.2	5.6	8.9	2.1	-1.3	0.5	3.1	4.0	2.7	3.7	0.1
Chemicals	9.4	3.2	7.7	8.4	6.9	4.4	-1.4	-0.7	2.7	-0.2	1.9	2.9	1.6	0.3
Petroleum and coal products	2.5	-3.6	-3.6	4.1	4.9	8.9	2.5	0.5	3.2	2.1	0.6	6.3	-0.4	2.1
Textiles	7.5	-4.1	-1.6	0.1	-0.8	-3.1	-0.1	0.3	-1.8	-1.6	-0.1	-0.4	0.3	-1.4
Food and tobacco	8.1	1.1	0.8	1.7	1.1	0.6	-5.3	0.7	1.2	-0.8	1.0	1.0	1.1	-0.7

Source: Ministry of International Trade and Industry, Industrial Statistics Monthly.

Table III. Japan: Investment, 1984/85-1989/90

(Percentage change over previous period)

	<u>Manufacturing</u>				<u>Nonmanufacturing</u>	
	All industries	All sectors	Inter-mediate goods	Pro-cessing	All sectors	Services
1984/85	4.0	13.4	2.2	22.3	-4.6	30.2
1st half	-1.1	9.1	2.4	14.3	-6.4	-12.4
2nd half	7.1	12.7	10.5	14.3	3.7	90.3
1985/86	9.0	13.2	12.5	13.7	4.5	2.4
1st half	5.7	4.7	4.5	4.9	6.3	-10.5
2nd half	-2.2	4.1	5.1	3.4	-6.3	-17.6
1986/87	-0.9	-11.9	-6.1	-15.7	12.3	3.6
1st half	0.2	-7.0	-2.6	-10.0	5.4	9.2
2nd half	0.1	-13.5	-11.1	-15.2	18.6	6.5
1987/88	1.7	-2.2	-1.2	-3.0	5.4	29.0
1st half	-0.9	1.2	2.1	0.5	-1.9	16.3
2nd half	2.2	7.8	4.8	10.2	-0.5	8.6
1988/89	18.0	28.0	16.7	36.4	9.5	30.6
1st half	10.7	13.7	6.2	19.3	9.2	25.9
2nd half	7.2	17.3	15.0	18.9	1.8	-1.6
1989/90	15.0	22.1	25.3	20.1	10.9	4.2
1st half	6.9	7.2	7.1	7.3	6.6	-14.8
2nd half	8.8	7.1	8.9	6.0	9.9	45.5
1990/91 <u>1/</u>	16.9	21.2	19.8	22.0	13.9	35.5
1st half	4.2	3.5	4.6	2.8	4.6	33.3
2nd half	3.9	11.8	7.6	14.6	-0.9	-21.4

Source: Bank of Japan, Short-Term Economic Survey of Principal Enterprises, various issues.

1/ Projection.

Table IV. Japan: Saving and Investment Balances, 1981-89

(In percent of GNP)

	1983-85 Average	1986	1987	1988	1989	1990
Foreign balance <u>1/</u>	2.8	4.3	3.7	2.9	2.1	1.4
Savings-investment balances						
Private sector <u>2/</u>	4.8	5.1	3.3	1.4	-0.3	...
General government	-2.2	-0.9	0.5	1.5	2.4	...
Gross savings	30.8	32.0	32.2	33.3	33.6	34.4
Private	27.9	28.1	26.7	26.8	26.2	...
General government	2.9	3.9	5.5	6.5	7.4	...
Gross investment	28.0	27.7	28.5	30.4	31.5	33.0
Private	22.9	23.0	23.5	25.4	26.2	...
General government	5.1	4.8	5.0	5.0	5.0	...

Sources: Economic Planning Agency, Annual Report on National Income Accounts; and staff calculations.

1/ Current account balance including net transfers.

2/ Including public enterprises.

Table V. Japan: Selected Labor Market Indicators, 1986-91 <sup>1/</sup>

(In millions of persons or index; average of year or quarter)

	1986	1987	1988	1989	1990	1989			1990				1991
						II	III	IV	I	II	III	IV	I
Total labor force	60.20 1.0	60.84 1.1	61.66 1.3	62.70 1.7	63.84 1.8	62.60 1.6	62.82 1.8	63.15 1.9	63.53 2.1	63.63 1.7	63.89 1.7	64.32 1.9	64.79 2.0
Total employment, including agriculture	58.53 0.8	59.11 1.0	60.11 1.7	61.28 1.9	62.45 1.9	61.16 1.8	61.41 2.2	61.74 2.1	62.22 2.3	62.29 1.8	62.53 1.8	62.96 2.0	63.48 2.0
Regular employees in manufacturing <sup>2/</sup>	101.2 1.2	99.7 -1.5	100.3 0.6	102.1 1.8	104.1 1.9	101.9 1.9	102.3 1.9	102.8 2.0	103.4 2.0	104.1 2.1	104.4 2.1	104.8 1.9	...
Labor force participation rate (percent)	62.8	62.6	62.6	62.9	63.3	63.7	63.5	62.9	61.9	64.0	63.8	63.3	62.5
Ratio of job offers to applicants	0.63	0.70	1.02	1.26	1.39	1.25	1.30	1.31	1.35	1.40	1.44	1.43	1.46
Unemployment rate (percent)	2.8	2.8	2.5	2.3	2.1	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1
Average hours worked by regular workers in manufacturing <sup>2/</sup>	99.2 -0.8	99.7 0.5	100.9 1.2	99.9 -1.0	98.0 -1.9	99.4 -0.6	100.0 -0.9	100.0 -0.8	98.6 -1.6	98.4 -1.1	98.5 -1.5	98.6 -1.5	...
Of which: Overtime work <sup>2/</sup>	92.5 -7.5	95.0 2.7	108.3 14.0	109.7 1.3	108.4 -1.2	111.2 4.8	108.5 -0.8	108.8 -2.0	109.9 -0.4	110.2 -0.8	108.2 -0.3	109.3 0.5	...
Labor productivity in manufacturing <sup>3/</sup> <sup>4/</sup>	99.4 -0.6	103.8 4.4	111.7 7.6	117.7 5.4	121.9 3.5	118.4 6.9	117.3 4.6	117.5 2.9	119.4 1.6	121.3 2.4	123.6 5.4	125.2 6.5	...
Unit labor cost in manufacturing <sup>3/</sup> <sup>5/</sup>	102.1 2.1	99.4 -2.6	96.5 -3.0	96.8 0.4	88.2 -8.9	95.5 -1.4	97.2 0.9	98.2 2.4	97.5 2.9	99.6 4.3	95.3 -2.0	97.1 -1.1	...

Sources: Ministry of Labor, Monthly Labor Statistics and Research Bulletin; and data provided by the Japanese authorities.<sup>1/</sup> Quarterly data are seasonally adjusted; figures in parentheses are percentage increase over the previous year.<sup>2/</sup> Workers in establishments with more than 30 employees; 1985 = 100.<sup>3/</sup> 1985 = 100.<sup>4/</sup> Output index (value-added weighted) divided by monthly total man-days (obtained from MITI's dynamic statistics of production).<sup>5/</sup> Cash earnings of regular workers divided by labor productivity.

Table VI. Japan: Cash Earnings of Regular Workers, 1986-91 <sup>1/</sup>  
 (Percentage change over the previous year or the same quarter of the previous year)

	Percentage share in 1990	1986	1987	1988	1989	1990	1989			1990				1991 <sup>2/</sup>
							II	III	IV	I	II	III	IV	I
Total cash earnings (real)		2.3	2.2	3.0	1.9	1.5	2.0	1.2	2.3	1.1	2.5	1.3	0.5	-0.8
Total cash earnings (nominal)	100	2.7	1.9	3.5	4.2	4.7	4.8	3.9	5.0	4.5	5.0	4.1	4.4	3.5
Contractual earnings (nominal)	73	2.9	2.0	3.5	3.1	3.8	3.9	3.9	4.0	3.5	4.0	4.0	4.0	4.5
Scheduled earnings <sup>3/</sup> (nominal)	66	3.2	2.0	2.8	3.0	3.8	3.6	3.8	3.9	3.4	4.0	4.0	3.8	4.8
Bonus (nominal)	27	2.2	1.5	4.1	7.5	7.9	10.5	8.1	11.5	16.6	14.6	1.2	5.5	13.0

Sources: Ministry of Labor, Monthly Labor Statistics and Research Bulletin; and data provided by the Japanese authorities.

<sup>1/</sup> Workers in establishments with more than 30 employees.

<sup>2/</sup> January-February 1991.

<sup>3/</sup> Wages earned for work performed during working hours scheduled under contract.

Table VII. Japan: Exchange Rates of the Yen, 1986-91 <sup>1/</sup>

(Period averages)

	Yen per U.S. dollar	Yen per deutsche mark	Yen per French franc	Yen per pound sterling	MERM (1985=100)	Relative normalized unit labor costs (1985=100)	Relative export unit values (1985=100)
1986	168.5	77.6	24.3	247.0	126.6	121.0	105.4
1987	144.6	80.4	24.1	236.4	136.9	124.3	105.1
1988	128.2	73.0	21.5	228.0	151.8	137.8	109.2
1989	138.0	73.4	21.6	225.7	145.2	131.1	108.7
1990	144.8	89.6	26.6	257.4	130.1	115.5	99.4
1989							
I	128.5	69.5	20.4	224.5	154.0	139.0	111.9
II	138.1	71.4	21.1	224.4	146.6	133.6	109.0
III	142.3	73.9	21.9	227.1	141.9	128.1	107.3
IV	143.0	79.0	23.2	226.7	138.2	123.8	106.5
1990							
I	147.9	87.5	25.8	245.0	130.1	116.5	101.4
II	155.3	92.5	27.5	259.9	123.1	109.6	97.0
III	145.2	91.1	27.2	270.2	128.1	113.0	98.3
IV	130.8	87.2	25.9	254.4	139.1	122.8	100.9
1991							
I	133.9	87.5	25.7	255.4	137.1	121.9	...
1990							
January	145.1	85.8	25.2	239.6	132.6	118.7	...
February	145.5	86.8	25.6	246.8	131.6	117.7	...
March	153.1	89.8	26.6	248.7	126.1	113.0	...
April	158.5	93.9	28.0	259.4	121.0	108.2	...
May	153.5	92.4	27.4	257.6	124.0	110.4	...
June	153.8	91.3	27.1	262.6	124.2	110.2	...
July	149.3	91.0	27.1	269.7	126.1	111.4	...
August	147.4	93.9	28.0	279.7	125.3	110.2	...
September	139.0	88.5	26.4	261.2	133.0	117.3	...
October	129.7	85.2	25.4	252.3	140.8	124.1	...
November	129.1	86.8	25.8	253.5	140.3	123.8	...
December	133.5	89.5	26.4	257.3	136.1	120.5	...
1991							
January	133.9	88.7	26.1	258.8	136.2	120.9	...
February	130.5	88.2	25.9	256.4	138.6	123.0	...
March	137.2	85.6	25.1	251.0	136.4	121.7	...
April	137.1	80.5	23.8	239.8	139.8	125.1	...
May	138.0	80.4	23.7	238.3	139.4	...	...

Source: IMF, International Financial Statistics, and staff estimates.<sup>1/</sup> Mid-point rates in Tokyo market.

Table VIII. Japan: Summary Balance of Payments, 1987-91

(In billions of U.S. dollars)

	Exports <u>1/</u>	Imports <u>1/</u>	Trade balance <u>1/</u>	Services and transfers <u>1/</u>	Current balance <u>1/</u>	Long-term capital <u>2/</u>	Basic balance <u>3/</u>	Short-term capital	Errors and omissions	Overall balance <u>3/</u>	Memorandum Item: Change in gross reserves	Current account (In bns. of yen)	Current account (As percent of GNP)
1987	224.6 (9)	128.2 (14)	96.4	-9.4	87.0	-136.5	-49.5	32.5	-3.9	-21.0	39.2	12,541	3.6
1988	259.8 (16)	164.8 (28)	95.0	-15.4	79.6	-130.9	-51.3	64.0	2.8	15.5	16.2	10,192	2.7
1989	269.6 (4)	192.7 (17)	76.9	-19.8	57.2	-89.2	-32.1	29.4	-22.0	-24.7	-12.8	7,853	2.0
1990	280.4 (4)	216.8 (13)	63.5	-27.8	35.8	-43.6	-7.8	7.8	-20.9	-20.9	-7.8	5,203	1.2
1988													
I	62.0 (15)	38.3 (40)	23.7	-2.4	21.2	-15.1	3.3	-5.6	7.4	5.0	3.4	2,717	3.0
II	63.4 (14)	41.4 (33)	22.0	-4.0	18.0	-36.6	-18.0	21.9	-2.4	1.4	2.8	2,254	2.4
III	65.7 (17)	42.4 (27)	23.2	-4.4	18.8	-42.2	-23.2	30.5	-5.2	2.1	3.5	2,519	2.7
IV	67.6 (14)	42.3 (16)	25.3	-4.5	20.8	-37.0	-13.4	17.3	3.0	6.9	6.5	2,606	2.7
1989													
I	70.6 (14)	45.9 (20)	24.7	-5.1	19.6	-5.6	10.5	-12.0	3.9	2.3	1.7	2,519	2.6
II	66.6 (5)	47.0 (14)	19.6	-5.6	14.0	-30.8	-16.5	8.6	-9.2	-17.1	-9.9	1,916	2.0
III	67.6 (3)	49.0 (15)	18.6	-4.5	14.1	-21.6	-6.6	12.3	-11.5	-5.9	-3.3	2,007	2.0
IV	65.5 (-3)	50.9 (21)	14.5	-4.5	10.0	-31.3	-19.4	20.6	-5.1	-4.0	-1.2	1,430	1.4
1990													
I	68.2 (-3)	51.6 (12)	16.6	-2.1	14.4	-16.1	-3.8	-5.7	-4.4	-13.9	-11.4	2,153	2.1
II	65.7 (-1)	52.1 (11)	13.6	-5.7	7.9	-19.0	-11.1	6.6	--	-4.5	0.2	1,226	1.1
III	70.5 (4)	54.0 (10)	16.5	-9.5	7.0	-7.2	0.2	7.4	-6.6	0.9	1.7	1,018	0.9
IV	75.9 (16)	59.1 (16)	16.8	-10.4	6.4	-1.3	6.9	-0.4	-9.8	-3.4	1.7	835	0.8
1991													
I	78.2 (15)	55.5 (7)	22.7	-4.9	17.8	10.6	21.0	-25.7	-1.4	-6.1	-7.2	2,392	2.1

Source: Bank of Japan, Balance of Payments Monthly. Seasonally adjusted data provided by the Bank of Japan.1/ Quarterly data are seasonally adjusted. Parentheses indicate percentage changes from the previous year or from the same period of the previous year.2/ Excluding Gensaki flows.3/ Quarterly data for the basic and overall balances are based on seasonally unadjusted data for the trade and current accounts.

Table IX. Japan: Exports and Export Indicators, 1986-91

(Indices 1985 = 100, unless otherwise specified) 1/

	1986	1987	1988	1989	1990	1990				1991
						I	II	III	IV	I
Exports										
Value										
U.S. dollars bn. 2/	209.2	229.2	264.9	275.2	286.9	69.8	67.5	71.9	77.3	79.9
Yen tr. 2/	35.3	33.3	33.9	37.8	41.5	10.2	10.5	10.6	10.1	10.7
Volume	99.4	99.7	104.5	108.8	114.8	112.3	112.5	114.2	116.5	118.9
(Volume growth)	-0.6	0.3	5.1	3.8	5.5	5.6	0.2	1.5	2.0	2.1
Export unit values										
U.S. dollars	121.0	132.1	146.5	146.2	144.1	144.1	137.2	142.1	152.9	155.9
(Percentage change)	21.0	9.2	10.9	-0.1	-1.5	-0.2	-4.8	3.6	7.6	2.0
Yen	84.6	79.7	77.2	82.8	86.0	87.6	88.8	87.3	83.3	86.6
(Percentage change)	-15.4	-6.1	-3.1	7.3	3.9	1.9	1.3	-1.7	-4.5	3.9
Export markets										
Market growth, non-oil 3/										
Year-on-year increase	8.4	10.1	11.1	8.2	5.0	...	...	...	...	...
Growth in partner countries 4/										
Year-on-year increase	4.5	5.3	5.5	3.8	3.0	...	...	...	...	...
Industrial production	99.8	103.2	113.0	119.9	124.1	121.6	123.9	126.8	129.0	128.8
Wholesale prices of manufactures	92.8	89.7	89.2	91.5	93.1	92.7	93.0	92.8	93.8	94.3
Measures of price competitiveness										
Relative normalized unit labor costs	121.0	124.3	137.8	131.1	115.5	116.5	109.6	113.0	122.8	121.9
Relative export unit values	105.4	105.1	109.2	108.7	99.4	101.4	97.0	98.3	100.9	...
Exchange rates										
Yen/dollar (average)	168.5	144.6	128.2	138.0	144.8	147.9	155.3	145.2	130.8	133.9
MERM index	126.6	136.9	151.8	145.2	130.1	130.1	123.1	128.1	139.1	137.1

Sources: IMF, International Financial Statistics; Ministry of Finance, The Summary Report on Trade of Japan; Bank of Japan, Economic Statistics Monthly; and staff estimates.

1/ With the exception of export unit values, measures of price competitiveness, and exchange rates, all quarterly are seasonally adjusted using seasonal factors calculated by the Bank of Japan.

2/ Customs clearance basis.

3/ Average of partner countries' non-oil import volumes weighted by relative importance in Japan's exports.

4/ An export-weighted average of partner countries' real GNPs.

Table X. Japan: Exports by End-Use, 1986-90

(Percent of total) 1/

	1986	1987	1988	1989	1990
Industrial supplies	<u>18.5</u>	<u>18.2</u>	<u>18.5</u>	<u>18.2</u>	<u>17.6</u>
Chemicals	4.5	5.0	5.2	5.3	5.5
Metals	6.8	6.3	6.6	6.2	5.2
Textiles	2.5	2.3	2.0	1.9	2.0
Capital equipment	<u>48.6</u>	<u>51.1</u>	<u>52.8</u>	<u>54.3</u>	<u>54.0</u>
Nonelectrical machinery	18.4	19.5	21.1	22.2	22.1
Electrical machinery	13.8	15.3	17.0	17.4	17.0
Transport equipment	12.0	11.8	9.9	9.9	10.2
Consumer nondurable goods	<u>1.0</u>	<u>0.9</u>	<u>0.9</u>	<u>0.8</u>	<u>0.9</u>
Textile products	0.4	0.4	0.3	0.3	0.3
Consumer durable goods	<u>29.9</u>	<u>27.8</u>	<u>25.7</u>	<u>24.4</u>	<u>25.1</u>
Passenger cars	15.8	15.6	14.6	14.1	14.4
Other	14.2	12.2	11.1	10.3	10.7
Other	<u>1.9</u>	<u>1.9</u>	<u>2.2</u>	<u>2.3</u>	<u>2.4</u>
Memorandum items:					
Total exports (in billions of U.S. dollars)	209.2 (19)	229.3 (10)	264.9 (16)	275.2 (4)	286.9 (4)
Total exports (in trillions of yen)	35.3 (-16)	33.3 (-6)	33.9 (2)	37.8 (11)	41.5 (10)

Sources: Japan Tariff Association, The Summary Report on Trade of Japan; and staff estimates.

1/ Subcategories are not necessarily exhaustive; parentheses indicate percentage changes from the previous year.

Table XI. Japan: Imports and Import Indicators, 1986-91

(Indices, 1985 = 100, unless otherwise specified)

	1986	1987	1988	1989	1990	1990				1991
						I	II	III	IV	I
<b>Total imports</b>										
Value (trillions of yen)	21.6	21.7	24.0	29.0	33.9	8.0	8.3	8.5	9.0	8.3
Value (billions of dollars)	126.4	149.5	187.4	210.8	234.8	54.9	53.3	57.6	68.8	62.5
Unit value (yen)	63.3	58.4	55.3	61.9	68.4	66.7	69.2	67.6	70.1	65.3
Unit value (dollars)	89.5	96.6	104.0	108.5	113.8	109.8	106.9	109.9	128.6	117.5
Volume	109.5	119.7	139.7	150.6	159.3	156.9	155.3	161.0	163.1	167.1
(Volume growth)	9.5	9.3	16.7	7.8	5.8	2.2	-1.0	3.7	1.3	2.4
<b>Imports of manufactures</b>										
Value (trillions of yen)	8.9	9.6	11.8	14.6	17.1	4.1	4.2	4.5	4.3	4.1
Value (billions of dollars)	52.8	66.0	91.8	106.1	118.0	28.1	27.1	30.1	32.6	30.4
Unit value (yen)	76.1	73.0	69.4	76.8	81.3	83.2	84.1	83.2	77.2	76.9
Unit value (dollars)	109.9	121.3	131.2	134.9	135.9	136.9	129.9	135.1	141.5	138.5
Volume	122.6	137.9	180.0	202.1	223.0	212.3	214.9	224.8	234.8	225.9
<b>Mineral fuel imports</b>										
Value (trillions of yen)	6.4	5.7	4.9	5.9	8.1	1.7	1.8	1.9	2.7	2.2
Value (billions of dollars)	36.9	39.1	38.4	43.1	56.7	11.9	11.4	12.8	20.6	16.6
Unit value (yen)	47.5	40.5	32.4	36.9	48.1	43.4	43.1	42.9	61.1	50.2
Unit value (dollars)	64.7	66.9	60.9	64.7	80.0	71.3	66.6	69.8	112.2	90.4
Volume	101.3	105.2	113.0	119.6	125.5	123.8	121.9	127.9	129.6	136.1
<b>Raw material imports</b>										
Value (trillions of yen)	3.0	3.2	3.6	4.2	4.1	1.1	1.1	1.0	0.9	0.9
Value (billions of dollars)	17.5	22.0	28.0	30.7	28.5	7.2	7.0	7.1	7.1	7.0
Unit value (yen)	69.2	68.5	73.7	83.6	85.2	86.2	91.6	86.6	76.0	75.8
Unit value (dollars)	97.7	112.8	138.3	146.5	140.8	141.9	141.5	140.6	139.3	136.4
Volume	99.4	107.7	110.8	114.1	109.8	110.9	108.0	109.9	110.7	112.0
<b>Imports of foodstuffs</b>										
Value (trillions of yen)	3.2	3.3	3.7	4.3	4.6	1.1	1.2	1.1	1.1	1.1
Value (billions of dollars)	19.2	22.4	29.1	31.0	31.6	7.7	7.8	7.6	8.4	8.5
Unit value (yen)	77.8	68.3	70.1	77.3	79.5	77.8	84.0	81.7	74.4	74.1
Unit value (dollars)	110.2	112.7	130.4	135.0	131.7	128.1	129.8	132.6	136.4	133.3
Volume	111.7	128.1	143.0	148.2	154.3	153.9	155.7	148.2	159.8	162.3
<b>Indicators</b>										
Industrial production	99.8	103.2	113.0	119.9	124.1	121.6	123.9	126.8	129.0	128.8
Total domestic demand	103.7	109.0	117.2	123.9	131.1	128.3	131.2	132.6	132.6	134.3
Inventory ratio of raw materials in manufacturing	99.9	95.1	93.4	90.0	89.1	92.0	89.7	87.0	87.7	91.0
<b>Exchange rates</b>										
Yen/dollar (average)	168.5	144.6	128.2	138.0	144.8	147.9	155.3	145.2	130.8	133.9
MERM Index	126.6	136.9	151.8	145.2	130.1	130.1	123.1	128.1	139.1	137.1

Sources: Ministry of Finance, Summary Report on Trade of Japan; IMF, International Financial Statistics; and staff estimates.

1/ With the exception of export unit values and exchange rates, quarterly data are seasonally adjusted by Bank of Japan and the staff; figures in parentheses indicate percentage change over preceding period.

2/ In constant prices, national accounts basis.

Table XII. Japan: Imports by End-Use, 1986-90 <sup>1/</sup>  
 (Percent of total imports excluding mineral fuels and nonmonetary gold)

	1986	1987	1988	1989	1990
Industrial supplies <sup>2/</sup>	<u>45.4</u>	<u>46.0</u>	<u>45.9</u>	<u>44.6</u>	<u>54.3</u>
Crude materials	19.0	18.8	17.5	17.1	11.1
Industrial chemicals	11.6	10.9	10.0	9.5	6.7
Metals	6.6	7.6	9.6	9.1	6.2
Textiles	2.1	2.2	2.3	2.3	1.5
Capital equipment	<u>16.0</u>	<u>15.3</u>	<u>15.4</u>	<u>16.2</u>	<u>14.0</u>
Nonelectric machinery	6.4	6.3	6.5	7.0	6.0
Electric machinery	5.1	5.0	5.6	6.1	4.9
Transport equipment	3.1	2.6	2.3	2.0	2.2
Consumer nondurable goods	<u>5.7</u>	<u>7.2</u>	<u>7.4</u>	<u>8.3</u>	<u>6.0</u>
Textile products	4.0	4.9	5.0	5.8	4.0
Consumer durable goods	<u>5.6</u>	<u>7.5</u>	<u>8.2</u>	<u>9.4</u>	<u>8.7</u>
Household and domestic electric equipment	0.6	0.8	1.1	1.2	0.8
Passenger cars	1.3	1.9	2.1	2.4	2.6
Food and direct consumer goods	<u>24.5</u>	<u>21.6</u>	<u>20.8</u>	<u>19.4</u>	<u>13.8</u>
Other	<u>2.8</u>	<u>2.5</u>	<u>2.2</u>	<u>2.1</u>	<u>3.2</u>
Memorandum items: <sup>3/</sup>					
Total imports	126.4 (-2)	149.4 (18)	187.4 (25)	210.8 (13)	234.8 (11)
Mineral fuel imports	36.9 (-34)	39.1 (6)	38.4 (-2)	43.0 (12)	56.7 (32)
Nonmonetary gold import	7.0 (245)	3.5 (-50)	4.1 (18)	3.5 (-15)	3.6 (2)
Total imports excluding mineral fuels and gold	82.5 (15)	106.8 (30)	144.9 (36)	164.3 (13)	174.5 (6)

Source: Japan Tariff Association, The Summary Report on Trade of Japan.

<sup>1/</sup> Subcategories are not exhaustive.

<sup>2/</sup> Excluding mineral fuels.

<sup>3/</sup> Billions of U.S. dollars; parentheses indicate percentage changes.

Table XIII. Japan: Direction of Trade, 1986-90 1/

(Percentage share of total value)

	1986			1987			1988			1989			1990		
	Exports	Imports	Balance												
Developed area	62.7	49.2	83.3	62.3	47.9	89.4	61.1	50.6	86.5	60.8	50.9	93.3	59.3	51.0	96.0
United States	38.5	23.0	62.1	36.5	21.0	65.3	33.8	22.4	61.4	33.9	22.9	69.9	31.5	22.4	72.0
Canada	2.6	3.9	0.8	2.4	4.0	-0.5	2.4	4.4	-2.4	2.5	4.1	-2.9	2.4	3.6	-3.2
Western Europe	17.9	14.3	23.4	19.9	15.2	28.6	21.2	16.3	32.8	20.5	16.7	33.2	22.1	18.2	39.3
Of which: European Community	14.7	11.1	20.2	16.4	11.8	25.2	17.7	12.8	29.4	17.4	13.4	30.7	18.7	15.0	35.0
(Germany, Fed. Rep. of)	(5.0)	(3.4)	(7.5)	(5.6)	(4.1)	(8.4)	(6.0)	(4.3)	(9.9)	(5.8)	(4.3)	(10.8)	(6.2)	(4.9)	(11.9)
(France)	(1.5)	(1.5)	(1.6)	(1.8)	(1.9)	(1.4)	(1.9)	(2.3)	(0.9)	(1.9)	(2.6)	(-0.4)	(2.1)	(3.2)	(-2.8)
(United Kingdom)	(3.2)	(2.8)	(3.7)	(3.7)	(2.0)	(6.8)	(4.0)	(2.2)	(8.3)	(3.9)	(2.1)	(9.8)	(3.8)	(2.2)	(10.6)
Other	3.7	8.0	-3.0	3.6	7.6	-4.0	3.7	7.4	-5.3	4.0	7.3	-6.9	3.3	6.8	-12.1
Developing area	35.3	48.7	14.7	36.1	50.0	10.0	37.3	47.3	13.1	37.7	47.0	7.2	39.4	46.9	6.3
Southeast Asia	20.0	23.3	14.9	23.1	25.9	18.0	25.3	25.5	24.9	26.7	25.1	32.0	28.8	23.3	53.5
Of which:															
NIEs 2/	14.4	9.9	21.2	17.2	12.6	25.8	18.8	13.3	32.0	19.2	12.9	39.8	19.7	11.1	58.4
(Korea)	(5.0)	(4.2)	(6.3)	(5.8)	(5.4)	(6.4)	(5.8)	(6.3)	(4.7)	(6.0)	(6.2)	(5.5)	(6.1)	(5.0)	(10.9)
(Taiwan Province of China)	(3.8)	(3.7)	(3.8)	(4.9)	(4.8)	(5.3)	(5.4)	(4.7)	(7.2)	(5.6)	(4.3)	(10.0)	(5.4)	(3.6)	(13.2)
Malaysia	0.8	3.0	-2.8	0.9	3.2	-3.2	1.2	2.5	-2.1	1.5	2.4	-1.5	1.9	2.3	0.2
Indonesia	1.3	5.8	-5.6	1.3	5.6	-8.8	1.2	5.1	-8.3	1.2	5.2	-12.0	1.7	5.4	-14.4
Thailand	1.0	1.1	0.8	1.3	1.2	1.5	2.0	1.5	3.1	2.5	1.7	5.1	3.2	1.8	9.4
Middle East	4.4	14.6	-10.4	4.0	13.5	-13.8	3.6	10.5	-13.1	3.1	10.9	-22.5	3.4	13.2	-39.8
Latin America	4.5	4.9	4.0	3.8	4.3	3.0	3.5	4.4	1.3	3.4	4.2	0.8	3.6	4.2	0.7
Africa	1.1	1.1	1.0	1.3	1.0	1.8	1.0	1.1	1.0	1.1	1.0	1.3	1.2	0.8	2.9
People's Republic of China	4.7	4.5	5.1	3.6	5.0	1.1	3.6	5.3	-0.5	3.1	5.3	-4.1	2.1	5.1	-11.1
Other	0.3	0.4	0.3	0.3	0.4	-0.1	0.2	0.5	-0.4	0.3	0.5	-0.4	0.3	0.4	--
Other 3/	2.0	2.0	2.0	1.6	2.2	0.6	1.6	2.1	0.4	1.5	2.1	-0.5	1.3	2.1	-2.3
Total															
In billions of US\$ 4/	209.2	126.4	82.8	229.2	149.5	79.7	264.9	187.4	77.6	275.2	210.8	64.4	286.9	234.8	52.1
(19)	(-2)		(10)	(18)		(15.6)	(25.3)		(3.9)	(12.5)		(4.3)	(11.4)		
In trillions of yen 4/	35.3	21.6	13.7	31.3	21.7	11.6	33.9	24.0	9.9	37.8	29.0	8.8	41.5	33.9	7.6
(16)	(-31)		(-6)	(-)		(1.9)	(10.4)		(11.4)	(20.7)		(9.6)	(16.8)		

Source: Japan Tariff Association, The Summary Report on Trade of Japan

1/ Customs clearance data; imports (c.i.f.)

2/ Newly industrializing economies: Korea, Taiwan Province of China, Hong Kong, and Singapore.

3/ Includes state trading countries, other than the People's Republic of China, and exports and imports not designated by region.

4/ Parentheses indicate percentage changes

Table XIV. Japan: Balance of Services and Transfers, 1986-90

(In millions of U.S. dollars)

	1986	1987	1988	1989	1990
Transportation (net)	<u>-2,537</u>	<u>-6,106</u>	<u>-7,436</u>	<u>-7,755</u>	<u>-9,532</u>
Receipts	11,316	12,954	15,524	18,090	18,099
Freight	(6,699)	(7,538)	(8,245)	(8,999)	(9,070)
Port disbursements	(2,964)	(3,377)	(4,391)	(5,442)	(5,615)
Time charters	(621)	(669)	(855)	(1,111)	(1,204)
Passenger fares	(666)	(878)	(1,138)	(1,469)	(1,264)
Payments	-13,853	-19,060	-22,960	-25,845	-27,631
Freight	(-3,950)	(-6,868)	(-7,301)	(-6,993)	(7,198)
Port disbursements	(-4,213)	(-4,640)	(-5,542)	(-6,129)	(6,535)
Time charters	(-2,718)	(-2,942)	(-3,968)	(-4,681)	(5,168)
Passenger fares	(-2,316)	(-3,571)	(-4,817)	(-6,538)	(7,253)
Travel (net)	<u>-5,766</u>	<u>-8,663</u>	<u>-15,789</u>	<u>-19,347</u>	<u>-21,530</u>
Receipts	1,463	2,097	2,893	3,143	3,578
Payments	-7,229	-10,760	-18,682	-22,490	-24,928
Investment income (net)	<u>9,473</u>	<u>16,670</u>	<u>21,032</u>	<u>23,442</u>	<u>23,204</u>
Receipts	29,086	49,245	74,837	101,785	122,167
Direct investments	(2,670)	(3,548)	(3,750)	(4,577)	(4,821)
Interest and dividend income	(-26,416)	(-45,697)	(-71,087)	(-97,208)	(117,346)
Payments	-19,613	-32,575	-53,805	-78,343	-98,963
Direct investment	(-1,258)	(-1,544)	(-2,001)	(-2,278)	(-2,253)
Interest and dividend income	(-18,355)	(-31,031)	(-51,804)	(-76,065)	(-96,710)
Official services (net)	<u>2,552</u>	<u>2,286</u>	<u>2,249</u>	<u>2,122</u>	<u>1,616</u>
Receipts	3,005	2,727	2,772	2,672	2,206
Payments	-453	-441	-523	-550	-590
Other private services (net)	<u>-8,654</u>	<u>-9,889</u>	<u>-11,319</u>	<u>-13,988</u>	<u>-16,230</u>
Receipts	8,830	12,617	15,728	18,164	19,759
Management fees	(1,507)	(2,289)	(2,915)	(3,198)	(3,579)
Patent royalties	(906)	(1,293)	(1,637)	(2,016)	(2,479)
Fees	(2,354)	(3,271)	(4,265)	(5,920)	(5,553)
Payments	-17,484	-22,506	-27,047	-32,152	-35,989
Management fees	(-2,334)	(-3,413)	(-3,952)	(-4,519)	(-5,431)
Patent royalties	(-3,237)	(-3,814)	(-5,015)	(-5,324)	(-6,039)
Fees <u>1/</u>	(-4,861)	(-6,589)	(-8,003)	(-10,934)	(-11,160)
Balance on services (net)	<u>-4,932</u>	<u>-5,702</u>	<u>-11,263</u>	<u>-15,526</u>	<u>-22,292</u>
(In billions of yen)	(-813)	(-835)	(-1,448)	(-2,143)	(-3,171)
Balance of transfers (net)	<u>-2,050</u>	<u>-3,669</u>	<u>-4,118</u>	<u>-4,234</u>	<u>-5,475</u>
(In billions of yen)	(-349)	(-528)	(-528)	(-580)	(-777)
Private	-585	-972	-1,101	-981	-1,007
Official	-1,465	-2,697	-3,017	-3,253	-4,468

Source: Bank of Japan, Balance of Payments Monthly.1/ Includes agent's fees and processing items.

Table XV. Japan: Long-Term Capital Account, 1986-91 1/

(In billions of U.S. dollars)

	1986	1987	1988	1989	1990	1990				1991
						I	II	III	IV	I
Japanese capital	<u>-132.1</u>	<u>-132.8</u>	<u>-149.9</u>	<u>192.1</u>	<u>120.8</u>	<u>-28.3</u>	<u>-33.8</u>	<u>-33.7</u>	<u>-24.9</u>	<u>-29.9</u>
Direct investment	-14.5	-19.5	-34.2	-44.1	-48.0	-13.9	-12.8	-11.1	-10.3	-10.7
Trade credits	-1.8	-0.5	-6.9	-4.0	0.7	-0.3	-0.3	0.1	1.2	1.2
Loans	-9.3	-16.2	-15.2	-22.5	-22.2	-5.8	-5.8	-5.7	-4.9	-4.8
Securities	-102.0	-87.8	-86.9	-113.2	-39.7	-5.1	-12.5	-13.8	-8.4	-14.2
Foreign markets	(-100.1)	(-89.8)	(-88.8)	(-112.0)	(-35.2)	(-5.8)	(-11.5)	(-11.4)	(-6.5)	(-12.9)
Stocks	(7.0)	(-16.9)	(-3.0)	(-17.9)	(-6.3)	(-4.9)	(-2.2)	(-0.5)	(1.3)	(0.5)
Bonds	(-93.0)	(-72.9)	(-85.8)	(-94.1)	(-29.0)	(-0.9)	(-9.4)	(-10.9)	(-7.8)	(-13.4)
Domestic market	(-1.9)	(2.0)	(1.9)	(-1.2)	(-4.5)	(0.7)	(-1.0)	(-2.4)	(-1.8)	(-1.3)
Other	-4.5	-8.8	-6.6	-8.3	-11.6	-3.3	-2.4	-3.3	-2.6	-1.4
Foreign capital	<u>0.6</u>	<u>-3.7</u>	<u>19.0</u>	<u>102.9</u>	<u>77.2</u>	<u>12.3</u>	<u>14.8</u>	<u>26.5</u>	<u>23.6</u>	<u>40.6</u>
Direct investment	0.2	1.2	-0.5	-1.1	1.8	0.6	0.4	0.6	0.2	--
Trade credits	--	--	--	--	--	--	--	--	--	--
Loans	--	-0.1	-0.1	17.8	39.1	9.6	7.9	12.1	9.5	10.7
Securities 3/	0.5	-6.1	20.3	85.1	34.7	2.7	6.5	11.9	13.5	28.0
Domestic market	(-17.9)	(-36.2)	(-14.8)	(9.4)	(3.7)	(-5.5)	(5.8)	(1.4)	(2.0)	(18.9)
Stocks	(-15.8)	(-42.8)	(6.8)	(7.0)	(-13.3)	(-11.7)	(0.8)	(-3.4)	(1.0)	(17.5)
Bonds	(-2.1)	(6.7)	(-21.6)	(2.4)	(17.0)	(6.2)	(5.0)	(4.8)	(1.0)	(1.4)
External bonds	(18.4)	(30.1)	(35.1)	(75.7)	(30.9)	(8.2)	(0.7)	(10.5)	(11.5)	(9.1)
Other	-0.1	1.3	-0.8	1.0	1.7	-0.7	--	1.9	0.4	1.8
Total	<u>-131.5</u>	<u>-136.5</u>	<u>-130.9</u>	<u>-89.3</u>	<u>-43.6</u>	<u>-16.1</u>	<u>-19.0</u>	<u>-7.2</u>	<u>-1.3</u>	<u>10.6</u>

Sources: Bank of Japan, Balance of Payments Monthly; and staff estimates.

1/ A negative sign indicates a net outflow of capital from Japan; components may not add to totals due to rounding.

2/ Provisional estimates.

3/ Excluding Gensaki transactions.

Table XVI. Japan: Direct Investment by Sector and by Region, 1986/87-1990/91 1/

	1986/87	1987/88	1988/89	1989/90	1990/91
<u>(In billions of U.S. dollars)</u>					
Total	22.3	33.4	47.0	67.5	56.9
North America <u>2/</u>	10.4	15.4	22.3	33.9	27.2
(United States)	(10.2)	(14.7)	(21.7)	(32.5)	(26.1)
Europe <u>3/</u>	2.4	4.8	8.5	14.2	14.1
Asia	2.3	4.9	5.6	8.2	7.1
Tax havens <u>4/</u>	5.3	6.2	6.2	5.2	2.7
Others	2.9	2.5	4.4	6.0	5.8
Manufacturing	3.8	7.8	13.8	16.3	15.5
North America <u>2/</u>	2.2	4.8	9.2	9.6	6.8
Europe	0.4	0.9	1.5	3.1	4.6
Asia	0.8	1.7	2.4	3.2	3.1
Nonmanufacturing	18.5	25.5	33.2	51.3	41.4
North America <u>2/</u>	8.2	10.5	13.1	24.3	20.4
Europe	2.9	5.7	7.3	11.7	9.7
Asia	1.5	3.2	3.0	5.0	4.1
<u>(In percent)</u>					
Memorandum items:					
Shares of total <u>5/</u>					
United States	59.7	54.2	53.2	52.1	48.1
Europe <u>3/</u>	14.0	17.7	20.7	22.7	26.0
Asia	13.7	17.9	13.7	13.1	13.1

Sources: Ministry of Finance, Zaisei Kinyu Tokei Geppo; and data provided by the Japanese authorities.

1/ On a notified basis, excluding direct real estate purchases (but not investment in the real estate industry).

2/ United States plus Canada.

3/ Excluding Luxembourg.

4/ The Bahamas, Bermuda, the Cayman Islands, the Netherlands Antilles, Luxembourg, and Panama.

5/ Excluding tax havens.

Table XVII. Japan: Direct Investment in Asia, 1986/87-1990/91 1/

	1986/87	1987/88	1988/89	1989/90	1990/91
<u>(In millions of U.S. dollars)</u>					
Newly industrializing economies	1,531	2,580	3,264	4,900	3,355
(Korea)	(436)	(647)	(483)	(606)	(284)
(Hong Kong)	(502)	(1,072)	(1,662)	(1,898)	(1,785)
(Taiwan Province of China)	(291)	(367)	(372)	(494)	(446)
(Singapore)	(302)	(494)	(747)	(1,902)	(840)
Indonesia	250	545	586	631	1,105
Malaysia	158	163	387	673	725
Thailand	124	250	859	1,276	1,154
People's Republic of China	226	1,226	296	438	349
Others	38	104	177	320	366
Total	<u>2,327</u>	<u>4,868</u>	<u>5,569</u>	<u>8,268</u>	<u>7,054</u>
<u>(In percent of total)</u>					
Newly industrializing economies	65.8	53.0	58.6	59.3	47.6
(Korea)	(18.7)	(13.3)	(8.7)	(7.3)	(4.0)
(Hong Kong)	(21.6)	(22.0)	(29.8)	(23.0)	(25.3)
(Taiwan Province of China)	(12.5)	(7.5)	(6.7)	(6.0)	(6.3)
(Singapore)	(13.0)	(10.2)	(13.4)	(23.0)	(11.9)
Indonesia	10.7	11.2	10.5	7.6	15.7
Malaysia	6.8	3.4	6.9	8.1	10.3
Thailand	5.3	5.1	15.4	15.4	16.4
People's Republic of China	9.7	25.2	5.3	5.3	4.9
Others	1.6	2.1	3.2	3.9	5.2
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Sources: Ministry of Finance, Monthly Finance Review; data supplied by the Japanese authorities; and staff estimates.

1/ On a notified basis, excluding direct real estate purchases (but including investment in the real estate industry).

Table XVIII. Japan: Geographic Distribution of Net Long-Term Capital Flows, 1985-90

(In billions of U.S. dollars, minus sign indicates net outflow of capital from Japan) 1/

	1985	1986	1987	1988	1989	First half 1990
<b>Total</b>	<b>-64.5</b>	<b>-131.5</b>	<b>-136.5</b>	<b>-130.9</b>	<b>-89.2</b>	<b>-35.1</b>
United States	-33.2	-65.7	-61.0	-59.2	-53.9	-8.9
European Community	-9.6	-34.4	-34.3	-34.1	13.2	-16.8
Other industrial countries	-5.0	-9.4	-10.9	-6.1	-14.9	-7.7
Developing countries	-12.4	-16.2	-20.0	-18.9	-15.6	6.9
State trading economies	-0.4	-0.1	0.1	-2.5	-4.0	-1.5
International organizations	-4.0	-2.0	-3.9	-5.4	-5.8	-1.3
Other 2/	--	-3.6	-6.4	-4.7	-8.3	-5.9
<b>Direct investment</b>	<b>-5.8</b>	<b>-14.3</b>	<b>-18.4</b>	<b>-34.7</b>	<b>-45.2</b>	<b>-25.7</b>
United States	-2.0	-7.8	-9.0	-19.6	-22.8	-15.7
European Community	-1.5	-2.7	-3.5	-5.7	-9.4	-4.3
Other industrial countries	-0.3	-0.7	-1.7	-3.0	-4.5	-2.1
Developing countries	-1.9	-3.1	-4.0	-5.8	-7.8	-3.3
State trading economies	-0.1	-0.1	-0.2	-0.6	-0.7	-0.3
<b>Trade credits</b>	<b>-2.8</b>	<b>-1.9</b>	<b>-0.5</b>	<b>-7.0</b>	<b>-4.0</b>	<b>-0.6</b>
United States	-0.6	-0.3	-0.5	-1.0	-1.3	-0.5
European Community	-0.5	-1.1	-1.1	-4.5	-1.6	-1.9
Other industrial countries	-0.8	-0.1	0.3	-1.8	-1.8	-0.5
Developing countries	-1.4	-1.1	0.7	0.6	1.4	1.1
State trading economies	0.5	0.8	0.1	-0.2	-0.6	0.2
<b>Loans</b>	<b>-10.5</b>	<b>-9.3</b>	<b>-16.3</b>	<b>-15.3</b>	<b>-4.7</b>	<b>5.9</b>
United States	-0.7	-0.7	-1.7	-2.8	-4.8	-1.8
European Community	-0.8	-1.0	-2.3	-1.8	1.4	-0.5
Other industrial countries	-2.2	-2.3	-3.6	-0.3	-2.0	-1.4
Developing countries	-4.8	-5.2	-7.3	-8.1	3.4	11.4
State trading economies	-1.1	-0.8	0.4	-1.2	-1.8	-1.3
International organizations	-0.9	0.6	-2.0	-1.1	-0.9	-0.6
<b>Securities and external bonds</b>	<b>-43.0</b>	<b>-101.4</b>	<b>-93.8</b>	<b>-66.7</b>	<b>-28.0</b>	<b>-8.3</b>
United States	-29.9	-55.9	-48.2	-33.3	-22.1	10.5
European Community	-6.6	-29.0	-26.4	-21.2	24.6	-9.9
Other industrial countries	-1.7	-6.3	-5.4	0.1	-5.2	-2.6
Developing countries	-3.6	-6.5	-8.9	-4.9	-11.0	-0.2
State trading economies	0.2	0.1	--	-0.4	-0.7	0.3
International organizations	-2.2	-1.5	--	-2.1	-3.5	-0.7
Other 2/	0.8	-2.3	-5.0	-4.8	-10.1	-5.8
<b>Other</b>	<b>-2.4</b>	<b>-4.6</b>	<b>-7.5</b>	<b>-7.4</b>	<b>-7.3</b>	<b>-6.3</b>
United States	0.1	-1.0	-1.6	-2.5	-3.0	-1.4
European Community	-0.2	-0.6	-1.3	-0.9	-1.7	-1.2
Other industrial countries	--	-0.1	-0.5	-1.1	-1.3	-1.1
Developing countries	-0.6	-0.4	-0.5	-0.9	-1.6	-2.1
State trading economies	--	-0.1	-0.3	-0.1	-0.2	-0.4
International organizations	-0.9	-1.2	-1.8	-2.1	-1.4	-0.1
Other 2/	-0.8	-1.3	-1.5	-0.1	1.9	-0.1

Source: Bank of Japan, Balance of Payments Monthly.

1/ Excluding Gensaki transactions. State trading economies comprise Albania, Bulgaria, Czechoslovakia, the German Democratic Republic, Kampuchea, Laos, Mongolia, Democratic People's Republic of Korea, People's Republic of China, Poland, Romania, the U.S.S.R., and Viet Nam.

2/ Data not classified by territories (net receipts accrued from intermediary trade, transactions, nonmonetary gold transactions, etc.).

Table XIX. Japan: Short-Term Capital Account, 1986-91 <sup>1/</sup>

(In billions of U.S. dollars)

	1986	1987	1988	1989	1990	1990				1991
						I	II	III	IV	I
Short-term capital	<u>56.9</u>	<u>95.7</u>	<u>64.0</u>	<u>29.4</u>	<u>7.8</u>	<u>-5.7</u>	<u>6.6</u>	<u>7.4</u>	<u>-0.5</u>	<u>-25.7</u>
Nonbank transactions	<u>-1.6</u>	<u>23.9</u>	<u>19.5</u>	<u>20.8</u>	<u>21.5</u>	<u>8.2</u>	<u>3.1</u>	<u>4.4</u>	<u>5.8</u>	<u>-11.5</u>
Trade credits	-1.5	-0.2	-0.8	-2.5	0.9	-0.3	-0.4	-0.2	1.8	-1.7
Securities	-3.7	-3.2	1.9	-3.3	-6.3	-1.9	-2.1	1.7	-4.0	-0.7
(Gensaki transactions)	(-0.7)	(3.1)	(13.4)	(-3.8)	(-9.7)	(-3.4)	(-4.8)	(2.1)	(-3.6)	(0.1)
Loans	3.9	27.4	16.9	26.0	29.6	11.4	9.6	-0.2	8.8	-10.9
Other	-0.3	--	1.6	0.6	-2.8	-1.1	-4.0	3.0	-0.8	1.8
Foreign exchange banks	<u>58.5</u>	<u>71.8</u>	<u>44.5</u>	<u>8.6</u>	<u>-13.6</u>	<u>-13.9</u>	<u>3.4</u>	<u>3.0</u>	<u>-6.2</u>	<u>-14.3</u>
Assets	-81.6	-107.1	-147.5	-133.9	-56.0	-17.9	18.9	-34.7	-22.2	37.3
Liabilities	140.1	178.9	191.9	142.5	42.4	4.1	-15.4	37.8	16.0	-51.6

Sources: Bank of Japan, Balance of Payments Monthly; and data provided by the Japanese authorities.<sup>1/</sup> Minus sign indicates net outflow of capital from Japan; components may not add to totals due to rounding.

Table XX. Japan: Net Flow of Financial Resources to Developing Countries and Multilateral Agencies, 1985-89 1/

	1985	1986	1987	1988	1989
<u>(In billions of U.S. dollars)</u>					
ODA	3.8	5.6	7.5	9.1	9.0
Bilateral	2.6	3.8	5.2	6.4	6.8
Multilateral	1.2	1.8	2.2	2.7	2.2
Other official flows	-0.3	-0.7	-1.8	-0.6	1.5
Private flows	8.1	9.7	14.7	12.8	13.5
Total resource flows	11.6	14.6	20.5	21.4	24.1
<u>(In billions of yen)</u>					
ODA	906	950	1,078	1,171	1,242
<u>(In percent of GNP)</u>					
ODA	0.29	0.29	0.31	0.32	0.31
Total resource flows	0.87	0.74	0.86	0.75	0.84

Source: Data provided by the Ministry of Foreign Affairs.

1/ Calendar years, DAC basis

Table XXI. Japan: Selected Monetary Indicators, 1986-91  
(In percent per annum; end of period data unless otherwise specified)

	1986	1987	1988	1989	1990	1989				1990				1991
						I	II	III	IV	I	II	III	IV	I
Official discount rate	3.00	2.50	2.50	4.25	6.00	2.50	3.25	3.25	4.25	5.25	5.25	6.00	6.00	6.00
Official projection of growth of M2 + CDs <u>1/</u>	...	...	...	...	...	10-11	10-11	9-10	9-10	9-10	11-12	12-13	11	8
Interest rates														
Call money rate <u>2/</u> <u>3/</u>	4.79	3.51	3.62	4.87	7.24	3.91	4.36	5.18	6.04	6.52	7.10	7.44	7.91	8.08
Two-month private bill rate <u>3/</u>	5.01	3.88	4.08	5.34	7.59	4.57	4.91	5.41	6.45	7.06	7.29	7.89	8.11	8.04
Three-month CD rate <u>3/</u>	5.10	3.86	4.05	5.31	7.62	4.54	4.89	5.41	6.41	7.09	7.33	7.87	8.19	7.95
Average lending rate (all banks)	5.63	5.05	5.03	5.78	7.70	5.06	5.18	5.43	5.78	6.43	6.82	7.16	7.70	7.68
Rate on one-year time deposits	3.76	3.39	3.39	4.32	6.08	3.39	3.39	3.95	4.32	4.75	5.63	5.84	6.08	6.08
Long-term prime rate	6.20	5.70	5.70	6.50	8.10	5.70	5.70	6.00	6.50	7.50	7.60	8.50	8.10	7.50
Yield on government bonds	5.23	5.07	4.69	5.71	...	5.09	5.37	5.06	5.71	6.94	6.60	8.22	6.41	6.63
Yield on industrial bonds	5.93	5.45	4.99	6.22	6.86	5.11	5.51	5.76	6.22	7.42	6.76	8.36	6.86	6.94
(Percentage change from previous year)														
Monetary aggregates <u>4/</u>														
M1	8.9	9.0	8.9	-0.9	5.0	9.4	5.4	2.8	-0.9	0.7	1.2	3.6	5.0	2.4
M2 + CDs	8.3	11.8	10.6	10.0	10.0	10.3	9.7	9.7	10.0	11.7	13.0	12.0	10.0	6.0
						(9)	(8)	(11)	(12)	(15)	(13)	(8)	(4)	(-1)
M3 + CDs <u>5/</u>	8.9	10.0	9.4	11.1	7.0	9.7	9.7	10.0	11.1	11.5	11.0	10.9	7.0	6.6
Broad liquidity <u>6/</u>	...	10.7	9.2	9.7	8.1	9.3	9.2	9.5	9.7	10.3	10.7	9.2	8.1	6.2
Index of credit availability <u>7/</u>	38	48	40	29	-14	34	34	30	19	2	-7	-11	-38	-52

Sources: Bank of Japan, Economic Statistics Monthly; and data provided by the Japanese authorities.

1/ Percentage change of average daily balance of M2 + CDs in the quarter shown compared with the corresponding quarter of the previous year.

2/ Average rate of unconditional money.

3/ Average rate over period.

4/ Percentage change of average monthly balance compared with corresponding period (December quarter for annual figures) of previous year. Parentheses indicate changes from previous quarter at seasonally adjusted annual rate.

5/ M2 + CDs + postal savings, agricultural and fishery cooperative, credit association and labor credit association deposits; M3 is only available on end-of-period basis.

6/ M3+CD + bonds with repurchase agreement (Gensaki) + bank debentures + government bonds + investment trusts + external bonds. Broad liquidity is a new indicator that the Bank of Japan began to publish in April 1989.

7/ Accommodative stance of financial institutions as perceived by principal enterprises (those responding "easy" minus those responding "tight" as a percentage of total respondents). Annual figures are average of quarterly surveys.

Table XXII. Japan: General Government Balances, FY 1982-89

Fiscal years	1982	1983	1984	1985	1986	1987	1988	1989
(In billions of yen)								
Saving <u>1/</u>	9,710	9,938	12,389	16,086	17,998	23,785	30,511	33,928
Central government	-5,679	-5,922	-4,770	-4,316	-2,907	810	2,761	2,204
Local government	7,783	7,938	8,308	9,835	10,161	12,675	15,202	18,721
Social security	7,606	7,922	8,851	10,567	10,744	10,300	12,548	13,003
Investment <u>2/</u>	18,316	17,985	17,691	18,102	19,032	21,833	22,674	24,144
Central government	2,651	2,711	2,643	2,709	2,969	3,639	3,506	3,413
Local government	15,584	15,187	14,961	15,305	15,975	18,098	19,078	20,635
Social security	81	87	87	88	88	96	91	96
Capital transfers <u>3/</u>	-722	-339	-280	-470	-36	442	377	453
Central government	-5,787	-5,223	-4,856	-4,787	-4,364	-4,001	-3,444	-3,440
Local government	5,241	5,078	4,835	4,583	4,982	5,051	4,138	4,212
Social security	-175	-193	-258	-266	-655	-607	-316	-319
Balance	-9,327	-8,386	-5,582	-2,486	-1,071	2,394	8,214	10,237
Central government	-14,117	-13,856	-12,270	-11,813	-10,240	-6,830	-4,189	-4,649
Local government	-2,560	-2,171	-1,818	-887	-832	-373	261	2,298
Social security	7,350	7,642	8,506	10,214	10,002	9,596	12,141	12,588
(In percent of GNP)								
Saving <u>1/</u>	3.6	3.5	4.1	4.9	5.3	6.7	8.0	8.4
Central government	-2.1	-2.1	-1.6	-1.3	-0.9	0.2	0.7	0.5
Local government	2.9	2.8	2.7	3.0	3.0	3.6	4.0	4.6
Social security	2.8	2.8	2.9	3.2	3.2	2.9	3.3	3.2
Investment <u>2/</u>	6.7	6.3	5.8	5.6	5.6	6.1	6.0	5.9
Central government	1.0	0.9	0.9	0.8	0.8	1.0	0.9	0.8
Local government	5.7	5.3	4.9	4.7	4.7	5.1	5.0	5.1
Social security	--	--	--	--	--	--	--	--
Capital transfers <u>3/</u>	-0.3	-0.1	-0.1	-0.1	--	0.1	0.1	0.1
Central government	-2.1	-1.8	-1.6	-1.5	-1.3	-1.1	-0.9	-0.8
Local government	1.9	1.8	1.6	1.4	1.5	1.4	1.1	1.0
Social security	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1
Balance	-3.4	-2.9	-1.8	-0.8	-0.3	0.7	2.2	2.5
Central government	-5.2	-4.8	-4.1	-3.6	-3.0	-1.9	-1.1	-1.1
Local government	-0.9	-0.8	-0.6	-0.3	-0.2	-0.1	0.1	0.6
Social security	2.7	2.7	2.8	3.1	2.9	2.7	3.2	3.1

Source: Economic Planning Agency, Annual Report on National Accounts, 1991.

1/ Gross saving (includes capital consumption allowance).

2/ Includes inventory accumulation and land acquisition.

3/ Includes capital transfers within the general government and with entities outside the general government.

Table XXIII. Japan: Public Sector Balances, FY 1982-89

Fiscal years	1982	1983	1984	1985	1986	1987	1988	1989
(In billions of yen)								
Saving <u>1/</u>	11,405	11,342	13,475	16,024	18,140	24,076	31,504	38,173
General government	9,710	9,938	12,389	16,086	17,998	23,781	30,511	33,928
Public enterprises	1,695	1,404	1,086	-62	142	291	993	4,245
Investment	26,944	26,111	26,015	25,047	25,838	27,492	28,097	29,898
General government <u>2/</u>	19,037	18,324	17,971	18,572	19,069	21,391	22,297	23,691
Public enterprises <u>3/</u>	7,907	7,787	8,044	6,475	6,769	6,101	5,800	6,207
Balance	-15,539	-14,769	-12,541	-9,023	-7,698	-3,416	3,407	8,275
General government	-9,327	-8,386	-5,582	-2,486	-1,071	2,394	8,217	10,237
Public enterprises	-6,212	-6,383	-6,959	-6,537	-6,627	-5,810	-4,807	-1,962
(In percent of GNP)								
Saving <u>1/</u>	4.2	4.0	4.5	4.9	5.3	6.8	8.3	9.4
General government	3.6	3.5	4.1	4.9	5.3	6.7	8.1	8.4
Public enterprises	0.6	0.5	0.4	--	--	0.1	0.3	1.0
Investment	9.9	9.1	8.6	7.7	7.6	7.7	7.4	7.4
General government	7.0	6.4	5.9	5.7	5.6	6.0	5.9	5.8
Public enterprises	2.9	2.7	2.7	2.0	2.0	1.7	1.5	1.5
Balance	-5.7	-5.2	-4.1	-2.8	-2.3	-1.0	0.9	2.0
General government	-3.4	-3.0	-1.8	-0.8	-0.3	0.7	2.2	2.5
Public enterprises	-2.3	-2.2	-2.3	-2.0	-2.0	-1.6	-1.3	-0.5

Source: Economic Planning Agency, Annual Report on National Accounts, 1991.

1/ Gross saving (includes capital consumption allowances).

2/ Includes inventory accumulation, land acquisition, and capital transfers.

3/ Includes inventory accumulation. Data on land acquisition and capital transfers are not available.

Table XXIV. Japan: Central Government General Account Budget, FY 1987-91 1/

(In billions of yen)

Fiscal years	1987 Settle- ment	1988 Settle- ment	1989 Settle- ment	1990		1991
				Initial	Revised	
Expenditure	56,851	60,524	64,994	63,535	66,793	67,295
General expenditure	34,336	35,137	37,576	35,373	37,971	37,037
Social security	10,240	11,748	12,353	11,615	11,545	12,212
Public works	7,387	6,676	7,406	6,215	7,013	6,590
Defense	3,455	3,670	3,922	4,159	4,254	4,386
Official aid	653	728	761	784	802	846
Foodstuff control	688	478	457	395	405	373
Other	11,913	11,837	12,677	12,205	13,682	12,630
No-interest lending program	458	1,272	1,229	1,300	1,300	1,300
Interest payments	10,481	10,536	10,631	11,152	11,156	12,024
Transfer of local allocation tax to local governments	11,086	13,031	14,965	15,275	15,931	15,975
Other <u>2/</u>	490	548	593	435	435	959
Revenue	48,862	53,658	57,473	60,563	61,790	64,903 <u>3/</u>
Taxes and stamp duties	46,798	50,827	54,922	58,004	59,131	61,772
Miscellaneous	2,064	2,831	2,551	2,559	2,660	3,131
Of which:						
Proceeds from sales of NTT and JNR shares	458	1,272	1,229	1,300	1,300	1,300
Deficit	7,989	6,866	7,521	2,972	5,003	2,392
Financing	7,989	6,866	7,521	2,808	5,003	2,392
Bond issues	9,908	7,700	7,232	6,028	7,747	6,302
Deficit-financing bonds	2,538	956	209	--	--	--
Construction bonds	6,880	6,196	6,430	5,593	6,343	5,343
Other	490	548	593	435	1,404 <u>4/</u>	959
Debt repayment	-1,371	-1,495	-1,459	-3,135	-3,293	-4,012
Other	-549	662	1,747	80	549	101
Carried over surplus	-809	522	1,747	80	549	101
Carry in	2,849	3,658	3,136	80	549	101
Carry out	-3,658	-3,136	-1,389	--	--	--
Drawdown from reserve funds	260	140	--	--	--	--
Memorandum items:						
In percent of GNP <u>5/</u>						
Expenditure	16.0	15.9	16.0	14.6	15.3	14.6
Revenue	13.7	14.2	14.1	13.9	14.2	14.0
Deficit	2.2	1.8	1.9	0.7	1.1	0.5
Bond financing	2.8	2.0	1.8	1.4	1.8	1.4
Deficit-financing bonds	0.7	0.3	0.1	--	--	--
General public works expenditure <u>6/</u>	2.2	2.1	2.1	1.7	1.9	1.7

Source: Data provided by the Japanese authorities.

1/ This presentation differs from that of the authorities; certain revenue and expenditure items in the official presentation are reclassified as financing items.

2/ Comprises noncash expenditures, including equity contributions to international organizations.

3/ Excludes the additional tax revenues generated by the temporary increases in the gasoline tax and corporate income tax rates to finance Japan's contribution toward the cost of the multinational forces (MNF) in the Middle East. These revenues are to be paid into a separate special account.

4/ Includes ¥ 969 billion of special bills issued to finance Japan's contribution toward the cost of the MNF in the Middle East.

5/ Figures for FY 1990 and FY 1991 are based on staff projections of GNP.

6/ Includes public works spending under the no-interest lending program.

Table XXV. Japan: Tax Receipts of the Central Government  
General Account, 1987/88-1991/92

	1987/88	1988/89	1989/90 Settle- ment	1990/91		1991/92 Budget <u>1/</u>
				Initial	Revised	
(In billions of yen)						
Individual income tax	17,437	17,954	21,382	21,372	24,345	25,738
Corporate income tax	15,811	18,438	18,993	19,711	18,637	19,267
Taxes on goods and services	6,975	7,165	8,033	10,145	9,695	10,006
Of which: Commodity tax	(1,851)	(2,043)	(--)	(--)	(--)	(--)
Consumption tax	(--)	(--)	(3,270)	(5,320)	(4,870)	(4,944)
Liquor tax	(2,081)	(2,202)	(1,786)	(1,914)	(1,914)	(2,000)
Gasoline tax	(1,648)	(1,395)	(1,465)	(1,423)	(1,423)	(1,503)
Tobacco tax	(1,021)	(1,009)	(961)	(957)	(957)	(987)
Custom duty	639	738	805	864	864	850
Stamp revenue	1,822	1,932	1,960	1,949	2,026	2,148
Other taxes	<u>4,117</u>	<u>4,600</u>	<u>3,740</u>	<u>3,963</u>	<u>3,564</u>	<u>3,763</u>
Total tax and stamp revenue	46,798	50,827	54,922	58,004	59,131	61,772
(Percentage change)						
Individual income tax	3.6	3.0	19.1	--	13.9	5.7
Corporate income tax	20.8	16.6	3.0	3.8	-1.9	3.4
Taxes on goods and services	6.7	2.7	12.1	26.3	20.7	3.2
Total tax and stamp revenue	11.7	8.6	8.1	5.6	7.7	4.5

Source: Data provided by Japanese authorities.

1/ Excludes the additional tax revenues generated by the temporary increases in the gasoline and corporate income tax rates to finance Japan's contribution toward the cost of the multinational forces in the Middle East. These revenues are to be paid into a separate special account.

Table XXVI. Japan: Fiscal Investment and Loan Program (FILP), FY 1987-91

(In billions of yen)

Fiscal years	1987	1988	1989		1990		1991
			Revised plan	Prel.	Initial plan	Revised plan	Initial plan
Sources of funds	<u>32,636</u>	<u>32,224</u>	<u>35,670</u>	<u>35,226</u>	<u>36,572</u>	<u>38,041</u>	<u>37,406</u>
Trust Fund Bureau	26,381	25,364	27,971	27,745	28,453	29,922	29,135
Postal savings	(7,957)	((8,463)	(8,500)	(6,044)	(7,200)	(7,200)	(8,800)
Welfare and national pensions	(4,334)	(5,867)	(4,310)	(4,793)	(5,540)	(5,540)	(6,430)
Repayment and other	(14,901)	(11,034)	(15,161)	(16,908)	(15,713)	(16,593)	(13,905)
Postal life insurance	3,899	4,221	5,614	5,592	6,055	6,055	6,305
Industrial investment special account	144	82	85	84	64	64	66
Government-guaranteed bonds and borrowing	2,212	2,246	2,000	1,805	2,000	2,000	1,900
Use of funds	<u>32,636</u>	<u>31,913</u>	<u>35,670</u>	<u>35,226</u>	<u>36,572</u>	<u>38,041</u>	<u>37,406</u>
Purchase of government bonds	5,041	2,390	2,192	2,192	2,000	2,000	600
FILP	27,595	29,523	33,478	33,034	34,572	36,041	36,806
Portfolio investments <sup>1/</sup>	(3,350)	(4,270)	(5,930)	(5,930)	(6,950)	(6,950)	(7,700)
Central government projects (special accounts)	(613)	(623)	(650)	(631)	(651)	(651)	(729)
Government nonfinancial enterprises	(6,688)	(7,443)	(8,140)	(7,812)	(8,639)	(8,705)	(8,446)
Government financial agencies	(11,433)	(12,544)	(14,181)	(14,126)	(13,789)	(15,042)	(15,153)
Of which: Housing Finance Corporation	4,859	5,230	5,603	5,598	5,593	5,903	6,403
Local governments	(5,007)	(4,216)	(4,210)	(4,168)	(4,170)	(4,319)	(4,365)
Other	(504)	(427)	(367)	(367)	(373)	(373)	(393)
Memorandum items:							
Increase in FILP expenditures (in percent) <sup>2/</sup>	12.6	4.2	9.1	7.3	1.9 <sup>3/</sup>	7.3 <sup>3/</sup>	-- <sup>4/</sup>
FILP expenditures as a percent of GNP <sup>2/</sup>	6.8	6.7	6.8	6.7	...	...	...

Source: Ministry of Finance, *Zaisei Kinyu Tokei Geppo*.<sup>1/</sup> Reflects the funding of the "lend-back" system under which the postal savings system, pension funds, and the postal life insurance fund receive funds for portfolio management on their own account.<sup>2/</sup> Excluding portfolio investment.<sup>3/</sup> Compared with preliminary outturn of the previous year.<sup>4/</sup> Compared with revised plan of the previous year.

References

Section II

- Chouraqui, J.C., M. Driscoll, and M.O. Strauss-Kahn, "The Effects of Monetary Policy on the Real Sector: An Overview of Empirical Evidence for Selected OECD Economies," OECD Working Paper No. 51 (Paris: April 1988).
- Chow, G.C., "Tests of Equality Between Subsets of Coefficients in Two Linear Regressions," Econometrica, Vol. 28 (1960) pp. 591-605.
- Citrin, D., "Exchange Rate Changes and Exports of Selected Japanese Industries," Staff Papers, International Monetary Fund (Washington), Vol. 32 (September 1985), pp. 404-29.
- Corker, R., "External Adjustment and the Strong Yen: Recent Japanese Experience," Staff Papers, Vol. 36, (Washington: International Monetary Fund, June 1989), pp. 464-513.
- \_\_\_\_\_, "The Changing Structure of Japanese Trade Flows," IMF Working Paper WP/90/107 (Washington: International Monetary Fund, 1990).
- Goldstein, M. and M. Khan, "Income and Price Effects in International Trade," in Handbook of International Economics, Volume II, ed. by R. Jones and P. Kenen, (Amsterdam: Elsevier Publishers: 1985), pp. 1041-1105.
- Harada, Y., "Adjustment Mechanisms for Reducing Current Account Imbalances in 1985-88: Counter-factual Simulations by the EPA World Model," Papers and Proceedings of the Sixth EPA International Symposium, (Tokyo: Economic Planning Agency, 1989).
- Helkie, W.L., and P. Hooper, "An Empirical Analysis of the External Deficit, 1980-86," in External Deficits and the Dollar, ed. by R. Bryant, G. Holtham, and P. Hooper (Washington: Brookings Institution, 1987).
- Hooper, P., and C. Mann, "The U.S. External Deficit: Its Causes and Persistence," International Finance Discussion Paper No. 316, (Washington: Board of Governors of the Federal Reserve System, November 1987).
- \_\_\_\_\_, "Exchange Rate Pass-through in the 1980s: The Case of U.S. Imports of Manufactures," Brookings Papers on Economic Activity, Vol. 1, (Washington: Brookings Institution, 1989), pp. 297-337.
- Japan, Bank of Japan, "Balance of Payments Adjustment in Japan: Recent Developments and Prospects," Special Paper No. 178 (Tokyo: May 1989).

\_\_\_\_\_, Economic Planning Agency, EPA World Economic Model, Discussion Paper No. 17 (Tokyo: 1986).

\_\_\_\_\_, Economic Planning Agency, Economic Survey of Japan: 1988-1989, (Tokyo: 1989).

Krugman, P.R., "Differences in Income Elasticities and Trends in Real Exchange Rates," European Economic Review, Vol. 33, (1989) pp. 1031-54.

\_\_\_\_\_, and R.E. Baldwin, "The Persistence of the U.S. Trade Deficit," Brookings Papers on Economic Activity, Vol. 1, (Washington: The Brookings Institution, 1987), pp. 1-55.

Loopesko, B., and R. Johnson, "Realignment of the Yen-Dollar Exchange Rate: Aspects of the Adjustment Process in Japan," International Finance Discussion Paper No. 311, (Washington: Board of Governors of the Federal Reserve System, August 1987).

Masson, P., S. Symansky, and G. Meredith, MULTIMOD Mark II: A Revised and Extended Model, Occasional Paper No. 71 (Washington: International Monetary Fund, 1990).

Ueda, K., "Perspectives on the Japanese Current Account Surplus," NBER Macroeconomic Annual, Vol. 3, (1988) pp. 217-67.

### Section III

Chadha, B., P. Masson, and G. Meredith, "Models of Inflation and the Costs of Disinflation," forthcoming IMF Working Paper (Washington: International Monetary Fund, 1991).

Corker, R., "Wealth, Financial Liberalization, and the Demand for Money in Japan," Staff Papers, Vol. 37, (Washington: International Monetary Fund, June 1990), pp. 418-32.

Masson, P., S. Symansky, and G. Meredith, MULTIMOD Mark II: A Revised and Extended Model, Occasional Paper No. 71 (Washington: International Monetary Fund, 1990).

Meredith, G., "Japan--Implications of the Recent Slowdown in M2 Growth," (unpublished, International Monetary Fund, February 1991).

Okina, Kunio, "Relationship Between Money Stock and Real Output in the Japanese Economy--Survey on the Empirical Tests of the LSW Proposition," Monetary and Economic Studies, Vol. 4 (Tokyo: Bank of Japan, April 1986), pp. 41-77.

Section IV

Adams, Charles, and David T. Coe, "A Systems Approach to Estimating the Natural Rate of Unemployment and Potential Output for the United States," Staff Papers, International Monetary Fund (Washington), Vol. 37 (June 1990).

\_\_\_\_\_, Paul R. Fenton, and Flemming Larsen, "Potential Output in Major Industrial Countries," Staff Studies for the World Economic Outlook, World Economic and Financial Surveys, International Monetary Fund (Washington), August 1987.

Chan-Lee, James H., David T. Coe, and Menahem Prywes, "Microeconomic Changes and Macroeconomic Wage Disinflation in the 1980s," OECD Economic Studies, No. 8 (Spring 1987).

Coe, David T., and Thomas Krueger, "Why is Unemployment So High at Full Capacity? The Persistence of Unemployment, the Natural Rate, and Potential Output in the Federal Republic of Germany," IMF Working Paper WP/90/101 (Washington: International Monetary Fund, 1990).

Corker, Robert, "External Adjustment and the Strong Yen: Recent Japanese Experience," Staff Papers, International Monetary Fund (Washington), Vol. 37 (June 1989).

Denison, Edward F., and William K. Chung, How Japan's Economy Grew So Fast: The Sources of Postwar Expansion, The Brookings Institution (Washington), 1976.

Goto, Akira, and Kazuyuki Suzuki, "R & D Capital, Rate of Return on R & D Investment, and Spillover of R & D in Japanese Manufacturing Industries," Review of Economics and Statistics, Vol. LXXI, (November 1989).

Griliches, Zvi, "Productivity Puzzles and R & D: Another Nonexplanation," Journal of Economic Perspectives, Vol. 2 (Fall 1988).

Hamada, Koichi, and Yoshio Kurosaka, "Trends in Unemployment, Wages and Productivity: The Case of Japan," Economica, Supplement, 1986.

Japan, Government of, Ministry of Health and Welfare, Population Projections for Japan: 1985-2085, Health and Welfare Statistics Association (Tokyo: 1987).

\_\_\_\_\_, Ministry of Labor, 1988 Labor White Paper, Japan Labor Association (Tokyo: 1988).

Marston, Richard, and Stephen Turnovsky, "Imported Materials Prices, Wage Policy, and Macroeconomic Stabilization," Canadian Journal of Economics, Vol. 18 (May 1985).

Section V

Clark, Robert L., Retirement Systems in Japan, (Irwin, 1991).

Japan, Government of, Economic Planning Agency, Economic Survey of Japan, 1984-85 (Tokyo: 1985).

\_\_\_\_\_, Ministry of Health and Welfare, Health and Welfare Services in Japan (Tokyo: 1988).

\_\_\_\_\_, Ministry of Health and Welfare, Annual Report on Health and Welfare for 1989 (Tokyo: November 1990).

\_\_\_\_\_, Social Insurance Agency, Outline of Social Insurance in Japan (Tokyo: various issues).

Section VI

Clark, Robert L., Retirement Systems in Japan (Irwin, 1991).

Feldman, Robert A., "Japan: Outlook for Social Expenditure, 1980-2025" (unpublished, International Monetary Fund, January 1987).

Hagemann, Robert and G. Nicoletti, "Aging Populations: Economic Effects and Implications for Public Finance," Organization for Economic Cooperation and Development, Department of Economics and Statistics, Working Paper No. 61. (Paris: 1989).

Heller, P.S., R. Hemming, and P.W. Kohnert, Aging and Social Expenditure in the Major Industrial Countries, 1980-2025, IMF Occasional Paper No. 47 (Washington: International Monetary Fund, 1986).

Japan, Government of, Economic Planning Agency, Economic Survey of Japan, 1984-85 (Tokyo: 1985).

\_\_\_\_\_, Ministry of Health and Welfare, Population Projections for Japan: 1985-2085 (Tokyo: 1986).

\_\_\_\_\_, Ministry of Health and Welfare, Health and Welfare Services in Japan (Tokyo: 1988).

\_\_\_\_\_, Ministry of Health and Welfare, Annual Report on Health and Welfare for 1989 (Tokyo: November 1990).

\_\_\_\_\_, Social Insurance Agency, Outline of Social Insurance in Japan (Tokyo: various issues).

Organization for Economic Cooperation and Development, Aging Populations, The Social Policy Implications (Paris: 1988a).

\_\_\_\_\_, Reforming Public Pensions (Paris: 1988b).

#### Section VII

International Monetary Fund, World Economic Outlook (Washington, D.C.: International Monetary Fund, October 1990).

Japan, Government of, Ad hoc Committee for Administrative Reform, "Konteki-Keseino Kanwatohni Kansuru Tohshin (Recommendations on Deregulation)," Chapter II (December 1, 1988) [in Japanese].

\_\_\_\_\_, Ministry of Finance, An Outline of Japanese Taxes, 1990, Tax Bureau (1990).

\_\_\_\_\_, Ministry of International Trade and Industry, "Seikiyu Shiryo (Petroleum Databook)," National Resources and Energy Agency (July 27, 1990a) [in Japanese].

\_\_\_\_\_, Ministry of International Trade and Industry, "Shigen Energy Kanren Shiryo (Related Data on Natural Resources and Energy)," Natural Resources and Energy Agency (July 1990b) [in Japanese].

\_\_\_\_\_, Ministry of International Trade and Industry, "Songon Energy Chonsakai Chukon Houkoku (Interim Report of the General Energy Research Committee)," Natural Resources and Energy Agency (October 15, 1990c) [in Japanese].

Organization for Economic Cooperation and Development, Energy Balances of OECD Countries, (Paris: 1989).

\_\_\_\_\_, Oil and Gas Information, 1987-89, International Energy Agency, (Paris: September 1990).

#### Section VIII

International Monetary Fund, Japan - Recent Economic Developments (SM/89/84, Supplement 1 and SM/90/121) (Washington, D.C.: International Monetary Fund).

Japan, Government of, Study Group on Financial Issues, On Interest Rate Liberalization of Non-Time Deposits (May 21, 1991) [in Japanese].

\_\_\_\_\_, Securities Exchange Council, How the Basic System Regarding the Capital Market Ought to be Reformed (June 19, 1991) [in Japanese].

\_\_\_\_\_, Financial Systems Research Council, On the New Financial System (June 25, 1991) [in Japanese].

Organization for Economic Cooperation and Development, Agricultural Policies, Markets, and Trade, Monitoring and Outlook, 1991 (Paris: 1991).

