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Understanding Japan's Financial and Economic Developments Since Autumn 1997

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1. Introduction

Japan's economy underwent an extremely severe recession. The real GDP recorded negative growth for five consecutive quarters, from the fourth quarter of 1997 on a quarter-to-quarter basis. Currently, Japan's economy is starting to pick up owing to positive effects from monetary and fiscal policies, and the recovery in the global economy, especially in Asia. This recession, however, turned out to be the worst ever experienced by Japan in the postwar era. Even at present, clear signs of a self-sustaining recovery in private demand have not been observed yet. These economic developments may be largely influenced by the disturbance in the financial system that occurred reflecting the failures of large financial institutions from autumn 1997. As a result, several unusual phenomena have been seen in the business cycle.

During the depressed phase of the economy from the end of 1997 for instance, business fixed investment declined substantially, especially in small firms reflecting a decrease in the lending ability of private banks. Paradoxically, however, the growth in money (particularly the monetary base) rather accelerated against the depressed real economy. On the other hand, the growth in money now seems to be slowing down gradually, while improvements are being observed in the economy such as the recovery in industrial production and the improvement in corporate sentiment. Thus, the relationship between the growth in money and the economy in the past two years looks different from what orthodox economic theory tells us. The savings rate of households, which is usually stable, has shown substantial fluctuations due to both mounting and easing of anxieties over the stability of the financial system. This has also been a characteristic of these two years. Furthermore, although this may be a favorable

✦ The opinions presented herein are the personal views of the authors, and do not represent the official opinion of the Bank of Japan or of the Research and Statistics Department.

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miscalculation, prices are recently starting to stop falling despite a seemingly substantial expansion in the output gap and a decline in wages.

In the financial market, various risk premiums expanded from the autumn of 1997 and remained large throughout 1998. The overnight call rate and the interest rates on term instruments such as the three-month Euro-yen detached substantially. Yield differentials between government bonds and corporate bonds, and yield differentials among corporate bonds across different ratings expanded, as well as the so-called Japan premium. By contrast, these risk premiums have contracted to a certain extent since the spring of 1999. Moreover, an unpredictable phenomenon has occurred within the interbank market: while the Bank of Japan has adopted the exceptional "zero interest rate policy," funds supplied by the Bank are not maintained as bank reserves, but are being accumulated as on-hand funds of *tanshi* companies (money market broker-cum-dealers).

These financial and economic developments in the past two years indicate that various events have occurred that cannot be easily understood by past experiences or by standard economic theory seen in textbooks. In addition, it seems that there is insufficient understanding of the much stronger interaction between financial and real economic developments in the past two years, thereby confusing discussions regarding monetary policy.

In these circumstances, it is very useful to review the financial and economic developments since the autumn of 1997, and examine the various events through empirical analysis and economic theory. By doing so, it may enhance understanding on how the financial system shock has influenced Japan's economy and what is happening at present. In this paper, we will first review chronologically the financial and economic developments in Japan during the past two years (section 2). Then, relying on empirical analyses conducted by staff members of the Research and Statistics Department, we will discuss the following two topics: (i) the relationship between money and the economy (section 3); and (ii) the relationship between the output gap and prices (section 4).

The outlines of this paper are as follows:

(a) Real economic developments have shown strong interactions with financial developments after the financial system shock hit Japan's economy in autumn 1997. The financial system shock decreased private consumption by discouraging consumer sentiment and business fixed investment through the tightened lending conditions on the part of private banks. In particular, when global concern over credit risks was heightened in the second half of 1998, the deterioration of the economy and tightening of financial conditions created a vicious circle. From the start of 1999, however, the opposite has been observed. Consumer sentiment and corporate financing have improved as financial anxieties have eased.

(b) Money and the real economy during this period have moved in opposite directions. The growth in money accelerated to some extent while the economy was depressed during 1998, but money growth has started to decelerate as the economy has started picking up in 1999. Thus, for the last two years, their relationship has been largely

different from the traditional one.

(c) One explanation for this phenomenon is that mounting financial anxieties increase precautionary demand for liquidity. The financial system shock shifts the IS curve to the left as observed in (a) and simultaneously, it shifts the LM curve to the left reflecting the increase in the precautionary demand for money, exerting upward pressure on interest rates. Then, it is possible for money to increase while output decreases significantly, so long as the rise in precautionary demand for money is large enough. From the end of 1997 to 1998, this phenomenon may have been actually observed. On the other hand, in 1999, a shift of the LM curve back to the right (together with that of the IS curve to some extent) has occurred due to easing anxieties over the financial system. This may have resulted in the fall in interest rates and the recovery of the economy, but the growth in money has been moderated by the decrease in precautionary demand. Our empirical analysis also supports this interpretation.

(d) In terms of monetary policy, the Bank of Japan supplied funds to meet the increase in the precautionary demand for money, trying to suppress overall interest rates (to prevent a leftward shift of the LM curve) during 1998. As a result of the financial system shock, however, its effects were partly offset by the weakening of banks' credit creation ability and the expansion of various risk premiums in the financial markets. In 1999, precautionary demand has declined with receding financial anxiety and the Bank has supplied further ample funds. As a result, interest rates have decreased further (further rightward shift of the LM curve) and various premiums are also contracting in the financial markets. Thus, the effects of monetary easing are becoming full-scale.

(e) As for price trends, a sharp decline has not been observed, although the output gap expanded and wages continue to decrease. We suggest the following two hypotheses as its background; (i) firms change pricing-behavior and are focusing on the rate of margin and (ii) the output gap calculated based on the traditional method is overestimated.

2. Chronology of financial and economic developments since autumn 1997

In this section we review financial and economic developments chronologically since autumn 1997 by dividing the period into three phases according to the characteristics of developments. We focus on the interaction between finance and the economy as much as possible. We then consider how various monetary and financial policies have affected the financial and economic developments.

(1) The First Phase—Outbreak of anxiety over the financial system (autumn 1997 to mid-1998)

From the autumn of 1997 to mid-1998, the economy turned to a clear decline, reflecting the shock on the financial system, and production, income, and expenditure showed negative interactions with one another.

According to the reference dates of business cycle released by the Economic Planning Agency, Japan's economy, which had continued a gradual recovery from the end of 1993, entered the recession phase from April 1997. Regarding the economic condition at that stage (Chart 1), private consumption plummeted shortly after the rise of the consumption tax rate in April 1997.[1] During the summer of 1997, however, industrial production and shipments picked up somewhat and there were no distinct signs of deterioration in employment conditions and demand-supply related indices. Although the Asian crisis had started in July 1997 triggered by the currency crisis in Thailand, the impact on Japan's trade was marginal up to that time. Therefore, the real turning point was November 1997, when not only the Korean crisis deepened Asian financial and economic turmoil substantially, but also the large shocks on the financial system hit Japan's economy. The failures of large financial institutions (Sanyo Securities, Hokkaido Takushoku Bank, Yamaichi Securities etc.) shook Japanese people's confidence, thereby exerting a strong negative impact on the economy. The negative impact of the financial system shock on the real economy will become clearer by examining developments in private consumption and business fixed investment.

Private consumption (SNA basis), after dropping in reaction to the stepped-up demand prior to the rise of the consumption tax rate in the second quarter of 1997, turned to an increase in the third quarter. It then declined substantially once again in the fourth quarter by around 1 percent on a quarter-to-quarter basis (annualized rate of 4 percent).[2] Judged from the fact that household income did not deteriorate distinctly (Chart 1), the drop in private consumption seems to have been influenced by the rise in the savings rate (the decline in the propensity to consume). In fact, indicators of consumer sentiment and the propensity to consume declined sharply through the end of 1997 when employment and income conditions did not worsen distinctly (Chart 2 (1) and Chart 2 (2)). This may be due to a rise in households' concern over future employment and income, reflecting mounting worries about the financial system. The consumer sentiment index deteriorated significantly in the *Consumer's Behavior Survey* of December 1997 (released by the Economic Planning Agency). This was largely attributed to consumers' pessimistic outlook for employment and income (Chart 2 (3)). At first glance, anxieties over the financial system and employment may not seem to be directly related to one another. The failure of major securities companies and banks, however, probably had a deep impact on consumer confidence, as it had never been observed during the postwar period. According to the sixth Opinion Survey on Lifestyle and Financial Behavior (*Seikatsu Ishiki ni Kansuru Ankeito Chousa*) conducted by the Bank of Japan in March 1998, nearly half of the respondents (49 percent) answered that they were concerned that the series of financial institution failures might affect their future employment and income.[3]

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[1] In this environment, the business conditions DI of major manufacturing firms improved somewhat in the May *Tankan* 1997, stock prices rose, and the exchange rate temporarily indicated an appreciation of the yen during April-May. Therefore, the outlook was rather optimistic overall just after the rise in the consumption tax rate.

[2] Private consumption continued to be stagnant, basically remaining flat for four consecutive quarters from the first quarter of 1998 on a quarter-to-quarter basis.

[3] For further details on the influence of the increasing uncertainty in future income on private

Business fixed investment in the private sector (SNA basis) turned flat at the end of 1997 after increasing until the third quarter of 1997, and then plummeted to around 3 percent on a quarter-to-quarter basis (annualized rate of over 10 percent) in the first quarter of 1998.[4] In the fourth quarter of 1997, the decline in the capacity utilization rate, which is usually a leading indicator of business fixed investment, was not distinct yet (Chart 1). The accumulation of capital stock was also moderate compared to that of 1990, the peak of the bubble economy (the growth of private capital stock was 7.4 percent at the end of 1990, 4.7 percent at the end of 1997 on a year-to-year basis), suggesting excess capacity was not so large at that point. Considering this, it is likely that disturbances in the financial system had a substantial negative impact on business fixed investment as well. The examination of business fixed investment developments in the first quarter of 1998 by industry and scale clearly tells the point. Investment by small firms in the quarter, non-manufacturers' investment in particular, showed an extremely large drop, while that by large manufacturing firms continued to increase (Chart 3). We suggest the following interpretation. Small firms do not have free access to the capital markets, and especially, small non-manufacturers rely heavily on borrowings from banks in their financing. After the burst of the bubble economy, this sector had a balance-sheet problem and their investment remained mostly weak, as private banks were no longer generous towards lending.[5] Then, the financial system shock in autumn 1997 and private banks' attitude toward extending credit rapidly became extremely stringent, exerting substantial downward pressure on business fixed investment, especially in this sector.

As regards the lending by private banks (Chart 4), the outstanding balance dropped sharply from the beginning of 1998.[6] This decline is due to four factors: (i) private banks' capital base decreased in conjunction with the disposal of large amount of non-performing loans and the decline in asset prices, weakening their risk-taking ability; (ii) since anxiety over the financial system broke out, banks put a priority on securing on-hand liquidity in preparation for account withdrawals and difficulties in fund-raising within the market, which rapidly intensified the cautious lending stance of private banks especially to small firms; (iii) banks reviewed all assets as they took on the medium-term task of improving profitability and financial soundness; (iv) banks made the risk evaluation towards firms more severe reflecting deteriorating profitability of firms. The last two factors may be in part the reflection of appropriate risk evaluation, which is similarly seen in the expanding differential between the yields of corporate and

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consumption, refer to the "*Saikin no kojinshouhidoukou ni tsuite"* (Recent Developments in Private Consumption) published in the Bank of Japan Monthly Bulletin June 1999 issue.

[4] Business fixed investment declined substantially by an annualized rate of around 10 to 20 percent for four consecutive quarters on a quarter-to-quarter basis from the first quarter of 1998.

[5] Apart from this, the reason for sluggish business fixed investment among small non-manufacturing firms since 1990 is that profitability in this sector have been stagnant due to structural problems. For further details, refer to the "*90nendai ni okeru hiseizougyou no shuekiteimei no haikei ni tsuite* (Stagnation and Structural Adjustments of Nonmanufacturing Industries during the 1990s <summary>)," Bank of Japan Monthly Bulletin February 1999 issue.

[6] The rate of decline indicated in Chart 4 (thin solid line) shows an exceptionally significant drop compared to the actual lending trend since 1998 as it includes the decline caused by non-performing loan write-offs and liquidations.

government bonds. Consequently, as indicated in the *Tankan*, the corporate finance conditions became increasingly harsh (Chart 5), which is unusual under monetary easing, and this led to the drop in business fixed investment.[7] The constraints on the economic recovery caused by the balance-sheet problem of firms and private banks throughout the post-bubble economy shifted into a obvious credit crunch phase after autumn 1997. Private banks' increasingly stringent lending attitude based on risk re-evaluation of their assets during this phase did deteriorate rather than improve their own assets further, by causing a depression in the economy and the fall in asset prices. This can be considered an example of "fallacy of composition."

As a result of these shocks on final demand,[8] production declined substantially.[9] These negative developments led to a rapid deterioration in corporate profits, household income, and employment conditions, which caused a vicious circle by discouraging final demand such as business fixed investment and household expenditure. Prices weakened overall mainly due to the expansion in the output gap.

In contrast to the depression in the economy and the decline in lending by private banks, growth in money stock in terms of M2 + CD (Chart 6 for money-related indices) rose somewhat from the end of 1997 to the beginning of 1998. Moreover, growth in monetary base (cash in circulation + bank reserves) accelerated to around 10 percent on a yearly basis at one point, which was well above the growth levels of M2 + CD (5 percent on a yearly basis at one point).[10] The increase in M2 + CD was attributed to the following two factors: (i) there was a shift of funds from financial assets not included in M2 + CD, such as investment trust and bank debentures, to bank deposits with higher liquidity, due to rising anxieties over the financial system; (ii) some firms gathered a large amount of on-hand funds (deposits) by issuing CPs (Commercial Papers) and borrowing from banks due to concerns about future availability of funds. Also the rise in monetary base is due to an increase in cash demand in line with financial anxiety, and the accumulation of reserves by financial institutions in preparation for unexpected account withdrawals and fund-raising difficulties in the market. Thus, the growth in money was enhanced overall, because precautionary demand increased largely, although

[7] As households reduced consumption due to future uncertainty, in the corporate sector, business fixed investment was restricted even among firms that did not face financial constraints, reflecting uncertainty in line with anxiety over the financial system. It is widely known that an increase in future uncertainty has a negative impact on business fixed investment (Dixit and Pindyck <1994>). For further details, refer to the "Annual Review of Monetary and Economic Developments in Fiscal 1997," Bank of Japan, Annual Review 1998.

[8] The financial and economic turmoil that erupted in Thailand in the summer of 1997 spread to Korea in November the same year, and had a negative impact on Japan's exports as well from the end of 1997.

[9] Industrial production continued to decline for three consecutive quarters from the fourth quarter of 1997 on a quarterly basis (total decline of 8.6 percent).

[10] From 1995 to 1996, the growth in M2 + CD and the monetary base diverged as well. This, however, was due to the substantial decline in the opportunity cost of holding cash, against the background of interest rate cuts conducted several times by the Bank in 1995. In this regard, the situation during that period was different from that at the end of 1997.

the transaction demand declined as the economy receded. As a result, both the money multiplier (M2 + CD / monetary base) and velocity of circulation of money (nominal GDP / M2 + CD) dropped substantially. This indicates that during a financial system shock, the function of private banks as financial intermediaries weakens dramatically and precautionary currency demand increases substantially, thereby drastically changing the money creation mechanism that is based on the money multiplier theory.

In the financial market (Chart 7 to 9 for financial market-related indices), there was upward pressure on funding costs in the private sector, particularly for financial institutions. Interest rates on term instruments such as the three-month Euro-yen and yields on bank debentures rose through the beginning of 1998. This was caused by the rise in fund demand mentioned above and the mounting caution of lenders. Yields on corporate bonds with low ratings also rose, while yields on government bills and bonds, which are classified as safety assets, remained rather low overall. These yield spreads between private-sector and government debts can be interpreted as the expansion of risk premium (liquidity risk and credit risk). As for short-term funds, the differentials between the Euro-yen and TB (Treasury Bills) interest rates expanded to around 1 percent at one point at the end of 1997, after the failures of major financial institutions were revealed. The so-called Japan Premium (a premium imposed on Japanese banks when raising funds in U.S. dollars) also increased substantially.

Meanwhile, stock prices followed a declining trend on the whole. Bank stocks dropped substantially, and stocks of other industries also weakened due to the deterioration in corporate profits and increasing concern about credit risks along with the rise in the number of bankruptcies. The exchange rate moved consistently towards the depreciation of the yen reflecting the mounting weakness of both the economy and the financial system in Japan.

Upward pressure on market interest rates also influenced the overnight call rate, which is the operating target of the Bank of Japan. Thus, the Bank provided ample funds to the money market and conducted money market operations to ease the upward pressure on the overnight call rate. Moreover, the Bank encouraged to lower interest rates on term instruments and tried to facilitate corporate finance by conducting longer-term operations to provide funds maturing after the fiscal year-end and the CP operation.[11]

(2) The Second Phase—Further increase in anxiety over the financial system (summer of 1998 to the end of 1998)

The financial and economic conditions in Japan continued deteriorating from the end of 1997 to the first half of 1998. However, expectations that the economic deterioration would moderate from the start of autumn seemed to arise at one point as the government

[11] From the start of 1998, the Bank of Japan simultaneously conducted short-term fund absorption by selling Bank bills. This was done when the market operations were conducted to increase the supply of funds maturing after the end of the fiscal year, so that the overnight call rate did not drop too much below the Bank's target.

launched a large-scale comprehensive economic stimulus package in April 1998. Unfortunately, however, this expectation did not materialize. From the summer on, uncertainty over Japan's financial system increased again, reflecting the financial problems revealed at some financial institutions such as the Long-term Credit Bank, and the difficulties of getting the Diet to pass the Financial Revitalization Law. As a result, stock prices plummeted sharply and upward pressures on interest rates on term instruments were exerted again. The characteristic of this phase, however, was that intensified anxieties regarding the financial system were not only due to domestic factors. They were triggered by the revelation of the Russian financial crisis and financial difficulties at a major US hedge fund, which aroused concern over global credit risk. In fact, the "flight to quality" movement spread from the summer to the autumn of 1998 in the financial markets of leading countries such as the US. In these markets, the drop in stock prices and the sudden rise in bond prices were observed simultaneously and differentials in corporate bond and government bond yields expanded. The fact that the yen appreciated while both Japan's economy and financial system faced problems indicates the global expansion of the risk premium.[12]

Under these circumstances, fund-raising of foreign currency became increasingly difficult for Japanese financial institutions[13], which in turn negatively influenced domestic corporate finance conditions. Even large firms engaged in international business faced such difficulties. Against the background of the deterioration in profits and balance sheets reflecting the economic downturn, the financial ratings of large firms were down-graded, and an increasing number of firms faced difficulties in issuing corporate bonds and CPs. In addition, the number of corporate bankruptcies increased. Reflecting these conditions, the lending stance of financial institutions became even more cautious and corporate financing was further tightened. Not only small firms but also large firms started to try to generate on-hand funds by reducing business fixed investment and inventories. The negative interaction was strengthened between the deterioration in the economy and the credit crunch. In this environment, many firms adopted mid-term goals of increasing capital profitability and improving balance sheets by reducing financial liabilities.[14]

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[12] It is widely noted that the unwinding of the short position in the yen by major US hedge funds triggered the appreciation of the yen. The US hedge funds had held the short position in the yen and long position in the Russian government bond and other risk assets (one form of the so-called "yen-carry trade") and unwound these positions along with the outbreak of the financial crisis in Russia, which led the yen to appreciate. This may be taken as an example of the increasing risk aversion in global financial markets at that moment.

[13] As is widely known, Japan's external asset-liability balance is in substantial surplus. Regarding the foreign currency balance of financial institutions, however, the structure is vulnerable in terms of liquidity at times when the international financial market is under tight conditions. This is because, while their investment activities are conducted on a long-term basis, their fund-raising is mainly on a short-term basis

[14] The following factors lie behind the background of firms' strong commitment towards increasing capital profitability and improving balance sheets: (i) the capital efficiency of Japanese firms has continued to decline gradually; (ii) requests by investors to improve firms' capital efficiency have strengthened amid increases in international capital inflow (this is greatly influenced by the fact that the ratio of shares held by foreign investors has increased); (iii) firms experienced the severe credit

Prices continued to be weak as CPI (Consumer Price Index) fell below the previous year's level. As for the outlook, a majority viewed that prices would drop further due to the expansion in the output gap and the decline in wages.

In response to concerns over further economic deterioration and the unstable financial market, the Bank of Japan decided to further ease its monetary policy at the Monetary Policy Meeting on September 9, 1998. This was done by lowering the overnight call rate to "around 0.25 percent" from levels "around slightly below the official discount rate (0.5 percent)." As a result of this monetary easing, interest rates on term instruments declined temporarily, but they were at a high level compared with that before the autumn of 1997 and it rose along with the Japan premium as anxiety over the financial system persisted. These movements, indicating an expansion in the liquidity risk premium or credit risk premium, prevented the interest rate cut from having the desired effect through "interest rate arbitrage mechanism." We mentioned before that the "money multiplier mechanism" was changed because of the weakened function of private banks as financial intermediaries. Thus, neither of the ordinary transmission mechanism of monetary easing did work. Under these circumstances, stock prices recorded a historical low since the burst of the bubble economy and this further heightened anxieties over the outlook for corporate finance.

The Bank of Japan decided to adopt the following three measures at the Monetary Policy Meeting on November 13 in order to alleviate these conditions surrounding corporate finance. (i) Expansion of CP repo operations; (ii) establishment of a temporary lending facility to support firms' financing activities; (iii) establishment of a new market operation scheme which utilizes corporate debt obligations as eligible collateral. At the same time, along with creating a new legal framework to rebuild the stability of the financial system, the government launched measures to alleviate the credit crunch such as enhancing the credit guarantee system and decided on another economic stimulus package based on additional public works expenditures. These financial measures may be called "emergency measures" as they were introduced to alleviate the extremely intensified credit crunch.

(3) The Third Phase—Easing of anxiety over the financial system (from the beginning of 1999)

Economic deterioration started to moderate gradually from around the end of 1998 and the beginning of 1999 as various measures launched by the Bank and the government started to take effect and international financial markets stabilized. Concerns over fund-raising of financial institutions and firms started to ease and the money markets became somewhat calm. By contrast, government bond yields soared. Following the announcement by the Trust Fund Bureau that it would stop outright purchases of government bonds, concerns over the supply-demand balance for government bonds

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crunch in the autumn of 1998, and; (iv) firms have come to deeply acknowledge the influence of financial ratings. For details on the first two, which are longer-term factors, refer to Maeda and Yoshida [1999].

that had been latent in the market rapidly emerged. This made the government bond yield rise from a bottom low of around 0.7 percent in October 1998 to around 2.5 percent in February 1999. In line with this, the appreciation of the yen and the weakening of stock prices progressed, causing growing concern about the economic outlook.

Under these circumstances, the Bank of Japan, at the Monetary Policy Meeting on February 12, decided to further ease its policy stance by encouraging the uncollateralized overnight call rate, which was around the 0.25 percent level, to move as low as possible. This monetary easing was decided so as to "avoid possible intensification of deflationary pressure and to ensure that the economic downturn will come to a halt." Along with the further supply of ample funds, the overnight call rate declined, gradually dropping to zero by mid-March. At the Monetary Policy Meeting on April 9, members agreed on "maintaining the zero interest rate policy until deflationary concerns are dispelled" and this was stated at the press conference by the Governor on April 13. Meanwhile, the government injected a total of 7.5 trillion yen worth of public funds into 15 major banks at the end of March. Thus, the Bank is strongly committed to monetary easing along with the zero interest rate policy and the anxiety over the financial system has eased in line with the government's injection of public funds into private banks. These factors have had positive effects in terms of stabilizing the financial market and improving the economy.

In the money market, to keep the call rate at virtually zero percent in a stable manner, the Bank continues to provide affluent funds into the market in the amount of some 1 trillion yen more than required (daily average of around 4 trillion yen). As a result, 70 to 80 percent of excess funds provided by the Bank is being accumulated as on-hand funds at the *tanshi* companies (money market broker-cum-dealers) instead of as reserves at private banks which have the credit-creating function. This shows that, under extreme conditions such as the zero-interest rate in the money market, presumptions of classic economic theory seen in textbooks, such as money multiplier theory, may not hold in reality.

This indicates that as the credit-creating function of financial institutions has not fully recovered, funds injected into the money market do not immediately lead to an increase in monetary aggregates. At the same time, however, since financial institutions have come to believe that they can obtain almost cost-free funds at any time, their incentive to hold funds has diminished. In such circumstances, there remains hardly any reason for liquidity premium to exist. Reflecting the rapid decline in the liquidity premium, the differentials between Euro-yen and TB interest rates and the Japan premium have almost disappeared. The interest rates on term instruments have also declined well below the levels seen before the autumn of 1997. This means that the money-creation mechanism based on the money multiplier theory is not functioning yet, under the condition where the capital of financial institutions is not abundant. But, the liquidity risk has disappeared due to the zero-interest rate policy and the ease in financial anxiety reflecting the injection of public funds. This has brought about over a 50bp decline in interest rates on term instruments and thus the effects of monetary easing were more than just a decline in the overnight call rate of 25bp. Under these circumstances, the

government bond yield has dropped to below 2 percent and stock prices have rebounded to the levels at the beginning of autumn 1997.

Signs of recovery in the real economy have been observed from the middle of 1999 as industrial production is picking up[15] and the recovery in corporate sentiment is becoming clear. With respect to final demand, the following three factors have helped the economy to improve: (i) public works and housing investment increased substantially, reflecting the economic measures taken by the government; (ii) exports have started to increase in line with the recovery in the Asian economies; (iii) consumer sentiment has improved and the savings rate has fallen as worries about the financial system are disappearing. As for the third factor, the situation was the opposite in the "first phase" (rise in savings rate reflecting worries over the financial system). The fact that private consumption has stopped deteriorating amid the continuing decline in compensation of employees implies how large the effects of the ease in financial anxiety are. In fact, the propensity to consume appears to be recovering slowly as seen in the gradual improvements of various consumer confidence-related indices (Chart 2). Furthermore, (iv) in line with the ease in anxieties among firms' fund-raising, the large decline in business fixed investment such as the one in 1998 has been avoided and this has attributed to the pick-up in the economy by reducing the negative contribution.[16] Nevertheless, business fixed investment is likely to be stagnant for a while, since firms are pursuing the mid-term goals of improving capital profitability and balance sheets as explained in the "second phase."

Meanwhile, prices show no clear signs of a substantial drop, as occurred in autumn 1998, even though a large output gap persists and wages continue to decline. This is likely to be because firms have started to change pricing-behavior and are emphasizing more on the rate of margin to improve profitability.

As for the developments of monetary aggregates, the growth in M2 + CD was relatively high from autumn 1997, but has slowed since the spring of 1999 despite the improvement in the real economy and the decline in interest rates (growth in M2 + CD has dropped from around 4.0 to 4.5 percent in the spring to around 3.0 to 3.5 percent recently on a yearly basis). Growth in the monetary base is also slowing overall reflecting the stagnant growth in cash in circulation even though the growth in reserves

[15] Industrial production increased by 0.6 percent in the first quarter of 1999 on a seasonally adjusted quarter-to-quarter basis but dropped by 1.0 percent in the second quarter. However, it increased again significantly in the third quarter by 3.9 percent and is likely to continue increasing in the fourth quarter according to production forecast indices (released by the Ministry of Trade and Industry).

[16] Real business fixed investment (SNA basis) in the private sector for the first quarter of 1999 increased for the first time in six quarters by 2.3 percent on a quarter-to-quarter basis. This is because investments by small firms, which had been postponed due to concerns regarding fund-raising, were concentrated temporarily in this period. Thus, it does not indicate a recovery "trend" in business fixed investment. In fact, business fixed investment in the second quarter of 1999 started to decline once again by 2.1 percent on a quarter-to-quarter basis and it continued to decline at the same pace in the third quarter. Judging from leading indicators such as machinery orders, business fixed investment has not stopped declining though the rate of its decrease has clearly diminished.

is increasing in line with the abundant supply of funds provided by the Bank.[17] Thus, while the economy is picking up, the growth in money is decelerating, and this contrasts with what happened during the "first phase." This is because precautionary demand for money has declined considerably although transaction demand has stopped falling. The slowing of growth in money indicates that demand for on-hand funds and cash has decreased, reflecting easing anxieties on the part of firms and households over the stability of the financial system. In fact, some firms, which accumulated on-hand funds due to financial anxiety in autumn 1998, seem to be allocating their excess funds for reducing financial debts.

Reflecting the decline in precautionary demand for funds and the reduction of financial liabilities to improve balance sheets among firms, lending by private banks continues to decline. According to the *Tankan* (Chart 5), the lending stance of private banks seems to be improving. However, from the viewpoint of the mid-term task to improve asset soundness and profitability, banks' risk evaluation of firms remains less generous compared to that before 1997 and this supply-side factor has also attributed to stagnant bank lending.

3. A puzzle regarding the relationship between money and the economy

In section 2, we chronologically reviewed Japan's financial and economic developments over the last two years and indicated that many unusual phenomena have been observed during that period. These unusual phenomena could be understood as follows in an abstract manner. First, an unprecedented shock, such as disturbances in the financial system, changes the behavior of economic agents. This is regarded as one example of the "Lucas critique" that is often discussed in the econometric field, in the sense that parameters of models may be altered when factors 'taken for granted' in the model change by large shocks etc. Second, various discontinuities could arise in cases where the economy comes to the boundary, such as the zero interest rate. This is one of the fundamental propositions in microeconomics.

What is more important, however, is to analyze these problems more concretely by using various data. We hereafter add some considerations and present hypotheses regarding the unusual phenomena discussed above, mostly relying on the results of empirical analyses conducted by staff members of the Research and Statistics Department for the last two years. We have already discussed how the financial system shock affected private consumption and business fixed investment in section 2. Therefore, we take up the following two important puzzles for further discussion; (i) the relationship between money and the economy, and (ii) the relationship between the output gap and prices.

[17] As the opportunity cost of holding cash has declined due to the zero interest rate policy, the monetary base is maintaining high growth compared to M2 + CD. From the same reason, the growth in M1 is showing double-digit growth.

(1) Magnitude of the financial system shock

As explained in section 2, indicators for the economy and money have moved in opposite directions since autumn 1997. In addition, among money stock, there were also different developments in the growth in M2+CD and in the monetary base. It is known that, although a relationship between certain macroeconomic variables is unstable in the short-run, there exists a stable relationship in the long-run (so-called "long-run equilibrium relationship" or "co-integration"). Therefore, it is essential to identify whether; (i) there is a weakening of relationship only in the short-run while long-run relationship remains intact, or (ii) the long-run equilibrium relationship itself breaks down, if we are to understand the magnitude of the financial system shock.

Based on the idea above, economists in the Department statistically tested these relationships by using Vector Error Correction Model (VECM), among seven major economic variables, including real GDP, M2 + CD, monetary base, CPI, stock prices, long and short-term interest rates.[18] The results were as follows (Chart 10):

(a) Using twenty years of data up to the third quarter of 1997 just before the serious financial system shock, they estimated VECM including seven major economic variables and found that five long-run equilibrium relationships existed[19]. In addition, it was also possible to make meaningful economic interpretation for those relationships, such as the money demand function, money multiplier etc.[20] During the same period, the parameters of VECM remained relatively stable.

(b) However, these long-run equilibrium relationships became unstable when one-year data series from the fourth quarter of 1997 was added.[21] The number of long-run equilibrium relationships decreased from five to three and they could not be specified. Looking at the stability test of parameters of VECM, the parameters of equation explaining the real GDP and those for M2+CD in particular changed significantly. This implies substantial changes in the reaction of the real GDP to M2+CD and interest rates etc., and the reaction of M2+CD to monetary base, interest rates and the real GDP etc.

These results imply that the financial system shock in autumn 1997 was substantial enough to change the existing long-run equilibrium relationship between money and the economy (more precisely, between monetary base and money supply, and between money supply and the economy). More concretely, these results can be interpreted to show that as a result of the financial system shock, (i) the increase in the monetary base

[18] This analysis was conducted by Tanaka, Hidenori (presently at Nagoya branch) and Kimura, Takeshi, Research and Statistics Department.

[19] Theoretically, in the case of seven variables, as many as 120 combinations of long-run equilibrium relationships could exist.

[20] In this analysis, in addition to the money demand function and the money multiplier, Fisher's formula of interest rates, term-structure of interest rates and discounted dividend model of stock prices were specified as long-run equilibrium relationships.

[21] Of course, it cannot be concluded that these long-run equilibrium relationships completely break down. Thus, it is possible that the long-run equilibrium relationship will emerge again if it is tested by adding data of several years after the removal of financial anxiety.

does not bring about an increase in broad money due to the malfunctioning of the credit creation mechanism and, (ii**)** the supply of money does not necessarily accompany an expansion of production activities for some reasons. With regard to (i), after the introduction of the "zero interest rate policy" from the beginning of 1999, the Bank of Japan supplied approximately 1 trillion yen as excess reserves, but banks have been reluctant to hold them. Moreover, the lending stance of private banks remains relatively cautious.[22] Considering these facts, the credit creation mechanism of private banks has not fully recovered yet. As for (ii), while the economy is picking up, the growth in money supply is slowing, suggesting that some structural changes may have occurred.

(2) Quantitative analysis of the precautionary demand and re-verification of the long-run equilibrium relationship between money and the economy

The results of analysis in 3 (1) suggest that the superficial relationship between money and the real economy has changed significantly since autumn 1997. We pointed out in section 2, based on various observations, that the growth of money during this period was influenced by the increase in liquidity held by economic agents from precautionary motives reflecting mounting uncertainty. If this view is correct, it is necessary to quantify the precautionary demand for money and re-examine whether the relationship between money and the economy became unstable even when taking precautionary demand into account.[23] Moreover, if we evaluate the movements of this precautionary liquidity demand, it may be possible to assess the meaning of the recent slowdown in money growth and whether the quantity of money is abundant compared to the economic activities.

Based on the idea above, Kimura and Fujita [1999], economists at the Research and Statistics Department, attempted to quantify precautionary demand for money and re-tested the long-run equilibrium relationship between money and the economy. They defined precautionary demand as "the liquidity demand of the private sector stemming from future uncertainty towards financing" and estimated the degree of uncertainty by using the Financial Position DI of firms in the *Tankan* survey.[24] Then, using VECM including money (M2 + CD) and GDP variables, they tested the long-run equilibrium

[22] Of course, the lending stance is recently improving compared with that in 1998 as observed in the *Tankan* survey (Chart 5).

[23] According to this view, the model in Section 3 (1) needs to be re-estimated because a variable for precautionary demand for liquidity is missing.

[24] Corporate financing DI can be expressed as 'Financing DI = Loan interest rate factor + Error term.' They considered that uncertainty towards financing could be captured as the variance of error term. More concretely, a time-series model, called TARCH (Threshold Auto-Regressive Conditional Heteroscedasticity), which assumes that the variance of the error term is heteroscedastic and asymmetric, was employed in this analysis.

relationship between money and the economy. The results were as follows (Chart 11):[25]

(a) Uncertainty towards financing (the proxy for precautionary demand for money) increased rapidly from the fourth quarter of 1997 when major financial institutions failed, and this was followed by a further rise during the second half of 1998. Uncertainty, however, began to recede rapidly from the start of 1999.
(b) Considering the precautionary demand, a long-run equilibrium relationship between money and the economy remained stable even when the data from the fourth quarter of 1997 was added.
(c) The money gap (the gap between equilibrium and actual money stock) without adjusting precautionary demand (which only considers the transaction demand for money: a concept similar to the *Marshallian k* <=M/PY>) showed a wide spread from 1998, suggesting significant excess supply of money. However, the one with the adjustment of the precautionary demand (which takes both the transaction and precautionary demand for money into account) was in a state of equilibrium during 1998, and then expanded widely from the beginning of 1999.

(3) Theoretical framework regarding impact of financial system shock on money and GDP.

On the basis of this empirical analysis, let us consider how financial system shock has influenced Japan's economy after autumn 1997 and how policies taken in those circumstances can be evaluated, using the conventional scheme of "IS-LM analysis" (Chart 12).

(a) Financial system shock exerts a negative impact on business fixed investment and private consumption, shifting the IS curve to the left.[26] At the same time, financial system shock creates a precautionary demand for money, which means heightened liquidity preference, thus increasing the demand for money under a constant GDP (Chart 12). This leads to a rise in interest rates under constant money supply, that is, a shift of the LM curve to the left. In other words, the financial system shock brings about "an unexpected monetary tightening" under a constant money growth. As a result of this leftward shifts of both the IS and LM curves, the real economy contracts significantly (Chart 12).
(b) The hypothesis that there was a substantial leftward shift of the LM curve is consistent with the upward pressure on interest rates on term instruments after the

[25] The simplified formula of estimated VECM is as follows:

Real money growth = $\alpha_m EC_{t-1}$+ a_mPast real money / GDP growth + b_mChange in real stock prices / Interest rates + c_mPrecautionary demand
Real GDP growth = $\alpha_y EC_{t-1}$ + a_yPast real money / GDP growth + b_yChange in real stock prices / Interest rates + c_yPrecautionary demand
EC = Real money -β_yReal GDP-β_sReal stock prices –β_DPrecautionary demand
EC indicates the error correction term (a money gap adjusting the precautionary demand).

[26] Financial system shock may also make the IS curve steeper, which means that investment becomes insensitive to changes in interest rates, as well as shifting the curve to the left.

financial system shock[27] and the tightening of corporate finance, particularly in the second half of 1998. The Bank of Japan attempted to prevent the leftward shift of the LM curve by providing ample funds. This can be confirmed, in the analysis above, by the fact that the money gap, with the adjustment of precautionary demand, did not contract but was in equilibrium on the whole during 1998. That is, ample supply of funds by the Bank avoided a drastic increase in interest rates on term instruments, and then led to the higher growth of money.

(c) The LM curve, on the other hand, shifted to the right from the beginning of 1999 owing to the zero interest rate policy after this February and the easing of financial anxiety reflecting the injection of public funds.[28] This point can be confirmed, in the analysis above, by the fact that the adjusted money gap became wide in 1999. This means that the effects of monetary easing are permeating further, that is, the effects of monetary easing are becoming full-scale. Also, in this process, the decline in interest rates on term instruments and a slowdown of money growth rate occur simultaneously, due to the decrease in the precautionary demand for money.

To quantify this, Kimura and Fujita [1999] attempted a simulation in which the precautionary demand for money from autumn 1997 (assuming that the demand would recede completely after two years) was added as an exogenous shock into the VECM estimated in 3 (2). The results were as follows (Chart13):

(a) Financial system shock pushes down GDP at the beginning (leftward shift of the IS curve) and at the same time, increases precautionary demand for money substantially, pushing down the adjusted money gap (shortage of money, large leftward shift of the LM curve).

(b) As a result of the decrease in the money gap (disequilibrium), such forces work as to restore the equilibrium. That is, they push GDP further down and increase the supply of money (the decline in velocity of money = the rise in *Marshallian k*).

(c) After about one year, as the precautionary demand for money decreases due to easing anxieties about the financial system and supply of money continues to increase, money gap comes to surpass a baseline (excess money, rightward shift of the LM curve).

(d) While excess money along with the decreased uncertainty leads to revitalization of corporate and household expenditures, money itself will turn to decrease (the rise in velocity of money = the decline in *Marshallian k*).

(e) GDP surpasses a baseline after about two years.

It should be emphasized that the simulation results do not necessarily guarantee a steady economic recovery, since they are based on various assumptions.[29] Our results,

[27] After autumn 1997, the degree of the leftward shift pressure of the LM curve was larger than that of the IS curve, resulting in upward pressure on interest rates.

[28] It is considered that the IS curve also shifts back to the right to some extent, in line with easing financial anxiety. An increase in public expenditures is also a factor in the rightward shift of the IS curve.

[29] For example, simulation results implicitly assume Keynesian effects: an increase in money leads to an increase in GDP through a decline in interest rates. The expansion of the money gap in 1999, however, has been partly caused by the fact that opportunity costs of holding money have declined to

however, provide useful framework to understand that the real economy and money may move in opposite directions with the outbreak and ease of financial system shock. On the basis of these results, it is necessary to recognize that money growth may slow during economic recovery, if the economy recovers as a result of the easing financial anxieties. After the currency crisis in November 1997, Korea also underwent a recession accompanied by a disturbance in the financial system. In that situation, the economy depressed although money growth rose, but as financial anxieties eased gradually from the start of 1999, the economy has recovered notably whereas money growth has slowed (Chart 14). This observation may support the above notion that the outbreak and ease of financial system shocks change the orthodox relationship between money and the real economy.

We would also add that, in a situation where money demand (the LM curve) becomes extremely volatile due to a financial system shock as was observed in autumn 1997, prices (interest rates) rather than quantitative indicators (money) should be targeted to implement monetary policy, as the classical paper by W. Poole [1970] showed thirty years ago.[30] That is, in the circumstances where the money demand becomes extremely volatile due to a shock on the financial side (the LM shock is extremely large), there is a high possibility that interest rates (real interest rates) will rise significantly and damage the economy when keeping money growth constant. Furthermore, since it is difficult to quantify and forecast to what extent such a shock fluctuates the demand for money, setting a proper target for money becomes an extremely tough task under such circumstances. Therefore, we may conclude that a policy that focuses on interest rates and promotes their decline is preferable (behind it, the supply of money increases).

4. A puzzle regarding price trends

Next, let us consider price developments during this period. It was generally thought that prices overall would decline significantly in 1999, due to the unprecedented large expansion of the output gap reflecting negative growth of the economy throughout 1998 and the decrease in wages from the second half of 1998. Japan's real GDP decreased by 2.5 percent in 1998, whereas the general perception on Japan's potential output growth lies somewhere around 1.5-2.0 percent. This fact implies GDP gap increased by 4

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almost zero as a result of the zero interest rate policy, meaning the relationship between interest rates and money becomes nonlinear. Hence, we cannot conclude that the present large money gap will lead to the economic recovery shown in the simulations.

As a technical problem, uncertainty towards financing = the precautionary demand for money shown in Chart 11, is a temporary shock which is not usually observed and thus, is rather close to a dummy variable. Therefore, the issue on how precisely the precautionary demand for money is measured leaves room for argument even if our interpretations are correct in terms of qualitative analysis.

[30] Poole [1970] showed that regarding the choice of monetary policy instruments, while large IS shocks militate in favor of targeting the money supply, large LM shocks militate in favor of targeting interest rates. Large negative IS shocks lead to a drop in the economy if interest rates are kept constant, since downward pressure is exerted on the real interest rates by the shocks. Therefore, a policy focusing on money is preferable in such circumstances (as a result, the interest rates decline).

percent or more within a single year! According to the standard economic theory, price developments are determined by the Philips curve relationship, in which the magnitude of the GDP gap in comparison with the NAIRU (Non-Accelerating Inflation Rate of Unemployment) plays a major role. [31] Then, it is by no means surprising that most economists thought the deflation on Japan's economy would further intensify in 1999.
On this point, domestic WPI (Wholesale Price Index) and CSPI (Corporate Service Price Index) did decline to a considerable extent. Their rates of decline, however, have not been noticeably large in comparison with the past. It should be noted that both WPI and CSPI include such technology-intensive goods and services as computers and telecommunications where the decline in prices is not an exception but rather a norm. In addition, year-to-year changes of CPI (Consumer Price Index; excluding perishables) have recently recovered to around zero after hitting the bottom in autumn 1998 (-0.5 percent in September 1998). Moreover, it seems that the recent relationship between CPI and the GDP gap shows considerable change compared with the past (Chart 15).
Why does not the relationship between the output gap and prices follow orthodox economic theories?[32] We suggest the following two hypotheses, although we have not yet reached a clear conclusion on this issue.

The first hypothesis is that the supply capacity of firms is getting smaller than that revealed by estimates using the "traditional method". The traditional method assumes production function with a maximum gross capital stock and labor input together with linear trends in technological innovation, and regards the difference between potential GDP calculated by the function and actual GDP as a GDP gap. Under the recent drastic change of economic structure, however, it is not unrealistic to assume that the ratio of obsolete equipment to gross capital stock counted statistically increases rapidly. Similarly, the value of human capital could have significantly decreased.[33] In these circumstances, the traditional method may overstate the potential GDP, leading to a considerable overestimation of the GDP gap.
From this point of view, economists at the Research and Statistics Department have tried to estimate the GDP gap, using various methodologies. Their results show different magnitudes of GDP gap estimates, implying the possibility that the traditional method overestimates the GDP gap (Chart16).[34] Although we cannot conclude which method is most appropriate, it is necessary to consider that there are larger degrees of errors in the estimation results of a GDP gap than before. In this respect, a recent paper by a FRB economist (Orphanides[1999]) is useful, which reported that the GDP gap in

[31] For instance, see Tanaka and Kimura [1998].

[32] Of course, actual consumer prices might be weaker than the CPI because of an upward bias in the CPI. If the recent change of relationship between a GDP gap and the CPI can be explained by a bias, it means there was a rapid expansion of an upward bias. This explanation, however, is not very persuasive unless the factors behind the widening bias are made explicit.

[33] Given the Japanese employment system, it is widely acknowledged that the nature of Japanese workers' skill can be understood as 'firm-specific human capital.' Then, under the recent dramatic changes in the industrial structure, such human capital may well have been significantly devaluated.

[34] This analysis is due mainly to Kasuya, Munehisa and Nishizaki, Kenji, Research and Statistics Department. For further details on GDP gap estimated assuming the stochastic trend for technological innovation, see Kasuya [2000].

the US had been consistently overestimated by wide margins during the course of 1970s when the potential output growth had slowed and the level of NAIRU had risen. According to the paper, these measurement errors were revealed only after years of lags. Then, it seems inappropriate to rely exclusively on the traditional Philips curve relationship when looking at price developments.

The second hypothesis is that firms deliberately have been changing their pricing-behavior after the financial system shock. As described above, while wages have been decreasing since the second half of 1998, prices seem to have stopped declining, which means that there has been an expansion of corporate margins (markups). In the past, it was widely noted that an aggressive pricing was one of the characteristics of Japanese corporate behavior where firms were trying to expand their profit not by keeping markups but by increasing market shares through price-cutting. This pricing-behavior may well be rational so long as the firms believe markets will expand rapidly.[35] However, the expected growth rate is decreasing under the continued severe recession and firms find financial difficulties in adopting aggressive sales expansion strategies. In these circumstances, it is not surprising that firms recently seem to put more emphasis on profit margins per unit rather than sales and market shares, which in turn seems to be affecting their pricing behavior. Although the decisive analytical results on this hypothesis have not been observed so far, it looks persuasive to some extent because of the following two reasons: (i) the survey confirms that firms are changing their behavior from focusing on quantitative expansion to the rate of return (Chart 17); (ii) interviews with firms suggest that among industries whose products are differentiated, firms facing a decrease in the expected growth rate and financial difficulties in sales expansion strategies, are not active in terms of price-cutting.
Of course, we do not claim that weak demand and lower expected growth always result in stable prices. The point we make here is that "downward pressure on prices stemming from sluggish demand may be partly offset by the significant changes in the firms' pricing-behavior when they anticipate slower growth in their product markets."[36] Moreover, it does not necessarily mean that the pricing-behavior of firms changes whenever the expected growth rate declines. As for this economic phase, it should be noted that various factors including changes in the environment surrounding corporate finance contribute to the significant change in firms' behavior.

To judge how accurate these hypotheses are, we need to observe economic and price trends for some time. Therefore, they are presented as "ideas" in this paper.[37]

[35] According to microeconomic theory, in cases where switching cost exists regarding the choice of products because of product differentiation or other reasons, price-cutting to expand market share is thought to be rational although short-term profits are sacrificed, provided that (i) future growth of the market is expected and (ii) manufacturing costs are expected to decrease in the long-run as a result of technological progress.

[36] A decline in prices cannot be stopped solely by changes in the pricing-behavior of firms when the expansion in the output gap is too rapid. In this sense, the explanation should be taken as the joint hypothesis together with the previous argument suggesting that "the output gap did not expand as much as it seemed."

[37] Except for the above, Japan's CPI might have a downward rigidity. Based on the distortion of price fluctuations, Kasuya [1999] calculated the weights of items that have strong downward

Nevertheless, it should be pointed out that the view that Japan's economy is still in a serious deflation is not necessarily correct in terms of the price trends explained above. In addition, it should be noted that the CPI developments in Japan are not distinctively low, when compared to Germany and France (Chart 18). Of course, it is undeniable that Japan's prices are on the deflationary side if anything, considering the upward bias of the CPI.[38] We also note that a potential downward pressure remains in prices under circumstances that clear signs of a self-sustained recovery in private demand have not yet been observed and wages continue to fall, as indicated in "The Bank's view on recent economic and financial developments" determined by the Policy Board, Bank of Japan, at the Monetary Policy Meeting.

5. Concluding remarks

We have examined Japan's financial and economic developments after the financial system shock in autumn 1997, taking up some empirical analyses. A brief summary highlights as follows:

(a) Developments in the real economy after the financial system shock in autumn 1997 have had strong interactions with financial developments. In particular, when global concern over credit risks was heightened in the second half of 1998, the deterioration of the economy and tightening of financial condition created a vicious circle. From the start of 1999, opposite developments have been observed, due to an easing of financial anxiety.

(b) Looking at the relationship between money and the economy during this period, the growth in money increased while the real economy depressed during 1998, but it started to decelerate as the economy started picking up in 1999. Thus, in the last two years, they have shown a relationship that is largely different from the traditional one.

(c) This is influenced by the rise and fall in the precautionary demand for money (the leftward and rightward shift of the LM curve) along with the mounting and easing of financial anxiety. This interpretation can be supported by empirical analysis.

(d) In terms of monetary policy, the Bank of Japan supplied ample funds to meet the increase in precautionary demand and tried to suppress overall interest rates during 1998. In 1999, precautionary demand has declined as financial anxiety has receded and the Bank continues to supply further ample funds. As a result, interest rates have decreased further and various risk premiums are also contracting in the financial market. Thus, the effects of monetary easing are becoming full-scale.

(e) As for price trends, a sharp decline has not been observed although the output gap has expanded. We suggest the following two hypotheses as its background; (i) firms change pricing behavior and are focusing on the rate of margin and (ii) the output gap calculated based on the traditional method is overestimated.

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rigidities out of all 580 items of the CPI. The results indicated that at least, around 20 percent of all items have downward rigidity.

[38] Shiratsuka [1999] indicated that Japan's CPI has an upward bias (measurement errors) of 0.9 percent on average.

Opinions may differ from the views expressed herein. In addition, under the conditions in which various structural problems exist and corporate restructuring exerts downward pressure on the economy, the effects of monetary easing alone cannot bring about a self-sustaining recovery led by private demand. We hope this paper will be of some help in discussions regarding Japan's economy.

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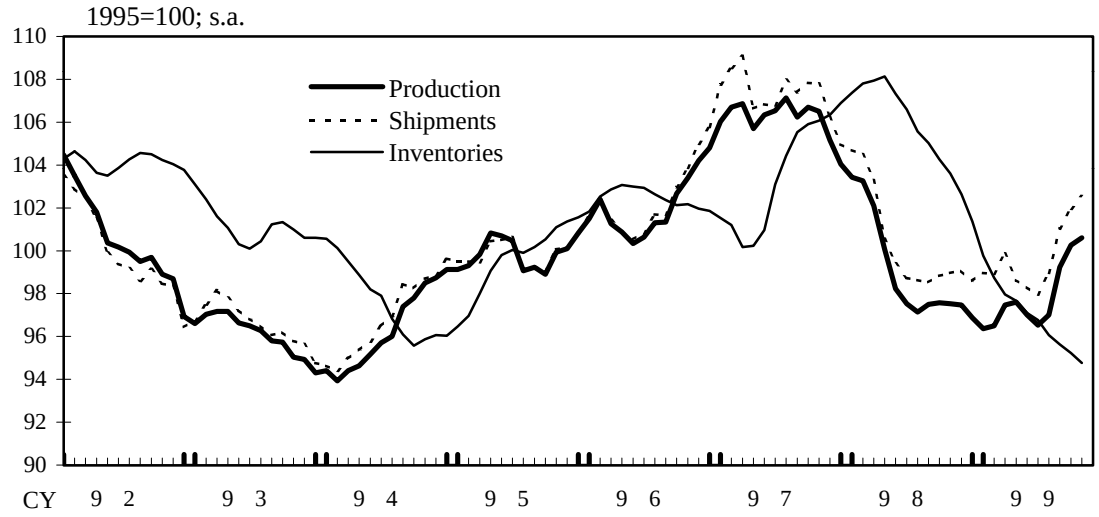
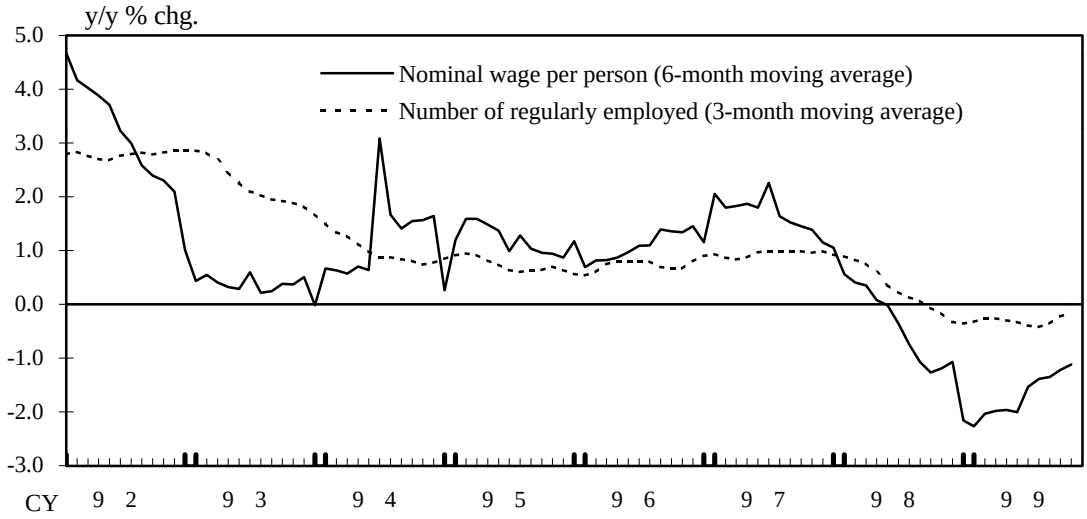
Production, Labor, and Supply-Demand Conditions

(1) Production, Shipments, and Inventories

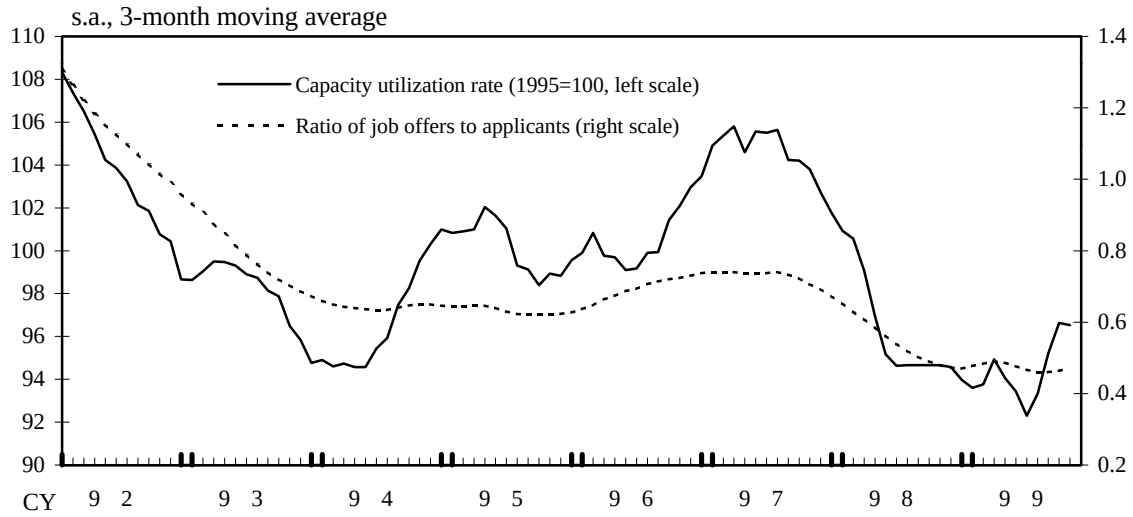


(2) Compensation of Employees



Note: Data for establishments with at least 5 employees.

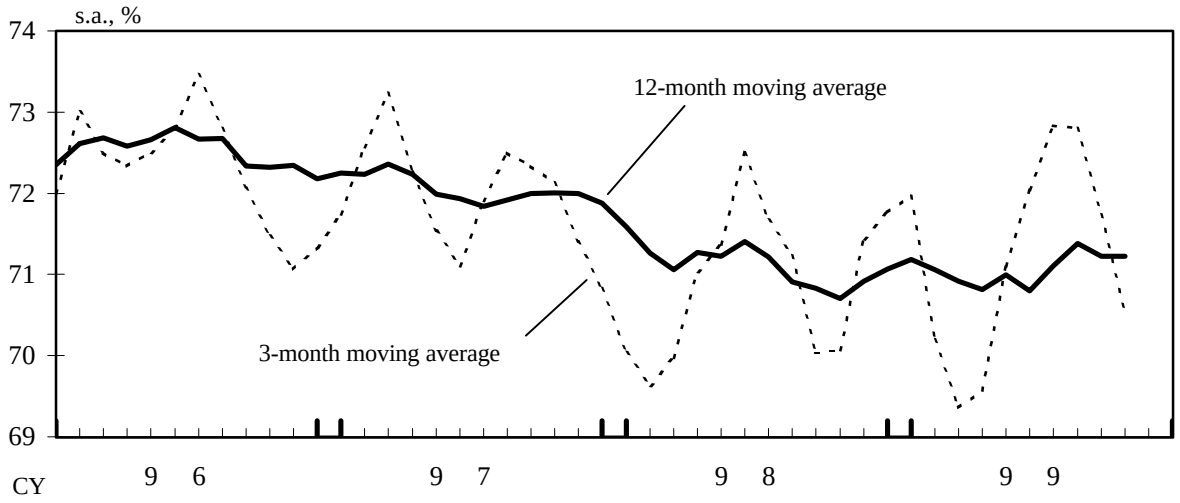
(3) Supply-Demand Conditions



Sources: Ministry of International Trade and Industry, "Indices of Industrial Production";
Ministry of Labor, "Monthly Labor Survey", "Report on Employment Service."

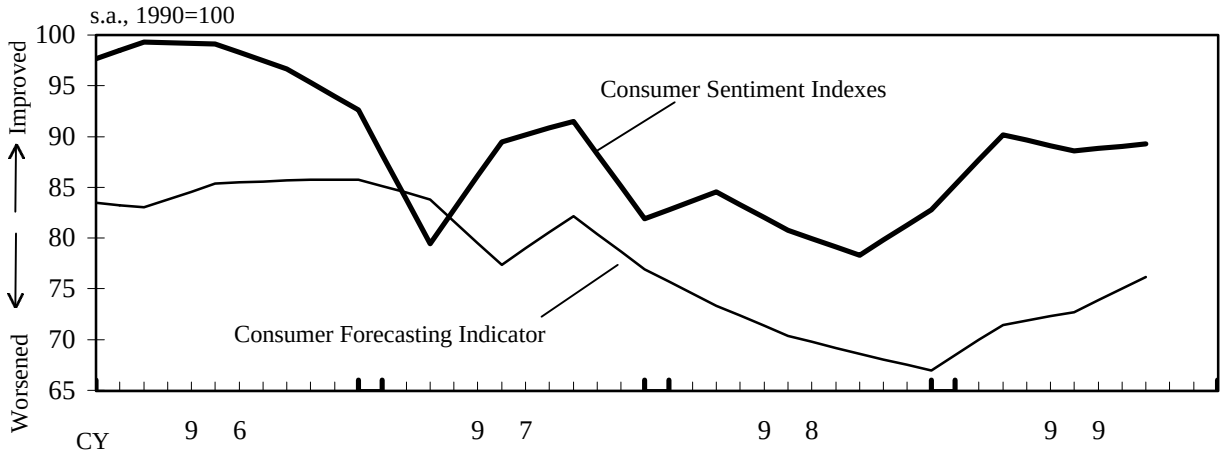
Consumer Confidence and Propensity to Consume

(1) Propensity to consume (Family Income and Expenditure Survey)



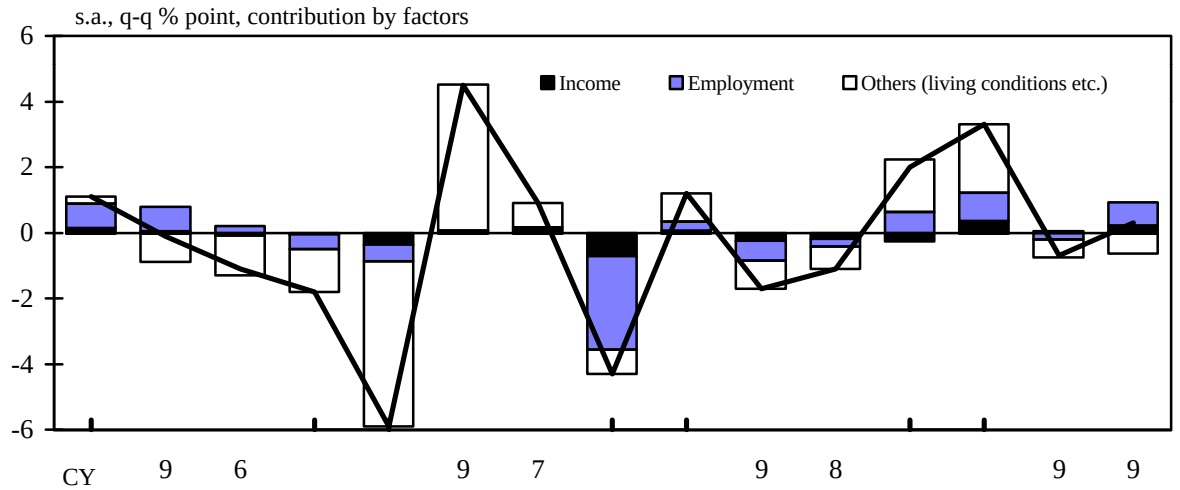
Note: Seasonally adjusted by Management and Coordination Agency.

(2) Surveys on consumer confidence



Notes: 1.Seasonally adjusted by X-11. "Consumer Sentiment Indexes" is seasonally adjusted by Economic Planning Agency.
2.Consumer Sentiment Indexes and Consumer Forecasting Indicator are based on surveys on consumer confidence.
3.Consumer Sentiment Indexes is surveyed by Economic Planning Agency, "Consumer Forecasting Indicator" by Nikkei RIM.

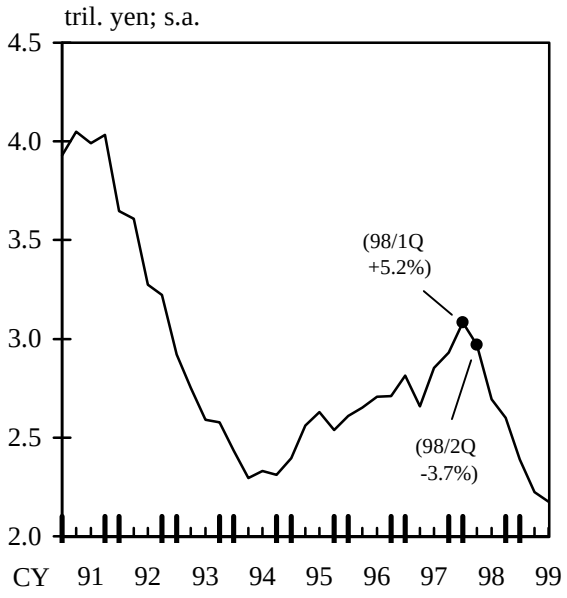
(3) Consumer Sentiment Index



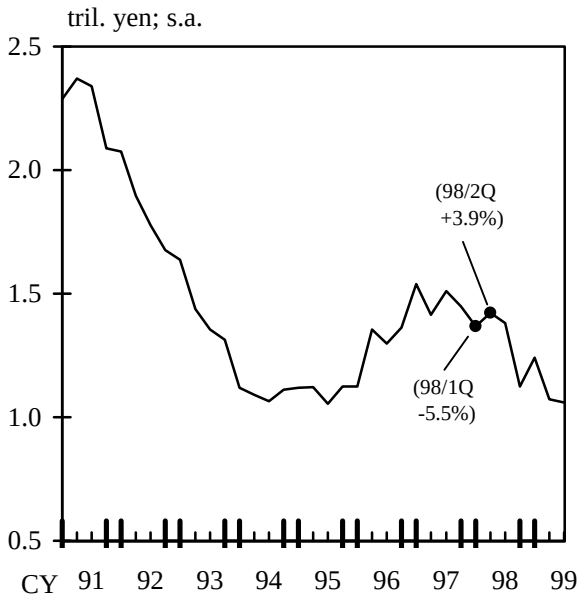
Note: All inquires are about consumers' prospects over coming six months.
Sources: Economic Planning Agency, "Consumer Behavior Survey";
Nikkei Research Institute of Industry and Markets (Nikkei RIM), "Consumption Forecasting Indicator";
Management and Coordination Agency, "Monthly Report on the Family Income and Expenditure Survey."

Business Fixed Investments by Industry and Scale

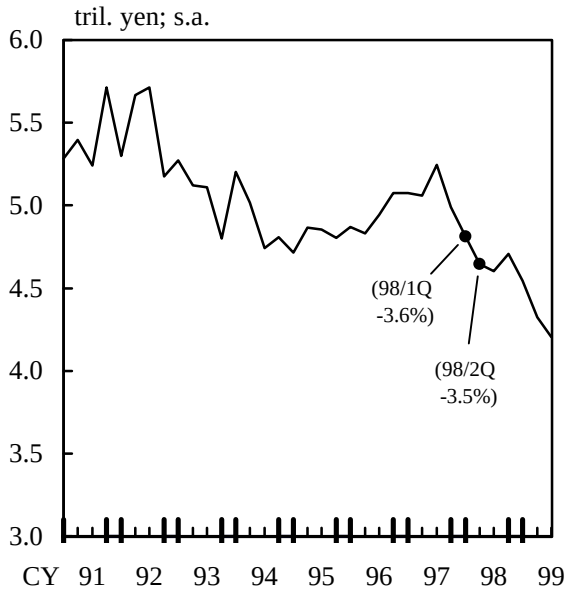
Manufacturing large firms



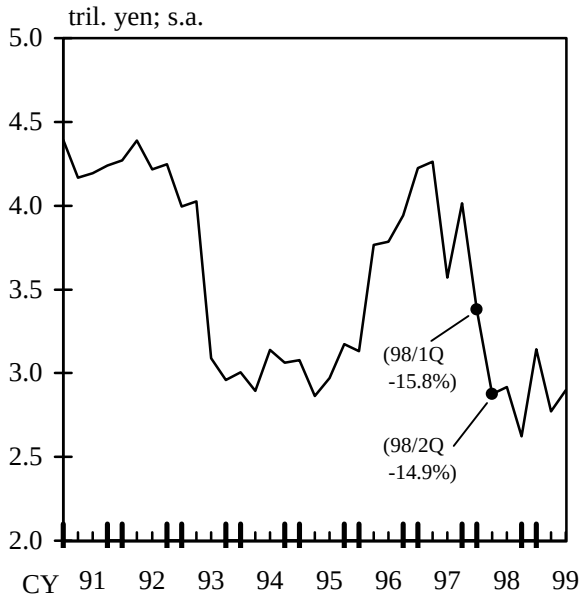
Manufacturing medium and small firms



Nonmanufacturing large firms



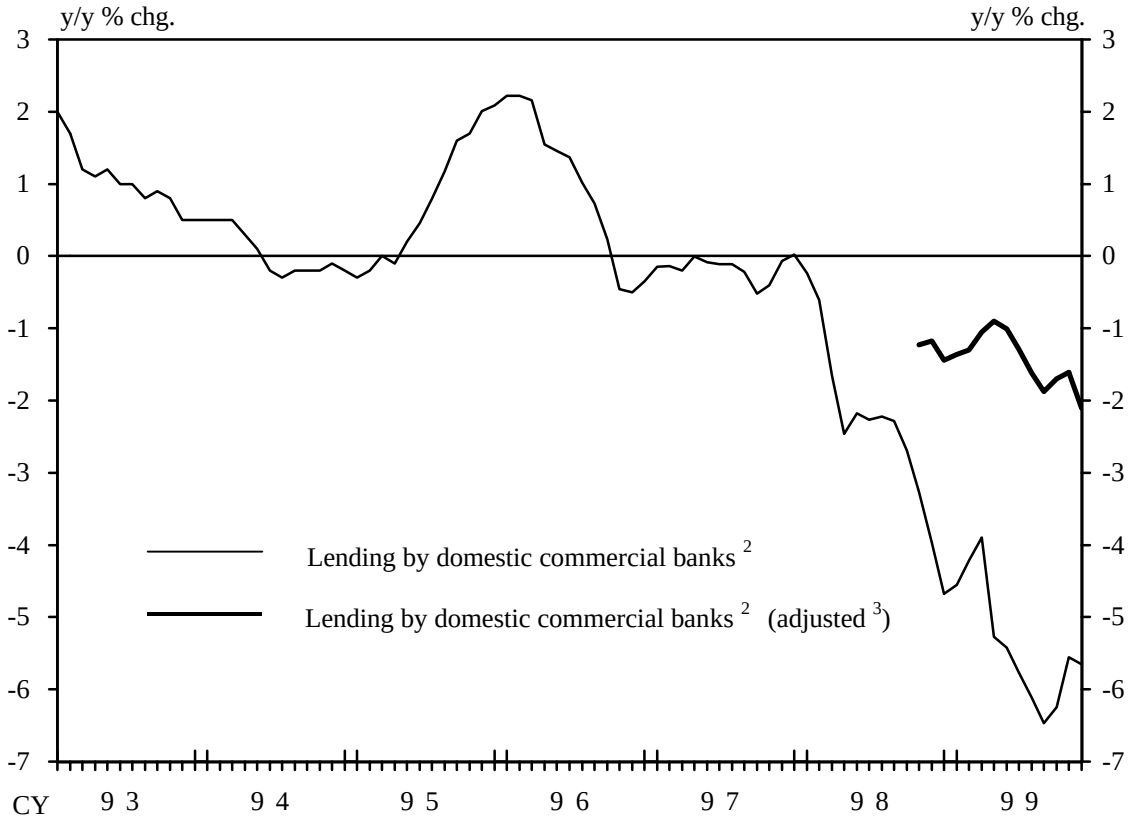
Nonmanufacturing medium and small firms



Note: "Large Firms" refers to firms with stockholders' equity of 1 billion yen or more, and "Medium and small Firms" refers to firms with stockholders' equity of 10 million or more but less than 1 billion yen.

Source: Ministry of Finance, "Financial Statements Statistics of Corporations by Industry, Quarterly."

Lending by Domestic Commercial Banks

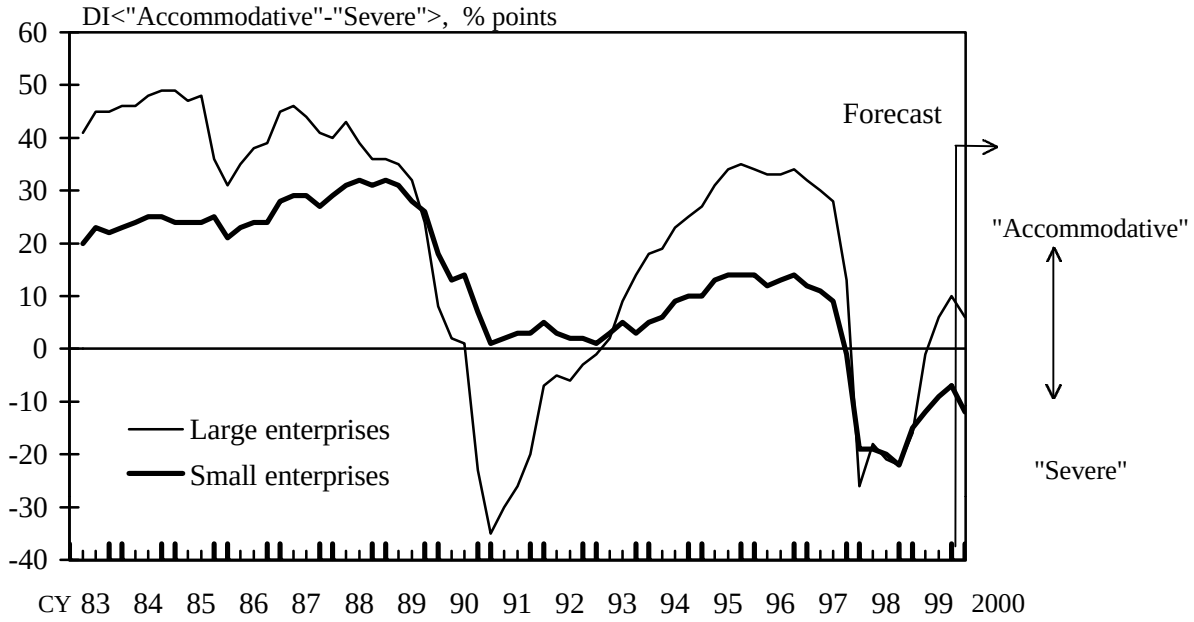


Notes: 1. Percent changes in average amounts outstanding from a year earlier.
2. "Domestic commercial banks" refers to member banks of the Japanese Bankers Association which consists of city banks, long-term credit banks, trust banks (excluding foreign-owned trust banks and trust banks that started business after October 1993), the member banks of the Regional Banks Association of Japan (regional banks) and the member banks of the Second Association of Regional Banks (regional banks II).
3. Adjusted to exclude
(1) fluctuations from the liquidation of loans,
(2) fluctuations in the yen value of foreign currency-denominated loans due to changes in exchange rates,
(3) fluctuations from loan write-offs,
(4) the transfer of loans to the former Japan National Railways Settlement Corporation to the General Account, and
(5) the transfer of loans to the former Housing Loan Administration Corporation to the Resolution and Collection Corporation.

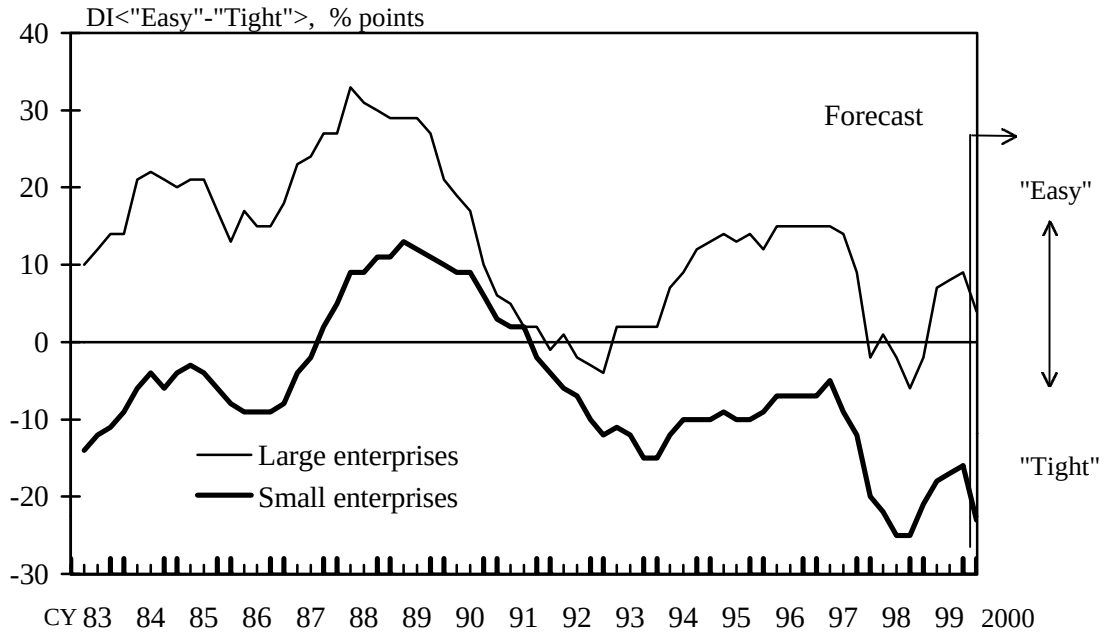
Source: Bank of Japan, "Principal Figures of Financial Institutions."

Corporate Finance-Related Indicators in the *Tankan* (December 1999)

(1) Lending Attitude of Financial Institutions



(2) Financial Position

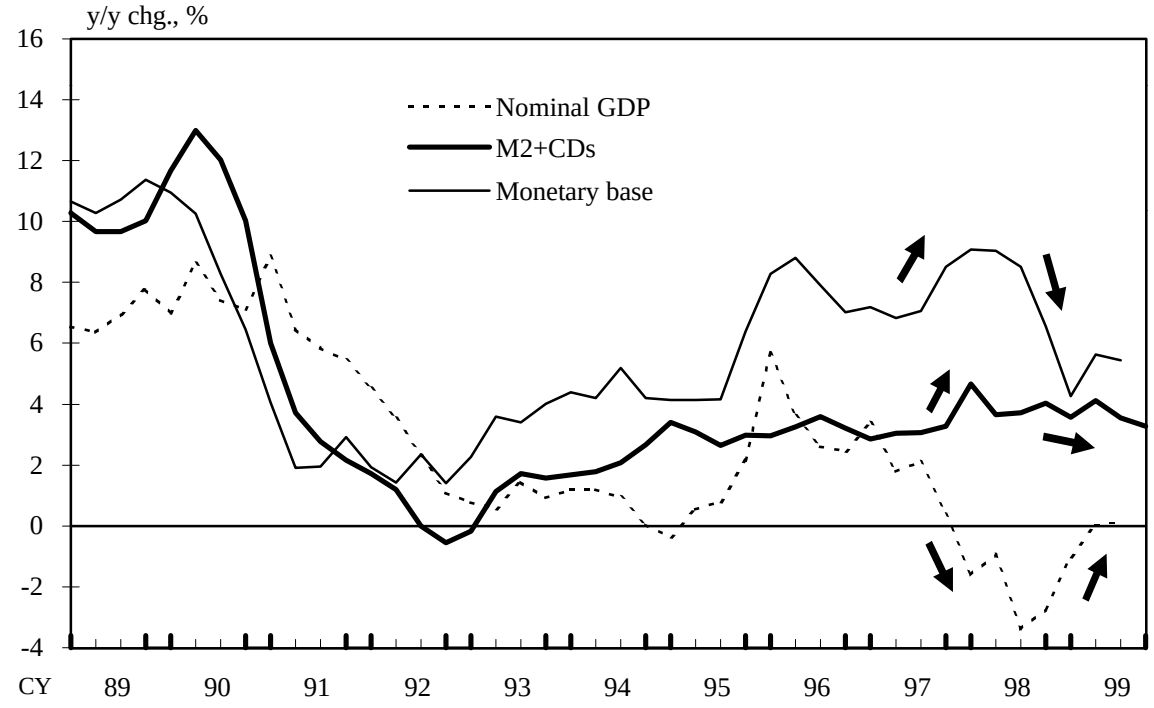


Note: Figures before December 1998 are based on the pre-revision *Tankan* , and those of March 1999 are based on the post-revision *Tankan* .

Source: Bank of Japan, "*Tankan* Short-term Economic Survey of Enterprises in Japan."

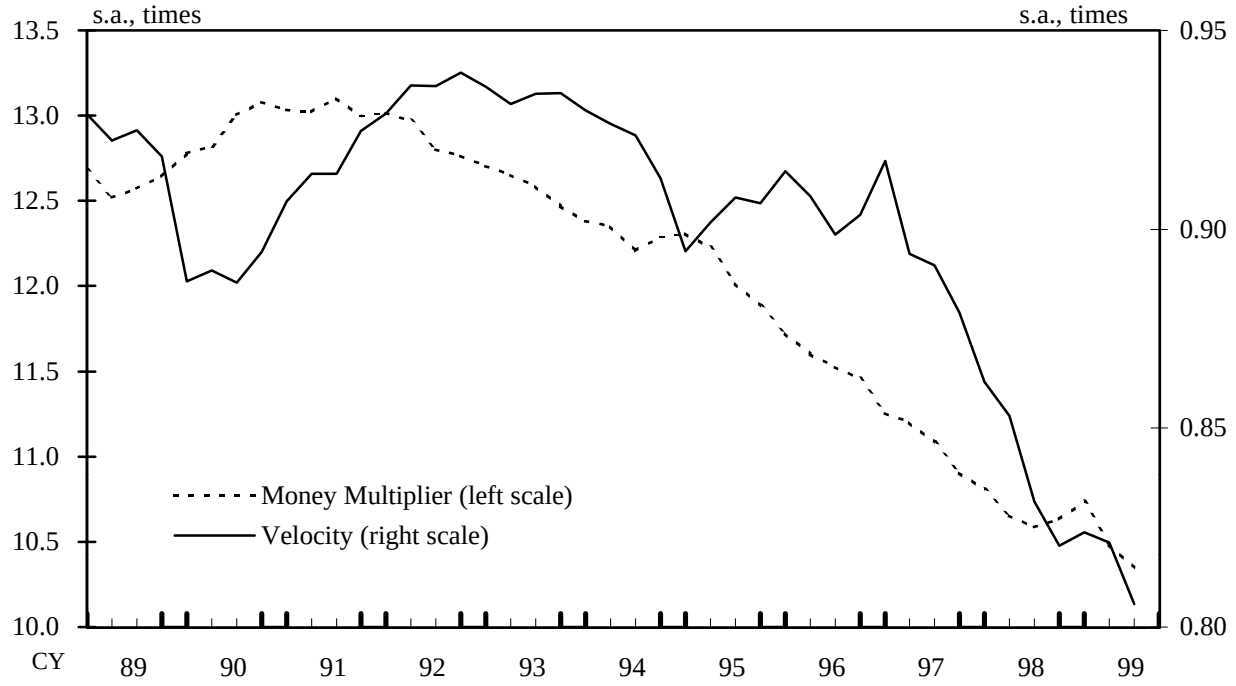
Money Stock

(1) Money Stock and Nominal GDP



Note: Data of M2+CDs for 99/4Q are Oct-Nov average.

(2) Money Multiplier and Velocity

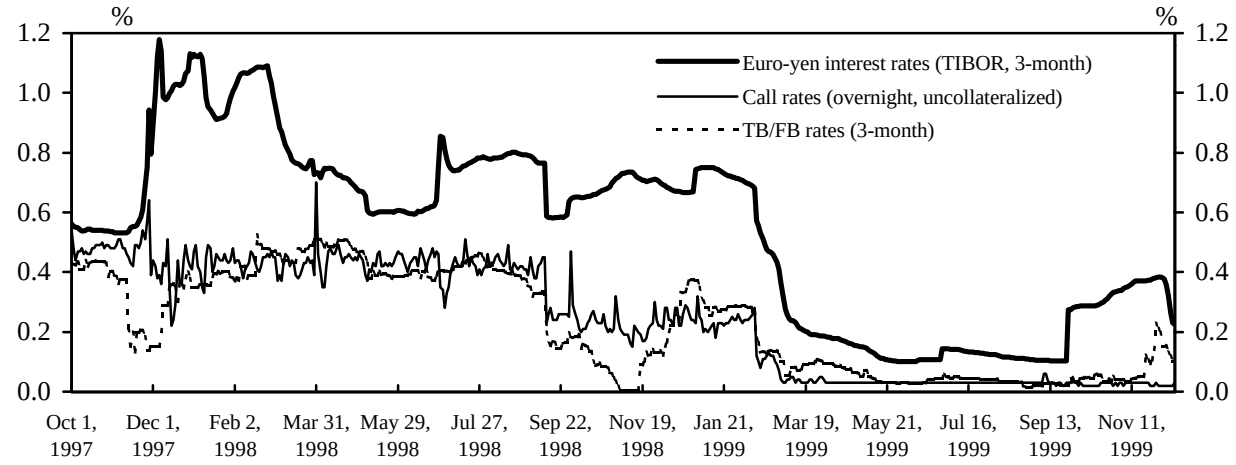


Note: Money multiplier = (M2+CDs)/monetary base
Velocity = nominal GDP/(M2+CDs)
Monetary base = cash currency in circulation+reserves (reserve requirement rate change adjusted)

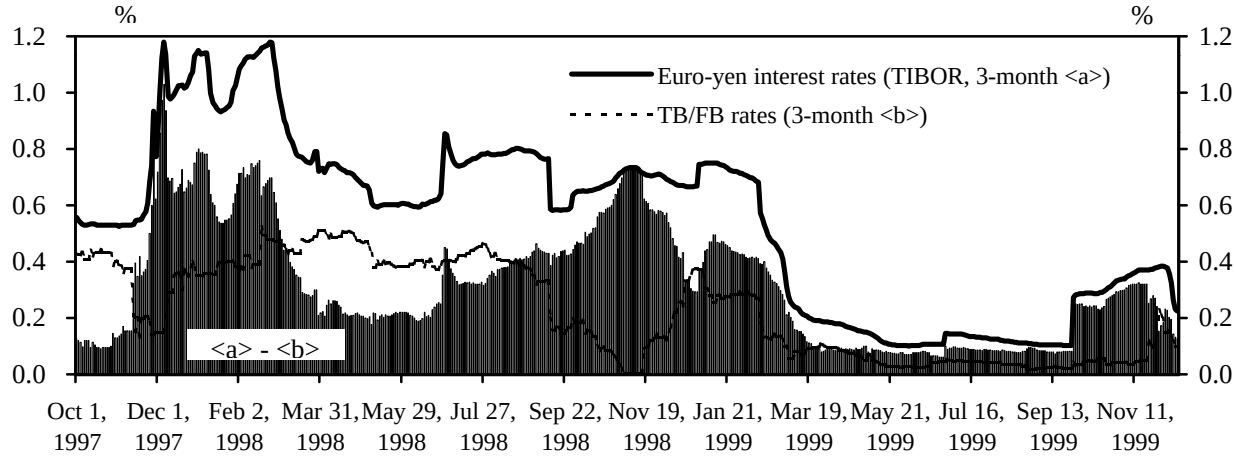
Sources: Bank of Japan, "Economic Statistics Monthly";
Economic Planning Agency, "National Income Statistics."

Short-Term Money Market Rates

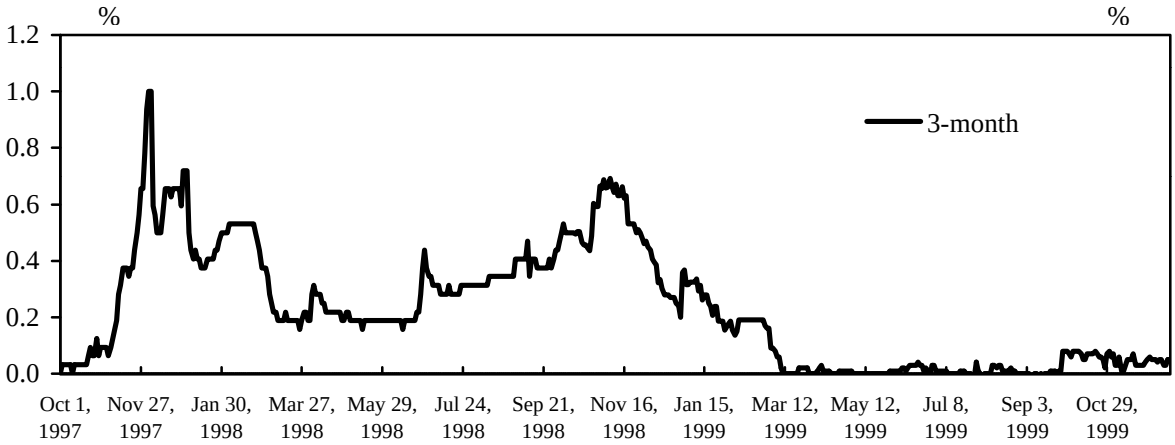
(1) Interest Rates on Term Instruments



(2) Yield Spread



(3) Japan Premium in the Eurodollar Market

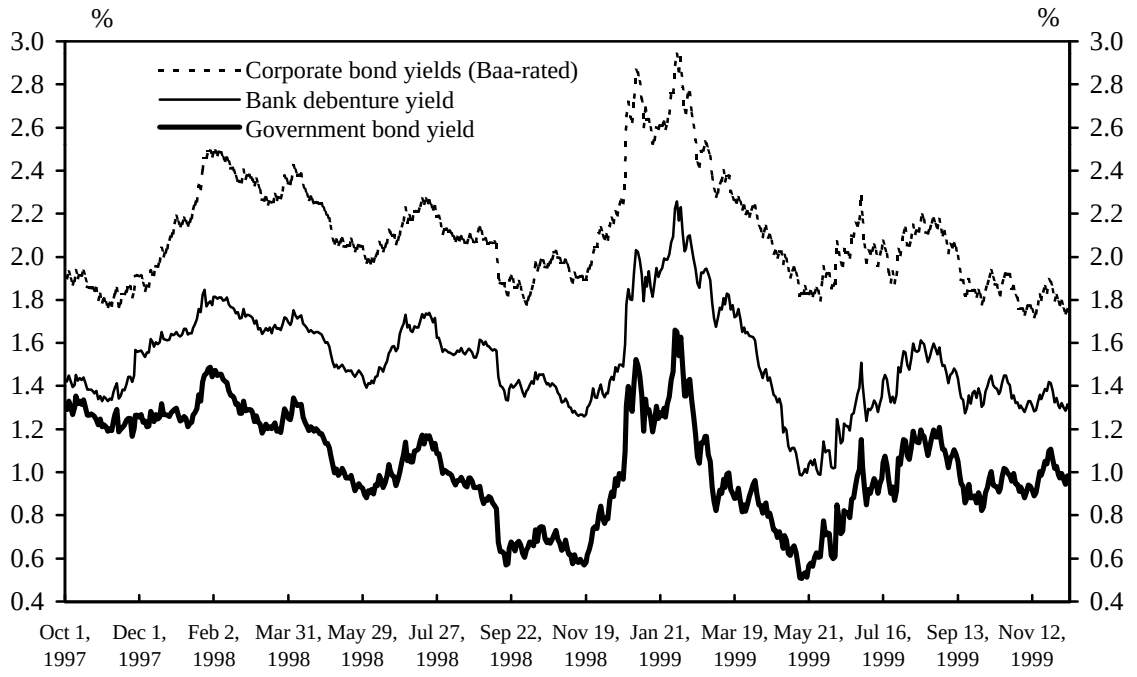


Note: Japan premium is an extra expense Japanese banks must pay for raising funds in overseas financial markets. Japan premium in this chart is calculated as follows: Japan premium = interest rate quoted by Bank of Tokyo-Mitsubishi - interest rate quoted by Barclays Bank in the Eurodollar market (London).

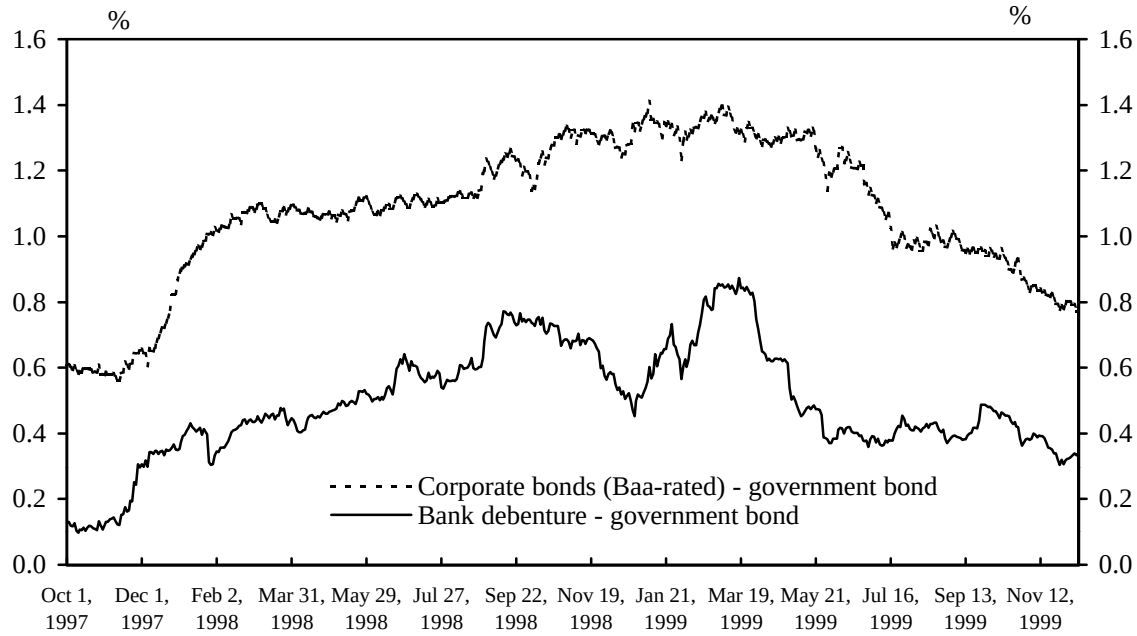
Sources: Bank of Japan; Japanese Bankers Association; Japan Bond Trading Co., Ltd; British Bankers' Association (BBA).

Yields of Bank Debentures and Corporate Bonds

(1) Bond Yields (5-year)



(2) Yield Spread

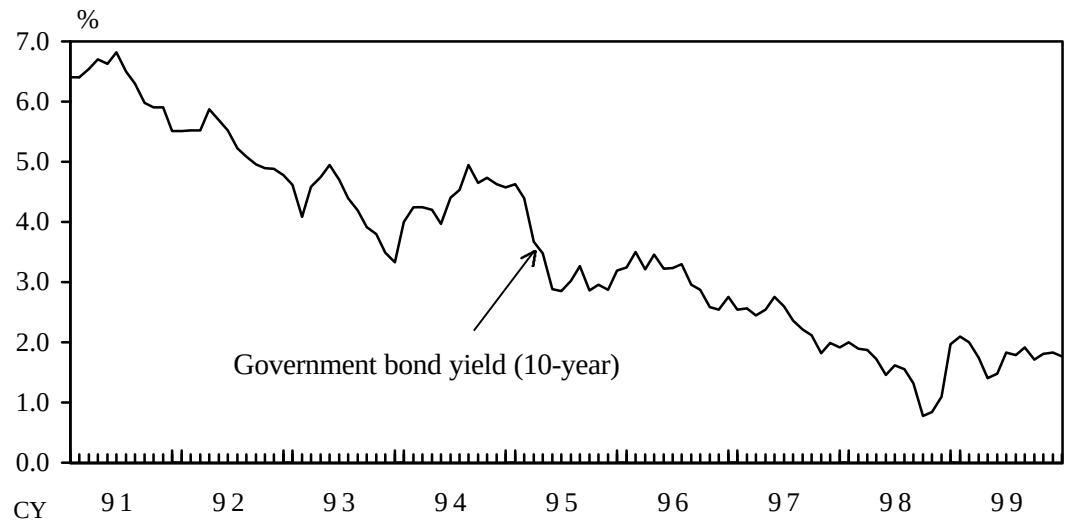


Note: The indicated ratings are of Moody's Japan K.K.

Source: Japan Securities Dealers Association, "Over-the-Counter Standard Bond Quotations."

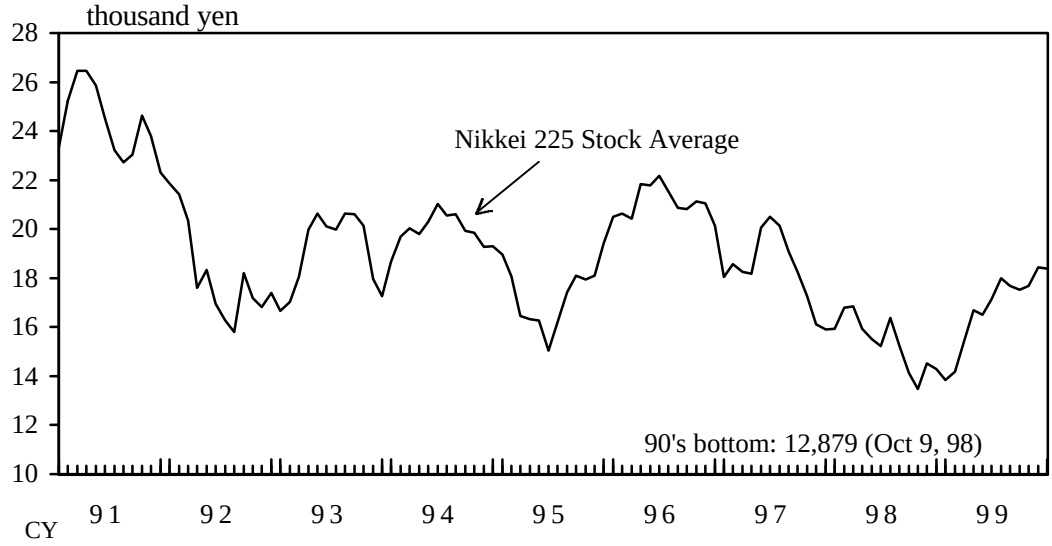
Long-Term Interest Rates, Stock Prices and Exchange Rates

(1) Long-Term Interest Rates



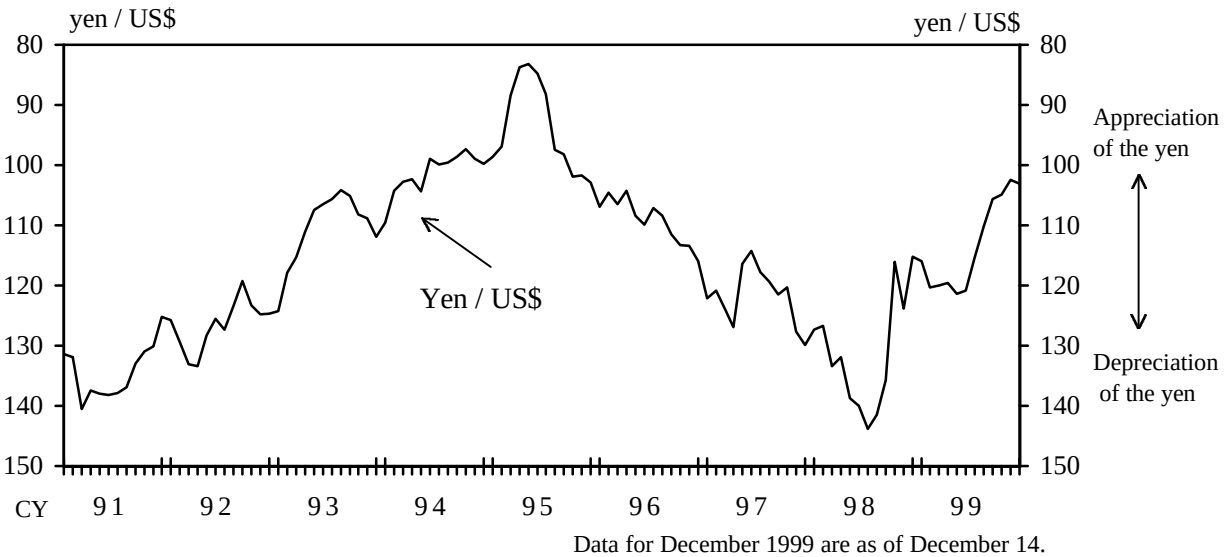
Data for December 1999 are as of December 14.

(2) Stock Prices



Data for December 1999 are as of December 1-14 average.

(3) Exchange Rates



Data for December 1999 are as of December 14.

Sources: Tokyo International Financial Futures Exchange; *The Nihon Keizai Shimbun*; Bank of Japan.

Verification of Long-run Relationships Using Seven Variables VECM

(1) Result of Cointegration Test

Hypothesized Number of Cointegrating Equation(s)	Sample Period	
	77/1Q - 97/3Q	77/1Q - 98/3Q
None	226.11 **	217.77 **
At most 1	150.16 **	145.51 **
At most 2	98.74 **	96.79 **
At most 3	65.62 *	58.33
At most 4	43.86 *	31.61
At most 5	23.15	12.38
At most 6	6.24	2.37

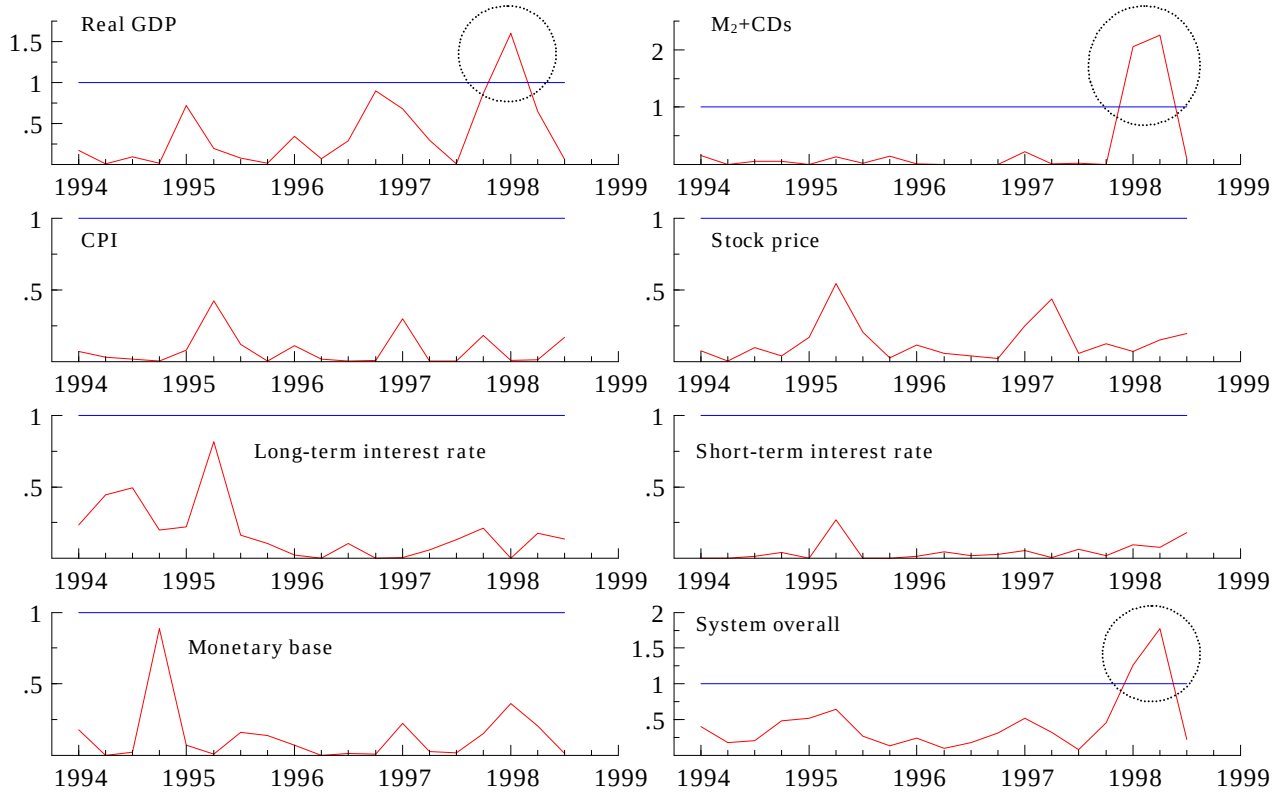
Legend: In the sample period 77/1Q-97/3Q, the null hypothesis “At most 5” is not rejected after rejection of all hypotheses from “None” to “At most 4” at 5% significance level. Thus, we can judge that the number of cointegration is five.

Notes: 1. This result is obtained from the trace test of Johansen's cointegration test.

2. ** indicates rejection of null hypothesis at 1% significance level and * indicates rejection of null hypothesis at 5% significance level.

3. Number of lags is set as three.

(2) Result of Stability Test (One-Step Chow Test)

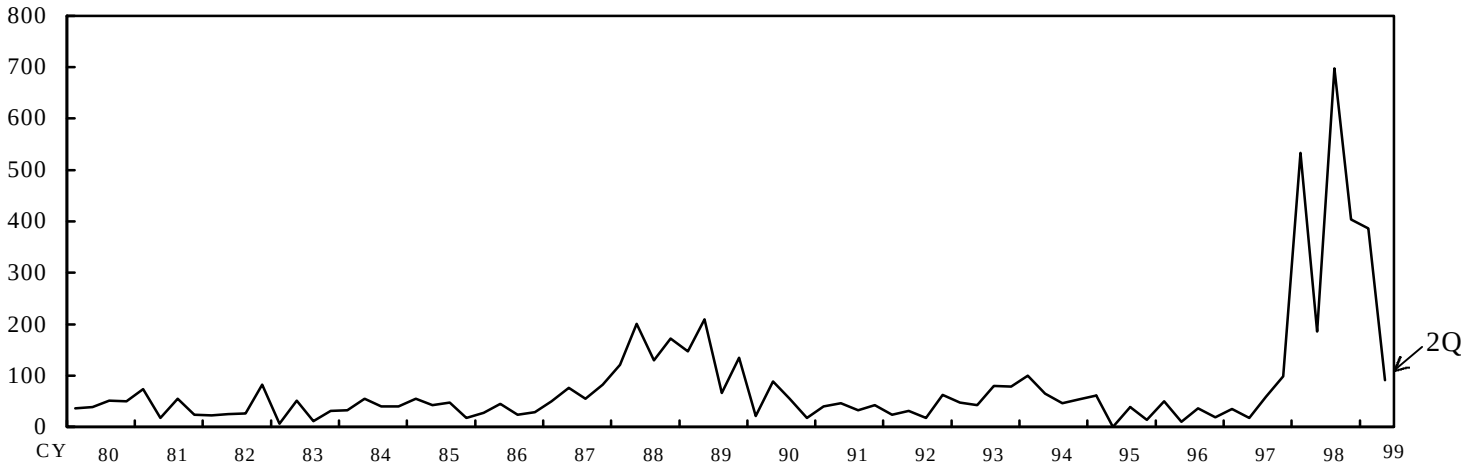


Notes: 1. Chow test examines stability of parameters estimated. The ways of Chow test are categorized to One-step Chow test, Break-point Chow test and Forecast Chow test from the difference in a base sample period of estimation.

2. We also tested the same sample using both Break-point Chow test and Forecast Chow test and obtained almost same results as those of One-step Chow test shown above.

Uncertainty towards Financing (Precautionary Demand for Money)

Uncertainty towards Financing (Conditional Variance h_t^2 of TARCH Model)



Notes: We estimated volatility of DI of Financial Position of firms from TANKAN as a proxy of uncertainty towards financing, using TARCH Model (Threshold Auto-Regressive Conditional Heteroscedasticity Model).

From the result of estimation, we find that volatility of next period's DI increases as the magnitude of current shock to DI increases. Moreover, in case of negative shock to DI, volatility of next period's DI becomes greater than in case of positive shock.

$$DI_t = -5.129 + 0.054\, rate_t - 0.059\, rate_{t-1} + e_t$$
(-8.615) (9.500) (-10.270)

$$h_t^2 = 39.070 + 0.937\, e_{t-1}^2 + 0.850\, e_{t-1}^2 d_{t-1} - 0.678\, h_{t-1}^2$$
(7.466) (5.101) (2.503) (-8.401)

where, $d_t = 1$ for $e_t < 0$, $d_t = 0$ for $e_t \geq 0$.

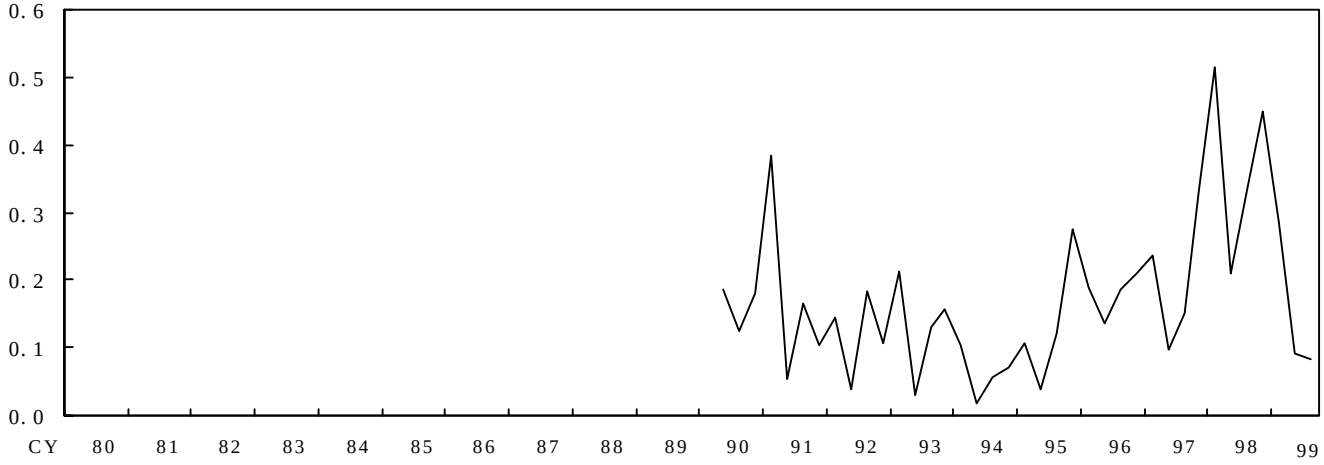
Sample period : 76/2Q-99/3Q,

DI_t : DI of Financial Position of firms from TANKAN,

$rate_t$: DI of Change in Interest Rate on Loan from TANKAN (accumulated figures starting 76/1Q),

values in parentheses are t-values.

Yield Spread (CD rate – TB rate)



Long-run Equilibrium Relationship between Money and GDP (Adjusted by Precautionary Demand for Money)

(1) Formula of Two Variables VECM (Simplified Formula)

Real Money growth = $a_m EC_{t-1}$ + a_m Past Real Money / GDP growth + b_m Change in Real Stock Price / Interest Rate + c_m Precautionary Demand

Real GDP growth = $a_y EC_{t-1}$ + a_y Past Real Money / GDP growth + b_y Change in Real Stock Price / Interest Rate + c_y Precautionary Demand

EC = Real Money - b_yReal GDP - b_sReal Stock Price - b_D Precautionary Demand

… EC indicates Error Correction Term (Money Gap adjusted by Precautionary Demand)

(2) Results of Cointegration Test

Cointegration in both periods

	Johansen's Cointegration Test		Parameters estimated				
	Maximum Eigenvalue Test	Trace Test	b_y	b_s	b_D	a_m	a_y
Sample Period 80/1Q - 97/3Q	16.60*	20.31**	1.458	0.072	0.474	-0.098	0.245
	(14.10)	(15.40)	(0.038)	(0.017)	(1.291)	(0.072)	(0.080)
Sample Period 80/1Q - 99/2Q	17.43*	22.58**	1.500	0.053	1.819	-0.086	0.228
	(14.10)	(15.40)	(0.035)	(0.014)	(0.671)	(0.063)	(0.069)

Notes: 1. Values in parentheses at "Johansen's Cointegration Test" columns are critical values at 5% significance level. ** indicates rejection of null hypothesis (= there is no cointegration) at 1% significance level and * indicates rejection of null hypothesis at 5% significance level.

2. Values in parentheses at "Parameters estimated" columns are standard errors.

3. Number of lags is set as 4 obtained from Likelihood Test.

4. Cointegration Vector b_D and its standard error are shown in 10000 times multiplied.

(3) Money Gap adjusted by Precautionary Demand for Money

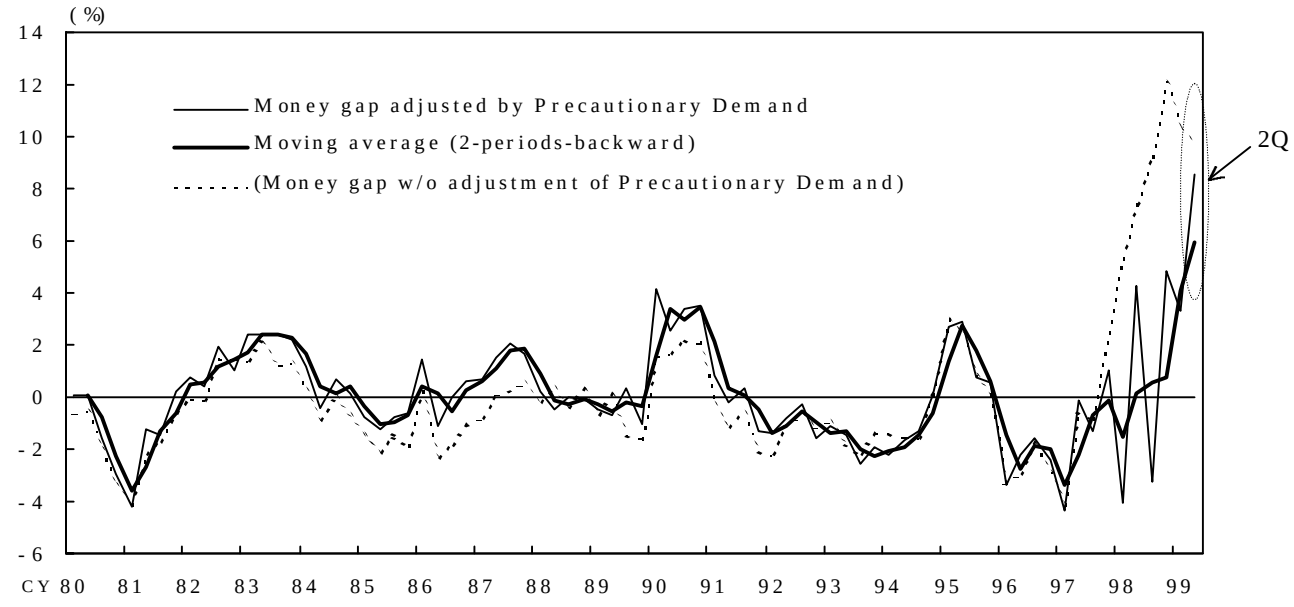
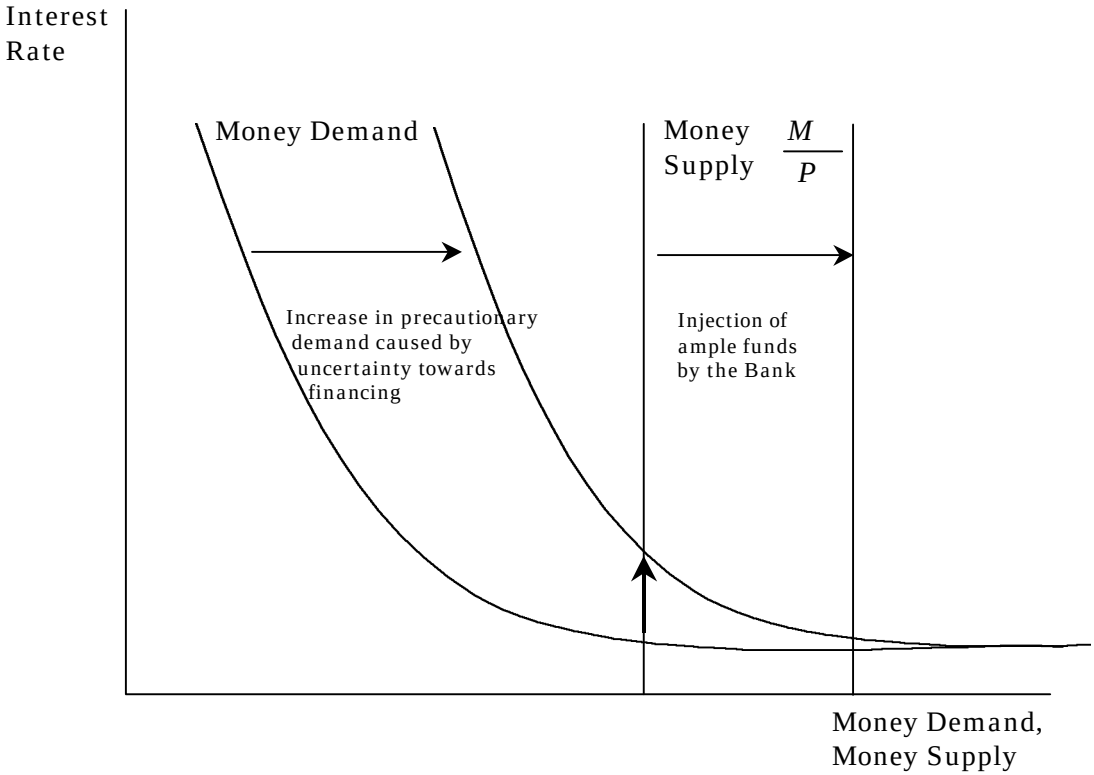


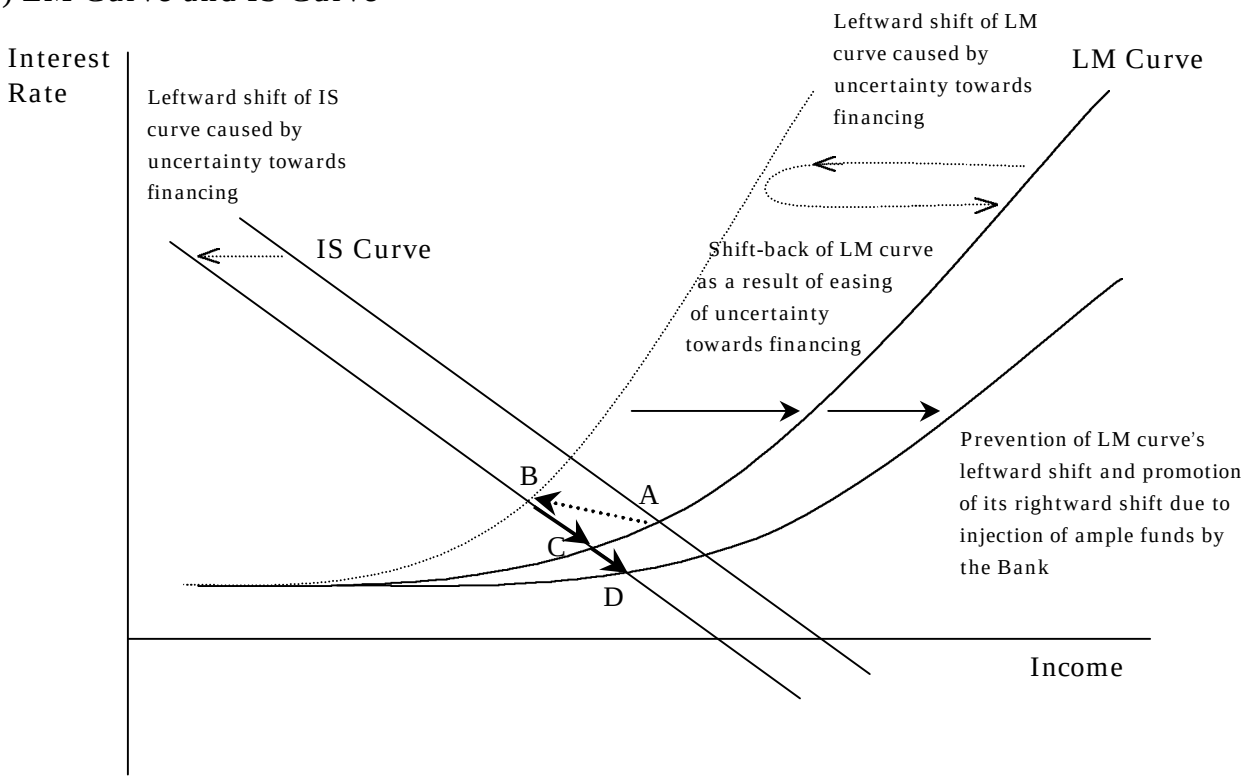
Chart 12

Impact of Financial System Shock (IS-LM Framework)

(1) Liquidity Preference

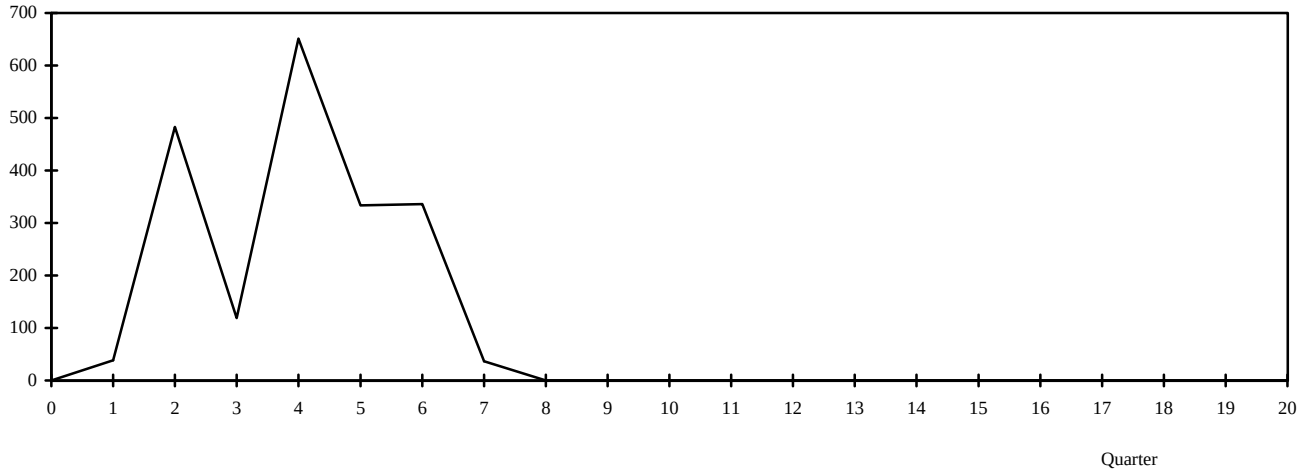


(2) LM Curve and IS Curve

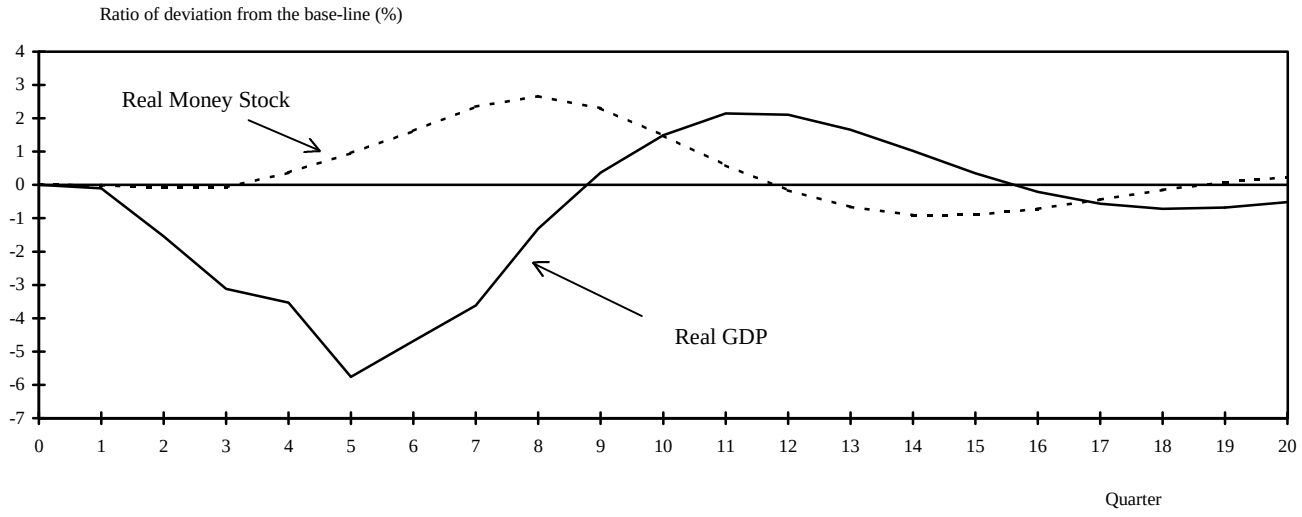


Impact of Financial System Shock (VECM Dynamic Simulation)

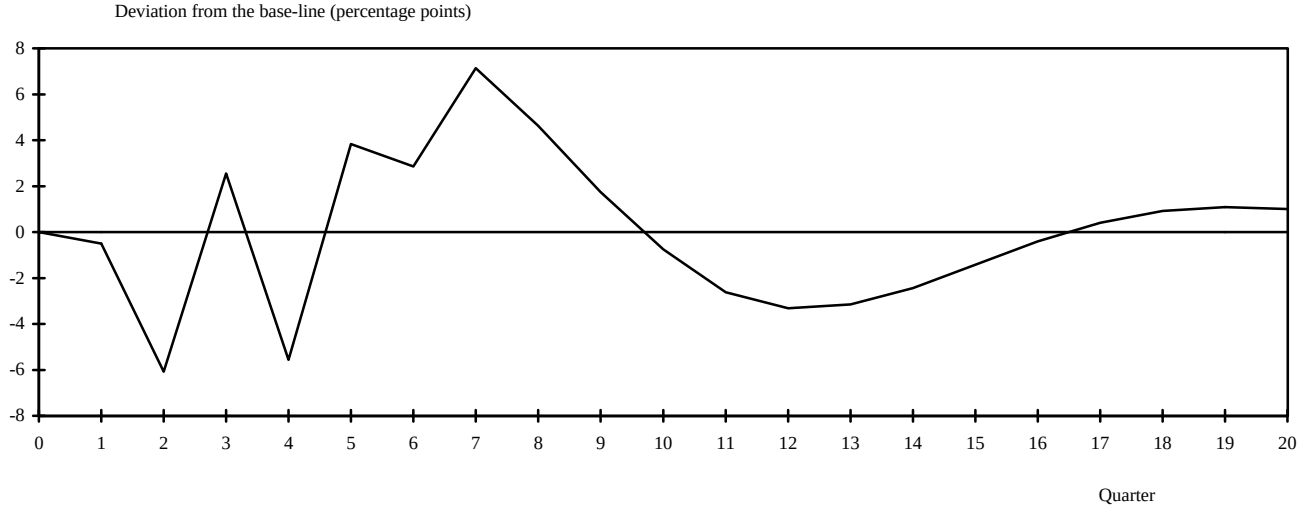
Financial System Shock (Precautionary Demand for Money)



Real GDP and Real Money Stock (M_2+CDs)



Money Gap adjusted by Precautionary Demand



Money Stock and GDP (Korea)

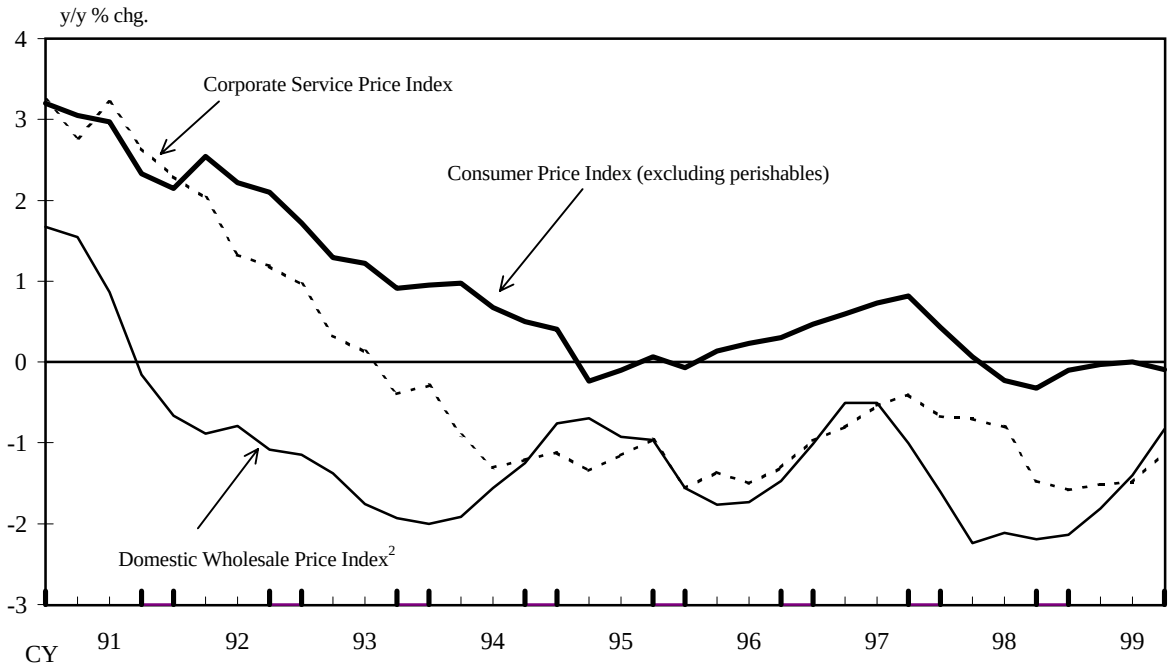
(1) Money Stock and GDP

(2) Velocity (Nominal GDP / M2)

Source: Bank of Korea, "Monthly Bulletin."

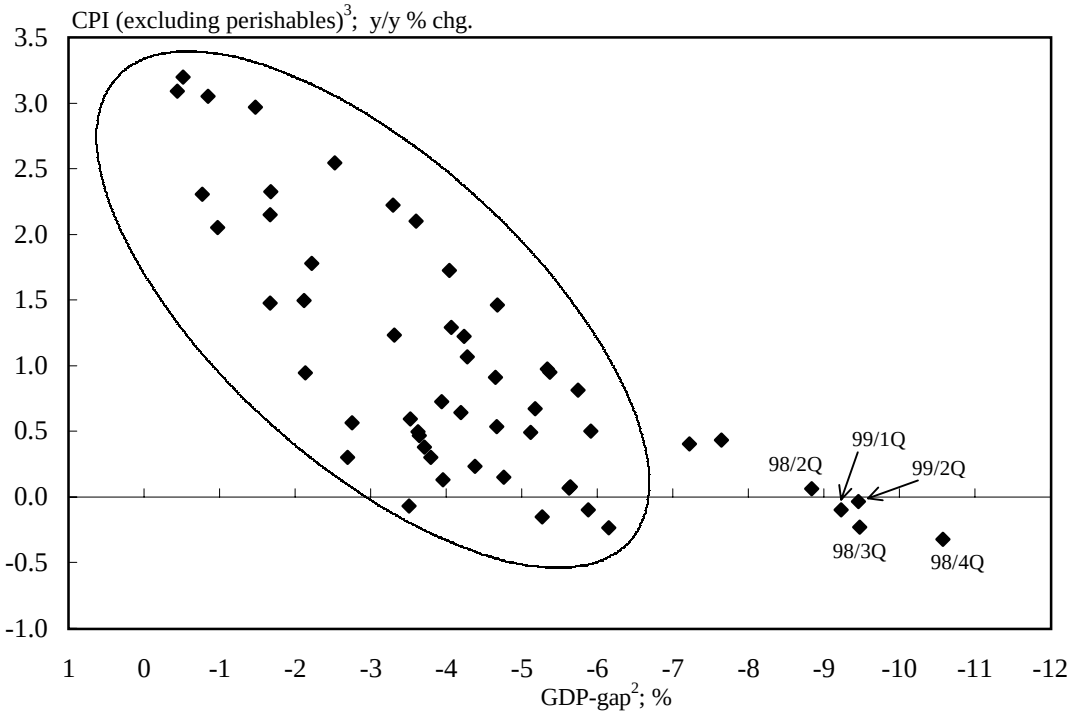
Prices

(1) CPI, WPI, CSPI



Notes: 1.Adjusted to exclude the effects of the consumption tax hike in April 1997.
2.Figures for 1999/4Q are as of October.

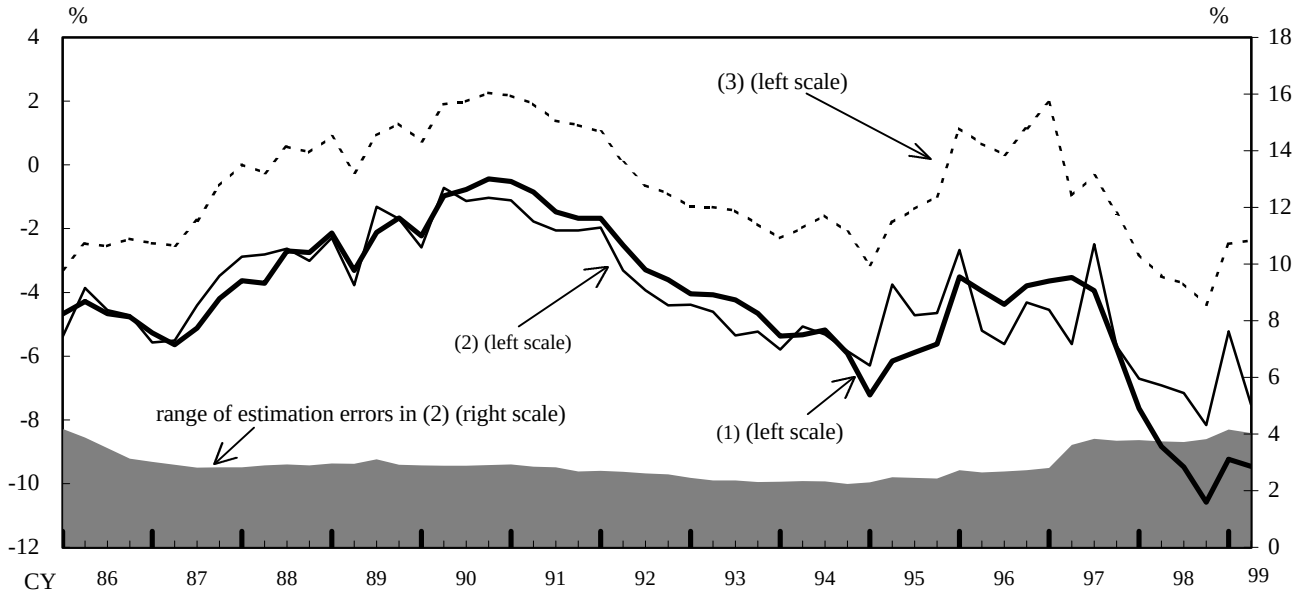
(2) CPI and GDP-gap



Notes: 1.Data: 1986/1Q-1999/2Q
2.Estimated assuming linear trends for technological innovation (see Chart 16 for further detail).
3.Adjusted to exclude the effects of the consumption tax.

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

GDP Gap



Estimation methods

A. Approach of measuring potential supply capacity of Japan's economy by using production function

(1) GDP gap estimated assuming linear trends for technological innovation ("traditional method")

[Concept] To calculate potential GDP on the assumption that Total Factor Productivity (TFP) follows linear trends when we divide Solow residuals of the production function into TFP and errors.

[Estimation] Estimate the following formula on the assumption that TFP follows the linear trend, adding "trend in bubble economy" (85/1Q-91/4Q).

$$\log(\text{Solow residuals}) = \underbrace{\text{constant} + a_1 * \text{linear trend} + a_2 * \text{trend in bubble economy}}_{\log(\text{TFP})} + \text{errors}$$

(2) GDP gap estimated assuming the stochastic trend for technological innovation

[Concept] To calculate potential GDP on the assumption that TFP follows the stochastic trend when we divide Solow residuals of the production function into TFP and errors.

[Estimation] Estimate the following formula on the assumption that TFP follows the stochastic trend.

$$\log(\text{Solow residuals}) = \underbrace{\text{stochastic trend}}_{\log(\text{TFP})} + \text{errors}$$

B. Approach of measuring potential supply capacity of Japan's economy only from observable data

(3) GDP gap estimated using the method of time-series analysis

[Concept] Assuming the stable relationship among potential GDP, actual GDP, and inflation rate, calculate potential GDP from actual GDP and inflation rate which are observable.

[Estimation] Estimate the following state space model with Kalman filter.

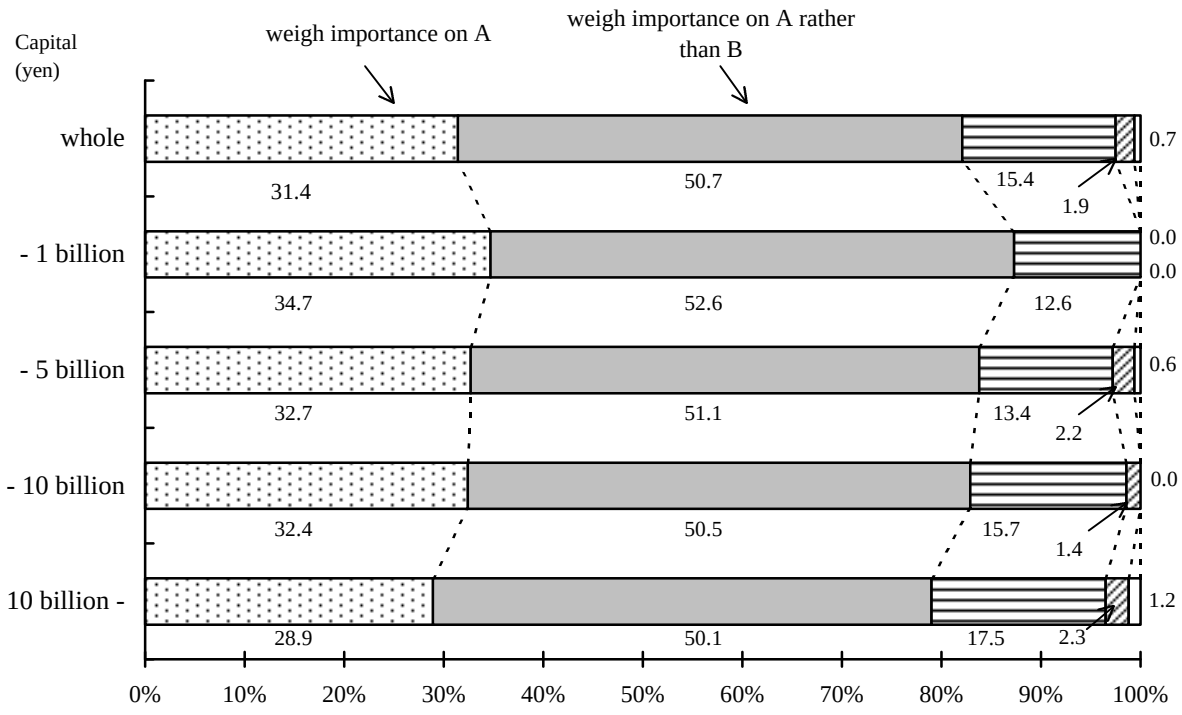
$$\text{inflation rate} = \gamma * \text{inflation rate}(-1) + \theta * \text{GDP gap} + \sigma * \text{import price (year-to-year changes)} + \text{errors}$$

Here, we can observe inflation rate, actual GDP, and import price, while we cannot observe potential GDP and GDP gap.

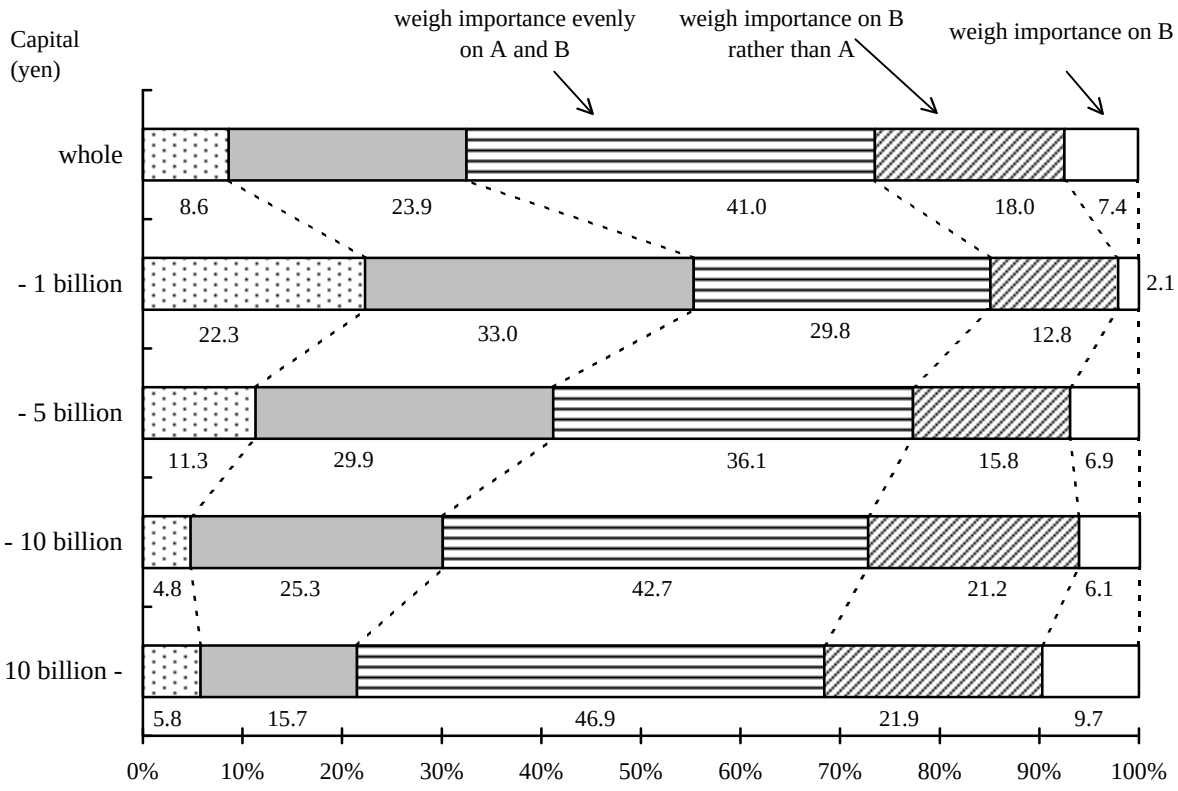
Japanese Corporate Financial Strategy

A: The size of sales and returns, B: Rate of returns on capital

(1) Current

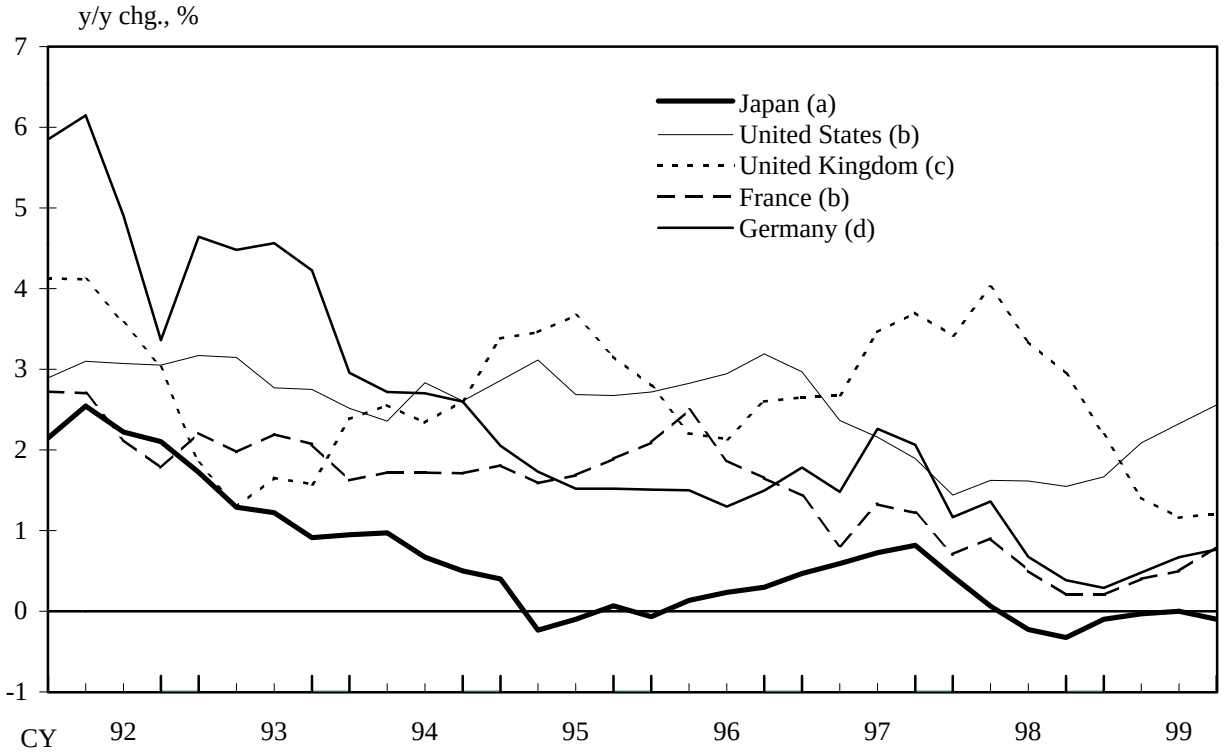


(2) Future



Source: Economic Planning Agency, "Report on the Survey of Private Enterprises' Activities (1999)."

International Comparison of Prices



Notes: 1. (a) Consumer Price Index excluding perishables (adjusted to exclude the effects of the consumption tax hike in April 1997 on the assumption that prices of all taxable goods fully reflect the rise of tax rate)
(b) Consumer Price Index
(c) Retail Price Index
(d) Cost of Living Index
2. Data for 99/4Q are those of October 1999.