Development Bank of Japan
Research Report
No. 9

Recent Trends in the Japanese Economy: Information Technology and the Economy

September 2000

Economic and Industrial Research Department
Development Bank of Japan

Contents

Recent Trends in the Japanese Economy:

Information Technology and the Economy

Summary

1. The Japanese economy is recovering slowly after bottoming out in April 1999. While the growth of exports is propping up overall demand, however, domestic demand is still weak, as the effects of fiscal and financial stimulus measures subside and consumption stagnates due to harsh income and employment conditions. Plant and equipment investment has bottomed out and is starting to recover, in contrast with the rest of domestic demand.

Personal consumption remains sluggish, and the pace of recovery is slower than in previous recoveries; this weak consumption is largely attributable to reduced income, which affects nominal as well as real consumption. Recently, income conditions are showing signs of improvement. The sustainability of the current economic recovery depends largely on the consumption trend.

Plant and equipment investment has started to rise at the end of 1999, and the pace of recovery has picked up. Returns on investment have been improving since the low of 1998, while machinery orders began to increase year-on-year at the end of 1999 in both the manufacturing and non-manufacturing sectors. However, the growth in the plant and equipment investment is not evident in the latter half of 2000 due to the growth in the manufacturing sector which depends on the electrical machinery industry and the end of the extraordinary contribution from the rapid growth of retail outlets in the non-manufacturing sector.

Housing investment is led by condominiums as investment in owned houses declines. Partly due to housing tax relief measures, the number of housing starts recovered to the annualized rate of around 1.2 million units in the first quarter of 1999. With the deadline for benefits from the measures extended to June 2001, sales and construction are buoyant for condominiums, which is not the case for owned houses.

Public investment is leveling off. Largely due to the two economic stimulus packages launched in 1998, public capital formation as a percentage of GDP exceeded 9% in the third quarter of 1999. Since then, however, the growth of public investment has slowed and even reversed in some areas due to difficult budgetary conditions.

Exports and imports continue to increase, mainly to and from Asia. Despite the appreciation of the yen since mid-fiscal 1999, exports have been growing led by producer goods, thanks to the recovery of the Asian economies from the currency crisis. Exports to Europe and the U.S. also remain strong. Meanwhile, imports have been increasing rapidly since early 1999, particularly producer goods, capital goods, and non-durable consumer goods from Asia.

Industrial production has been growing slowly since the summer of 1999, after remaining flat for some time, while shipments turned upward at the same time. Inventories have reached the level of last year, and are now intentionally being built up. Shipments are

growing rapidly for producer goods and capital goods, in sharp contrast with the slow growth for consumer goods and construction materials.

Prices remain weak, except for the impact of higher oil prices. Although there are signs of a recovery in job offers, unemployment remains high, affected by the harsh environment for regular employment. Long-term interest rates stayed low even after BOJ ceased zero interest-rate policy. The growth of the money supply has dropped to around 2%, reflecting inactive lending.

2. The progress of information technology (IT) has had a considerable economic impact through rapid development of data processing and telecommunication. The impact of IT on the Japanese economy has grown in various areas including plant and equipment and software investment, production, trade, consumption and prices.

"IT investment" is measured as the total of plant and equipment investment in the IT supply industries, or as the investment in IT goods by all industries except the IT supply industries. The former and the latter amounted ¥6 trillion, respectively (about 8% of plant and equipment investment) in 1995. Even in the latter half of the 1990s, when plant and equipment investment stagnated, IT investment rose steadily. Also, the share of software expenditure in total data-processing costs has continued to increase. In particular, software investment amounted to almost ¥3 trillion in 1995.

IT-related production is robust in both goods and services. As regards IT-related goods, the production of manufactured goods such as computers has increased slowly, but that of semiconductors and other IT-related parts has risen substantially. The steady growth of IT-related services owes much to the rapid progress of mobile communications. As regards the trade in IT goods, there has been a substantial increase in imports. In particular, Asia has a trade surplus with Japan in office equipment.

IT-related consumption is increasing steadily while overall consumption stagnates. The gap in IT-related consumption can be attributed to the age of householders rather than to their income. Since 1995 in particular, the IT consumption ratio has risen sharply for those under 29 years old, but shown no substantial change for 60 year-olds and over. Although IT-related prices have contributed substantially to the decline in wholesale prices, their impact on consumer prices has been much smaller.

I. Recovery of the Japanese Economy

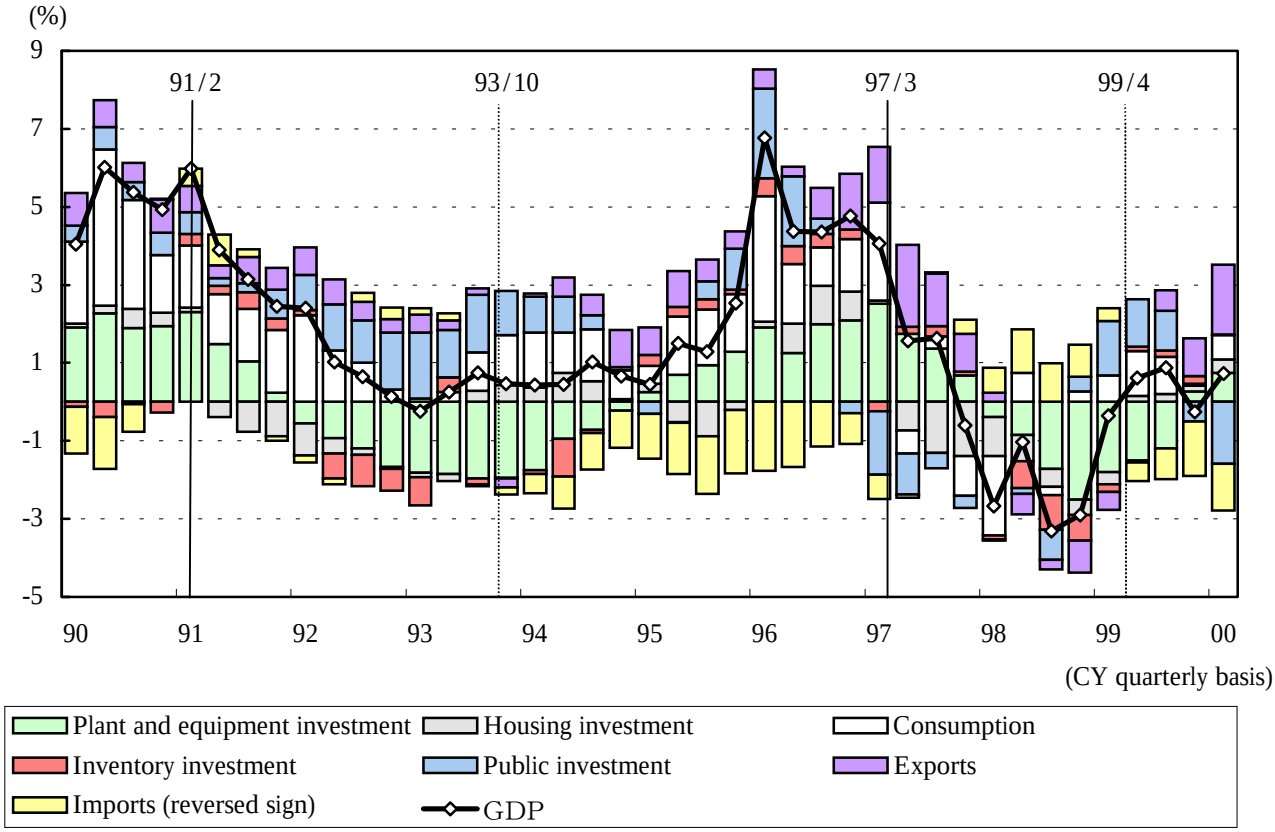
1. Production: Edging up

The Japanese economy is recovering slowly after bottoming out in April 1999. While the growth of exports is propping up overall demand, however, domestic demand is still weak, as the effects of fiscal and financial stimulus measures subside and consumption stagnates due to harsh income and employment conditions. Plant and equipment investment has bottomed out and is starting to recover, in contrast with the rest of domestic demand.

After recording the first year-on-year increase in seven periods in the second quarter of 1999 (up 0.6%), real GDP (Figure 1-1) has narrowly kept growing; up 0.9% in the third quarter, down 0.3% in the fourth quarter, and up 0.7% in the first quarter of 2000. For fiscal 1999 as a whole, it increased 0.5%, recording the first positive growth in three years. Excluding the growth of 0.6% carried over from the previous year, however, the growth within fiscal 1999 was -0.1%, indicating a negative growth for the third consecutive year. Quarter by quarter change also points to negative growth for the third and fourth quarters of 1999. Although there was rapid growth in the first quarter of 2000 of 2.5% from the previous quarter thanks to the leap-year effect, the level was still lower than that of the second quarter of 1999 (on a seasonally adjusted basis). Thus, the pace of recovery is slow.

Figure 1-1. Trends in Real GDP

(Year-on-year change by component)



Source: Economic Planning Agency, "Annual Report on National Accounts," 1990 as base year.

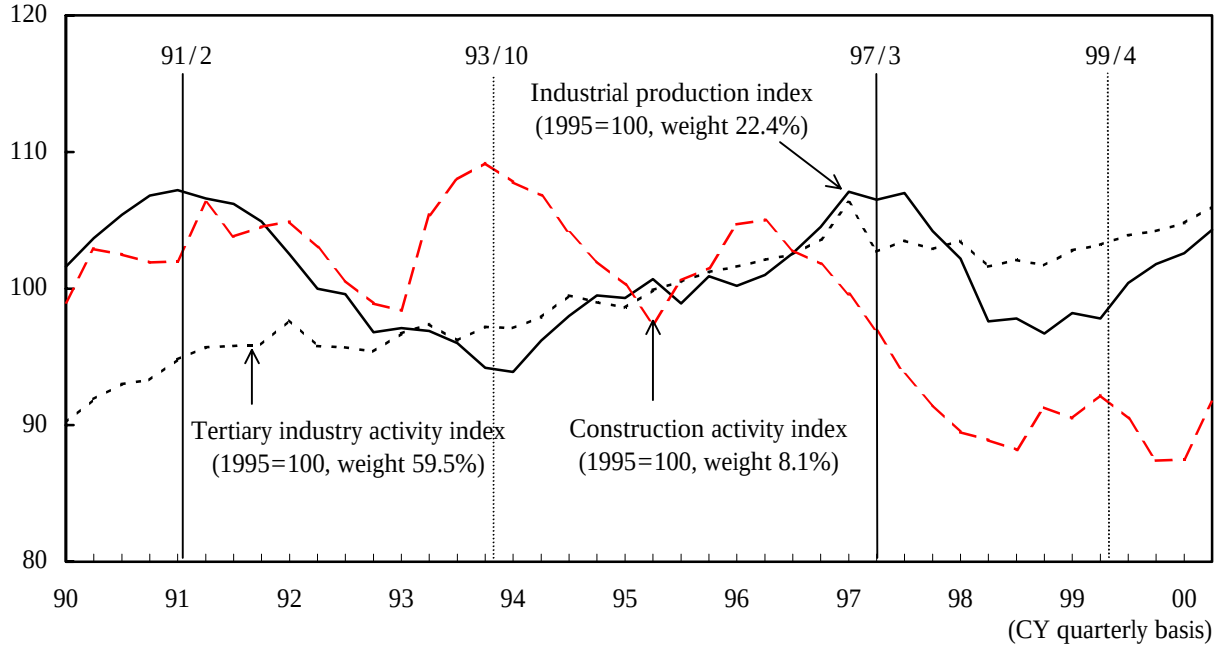
Among expenditures, private consumption remains sluggish. Its year-on-year growth fell to 0.1% in the fourth quarter of 1999 after peaking at 1.9% in the second quarter of the same year. Despite the leap-year effect, the growth in the first quarter of 2000 was only 1.1%, indicating the weakness of recovery. As regards workers' households, the positive impacts from tax reduction and the rise in consumption propensity have been more than offset by the deterioration of income mainly due to the reduction in bonus.

Plant and equipment investment of private corporations increased for the first time in eight periods in the fourth quarter of 1999, up 1.7% from the previous year. It also rose 4.3% in the first quarter of 2000, reflecting rapid improvement in the non-manufacturing sector. Even in the manufacturing sector, where investment is still lower than the previous year, conditions have been improving steadily. In light of the improvement in return on investment return and the trend of machinery orders, which serve as leading indicators, plant and equipment investment is expected to continue to recover from its slump.

Housing investment has been increasing on the previous year since the second quarter of 1999, mainly due to the continuation of low interest rates and the effect of housing tax relief measures. Housing starts exceeded 1.2 million units for fiscal 1999 as a whole. However, housing starts for owned houses, which led the recent recovery, are now falling. Despite the support from dwellings for sale including condominiums, housing starts are showing signs of leveling off.

Public demand including government final consumption and public fixed capital formation has not reached the previous year's level since the fourth quarter of 1999 as the effect of the two economic stimulus packages in fiscal 1998 subsided. Looking ahead, public demand is not expected to increase substantially despite the economic renewal measures (totaling ¥18 trillion) agreed on in November 1999, as local governments continue to face financial difficulties.

Figure 1-2. Trend of Production Indicators (Seasonally adjusted)



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

Exports of goods and services rose in the third quarter of 1999, led by Asia and supported by the global economic boom, recording a double-digit increase on the previous year in the first quarter of 2000. Imports are also increasing, mainly from Asia, recording a double-digit increase on the previous year for the second consecutive period. The first quarter of 2000 saw the first positive contribution in six periods from net exports.

Figure 1-2 shows the trend of major production indicators including industrial production index, construction activity index and tertiary industry activity index.

The industrial production index started to rise in the third quarter of 1999, recording a substantial gain of 2.7% on the previous year led by transport equipment and electrical machinery. Electrical machinery has since led the mild rise in industrial production, generating ancillary demand and supported by growing exports. Industrial production recorded a fourth consecutive increase in the second quarter of 2000.

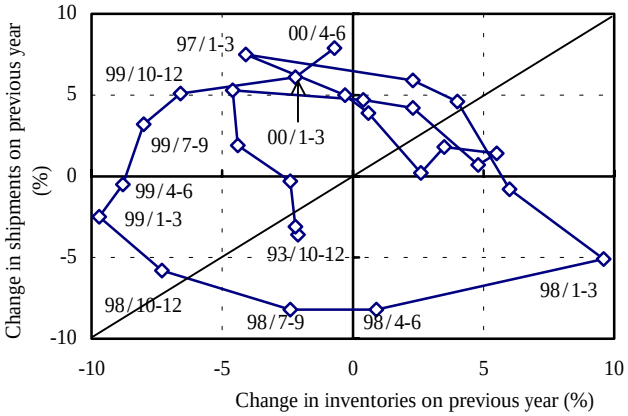
The construction activity index rose temporarily from the fourth quarter of 1998 as public works projects took off. However, it then leveled off and stayed low. The tertiary industry activity index remains firm as a whole, thanks to the contribution from transport/communications supported by mobile communications and freight transport. In addition, activity is picking up in business services, a component of the service sector which has the heaviest weight in the index.

2. Shipments: Edging up, Inventories: Intentionally being built up

Figure 1-3 shows the inventory cycle in terms of the growth of shipments and inventories. For the whole industrial sector, the year-on-year decline in inventories began to slow down in the second quarter of 1999 and shipments increased for the first time in two years in the third quarter of 1999, indicating the end of inventory adjustment. The year-on-year increase in shipments has since accelerated, while inventories started to increase on the previous period in the first quarter of 2000. So far, inventories have been increasing for products with rising demand such as semiconductor-related items, and such developments suggest that inventories are now being intentionally built up in the inventory cycle.

The recovery in shipments differs among goods, while inventories are generally bottoming out. Shipments of capital goods (excluding transport equipment) have bottomed out and are now moving upward, boosted by the recovery in plant and equipment investment (Figure 1-4). Shipments have come to a halt for construction materials as public investment has leveled off (Figure 1-5). Consumer goods have risen slowly from the previous year, reflecting the weak recovery in personal consumption (Figure 1-6). But the shipments increased for the domestic market in the first quarter of 2000 due to the leap-year effect, following signs of improvement that shipments of durable good are showing in the second quarter. Shipments of producer goods led final demand goods in recovery, recording a double-digit increase on the previous year (Figure 1-7). Meanwhile, inventories outran last year's level in the second quarter of 2000 for producer goods.

Figure 1-3. Inventory Cycle
(Mining and manufacturing sector)



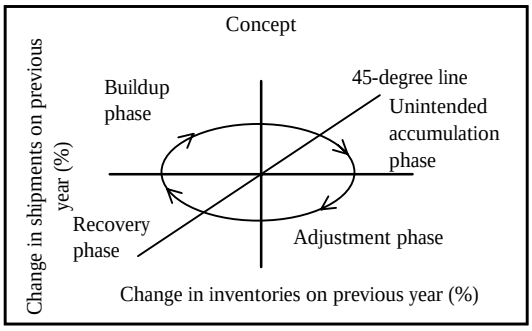


Figure 1-4. Inventory Cycle of Capital Goods (Excluding transport equipment)

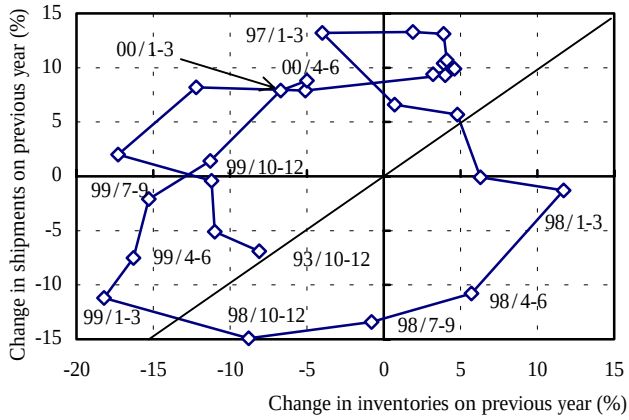


Figure 1-5. Inventory Cycle of Construction Materials

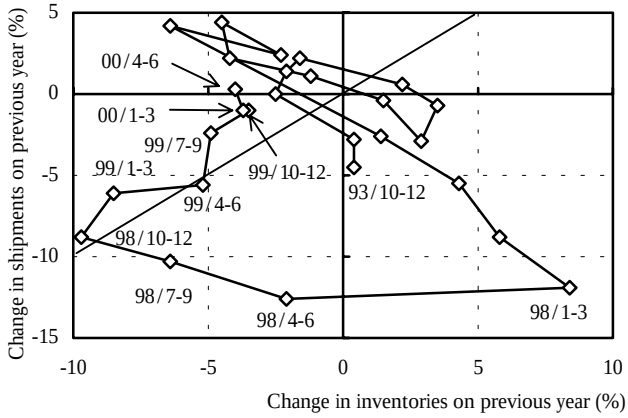


Figure 1-6. Inventory Cycle of Consumer Goods

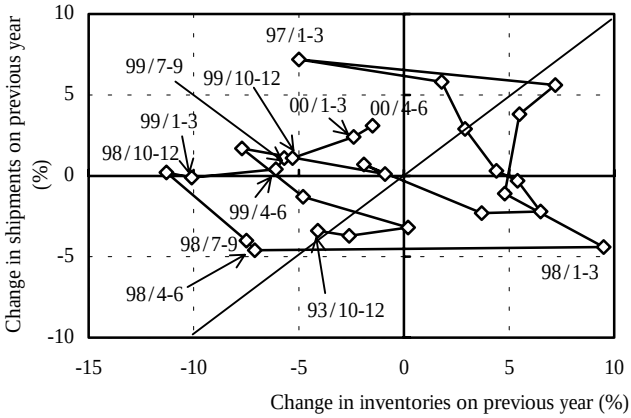
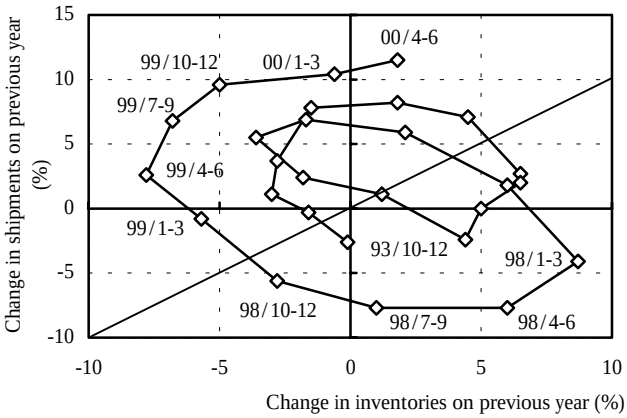


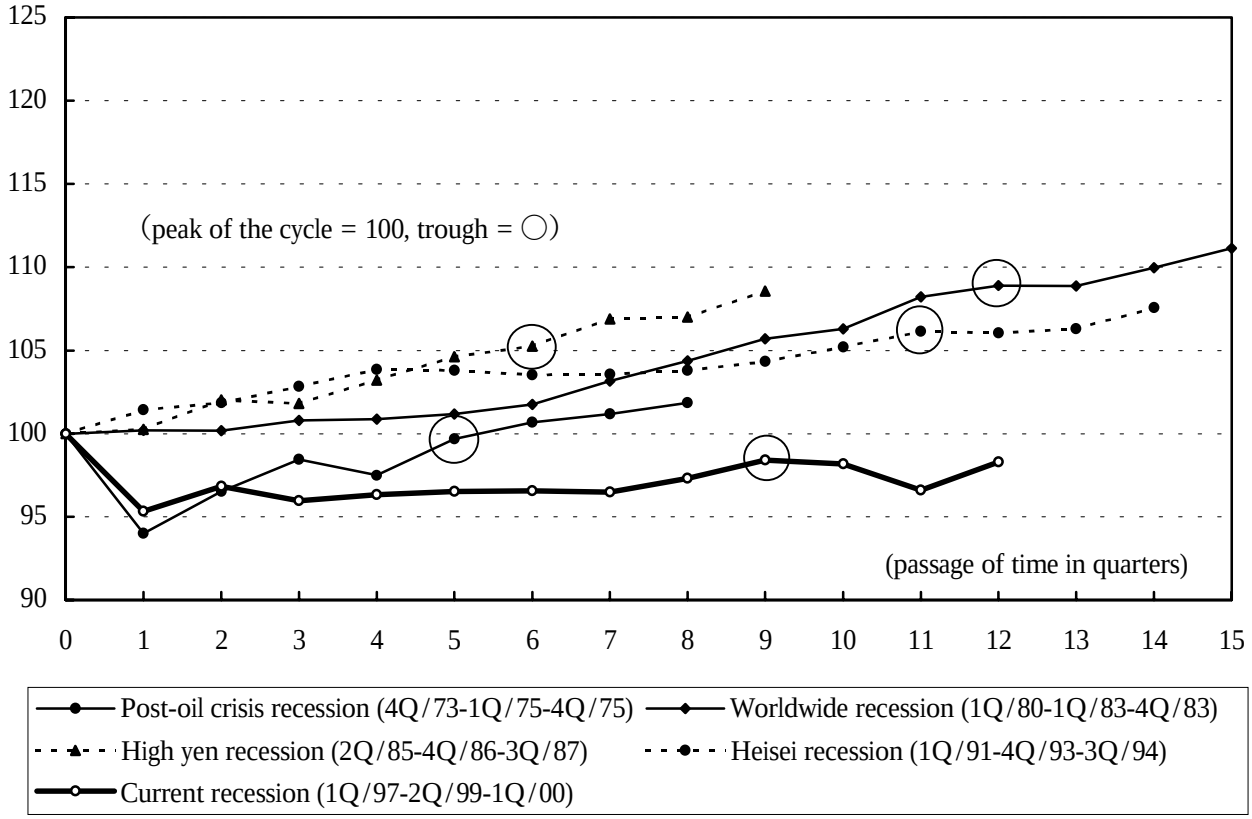
Figure 1-7. Inventory Cycle of Producer's Goods



3. Consumption: Sluggish

In the current recession, personal consumption has remained sluggish for a long time and not shown strong recovery in the three quarters following the economic bottom (2Q/99). Figure 1-8 confirms this by comparing the current recession with previous recessions: (i) post-oil crisis recession, (ii) worldwide recession, (iii) high yen recession and (iv) Heisei recession. The data indicate the levels of real consumption on a quarterly basis, indexed on the peak of each business cycle (=100).

Figure 1-8. Real Personal Consumption at Past and Current Business Cycle



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

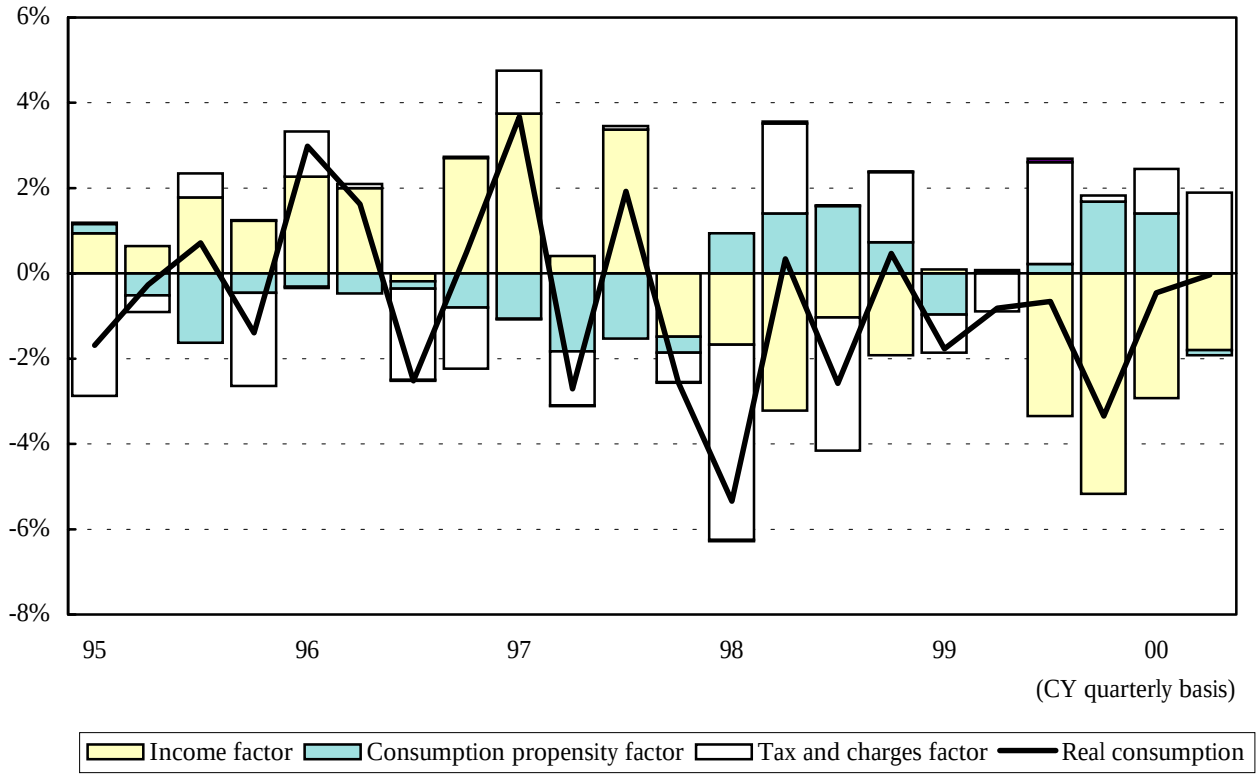
With the exception of the post-oil crisis recession, the level of real consumption in previous recessions ((ii), (iii) and (iv)) always exceeded 100. In the current recession, real consumption has remained low following the large drop in the second quarter of 1997 due to the consumption tax hike. The recovery has been weak, even after the economic trough. The consumption was still below that of the first quarter of 1997 (=100) in the first quarter of 2000, in spite of the leap year effect, which accounts for 0.8% of the 1.8% seasonally adjusted increase from the previous quarter. The current weakness of consumption is evident, because, even in the post-oil crisis recession ((i)), real consumption regained the pre-recession peak level at the trough (1Q/75), then followed a mild recovery.

Figure 1-9 analyzes the factors behind sluggish consumption from the growth in real consumer spending in workers' households according to the Family Income and Expenditure Survey. Here, the factors influencing consumption are decomposed into income (pre-tax income

including regular wages and salaries, overtime pay and bonus), tax and charges (income tax, inhabitant tax, social insurance premium, etc.) and consumption propensity (ratio of consumption to disposable income, which is equivalent to income minus tax and charges).

From the latter half of 1999 to early 2000, consumption was supported by the reduction in tax and charges due to the continuation of tax relief measures (contribution to year-on-year change from 3Q/99 to 1Q/00 amounting to 0.2%, 1.7% and 1.4% respectively) and the rise in consumption propensity (2.4%, 0.1% and 1.0% respectively). However, it was depressed by the fall in income due to the reduction of bonus and the reaction to last year's local sales promotion voucher handouts (contribution amounting to –3.3%, -5.2% and –2.9% respectively). Even in the second quarter of 2000, consumption only regained the previous year's level, because the improved consumption propensity was cancelled out by the decline in income.

Figure 1-9. Factoral Resolution of Real Consumption Expenditure of Workers' Households (Change on previous year)



Notes: 1. C／P = α ×(Y－T)／P is resolved according to the following formula:
Δ(C／P)= α × Δ(Y／P)－ α × Δ(T／P)＋Δ α ×(Y－T)／P＋residual
(income factor) (tax and charges factor) (consumption propensity factor)
C: consumption expenditure, Y: income, T: tax and charges, α : average consumption propensity, P: consumer price
2. Contribution of local sales promotion vouchers to income amounts to +1.0% for 1Q/99 and +0.1% for 2Q/99 (DBJ estimate).

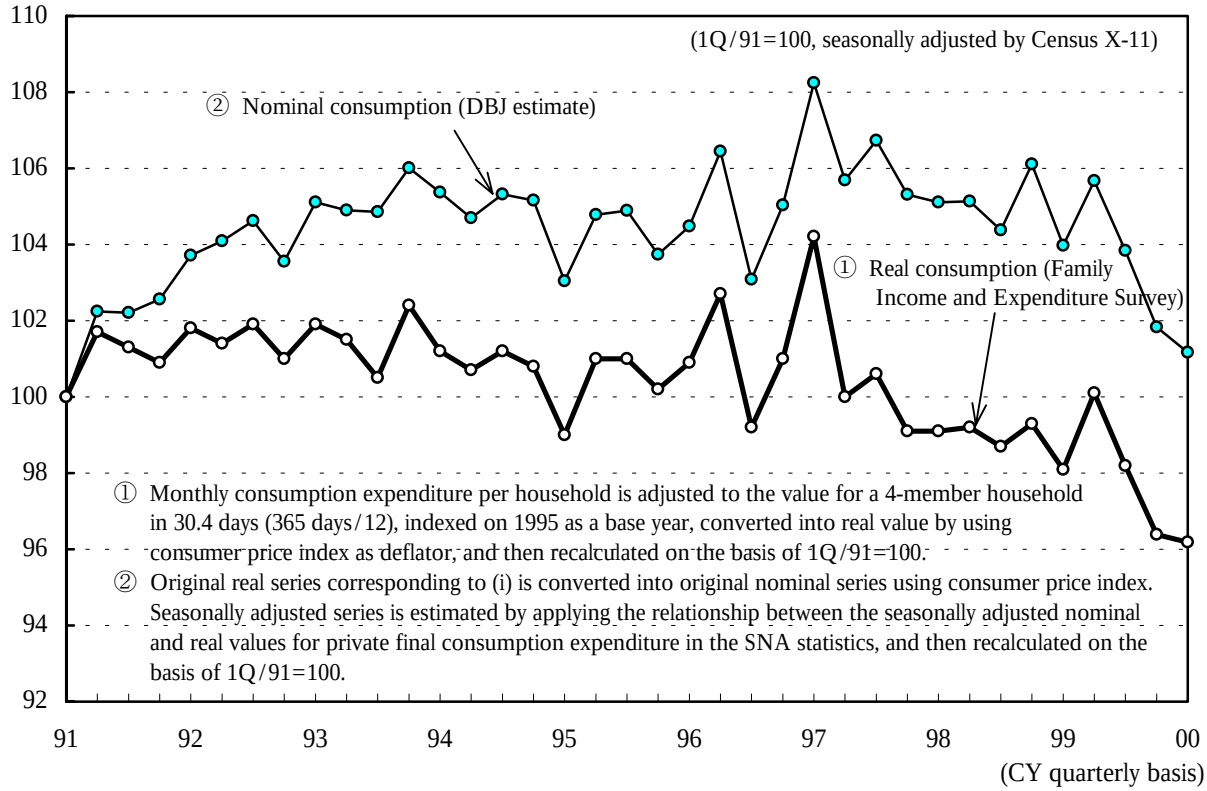
Sources: Management and Coordination Agency, "Family Income and Expenditure Survey" and "Consumer Price Index."

The consumption has been sluggish even in nominal base. Figure 1-10 compares real consumption with nominal consumption. [see (Note) 2. in Figure 1-10 for the method of estimation].

The real consumption fell below the 1996 level as early as in the fourth quarter of 1997, when financial instability became apparent, while the nominal consumption has experienced substantial drops since the fourth quarter of 1999, almost falling to the level of nine years ago in the first quarter of 2000. The data suggest that it is increasingly difficult to compensate for the decline in prices by selling more.

Figure 1-10. Trend of Consumption Level Index for All Households

(Seasonally adjusted)



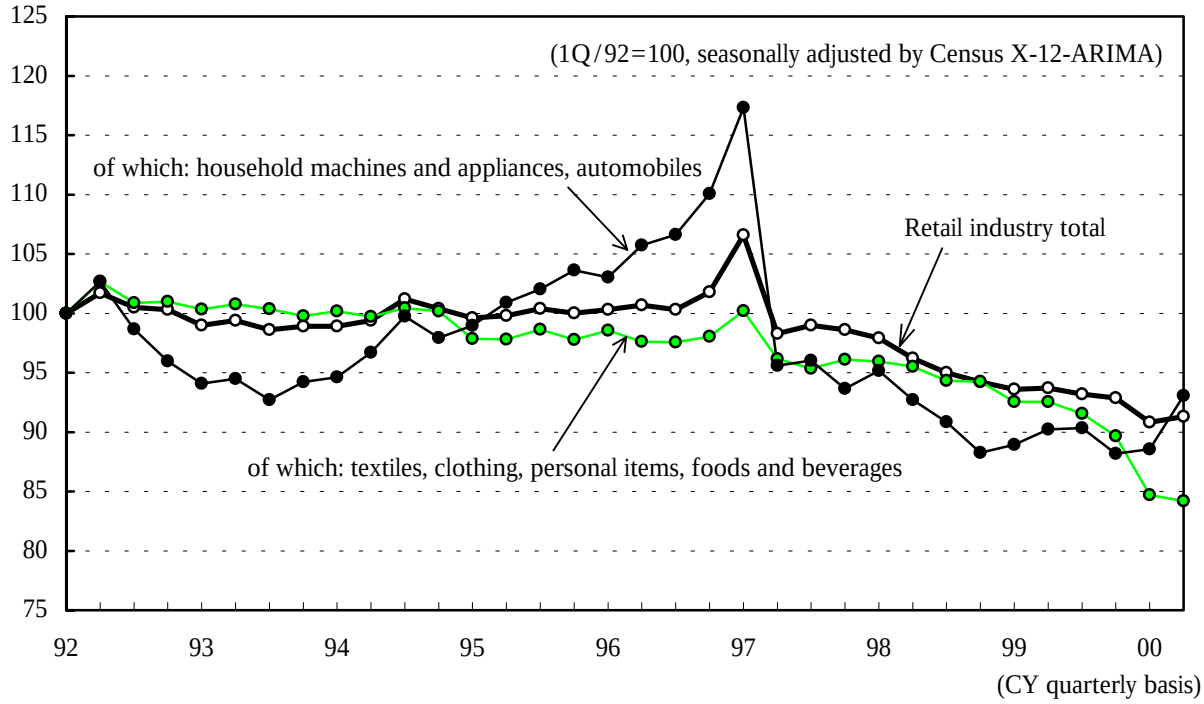
Sources: Economic Planning Agency, "Annual Report on National Accounts;" Management and Coordination Agency, "Family Income and Expenditure Survey," and "Consumer Price Index."

The sales statistics by vendors paint a similar picture. Figure 1-11 shows the trend of the retail sales index (seasonally adjusted, 1995=100) separately for durable goods (household machinery and appliances, automobiles) and for semi- and non-durable goods (textiles, clothes, personal goods, foods and beverages). The index for durable goods, which account for just under 20% of total retail sales, remained almost static throughout 1999, but the composite index has not bottomed out. In particular, the index for semi- and non-durable goods, which account for 40% of total retail sales, has dropped significantly since the fourth quarter of 1999.

The hardship is partially attributable to unsuccessful sales campaigns carried out since the autumn of 1999[1]. In addition, efforts by existing stores to compete with the prices of emerging discount stores have been largely unsuccessful in attracting consumers.

Figure 1-11. Trend of Retail Sales Index

(Seasonally adjusted)



Notes: Retail sales index by industry (seasonally adjusted) is estimated using the weight of each industry in total sales (1995 as base year) and then recalculated on the basis of 1Q/92=100. The weights of industries appearing here are as follows;

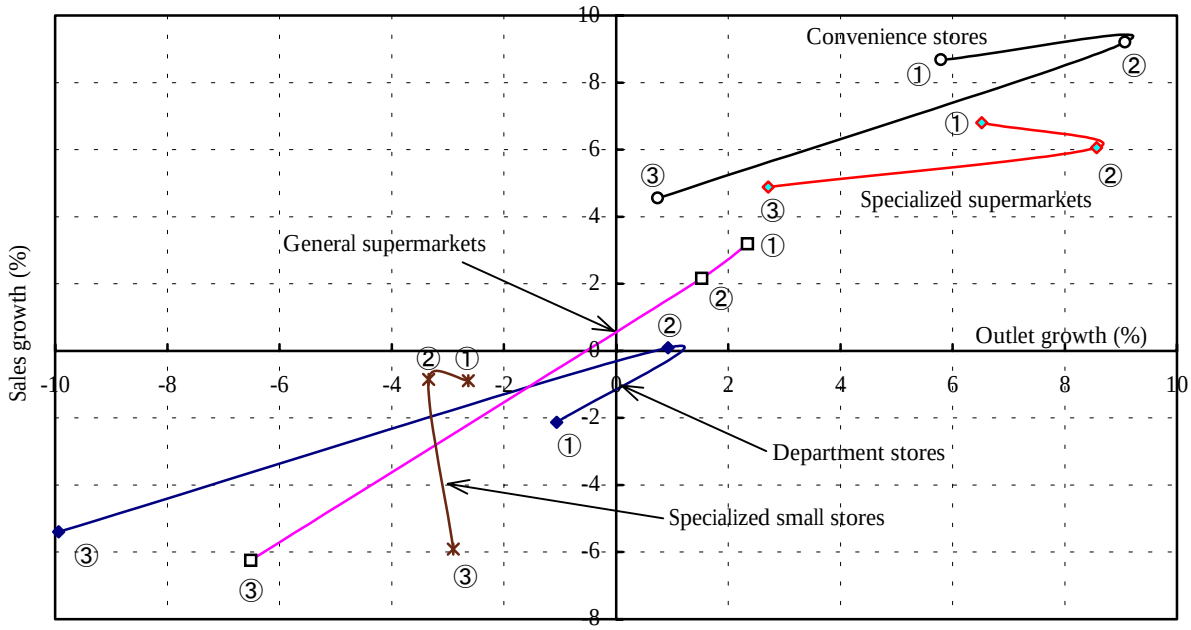
- Textiles, clothing, personal items, foods and beverages 39.4%
- Household machines and appliances, automobiles 17.0%

Source: Ministry of International Trade and Industry, "Report on the Current Survey of Commerce."

[1] Many stores have conducted such campaigns to fend off the reaction to the consumption tax payback campaigns mostly conducted by supermarkets in the autumn of 1998.

Reviewing the rise and fall of major players in the retail industry throughout the 1990s, Figure 1-12 plots the number of stores and the value of sales by business category according to Census of Commerce the following three periods: (i) 1991-94, (ii) 1994-97 and (iii) 1997-99. In the 1990s, strong new players emerged in the retail industry such as convenience stores and new types of supermarkets specialized in clothing, foods or living, while traditional department stores and general supermarkets struggled. However, all categories of stores faced difficult conditions due to sluggish consumption from 1997 to 1999. The number of outlets of department stores and general supermarkets decreased as closures outnumbered new openings (annual drop of 9.9% for the former and 6.5% for the latter), and sales started to fall (annual drop of 5.4% and 6.2% respectively). Convenience stores and specialized supermarkets also saw their power wane, with both the number of outlets and the value of sales declining.

Figure 1-12. Growth of Outlets and Sales in the 1990s by Type of Stores
(Annual rate)

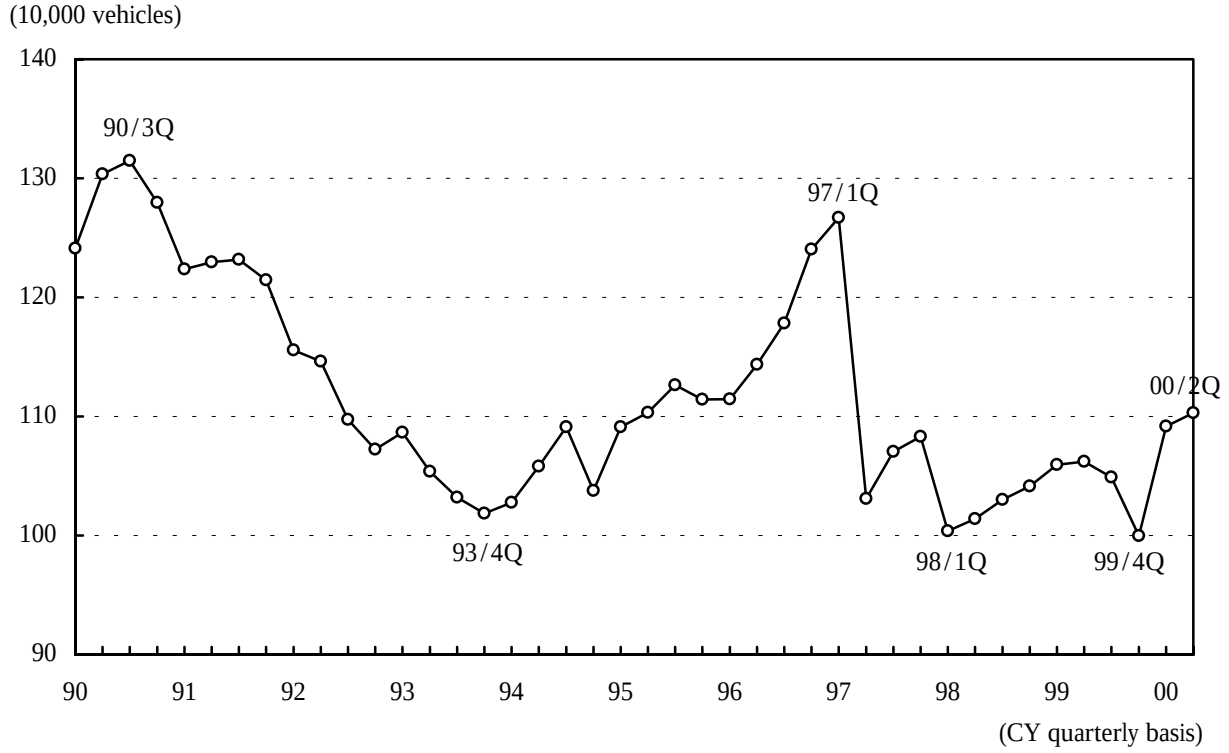


Note: Average annual growth rate for the periods ① 1991-94, ② 1994-97 and ③ 1997-99. Data for 1999 are provisional.
Source: Ministry of International Trade and Industry, "Census of Commerce."

Against this backdrop, new car registrations (seasonally adjusted, Figure 1-13), among durable goods ranged from 1.0 to 1.1 million units per quarter following the consumption tax hike in 1997, and have shown signs of recovery in recent months. After posting another record low in the fourth quarter of 1999 at 999,000 vehicles as the sales boom for new types of light automobile receded, new car registrations in the second quarter of 2000 (11.03 million vehicles) exceeded the previous quarter, which was inflated due to the leap-year effect. However, small car registrations in June 2000 increased for the first time in 17 months since January 1999. Further recovery depends on the effect of major model changes due this summer and thereafter.

Figure 1-13. Trend of New Car Registrations

(Seasonally adjusted by Census X-11 method)

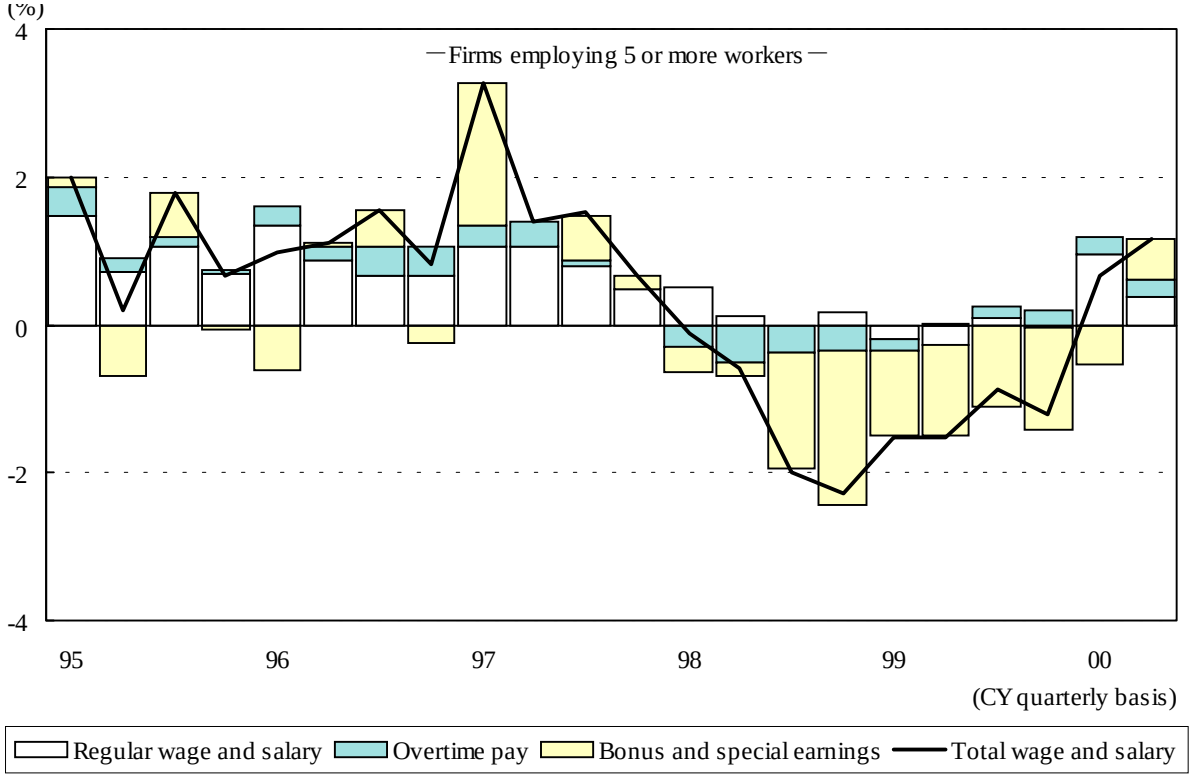


Source: Economic Planning Agency, "Indexes of Business Conditions."

The income condition is the most important factor in forecasting future consumption trends. Total wages and salaries per person (Figure 1-14) rose in the first quarter of 2000 for the first time in nine quarters. Overtime pay has been increasing since the third quarter of 1999, reflecting an increase in overtime hours due to production growth. Bonus is expected to bottom out this summer in the private sector, after experiencing successive year-on-year declines up to the winter of 1999. Regular wages and salaries are not expected to rise substantially for some time, as the spring labor offensive of 2000 is likely to result in a record-low wage rise of about 2%. Nevertheless, overall income conditions have seen their worst period. The sustainability of the economic recovery depends on whether consumption picks up as income conditions improve gradually.

Figure 1-14. Trends in Wage and Salary per Person

(Trend of year-on-year change by component)



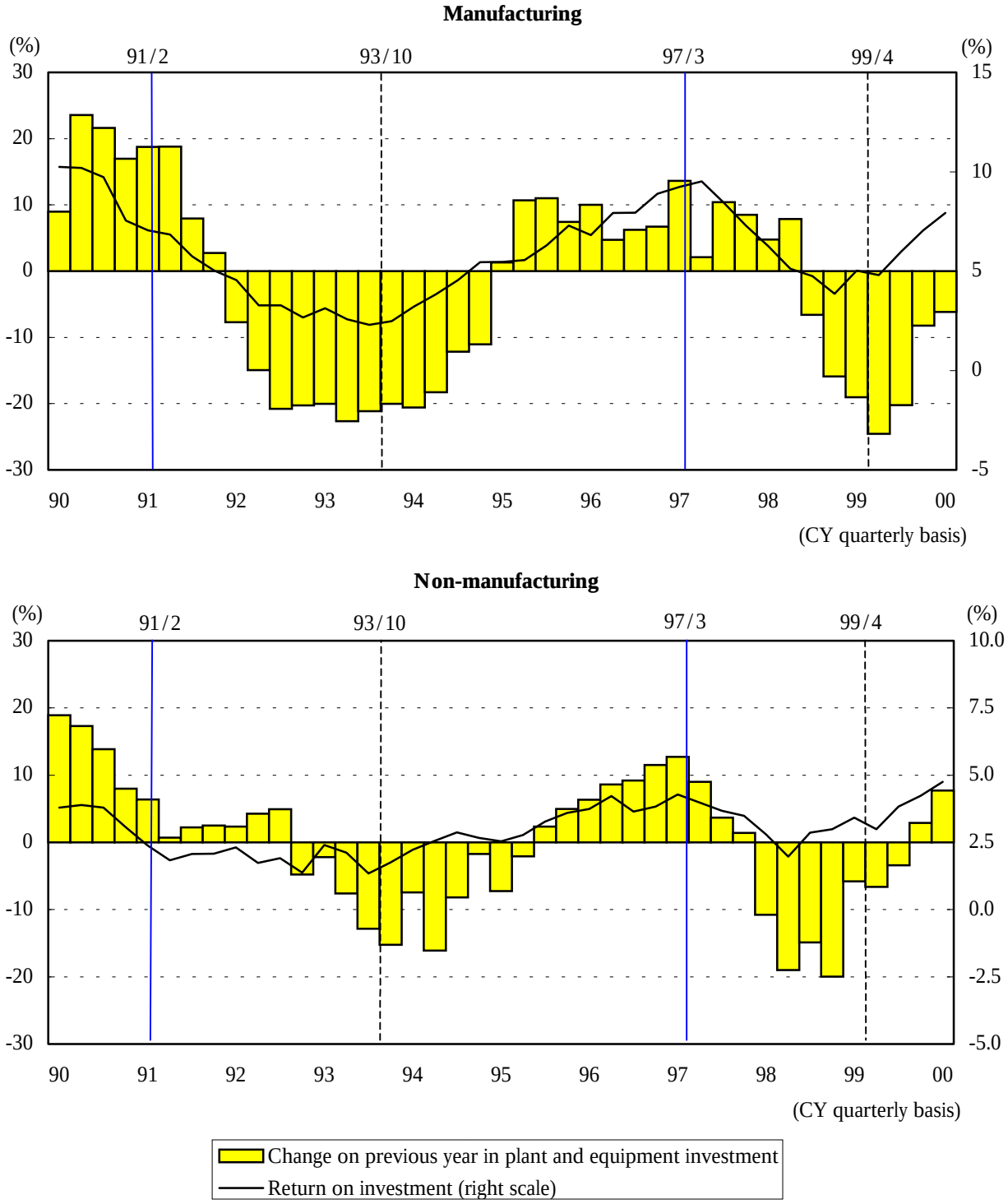
Source: Ministry of Labor, "Monthly Labor Survey."

4. Plant and Equipment Investment: Starting to Recover

Plant and equipment investment on a real GDP basis rose 1.7% on the previous year in the fourth quarter of 1999, the first increase in eight periods, and accelerated 3.7% in the first quarter of 2000.

Figure 1-15 shows the year-on-year growth by industry according to the Statistical Survey of Incorporated Enterprises. Although there have been improvements in both the manufacturing and non-manufacturing sectors, plant and equipment investment in the manufacturing sector has only bottomed out and was still down 6.1% from the previous year in the first quarter of 2000, while the non-manufacturing sector led the recovery with a strong 7.7% increase.

Figure 1-15. Plant and Equipment Investment and Return on Investment
(corporations of all sizes)



Notes: 1. Return on investment = operating profit-tangible asset – average lending rate of banks (new loans, total), where operating profit-tangible asset ratio = operating profit/(tangible fixed assets + inventories).
2. No adjustments are made for changes in the accounting rule on business tax (ministerial order revised in Dec. 1998).

Sources: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises," etc.

The increase in the non-manufacturing sector is largely due to the service industry, followed by wholesale/retail. By corporate size, small companies[2] made the greatest contribution to the increase. However, the sustainability of the increased investment in the non-manufacturing sector require careful attention for two reasons: First, the service industry mainly is led by hotels and recreational facilities, but such development of those two industries is not quite convincing because their profit levels remain relatively low. Second, the wholesale/retail industry is mainly led by large-scale investment in redevelopment projects and the accelerated establishment of new outlets before the enforcement of the Law on the Location of Large-scale Retail Stores. Plant and equipment investment in the manufacturing sector is led by electric machinery with a double-digit increase on the previous year. However, substantial declines have continued in other major industries such as transport equipment and chemicals.

Return on investment (operating profit-tangible asset ratio – average interest rate on new loans: see Note of Figure 1-15), shown in the same figure, has been improving since the second quarter of 1998 in the non-manufacturing sector and since the fourth quarter of 1998 in the manufacturing sector, largely exceeding the empirical threshold for positive plant and equipment investment (5% for manufacturing and 2.5% for non-manufacturing)[3]. Although the recovery of plant and equipment investment in the manufacturing sector lags behind the improvement in return on investment, favorable conditions are now being created for investment recovery.

Machinery orders (Figure 1-16), which are considered to lead plant and equipment investment by two to three quarters, rose from the previous year in the fourth quarter of 1999 (first increase in nine periods for manufacturing and in 11 periods for non-manufacturing). The recovery trend has been confirmed by the four consecutive increases since then. Investment in the manufacturing sector is dominated by electrical machinery, but is also bottoming out in other industries. In the non-manufacturing sector, investment has risen in many of the major industries including telecommunications, wholesale/retail and finance/insurance.

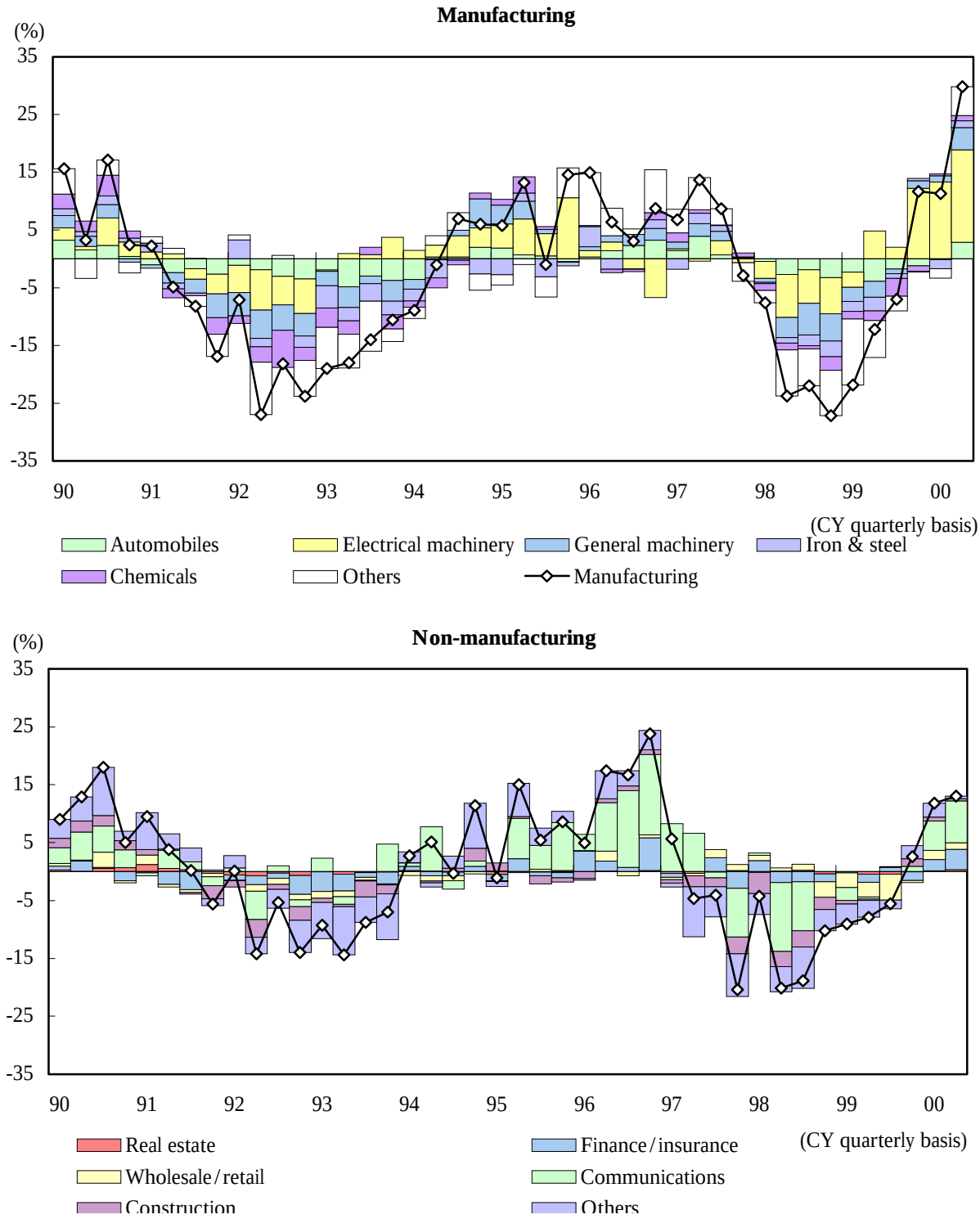
Although the current increase in plant and equipment investment may be partly attributable to temporary factors, investment is expected to continue to recover for some time.

[2] The Quarterly Report of Statistical Survey of Incorporated Enterprises covers the corporations capitalized with ¥10 million or over. Of those companies, large-sized companies are defined as those capitalized with ¥1 billion or over, medium-sized companies with ¥100 million or over and less than ¥1 billion, and small-sized companies with ¥10 million or over and less than ¥100 million.

[3] For data since the first quarter of 1999, the inflating effect of the change in accounting rules applicable to corporate tax should be discounted.

Figure 1-16. Trends in Orders Received for Machinery

(Trend of year-on-year change by industry)



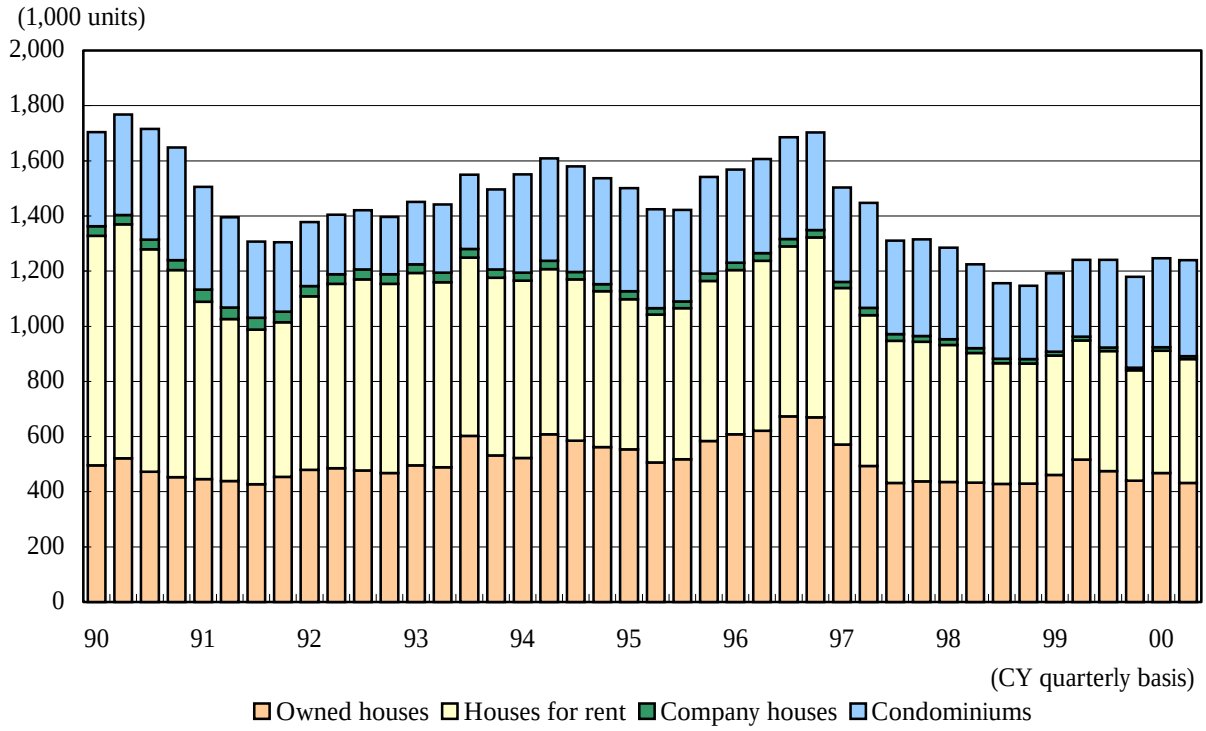
Source: Economic Planning Agency, “Orders Received for Machinery.”

5. Housing Starts: Led by Condominiums, Downtrend for Owned Houses

Housing starts fell continuously from the first quarter of 1997, falling below 1.2 million in fiscal 1998 for the first time in 15 years (1.18 million units), but then rose on the previous period in the first quarter of 1999 largely due to the effect of housing tax relief measures and low interest rates. As a result, housing starts recovered slightly in fiscal 1999 to 1.23 million units (Figure 1-17). The average indicates and records over 1.2 million units in the first and the second quarter of 2000, as the increase in condominiums is more than offset by the decline in owned houses.

Figure 1-17. Trend of Housing Starts

(Seasonally adjusted annual rate)

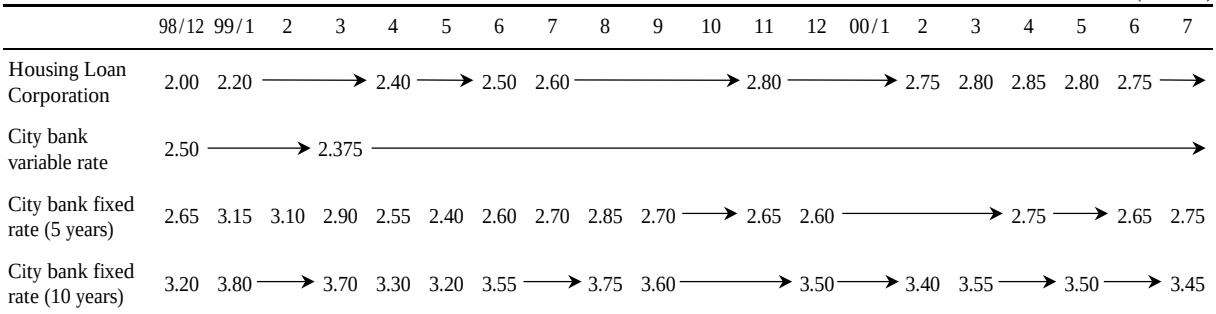


Notes: Census X11 is used for seasonal adjustment.
Source: Ministry of Construction, "Report on Statistical Survey on Construction Starts."

After recording a double-digit increase on the previous year in the first half of fiscal 1999, the construction of owned houses leveled off in the latter half of the year, as the standard lending rate of the Housing Loan Corporation left the floor of 2.0% in December 1998 (Figure 1-18). Other factors include the expectation that interest rates will rise, as well as the initial inhabitation deadline of December 2000 to benefit from housing tax relief. Following the substantial increase of 26.9% on the previous year in January 2000, when housing starts showed a huge increase, the construction of owned houses has declined for five consecutive months, thus confirming the downtrend.

Figure 1-18. Trend of Housing Loan Interest Rates

(Unit: %)



Notes: 1. Interest rate of the Housing Loan Corporation represents the standard rate (applicable to "certain housing of good quality" for the initial 10 years).
2. The rate represents that at the end of the month.

Factors supporting immediate housing purchases may have weakened as the standard lending rate of the Housing Loan Corporation has remained stable at around 2.8% since the beginning of the year and the deadline for tax relief measures was extended to June 2001. The number of applications for the Corporation's housing purchase loans, a leading indicator of the construction of owned houses, declined substantially from the previous year for the third and fourth invitations in 1999 (Figure 1-19). The number of applications rose by only 4.3% for the first invitation in 2000. Thus, housing starts are expected to remain weak for owned houses. However, there may be a surge in demand in the latter half of fiscal 2000 as the deadline for tax relief approaches.

Figure 1-19. Housing Loan Applications for Owned Houses

Invitation		Application deadline	Application period (days)	Number of applications (1,000)	Change on previous year (%)	Standard rate (%)
FY1997	1	May 30	10	55	-47.7	3.10
	2	Sep. 12	15	52	-60.3	3.10
	3	Nov. 28	18	47	-21.9	3.00
	4	Mar. 6	19	57	-33.2	3.00
FY1998	1	Jun. 5	23	62	13.3	2.75
	2	Sep. 30	31	67	28.8	2.55
	3	Dec. 25	37	70	49.9	2.00
	4	Mar. 26	48	101	75.1	2.20
FY1999	1	Jun. 18	36	62	0.0	2.40
	2	Oct. 29	67	88	32.6	2.60
	3	Jan. 14	61	37	-47.3	2.80
	4	Mar. 10	33	38	-62.5	2.75
FY2000	1	Jun. 30	72	65	4.3	2.75

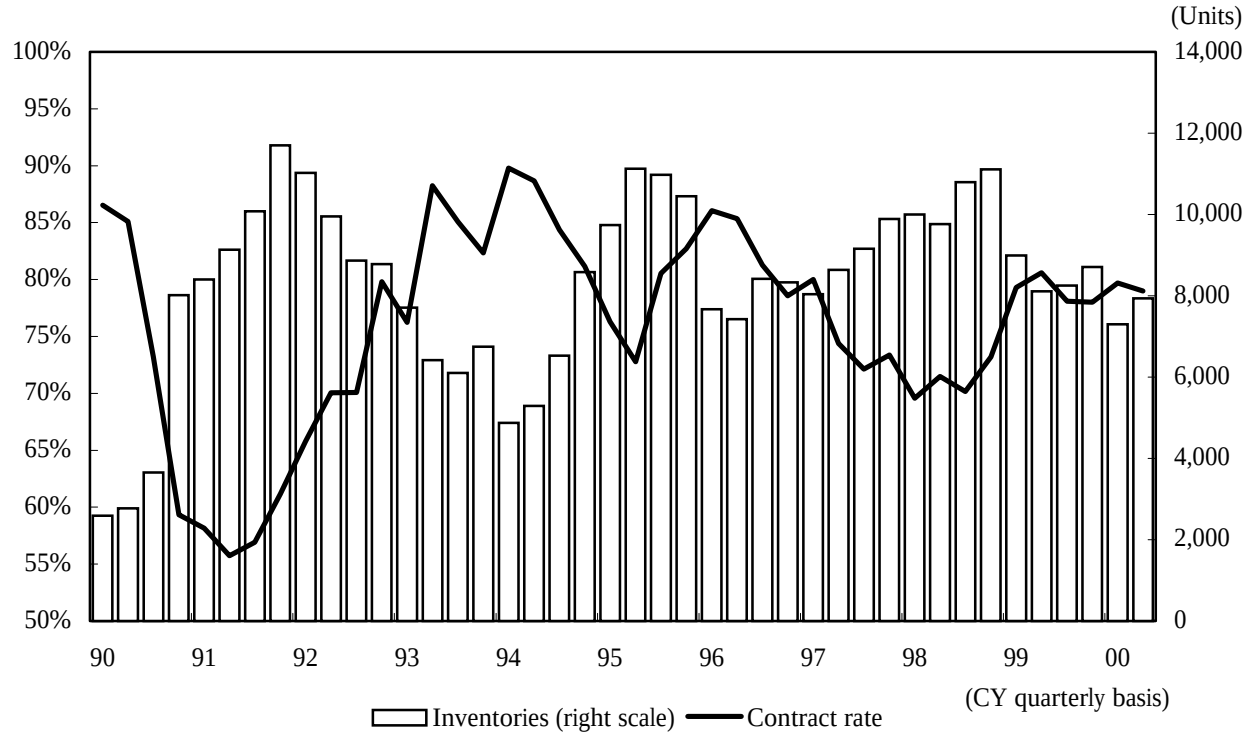
Source: Housing Loan Corporation, "Monthly Report on Housing Loans."

In contrast, sales of condominiums are buoyant, largely offsetting the sluggishness for owned houses. Throughout 1999, the contract rate of condominiums in the Tokyo metropolitan area remained at almost 80%, leading to a fall in completed inventories (Figure 1-20). Condominiums are expected to support housing investment for some time, because their longer construction periods (nine months to one year) would hasten any last-minute demand.

The construction of houses for rent continues to slide due to a small glut on the supply side.

Figure 1-20. Contract Rate and Completed Inventories of Condominiums

(Tokyo metropolitan area)



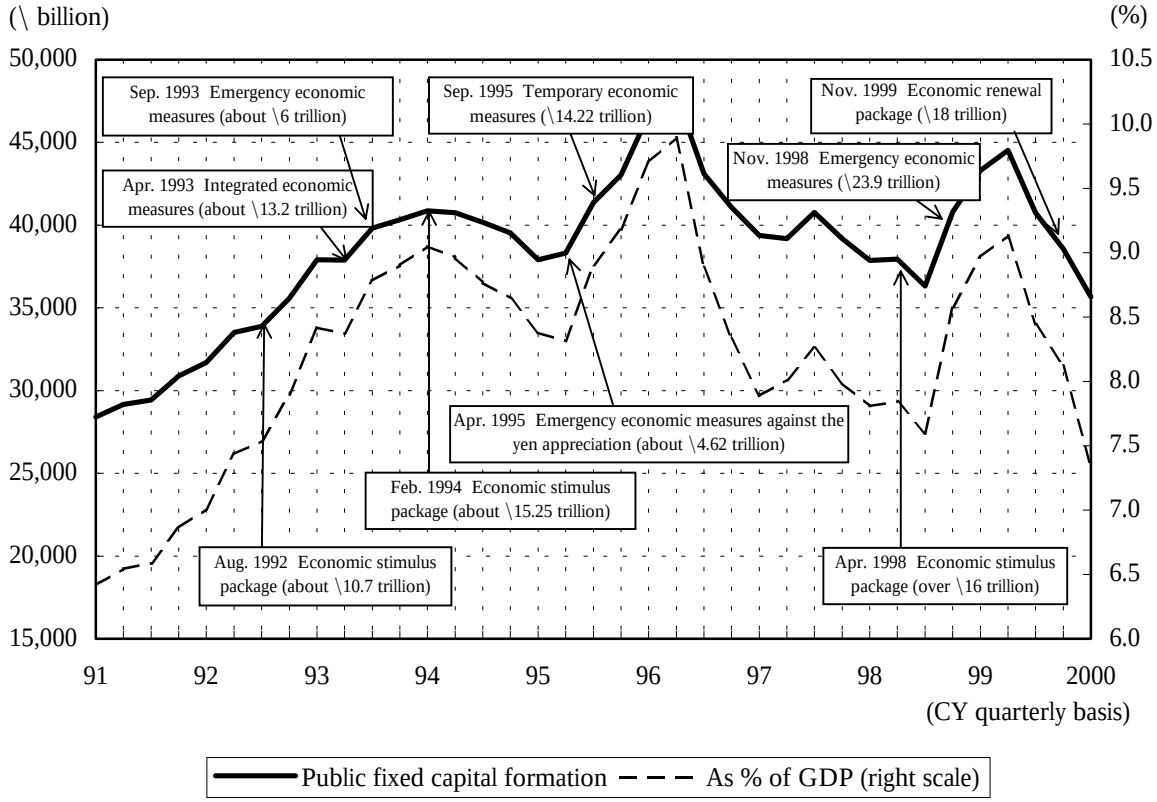
Notes: Contract rate represents the quarterly average ratio of units sold in the months to units marketed in the month. Completed inventories are measured at the end of each quarter.

Source: Real Estate Research Institute, “Trend of Condominium Market in Tokyo Metropolitan Area.”

6. Public Investment: Leveling off

Public investment (public capital formation, Figure 1-21) started to rise in the fourth quarter of 1998 thanks to the economic stimulus package of April 1998 (totaling over ¥16 trillion) and the emergency economic measures of November 1998 (¥23.9 trillion). It increased to 9.1% of GDP in the second quarter of 1999, but since the third quarter of 1999, it has declined for three consecutive periods to 7.3% in the first quarter of 2000.

Figure 1-21. Trend of Public Investment

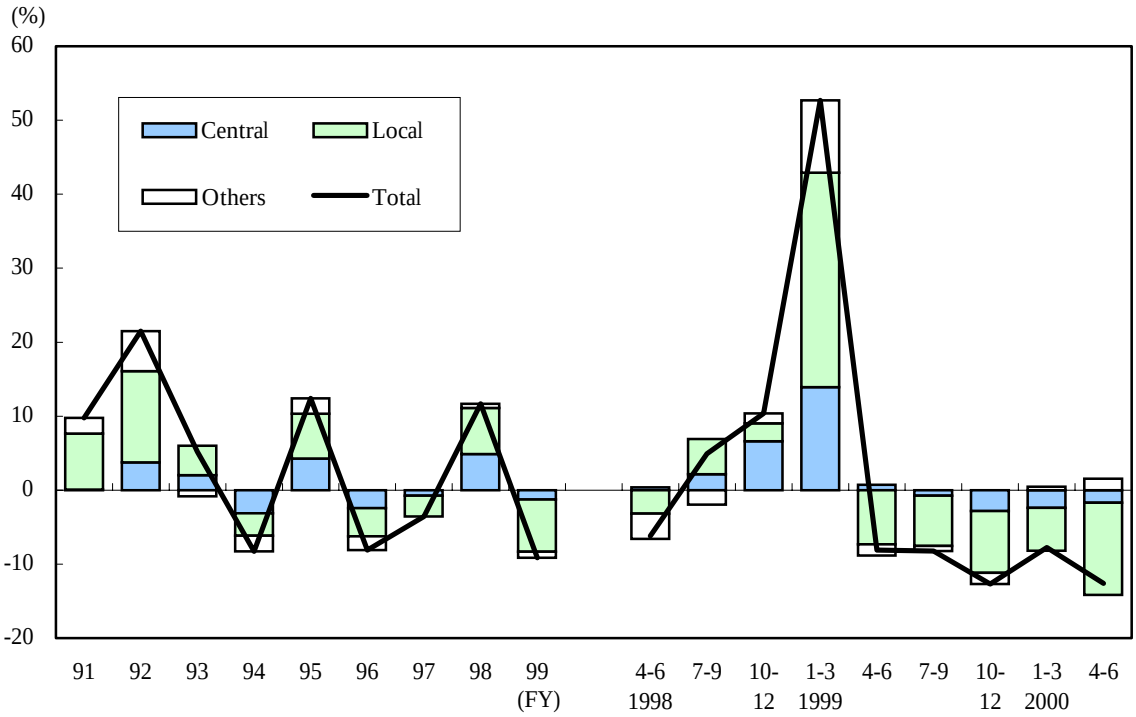


Note: Data represent seasonally adjusted annual rate.
Source: Economic Planning Agency, "Annual Report on National Accounts."

The contract value of public works, the leading indicator, recorded a substantial increase of 11.7% for fiscal 1998 largely thanks to the large increase of 52.7% in the first quarter of 1999 due to the economic stimulus measures. However, the contract value began to fall again in the second quarter of 1999, particularly in regions with financial difficulties, and declined 9.1% in fiscal 1999 (Figure 1-22). The downtrend still continues in fiscal 2000.

Although the economic renewal package (totaling about ¥18 trillion) should have some effect, public investment will not increase significantly in fiscal 2000 due to harsh budgetary conditions.

Figure 1-22. Trend of Contract Value for Public Works (Change on previous year)

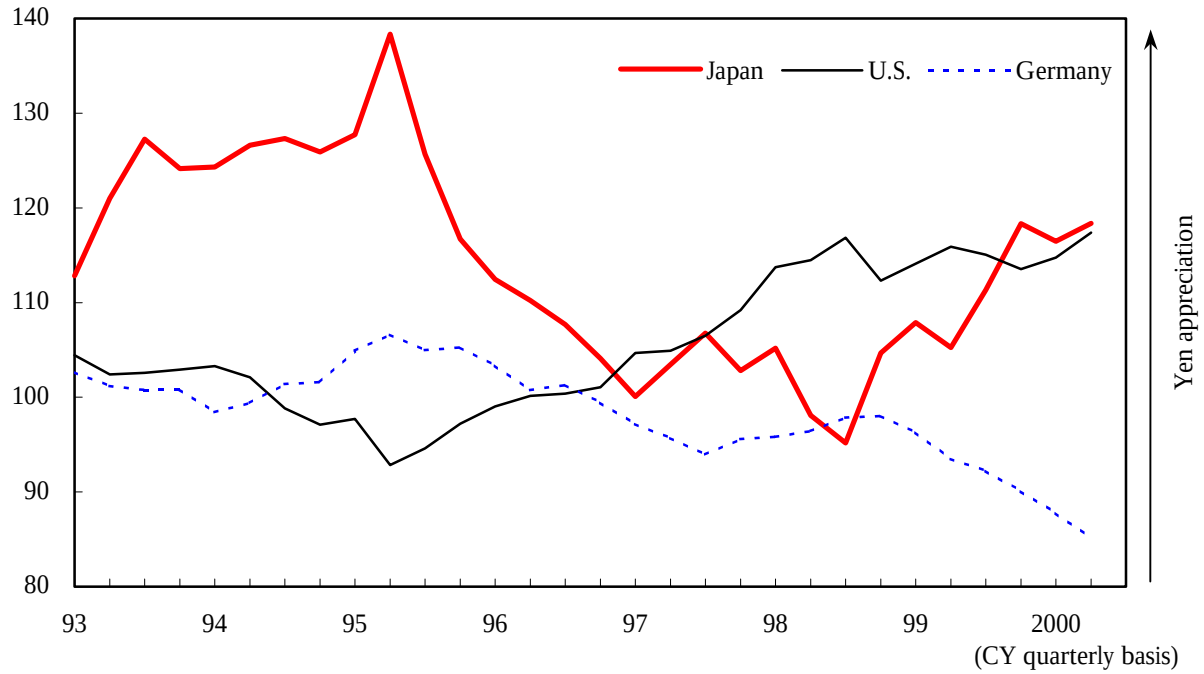


Source: Association of Surety Companies, "Table of Surety Business."

7. Exports and Imports: Increase Led by Asia

Figure 1-23 shows the trend of the real effective exchange rate of major currencies. The yen has been appreciated since September 1998, with a substantial appreciation since September 1999, and remains strong at present.

Figure 1-23. Trend of Real Effective Exchange Rate (1990=100)



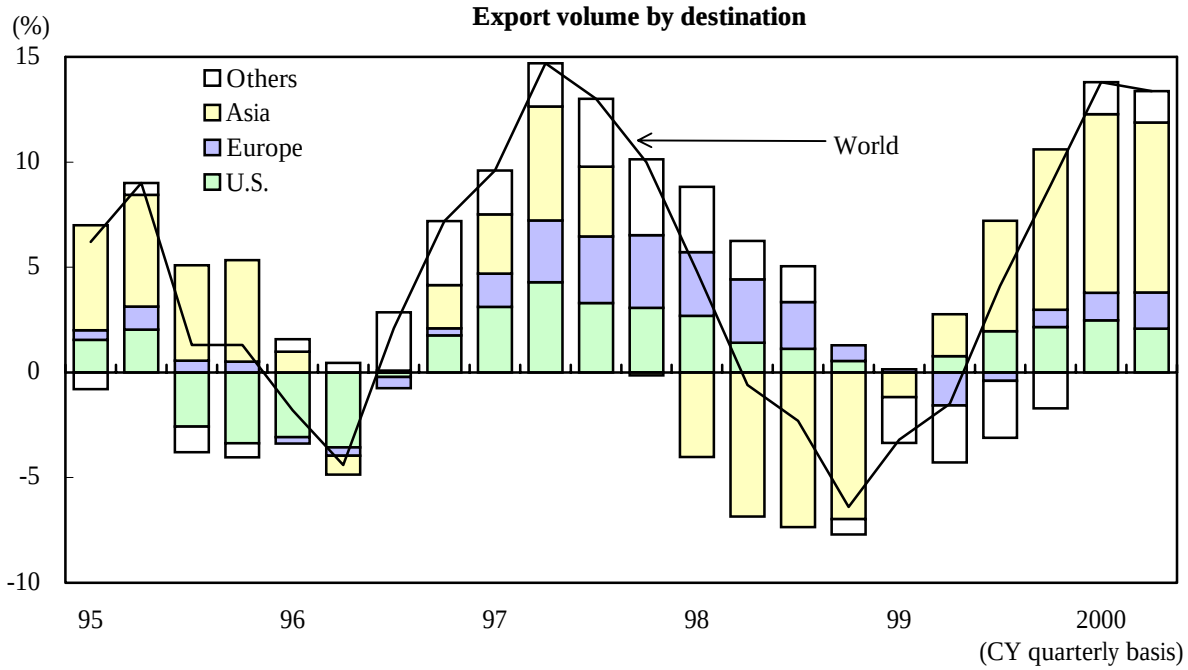
Note: Real effective exchange rate is a trade-weighted currency index after adjustment for inflation, covering the trading partners including 21 developed and 23 developing countries.
Source: JP Morgan, "World Financial Market."

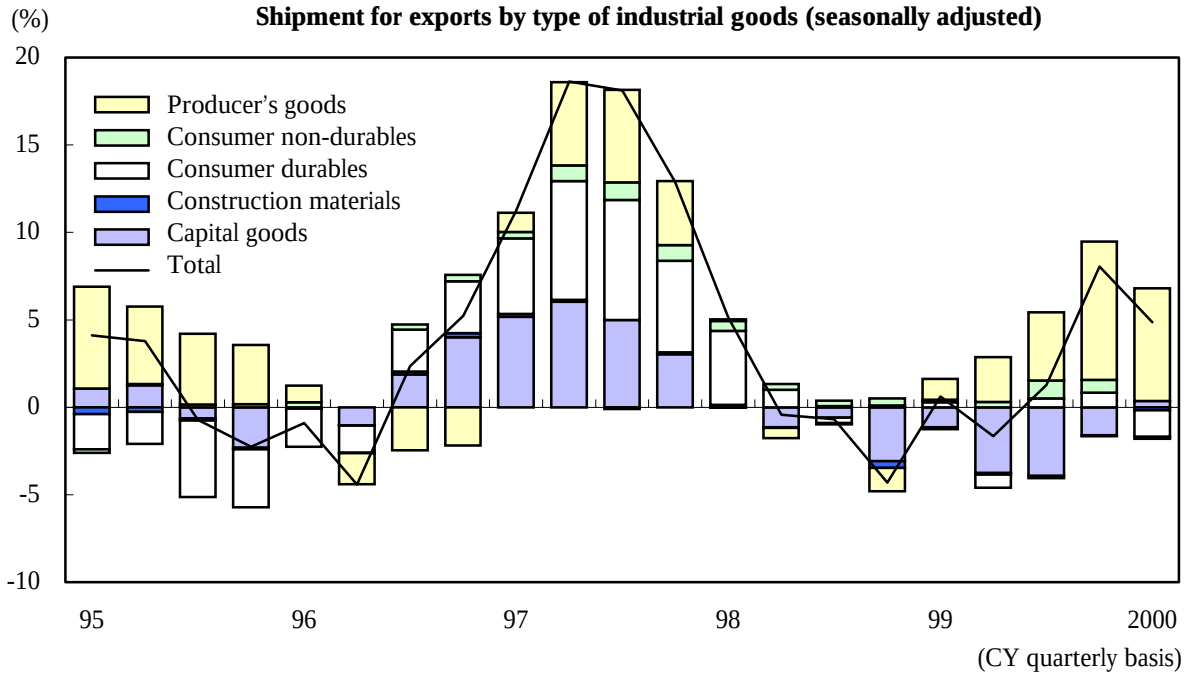
The volume of exports (Figure 1-24) slowed substantially from the latter half of 1997 due to the Asian currency crisis, recording consecutive declines on the previous year from the second quarter of 1998, then rose on the previous year in the third quarter of 1999, backed by the recovery of the Asian economies. A double-digit increase has continued for two consecutive quarters since the first quarter of 2000.

By destination, exports to Asia fell on the previous year in the fourth quarter of 1997 due to the currency crisis in ASEAN countries and South Korea, followed by a substantial drop of 17.7% in the third quarter of 1998. However, they then recovered in the second quarter of 1999 (up 5.7% from the previous year) and have led the overall increase in exports until now. Backed by robust domestic demand, exports to the U.S. have increased considerably since the fourth quarter of 1996 and remain strong. Exports to Europe have regained strength since the third quarter of 1999, after a substantial slowdown in the first half of the year due to the depreciation of the euro.

Figure 1-24 shows the growth of shipments for export by type of goods according to the Industrial Production Statistics. In 1998, the growth of durable consumer goods exports slowed down for Europe and the U.S., while capital goods made a negative contribution. The increase in exports in 1999 was led by producer goods such as transformers and fixed condensers. Exports of producer goods are still increasing, mainly to Asia.

Figure 1-24. Trend of Export Volume (Change on previous year)





Sources: Japan Tariff Association, "Summary Report on Trade of Japan;" Ministry of International Trade and Industry, "Summary of Analysis of Mining and Manufacturing Industrial Activities."

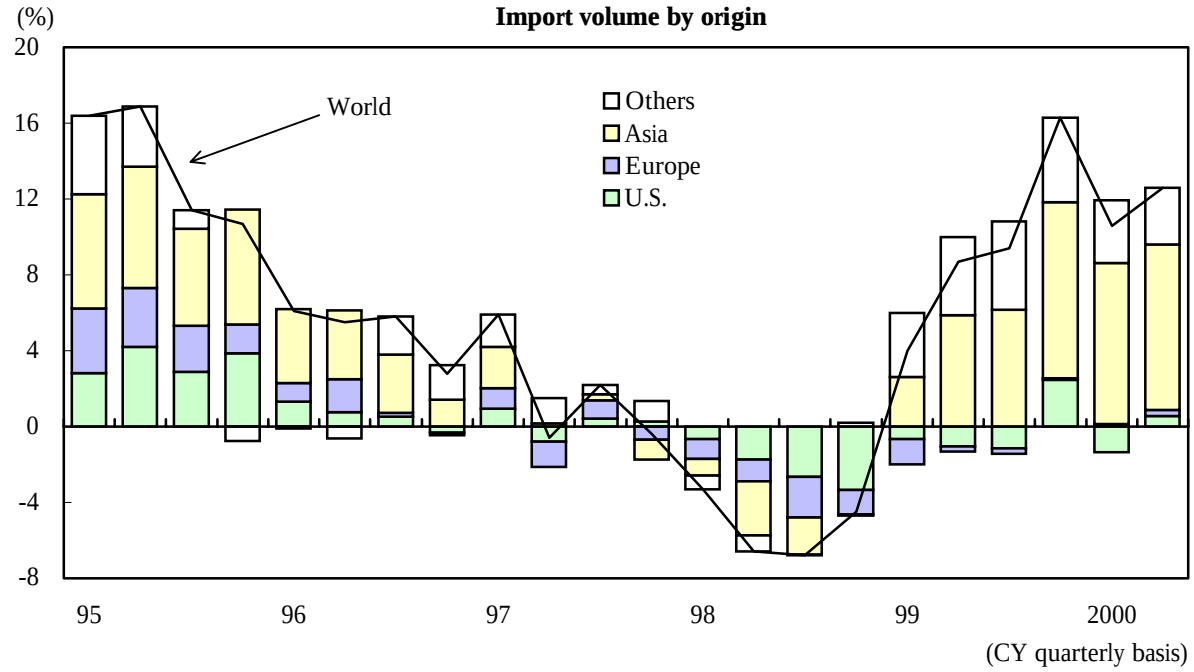
Import volume (Figure 1-25) fell on the previous year in the fourth quarter of 1997 due to the sluggish domestic demand, falling by as much as 6.8% in the third quarter of 1998. After turning upward in the first quarter of 1999 (up 4.0%), it increased for six consecutive quarters, as domestic demand bottomed out and the yen strengthened.

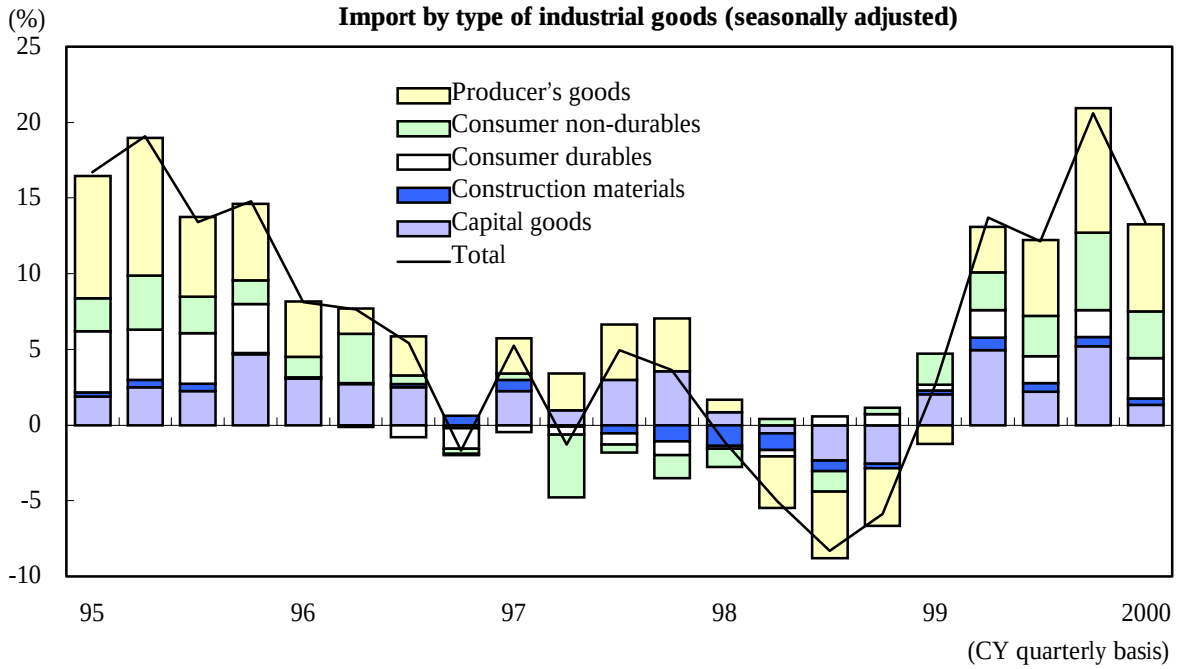
By origin, imports from Asia, which had made large negative contributions until the third quarter of 1998, recorded double-digit increases for five consecutive periods from the second quarter of 1999. On the other hand, imports from Europe and the U.S. have not picked up significantly.

By type of goods, Figure 1-25 indicates that the negative contributions from producer goods and capital goods were largely responsible for the decrease in imports in 1998. In 1999, the recovery of domestic production boosted imports of producer goods and capital goods, while non-durable consumer goods such as clothing and dairy and meat products led the overall increase in imports.

Imports started to rise in the first quarter of 1999, while exports started to recover a little later (3Q/99) but have continuously increased since then. On balance, net exports in fiscal 1999 were smaller than in the previous year. In the first quarter of 2000, however, net exports were up on the previous year as well as on the previous period, due to the large increase in exports to Asia. The current account surplus continued to shrink for some time due to the rapid increase in imports from Asia and the impact of higher oil prices.

Figure 1-25. Trend of Import Volume (Change on previous year)





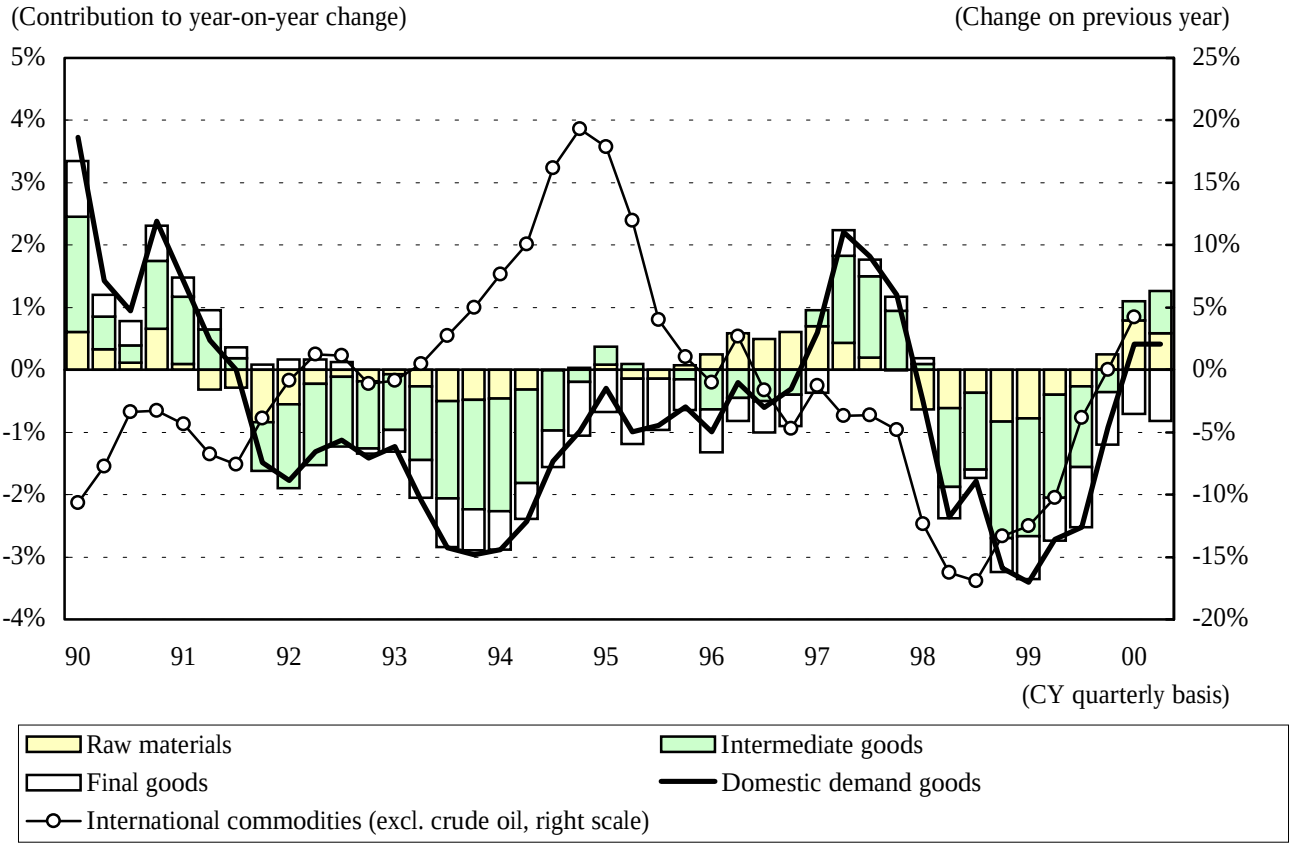
Sources: Japan Tariff Association, "Summary Report on Trade of Japan;" Ministry of International Trade and Industry, "Summary of Analysis of Mining and Manufacturing Industrial Activities."

8. Wholesale Prices: Bottoming out, Consumer Prices: Still Weak

International commodity prices (Figure 1-26), mostly composed of primary products excluding crude oil, have been improving gradually. The decline in international commodity prices on the previous year slowed down in 1999 as the world economy recovered, led by Asia, and the first quarter of 2000 saw the first rise in commodity prices in 15 quarters.

As shown in Figure 1-26, the decline in wholesale prices (domestic demand goods) slowed down from the second quarter of 1999 due to the progress in inventory adjustment and rising oil prices, but then recorded the first increase in nine periods in the first quarter of 2000. Although wholesale prices appear to be bottoming out for raw materials and intermediate goods, the prices of final goods continue to fall.

Figure 1-26. Trend of Commodity and Wholesale Prices (Domestic)



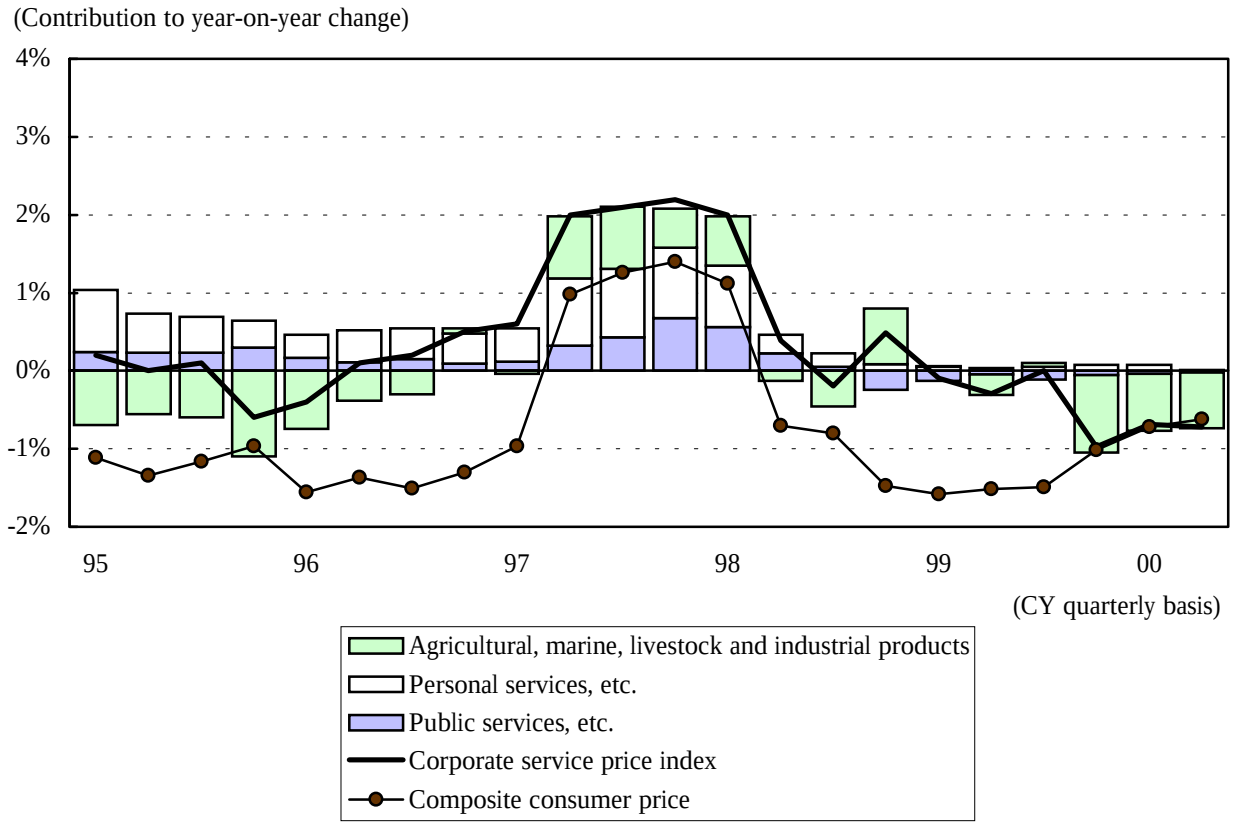
Note: Wholesale prices represent the average of domestic and import prices for domestic demand goods.
Sources: Bank of Japan, "Price Indexes Monthly;" IMF, "International Financial Statistics.

The decline has been slowing for corporate service prices (Figure 1-27), but the downward pressure from deregulation in the communication and finance sectors still prevents any substantial recovery.

Figure 1-27 shows the trend of consumer prices for commodities and services. Prices of commodities (agricultural, marine, livestock and industrial products) have been falling since the third quarter of 1998. Although the larger drops since the fourth quarter of 1999 are largely attributable to the substantial fall in fresh food prices, the decline in prices of imported durable goods and textile products due to the yen appreciation and intensified price competition has also made a significant contribution.

In addition, service prices remain weak including personal and public services. Substantial downward pressure comes from the exemption of the elderly population from pharmaceutical payments, as well as from declining prices for recreation, eating-out and telecommunications. As a result, the composite consumer price index is still weak.

Figure 1-27. Trend of Corporate Service and Consumer Prices (Goods and services)



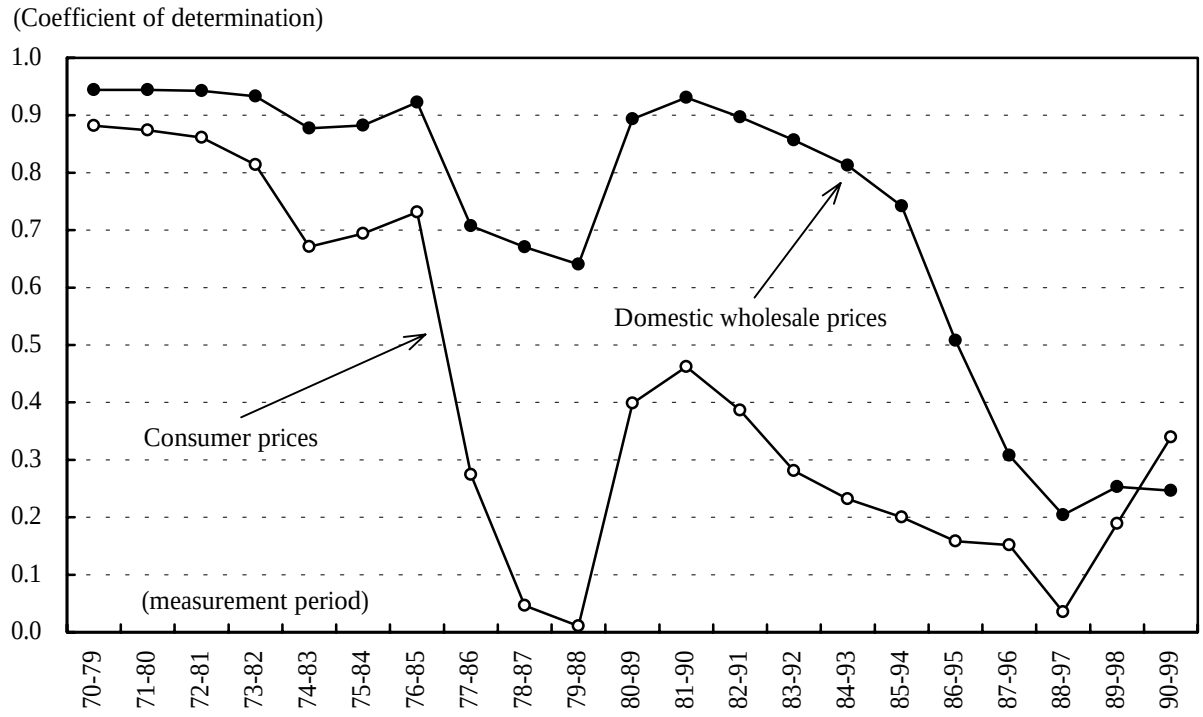
Notes: 1. Personal services, etc. include publications, rent and restaurant. Public services, etc. include electricity, city gas and water supply.
2. Corporate services include lease/rental, transport, communications, real estate rental, bank commission, insurance premium, etc.

Sources: Bank of Japan, "Price Indexes Monthly;" Management and Coordination Agency, "Consumer Price Indexes Monthly."

Figure 1-28 illustrates the impact of the crude oil prices on domestic wholesale and consumer prices. The data represent the result of a regression analysis, in which domestic wholesale prices or the composite consumer index excluding the rent attributable to owned houses is regressed for prices of imported oil. The variables were measured at ten-year intervals and respectively converted into logarithms. The lines indicate the change in the coefficient of determinants when the measurement period is shifted by one year for each year since 1970 (see (Note) 2. in Figure 1-28).

The result suggests that the impact of imported oil prices on wholesale and consumer prices has been declining over the long term. This phenomenon may be partially explained by the reorientation of the Japanese industrial structure toward energy saving and the yen appreciation, as well as by the difficulty in passing oil prices on to the outputs due to greater price competition. The analysis shows that the current rise in crude oil prices has much less impact on prices in general than the rise up to the early 1980s.

Figure 1-28. Relationship between Imported Oil Prices and Domestic Wholesale and Consumer Prices



Notes: 1. The following formula is used for measurements on a quarterly basis.
ln (domestic wholesale prices or composite consumer prices excluding the rent attributed to owned houses) = $\alpha + \beta$ *ln (imported oil prices)
2. Among the oil products including crude oil for which data are available from 1Q/70, imported oil prices represent weighted average of naphtha, heavy oil A and heavy oil C.

Sources: Bank of Japan, "Price Indexes Monthly;" Management and Coordination Agency, "Consumer Price Index Monthly."

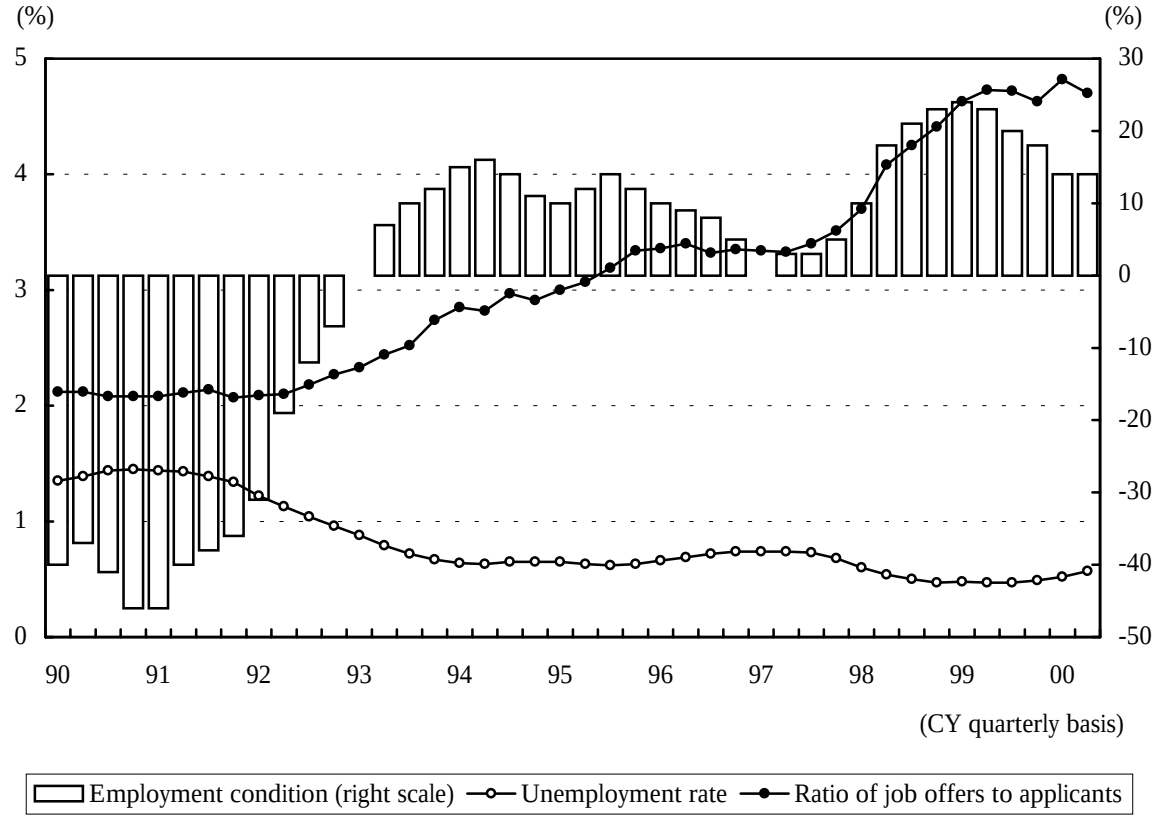
9. Employment Conditions: Harsh Despite Recovery in Job Offers

Figure 1-29 shows the trend of principal macroeconomic employment indicators (the ratio of job offers to applicants, unemployment rate, employment conditions). The ratio of job offers to applicants recovered from a low of 0.46 in June 1999 to 0.59 in June 2000. This slight improvement in the job market is due to the rise in effective job offers since September 1999, (up 0.8% from the previous year in September 1999 and 21.6% in May 2000).

The employment conditions (= "surplus" – "shortage") reported in the Tankan business sentiment survey published by the Bank of Japan still points to excessive employment. The indicator remained at a high level of 14 in the second quarter of 2000, after peaking in the first quarter of 1999 at 24.

Likewise, unemployment rate remains high at 4.7% in June 2000, even though it recovered slightly from a high of 4.9% in February-March 2000. During the previous economic recovery (from 4Q/93 to 1Q/97), the unemployment rate continued to rise at the earlier stage while the ratio of job offers to applicants increased slightly and the employment conditions improved gradually. Although unemployment rate leveled off at the latter stage, it did not show significant improvement. This experience does not bode well for the job market.

Figure 1-29. Long-term Trend of Macroeconomic Employment Indicators

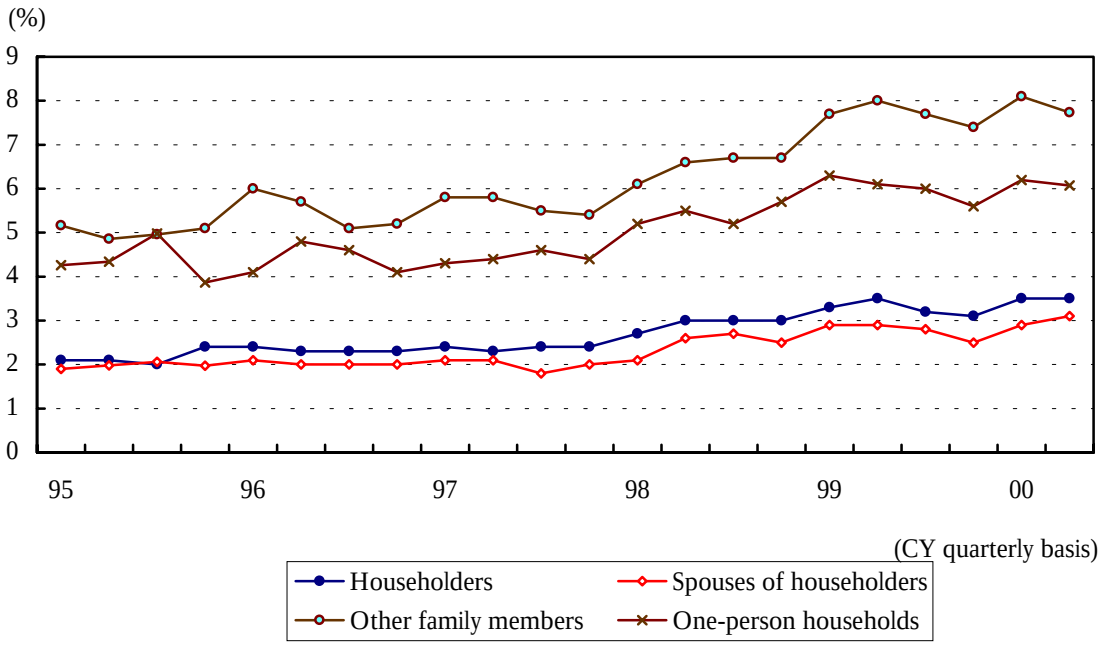


Note: Employment condition = "surplus" – "shortage."
Sources: Management and Coordination Agency, "Labor Force Survey;" Ministry of Labor, "Statistics on Placement Activities;" Bank of Japan, "Tankan."

Figure 1-30 shows the trend of unemployment rate by relationship with the householder. Currently, unemployment rate is at record high levels for householders and their spouses (3.6% and

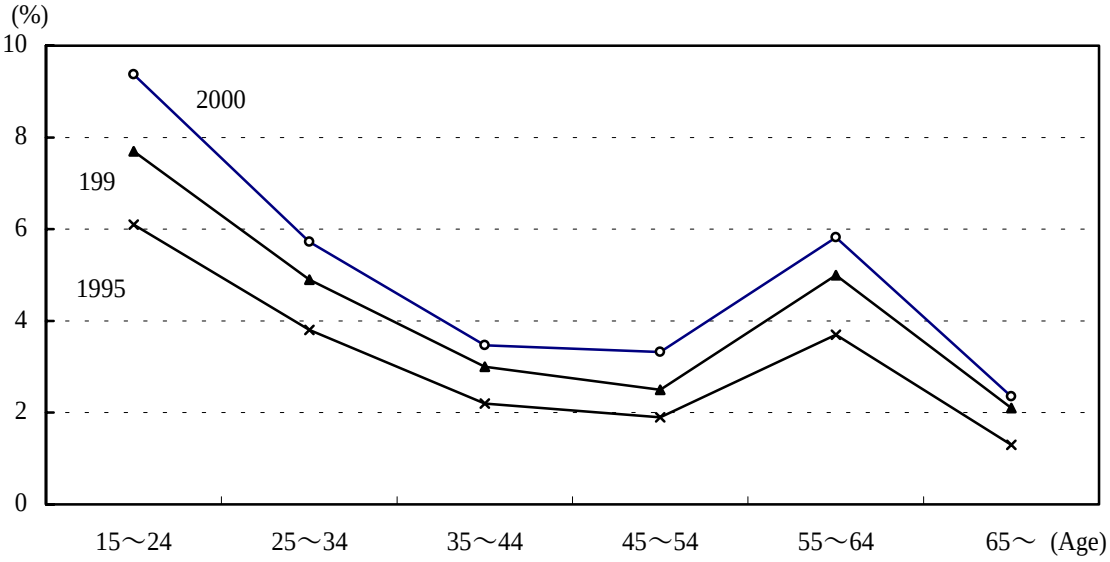
3.3% respectively). The unemployment rate of "other family members" including unemployed new graduates is also high after posting a record high this spring (9.0% in March 2000). By age group, the average unemployment rate in January-June 2000 exceeds last year's level for all age groups. Unemployment rate is particularly high among the younger generation between 15 and 34 years old as well as among the older population between 45 and 64 (Figure 1-31).

Figure 1-30. Unemployment Rate by Relationship with Householder



Source: Management and Coordination Agency, "Labor Force Survey."

Figure 1-31. Unemployment Rate by Age Group



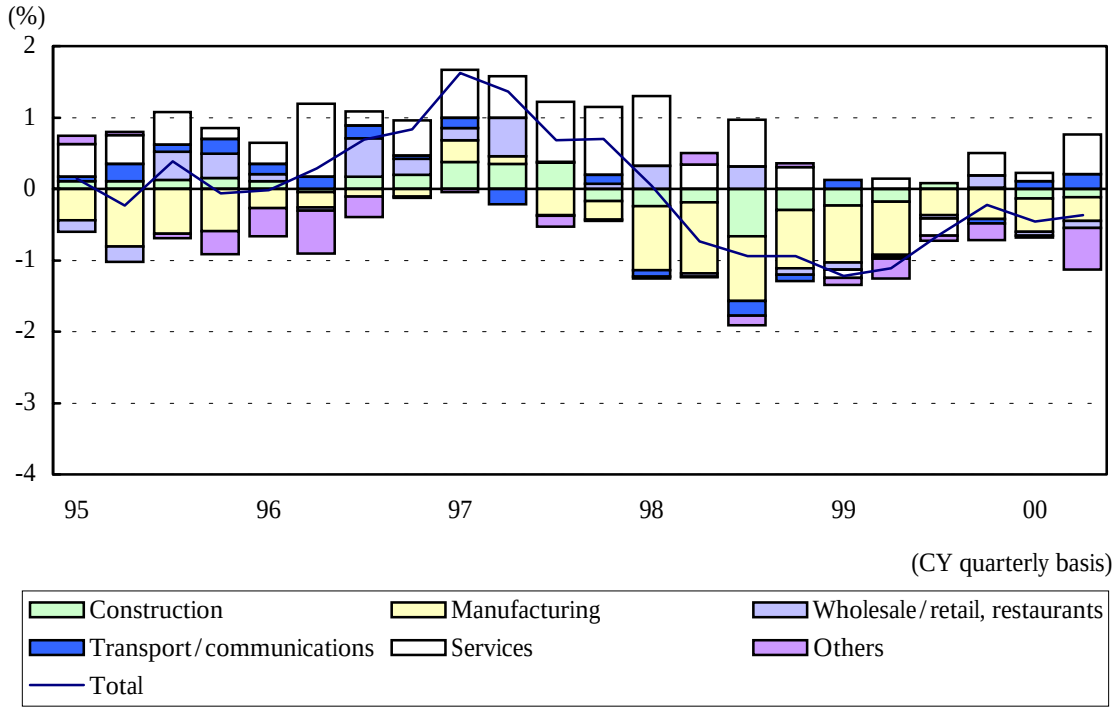
Note: CY average. January-June average for 2000.
Source: Management and Coordination Agency, "Labor Force Survey."

The number employed has stayed below the previous year's level since the second quarter of 1998 (Figure 1-32). Although seasonally adjusted data indicate a recovery from the bottom in March 2000 (at 64.14 million), future prospects are not good for the following three reasons.

First, labor demand is still weak in industries other than services and transport/communications, as the number employed continues to fall in the manufacturing sector and has turned down again in construction, wholesale/retail and restaurants.

Figure 1-32. Number Employed by Industry

(Change on previous year)

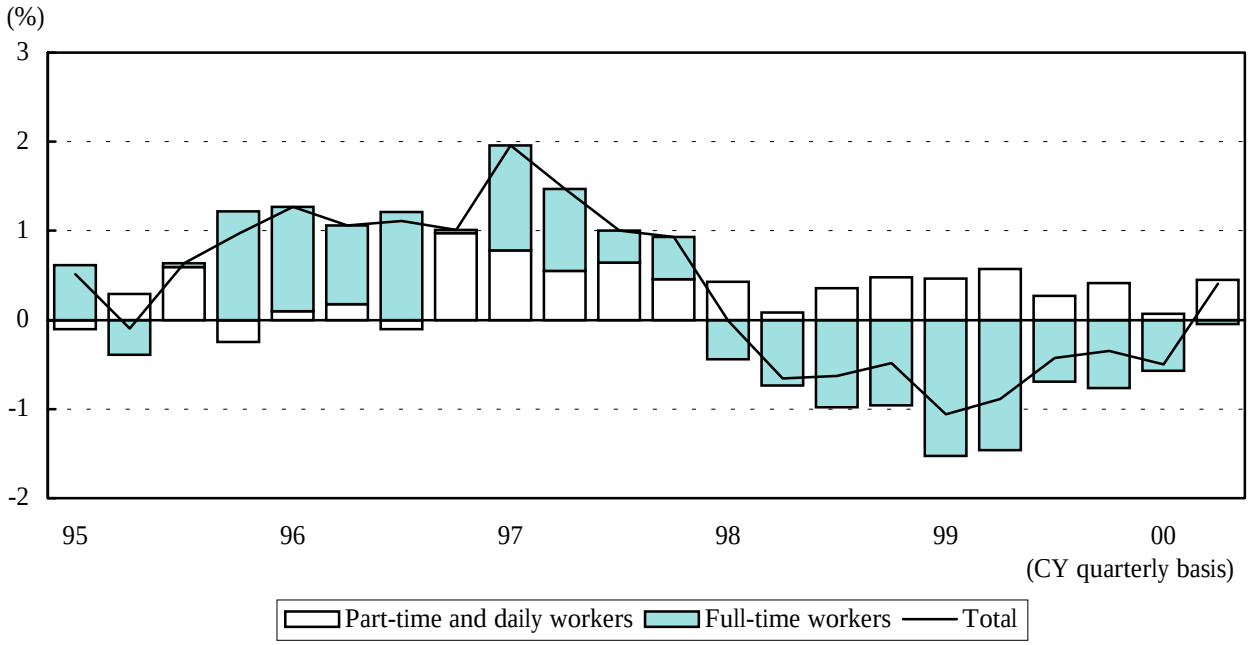


Source: Management and Coordination Agency, "Labor Force Survey."

Second, the increase in labor demand has not led to any increase in regular employment for a considerable period of time. Figure 1-33 shows the change in regular employment and in temporary/daily employment separately. Regular employment has stayed below the previous year's level since the first quarter of 1998. Meanwhile, there has been a constant increase in temporary/daily employment, which represents irregular workers with lower labor cost for employers.

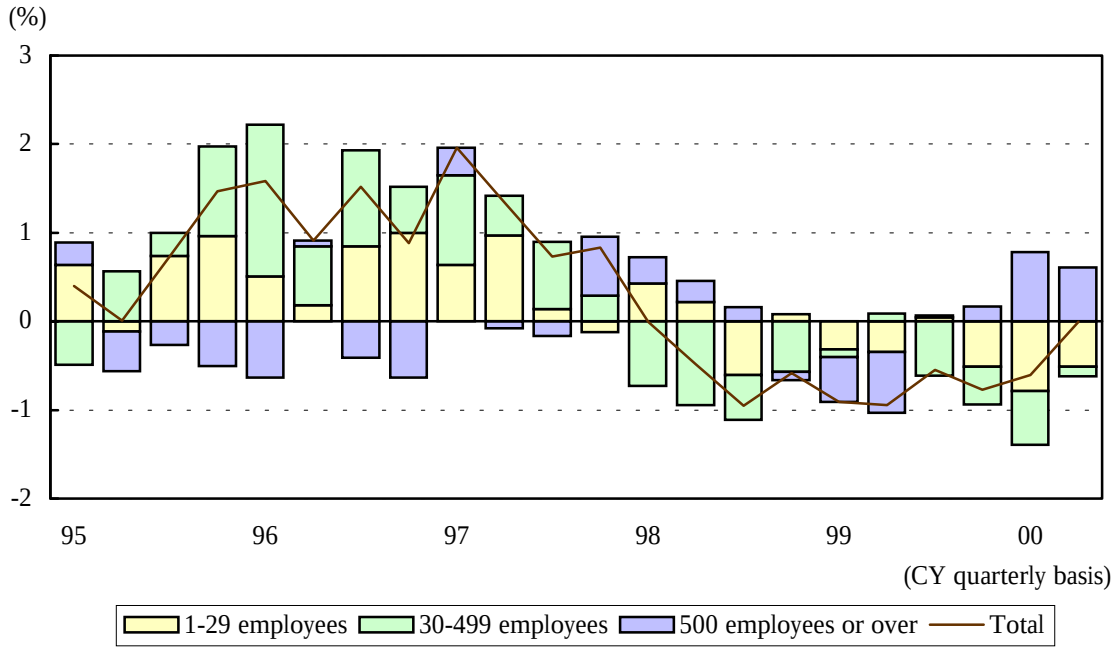
Third, although the reduction of employees in large companies (employing 500 or more workers) has slowed down considerably since the third quarter of 1999, the number employed by small (employing 1-29 workers) and medium-sized (30-499 workers) companies continues to decline (Figure 1-34). Smaller companies have traditionally led employment recoveries, but not for the current economic recovery. Employment may have been adversely affected by the increase in corporate bankruptcies since October 1999, when the effect of the special guarantee scheme for small- and medium-sized enterprises began to faded out.

Figure 1-33. Contribution to Change in Number Employed (Non-agricultural Sector)



Source: Management and Coordination Agency, "Labor Force Survey."

Figure 1-34. Contribution to Change in Number Employed (Non-agricultural sector excluding government)

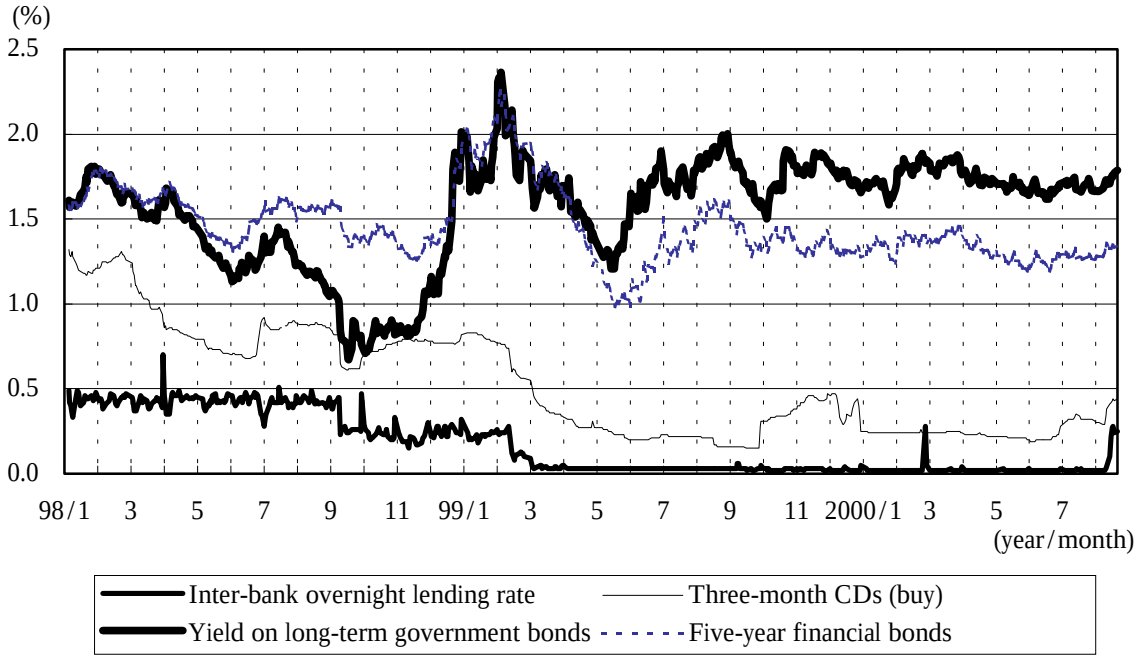


Source: Management and Coordination Agency, "Labor Force Survey."

10. Interest Rates: Stable at Low Levels, Lending: Still Shrinking

The Bank of Japan ceased its zero interest rate policy on August 11, and so inter-bank overnight lending rates (unsecured) have been guided to be around 0.25% since then (Figure 1-35). Yields on three-month CDs have shown a slight increase. Long-term interest rates have made a relatively small movements between 1.5% and 2.0% since June 1999.

Figure 1-35. Trend of Long-term and Short-term Interest rates

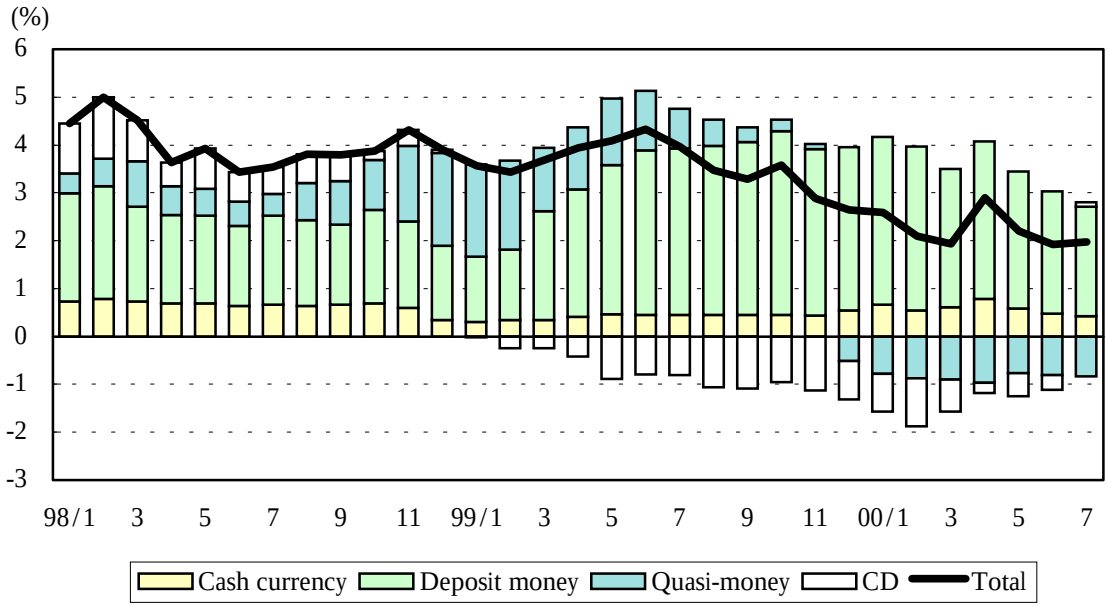


Notes: 1. Five-year financial bonds are represented by Industrial Bank of Japan debentures.
2. Three-month CDs are represented by the quotation (buy) rate on new issues.
Source: Nihon Keizai Shimbun.

Money supply (M2+CD) grew by more than 3.5% from fiscal 1998 to the first half of fiscal 1999, dropped to a low of 1.9% in the latter half of the year, and is now around 2% (Figure 1-36). In detail, there has been a reduction of quasi-money (term deposits, etc.) and CDs, as well as slower growth of deposit currencies, both reflecting the weak lending activity.

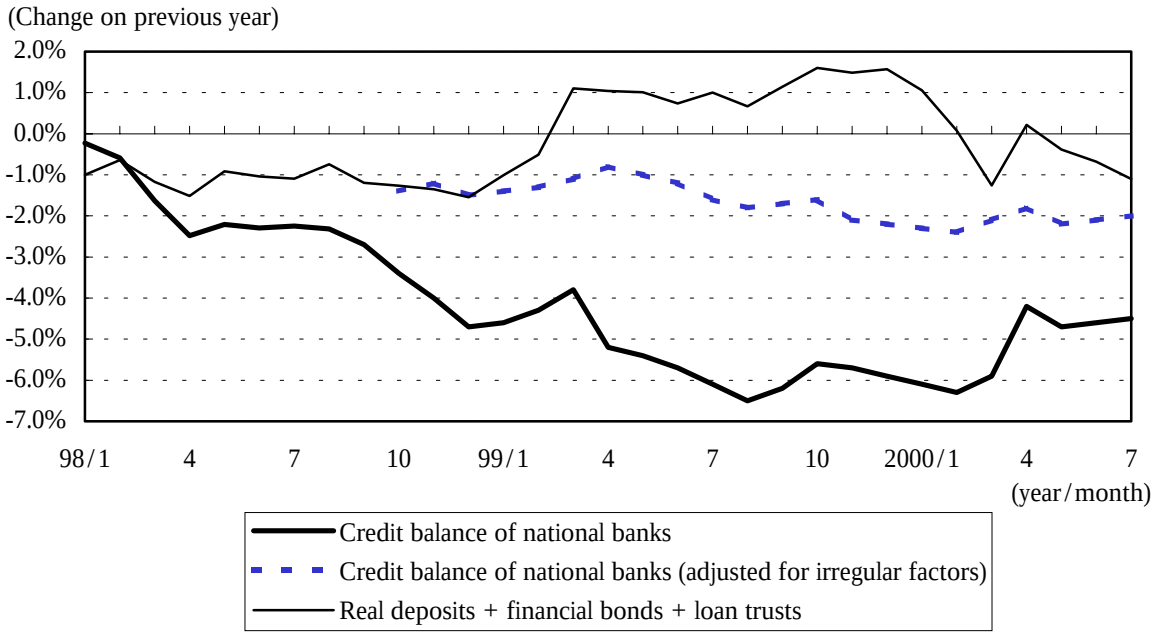
Outstanding bank credits have been dropping since fiscal 1998, falling by over 2%, and fiscal 1999 saw an even faster decline (Figure 1-37). By the end of July 2000, the pace of decline had slowed somewhat to 4.5% on the previous year, but still stood at 2.0% excluding extraordinary factors such as the sales and write-offs of credits, thus indicating no significant changes in the downtrend.

Figure 1-36. Growth of Money Supply



Note: Average balance, change on previous year.
Source: Bank of Japan, "Financial and Economic Statistics Monthly."

Figure 1-37. Credit Balance of National Banks



Note: Real deposits do not include money deposited with long-term trust banks or held in trust.
Source: Bank of Japan, "Trend of Credit Absorption."

II. Information Technology and the Economy

1. Concepts of IT (Hardware) Investment

As the use of the term "information technology (IT)" has expanded rapidly in recent years, various analyses on plant and equipment investment trends now focus on IT investment. The concept of IT investment is confusing in two senses. First, its definition is not necessarily uniform, and second, it encompasses various concepts with different characteristics. Moreover, the definition of IT investment requires two steps: First, the selection of "coordinate axes," i.e. the type of equipment, or the type of industries, or both. Second, the selection of "scope," i.e. what should be considered as IT-related for the selected axis.

In addressing IT investment, the prevailing method of axis selection exclusively concerns the type of equipment (Definition 1). This definition, which is adopted by the NIPA statistics in the U.S. (referred to as "information processing equipment" instead of "information technology"), is convenient for making comparisons between Japan and the U.S.[4] It should be noted, however, that this encompasses the investment in IT user companies to improve productivity, to reduce costs or to expand sales channels, as well as the investment by suppliers of IT-related goods and services, such as the communication equipment purchased by telecommunication companies. The once popular term "information-related investment" primarily referred to the former type of investment and some analyses may well use this concept to focus only on IT users (Definition 2). IT investment can be defined more broadly. This definition adopts both equipment and industries as coordinate axes and considers their combination as IT investment (i.e. includes all investments related to IT in terms of either equipment or industries). According to this definition, the acquisition of semiconductor manufacturing instruments (not included in IT as equipment) by semiconductor manufacturers (industry supplying IT-related goods and services) is typically included in IT investment (Definition 3)[5].

An increase in IT investment may have a different background or impact according to which of the definitions is adopted[6]. Acknowledging such diverse concepts of IT investment, the following sections deal with measurements and fact-finding on this type of investment.

[4] A substantial difference exists between Japan and the U.S. as to the scope of IT equipment, thus requiring adjustments in making comparisons. In the NIPA statistics, a wide range of "OA/FA equipment" and "high-tech equipment" is included in IT equipment, whereas construction and civil engineering facilities for telecommunication are often included in Japan when they are related to IT.

[5] The concept of IT investment cited in newspapers is considered to be similar to this definition.

[6] For example, the narrowest definition 2 explains the increase in IT investment only by the domestic companies, whereas Definition 1 also considers the behavior of Japanese consumers as well as that of foreign companies and consumers. The scope is even wider in the broadest definition 3.

2. Trend of IT Facility (Hardware) Investment

Figure 2-1 focuses on the IT-related items in private fixed capital formation (excluding housing and software; historical price basis) appearing on the Fixed Capital Matrix in the Input-Output Tables for 1995[7]. The types of equipment are shown vertically, and the types of industry horizontally (activity basis).

Figure 2-1. IT Investment in Private Fixed Capital Formation (1995, in ¥ trillion)

Goods \ Industry			IT-supplying industries			IT-user industries	Private sector total	General scope of IT equipment (Note 3)	
			Electronic/communication equipment manufacturer	Communications	Information services			Japan	U.S.
IT-related facility	Equipment	Core: Electronic calculators (Note 4)	0.2	0.2	0.1	5.0d	5.5	○	○
		Core: Telecommunication equipment (Note 4)	0.1	1.7	0.0	1.1e	3.0	○	○
		Gray: Office equipment (Note 5)	0.0	0.0	0.0	1.1	1.2	○	○
		Gray: Applied electronic devices (Note 5)	0.1	0.0	0.0	1.2	1.2		○
		Gray: Other related equipment (Note 5)	0.3	0.1	0.0	2.7	3.0		○
	Construction/civil engineering (telecommunication facilities)		0.0	0.7	0.0	0.0	0.8	○	
(IT-related equipment sub-total)			(0.6)	(2.7)	(0.2)	(11.1)	(14.6)	(10.4)	(13.9)
Non-IT plant and equipment			1.3	1.0	0.2	54.7	57.2		
Private non-housing fixed capital formation total			1.9a	3.7b	0.4c	65.9	71.9		

Plant and equipment investment by the industries supplying IT goods and services (a + b + c)
6.0 (share in gross fixed capital formation excluding housing: 8.4%)
Investment in (core) IT equipment by the IT user industries (d + e)
6.1 (8.5%)

Notes:
1. All values are converted into purchase prices. The sum of each column does not necessarily equal the total due to rounding.
2. Excludes software.
3. General scope of IT equipment is based on the definition most widely used since JDB *Chosa* No.208 for Japan, and on the definition in the NIPA statistics for the U.S. (The correspondence with the Japanese Input-Output Table is based on Ministry of International Trade and Industry, "Analysis of Industrial Activities, Annual Review for 1999."
4. Data for computers represent the sum of main parts and accessory devices. Telecommunication equipment does not include "other telecommunication equipment" (security devices for traffic signals, etc.).
5. Office machines include copying machines and word processors, etc. Applied electronic devices include X-ray apparatuses, applied electronic devices for medical purposes, numerical control devices, etc. Other related equipment includes electrical measuring instruments, analytical equipment, medical instruments, AV equipment, cameras, etc.

Source: 1995 Input-Output Table, Fixed Capital Matrix.

[7] Conceptually, it is similar to plant and equipment investment by private companies in the National Income Statistics.

The broadest definition of IT-related equipment is used here. The types of equipment which are always classified as IT equipment are included in the "core" area, and other types of equipment are placed in the "gray" area (darker gray indicating weaker relationship with IT). As regards the types of industry, the electronic and communication equipment manufacturers in the electrical machinery industry, as well as the telecommunication and information service industries are defined as suppliers of IT goods and services. All other industries are regarded as IT-user industries[8].

According to Definition 1 in the previous section, which exclusively focuses on the types of equipment, IT equipment (hardware) investment in 1995 is estimated to be ¥10.4 trillion based on the broadly-used classifications in Japan (see circles in the Figure), and ¥13.9 trillion based on the classifications in the NIPA statistics (also see circles in the Figure) of the U.S.A. Thus, of the total private fixed capital formation of ¥71.9 trillion, IT investment accounts for 14.5% in the former case, and 19.3% in the latter case (the so-called "IT investment ratio," nominal basis).

In order to distinguish between investments with different characteristics, plant and equipment investment (regardless of the types of equipment) by the suppliers of IT-related goods and services was calculated separately from the IT equipment investment (core area) in the IT-user industries. The latter approximately corresponds to the Definition 2 in the previous section, or the concept of "information investment" used in the past (excluding that part attributable to the IT-supplying industries)[9]. The plant and equipment investment in the IT-supplying industries amounted to ¥6.0 trillion in 1995, while the amount of "information investment" in the IT-user industries stood at ¥6.1 trillion. The sum of ¥12.1 trillion corresponds to the broadest concept (Definition 3 in the previous section).

Again based on the concept of Definition 1, Figure 2-2 shows the share of each industry in the ¥8.5 trillion invested in core IT equipment by both the IT-user and IT-supplying industries in 1995. The result indicates that leasing services account for almost 40% of the total amount, attesting to the advancement of the rental and leasing of IT equipment[10]. Excluding the IT-supplying industries, the finance/insurance industry is the most active buyer of IT equipment. Figure 2-3 indicates the share of core IT equipment in total plant and equipment investment by industry as of 1995. In addition to the leasing service and IT-supplying industries, substantial shares exist in broadcasting and finance/insurance.

Although IT investment has drawn people's attention by its rapid growth, it is also important to follow the chronological developments in view of the diverse concepts of IT investment and observe them closely.

[8] As IT users include leasing services, the equipment rented or leased from leasing services to IT suppliers is credited to user industries.

[9] If the analysis focused on the amount of "information investment," more detailed calculations should be conducted by regarding as user investments the purchase of computers and communication equipment by the electronic/communication equipment manufacturers as well as the purchase of electronic calculators by the telecommunication industry, for example.

[10] Leasing services only account for about 10% of gross fixed capital formation.

Figure 2-2. Industries with Large Share in Private IT Equipment Investment (1995)

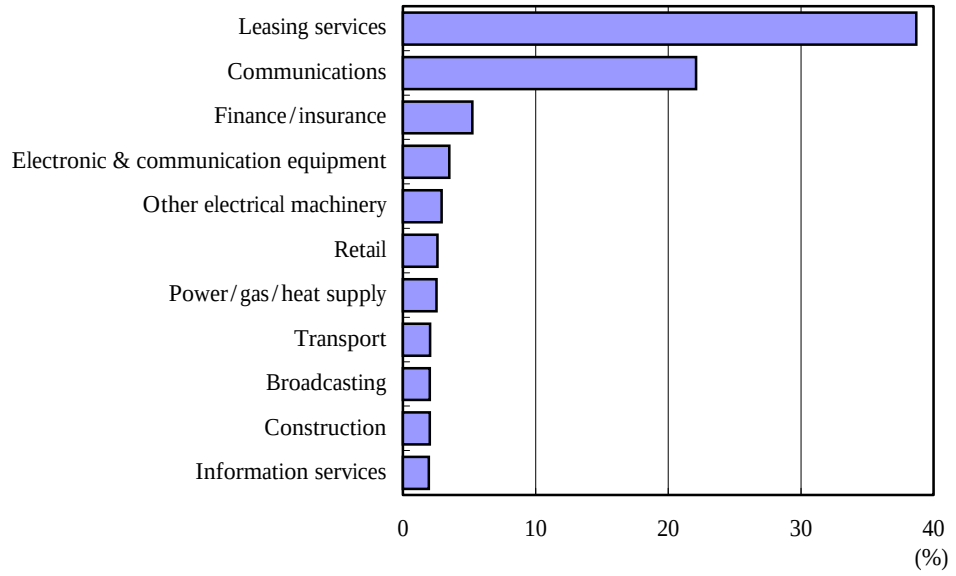
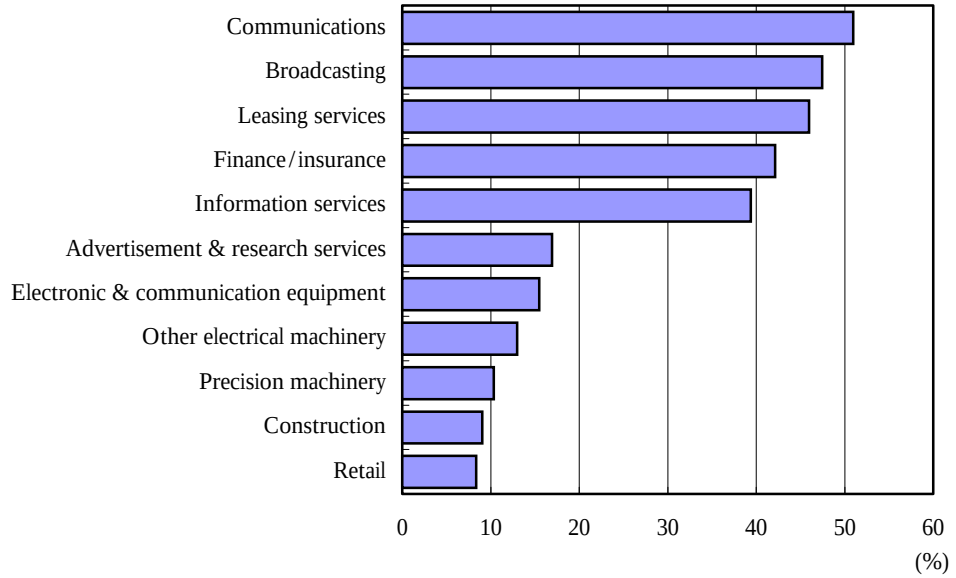


Figure 2-3. Industries with High IT Equipment Investment Ratios (1995)



Notes:
1. Purchase prices.
2. Excludes software.
3. Industrial shares represent percentages of total private investment in (core) IT equipment in all industries including IT suppliers (¥8.5 trillion).
4. "Other electrical machinery" refers to electrical machinery excluding electronic and communication equipment.

Source: 1995 Input-Output Tables, Fixed Capital Matrix.

Figure 2-4a estimates the trend of core IT equipment investment since 1990 according to Definition 1[11], and compares it with the trend of plant and equipment investment on a GDP basis (both indices on a nominal basis, 1995=100). As in the case of plant and equipment investment in general, IT equipment investment has moved in parallel with the business cycle, but has also shown a constant upward trend. Indeed, the index stands at 96 for total plant and equipment investment as of 1999, while it amounts to 117 for IT investment, attesting to its increased weight. A closer look at the cyclical movement indicates that IT investment led the recovery of overall plant and equipment investment in 1994, at the initial stage of the previous economic recovery. This was also the case in 1999, when the economy last hit the bottom. Influenced by the New Economy argument in the U.S., many emphasize the current increase in IT equipment investment, asserting that it suggests some sort of structural change. However, the above observation confirms that a significant growth of IT investment during an economic recovery is not a new phenomenon in itself. Figure 2-4b estimates the trend of real IT equipment investment using WPI by product (1995=100). The index rose to a high of 158 in 1999 (106 for the whole plant and equipment investment[12]), suggesting that the decline in prices of IT-related equipment is closely related with the growth of real IT equipment investment and the IT investment ratio. In conducting positive analysis or in interpreting the result of the analysis on the economic implications of IT, such as the impact of IT investment on productivity, data should be examined thoroughly, noting that the rapid price reduction results in a considerable divergence between nominal and real values.

[11] The Figure uses the series of shipment values for domestic capital goods calculated as the production/shipments by product appearing in the Industrial Statistics Table adjusted for export/import and consumer durables, such as PCs and cellular phones.

[12] The series of real IT equipment investment is estimated using WPI with 1995 as base year, while total plant and equipment investment represents the real series of 1990 prices according to the National Income Statistics. Therefore, a precise comparison between the two series is not possible.

Figure 2-4. Trend of IT Equipment Investment (1995=100)

Figure 2-4a. Nominal value

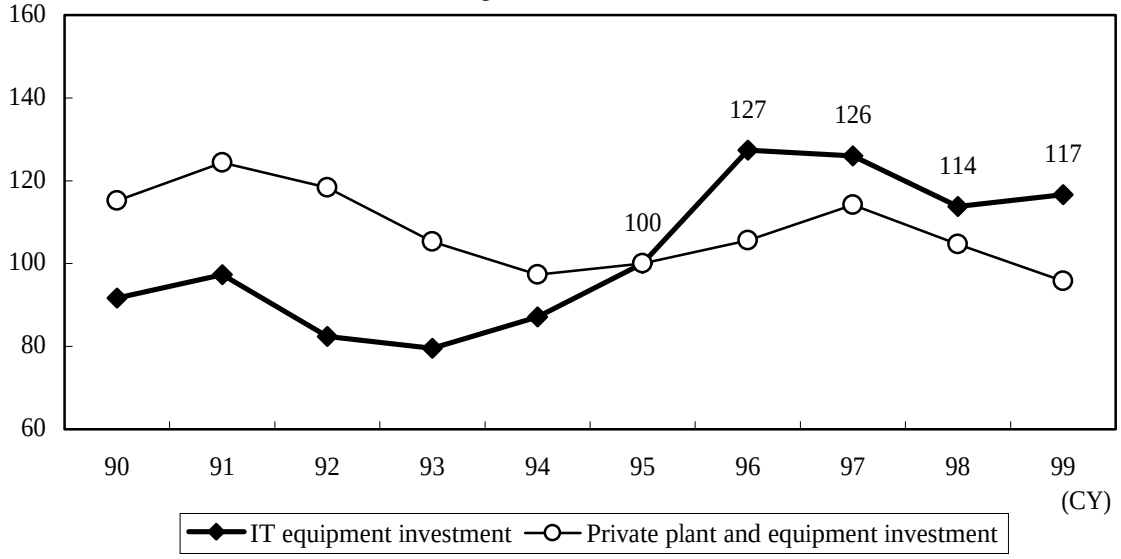
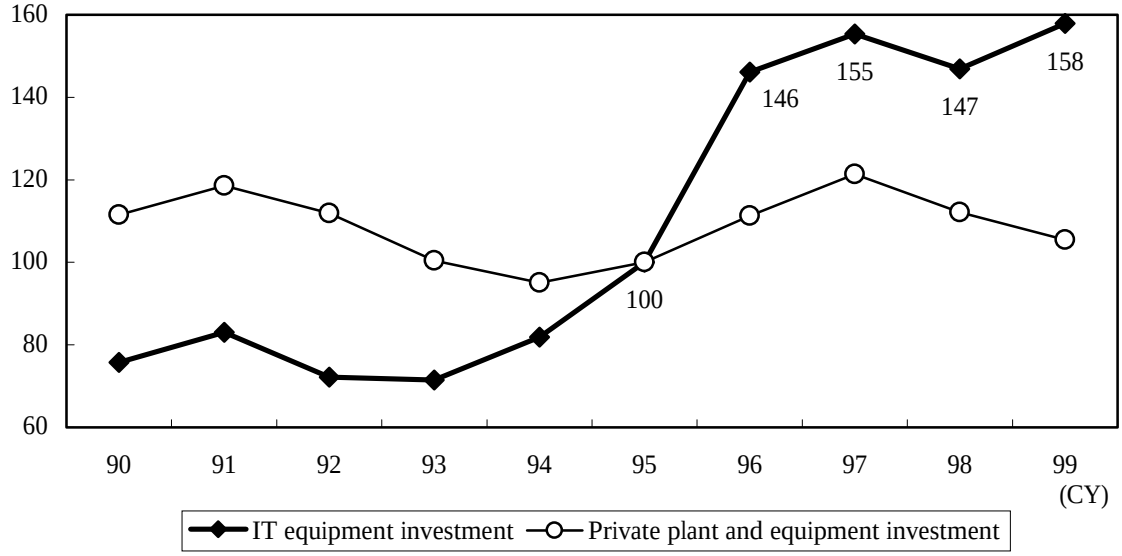


Figure 2-4b. Real value

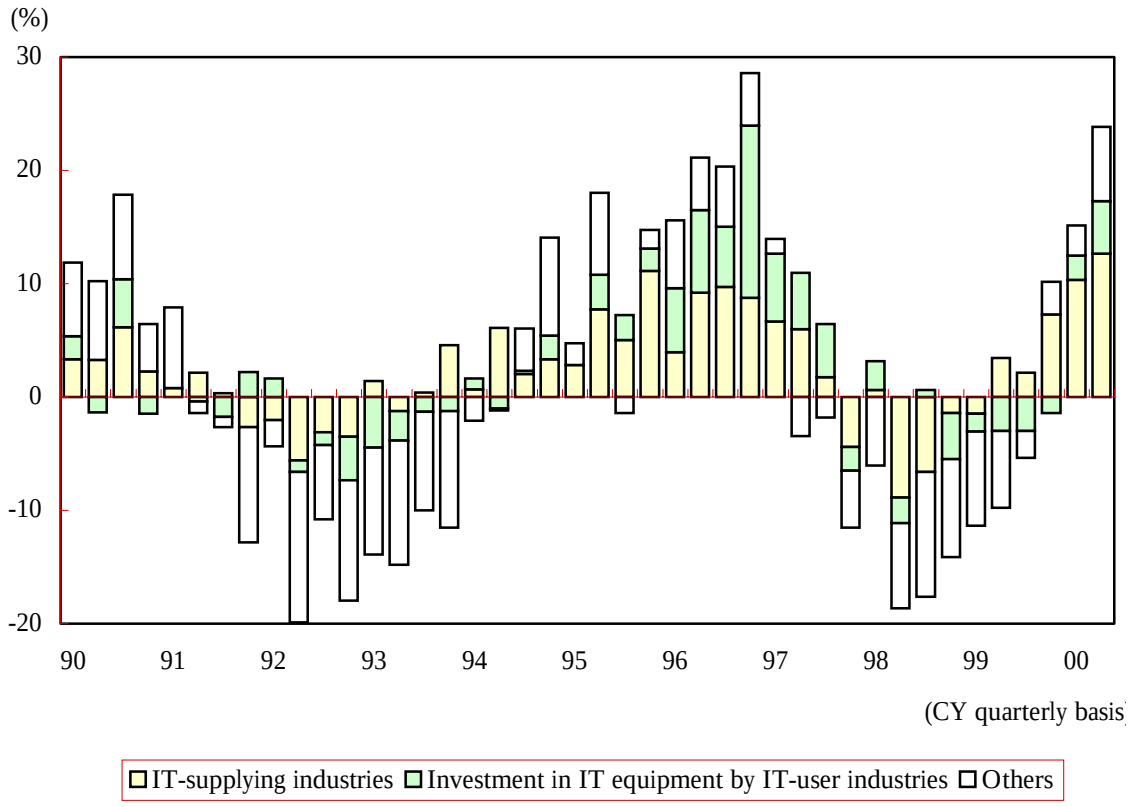


Notes:
1. As in the previous page, IT equipment is limited to core equipment. The index represents the trend of shipments for domestic capital goods calculated by DBJ. Real values are calculated using domestic wholesale price index (1995 as base year) for individual products.
2. Private plant and equipment investment is taken from Economic Planning Agency, "National Income Statistics." Real values represent 1990 prices.

Sources: Ministry of International Trade and Industry, "Census of Manufacturers," "Yearbook of Machinery Statistics," "Directory of Industrial Indices;" Electronic Industries Association of Japan, "Trend of Electronic Industries;" Bank of Japan, "Price Indexes Monthly;" Economic Planning Agency, "National Income Statistics."

Let us examine the impact of IT investment separately for the IT-supplying industries (regardless of the type of equipment) and for the IT-user industries (investment in IT equipment). Figure 2-5 breaks down the contribution by both industries to year on year change in real machinery orders. It indicates that during the previous phase of economic expansion, IT equipment investment by the user industries made substantial contributions in 1996 and 1997, possibly prolonging the expansion of total plant and equipment investment through the ripple effect on the IT-supplying industries. In the current phase of recovery, total investment is solely led by the IT-supplying industries, with little contribution coming from users. Although the current increase in investment in the IT-supplying industries is often discussed in conjunction with the advancement of IT in the corporate sector in general, at least for the moment it is largely attributable to the growth of consumer and foreign demand for IT equipment and services.

Figure 2-5. Contribution of IT to Year-on-Year Change in Real Machinery Orders



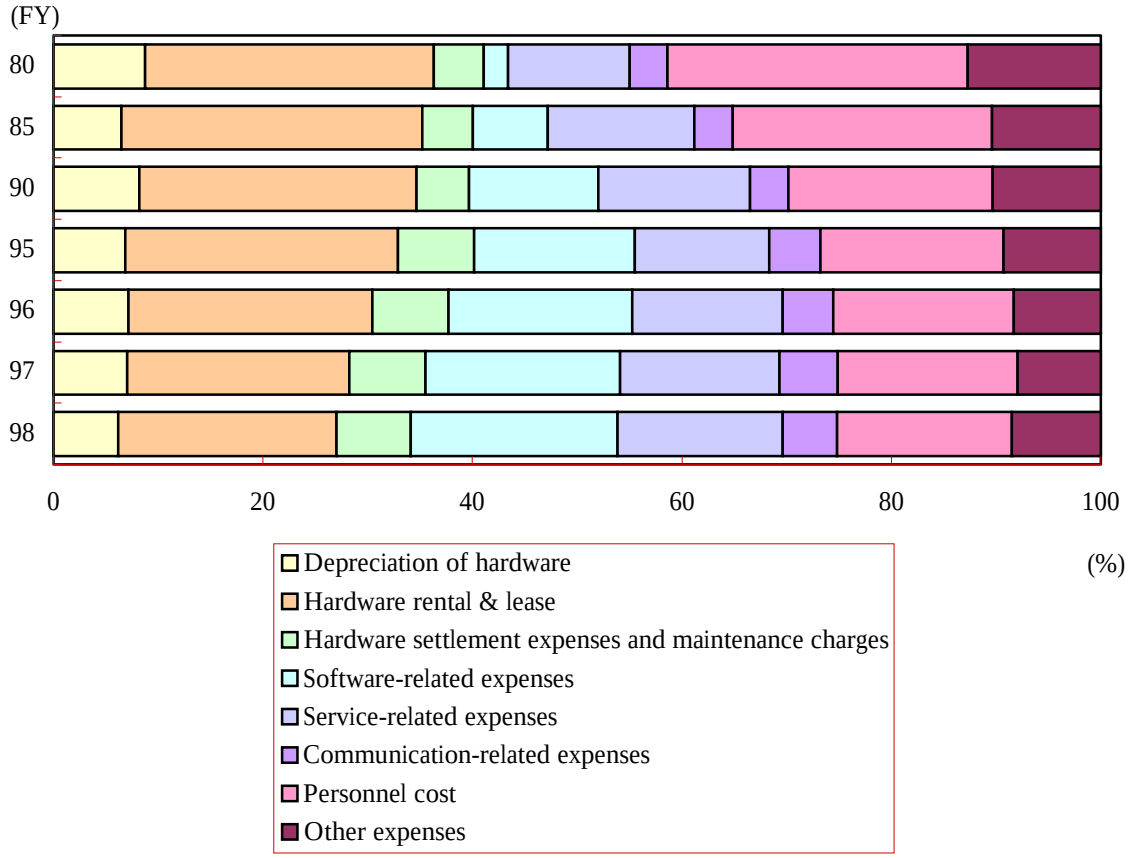
Notes: 1. Civil demand excluding ships and electricity.
2. IT investment by IT-supplying industries refers to orders received from the electrical machinery, communication and information service industries. IT investment by IT-user industries refers to orders for computers and communication equipment received from industries other than IT-supplying industries. Machinery orders do not include most of PCs (except when they are purchased as system terminals), but include cellular phones including for personal use. Orders received through the leasing industry are allocated to final user industries but attributed to the leasing industry (included in other non-manufacturing industries) when the final user cannot be identified.

Sources: Economic Planning Agency, “Machinery Orders Statistics;” Bank of Japan, “Price Indexes Monthly.”

3. Trend of Software Investment

Based on a questionnaire survey by the Ministry of International Trade and Industry, Figure 2-6 shows the composition of corporate expenses related to data processing. Since the 1980s, the shares of hardware-related and personnel expenses have declined almost continuously, while those of software, service and communication-related expenses have risen. This movement implies that companies have shifted their emphasis over the years to software, outsourcing and networking.

Figure 2-6. Composition of Corporate Expenses Related to Data Processing



Notes:
1. The sampling method was substantially revised in the fiscal 1996 survey conducted in 1995, which makes a break from the previous data.
2. Software-related expenses represent the total of software user charges, software purchasing cost and software production charges.
3. Service-related expenses include data production/input charges, online service charges, external personnel cost, etc.
4. Other expenses include rent for computer rooms, shared expenses, depreciation, repair charges, electric fees, cost of office supplies, etc.

Source: Ministry of International Trade and Industry, “Survey on Data Processing”.

In the current system of national accounts (68SNA), software is treated as intermediate consumption except when it is pre-installed in hardware (Figure 2-7). As the importance of software in information technology has increased, however, the new system of national accounts (93SNA)[13] would recognize as an intangible fixed asset any software that will be used for one year or longer, and that the purchase of such software would be treated as plant and equipment investment. Although software for general use (package software) and in-house software will still be treated as intermediate consumption in Japan due to the lack of basic statistics, ordered software will be accounted for as fixed capital formation in response to 93SNA. As a result, GDP as well as private plant and equipment investment will be pushed up by the corresponding amount[14]. According to the 1995 Input-Output Table, which already incorporated this idea, investment in ordered software amounted to ¥3.2 trillion, which is equivalent to 4.4% of total plant and equipment investment in 1995 excluding software. By tracing the estimation method used in the Input-Output Table as far as possible,[15] software investment increased steadily from ¥2.5 trillion in 1990 to ¥4.6 trillion in 1998 in value, and from 3.0% to 6.1% as a percentage of total plant and equipment investment (Figure 2-8a).

Figure 2-7. Treatment of Software Investment in National Income Statistics

		Current system (based on 68SNA)	New system (based on 93SNA)
Pre-installed in hardware		Treated as fixed capital formation with mainframes	Treated as fixed capital formation with mainframes
Other software	Ordered	Intermediate consumption	Treated as (intangible) fixed capital formation
	General use	Intermediate consumption	Intermediate consumption
	In-house	Intermediate consumption	Intermediate consumption

The concept of 93SNA was already introduced in the Input-Output Table for fiscal 1995 (May 1999). It will be introduced in the National Income Statistics by the end of October 2000 to coincide with the transition to the 1995 standard.
Sources: Economic Planning Agency, "The Recent Opinions on Japan's GDP Figures and Our Approach," etc.

[13] The current system of national accounts (SNA) in Japan is based on the standard recommended by the United Nations in 1968 (68SNA). Since the adoption of its revised version in 1993 (93SNA) in light of subsequent changes in economic environment, countries have been developing new SNAs to incorporate the new standard. (Although the U.S. has its own system apart from SNA, software has been included in fixed capital formation since October 1999.) In Japan, the new national accounts based on 93SNA will be published by the end of October 2000 to coincide with the transition to the 1995 standard. However, the shift to 93SNA has already been made in the Input-Output Table for 1995 published in May 1999.

[14] In the NIPA statistics of U.S.A., all software is treated as fixed capital formation including general-use and in-house software.

[15] Software investment is estimated on the basis of ordered software sales in the Survey on the Condition of Specified Service Industries. Adjustments are made for the discontinuities due to the revision of the population with reference to the Statistics of Business Establishments and the Survey on Service Industries.

Although very few statistics are available for in-house software, a rough estimate can be made from the number of data-processing technicians according to the 1995 Census. Suppose that the technicians belonging to the software and data-processing industries are involved in the production of ordered software, and that the technicians employed in other private sector industries are involved in the production of in-house software. The latter workers account for just under 60% of the former workers (Figure 2-8b). If the productivity of the two groups of technicians is the same, investment in in-house software amounts to almost ¥2 trillion (¥3.2 trillion × 60%).

Figure 2-8. Software Investment (¥ trillion)

Figure 2-8a

	1990	1995	1998
Software investment (a)	2.5	3.2	4.6
Private plant and equipment investment (b)	83.1	72.1	75.5
a/b (%)	3.0	4.4	6.1

Figure 2-8b

Number of data-processing technicians employed (1995 Census, in 10,000 persons)	
Software and data-processing service industries (c)	37.8
Other private sector (d)	22.3
d/c (%)	59.0

Note: Software investment in 1995 is according to the 1995 Input-Output Tables, Fixed Capital Matrix. Data for 1990 and 1998 are estimates according to Management and Coordination Agency, "Establishment and Enterprise Census," "Survey on Service Industries;" Ministry of International Trade and Industry, "Survey of Selected Service Industries." Private plant and equipment investment is based on the National Income Statistics and does not include software investment.

Finally, Figure 2-9 shows the shares of individual industries in the total software investment of ¥3.2 million in 1995. Finance/insurance has the greatest share with over 20%, and excluding the IT-supplying industries, non-manufacturing industries such as power/gas/heat supply, advertisement/research services and transport followed. Figure 2-10 indicates that the share of software investment in total plant and equipment investment by industry as of 1995 is also highest in the finance/insurance industry when the IT-supplying industries are excluded.

Figure 2-9. Industries with Large Share in Private Software Investment (1995)

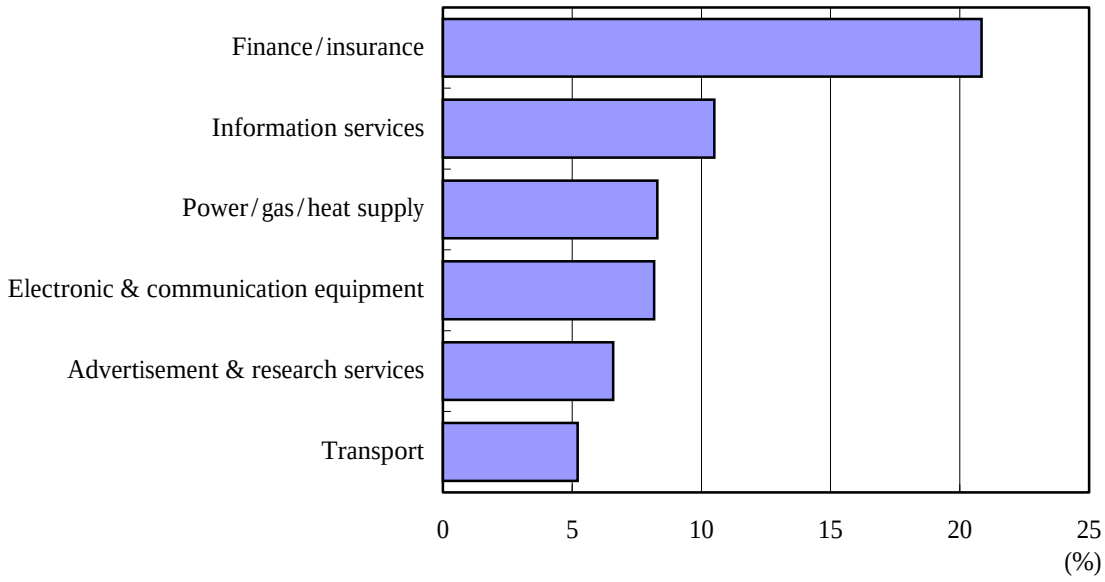
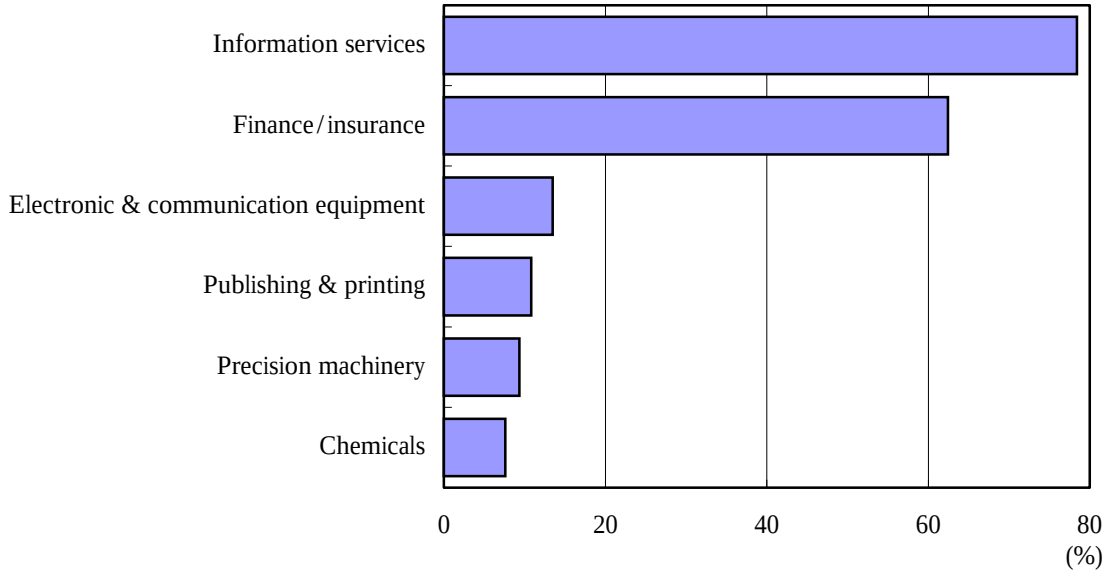


Figure 2-10. Industries with High Software Investment Ratios (1995)

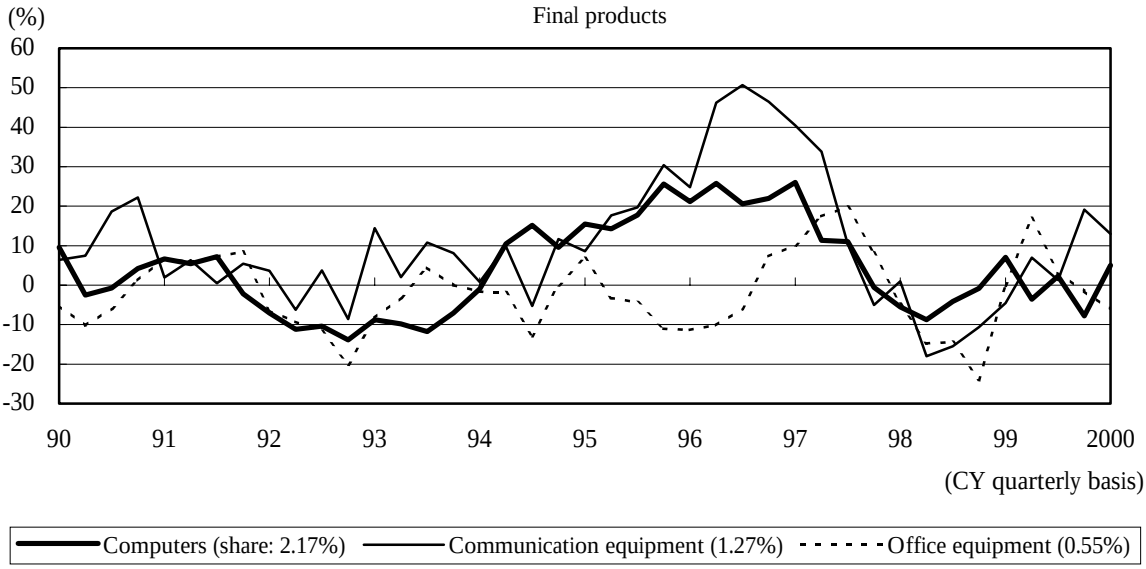


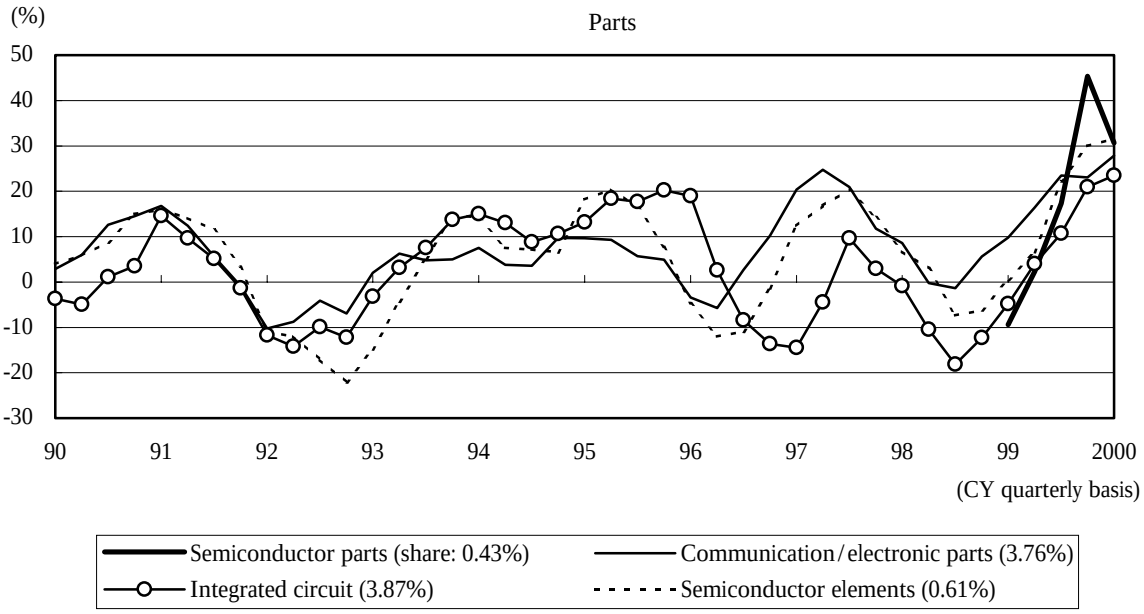
Note: Figure 2-9 represents percentages of the private sector total. Software investment ratio represents a percentage of gross fixed capital formation (which does not include software investment) excluding residential investment in each industry.
Source: 1995 Input-Output Table, Fixed Capital Matrix.

4. IT-related Production and Services

In the industrial sector, the production of computers, communication machines and office equipment, which are closely related to IT (total share of 4.0% in industrial production as of 1995), has only managed to edge up due to the stagnant growth of mainframes and communication facilities (Figure 2-11). This contrasts strongly with the substantial growth of PC and cellular phone production. IT-related production is now led by parts including those for IT-related equipment (total share of 8.7%), with a rapid growth since fiscal 1999.

Figure 2-11. IT Production in Industrial Production



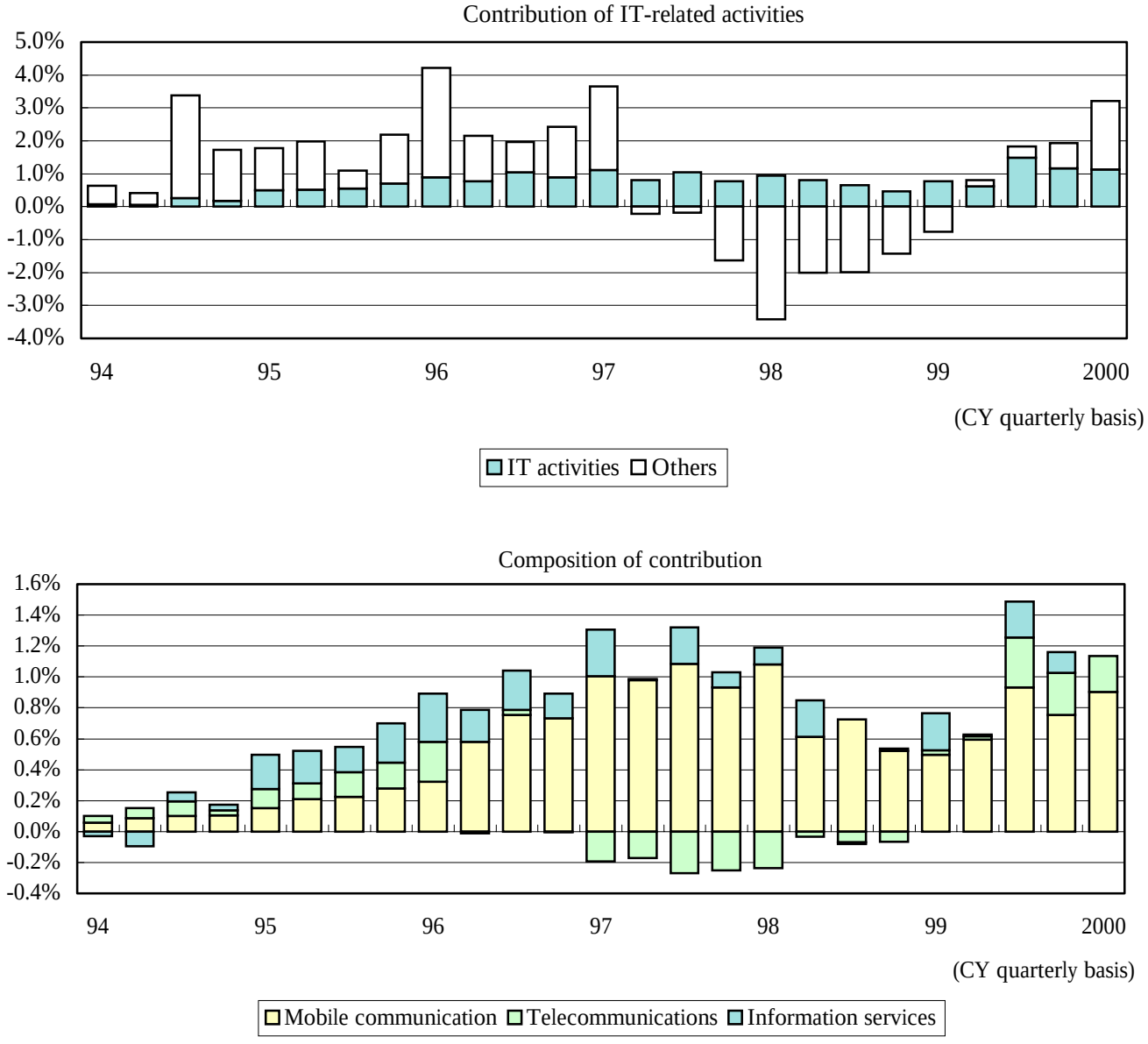


Note: Change on previous year. Shares represent percentages of index (1995 as base year).
Source: Ministry of International Trade and Industry, "Industrial Production Index."

In the commerce/service sector, the share of IT business activities account for about 5%, including mobile communication and other telecommunication and information services (1995 as base year). While business activities other than IT have largely followed the business cycle, IT business activities have continuously made substantial positive contributions (Figure 2-12). Such contributions have mostly come from the rapid growth of mobile communication, although the expansion of information services has also played a role. Telecommunications other than mobile communication show a cyclical movement.

Figure 2-12. IT-related Activities in the Commercial/Service Sector

(Change on previous year)



Note: IT-related activities include mobile communication, domestic telecommunications (excluding mobile communication), international telecommunications and information services.

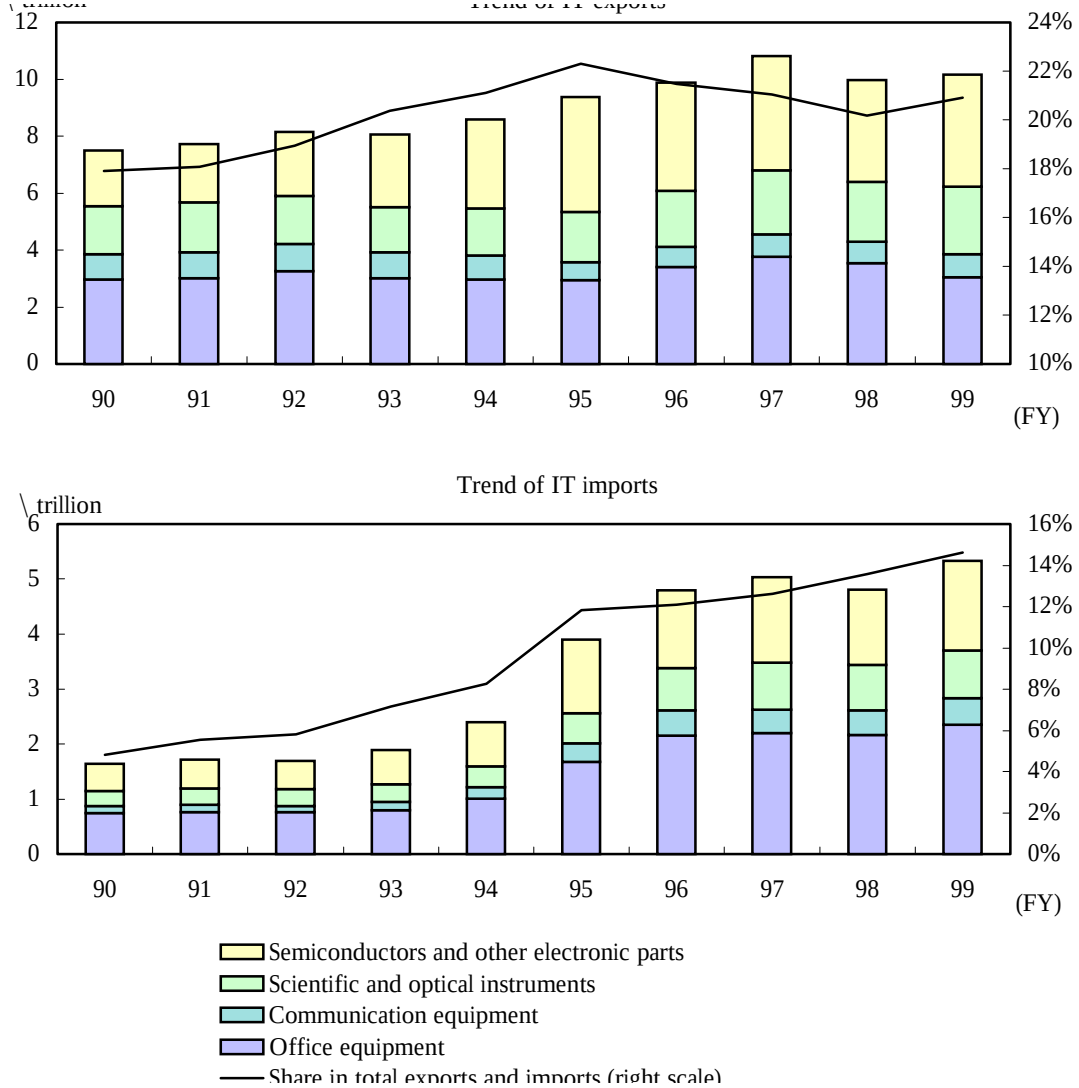
Source: Ministry of International Trade and Industry, "Tertiary Industry Activity Index."

5. Trend of Trade in IT-related Goods and Services

The trend of exports and imports of IT-related goods[16] is shown in Figure 2-13. Exports peaked in fiscal 1997 and have since leveled off. The share of IT-related goods in total exports has also leveled off and was 20.9% for fiscal 1999.

Imports are still increasing after growing substantially in fiscal 1995. The share of IT-related goods in total imports also rose from only 4.8% in fiscal 1990 to 14.6% in fiscal 1999. The increase has been led by office equipment.

Figure 2-13. Trend of IT-related Exports and Imports



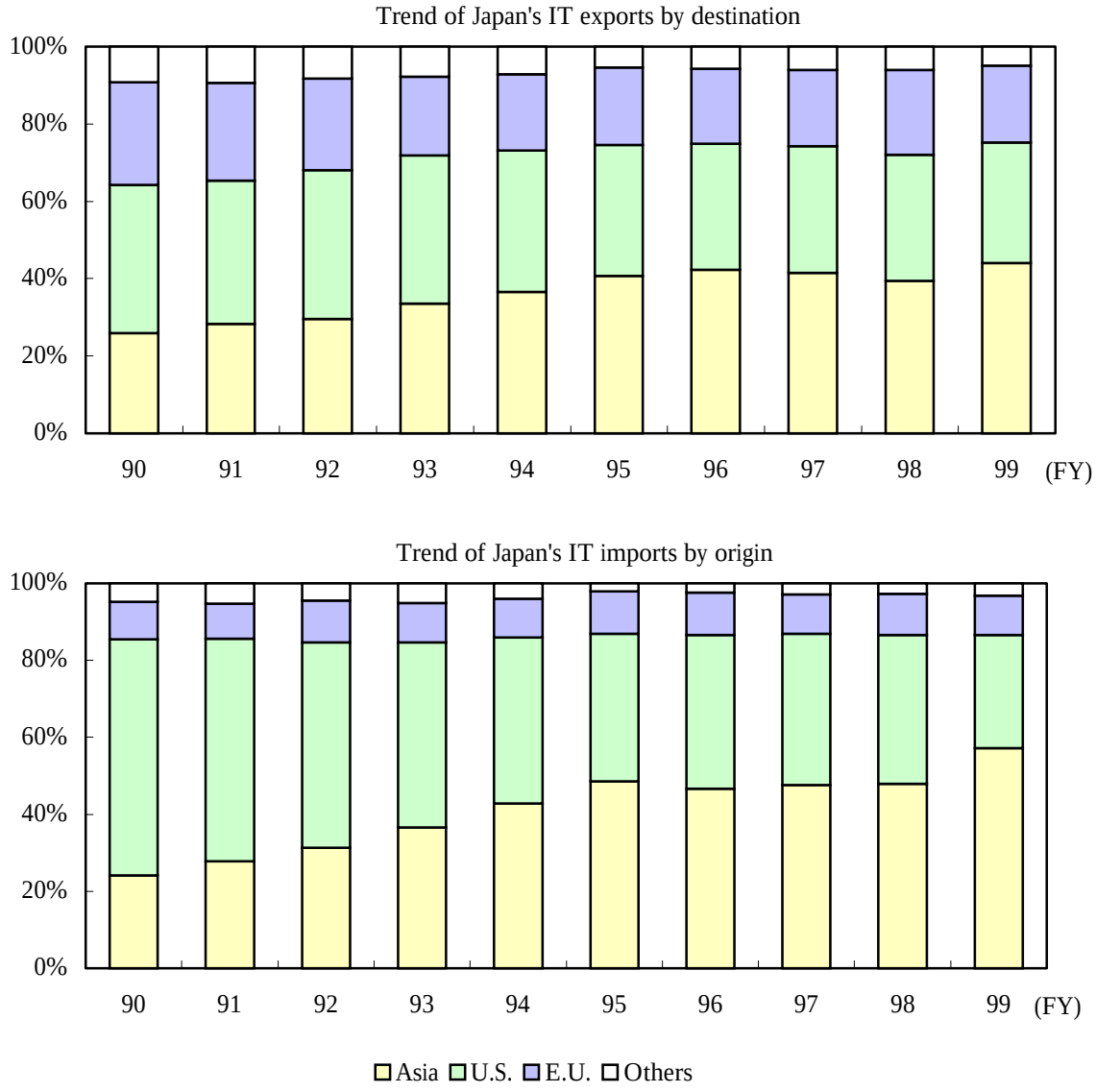
Source: Japan Tariff Association, "Summary Report on Trade of Japan."

Figure 2-14 shows the regional composition of IT-related trade partners of Japan. The share of Asia has been increasing in both exports and imports, surpassing the shares of both the U.S.

[16] For the purpose of this section, "IT-related" goods are defined as office equipment (including PCs), communication equipment, scientific and optical equipment (including LC devices and semiconductor production devices) and semiconductors and other electronic parts according to the product classifications in the Japan Tariff Association, "Summary Report on Trade of Japan."

and the EU. In particular, Asia's share in IT-related imports rose significantly from 24.1% in fiscal 1990 to 57.2% in fiscal 1999. This implies that the international division of labor has progressed through the transfer of production facilities from Japan and the U.S.

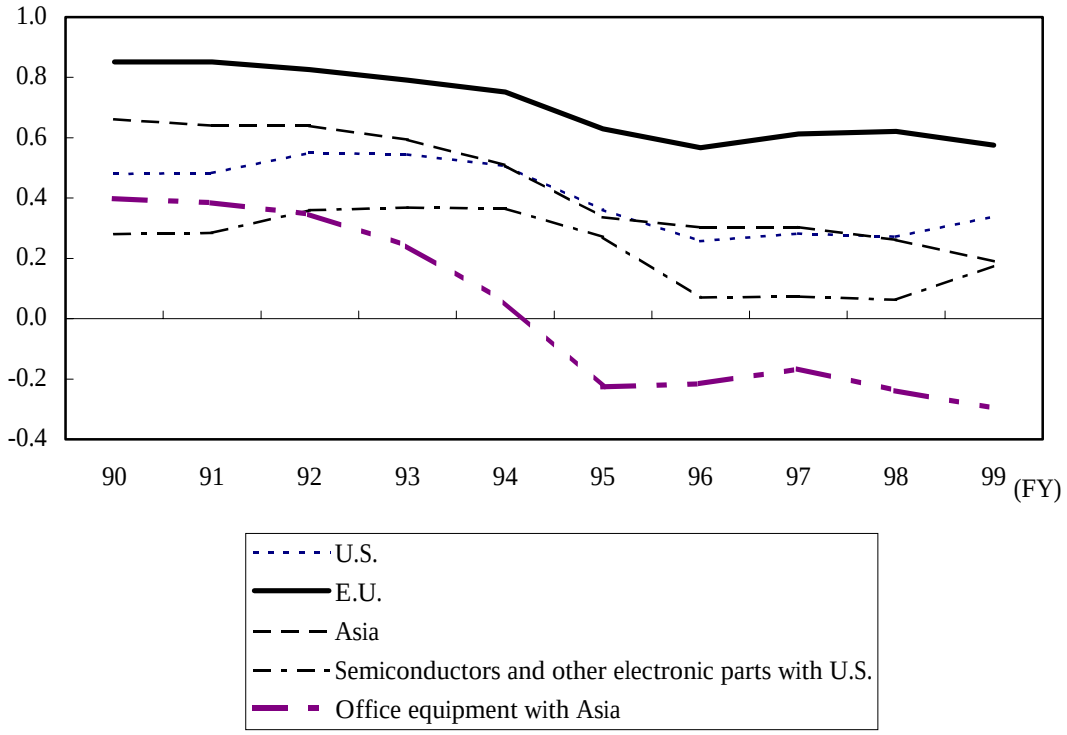
Figure 2-14. IT-related Imports and Exports by Region



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

Figure 2-15 examines the progress in international division of labor concerning IT-related goods, using the trade specialization coefficient (= (exports – imports) / (exports + imports)). The progress can be observed from the downtrend of the coefficient with all trading partners (U.S., EU and Asia). In particular, the drop has been substantial in trade with Asia, which is fast becoming a major exporter of IT-related goods to Japan. As far as office equipment is concerned, Japan's trade specialization coefficient with Asia fell below zero in fiscal 1995, indicating a trade deficit. Also, the coefficient is low in trade with the U.S. for semiconductors and other electronic parts, showing that Japan is highly dependent on the U.S. for certain IT parts.

Figure 2-15. Trend of IT Trade Specialization Coefficient



Note: Trade specialization coefficient = (exports – imports) / (exports + imports). The coefficient equals 1 with exports only and –1 with imports only.
Source: Japan Tariff Association, "Summary Report on Trade of Japan."

The composition of service trade is shown in Figures 2-16 and 2-17. Transport and travel account for the majority of the Japanese trade in services. The small shares of communications and information indicate that the trade in IT services does not have much impact on service trade as a whole.

Figure 2-16. Service Exports from Japan (1999)

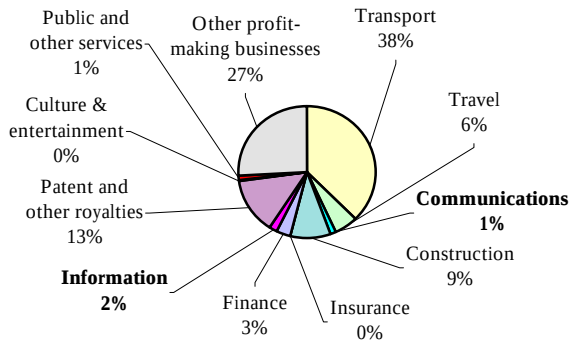
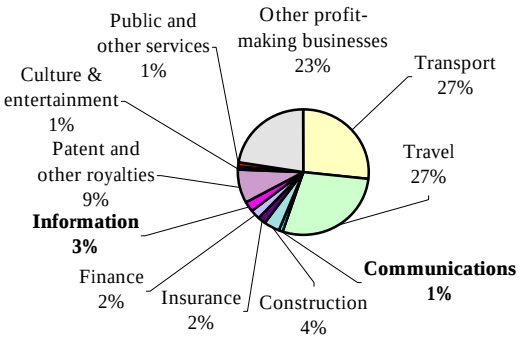


Figure 2-17. Service Imports to Japan



Japan has trade deficits in both communications and information (Figures 2-18 and 2-19).

Figure 2-18. Communications

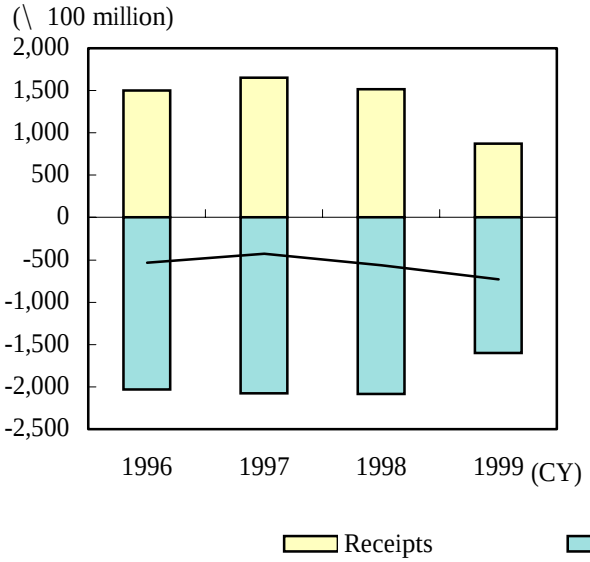
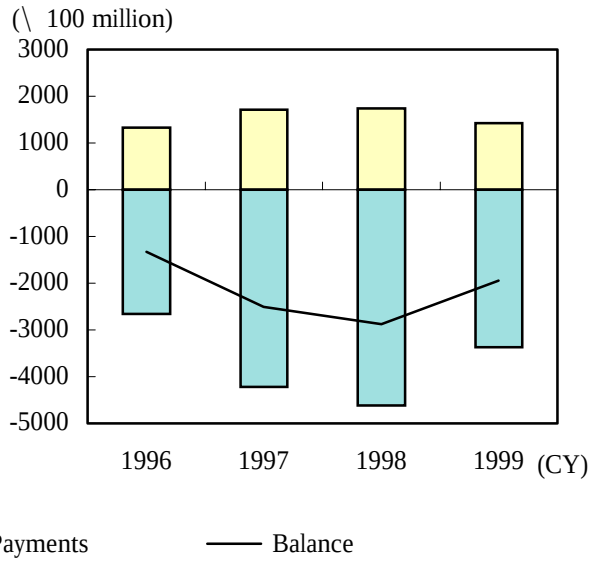


Figure 2-19. Information

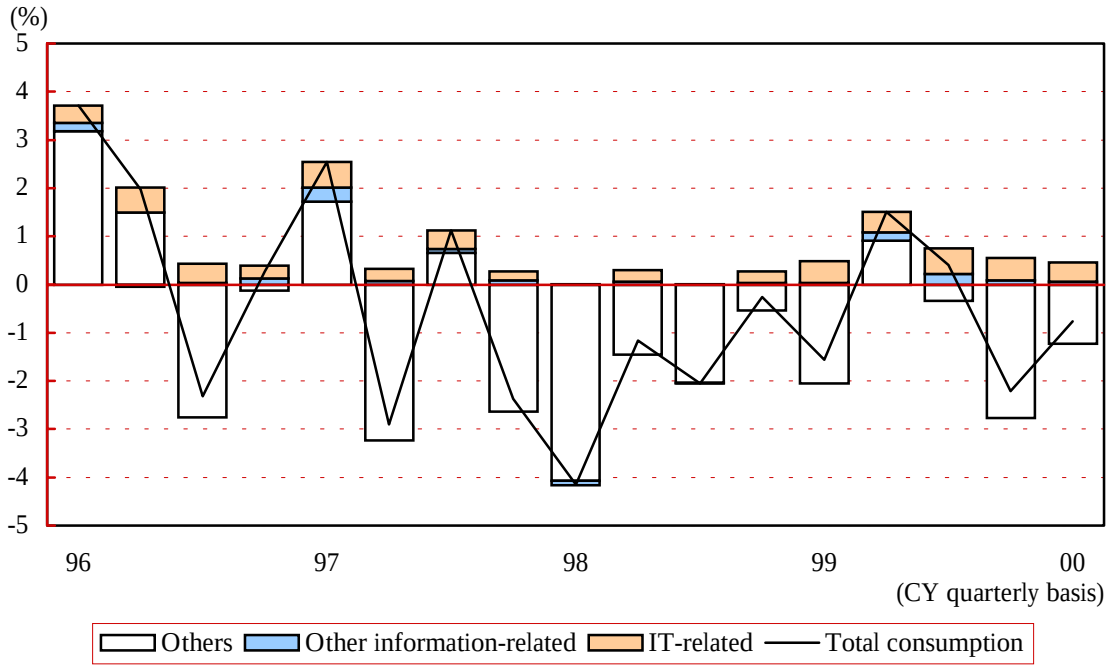


6. IT-related Consumption and Widening Generation Gap

This section first examines the overall trend of information-related consumption[17] in consumer spending in order to examine the expansion of IT in the household sector from various aspects.

Figure 2-20 estimates real information-related consumption[18] in the households covered by the Family Income and Expansion Survey to examine the trend of its contribution to the year-on-year change in total consumer spending[19]. While "other consumption," which is unrelated to information, has seen its contribution decline rapidly, the contribution of information-related consumption, IT-related consumption in particular has made positive contributions to the year-on-year change. As the perceived decline in IT-related prices has not been fully incorporated into the statistical data[20], it cannot be argued that the contribution of IT-related consumption has become stronger over the years. Nonetheless, IT-related consumption is considered to have played a role in supporting overall consumption.

Figure 2-20. Contribution of Real Information-related Consumption on Year-on-Year Change in Total Consumption (All households)



Note: Consumer price index for each item is used as deflator.
Sources: Management and Coordination Agency, "Family Income and Expenditure Survey," and "Consumer Price Index."

[17] Information-related consumption is divided into "IT-related" consumption, which enables interactive exchange of information through the media, and "other information-related" consumption, which mainly provide one-way information through the media. Based on the classifications of the Family Income and Expenditure Survey, "IT-related" consumption includes IT goods (PCs, word processors, communication equipment) and telephone charges, whereas "other information-related" consumption includes postal charges, TV, stereo sets, tape recorders, VCRs, TV games, audio and video discs, unused and recorded audio and video tapes, books and other printed matters (newspapers, magazines, etc.) and TV license fees.

[18] Nominal values are deflated by consumer price index for each product to convert to real values. Calculations are only made for 1995 and thereafter due the availability of data.

[19] Total consumer spending represents the aggregate of all product classifications but excludes "pocket money (of which, detailed uses unknown)," "social expenses" and "remittances."

[20] See "7. Reduction in IT-related Prices" for details.

Figure 2-21 shows the share of information-related consumption in total consumption (nominal basis) by type of family. Relevant data are available from 1987 for all households covered by the Family Income and Expenditure Survey, and from 1995 for one-person households. For all households with two or more members, the share of information-related consumption has risen since 1995 led by IT-related consumption to reach a level comparable to the proportion of investment in human capital[21] (from 5.4% in 1995 to 6.5% in 1999). In contrast, the share of information-related consumption in one-person households is higher than in family households (7.6% in 1995 and 8.5% in 1999) and far exceeds the proportion of investment in human capital, which is less than 1%.

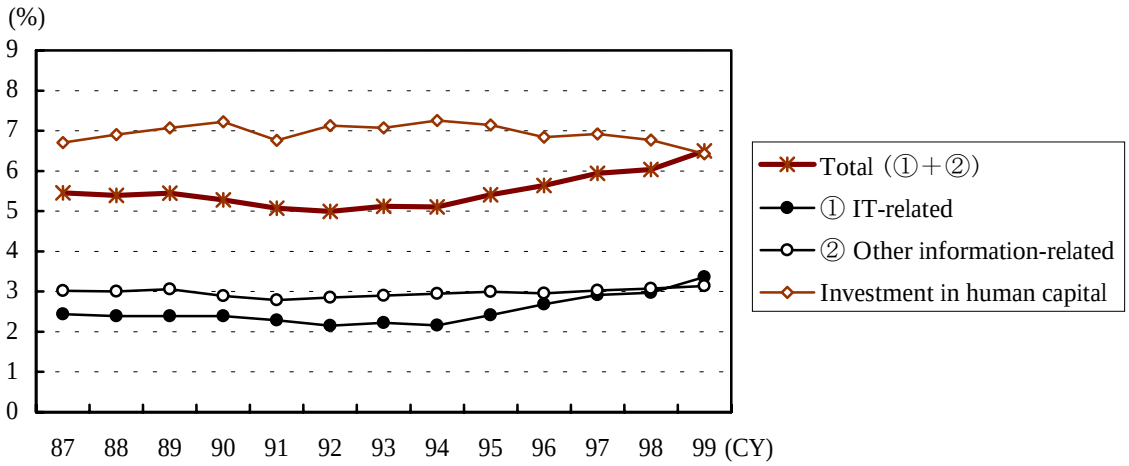
For both types of household, the share of IT-related consumption surpassed that of other information-related consumption for the first time in 1999, and the weight of other information-related consumption has remained stable for a long time at around 3% or 4%.

With regard to the diffusion of IT in the household sector, many refer to the "digital divide," i.e. the growing inequity and economic gap between those who can benefit from IT and those who cannot. The following section examines the difference in the weight of information-related consumption between income groups and age groups.

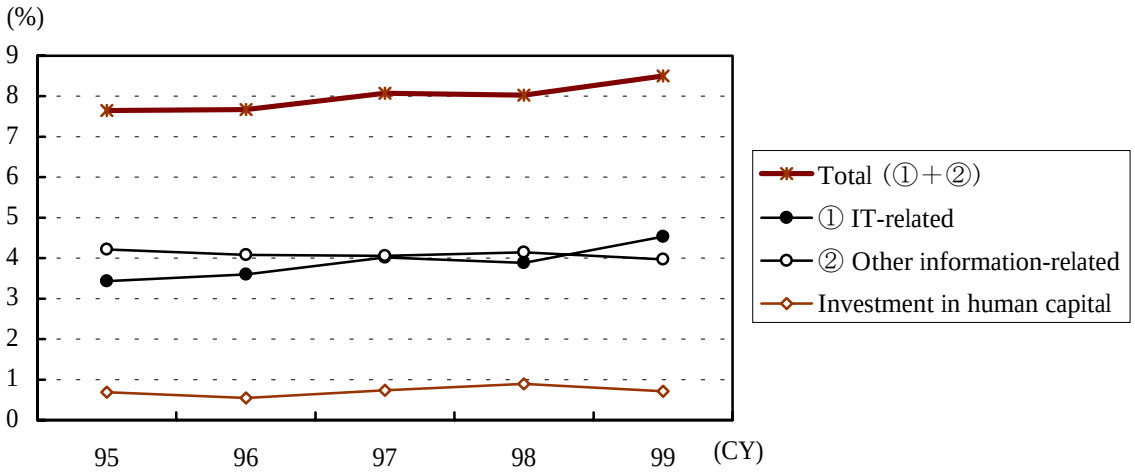
[21] Human capital investment includes education (school fees, reference books for study, tutorial fees in cram schools, preparatory schools, etc.) as well as lesson fees (language, various learning and training), according to the product classifications in the Family Income and Expenditure Survey.

Figure 2-21. Weight of Information-related Consumption by Type of Household

(a) All households with two or more members



(b) All one-person households

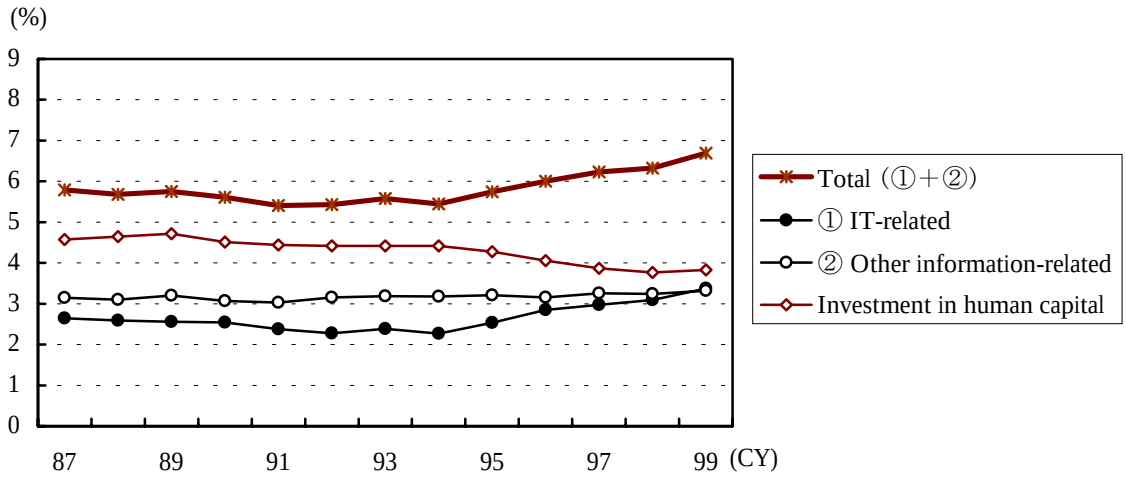


Note: Weights are calculated in nominal terms.
Sources: Management and Coordination Agency, "Family Income and Expenditure Survey," and "Income and Expenditure Survey for One-person Households."

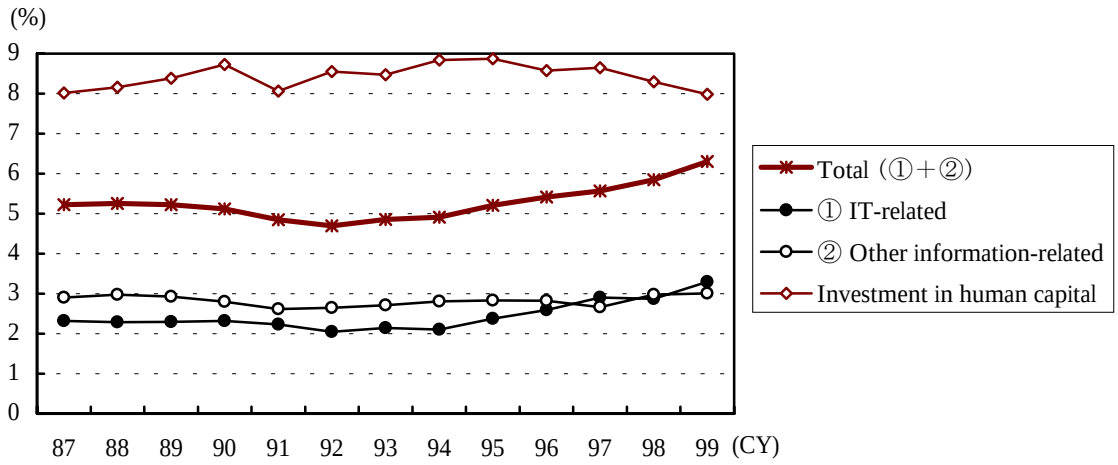
Figure 2-22 divides the households covered by the Family Income and Expenditure Survey into the low income group (income brackets I and II) and the high income group (income brackets IV and V). The share of information-related consumption is slightly higher in the low income group for both IT and non-IT consumption. It can be observed, however, that the gap between the two income groups is not so great as in the investment in human capital. (The gap is twice as large as in the latter case.)

Figure 2-22. Weight of IT-related Consumption in High Income and Low Income Groups of All Family Households

(c) Annual income brackets I + II



(d) Annual income brackets IV + V

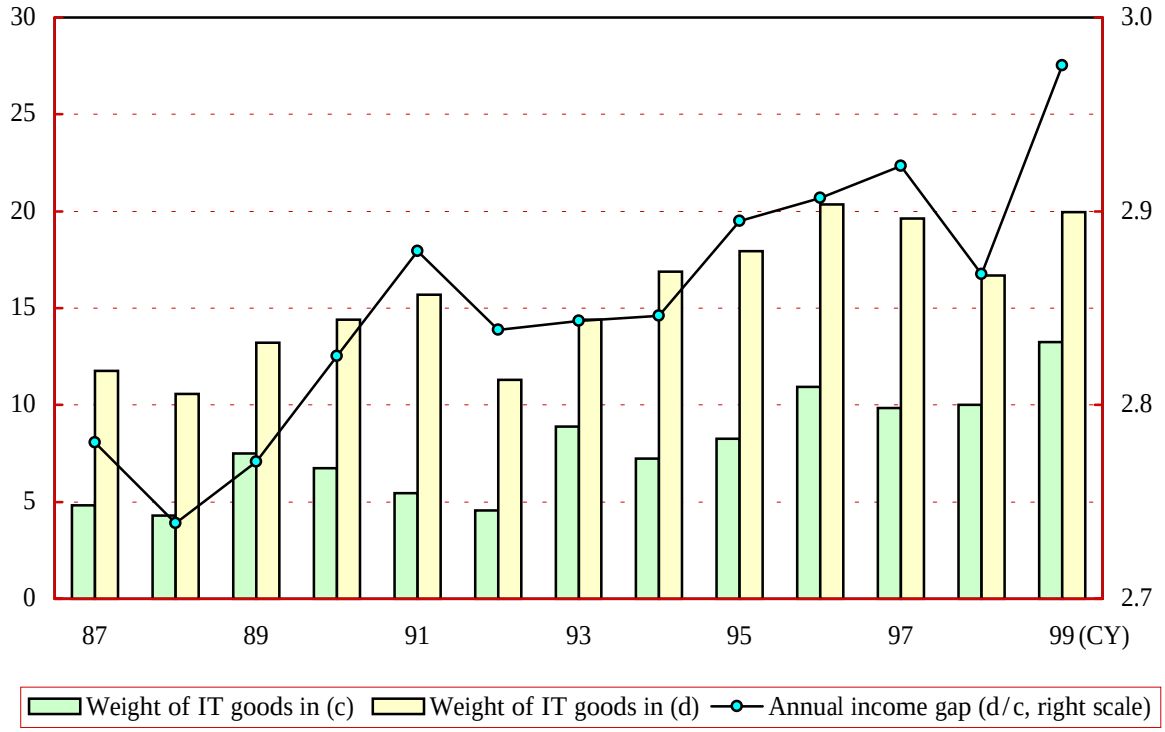


Notes: 1. Weights are calculated in nominal terms.
2. Annual income is on a pre-tax basis. Income bracket I earns the lowest income and bracket V the highest income.

Source: Management and Coordination Agency, "Family Income and Expenditure Survey."

The share of IT goods in IT-related consumption is shown in Figure 2-23. Although the share is typically higher in the high income group than in the low income group, no significant increase in the gap has been observed so far despite the widening income gap between the two groups since the bubble period (up from 2.78 times in 1987 to 2.98 times in 1999). The aggravation of the digital divide in the household sector cannot be observed, at least from the income factor only.

Figure 2-23. Annual Income Gap and Weight of IT Goods

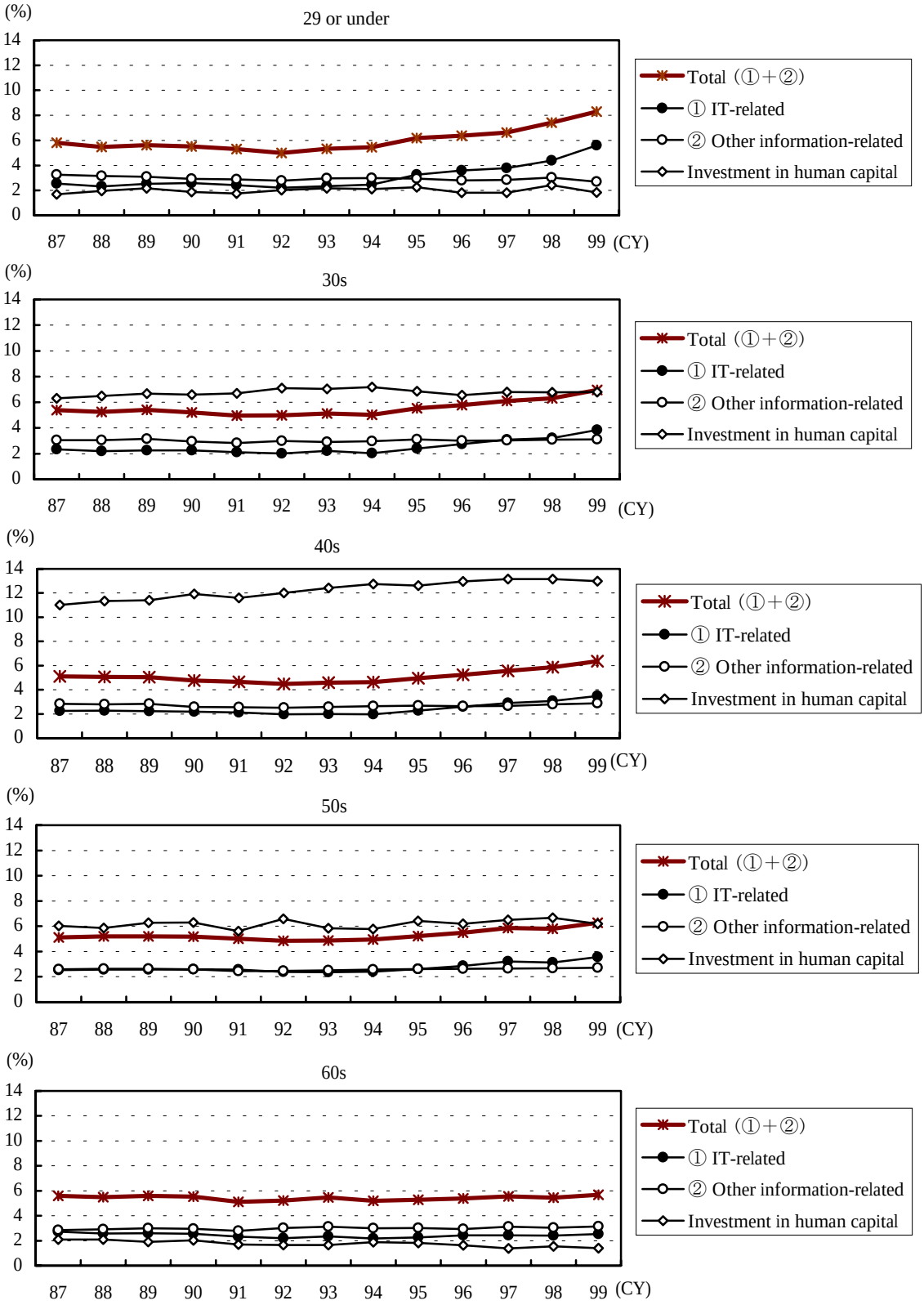


Note: The weight of IT goods represents the share in IT-related consumption (nominal).
Source: Management and Coordination Agency, "Family Income and Expenditure Survey."

However, the gap becomes clear when the households are classified according to the age of the householder (Figure 2-24). Householders in their 30s are closest to the average of all households as far as the trends of information-related consumption and the investment in human capital are concerned. Householders in their 40s have increased the weight of information-related consumption since 1995 despite the rising investment in human capital due to a heavier burden of child education.

The gap is most significant between the youngest and the oldest age groups. The share of information-related consumption increased most rapidly in the youngest age group of 29 or under, from 5.8% in 1987 to 8.3% in 1999. In contrast, the share of information-related consumption has remained unchanged in the age group of 60 or over (5.6% in 1987 and 5.7% in 1999). The gap between the two age groups has been widening since 1995.

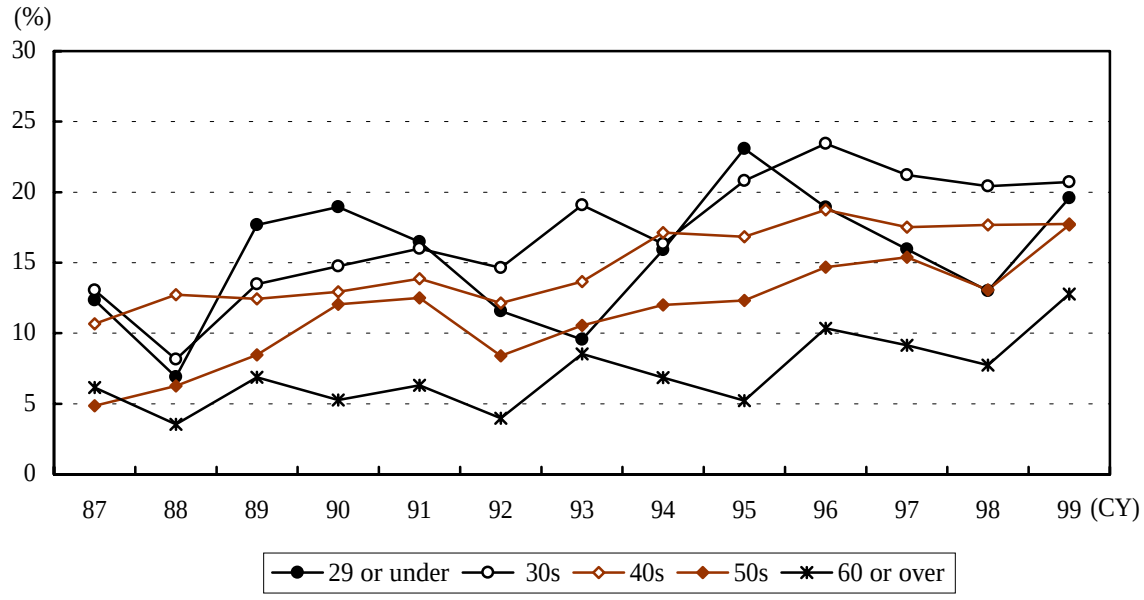
Figure 2-24. Weight of Information-related Consumption in All Family Households by Householder's Age



Notes: Weights are calculated in nominal terms.
Source: Management and Coordination Agency, "Family Income and Expenditure Survey."

Moreover, this gap stems from IT-related consumption. While the share of IT-related consumption surpassed that of other information-related consumption as early as in 1995 for 29 year-olds and younger, the former has not caught up with the latter for 60 year-olds and over. As regards the share of IT goods in IT-related consumption (Figure 2-25), however, no remarkable widening of the generation gap has been observed chronologically, although the weight of IT goods tends to decline as the population ages. The generation gap in IT-related consumption is largely due to the difference in telephone charges. Indeed, phone bills for those aged 29 or under (¥9,939/month on average in 1999) are almost twice as large as for those aged 60 or over (¥5,362/month). Thus, IT consumption in daily life consists mostly of communications through cellular phones rather than access to the Internet through PCs.

Figure 2-25. Weight of IT Goods by Householder's Age



Note: The weight of IT goods represents the share in IT-related consumption (nominal).
Source: Management and Coordination Agency, "Family Income and Expenditure Survey."

Finally, Figure 2-26 shows the trend of household use of IT goods[22] since 1995 by type of household and by income, as well as by type of household and by age of the householder.

By type of household, the use of IT goods has increased faster in family households (with two or more members) than in one-person households (rate of expansion from 1995 to 1999: 18.6% and 9.8% respectively). As in the case of expenditure, no significant widening has been observed in the gap among family households according to income or age. The gap in IT use between the high income group and the low income group only increased from 19.6% in 1995 to 26.1% in 1999. Meanwhile, the gap between those aged 29 or under and those aged 60 or over actually shrank from 11.2% to 8.6%.

On the other hand, the gap in IT use has been widening in one-person households between income and age groups. The gap between the low income group and the high income group grew substantially from 18.1% in 1995 to 32.8% in 1999, attesting to the slow progress of IT use in the low income group. The gap also widened between the youngest and the oldest age groups from 27.1% to 38.4%, as the use of IT goods has hardly expanded among those aged 60 or over. The wider gap in IT use among one-person households than in family households according to income is largely attributable to the minimal spread of IT use among the elderly, who are also in the low income group.

It is still uncertain how the diffusion of IT goods will improve the quality of life. Nonetheless, it is now necessary to overcome the "IT illiteracy" that is prevalent among the elderly living alone, so as to ensure equal opportunities.

Figure 2-26. Trend of Household IT Use by Type of Household, Income and Householder's Age

(%)

End FY	Family households					One-person households				
	Average	Low income	High income	29 or younger	60 or older	Average	Low income	High income	29 or younger	60 or older
95	30.4	22.9	42.5	33.6	22.4	29.1	23.2	41.3	41.1	14.0
96	34.0	25.8	46.8	30.5	26.4	29.3	22.2	41.4	43.7	12.9
97	40.4	30.8	53.6	42.5	30.0	34.1	25.2	53.4	52.2	15.9
98	43.6	32.8	58.0	43.3	33.6	37.8	29.7	50.9	54.2	20.3
99	49.0	36.9	63.0	46.0	37.4	38.9	29.0	61.8	56.9	18.5

Note: Annual income is on an after tax and social security charges. For family households, the low income group earns less than ¥5.5 million and the high income group ¥7.5 million or more. For one-person households, the low income group earns less than ¥3 million and the high income group ¥5.5 million or more.

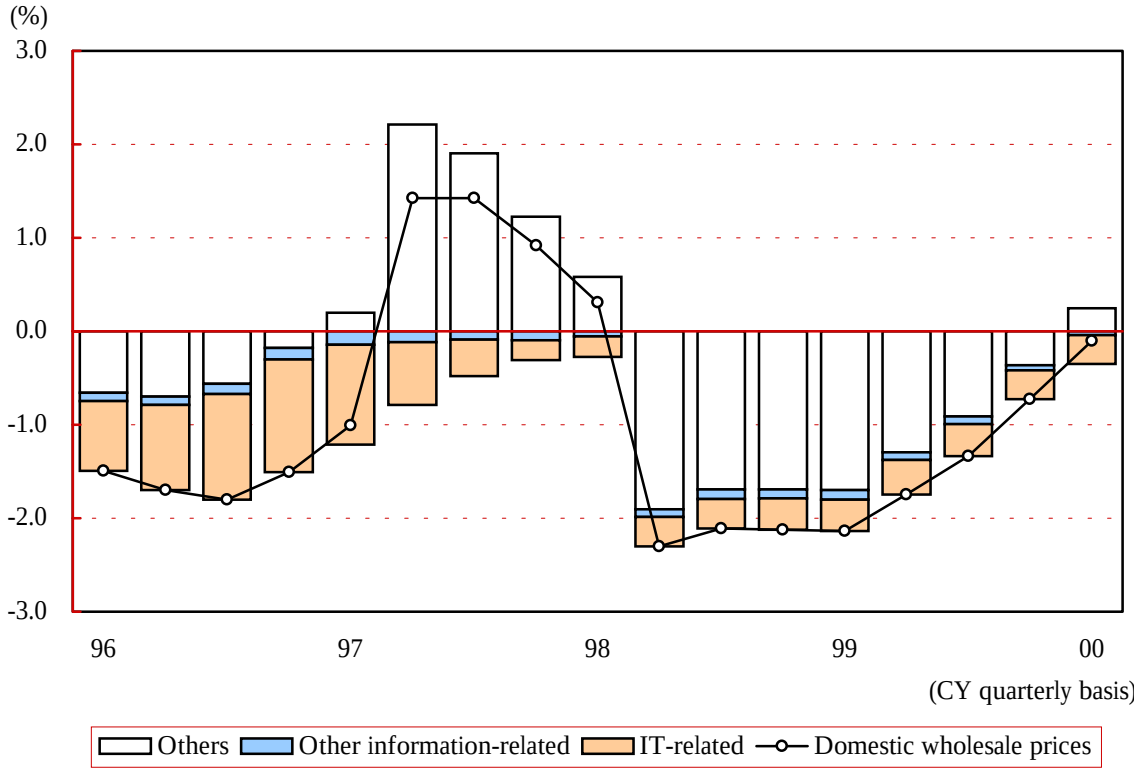
[22] IT goods for family households include PCs, facsimiles and push-button phones (including telephone sets with various functions and cellular phones) according to the Survey on Consumption Trend. IT goods for one-person households include PCs, facsimiles, push-button phones, telephone sets with answering machines and cellular phones. The ratio of IT use in households represents the simple average of all products.

7. Decline in IT-related Prices

This section examines the impact of the emerging IT on domestic wholesale prices, corporate service prices and consumer prices. The discussion covers the period since 1995 (since 1996 for year-on-year changes) in all cases due to the availability of relevant data.

Figure 2-27 indicates the contribution of information-related prices[23] to the year-on-year change in domestic wholesale prices. IT-related prices have declined continuously without recovering in 1997, when the consumption tax rate was raised, thus exerting a greater downward pressure on wholesale prices than other information-related prices. Since around 1998, however, IT-related prices have only declined by 0.3-0.4% on the previous year, though this movement might not necessarily reflect the actual trend.

Figure 2-27. Contribution of Information-related Prices to Year-on-Year Change in Domestic Wholesale Prices

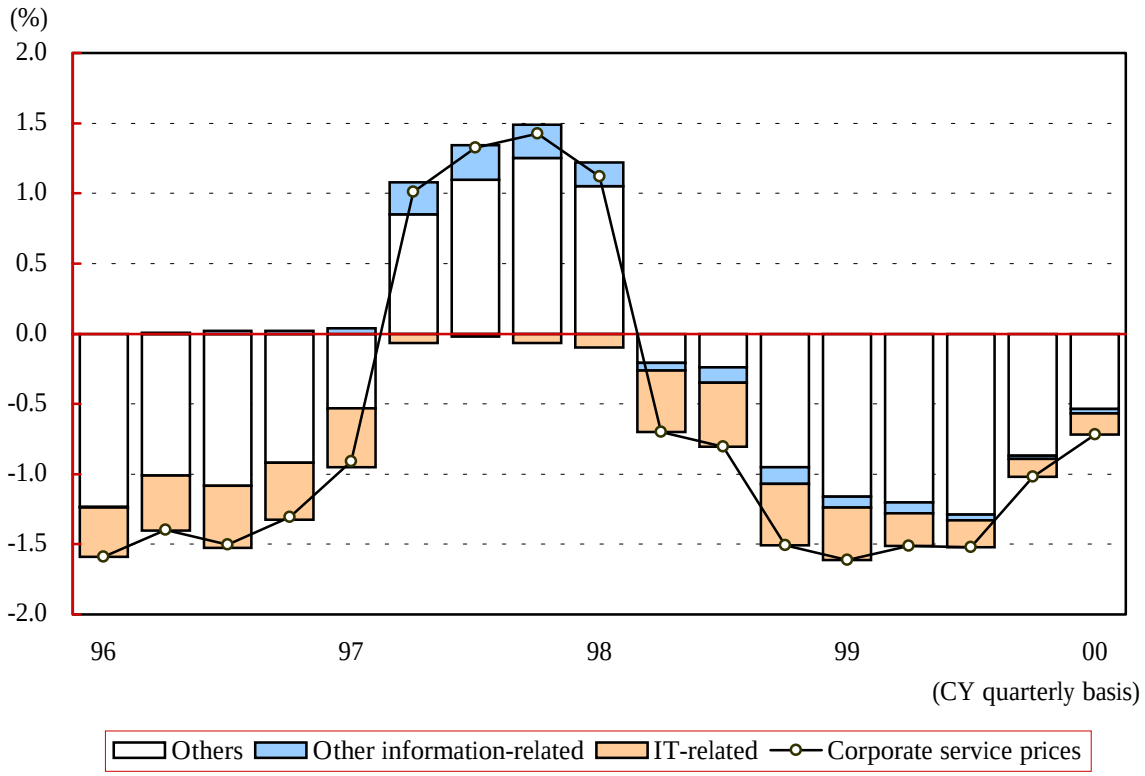


Note: The contribution of "others" is calculated as residual.
Source: Bank of Japan, "Price Indexes Monthly."

[23] The weight of information-related prices in domestic wholesale prices (1995 as base year) is 10.4%. "IT-related" goods (with a weight of 8.9%) include word processors, communication equipment, paper for information equipment, communication cables, applied electronic devices, electronic parts and electronic devices. "Other information-related" goods (1.5%) include color TV, VCRs, video disk players, car navigation systems, audio equipment, applied electronic toys, audio records, video records and published/printed matters.

Likewise, Figure 2-28 shows the contribution of information-related prices[24] to the year-on-year change in corporate services. While other information-related prices rose in 1997 due to the consumption tax hike, IT-related prices have declined almost continuously. Here again, however, the decline in IT-related prices has been slowing down recently. The upturn in other information-related prices is related to the trend of specialized services, in which personnel cost accounts for a substantial part.

Figure 2-28. Contribution of Information-related Prices on Year-on-Year Change in Corporate Service Prices



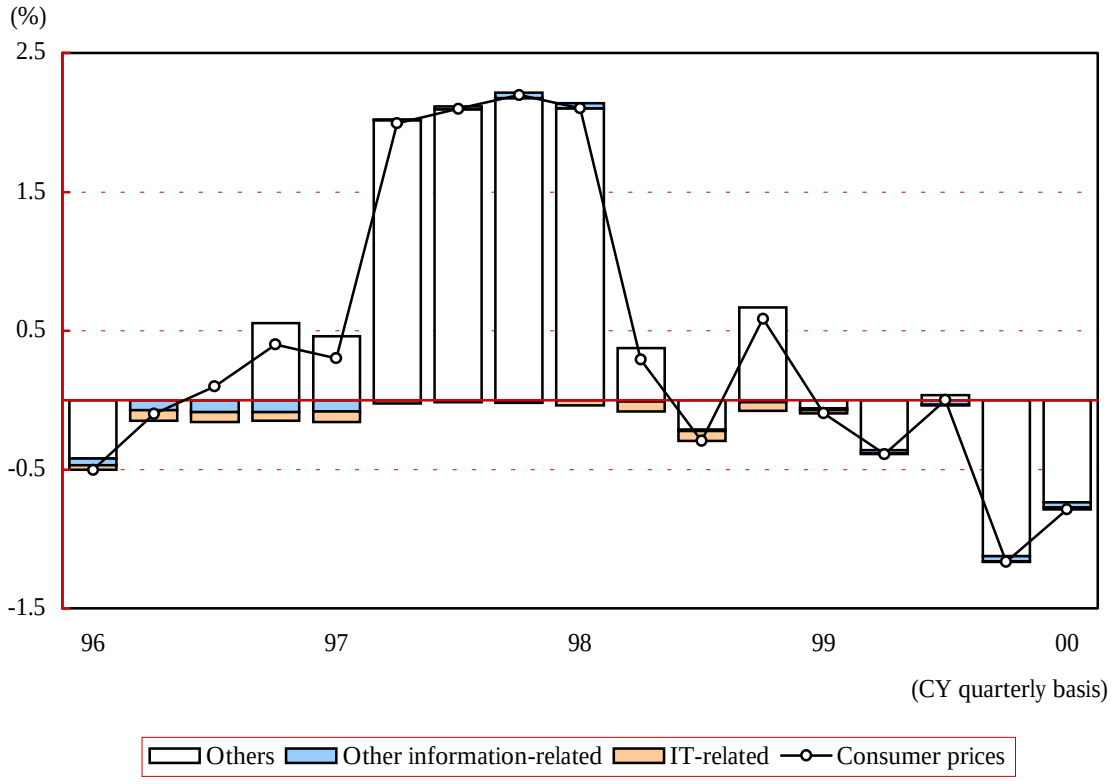
Note: The contribution of "others" is calculated as residual.
Source: Bank of Japan, "Price Indexes Monthly."

[24] The weight of information-related prices in corporate service prices (1995 as base year) is 32.2%. "IT related" services (with a weight of 19.1%) include software development, data-processing, domestic and international telecommunications, mobile communication, access charges and finance/insurance. "Other information-related" services (13.1%) include postal services, information services, market research, specialized services (law, accounting, civil engineering/construction, etc.) and broadcasting.

In contrast, the contribution of information-related prices[25] to the decline in consumer prices is smaller than in domestic wholesale prices or corporate service prices (Figure 2-29). The relative price of information-related goods to total consumer prices (Figure 2-30) indicates that IT-related prices have fallen faster than other information-related prices. Although IT-related prices have fallen by about 10% since the first quarter of 1995, the decline has leveled off since 1998.

It is increasingly argued that the trend of consumer prices does not reflect the actual sentiment in daily life. The gap between prices and sentiment is likely to be greater for IT-related goods because the rapid technological development frequently improves the quality of products covered by the survey[26]. Moreover, the impact of new products cannot be ignored. At present, changes in product quality and new products can only be incorporated in the survey when the relevant standard is revised every five years. In view of this, the impact of IT-related prices is considered to be greater than can be observed in the data.

Figure 2-29. Contribution of Information-related Prices on Year-on-Year Change in Consumer Prices

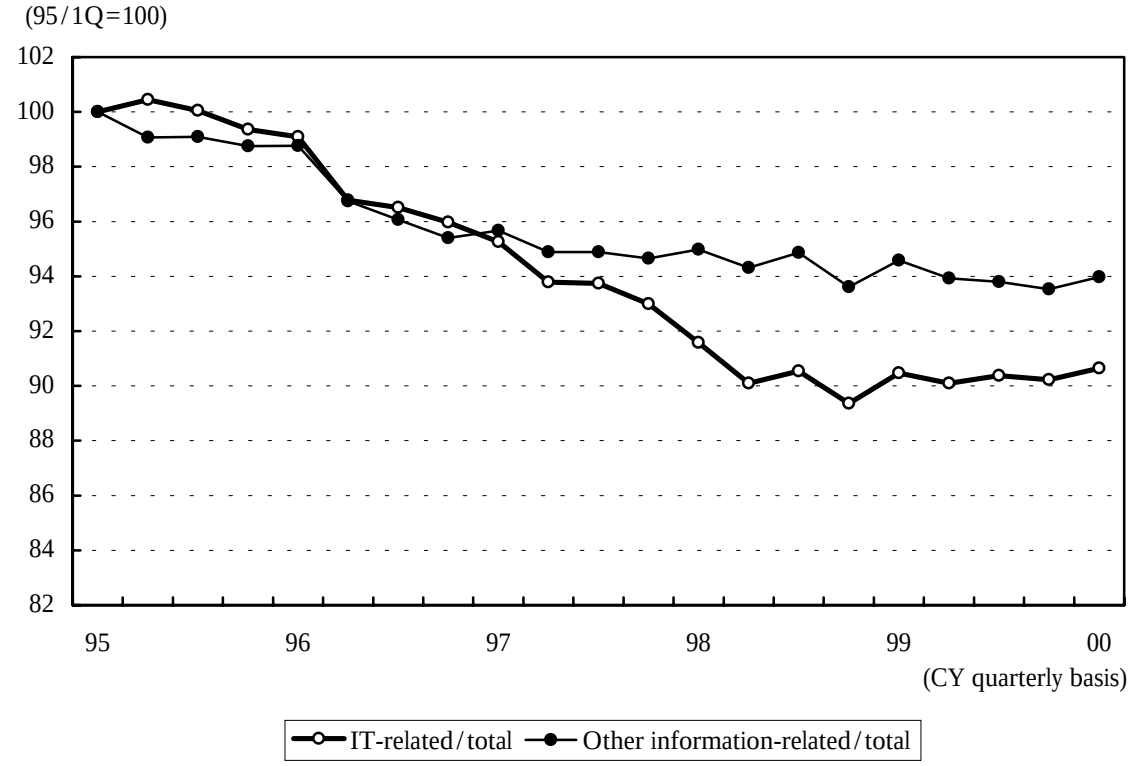


Note: The contribution of "others" is calculated as residual.
Source: Management and Coordination Agency, "Consumer Price Index."

[25] The weight of information-related prices in consumer prices (1995 as base year) is 5.1%. "IT-related" consumption (with a weight of 2.1%) includes word processors, telephone sets and telephone charges. "Other information-related" consumption (3.0%) includes postal charges, TV, stereos, tape recorders, VCRs, home TV game machines, compact discs, cassette tapes, video tapes, books/other printed matter and TV license fees.

[26] The consumer price index, which was originally developed according to the international standard established by the International Labor Organization (ILO), typically considers the structure of household consumption as constant to identify the changes in required costs as prices fluctuate. Therefore, it has limited ability to grasp swiftly any change in the types and amounts of goods and services purchased by households in measuring the impact of price fluctuations on the cost of living.

Figure 2-30. Trend of Relative Information-related Prices



Source: Management and Coordination Agency, "Consumer Price Index."

(as of August 21, 2000)
[by Economic Research Group (e-mail: noarai@dbj.go.jp)]

List of Back Numbers (Including *JDB Research Report*)

No.9 Recent Trends in the Japanese Economy: Information Technology and the Economy (This Issue)

No.8 Trend of International Reorganization Affecting the Japanese Automobile and Auto Parts Industries, June 2000

No.7 Survey on Planned Capital Spending for Fiscal Years 1999 and 2000, May 2000

No.6 Current Status and Future Perspective of the Japanese Remediation Industry: Technology and Market for Underground Remediation, May 2000

No.5 Recent Trends in the Japanese Economy: The 1990s in Retrospect (This Issue)

No.4 Destabilized Consumption and the Post-bubble Consumer Environment, January 2000

No.3 The Slump in Plant and Equipment Investment in the 1990s: Focusing on Lowered Expectations, the Debt Burden and Other Structural Factors, January 2000

No.2 Survey on Planned Capital Spending for Fiscal Years 1998, 1999 and 2000, November 1999

No.1 Corporate Strategies in Japan's Semiconductor Industry: Implications of Development in Other Asian Countries, November 1999

JDB Research Report

No.96 Recent Trends in the Japanese Economy: Focused on Fixed Investment and Capital Stock, August 1999

No.95 Efforts to Protect the Natural Environment in the United States and Germany: Environmental Mitigation and Biotope Conservation, July 1999

No.94 Survey on Planned Capital Spending for Fiscal Years 1998 and 1999, June 1999

No.93 Towards the realization of 'environmental partnership': A survey of Japan's environmental NPO sector through comparison with Germany, June 1999

No.92 The Impact of Demographic Changes on Consumption and Savings, March 1999

No.91 Recent Research and Development Trends in Japanese Enterprises: Technology Fusion, March 1999

No.90 Recent Trends in the Japanese Economy: Prolonged Balance Sheet Adjustment, January 1999

No.89 Impact of Asset Price Fluctuations on Household and Corporate Behavior: A Comparison between Japan and the U.S., December 1998

No.88 Survey on Planned Capital Spending for Fiscal Years 1997, 1998, and 1999, December 1998

No.87 Foreign Exchange Rate Fluctuations and Changes in the Input-Output Structure, November 1998

No.86 Structural Changes in Unemployment of Japan: An Approach from Labor Flow, November 1998

No.85 Recent Trends in the Japanese Economy: Characteristics of the Current Recession, August 1998

No.84 R&D Stock and Trade Structure in Japan, August 1998

No.83 Survey on Planned Capital Spending for Fiscal Years 1997 and 1998, August 1998

No.82 The Significance, Potential, and Problems of DNA Analysis Research: Establishing Public Acceptance is Essential, May 1998

No.81 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1996, 1997 and 1998 Conducted in August 1997, March 1998

No.80 Recent Trends in the Japanese Economy: Growth Base of the Japanese Economy, January 1998

No.79 Information Appliances: The Strength of Japanese Companies and Tasks for the Future, January 1998

No.78 Challenges and Outlook for the Japanese Machinery Industries: Impact of ISO14000 Series and Environmental Cost, January 1998

No.77 Current Conditions and Issues of Computerization in the Health Care Industry : For the Construction of a Health Care Information Network, January 1998

No.76 Household Consumption and Saving in Japan, December 1997

No.75 The Direction of Japanese Distribution System Reforms: Strengthening the Infrastructure to Support Diverse Consumer Choices, November 1997

No.74 Foreign Direct Investments by Japanese Manufacturing Industries and Their Effects on International Trade, October 1997

No.73 The Impact of the Changing Trade Structure on the Japanese Economy: With Special Focus on the Effects on Productivity and Employment, October 1997

No.72 An Analysis of Foreign Direct Investment and Foreign Affiliates in Japan, August 1997

No.71 Recent Trends in the Japanese Economy: Stock Replacement and New Demand as Aspects of Economic Recovery, August 1997

No. 70 Corporate Fundraising : An International Comparison, June 1997

No. 69 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1996 and 1997 Conducted in February 1997, May 1997

No. 68 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1996 and 1997 Conducted in August 1996, August 1997

No. 67 An International Comparison of Corporate Investment Behavior: Empirical Analysis Using Firm Date from Japan, France and the US, April 1997

No. 66 Housing in the National Capital: Analysis of the Market for Housing using Micro Data, March 1997

No. 65 The Environment for Locating Business Operations in Major East Asian Cities, January 1997

No. 64 Direction of Reconstruction of Business Strategy in the Chemical Industry, January 1997

No. 63 Reflection on Discussions Concerning Regulation of the Electric Power Industry: Deregulation of the Electric Power Industry in Japan and Implication of Experiences in the United States, December 1996

No. 62 Current Status and Future Perspective of the Japanese Semiconductor Industry, November 1996

No. 61 A Breakthrough for the Japanese Software Industry?: Responsiveness to Users' Needs is the key, October 1996

No. 60 Recent Trends in the Japanese Economy Focusing on the Characteristics and Sustainability of the Current Economic Recovery, September 1996

No. 59 Analysis of the Primary Causes and Economic Effects of Information: Related investment in the United States and Trends in Japan, August 1996

No. 58 Selected Summaries of Research Reports: Published in FY 1995, June 1996

No. 57 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1995 and 1996 Conducted in February 1996, May 1996

No. 56 Recent Trends in the Japanese Economy, May 1996

No. 55 Issues Concerning the Competitiveness of the Japanese Steel Industry, February 1996

No. 54 Changes in the Financial Environment and the Real Economy, January 1996

No. 53 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1994, 1995 and 1996 Conducted in August 1995, October 1995

No. 52 Current Economic Trends: Focusing on the Appreciation of the Yen and its Effects, October 1995

No. 51 Problems Concerning the International Competitiveness of the Petrochemical Industry, October 1995

No. 50 An Economic Approach to International Competitiveness, October 1995

No. 49 Selected Summaries of Research Reports Published in FY 1994, July 1995

No. 48 Strategies for Improving the Efficiency of the Japanese Physical Distribution System: Part2, July 1995

No. 47 Issues on International Competitive Strength of the Auto Industry, June 1995

No. 46 Problems Concerning the International Competitiveness of the Electronics and Electric Machinery Industry, June 1995

No. 45 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1994 and 1995 Conducted in March 1995, June 1995

No. 44 Strategies for Improving the Efficiency of the Japanese Physical Distribution System, March 1995

No. 43 Capital Spending Recovery Scenario Cycle and Structure, August 1994

No. 42 Progress of International Joint Development between Industrialized Countries on the Private Level, May 1994

No. 41 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1993, 1994 and 1995 Conducted in August 1994 , November 1994

No. 40 Selected Summaries of Research Reports Published in FY 1993, June 1994

No. 39 Recent Trends in Japan's Foreign Accounts, April 1994

No. 38 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1993 and 1994 Conducted in March 1994, April 1994

No. 37 Economic Zones and East Asia Prospect for Economic Activity Oriented Market Integration, December 1993

No. 36 Japanese Corporate Responses to Global Environmental Issues, December 1993

No. 35 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1992, 1993 and 1994 Conducted in August 1993, September 1993

No. 34 Structure of Profit to Capital in the Manufacturing Industry, September 1993

No. 33 Comparison of the Japanese and The U.S. Labor Markets, October 1992

No. 32 The Relative Competitiveness of U.S., German, and Japanese Manufacturing, March 1993

No. 31 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1992 and 1993 Conducted in March 1993, April 1993

No. 30 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1991, 1992 and 1993 Conducted in August 1992, December 1992

No. 29 Flow of Funds in the 80s and Future Corporate Finance in Japan, November 1992

No. 28 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1991 and 1992 Conducted in February 1992, April 1992

No. 27 An Analysis of Foreign Direct Investment in Japan, March 1992

No. 26 Projection of Japan's Trade Surplus in 1995: Analysis of Japan's Trade Structure in the 80s, February 1992

No. 25 Intra-Industry Trade and Dynamic Development of The World Economy, November 1991

No. 24 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1990, 1991 and 1992 Conducted in August 1991, September 1991

No. 23 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1990 and 1991 Conducted in February 1991, March 1991

No. 22 Trends of the Petrochemical Industry and its Marketplace in East Asia, March 1991

No. 21 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1989, 1990 and 1991 Conducted in August1990,September 1990

No. 20 Deepening Economic Linkages in The Pacific Basin Region: Trade, Foreign Direct Investment and Technology, September 1990

No. 19 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1989 and 1990 Conducted in February 1990, March 1990

No. 18 Petrochemicals In Japan, The US, and Korea an Assessment of Economic Efficiency, February 1990

No. 17 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1988, 1989 and 1990 Conducted in August 1989, October 1989

No. 16 Impact of the EC Unification on Japan's Automobile and Electronics Industries, August 1989

No. 15 Industrial and Trade Structures and the International Competitiveness of Asia's Newly Industrializing Economies, August 1989

No. 14 The Japan Development Bank Reports on Capital Investment Spending: Survey for Fiscal Years 1988 and 1989 Conducted in February 1989, March 1989

No. 13 The Japan Development Bank Reports on Capital Spending: Survey for Fiscal Years 1987, 1988 and 1989 Conducted in August 1988, September 1988

No. 12 Growing Foreign Investors' Activities and the Future of Internationalization, September 1988

No. 11 Futures Tasks and Prospects for the Japanese Machine-Tool Industry, July 1988

No. 10 International Division of Labor in the Machine Industries Among Japan, Asia's NICs and ASEAN Countries, June 1988

No. 9 Trends of the Petrochemical Industry and its Marketplace in East Asia around Japan, May 1988

No. 8 The International Competitiveness of Japan and U.S. in High Technology Industries, April 1988

No. 7 The Japan Development Bank Reports on Private Fixed Investment in Japan, March 1988

No. 6 Economic Projections of the Japan's Economy to the Year 2000, February 1988

No. 5 The Japan Development Bank Reports on Private Fixed Investment in Japan, September 1987

No. 4 Current Trends in the Japanese Auto Parts Industry in Overseas Production, July 1987

No. 3 Current Moves for Foreign Direct Investment into Japan, May 1987

No. 2 Overseas Direct Investments by Japanese Corporations, May 1987

No. 1 Current U.S. Consumption Trends, May 1987